

Invitation to Bid

Project: Sludge Press Replacement - Phase 1

Release: June 7, 2022

Last day for Questions: June 20, 2022 by 5:00 PM

Bids Due Date: June 28, 2022, no later than 12:00 PM

Kenai City Hall

210 Fidalgo Avenue

Kenai, AK 99611

ATTN: Director of Public Works



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ADVERTISEMENT FOR BID





Construction: Sludge Press Replacement – Phase 1 Last Day for Questions: June 20, 2022 by 5:00 PM Bid Due Date and Time: June 28, 2022 by 12:00 PM

Scope of Work: Installation of an owner furnished sludge dewatering screw press, installation of screw press equipment support, access platforms, process piping, digested sludge pumps, polymer system, washwater booster pump system, screw conveyor, building ventilation upgrades, and building structural rehabilitation at the City of Kenai Wastewater Treatment Facility (WWTF).

Bidders should contact the Public Works Department at (907) 283-8236 to be placed on the plans holders list. Questions may be submitted to publicworks@kenai.city.

A pre-bid conference will be held at 11:00 AM local time on June 16, 2022 at Kenai City Hall with a site visit to follow. Meeting information will only be provided to those on the current plan holder's list.

Bids must be delivered in a sealed envelope clearly marked with the project name to the Public Works Department at the address above. Bid documents can be obtained on City of Kenai website at www.kenai.city or at City Hall for a non-refundable fee of \$60.00 including sales tax for each set of documents.

Publish: <u>Anchorage Daily News</u> – June 7, 2022

Peninsula Clarion – June 7, 2022

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INSTRUCTIONS TO BIDDERS



CITY OF KENAI INSTRUCTIONS TO BIDDER

1. GENERAL

These instructions specify the form and procedures for the submission of a complete and acceptable bid. To obtain addenda in a timely manner, you should be on the City of Kenai's plan holder's list. Downloading project specifications and drawings from the City website or other online plans rooms does not place you on the City's plan holder's list. To be added to the plan holder's list, please contact the Public Works Department Administrative Assistant by phone (907) 283-8236 or by email at publicworks@kenai.city.

Project Name: Sludge Press Replacement Project – Phase 1

Last Day for Questions: June 20, 2022 by 5PM Bid Due Date and Time: June 28, 2022 by 12PM

2. EVIDENCE OF QUALIFICATIONS

Upon request of the City, a Bidder whose bid is under consideration for the award of the Agreement, shall submit promptly to the City, satisfactory evidence of the Bidder's financial resources, their experience, their performance in completing other projects of a similar nature, and the organization and equipment they have available for the performance of the Agreement.

3. BIDDER QUALIFICATIONS

Before the bid is considered for award, the City reserves the right to determine whether or not a Bidder is responsible and to require the Bidder to complete a Bidder Qualification Form and/or provide a current financial statement prepared by a Certified Public Accountant. The City shall determine whether a Bidder is responsible on the basis of the following criteria:

- The skill and experience demonstrated by the Bidder in performing Agreements of a similar nature.
- The Bidder's record for honesty and integrity.
- The Bidder's capacity to perform in terms of facilities, personnel, and financing.
- The Bidder's past performance under City Agreements. If the Bidder has failed in any material way to perform its obligations under any Agreement with the City, the Bidder may be determined as a non-responsible Bidder.
- A Bidder's representations concerning their qualifications will be construed as a covenant under the Agreement. Should it appear that the Bidder has made a material misrepresentation, the City shall have the right to terminate the Agreement for the Contractor's breach, and the City may then pursue such remedies as provided in the Agreement Documents or as provided by state statute, City code, or as appropriate.

Any final determination that a Bidder is non-responsible will be made by the City Manager. Such determination will be made in writing to the Bidder setting forth the reasons for such determination.

4. CONDITIONS AFFECTING THE WORK

The City assumes no responsibility for any understanding or representations concerning conditions made by any of its officers, agents, or employees prior to the execution of this Agreement, unless such understanding or representations are expressly stated in the bid documents or Addenda.

The Bidder shall include in their bid, sufficient sums to cover all items required by the Agreement and the conditions of the site(s), and shall rely entirely upon their own examination in making their bid. The submission of a bid shall be taken as prima facie evidence of compliance with this paragraph.

If information or documentation required for submitting an accurate and complete bid is absent from these documents, the Bidder is required to notify the Public Works Director by facsimile (907) 283-3014, or by e-mail to publicworks@kenai.city.

5. SECURITY TO BE FURNISHED BY BIDDER

If the bid exceeds \$100,000, a certified check, bank cashier's check, or bid bond, made payable to the City of Kenai amount equal to five (5%) percent of the total bid, shall accompany each bid as evidence of good faith, a guarantee that if awarded the agreement, the Bidder will execute the agreement and give bond as required. All Bidder's checks or bid bonds will be retained until the successful Bidder has entered into a satisfactory agreement and furnished bonds, as required. The successful Bidder shall furnish the City a Performance and Payment bond in the full amount of the Agreement and shall maintain the Bond in force during the continuance of the Agreement. The bonds must be furnished prior to the City's execution of the Agreement. The Bond shall be for the faithful performance of the Agreement in all respects including, but not limited to, payments for all materials and labor. All alterations, extensions of time, additional work, and other changes authorized by the Agreement Documents may be made without securing the consent of the Surety or Sureties. Power-of-Attorney for the person signing the Bond for the Surety must be submitted with the Bond. These bonds, in whatever amount required by the specific agreement, shall be administered and deemed governed by the provisions of Alaska Statutes Title 36, Chapter 25, and shall comply with all requirements for payment and submission of claims as provided by that chapter.

6. LICENSING

Alaska State Statutes requires that all businesses wishing to engage in business in Alaska obtain license(s). All Bidders are required to furnish with their bid, the applicable, current licenses required to perform the work. Applicable licenses may include the following: Contractor's License, Specialty Contractor License, and Alaska Business License. Failure to submit license(s) with the bid may result in rejection of the Contractor's bid.

7. TAX COMPLIANCE CERTIFICATE

No agreement will be awarded to any individual or entity that is in violation of the tax laws of the City of Kenai or the Kenai Peninsula Borough unless the violation is cured within ten business days of notice. The Tax Compliance Certificate must be signed by the Bidder only and submitted with the bid. The City will obtain verification of tax compliance from the Kenai Peninsula Borough for the successful bidder. Bids submitted without a completed Tax Compliance Certificate may be considered non-responsive.

8. INTERPRETATION OR CORRECTIONS OF BID DOCUMENTS

Bidders shall notify the Public Works Director promptly of any error, omission, or inconsistency that may be discovered during examination of the bid documents and the proposed work site(s). Requests from Bidders for interpretation or clarification of the bid documents shall be made in writing to the Public Works Director and shall arrive no later than the time and date specified in Section 1 of these Instructions to Bidders. Questions may be faxed to (907) 283-3014 or emailed to publicworks@kenai.city. The subject line of the email or fax must include the name of the project.

Oral questions may be presented at a pre-bid conference if one is provided for in Section 1 of these Instructions to Bidders. Interpretations, corrections, or changes, if any, to the bid documents shall be made by Addendum. Bidders shall not rely upon interpretations, corrections, and changes made in any other manner, including orally, at the pre-bid conference. Interpretations, corrections, and changes shall not be binding unless included in an Addendum. All Addenda issued during the time of bidding shall become part of the Agreement Documents. Questions or requests for clarifications shall be directed to the Public Works Director. Only written interpretations or corrections by Addendum shall be binding, and no other forms of interpretation or correction will be binding on the City of Kenai.

It is the Bidder's sole responsibility to ascertain that they have received all Addenda issued by the City of Kenai. Addenda will be issued electronically and/or by facsimile. All Addenda must be acknowledged in the space provided on the Bid Form. If no Addenda have been issued, write or type "zero" or "N/A" on the Bid Form in the space provided.

9. PREPARATION AND SUBMISSION OF BIDS

- Bids must be received at City Hall prior to the time and date specified in Section 1 of these Instructions to Bidders.
- Bids must be submitted on the Bid Form furnished. Bids must be completed in ink or by typewriter, and must be manually signed by an authorized person. If erasures or other changes appear on the forms, the person signing the bid must initial each erasure or change in ink.
- Bids shall specify a unit or lump sum price, typed or written in ink in figures, for each bid item called for. In case of error in the extension of prices, the unit price will govern. Bids may be rejected if they show any omissions, alteration of the forms, additions not called for, conditional or alternate bids not called for, qualified bids, or irregularities of any kind.
- It is expressly agreed that the quantities shown in the Bid Form, whether for a "Unit Price Bid" or in connection with a "Lump Sum Bid" on the Bid Form are approximate only for use as a basis for comparison of bids and are not to be taken to be either representations or warranties. The City does not expressly, nor by implication, agree that the actual amount of work will correspond therewith.
- The Bid Form invites bids on definite plans and specifications. Only the amounts and information asked for on the Bid Form will be considered as the bid. Each Bidder shall bid upon the work exactly as specified and as requested on the Bid Form, and Bidders shall bid upon all alternates as indicated. When bidding on an alternate for which there is no charge, Bidder shall write the words "No Charge" in the space provided.

- One (1) complete bid package shall be completely sealed in an envelope clearly marked with the Bidder's company name, and the "Project Name" and "Bid Due Date" specified in Section 1 of these Instructions to Bidders. A complete bid package shall include the following documents:
 - o Bid Form
 - o Tax Compliance Certificate
 - Applicable Licenses
 - Non-Collusion Affidavit
- Bids received without all the required documents may be considered non-responsive.
 Bids received after the bid due date and time will be considered non-responsive and will not be accepted.
- No responsibility shall be attached to the City for the premature opening of, or the failure to open a bid not properly addressed and identified.
- Please note that overnight delivery from the Lower 48 States is generally not available.
 Prospective Bidders should anticipate a minimum of two to three days delivery time for express, priority or expedited delivery services.

10. MODIFICATION OF BIDS

Bid modifications will be accepted by the City at publicworks@kenai.city and binding upon the Bidder where the modification:

- is received at City Hall prior to the time and date specified in Section 1 of these Instructions to Bidders.
- does <u>not</u> identify the adjusted Bid Total price. Only adjustments to the sealed bid will be accepted. For example:
 - CORRECT Decrease the Unit Bid Price of Item 20.22 Leveling Course by \$2.50 per ton and the Bid Total by \$2,500.
 - o CORRECT Increase the Unit Bid Price of Item 90.16 Mobilization and Demobilization and the Bid Total by \$5,000.
 - o INCORRECT Decrease the Bid Total by \$5,000 for a new Total of \$95,000.
- is signed by the same individual who signed the original bid.

Should there be more than one bid modification from a Bidder, only the last modification received prior to the deadline shall be applied to the bid. All earlier modifications shall be disregarded.

Any modification which fails to meet any requirement of this section shall be rejected, and the bid shall be considered as if no modification had been attempted.

It is the Bidder's responsibility to confirm the City's receipt of any bid modification.

11. WITHDRAWAL OF BID

At any time prior to scheduled closing time for receipt of bids, any Bidder may withdraw their bid, either personally or by written request.

After the scheduled closing time for receipt of bids, no Bidder will be permitted to withdraw their bid unless Notice of Award is delayed for a period exceeding forty-five (45) days.

A bid may not be withdrawn after opening without the written consent of the City.

12. ACCEPTANCE – REJECTION OF BIDS

The City reserves the right to reject any or all bids, to waive minor irregularities in any bids or in the bidding procedure, and to accept any bid presented which meets or exceeds said specifications and which is deemed to be in the best interest of the City. However, the requirements for timeliness and manual signatures shall not be waived. The City is not obligated to accept the lowest bid and is not responsible for bid preparation costs. AIP Grant requirements do require acceptance of the lowest bid, if the City chooses to move forward with the Project as Bid.

13. EXECUTION OF AGREEMENTS

The successful Bidder shall be required to execute an Agreement for the work within ten (10) days after receiving the Notice of Award and Agreement documents from City; if Contractor does not return executed copies within this time, then, at the option of City, the bid may be rejected.

14. AWARD OF AGREEMENT

It is the intent of the City to award the bid to the lowest, qualified, responsive and responsible Bidder. Unless otherwise stated in the bid documents, the Agreement, if awarded, shall be awarded to the responsible Bidder who submits the lowest responsive bid. When bid documents contain a base bid and alternates, only the total of the base bid and the alternates to be awarded shall be used to determine the low Bidder.

The amount of the Agreement shall be the total sum of the amounts computed from the estimated quantities and unit prices and/or the lump sum awarded by the City and specified in the Agreement.

On all bids, Notice of Award or rejection will be given within forty-five (45) days of bid opening. The notice will be in writing and signed by the Public Works Director. A Notice of Intent to Award, and no other act of the City of Kenai or its representatives, constitutes an acceptance of a bid. The acceptance of a bid shall bind the successful Bidder to execute the Agreement.

15. AGREEMENT AND PERFORMANCE AND PAYMENT BOND SIGNATURE INSTRUCTIONS WHEN BONDS ARE REQUIRED

The successful Bidder shall insert the full name and business of the Contractor in the Agreement and on the Performance and Payment Bond, hereinafter the Bond.

If the Contractor is a partnership or joint venture, all partners or joint ventures shall sign the Agreement and the Bond except that one partner or one joint venturer may sign for the partnership or joint venture when all other partners or joint venturers have executed a Power-of-Attorney authorizing one partner or joint venturer to sign. The Power-of-Attorney shall accompany the executed Agreement and the Bond.

If the Contractor is a Limited Liability Company (LLC), a person with appropriate authority to bind the LLC shall execute the Agreement and Bond unless a Power-of-Attorney or Corporate Resolution accompanies the executed Agreement and Bond.

If the Contractor is a corporation, the President or Vice-President and Secretary or Treasurer of the corporation shall execute the Agreement and the Bond unless a Power-of-Attorney or Corporate Resolution accompanies the executed Agreement and Bond.

The Bond shall be returned undated as to Agreement Date. The Agreement Date shall be inserted on the Agreement when the City signs the Agreement and the Bond shall be dated the same as the Agreement Date.

16. SPECIAL PROVISIONS

If funded in part or in whole by a grant or grants, the contractor and their subcontractors will be required to comply with the requirements of these grants, including insurance and purchasing requirements, if any. If any permits are included with the bid documents, e.g. a U.S Corp of Engineers wetland permit, all conditions of this permit must be met by the Contractor and their Subcontractors.

17. APPEAL PROCEDURE

KMC 7.15.120 Appeal procedures.

- (a) Any party submitting a bid or proposal for a contract with the City and who believes that they are adversely affected by the City's relevant ordinances, regulations, procurement process, or by any acts of the City in connection with the award of a City contract, may file a protest appeal with the City Clerk. All protest appeals must be to the City within five (5) calendar days of the issuance of the City's notice of its intent to award the contract. The appeal must be hand delivered, delivered by mail, or by facsimile and must comply with all requirements of this section. If the fifth day is a City-recognized holiday or a weekend, the deadline for appeal shall be the next work day. It is up to the protester to choose a method of delivery to assure timely receipt by the City.
- (b) Rejection of Appeal. The Clerk shall reject an untimely or incomplete appeals. Such rejection shall be final and may be appealed to the Superior Court pursuant to the Court Rules of Appellate Procedure.
- (c) The protest appeal must be in writing and shall include the following information:
- (1) The name, address, e-mail, and telephone (and facsimile if available) numbers of the protester;
- (2) The signature of the protester or the protester's representative;
- (3) Identification of the contracting agency and the solicitation or contract at issue;
- (4) A statement of the legal and factual grounds of the protest, including copies of relevant documents; and
- (5) The form of relief requested.
- (d) Stay of Award. If a timely and complete protest appeal is filed, the award of the contract shall be stayed until all administrative remedies have been exhausted, unless the City Manager determines in writing that award of the contract pending resolution of the appeal is in the best interests of the City.
- (e) Notice and Response. Notice of the stay and protest appeal shall be delivered to any party who may be adversely affected by the City Manager's decision by facsimile, first class mail or in person within three (3) business days of receipt of a properly filed appeal.
- (f) City Manager Decision. The City Manager shall issue a written decision to the appellant within ten (10) business days of the date the appeal is filed. If multiple appeals have been filed, they may be consolidated for purposes of the decision. Copies of the appeal and decision shall be

provided to any interested party requesting one. The decision may include any lawful action, including without limitation an amendment of all or any part of the recommended award. For good cause shown, the City Manager may extend the date for the decision for such additional period as may be necessary.

- (g) If the City Manager sustains a protest in whole or in part, the City Manager shall implement an appropriate remedy. In determining an appropriate remedy, the City Manager shall consider the circumstances surrounding the solicitation or procurement including the seriousness of the procurement deficiencies, the degree of prejudice to other interested parties or to the integrity of the procurement system, the good faith of the parties, the extent the procurement has been accomplished, costs to the agency and other impacts on the agency of a proposed remedy, and the urgency of the procurement to the welfare of the City.
- (h) Notwithstanding subsections (a) and (b) immediately above, if the City Manager sustains a bid protest appeal in whole or part, the protester's damages shall not exceed the reasonable bid or proposal preparation costs.
- (i) Appeal to Superior Court. Appeals may be taken from the written decision of the City Manager within thirty (30) days of the date of the decision pursuant to Part VI of the Alaska Rules of Appellate Procedure.

(Ord. 2852-2015)

18. COMPLIANCE OR ACCEPTED ALTERNATES TO SPECIFICATIONS

Bidder hereby agrees that the material offered will meet all the requirements of the specifications in this solicitation unless alternates have been deemed acceptable by the City. Manufacturer's names, trade names, brand names, model and catalog numbers used in these specifications are for the purpose of describing and establishing general quality levels. Such references are not intended to be restrictive. Alternates will be approved via addenda, and only via addenda. Request for alternates must be submitted no later than the Last Day for Questions in the Advertisement for Bid. An alternate must be requested via email sent to the addresses in section 1 with an explanation giving in detail the extent of the alternate, the reason for which it is requested, and why the City should approve the alternate. Provide as much detail as possible. If multiple models or options are provided with your submittal data clearly indicate which you are requesting. The City of Kenai will be the sole judge of whether an alternative is acceptable to the items specified.



BID FORM



CITY OF KENAI BID FORM

TO: CITY OF KENAI
Public Works Dena

Public Works Department 210 Fidalgo Avenue Kenai, Alaska 99611-7794

From:

Name of bidder's Company or Business Entity

BIDDER'S DECLARATION & UNDERSTANDING

The undersigned, hereinafter called the Bidder, declares that the Bidder has carefully examined the Addenda, Specifications and Drawings, Agreement, General Conditions, and Instructions to Bidders (hereinafter called "Bid Documents"), and the location(s) where work is to be performed for the project, and that the Bidder has satisfied themselves as to the quantity and condition of work involved.

It is expressly agreed that the quantities shown in the Bid Form, whether for a "Unit Price Bid" or in connection with a "Lump Sum Bid" on the Bid Form are approximate only for use as a basis for comparison of Bids and are not to be taken to be either representations or warranties. The City does not expressly, nor by implication, agree that the actual amount of work will correspond therewith.

The Bidder further declares that the only person or parties interested in the Bid are those named herein, that this Bid is, in all respects, fair and without fraud, that it is made without collusion with any official of the City of Kenai, and that the Bid is made without any connection or collusion with any person submitting another Bid.

The Bidder agrees not to withdraw this bid within forty-five (45) days after the actual date of the bid opening.

DOCUMENTS TO SUBMIT WITH THIS BID

- 1. Bid Form (3 Pages)
- 2. Tax Compliance Certificate
- 3. Applicable Licenses
- 4. Non-Collusion Affidavit
- 5. Bid Bond with Power-of-Attorney (If Bid exceeds \$100,000.00)

DOCUMENTS THE CITY OF KENAI IS TO RECEIVE WITHIN 10 DAYS AFTER NOTICE OF AWARD

The Bidder agrees that if this Bid is accepted he will deliver to the City of Kenai, within ten (10) calendar days of Notice of Award, the following:

- 1. Executed Agreement
- 2. Certificate(s) of Insurances*
- 3. Construction Schedule
- 4. List of Subcontracotrs
- 5. Performance and Payment Bond
- 6. Power of Attorney and/or Corporate Resolution (See Instructions to Bidders)

*The City shall be named as an additional insured on General Liability and Automobile Liability insurances with respect to the performance or failure to perform under this Agreement.

TIME OF COMPLETION AND LIQUIDATED DAMAGES

Bidder agrees to commence and complete work as follows:

SLUDGE PRESS REPLACEMENT – PHASE 1

All work, including administrative submittals must be 100% complete on or before March 15, 2023.

TIME OF COMMENCEMENT AND COMPLETION: Work shall commence upon receipt of the Notice to Proceed (NTP). A Notice of Award (NOA) is anticipated on July 7 but may not be issued until as late as August 4, 2022. The contractor has ten days after NOA to provide the required paperwork per the bid documents. The NTP will be issued within 5 business days after receipt of contractor's paperwork. All work must be substantially completed on or before February 28, 2023. Liquidated damages will be charged against the Contractor as provided below.

LIQUIDATED DAMAGES. Liquidated damages will be charged as provided for in the Agreement Documents in the amount of Five Hundred Dollars (\$500.00) for each calendar day.

BID TABULATION AND SUMMARY

Bidder agrees to perform all of the work described and per the conditions in the Bid Documents for the prices stated on this Bid Form.

Prices are to be shown in both words and figures. In case of discrepancy, the amount shown in words will govern. In case of error in the extension of prices, the unit price will govern. Bidder understands that the City reserves the right to reject any or all bids and to waive irregularities in the bidding.

BID GUARANTEE: The Undersigned further agrees that the check or bid bond accompanying the bid is left in escrow with the City, that the amount of the check or bond is the measure of damages which the City will sustain by failure of the Undersigned to deliver said documents within ten (10) days after written notice of the award of contract to him or her, and that check shall become the property of the City, or the bid bond shall remain in full effect, should he or she so fail. But if this bid is not accepted within forty-five (45) days of the date set for the opening thereof, or if accepted and the Undersigned delivers said Agreement, and performance, and labor, and material payment bonds as required, the check shall be returned to him or her and the bid bond shall become void.

EXECUTION OF BID

Bidder shall complete and submit all pages of the Bid Form.

I have received the Bid Documents for the Project: **SLUDGE PRESS REPLACEMENT – PHASE 1**I have received Addenda No(s) _____ and have included there provisions in my proposal.

I have examined both the Bid Documents and the work locations, and submit the following bid with the understanding that I agree:

- 1. To hold my bid open forty-five (45) consecutive calendar days.
- 2. To accept the provisions of the Bid Documents.
- 3. To enter into and execute an Agreement, if awarded, on the basis of my Bid.
- 4. To furnish all labor and materials and to accomplish the work in accordance with the Bid Documents.
- 5. To complete the project as specified above in TIME OF COMPLETION.

BASE BID – SLUDGE PRESS REPLACEMENT – PHASE 1: (All work as required in Schedule A in accordance with Specifications and Drawings)

Item Number	Pay Item Description	Unit	Estimated Quantity	Unit Bid Price (Figures only)	Amount Bid (Figures only)
	Sludge Press				
	Replacement – Phase 1,	Lump			
A-1	Complete	Sum	1		
	System Integrator Per				
	Specification Section	Lump			
A-2	40 90 00	Sum	1	\$26,139.00	\$26,139.00

A-2	Specification Section 40 90 00	Lump Sum	1	\$26,139.00	\$26,139.00	
				<u>\$</u> (In fig	gures)	
\$					Dollars	
		(Ar	nount Writte	en in Words)		
is fully ex		Bidder agre	es to comm	ence work immediate	ent until the final Agreement ly upon full execution of the	
	If provided a Notice of Award, Bidder agrees to execute and perform the Agreement in accordance with the Bid Documents.					
By executing this Bid I certify that I have authority to bind the Company or Business Entity submitting this bid.						
Name of	Company or Business I	Entitiy	_	Date		
Signature	Э			Title		
Print Nar	me			Phone		
Address			_	Fax		

Email address

Address



KENAI PENINSULA BOROUGH TAX COMPLIANCE CERTIFICATION



Tax Compliance Certification Kenai Peninsula Borough Finance Department

144 N. Binkley Street

Phone: (907) 714-2197

Soldofna, Alaska 99669-/599 www.kpb.us		or: (907) 714-217 Fax: (907) 714-237	
1.) Fill in all information requested. 2	2.) Sign and date. 3.) Submit v	vith solicitation, or oth	er. For Official Use Only
Reason for Certificate:		For Department	:
☐ Solicitation ☐ Other:		Dept. Contact:	
Business Name:			·
Business Type:	☐ Individual ☐ Corpora	ıtion 🗌 Partnershi	p Other:
Owner Name(s):			
Business Mailing Address:			
Business Telephone:		Business Fax:	
Email:			
contracting to do business with th	la Borough Code of Ordinan ne Kenai Peninsula Borough b	nces, Chapter 5.28.14 be in compliance with	elow. If no, please sign below.) 0, requires that businesses/individuals 1 Borough tax provisions. No contract Borough Code of Ordinances in the
REAL/PERSONAL/BUSINESS PROF	PERTY ACCOUNTS	TAX ACCOUNTS	S/STATUS (TO BE COMPLETED BY KPB)
ACCT. NO.	ACCT. NAME	YEAR LAST PAID	BALANCE DUE
			In Commission of Makin Commission
KPB Finance Department (signature	required)	Date	In Compliance 🗌 Not in Compliance
SALES TAX ACCOU	NTS	TAX ACCOUNTS	/STATUS (TO BE COMPLETED BY KPB)
	ACCT. NAME	FILED THRU	M/F'S BALANCE DUE
			In Compliance 🔲 Not in Compliance
KPB Sales Tax Division (signature rec	ųuired)	Date	
CERTIFICATION: I,(Name o	the		, hereby certify that, to the
(Name o best of my knowledge, the above i		(Title) (Date)	

Signature of Applicant (Required)



NON-COLLUSION AFFIDAVIT



NON - COLLUSION AFFIDAVIT

(To be executed and submitted with Bid Proposal)
I,of, Firm Name
Firm Name
being duly sworn, do depose and state:
I, or the firm, association, or corporation of which I am a member, who bid on the Contract to be executed by the City of Kenai, for the construction of that certain construction project designated as:
Sludge Press Replacement – Phase 1
located at Kenai, Alaska in the State of Alaska, have not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding in connection with such Contract.
Signature
Name
Title
Date
ACKNOWLEDGMENT
STATE OF ALASKA)
)ss THIRD JUDICIAL DISTRICT)
The foregoing instrument was acknowledged before me this day of, 202, by
NOTARY PUBLIC for State of Alaska My Commission Expires:



REQUEST FOR CONSIDERATION AS LOCAL BIDDER



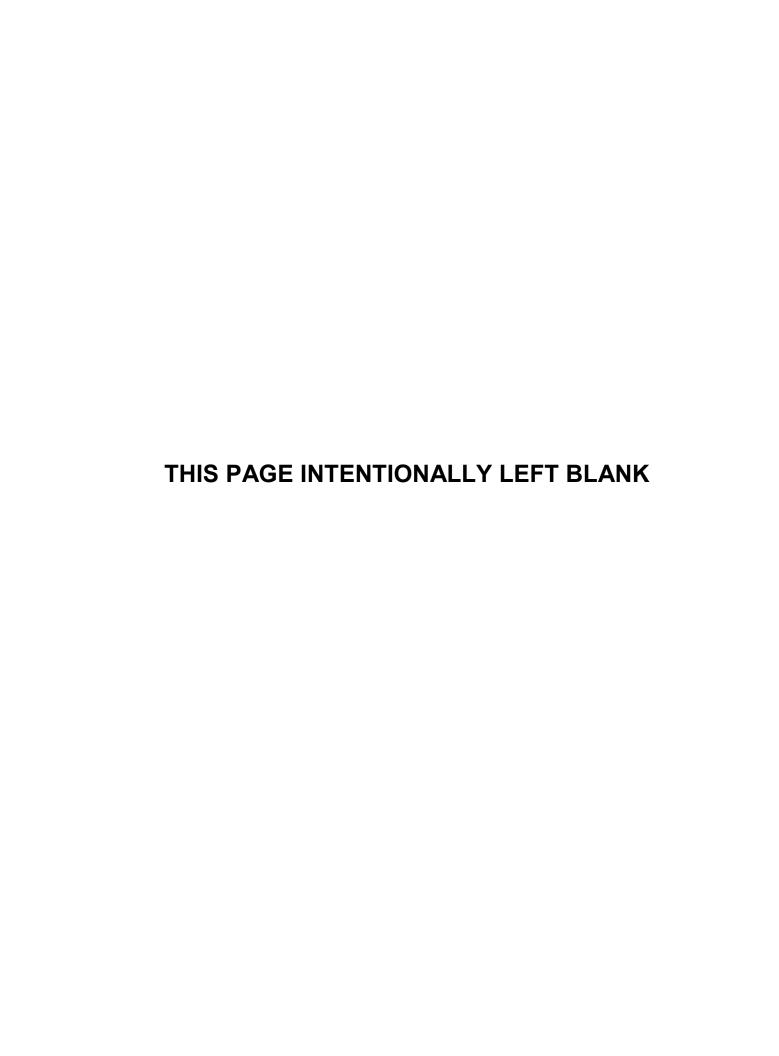
REQUEST FOR CONSIDERATION AS LOCAL BIDDER

		are that listed below and ore qualifies as "Local Bidder":				
LC	CA	L PREFERENCE				
1.	pre	awarding competitive bid purchases or construction contracts under KMC 7.15.045 eference may be given to an otherwise qualified "local bidder" unless such eference is prohibited by the funding source.				
2.	For purpose of this section, a "local bidder" is a person who:					
	a.	Holds a current state business license, and in addition for construction contracts holds a current, appropriate state contractor's registration certificate;				
	b.	Submits a bid for a competitive purchase or construction contract under the name as appearing on the person's license and, where applicable, a certificate;				
	C.	Has continuously maintained a physical place of business within the Kena Peninsula Borough staffed by the bidder or an employee of the bidder for a period of one hundred eighty (180) days immediately preceding the date of the bid opening. Bidder must prove compliance with this requirement to the City's satisfaction. Mere maintenance of a mail box or telephone answering service, for example, is not sufficient to comply with this provision; and				
	d.	If a joint venture, is composed entirely of venturers that qualify under this section.				
3.	ex tha ho pro	a award shall be made to the lowest responsible bidder pursuant to KMC 7.15.045 cept that a bid may be awarded to a local bidder if the local bidder's bid is not more an five percent higher than the lowest responsible non-local bidder's bid; provided wever, such preference shall never exceed twenty-five thousand dollars, and further by by the other provisions of KMC 7.15.045 of this chapter as applicable, have en met and the City chooses to award the bid.				
4.		The City may require a bidder to provide additional information regarding his qualifications as a "Local Bidder."				
	CC	DMPANY NAME PRINTED NAME				
	AD	DRESS SIGNATURE				
		DATE				

Local Bidder Rev 2013-03-04



BID BOND AND POWER OF ATTORNEY



BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned,		
as Principal, and		
as Surety, are hereby held and firmly bound unto		
as the OWNER, in the penal sum of for the payment of which, well and truly made, we hereby jointly and severally bind ourselves, successors and assigns.		
Signed this day of, 2022. The Principal has submitted to		
, a certain BID, attached hereto and hereby made a part		
hereof, to enter into a contract in writing for the		
(a) If said BID shall be rejected, or (b) If said BID shall be accepted and the principal shall execute and deliver a contract in the Form of Contract attached hereto (properly completed in accordance with said BID), and shall furnish a BOND for his faithful performance of said contract, and for the payment of all persons performing labor or furnishing materials in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said BID, then this obligation shall be void, otherwise the same shall remain in force and effect; it being expressly understood and agreed the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated. The Surety, for value received, hereby stipulates and agree that the obligations of said Surety and its BOND shall be in no way impaired or affected by any extension of the time within which the OWNER may accept such BID; and said Surety does hereby waive notice of any such extension. IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these		
presents to be signed by their proper officers, the day and year first set forth above. L.S.)		
Principal		
Surety		
By:		

IMPORTANT- - Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the project is located.

Bid Bond Rev 2013-03-04



AGREEMENT



CITY OF KENAI AGREEMENT BETWEEN OWNER AND CONTRACTOR

MADE AS OF THE DAY C	DF 202	
BETWEEN the OWNER:	CITY OF KENAI 210 Fidalgo Avenue Kenai, Alaska 99611-7794	
AND the CONTRACTOR:		
FOR the PROJECT: Sludge Press Replacement Project – Phase 1		
The Owner and Contractor agree as set forth below.		

DAVACE

ARTICLE 1 THE WORK

The Contractor shall perform all the work required by the contract documents.

ARTICLE 2 ENUMERATION OF THE CONTRACT DOCUMENTS

The additional documents which are specifically incorporated into this Agreement by reference and which form the contract documents are:

- A. Any and all later modifications, change orders, and written interpretations of the contract documents issued by the Owner
- B. This Agreement
- C. Addenda
- D. Supplemental General Conditions (if any)
- E. General Conditions
- F. Drawings and Specifications Provided by Engineer. In the case of an inconsistency between Drawings and Specifications or within either Document not clarified by addendum, the better quality or greater quantity of Work shall be provided.
- G. Drawings and Specifications in the latest edition of the Municipality of Anchorage Standard Specifications (M.A.S.S.) In the case of an inconsistency between Drawings and Specifications or within either Document not clarified by addendum, the better quality or greater quantity of Work shall be provided. Contractor is responsible for obtaining the latest edition of the M.A.S.S
- H. The Request for Proposals / Invitation to Bid
- I. The Contractor's bid/proposal.

Any other attachments to this Agreement do not form a part of the Agreement but are for reference or proof of compliance with the requirements of the Agreement, except where the provisions of this Agreement provide such attachments will be or are a part of the Agreement.

These form the contract and what is required by any of the documents shall be as binding as if required by all. The intention of the contract documents is to require the furnishing of all labor, material, equipment, and other items necessary for the proper execution and completion of the work and to prescribe the terms and conditions of the contract and payment, so as to include work and materials which may be necessary to produce the intended results.

M.A.S.S. is the Municipality of Anchorage Standard Specifications, and Divisions 20 through 80 are hereby incorporated into these Contract Documents. Division 10 is specifically excluded. The Contractor is responsible for checking www.muni.org/projectmgmt/publications.cfm to ensure they have the most current version. Specifications, drawings, and general provisions provided by the Owner (City of Kenai) or their Agents (Engineers, Architects, or others as appointed by the City) take precedence over the M.A.S.S.

ARTICLE 3 TIME OF COMMENCEMENT AND COMPLETION

Work shall commence upon receipt of the Notice to Proceed. All work must be substantially completed within ____ days after the date of the notice to proceed. Liquidated damages will be charged against the Contractor as provided below.

ARTICLE 4 CONTRACT SUM

The Owner shall pay the Contractor as provided in this contract the total sum price of \$______for the successful completion of the specified work.

ARTICLE 5 PROGRESS PAYMENT

Progress payments shall be made per the General Conditions.

ARTICLE 6 FINAL PAYMENT

Final payment shall be made per the General Conditions. The Contractor shall request the final inspection at least five (5) days in advance of the anticipated date of inspection. If all work has not been satisfactorily completed, the Contractor shall be liable for all costs incurred by the Owner in making such inspection.

ARTICLE 7

NOTICES

All legal notices relating to this contract, including changes of address, shall be mailed to the Owner and the Contractor at the following addresses:

OWNER
CITY OF KENAI
Public Works Director
210 Fidalgo Avenue
Kenai. AK 99611

CONTRACTOR

ARTICLE 8 INDEMNIFICATION

No provision in the contract documents lessens, alters, or makes inapplicable the requirement for indemnification stated in the General Conditions or other documents incorporated into the contract by this Agreement.

ARTICLE 9 JURISDICTION: CHOICE OF LAW

This contract shall be governed by the laws of the State of Alaska, and any lawsuit brought thereon shall be filed in the Third Judicial District at Kenai, Alaska.

ARTICLE 10 ATTACHMENTS

In the event there is any difference between an attachment to the original of this Agreement on file with the City of Kenai Public Works Department and any attachment to a copy of the Agreement, the attachments to the original filed with the Public Works Department shall control.

ARTICLE 11 LIQUIDATED DAMAGES

Owner and Contractor recognize that time is of the essence in performance of this contract and the Owner will suffer financial loss if the work is not substantially complete within the time specified above, plus any extensions thereof allowed in accordance with contract documents. They also recognize the delays, expense and difficulties involved in proving the actual loss suffered by Owner if the work is not substantially complete on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty) Contractor shall pay Owner Five Hundred Dollars (\$500.00) for each calendar day that expires after the contract time required for substantial completion to the actual date of substantial completion determined as set out in the Contract Documents. The Owner and Contractor agree that this amount is a reasonable forecast of just compensation for the harm that is caused by the delay.

ARTICLE 12 NO THIRD-PARTY BENEFICIARY

This Agreement is intended solely for the benefit of each party hereto. Nothing contained herein shall be construed or deemed to confer any benefit or right upon any third party.

OWNER and CONTRACTOR each binds themselves, their partners, successors, assigns and legal representatives in respect to all covenants, Agreements and obligations contained in the Contract Documents.

IN WITNESS WHEREOF, the parties have caused this Agreement to be executed in their respective names or by their duly authorized representatives as of the date and year above written.

OWNER:	CONTRACTOR:
CITY OF KENAI	
By:	By:
Name:	Name:
Title:	Title:
STATE OF ALASKA	STATE OF ALASKA
THIRD JUDICIAL DISTRICT))ss. THIRD JUDICIAL DISTRICT)
THIS IS TO CERTIFY that on this, 202_ Paul Ostrander, City Manager,	THIS IS TO CERTIFY that on this, 202_
City of Kenai, Alaska, being personally known to me or having produced satisfactory evidence of identification, appeared before me and acknowledged the voluntary and authorized execution of the foregoing instrument on behalf of said City.	(title), being personally known to me or having produced satisfactory evidence of identification, appeared before me and acknowledged the voluntary and authorized execution of the foregoing instrument on behalf of said corporation.
NOTARY PUBLIC FOR ALASKA My Commission Expires:	NOTARY PUBLIC FOR ALASKA My Commission Expires:
Approved by Legal: Approved by Finance:	

GENERAL CONDITIONS TO THE CONTRACT



GENERAL CONDITIONS OF THE CONTRACT BETWEEN OWNER AND CONTRACTOR

ARTICLE 1 CONTRACT DOCUMENTS

- 1.1 The contract documents enumerated in the Agreement between Owner and Contractor form the final and completely integrated contract between the parties and supersede any prior statements, negotiations, agreements, documents or representations, written or oral. What is required by any one contract document is deemed to be required by all documents.
- 1.2 The contract documents consist of documents designated as contract documents and enumerated in the Agreement between Owner and Contractor.
- 1.3 The contract documents do not include any documents unless specifically enumerated in Agreement between Owner and Contractor.
- Unless specifically provided otherwise in the contract documents the parties to this agreement intend that Contractor will obtain all permits, inspections, tests, bonds, and insurance required by state or federal law, rule, regulation or order, or local ordinance or rule or regulation or the contract documents, whichever requirement is greater, and provide all labor, equipment, transportation, water, heat, utilities, tools, scaffolding, materials, supplies, facilities, and services necessary for performance of the contract and that the cost of these requirements be included within the contract price. The parties further intend that the cost of all overhead, supervision, and other incidental expenses required or occasioned by the contract is included in the contract price. The parties also intend that minor items required to produce complete functional system(s) and sub-system(s) are deemed to be required by the contract documents at the contract price whether or not specifically expressed. The requirements stated in this provision apply whether or not the execution or completion of the work is temporary or permanent and whether or not it is incorporated or to be incorporated in the work or final product.
- 1.5 The requirements of the contract documents and the duties and rights of each party may be amended subsequent to execution of this contract only by:
 - 1. A written amendment to the contract signed by both parties; or,
 - A change order issued pursuant to ARTICLE 9.1
- 1.6 The term "Work" includes all procurement, labor, materials, products, equipment, erection, installation, and alterations necessary to complete the construction envisioned by this contract. The term "Project" refers to the overall construction, of which the work required by the contract may be the whole or may be a part. The term "Architect" also refers to Registered Engineers as appropriate.
- 1.7 The contract between Owner and Contractor shall be executed and returned by Contractor within the time required in the instructions to bidders. A written Notice to Proceed with the work will be issued to Contractor within five (5) days after Owner has executed the contract, except as provided in ARTICLE 4.1.3.
- 1.8 Should any provision or requirement of one portion of the contract documents conflict with any other portion of the contract documents, unless otherwise provided herein, the conflict will be resolved by reference to the contract documents in the following order of priority:
 - A. Any and all later modifications, Change Orders, and written interpretations of the Contract Documents issued by the Owner
 - B. The Agreement
 - C. Addenda
 - D. Supplemental General Conditions (if any)
 - E. General Conditions

¹ Unless otherwise stated, all references to an ARTICLE refer to the articles of these general conditions.

- F. Drawings and Specifications Provided by Engineer. In the case of an inconsistency between Drawings and Specifications or within either Document not clarified by addendum, the better quality or greater quantity of Work shall be provided.
- G. Drawings and Specifications in the latest edition of the Municipality of Anchorage Standard Specifications (M.A.S.S.) In the case of an inconsistency between Drawings and Specifications or within either Document not clarified by addendum, the better quality or greater quantity of Work shall be provided. Contractor is responsible for obtaining the latest edition of the M.A.S.S.
- H. The Request for Proposals / Invitation to Bid
- I. The contractor's bid/proposal.
- 1.9 In case of difference between small and large scale drawings, the large scale drawings shall govern. Schedules on any contract drawing shall take precedence over conflicting information on that or any other contract drawing. On any of the drawings where a portion of the work is detailed or drawn out and the remainder is shown in outline, the parts detailed or drawn out shall apply also to all other like portions of the work.
- 1.10 In the event Contractor believes a discrepancy exists in the contract documents, Contractor shall submit the issue to the Project Representative together with Contractor's proposed course of action for performance of the work. Project Representative shall respond within seven (7) working days or advise Contractor that a response cannot be given within that time. If response will take more than seven (7) working days, Project Representative shall take steps to provide a response within a reasonable time. Any action taken by Contractor prior to or without Owner's response shall be at Contractor's own risk and expense.
- 1.11 Words and abbreviations which are not defined in the contract documents, but which have well known technical or trade meanings, shall be construed in accordance with the common meaning established by sound architectural or engineering practice in the State of Alaska.
- 1.12 Drawings, Specifications, other documents prepared for this project, and copies of them that are furnished by Owner and/or Architect or Consultant for this project, whether or not the documents or project are completed, shall be the property of Owner. All rights of use are reserved to Owner for this project and any subsequent project in which Owner participates in construction. Owner specifically relieves Architect or Consultant of any responsibility or liability pertaining to any subsequent use of the documents, in whole or in part, where those documents bear the stamp of a subsequent Architect or Consultant and are used for a subsequent project.
- 1.13 An electronic version of contract documents, typically in pdf format on a disc, will be furnished to the Contractor without charge. Contractor shall check all documents furnished immediately upon receipt and shall promptly notify Owner of any discrepancies.
- 1.14 The contract documents shall not be construed in any way as limiting Contractor's responsibility to perform the work completely, nor shall any prior customs or trade practices be held to constitute a waiver of the requirements of the contract documents or any portion of them.
- 1.15 The individual(s) executing the contract represent that they have the legal authority to execute the contract as or on behalf of Contractor in accordance with the bid instructions and the contract documents.
- 1.16 Execution of the contract by Contractor is a representation that Contractor has visited the site, become familiar with the local conditions under which the work is to be performed, has correlated personal observations with the requirements of the contract documents and enters this contract with knowledge of those conditions.

ARTICLE 2 ADMINISTRATION OF THE CONTRACT

2.1 The term "Project Representative" shall mean a person or entity employed by or under contract to Owner to be Owner's on-site designated representative. The term Project Representative shall include the Project Representative's employees.

- 2.2 The terms "Architect" or "Engineer" (hereinafter used interchangeably) shall mean the person or entity contracted by the City of Kenai to provide design services for the project. Architect or Engineer also includes employees of the Architect or Engineer. Architect shall provide professional services during construction as described herein below or as authorized by Owner.
- 2.3 Project Representative will provide administration of this contract and all communication made to Owner, Architect or Engineer by Contractor shall be made through Project Representative.
- 2.4 Project Representative will be Owner's primary representative during construction until final payment has been made and the project has been closed out. Owner's instructions to Contractor shall be made through Project Representative, who shall have authority to act on behalf of Owner to the extent set forth in this contract.
- 2.5 Project Representative shall not have the authority to require additional work, changes in the work, modifications or waivers of the rights, work or duties required by the contract documents or the right to bind Owner to any change in specifications or drawings without the written consent of Owner except as provided herein.
- 2.6 Project Representative shall have authority to allow minor deviation in the requirements of the contract documents by Field Order to a maximum cumulative amount of \$5,000.00 per each additional work item, change in work, modification or waiver in the work. Field Orders are to be incorporated into a subsequent Change Order.
- 2.7 Project Representative will render interpretations of the contract documents necessary for the proper execution or progress of the project. All interpretations and decisions of Project Representative shall be consistent with the intent of the contract documents and shall be in writing.
- 2.8 Matters relating to design intent will be referred to the design Architect whose decisions will be final, consistent with the intent of the contract documents.
- 2.9 Project Representative, Architect, and authorized representatives of Owner shall have access to the project site and to the work at all times and shall be afforded every reasonable facility for ascertaining whether or not the work is in accordance with the requirements and intent of the contract documents.
- 2.10 All claims, disputes and other matters in question between Contractor and Owner relating to the execution or progress of the work shall be resolved pursuant to ARTICLE 12.
- 2.11 Project Representative shall have the authority: 1) to reject work which does not conform to the contract documents; 2) to require additional inspections or testing of any work during, prior to, or after fabrication, installation, or completion; 3) to specify both remedial work necessary to correct defective work and the time within which such work must be performed.
- 2.12 On the basis of on-site observations and inspections Project Representative will keep Owner informed of the progress of the work, and will endeavor to guard Owner against defects and deficiencies in the work. If Project Representative determines that any construction method, sequence, material, technique, safety precaution, act or omission of Contractor, Contractor's subcontractors, suppliers, or any of their agents, is detrimental to the progress, quality or safety of the work or to Owner's interest, then Project Representative shall inform Owner promptly, and Owner may, among other things, stop the work and order remedial measures. This provision shall not eliminate or reduce the responsibilities or requirements placed upon contractor and/or subcontractors by the contract documents and shall not place any liability upon the owner for action or omission in regard to this provision.
- 2.13 In accordance with the requirements of ARTICLE 8.5, Project Representative will determine amounts owing to Contractor and will recommend that Owner issue payment in the amount determined due.
- 2.14 Project Representative, with the concurrence of Owner, will determine the dates of Substantial Completion and Final Completion. The Architect will receive and forward to Owner for Owner's review, written warranties and related documents required by the contract and assembled by Contractor.

2.15 Project Representative's duties, responsibilities, and limitations of authority will not be modified without written consent of Owner and Project Representative.

ARTICLE 3 OWNER GENERAL RIGHTS AND DUTIES

- 3.1 At Owner's option, Owner may undertake any or all tasks of Project Representative described in ARTICLE 2.
- 3.2 Owner's directions to Contractor will be made in writing either directly or through Project Representative in accordance with ARTICLE 2. No verbal representation shall be binding upon any party unless confirmed in writing.
- 3.3 Owner shall have the right to perform work related to the project under separate contract(s) in accordance with the provisions of ARTICLE 6.
- Owner shall have the right to issue change orders from time to time which may alter the scope of work required by the contract documents. All change orders will be subject to provisions of ARTICLE 9.
- 3.5 Owner will have the authority to reject work which does not conform to the requirements of the contract documents and to require such remedial work at no charge to Owner as is necessary to correct the defective work. Where defective work is being performed by Contractor and Contractor fails to correct the defective work within a reasonable period of time as set out in ARTICLE 10, or repeatedly fails to carry out the work in accordance with the contract documents, Owner shall have the authority to order an immediate halt to all defective work. Any losses suffered by Contractor as a result of the halt shall be borne by Contractor without recourse to Owner. Issuance of a stop-work order shall not be construed as constituting a breach of the agreement nor authorize Contractor to refuse to perform other portions of the work which Owner has not halted.
- 3.6 Owner shall have the right to terminate the contract or suspend performance of the contract as set out in these general conditions or other contract documents.
- 3.7 Owner shall promptly pay Contractor all sums properly due as provided by ARTICLE 8. If Owner fails to issue payment for a period of forty-five (45) days after the certificate of payment has been approved by Project Representative, without a written statement indicating why payment is being withheld, then Contractor may terminate the contract upon seven (7) days written notice to Owner and may recover from Owner payment for all work executed and for any proven losses sustained upon any materials, equipment and tools, including a reasonable profit and overhead.
- 3.8 Owner and Contractor warrant that neither party will maintain an action against the other for punitive or exemplary damages.

ARTICLE 4 CONTRACTOR'S GENERAL RIGHTS AND DUTIES

4.1 EXAMINATION OF SITE AND CONTRACT DOCUMENTS

- 4.1.1 The term "Contractor" means the person or entity identified in the Agreement which has contracted with Owner to perform the work of the contract. This definition includes a responsible officer of Contractor's organization or its authorized representative who shall be made known to Owner.
- 4.1.2 Contractor represents by execution of the Agreement that Contractor has carefully examined the contract documents and the site upon which the work is to be performed and has developed familiarity with the nature, extent, site access, and risks involved in the work and with all local conditions and applicable statutes, ordinances and regulations that may affect the performance of the work. Contractor assumes full responsibility for having correlated Contractor's study of the contract documents and observation of the site. Contractor represents that Contractor has studied all available surveys and investigation reports of subsoil and latent physical conditions of the site and has made such additional surveys and investigations as Contractor deemed necessary for the performance of the work at the contract price, within the time specified and in accordance with the requirements of the contract documents.

- 4.1.3 Contractor shall not begin work until given a Notice to Proceed, which will be issued as promptly as possible after the Agreement has been executed by all parties. If Owner is required to delay issuance of a Notice to Proceed for more than five (5) working days because of fault of Contractor or other reasons which Owner deems sufficient, then Contractor shall be notified in writing of the delay and when issuance of the Notice to Proceed is anticipated.
- 4.1.4 Before commencing any part of the work, and prior to undertaking each subsequent phase of the work, Contractor shall carefully study the plans and specifications and check and verify all previous work and pertinent dimensions, figures and amounts shown in them and shall make all applicable field measurements. Contractor shall at once report in writing to Owner any apparent conflict, ambiguity, discrepancy, error or other omissions which Contractor may discover. Contractor shall be liable to Owner for failure to notify Owner of any conflict, ambiguity, discrepancy, error or other omissions which Contractor discovered, but failed to report to Owner and shall be responsible for providing a remedy.
- 4.1.5 Contractor shall lay out the work from established base lines and bench marks indicated on the drawings and shall be responsible for all measurements in connection therewith. Contractor will be held responsible for the execution of the work to such lines and grades. It shall be the responsibility of Contractor to maintain, preserve, or replace all stakes and other marks.
- 4.1.6 Drawings showing location of equipment, piping, etc., are diagrammatic and job conditions will not always permit installation in the location shown. If a situation occurs which may require relocation of an item or system which substantially differs from the location called for in the contract documents, it shall be brought to Owner's attention immediately and the relocation determined with the concurrence of Architect or Engineer. If Contractor relocates such items without approval, Contractor will be responsible for any cost or expense for removal or further relocation necessitated by installation without approval.

4.2 SUBMITTALS

- 4.2.1 Within 10 days after the effective date of the notice to proceed and prior to commencement of work, Contractor shall submit to Owner the construction progress schedule and schedule of values required in Articles 4.2.2, 4.2.3 and 4.2.4. The schedule of values and progress schedule must be acceptable to owner and provide reasonable divisions of contract work with corresponding payment. No payment will be made under this contract prior to completion of this requirement. In cases of a unit bid project, the bid schedule on the bid form will be the schedule of values.
- 4.2.2 In accordance with the requirements governing submittals as provided in the contract documents, Contractor shall prepare and submit to Owner a detailed progress schedule for the work which reveals and identifies the critical path of progress, which is consistent with the work and time required by the contract, and which shall provide for the most expeditious and practicable execution of the work. Float time between work items is part of the project and not property of the Contractor. Float time is defined as the amount of time that spans from completion of one previously scheduled activity and extends to the point at which the next scheduled activity is set to begin.
- 4.2.3 Contractor shall also provide Owner with a proposed schedule of values upon submittal of a detailed progress schedule for the work. The schedule of values shall be allocated to various portions of the work and be prepared in such a form and supported by such data to substantiate its accuracy as reasonably required by Owner. Each item of work shall include all applicable profit and overhead. This schedule of values, unless objected to by owner shall be the basis for progress payments made to Contractor and shall include specific lump sum amounts for "Final Payment." This line item shall be in conformance with guidelines specified in ARTICLE 8. Contractor, at the request of Owner, shall amend the progress schedule and the schedule of values as the work progresses.
- 4.2.4 The schedule of values must show a complete breakdown of all phases of the work required by the contract documents. Payment will be in accordance with ARTICLE 8. Pay requests, schedules of value and progress schedules must correspond.
- 4.2.5 Contractor shall submit for Architect's and Owner's approval all product data required by the contract documents in conformance with the dates specified in the detailed progress schedule. Such data include illustrations, standards, schedules, performance charts, instructions, brochures, diagrams, or other

- information necessary to assist Architect in determining whether a proposed product meets the intent of the contract documents.
- 4.2.6 Contractor shall also submit physical samples of materials, equipment or workmanship where required by the contract documents. After approval by Owner and Architect, the sample shall be established as the minimum standard of work, material, equipment or other quality which will be acceptable for work of which the sample is representative.
- 4.2.7 Submittal of shop drawings by contractor constitutes a representation by contractor that the submittal and work, or products required or to be used in accordance with that submittal, will meet or exceed the criteria and conditions of the contract documents and that performance of the work identified in those submittals will meet the progress schedule.
- 4.2.8 Before initiating any work for which shop drawings are required, Contractor shall obtain Architect's approval of the shop drawings, which include drawings, diagrams, schedules and other data specially prepared by Contractor, a subcontractor, a manufacturer, a supplier or distributor to illustrate in detail that portion of the work. Contractor shall review, approve, and submit all shop drawings, whether prepared by himself/herself or subcontractor or supplier. It shall be the duty of Contractor to provide a whole or complete system and to coordinate all work depicted by a particular shop drawing with the work required by other shop drawings for that portion of the work or for related or adjacent work.
- 4.2.9 Contractor shall provide a copy of all transmittal letters to Project Representative at the time the submittal is made to Architect. Architect will review Contractor's submittals only for conformance with the design concept of the work and the information given in the contract documents. Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component. Architect will return reviewed submittals to Contractor with written comments and forward one set to Project Representative with reasonable promptness so as to cause no delay. A minimum of five (5) sets of submittals shall be required.
- 4.2.10 Should Architect reject any proposed shop drawings, product data or sample, Contractor shall resubmit revised drawings, samples or product data and draw Architect's attention to any deviation or revisions other than those requested by Architect.
- 4.2.11 All of Contractor's submittals shall be made in conformance with the dates specified in the detailed progress schedule with reasonable promptness and in such sequence as to cause no delay in the work of Owner or any separate contractor.
- 4.2.12 The Contractor shall provide two (2) hard copies and an electronic .PDF file of the operation and maintenance manuals for equipment and systems incorporated in the work.

4.3 SAFETY AND CONTROL OF SITE

- 4.3.1 Contractor is deemed to be in physical control of the work site. Contractor shall confine Contractor's operations at the site to those areas described in the contract documents or permitted by applicable statutes, ordinances or permits.
- 4.3.2 Contractor shall not unreasonably encumber the site with materials, equipment or ancillary construction. Contractor shall be responsible for eliminating or minimizing to the extent reasonably possible, public hazards and inconveniences which might result from this work.
- 4.3.3 Contractor shall at all times keep the premises free from accumulation of excess snow, waste materials or rubbish and shall keep adjacent public road clear of mud and dust caused by Contractor's activities. At the completion of the work, Contractor shall remove all waste materials and rubbish from the project as well as Contractor's tools, equipment and surplus materials. The removal and disposal of waste materials, rubbish, or other material, shall be accomplished in accordance with all local, state and federal requirements.
- 4.3.4 Contractor shall be responsible for initiating, maintaining and supervising all necessary safety precautions in connection with this work and shall be responsible for ascertaining and adhering to all applicable federal, state, and local standards, laws, ordinances, regulations, requirements and any lawful order of any public authority bearing on the safety of persons or property or their protection from damage, injury, or loss.

- 4.3.5 Contractor's duty to maintain a safe and secure project site shall include all precautions necessary to assure the safety and protection against injury and damage, of all employees engaged in the work and any other person who may be affected by the work including Owner's agents and employees; Contractor's agents and employees; and members of the general public. Contractor shall assure the safety and protection of all work, materials and equipment which may be upon the site; utilities and other property of Owner including portions of structures and utilities not designated for removal or relocation, trees, shrubs, lawns, walks, pavements and roadways. Contractor duties include but are not limited to protection of project site from vandalism. Such precautions shall further include but not be limited to protection from dangers from hazardous materials.
- 4.3.6 Contractor shall take all necessary measures to prevent members of the general public from entering upon the site without the permission of Owner or Contractor.
- 4.3.7 Contractor shall comply with all OSHA requirements, give all safety notices, erect and maintain all reasonable safeguard notices and barriers, including danger signs and fences which may be required to protect the site and limit access to it.
- 4.3.8 In the event of an emergency, the Contractor will take all means necessary to minimize all damage to or exposure from effects of a catastrophic event. In such case, the Contractor may consult with Owner or seek Owner's assistance. The responsibility for protection of the site, work, and all material remains with the Contractor.
- 4.3.9 Contractor shall designate a person in Contractor's employ at the site to be primarily responsible for the prevention of accidents, identification of all applicable safety standards, statutes and regulations, including but not limited to those addressing hazardous material, and full compliance therewith. This person shall be Contractor's Superintendent unless otherwise designated by Contractor in writing to Owner.
- 4.3.10 Should Project Representative or other representative of Owner ascertain that a safety danger exists, Project Representative or Owner may order an immediate cessation of all dangerous activity and a correction of any safety hazard. Written notice of the order to stop work or to correct the safety hazard shall be made to Contractor as soon as practicable. Contractor shall have no recourse against Owner for any alleged losses or delays arising from this section unless the order to stop work or correct safety deficiency is wholly without basis.
- 4.3.11 Should Contractor elect to utilize explosives or other hazardous materials or equipment, or should Contractor be required to do so for the execution of the work, Contractor shall first give jurisdictional authorities and Owner notice of the intention to utilize hazardous materials, explosives or equipment at a particular time and date. Contractor shall use the utmost care in utilizing such materials and shall use only properly qualified and licensed personnel.
- 4.3.12 Contractor shall correct any damage to the property of Owner or other parties which arises out of the activities or omissions of Contractor, Contractor's agents, subcontractors, employees, personnel or suppliers. Contractor shall commence remedial activities within seven (7) days from the date of the damage. If Contractor fails to do so, Owner or the affected party may utilize his own forces to correct or replace the damaged property and Contractor shall promptly reimburse Owner or the affected party for all losses and costs thereupon. In the event Contractor fails to reimburse Owner as set forth herein, Owner may set off the amount due Owner from any amount due Contractor.

4.4 SUPERVISION AND QUALITY OF THE WORK

4.4.1 Contractor shall supervise and direct the work using the best skill and attention. Contractor is responsible for, and agrees to comply with all applicable local, state and federal ordinances, laws, regulations and statutes. Contractor shall be solely responsible for all construction means, methods, techniques, sequences and procedures, and for the schedule and coordination of all portions of the work to be performed under the contract. Contractor shall also be required to coordinate the work with that of any other contractor working on the project so as to minimize delay, inconvenience, and expense to both. Where identified in writing by Owner at any time, Contractor shall be required to coordinate the work with any partial use of the site that Owner deems necessary.

- 4.4.2 All materials and equipment shall be applied, installed, connected, erected, used, cleaned, prepared or conditioned in accordance with the instructions of the applicable manufacturer, fabricator or processor except as otherwise provided in the plans and specifications.
- 4.4.3 Contractor shall keep on the job site at all times during work progress, a competent resident superintendent capable of reading and thoroughly understanding the plans and specifications. The superintendent will be Contractor's representative at the site and all communications given to the superintendent shall be as binding as if given to Contractor directly. In the event Contractor decides to replace the superintendent, Contractor shall submit to Owner a written notice including the proposed new superintendent's qualifications. The superintendent shall not be replaced without this written notice and a statement of non-objection by the Owner.
- 4.4.4 Contractor shall provide sufficient, competent, and suitable qualified personnel to survey and lay out the work and to perform all construction required by the contract documents. Contractor is responsible for maintaining good discipline and order at the job site at all times and shall not employ any unfit person or anyone not skilled in the task assigned to that person.
- 4.4.5 Contractor shall be fully responsible to Owner for the acts and omissions of Contractor's employees and agents, Contractor's subcontractors and their employees and agents, and any other persons performing any of the work for the benefit of Contractor.
- 4.4.6 Contractor shall not permit the possession or use of alcohol or controlled substances on the site, and shall remove from the site any person who possesses, uses, or is under the influence of alcohol or controlled substances. Contractor shall require all Contractor's agents, subcontractors, employees or suppliers who perform work on site to sign a statement that they have been informed and will abide by the above policy. A copy of all such statements shall be kept at the job site throughout the duration of Contractor's work.
- 4.4.7 Contractor warrants to Owner that all work will be free from faults and defects and meeting or exceeding the requirements of the contract documents and all local, state, and federal legal requirements. All work not so conforming to these standards will be considered defective, and Owner may require its correction.

4.5 DIVISION OF THE WORK

4.5.1 The division of the work into various specialties and divisions in the contract specifications and drawings shall not bind Contractor in apportioning the work among various subcontractors, specialty contractors or workers, and Contractor's own employees.

4.6 TITLE 36 AND OTHER STATUTORY REQUIREMENTS

- 4.6.1 Contractor shall give and post all notices and comply with all federal, state, and local laws, ordinances, regulations, requirements and any lawful order of any public authority bearing on the performance of the work, and shall notify Owner in writing if the drawings and specifications or the contract documents are at variance therewith. If Contractor knows or should know that Contractor is performing work contrary to such legal requirements without giving written notice to Owner in time for Owner to give a stop work order, the Contractor shall bear all costs to remedy that work and to bring it into conformance with the applicable requirements. In the event Contractor fails to reimburse Owner as set forth herein, Owner may set off the amount due Owner from any amount due Contractor. This requirement does not lessen or alter the requirement for indemnification stated in ARTICLE 4.13.
- 4.6.2 Contractor and subcontractors shall strictly comply with all requirements of Title 8, Chapter 30 of the Alaska Administrative Code and Title 36 of the Alaska Statutes as applicable to this contract.
- 4.6.3 Contractor or subcontractors of the contractor shall pay all employees unconditionally as required by AS 36.05.040 and any other applicable laws or regulations. Wages may not be less than those stated in the advertised specifications, regardless of the contractual relationship between the Contractor or subcontractors and laborers, mechanics, or field surveyors. The wages are determined for the region in which the work is done and the rates are issued by the Alaska State Department of Labor (see attached Title 36 wage schedule). The scale of wages to be paid shall be posted by Contractor in a prominent and easily accessible place at the site of the work. If it is found that a laborer, mechanic or field surveyor employed by the Contractor or subcontractor has been or is being paid a rate of wages less than the rate

of wages required by this contract, Owner may, on written notice to Contractor hold Contractor in immediate default and terminate Contractor's right to proceed with the work or that part of the work for which there is a failure to pay the required wages, and Owner may prosecute the remaining work to completion by contract or otherwise, holding Contractor and Contractor's sureties liable for any costs in excess of the contract price. In the event Owner permits Contractor to pursue further work under the contract, Owner shall withhold so much of the accrued payments as is necessary to pay to laborers, mechanics, or field surveyors employed by the Contractor or subcontractors the difference between the rates of wages required by the contract to be paid laborers, mechanics, or field surveyors on the work and the rates of wages in fact received by laborers, mechanics, or field surveyors.

4.6.4 A copy of certified payrolls shall be provided to the Project Representative with each Progress Payment Request.

4.7 PROJECT RECORDS

- 4.7.1 Contractor shall maintain at the project site copies of plans and technical specifications, approved shop drawings and manufacturers' information sheets, and other contractor documents which are necessary for the expeditious and correct execution of the work.
- 4.7.2 Contractor shall maintain at the project site a complete daily job report showing job conditions, work activities started, in progress, interrupted and completed; work force, including identification and number of Contractor's employees and subcontractors by craft; receipt and disposition of materials and equipment; tests performed, visiting personnel and any accidents on a particular day. Owner shall have access to the daily report at all times. A copy of each daily report shall be provided to Project Representative at the end of each week.
- 4.7.3 Contractor shall keep one record copy of all specifications, drawings, addenda, modifications, and shop drawings at the job site in good order and annotated to show all changes made during the construction process. These shall be available to Owner during construction and turned over to Owner prior to final completion of the work.

4.8 ALLOWANCES

4.8.1 Contractor shall include in the contract sum all allowances stated in the specifications or plans, and all items covered by these allowances shall be supplied in such amounts, or by such a person, as Owner may direct. The allowance shall include the cost to Contractor, less applicable trade discounts, of materials and equipment required by the allowance; delivery at the site, applicable taxes; Contractor's cost for unloading and handling on the site, for labor, installation, overhead, profit and other expenses incurred by Contractor. Whenever the cost of the allowed item exceeds or is less than the allowance, the contract sum shall be adjusted equitably by change order.

4.9 NONDISCRIMINATION

- 4.9.1 Contractor must comply with all federal and state laws, rules, regulations and orders, and all local ordinances, regulations and rules concerning wages, taxes, social security, workers' compensation, nondiscrimination, licenses, registration requirements, and similar provisions governing employment of individuals.
- 4.9.2 Contractor will not discriminate against any employee or applicant for employment or refuse employment to a person, or bar a person from employment, or discriminate against a person in compensation or in a term, condition, or privilege of employment because of the person's race, religion, color, or national origin, or because of the person's age, physical or mental disability, sex, marital status, changes in marital status, pregnancy, or parenthood when the reasonable demands of the position do not require distinction on the basis of age, physical or mental disability, sex, marital status, changes in marital status, pregnancy, parenthood, or political affiliation. Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the provisions of this nondiscrimination clause. Contractor further agrees to insert this provision in all subcontracts hereunder and to require the subcontractors to insert this provision in their subcontracts.

Notwithstanding the prohibition against employment discrimination on the basis of marital status or parenthood stated above, an employer may, without violating this provision, provide greater health and retirement benefits to employees who have a spouse or dependent children than are provided to other employees.

- 4.9.3 Contractor shall state, in all solicitations or advertisements for employees to work on contract jobs, that all qualified applicants will receive consideration for employment in accordance with the above referenced nondiscrimination clause.
- 4.9.4 Contractor shall comply with the reporting requirements which the State of Alaska may establish by regulation.
- 4.9.5 Contractor shall include the provisions of these paragraphs in this section in every subcontract or purchase order under this contract so as to be binding upon every such subcontractor or vendor of Contractor under this contract.

4.10 TAXES

- 4.10.1 Contractor shall pay all sales, consumer, use and other taxes for the work or portions thereof provided by Contractor which are legally enacted at the time bids are received, whether or not yet effective.
- 4.10.2 Contractor shall comply with Owner's requirements for payment of taxes. This contract is specifically subject to the provisions of City of Kenai Code, as it now stands or as it may be amended, including but not limited to termination of the contract for non-compliance. If the violation arises from failure to file or remit sales taxes, no payment will be made to Contractor until all filings have been made and all amounts due are paid.

4.11 PERMITS, FEES, AND NOTICES

- 4.11.1 Contractor shall secure the building permit from the City of Kenai at no cost. Unless otherwise provided in contract documents, Contractor shall secure and pay for all other legally required permits and government fees, licenses and inspections necessary for the proper execution and completion of the work. These are customarily secured after execution of the contract. These costs are part of the contract price. This provision does not lessen the requirements set out in ARTICLE 1.4.
- 4.11.2 Contractor is required to comply with all permits obtained by Owner for project, if any. Contractor is responsible for requesting information from Owner regarding any applicable permits obtained by Owner.

4.12 ROYALTIES AND PATENTS

4.12.1 Contractor shall pay for all royalties and license fees. Contractor shall defend all suits or claims for infringement of any patent rights and shall save Owner harmless from loss on account thereof.

4.13 INDEMNIFICATION

4.13.1 The contractor shall indemnify, hold harmless, and defend the City at its own expense from and against any and all claims, losses, damages or expenses, including reasonable attorney's fees, of, or liability for, any wrongful or negligent acts, errors, or omissions of the contractor, its officers, agents or employees, or any subcontractor under this contract. The contractor shall not be required to defend or indemnify the City for any claims of, or liability for, any wrongful or negligent act, error, or omission solely due to the independent negligence of the City. If there is a claim of, or liability for, the joint negligence of the contractor and the independent negligence of the City, the indemnification and hold harmless obligation shall be apportioned on a comparative fault basis. Apportionment shall be determined upon final determination of percentage of fault. If any such determination is by settlement, the percentage of fault attributed to each party for purposes of this indemnification provision shall only be binding upon the parties included in the settlement agreement. "Contractor" and "City" as used in this article include the employees, agents, officers, directors, and other contractors who are directly responsible, respectively, to each. The term "independent negligence of the City" is negligence other than in the City's selection, administration, monitoring, or controlling of the contractor and in approving or accepting the contractor's work.

ARTICLE 5 SUBCONTRACTORS AND SUPPLIERS

5.1 DEFINITIONS AND RESPONSIBILITIES

- 5.1.1 A subcontractor is a person or entity having a direct contractual relationship with Contractor, or with one of Contractor's subcontractors, to perform any of the work at the site. A supplier is any manufacturer or person or firm providing materials, equipment or assemblies to Contractor or to one of the subcontractors for inclusion in this project.
- 5.1.2 All contracts between Contractor, subcontractors and suppliers (whether or not in privity with Contractor) shall be in accordance with the terms of this contract and shall incorporate the General Conditions of this contract. Contractor shall include in such contracts, and require its inclusion in any subcontracts, a provision holding any subcontractor or supplier (whether or not in privity with Contractor) directly accountable to Owner for work which fails to meet the requirements of the contract documents, or which prevents Contractor or any subcontractor from performing work. This direct accountability to the Owner shall be in addition to Contractor's liability for any such failure.
- 5.1.3 The provisions in this ARTICLE shall not be construed as creating a right of recourse, or any direct contractual relationship, between Owner or Owner's agents and any subcontractor, supplier, or manufacturer (whether or not in privity with Contractor).
- 5.1.4 Contractor shall make all necessary copies of these contract documents available to Owner and to each subcontractor and shall require each subcontractor to make copies of these contract documents available to each of Contractor's subcontractors, if any.
- 5.1.5 Contractor shall be fully responsible for enforcing discipline among subcontractors, their employees and their subcontractors, and for insuring that each subcontractor performs the work in accordance with the contract documents and all safety regulations.
- 5.1.6 Contractor shall have the discretion to require subcontractor(s) to provide payment or performance bonds for work of the subcontractor(s).

5.2 AWARDS TO SUBCONTRACTORS AND SUPPLIERS

- 5.2.1 At Owner's request Contractor shall submit to Owner a list of all principal subcontractors and material suppliers and shall not contract with any proposed person or organization to whom Owner voices a reasonable objection. This provision applies to substitution of subcontractors or suppliers subsequent to Owner's initial objection to a proposed person or entity. Such list shall be submitted in accordance with Division 1 requirements as provided in the contract specifications.
- 5.2.2 Rejection of a proposed subcontractor or material supplier shall not entitle Contractor to any increase in the contract sum or time.
- 5.2.3 At Owner's request Contractor shall submit to Owner a copy of any subcontract and any purchase orders for materials and equipment prior to purchase of such items.

5.3 CONTRACTOR PAYMENTS TO SUBCONTRACTORS AND SUPPLIERS

- 5.3.1 Recognizing the importance of maintaining the integrity of a public contract, Contractor warrants that Contractor will pay all subcontractors and material suppliers at least monthly on or about the 20th day of each month upon approval of the subcontractors' and materials suppliers' billing, for all apparently acceptable work performed on the site during the preceding month and for all apparently acceptable material incorporated into the project or delivered and properly stored at the site during any month for which Contractor has received payment from Owner. If Owner retains a percentage of sums due, Contractor may retain a like percentage, but when retainage is paid, Contractor must pay to the subcontractor or supplier interest on retainage equal to interest rate paid to Contractor by Owner.
- 5.3.2 In furtherance of Contractor's warranty under this ARTICLE and ARTICLE 8, Owner, may require Contractor to declare Contractor's status of accounts with any or all the subcontractors and suppliers. A proof of payment to subcontractors and suppliers shall be made in a form acceptable to Owner. If Contractor

breaches this warranty and fails to pay each subcontractor and materials supplier within 45 days after a monthly billing has been presented, then Owner reserves the right to withhold sufficient sums from Progress Payments due to Contractor and to issue payment to the subcontractors or material suppliers directly. This ARTICLE shall not be construed as creating a right in the subcontractors or material suppliers to have direct recourse against Owner for payment. Contractor expressly agrees that Owner will not be liable for any exercise of Owner's discretionary right under this section, and Contractor agrees to release and indemnify Owner for any claims arising therefrom, either by Contractor directly or by any subcontractor or material supplier. Likewise, this ARTICLE shall not be construed as creating a right in Contractor's surety or any other subrogated party to have direct recourse against Owner for failure to withhold sums pursuant to this section.

ARTICLE 6 SEPARATE CONTRACTS

- 6.1 Owner has the right to award separate contracts for work on the project that is not included in this contract.
- 6.2 When separate contracts are awarded for different portions of the Project or other work on the site, the term Contractor in the contract documents in each case shall mean the Contractor who executes each separate contract.
- 6.3 Contractor shall afford other contractors and Owner's own forces reasonable opportunity for the introduction and storage of materials and equipment and for the execution of their work and shall properly connect and coordinate Contractor's work with theirs as required by the contract documents.
- 6.4 Any costs caused by defective or ill-timed work under separate contracts shall be borne by the party responsible thereof and shall be paid promptly.
- When separate contracts are let within the limits of any one project, each Contractor shall conduct the work so as not to interfere with or hinder the progress of completion of the work being performed by other Contractors. Contractors working on the same project shall cooperate with each other as directed.
 - Each Contractor involved shall assume all liability, financial or otherwise, in connection with his or her contract and shall protect and save harmless the Owner from any and all damages or claims that may arise because of inconvenience, delays, or loss experienced because of the presence and operations of other Contractors working within the limits of the same project.
- If any part of Contractor's work depends upon work performed by Owner or any separate contractor, prior to proceeding with the work, Contractor is required to report to Owner any apparent discrepancies, defects or delays in the other work which impede proper execution of the work required by this contract. If Contractor fails to report such unsuitable work by another contractor to Owner, then Contractor shall be deemed to have accepted the unsuitable work and any liability for all deficiencies, damages and costs which arise as a result of the defective work or of Contractor's use or covering of the unsuitable work.
- 6.7 Should Contractor or any subcontractor delay or cause damage to the work or property of any other contractor or person, Contractor shall repair the damage or settle the claim and shall further, to the extent allowed by law, indemnify, defend, and hold Owner harmless from any and all claims, costs, expenses, injury, damages, or loss of any kind, including attorneys' fees, court costs, or arbitration costs, which arise out of such delay or damage.
- 6.8 Should a dispute arise between Contractor and separate contractors as to the responsibility for completing, finishing or cleaning up particular work or a portion of the work, Owner may complete, finish or clean up the disputed portion and apportion the cost among Contractors responsible as Owner shall determine to be equitable.

ARTICLE 7 BONDS AND INSURANCE

7.1 PERFORMANCE AND PAYMENT BONDS

7.1.1 For contracts with a contract sum of one hundred thousand dollars (\$100,000) or greater, or as otherwise specified in the request for bid, Contractor shall provide as part of the basic contract sum, a performance bond and a payment bond, each in the amount of 100% of the contract amount, prior to Owner's execution

of the contract. Contractor shall have no recourse of any kind against Owner, if Owner declines to award a contract due to Contractor's failure to provide the required bonds. These bonds, in whatever amount required by the specific contract, shall be administered and deemed governed by the provisions of Alaska Statutes Title 36, Chapter 25 and shall comply with all requirements for payment and submission of claims as provided by that chapter.

- 7.1.2 All bonds shall name Owner as the beneficial party and shall protect Owner for a period of at least one year subsequent to the date of final payment upon this contract. All bonds shall be executed upon a form acceptable to Owner and by a surety company licensed to do business within the State of Alaska and acceptable to Owner. The form of the bond shall provide that Owner shall have at least thirty (30) days prior notice of any lapse in bond coverage. The bond payment shall be applicable to all subcontractors or material suppliers (whether or not in privity with Contractor) who might attempt to assert a claim against Owner.
- 7.1.3 Owner may inform the surety as to the general progress and status of the work. A copy of all communications with the surety company shall be provided promptly to Contractor upon request.
- 7.1.4 In the event Contractor refuses, or is unable to make payments to laborers, subcontractors or material suppliers, or to complete the work, or to correct defective work, within the times provided by this contract, Owner may elect to call upon Contractor's surety to rectify Contractor's default. Contractor shall first be given seven (7) calendar days written notice (effective when mailed) of Owner's intentions to call upon the surety company and Owner shall specify to Contractor the basis for the proposed course of action. If Contractor fails to correct the default within the time provided, Owner shall promptly call upon the surety.
- 7.1.5 Prior to final payment or reduction in retainage, Contractor shall provide written consent of each affected surety releasing Owner from any further claims arising from payment to Contractor and obligating the surety company to rectify any default, nonpayment, defective work, error, omission or deficiency of Contractor.
- 7.1.6 Contractor and Owner expressly agree that Owner shall be entitled to retain from payments to Contractor amounts in excess of normal retainage if these additional amounts may be necessary to indemnify Contractor's surety for any payment or corrective work which the surety might be required to undertake. This additional retainage will be made only upon written directive by Contractor's surety specifying the reason for retaining extra amounts, the amounts to be retained and agreement of the surety to reimburse Owner for any interest which may be due Contractor under the provisions of the Alaska Statutes.

7.2 CONTRACTOR'S INSURANCE

- 7.2.1 The services to be rendered under this contract are those of an independent Contractor.
- 7.2.2 Contractor and all subcontractors, if any, shall be responsible for the purchase and maintenance of all insurance required by law and at a minimum purchase the insurance coverage as specified in ARTICLE 7.2.5 and 7.2.6 below, and any other insurance coverage as may be specified in ARTICLE 7.2.11 SUPPLEMENTARY GENERAL CONDITIONS OF INSURANCE, if attached and forming a part of this contract. Such insurance shall be by a company/corporation currently rated "A-" or better by A.M. Best.
- 7.2.3 This insurance coverage required by ARTICLE 7.2.5 and 7.2.6, and ARTICLE 7.2.11 if attached, shall be in acceptable form, and for the amounts specified by the City of Kenai, or as required by law, whichever is greater.
- 7.2.4 The insurance policies shall remain in force for the life of the contract and shall be a part of the contract price.
- 7.2.5 Commercial general liability with minimum coverage of \$1,000,000 and automobile liability insurance with minimum coverage of \$1,000,000 combined single limit bodily injury and property damage per occurrence. This insurance shall be primary and exclusive of any other insurance carried by the City of Kenai. The commercial general liability insurance shall be without limitation on the time within which the resulting loss, damage, or injury is actually sustained.
- 7.2.6 Per Alaska State Statutes, Worker's Compensation and Employers Liability Insurance shall be provided for all employees who are performing work under this contract.

- 7.2.7 Certificate(s) of Insurance shall be provided by Contractor and all subcontractors, or their Insurance Companies and/or their Agents, naming the City of Kenai as an additional insured for the work specified in this contract with a waiver of subrogation for commercial general liability insurance and automobile liability insurance. The certificates of insurance must reference the specific contract by name. Workers compensation insurance must be endorsed for waiver of subrogation against the City. Certificates of Insurance, acceptable in form and content, will be delivered to Owner at the address designated for legal service in the agreement, at or prior to presentation of the contract for execution by owner.
- 7.2.8 There shall be no cancellation or material change of the insurance coverage, or intent not to renew the insurance coverages as specified in this contract, without thirty (30) days prior written notice to the City of Kenai. Notice of cancellation, material change in coverage, or intent not to renew will be delivered to the address designated for legal notice in the agreement.
- 7.2.9 Upon renewal or change in policies during the contract, Certificates of Insurance shall be delivered to the address designated for legal notice in the agreement.
- 7.2.10 Owner shall have the option to purchase and maintain such insurance as will protect Owner against property losses or liability claims, which may arise from operations under the contract. Insurance providing coverage against fire and extended coverage perils, may, at Owner option, provide coverage to the full insurable value of the project and insure the interests of Contractor and all subcontractors as their interests may appear. Any recovery for loss insured pursuant to this General Condition is to be adjusted to Owner and made payable to Owner as trustee for the insured, as their interests may appear. This section does not modify the contractor or subcontractors' responsibility to provide insurance as required in ARTICLE 7.
- 7.2.11 May be added in supplementals as Supplementary General Conditions of Insurance.

ARTICLE 8 MEASUREMENT, PAYMENT AND COMPLETION

8.1 SCOPE OF PAYMENT

8.1.1 Unless altered by change order, Contractor shall be paid only that sum set forth in the agreement between Owner and Contractor as Contractor's compensation for performance of all work required by the contract documents.

8.2 LUMP SUM PAY ITEMS

- 8.2.1 Each bid item is characterized as either a lump sum item or a unit price item in the bid documents. Where the item is bid at a lump sum price, no additional compensation shall be paid to Contractor for additional work required because Contractor failed to include items or quantities in Contractor's estimate or a subcontractor's estimate, or failed to utilize proper construction means, methods, procedures or sequence or by virtue of any decision of Contractor.
- 8.2.2 Contractor is required to provide and pay for all requirements necessary for the proper execution and completion of the contract unless specifically excluded by the contract documents. The costs are part of the contract price. The requirements include but are not limited to the requirements stated in ARTICLE 1.4.
- 8.2.3 All materials and equipment incorporated in the work shall be new except as otherwise provided in the contract documents. All materials and equipment shall meet or exceed the requirements of the plans and specifications and Contractor shall furnish, if requested, satisfactory evidence as to the source, kind and quality of any materials and equipment.

8.3 UNIT COST ITEMS

8.3.1 Quantities appearing in the bid schedule are approximate and are prepared for comparison of bids. Payment to Contractor will be for actual quantities of work performed and materials furnished in accordance with the contract documents. Scheduled quantities of work and materials may be increased, decreased or eliminated as provided herein.

8.4 APPLICATION FOR PAYMENT

- 8.4.1 Applications for payment shall be based on Contractor's submitted schedule of values, as approved by Owner per Section 4.2. Schedule of values shall be prepared in such form and supported by such data as may be required by Owner to substantiate its accuracy prior to Contractor's first application for payment.
- 8.4.2 The schedule of values shall include quantities of work, unit prices and other items comprising the contract price. It shall subdivide the work into each component part in sufficient detail to serve as the basis for progress payments during construction.
- 8.4.3 With each subsequent application for progress payment, Contractor shall provide a schedule of values to Owner showing all work which has been performed to date together with the value thereof, and the percentage of work completed.

8.5 PROGRESS PAYMENTS

- 8.5.1 Progress Payments shall be made monthly, based upon the amount of apparently acceptable work performed at the site and apparently acceptable materials purchased for the project and properly stored at the site during the previous month. Disbursement of progress payments will not effect a transfer of the risk of loss from the Contractor to the Owner for invoiced equipment or material. The risk of loss of the work and all material and equipment not yet incorporated in the work is the liability of the Contractor until substantial or final completion, whichever is earlier.
- 8.5.2 The value of work performed and materials stored shall be set forth in Contractor's revised schedule of values. If requested by Owner, Contractor shall promptly provide Owner any additional information necessary to ascertain the value of the work performed or the cost of materials stored at the site during the previous month. Each updated Schedule of Values shall be in the form of a notarized affidavit. Proof of certified payroll shall be provided per ARTICLE 4.
- 8.5.3 By application for payment, Contractor warrants and guarantees to Owner that title to all work, materials, and equipment for which payment is requested will pass to Owner either by incorporation in the construction and after substantial completion or upon receipt of payment, whichever occurs later, that such title will be clear of all liens, claims, security interests, and other encumbrances, except for liens to be released later prior to final payment and specifically identified on the application for payment, and that all such work, materials, and equipment are of acceptable quality.
- 8.5.4 Each application for payment shall be made no later than the tenth day of each month for work performed during the preceding month. Progress Payment requests shall be submitted to Project Representative for analysis and recommendation to Owner.
- 8.5.5 Project Representative will review Contractor's application for payment within seven (7) working days after receipt and if Project Representative ascertains that the amounts set forth therein are properly due and owing to Contractor, then Project Representative shall issue a Certificate of Payment to Owner. If Project Representative determines that only a portion of the sum requested is then properly due and owing to Contractor, then Project Representative may issue a Certificate of Payment in a lesser amount or may reject the application altogether. Project Representative will notify in writing both Contractor and Owner of the reasons for reduction or rejection of any application for Progress Payment.
- 8.5.6 Project Representative's issuance of a Certificate of Payment constitutes a representation that the work has progressed to the point indicated and that to the best of Project Representative's professional knowledge and information, Contractor is entitled to payment in the amounts certified.

8.6 RETAINAGE

8.6.1 After receipt from Project Representative of the Certificate for Payment, Owner shall make payment to Contractor within thirty (30) days. Owner shall have the option to retain up to 10% of the full amount of the Certificate for Payment plus lump sum amounts for material and equipment not properly stored, or subject to damage prior to use. Amounts retained by Owner may be held by Owner until project completion. If the project involves grant money or the City has entered into a written contract with the state to provide state funds, payment will be made in accordance with AS 36.90.200-270.

8.6.2 Owner may withhold additional sums of money from progress payments in an amount sufficient to safeguard and protect Owner against any apparently meritorious claims against Contractor by any party other than Owner, and for any work which Owner ascertains to be defective or not meeting the requirements of the contract documents.

8.7 CONDITIONS OF PAYMENT

- 8.7.1 Project Representative may refuse to approve all or any part of any request for progress payment if, in Project Representative's opinion, it would be incorrect to make the representation to Owner set out in ARTICLE 8. Project Representative may also refuse to approve all or any part of any request for progress payment, if subsequently discovered evidence or the results of subsequent inspections or tests nullify any payment previously approved.
- 8.7.2 Owner may withhold payment to the extent necessary to protect Owner from loss resulting from:
 - Defective or damaged work;
 - B. Claims or liens which have been filed or may be reasonably expected;
 - C. Contract price reduction by modifications or change orders;
 - D. Owner cost to correct or complete defective work;
 - E. Unsatisfactory prosecution of the work by Contractor, including but not limited to failure to furnish adequate submittals or to clean up the work or site;
 - F. Reasonable evidence that the work cannot be completed for the unpaid balance of the contract sum;
 - G. Failure of Contractor to make payment properly due to subcontractors, employees, suppliers or utilities:
 - H. Reasonable evidence to believe the work cannot be completed within the contract time.
 - I. Damage to Owner's property not replaced or repaired in timely manner.

When the grounds for withholding payment are removed, payment shall be made for amounts withheld.

8.7.3 Neither the issuance of a Certificate of Payment, nor the making of any progress payment, nor the partial or entire use of the project by Owner shall constitute an acceptance of any work not in accordance with the contract documents nor shall it constitute a waiver of any right accruing to Owner or of any duty of Contractor.

8.8 SUBSTANTIAL COMPLETION

- 8.8.1 Substantial Completion is defined as the state of construction at which the work is sufficiently complete and in accordance with the contract documents, so that Owner could occupy and utilize the work or a specific portion of it, for its intended use.
- 8.8.2 When Contractor considers the work substantially complete Contractor shall notify Project Representative in writing and request a Substantial Completion inspection. The request shall be made a minimum of three business days in advance. The notice shall include a comprehensive list of items to be completed, reasons they are not completed and a date of anticipated completion. The notice shall also include copies of all code compliance inspections, the Certificate of Occupancy, if applicable, and any other documents required by the contract.
- 8.8.3 Project Representative shall schedule the Substantial Completion inspection and notify Contractor. The inspection will be performed by Project Representative, Architect, Design Engineers, and Owner personnel in the presence of Contractor. Should this inspection find the work not substantially complete, Owner may terminate the inspection and promptly notify Contractor in writing of the conditions for reinspection. Any deficiencies identified by this inspection will be listed and promptly furnished to Contractor for remedial action.
- 8.8.4 If Contractor has requested that Project Representative and Owner make an inspection to ascertain Substantial Completion, and if the work is not then substantially complete, Contractor shall be liable for all costs Owner, Architect, and Project Representative have incurred in making the inspection.

- 8.8.5 If it is determined on the basis of inspection that the work is substantially complete, Project Representative will issue a Certificate of Substantial Completion. Included in the certificate shall be a list of items which must be completed or corrected before final payment and the time within which such items shall be complete and corrected. Failure to include an item on this list does not alter the responsibility of Contractor to complete all work in accordance with contract requirements.
- 8.8.6 Certificate of Substantial Completion shall state the date of Substantial Completion and the respective responsibilities of Owner and Contractor for the maintenance, insurance and security of the work. Certificate of Substantial Completion shall specifically authorize Owner to take possession of the premises and utilize them for their intended purpose. Owner's beneficial occupancy of the premises shall make reasonable allowance for the performance of the work which Contractor must complete prior to final completion.
- 8.8.7 If Contractor fails to complete or correct work required by the Certificate of Substantial Completion within the time allowed, then the Certificate of Substantial Completion shall be voided and the contract time expended by Contractor shall be counted, and the acceptability of the work shall be inspected as if a Certificate of Substantial Completion had not been issued.
- 8.8.8 Upon Substantial Completion of the work and upon application by Contractor and certification by Project Representative, Owner shall make payment, reflecting adjustment in retainage, if any, for such work as provided in the contract documents.

8.9 FINAL COMPLETION AND WARRANTY PERIOD

- 8.9.1 The terms Final Completion and Warranty Period refer to, respectively, the finalization of the construction phase and a one-year warranty period following the Substantial Completion. Final Completion shall be represented by a lump sum dollar amount identified on the schedule of values. Final Payment represents a sum of money to perform all tasks necessary from Substantial Completion to Final Completion, including completion of final punch list, completion of as-built data, turnover of all warranty information, notarized acknowledgments of payments, and relinquishment of claims against Owner.
- 8.9.2 When Contractor considers the work ready for Final Completion, Contractor shall forward to Project Representative an application for final payment including (1) an affidavit that all payrolls, bills for materials and equipment, and other indebtedness connected with the work have been paid or otherwise satisfied, (2) consent of surety, if any, to payment, (3) irrevocable, notarized proof of payment and relinquishment of claim against Owner, issued by every subcontractor (whether or not in privity with Contractor), material supplier and other party who might assert a claim against Owner, and (4) all other documentation required by the contract documents. Project Representative and Owner shall promptly inspect the work to see that it is fully performed and complete, that all portions of the work are acceptable and that the contract is fully performed aside from completion of the Warranty Period. After Project Representative has made a determination that these requirements have been met, Project Representative shall prepare and recommend that Owner issue a Certificate of Final Completion and Final Payment.
- 8.9.3 Project Representative's approval of Final Payment constitutes an additional representation by Project Representative to Owner that to the best of Project Representative's knowledge and information, all conditions which Contractor must fulfill prior to being entitled to Final Payment have in fact been fulfilled in accordance with the contract documents.
- 8.9.4 If any party refuses to relinquish its claim, or if Owner considers that any item or portion of the work: (1) is of doubtful acceptability under the contract documents; or (2) may diminish the value of the work; or (3) may prove to be ultimately unreliable; or (4) may prove to be less functional than required by the intent of the contract, then Owner, in lieu of refusing Final Payment to Contractor, may allow Contractor to furnish a bond in a form and in an amount satisfactory to indemnify Owner against losses occasioned thereby. If any additional costs to settle the claim or to correct work of doubtful quality accrue to Owner in excess of the indemnity available to Owner, Contractor shall refund to Owner all differences and costs which Owner might be compelled to pay, including all litigation costs and reasonable attorney fees.
- 8.9.5 Acceptance of final payment by Contractor constitutes an explicit waiver of all claims which Contractor might assert against Owner except those previously made in writing and identified by Contractor as unsettled at the time of the Application for Final Payment.

- 8.9.6 Final Payment to Contractor shall constitute a waiver of all claims which Owner might assert except those arising from: (1) unsettled claims; (2) faulty or defective work (3) failure of the work to comply with the requirements of the contract documents; (4) warranties required by this contract or that by their terms do not expire upon completion of the contract.
- 8.9.7 If, after Substantial Completion, Warranty Completion is delayed through no fault of Contractor, or by the issuance of change orders affecting Final Completion, Owner may, upon recommendation of the Project Representative, extend the contract time by a reasonable period and accept certified applications for further Progress Payments.
- 8.9.8 Upon completion of all requirements identified in ARTICLE 8 as "Final" the funds representing Final Payment shall be released to Contractor along with the Certificate of Final Completion. Upon issuance of Certificate of Final Completion all contract sums shall be accounted for to Contractor and shall be paid to Contractor. However, any and all applicable bonds shall not be released until after the Warranty Period.

8.10 TIME AND LIQUIDATED DAMAGES

- 8.10.1 The time permitted for construction of the work will run from issuance of Notice to Proceed through the dates for Substantial Completion as specified in Agreement between Owner and Contractor, unless a specific completion date is specified.
- 8.10.2 The term "day" as used in this contract shall mean "calendar day" unless specifically stated otherwise.
- 8.10.3 All warranty periods and obligations accruing to Contractor through completion of the work shall be considered to begin on the date of Substantial Completion, unless otherwise agreed to separately in writing by Owner and Contractor.
- 8.10.4 Contractor shall begin the work as soon as possible after the date identified in Notice to Proceed and shall prosecute the work expeditiously and with adequate labor and materials.
- 8.10.5 Liquidated damages will be applied in the amount set out in the Agreement.
- 8.10.6 Claims for extension of time will be considered only if they affect "critical path" items specifically identified in the detailed progress schedule or in any applicable Supplementary Conditions. Claims for extension of the contract time must be made in writing to Owner not more than twenty (20) days after the reason for requested extension appears.

ARTICLE 9 CHANGES IN THE WORK, CONTRACT PRICE, AND TIME

9.1 CHANGE ORDERS

- 9.1.1 Without invalidating this contract, Owner may, at any time, order additions, deletions, or revisions in the work. All such changes must be authorized by written change order. Upon receipt of a change order, Contractor shall proceed with the work in accordance with applicable requirements of the contract documents. If any change order entails an increase or decrease in the contract price or an extension or curtailment of the contract time, adjustment will be made as provided herein.
- 9.1.2 Extra work will be paid for either at a fixed price specified in the change order (using unit prices or a lump sum amount) or on a time and materials basis.
- 9.1.3 Project Representative may authorize minor changes, alterations or deviations in the work in accordance with ARTICLE 2. These changes shall be authorized by written Field Order to be included in a subsequent Change Order.
- 9.1.4 Any additional work performed by Contractor without a properly executed change order will not entitle Contractor to an increase in the contract amount or to an extension of the contract time, except in the case of emergency threatening life, safety or property.

9.2 ISSUANCE OF CHANGE ORDER

- 9.2.1 The contract sum constitutes the total compensation to Contractor for the work required by this contract. The contract price may be changed only by a properly executed change order. Any request for increase in the contract price shall be based upon written notice delivered to Project Representative within ten (10) days after the reason for the proposed increase appears. Change order proposals must be accompanied by all pertinent data and documentation, including a detailed estimate showing costs, quantities, unit prices and markups for overhead and profit.
- 9.2.2 Project Representative shall analyze Contractor's change order proposal and shall make a recommendation to Owner within a reasonable period of time. If Owner accepts the proposal, Project Representative shall prepare the change order for execution by Contractor and Owner.
- 9.2.3 The value of any work added or deleted by change order shall be determined by one of the following methods:
 - A. Application of unit prices set forth in the bid: unit prices shall include all direct and indirect costs of the work, including labor, equipment (whether owned or rented), materials, home office expense, all overhead and profit.
 - B. Application of mutually accepted unit prices for work not covered by bid unit prices: unit prices shall include all direct and indirect costs of the work, including labor, equipment (whether owned or rented), materials, home office expense, all overhead and profit.
 - C. Mutual acceptance of a lump sum: Contractor's lump sum proposal must include an itemized breakdown of all costs of Contractor, subcontractors and suppliers. Breakdowns shall show quantities and prices of labor, materials, equipment and other direct costs. To direct costs shall be added the allowable combined overhead and profit as provided in ARTICLE 9.4.
 - D. At Owner's option, Contractor may be directed to proceed with additional work on a "time and materials" basis which may also stipulate a maximum "not to exceed" amount. Contractor will be required to maintain and submit detailed records showing all quantities and prices of labor, materials, equipment and other direct costs. To direct costs shall be added the allowable combined overhead and profit as provided in ARTICLE 9.4.
- 9.2.4 When both additions and credits for related work or substitutions are involved in any one change, the allowance for overhead and profit shall be based on the net change. All related items within a proposal shall be considered as a single item for purposes of computing overhead and profit.
- 9.2.5 When Contractor is directed to proceed on a time and materials basis, costs of the work shall be submitted daily for approval by Project Representative and may only include:
 - Actual payroll costs for employees, as substantiated by certified payroll, in the direct employ of Contractor for the times actually utilized in prosecution of the additional work, including allowance for benefits which Contractor customarily provides its employees;
 - B. The actual substantiated cost to Contractor for all material and equipment incorporated into the work, including transportation and storage expenses;
 - C. The actual substantiated amounts of payments by Contractor to subcontractors for work performed by the subcontractors;
 - D. Any costs of special consultants to the extent authorized by Owner:
 - E. Substantiated equipment rental costs at reasonable market rates;
 - F. Additional supervision and travel costs reasonably related to the work performed;
 - G. Increased bond premiums:
 - H. Additional license fees, permits, or applicable taxes;

I. Minor incidental expenses such as telegrams and long distance telephone charges.

To these direct costs shall be added the allowable combined overhead and profit as provided in ARTICLE 9.4.

- 9.2.6 Unless specifically agreed to by Owner in writing, the cost of additional work shall not include any portion of Contractor's general overhead, nor any sum attributable to Contractor's prosecution and supervision of the principal work at the site, nor any overtime expense, unless specifically agreed to by Owner in writing. Contractor shall not be compensated for any casualty or other losses or expenses attributable to negligence of Contractor or any person in its employ or any subcontractor or supplier.
- 9.2.7 Payment to Contractor shall be made only for the actual quantities of work performed and accepted or materials furnished, in conformance with the contract or applicable change order. When the accepted quantities of work or materials vary from the quantities stated in the bid schedule, Contractor shall accept as payment in full, payment at the original contract unit prices for the quantities of work and materials furnished, completed and accepted; except as provided in the contract documents.

9.3 UNIT PRICES

- 9.3.1 When unit prices are used, and where the final quantity of a major contract item varies more than 25% above or below the bid quantity, either party to the contract may request an equitable adjustment in the contract unit price of that item. A major contract item is an item equal to 10% or more of the total contract.
- 9.3.2 When the final quantity of work is less than 75% of the bid quantity, the equitable adjustment shall be made for those units of work done and accepted, except that the total payment for the item shall not exceed 75% of the total amount bid for the item.
- 9.3.3 To determine unit prices for authorized changes or additions in the work that alter the quantity of work under a lump sum pay item, adjustment to the pay item will be determined by multiplying the added or deleted quantity by the quotient of the contract lump sum price and the estimated quantity shown on the original plans. Payment will be made under a new contract item established for that purpose. Adjustments will be made as a change order to the contract.
- 9.3.4 No allowance shall be made for any increased expenses, loss of expected reimbursement or loss of anticipated profits suffered or claimed, either directly from such alterations in quantities or indirectly from unbalanced allocations among the contract items by Contractor, or any other causes.

9.4 ALLOWABLE OVERHEAD AND PROFIT

- 9.4.1 When the value of change order work is determined by the lump sum method or by the time and materials method, the following definitions and percentages shall apply.
- 9.4.2 Direct costs are defined as the net cost to Contractor to accomplish a given change. Costs of bonds and insurance associated with the change shall be applied after addition of indirect costs.
- 9.4.3 Indirect costs are defined as general operational charges relating to the accomplishment of a given change, including but not limited to small tools, incidental job burdens and general office expense.
- 9.4.4 Overhead and Profit: Allowances for all indirect costs shall be identified as combined overhead and profit and shall not exceed the percentages in the following schedule:

A. Additive work:

- (1) Prime Contractor:
 - (a) 15% of the direct costs of own work in excess of \$1,000.00; 20% when the total value of own work is equal to or less than \$1,000.00.
 - (b) 8% of the direct costs of work performed by subcontractors not including subcontractor's overhead and profit.
 - (c) 8% of the direct costs of equipment.
- (2) Subcontractors: percentages represented in subsections (a) and (b) are a maximum percentage

- allowed regardless of the tier or number of subcontractor(s) performing the work:
- (a) 15% total of the work performed by subcontractors in excess of \$1,000.00; 20% total of the work performed by subcontractor equal to or less than \$1,000.00.
- (b) 8% of the direct costs of equipment.
- (3) In no case shall overhead and profit exceed 23% of the direct costs of work or 16% of the direct costs of equipment when the cost of the work exceeds \$1,000.00. In no case shall overhead and profit exceed 28% of the direct costs of work or 16% of the direct costs of equipment when the cost of the work is equal to or less than \$1,000.00.

B. Deductive work:

(1) Prime Contractor: 4% of the direct cost of deleted own work.

9.5 CONCEALED CONDITIONS

- 9.5.1 This ARTICLE applies only when concealed conditions substantially at variance with the conditions set forth in the contract documents are encountered and these conditions were not foreseeable by Contractor or reasonably inferable from information provided by Architect or Owner in the bidding documents.
- 9.5.2 If it is determined the Contractor could not predict the concealed conditions as set forth under ARTICLE 9.5.1, Owner may issue a change order for the performance of additional work required with an equitable adjustment in the contract sum. Contractor shall not begin work upon any concealed condition until Owner has approved a written change order

ARTICLE 10 TESTING AND CORRECTION OF WORK

10.1 TESTS AND INSPECTIONS

- 10.1.1 Contractor shall be responsible for securing permits and approvals from entities having jurisdiction over the work. Contractor will provide any special testing or inspections required by the contract documents. Contractor shall notify Owner 48 hours prior to performing testing. Contractor shall not cover work that requires testing, inspection or approval until such testing, inspection, or approval has been completed. Owner reserves the right to approve the testing agency.
- 10.1.2 Neither observation by Owner nor inspections, tests, or approvals by Owner or Owner's testing agency shall relieve Contractor from Contractor's obligation to perform the work in accordance with the contract documents.

10.2 UNCOVERING OF WORK

- 10.2.1 If any work is covered or buried contrary to contract requirements or Owner's written request, such work shall be uncovered at Owner's request for inspections, tests or approvals. Uncovering and recovering shall be at Contractor's expense, unless Contractor has given notice of intent to cover the work and Owner has not acted with reasonable promptness to provide any necessary tests, inspections or approvals.
- 10.2.2 If any work has been covered which Owner has not specifically requested to observe prior to covering, or if Owner considers it necessary or advisable that covered work be inspected or tested by others, then Contractor shall, at Owner's request, uncover, expose or otherwise make available for observation, inspection, or testing, that portion of the work as Owner may require. Contractor shall furnish all necessary labor, materials and equipment. If such work is found to be defective, Contractor shall bear all expenses, including compensation for any additional professional services and testing. If, however, the uncovered work is found not to be defective, Contractor shall be allowed an equitable adjustment in the contract price or the contract time. Only Contractor's direct costs attributable to the uncovering of work and its recovering shall be allowed.

10.3 DEFECTIVE WORK

- 10.3.1 All work not meeting the requirements of the contract documents shall be considered defective.
- 10.3.2 Contractor shall promptly correct or replace any defective work. Any and all costs associated with correction or replacement shall be borne by Contractor. Contractor shall also bear the expense of making good all

- work of others destroyed or damaged or required to be redone because of the correction or replacement of defective work.
- 10.3.3 If, after seven (7) days written notice to Contractor, Contractor fails to correct deficiencies or to provide Owner with an approved schedule for correcting defective work, Owner may, without prejudice to any other remedy it may have, make good deficiencies and deduct the cost thereof from the payment then or thereafter due Contractor. No extensions of time shall be allowed for correction of work that is defective.

ARTICLE 11 WARRANTIES

- 11.1 Contractor unconditionally warrants for a period of one year from issuance of the Certificate of Substantial Completion the usability and quality of all work, labor and materials incorporated into the project, unless otherwise provided in the contract documents. After the approval of Final Payment and prior to the expiration of one year after the date of Final Completion, any work found to be defective shall be remedied promptly by Contractor within fourteen (14) days of written notice without cost to Owner and in accordance with Owner's written instructions. Contractor shall either correct such defective work, or, if it has been rejected by Owner, remove it from the site and replace it with acceptable work. If Contractor does not promptly comply with the terms of Owner's instructions, Owner may have the defective work corrected or the rejected work removed and replaced, and all direct and indirect costs of such removal and replacement, including compensation for additional professional services, shall be deducted from Warranty Period Payment, unless the surety elects to remedy deficiency.
- 11.2 In addition to other warranties set forth in this contract and in accordance with requirements stated in the contract documents, Contractor shall obtain and transmit to Architect all warranties on material and equipment incorporated into the work and either provided by the supplier or otherwise required by the contract documents. Transmittal of warranties to Owner shall be a prerequisite of the Certificate of Final Completion.
- 11.3 All material and equipment installed by Contractor shall have a manufacturer's warranty for a period of one year, except as otherwise provided by the contract documents. The period of warranty shall begin on the date of Substantial Completion unless otherwise noted on the Certificate of Substantial Completion. This article does not limit any manufacturer's warranty which extends for a period of time longer than that specified as minimum in the contract documents.
- 11.4 If a warranty period in excess of one year on a particular item or part of the work is required by the contract documents, the longer warranty period shall govern warranty obligations of Contractor.
- 11.5 Owner may accept defective work or materials found during the warranty period instead of requiring correction or removal and replacement. If acceptance occurs prior to approval of final payment, a change order shall be issued to reduce the contract price. If acceptance occurs after approval of final payment, an appropriate amount shall be paid by Contractor to Owner.
- 11.6 The provisions of this ARTICLE shall not be construed as limiting the right of Owner to make a claim against Contractor for work not constructed in accordance with the contract documents. Where a defect attributable to Contractor's or subcontractor's materials or workmanship appears after expiration of the one-year warranty period, Owner shall notify Contractor of the appearance of damages due to defective work or materials and shall offer Contractor the right to replace or repair all defective work and other work using Contractor's forces. If Contractor fails to correct the work and any consequentially damaged work within a reasonable time, or if Contractor refuses to correct the work, Owner may correct the work utilizing Owner's own forces. Contractor shall pay Owner all costs attributable to correction of the defective work and any consequential damages occasioned by the defective work.
- 11.7 Should Owner and Contractor agree to delay completion of any items, the one-year warranty period for those items shall commence upon written acceptance of each item by Owner.

ARTICLE 12 CLAIMS AND LITIGATION

12.1 This contract shall be governed by the laws of the State of Alaska, and any lawsuit brought thereon shall be filed in the Third Judicial District at Kenai, Alaska.

- 12.2 No controversy or claim arising out of this contract shall be subject to binding arbitration unless both Owner and Contractor agree in writing to submit the question to arbitration at the time when the controversy arises.
- 12.3 All claims, disputes and other matters in question between Contractor and Owner relating to the execution or progress of the work shall be referred initially to Project Representative, who shall render a recommendation in writing to Owner within a reasonable time.
- During pendency of any claim arising out of this contract, Contractor shall carry on the work and maintain the Progress Schedule approved by Owner unless otherwise agreed by Contractor and Owner in writing. Should Contractor cease work, Contractor shall be in breach of this contract and Owner shall have the right to terminate the contract and to prosecute the work to completion with Owner's own forces or with a replacement Contractor. Contractor shall be responsible for any increase in costs to Owner above the contract price.
- 12.5 Contractor may make claims for additional costs only if the additional cost involved has occurred because of:
 - A change order issued by Owner, where the additional sum due Contractor set forth in the change order is in dispute.
 - B. An order by Owner to stop the work where Contractor was not at fault.
 - C. Concealed conditions as set out in ARTICLE 9.
 - D. Failure of payment by Owner pursuant to ARTICLE 3.
 - E. Additional costs or delays caused by separate contractors' or Owner's forces in accordance with ARTICLE 6.
- 12.6 Contractor shall not make a claim for additional costs where the basis of the claim lies in an oversight or mistake made by Contractor during the bidding process or by reason of negligent acts or omissions of Contractor or any mistake in judgment or improper selection of construction means, methods, sequences and materials during the course of construction.
- 12.7 If Contractor is entitled to make claim for an increase in the contract sum, Contractor shall deliver to Owner written notice of Contractor's intention to assert each claim within twenty (20) days after occurrence of each event giving rise to the claim. Contractor must give this notice of claim and specify the full extent and nature of the claim(s) to Owner before proceeding to execute the work upon which a claim might be asserted. No claim for additional costs or compensation shall be valid unless the prior twenty (20) day notice has been given. Adherence to this provision shall be strict. Any adjustment in the contract sum resulting from settlement of claims shall be authorized by change order.

ARTICLE 13 TERMINATION OF THE CONTRACT OR SUSPENSION OF THE WORK

13.1 TERMINATION BY OWNER

- 13.1.1 Owner shall have the right to terminate the contract if Contractor should file for bankruptcy, reorganization, otherwise be declared insolvent, or if Contractor makes a general assignment for the benefit of creditors. Exercise of these rights, where required by law, is contingent upon relief from the automatic stay provisions of the United States Bankruptcy Court or through other appropriate court order. This right of termination is in addition to the right of Owner to terminate for cause outlined below and other rights of termination as stated in the contract documents.
- 13.1.2 Termination for cause: If Contractor: (1) repeatedly refuses or fails to supply enough proper skilled workmen; or (2) fails to pay promptly all subcontractors, suppliers, or other parties as set out in the contract documents; or (3) fails to adhere in all respects to the provisions of Title 8, Chapter 30, of the Alaska Administrative Code and Title 36 of the Alaska Statutes as applicable to this contract and all other pertinent statutes, ordinances or regulations or orders of any local, state, or federal authority concerning payment; or (4) allows insurance to lapse; or (5) if after seven (7) days written notice, without prejudice to any other remedy of Owner, Contractor fails to correct to Owner's satisfaction deficiencies in work that does not conform to the contract documents; or (6) allows a situation that creates a danger to person or property to arise. Where an emergency situation creating a danger to person or property arises, Owner may at its option terminate the contract and take possession of the site and any of Contractor's equipment and material necessary to complete an emergency response or hire a separate contractor to complete the

emergency response. Contractor shall be paid the contract rate for the material used and shall be paid for the use of Contractor's equipment at the price shown in the contract documents or at the rate for such equipment listed in <u>RENTAL RATE BLUE BOOK FOR CONSTRUCTION EQUIPMENT</u>, published by Machinery Information Division of K-III Directory Corporation, 1735 Technology Drive, Suite 410, San Jose, California 95110. If the rate for such equipment is not so listed, reliable sources will be used to determine a reasonable rate.

- 13.1.3 In the event of termination for cause, Owner shall have the right of set-off, from any payment due Contractor, of all expenses, costs, and damages including but not limited to all professional and legal expenses and attorneys' fees and costs or other additional expenditures necessary to complete the projects that are occasioned by the termination. In the event such amounts exceed the amount of payment withheld, Contractor shall be liable to Owner for such amounts. No payment shall be made to Contractor prior to determination that a balance is due Contractor after the amount of set-off is determined.
- 13.1.4 Owner may terminate this contract at any time for the convenience of Owner for any reason deemed by Owner to be in the best interest of Owner.
- 13.1.5 If this contract is terminated for convenience, Contractor will be directed to make all necessary preparations for closing out the project and for safeguarding Owner's materials and the work already completed. Contractor will be paid for all conforming work done to date and for all materials delivered to the site and already paid for by Contractor, together with all reasonable costs directly attributed to termination, including fixed overhead. Contractor shall be responsible for minimizing the extent of such expenses and shall not be paid for expenses which could have been reasonably avoided. On the date that notice of termination or suspension for convenience is issued, Contractor shall immediately take all actions necessary to stop orders of material, rental of equipment or premises, employment of persons on the project, and shipment of materials not yet delivered to the site. The notice of termination or suspension for convenience shall specify a date by which all steps necessary for termination shall be completed and by which Contractor shall have removed any unused material and all Contractor's equipment and forces. Contractor shall leave the premises in a clean and safe condition on or prior to the date specified in the notice. Owner shall certify that all termination procedures have been completed and that the premises have been turned over to the possession of Owner. Within fifteen (15) days after that certification by Owner, Contractor shall render to Owner a bill for all expenses incurred in termination and for all work done subsequent to the last progress payment. Owner shall pay Contractor all sums properly due, together with any retainage not necessary to cover apparently nonconforming work or other changes, within fifteen (15) working days after the bill has been received by Owner, provided that Owner has received releases for all liens.
- 13.1.6 If Contractor is terminated for cause or default on this contract, the performance bond surety shall commence performance within fourteen (14) days of the termination or default. If the surety does not arrange for or commence performance by that date, Owner shall have the option to complete or arrange for performance and the surety shall not be relieved of any responsibility for payment of costs of performance.
- 13.1.7 Should Owner elect to terminate Contractor's services prior to final completion of the work, such termination shall not affect any rights Owner might assert against Contractor at time of termination or thereafter. Any retention or payment of monies by Owner to Contractor shall not release Contractor from that liability.

13.2 SUSPENSION OF THE WORK

13.2.1 Owner may, at any time and for any reason, suspend the work or any portion of it for a period not to exceed ninety (90) days, by written notice delivered to Contractor thirty (30) days prior to the date fixed for suspension. The notice of suspension shall fix the date on which the work is to be resumed and Contractor shall resume the work on the date so fixed. Equitable adjustment in the contract price, the contract time, or both shall be made for cost or delay directly attributable to suspension of the work.

13.3 TERMINATION BY CONTRACTOR

13.3.1 If through no act or fault of Contractor, Owner orders a suspension of work for a period of more than ninety (90) days, Contractor may, upon thirty (30) days written notice to Owner, terminate this contract and recover from Owner payment for work accepted to date plus purported overhead and profit in the manner provided in ARTICLE 9.4. Contractor shall also have the right to terminate this contract if Owner fails within forty-

five (45) days to pay amounts properly due Contractor for satisfactorily accomplished work, so certified by Project Representative, as due and payable. The provisions of this section do not include amounts ordinarily retained from Contractor's Application for Payment or amounts retained because of unsatisfactory, defective, or incomplete work, or for any other reason provided in the contract documents.

ARTICLE 14 MISCELLANEOUS PROVISIONS

- 14.1 Whenever any provision of the contract documents requires written notice, such notice shall be deemed to have been given and binding when given by certified mail to the respective party at the address provided in the Legal Notice provision of the agreement section of the contract documents.
- 14.2 Neither party may assign this contract without the written consent of the other party and Contractor may not delegate duties under this contract other than as provided in the contract documents without the prior written consent of Owner.
- In the event a provision of the contract documents is found to be unenforceable or void for any reason, it shall be considered as severed from the contract documents, and the remaining portions of the contract documents shall stand as if that provision had never been included in the contract documents. In the event the unenforceable or void provision is legally essential to the continuing existence of the contract, the parties shall attempt to substitute a reasonable replacement provision.
- 14.4 No general condition stated in these provisions or other provision in the contract documents lessens, alters, or makes inapplicable the requirement for indemnification stated in ARTICLE 4.13. In the event of conflict between any contract provisions, the requirements set out in ARTICLE 4.13 control.

END GENERAL CONDITIONS



SUBCONTRACTOR'S LIST



SUBCONTRACTORS LIST

PROJECT: Sludge Press Replacement - Phase 1

PRIME CONTRAC	CTOR	
Name:		
Address:		
Phone:	Contractor's License:	Business License:
information has b		or be on the job site until the following ors' and Business Licenses have been of any changes in this list.
SUBCONTRACT	TORS	
Name:		Amount of Contract:
Address:		
Phone:	Contractor's License:	Business License:
	*************	******
Name:		Amount of Contract:
Address:		
Phone:	Contractor's License:	Business License:
	*************	******
Name:		Amount of Contract:
Address:		
Phone:	Contractor's License:	Business License:
	*********	*****
Name:		Amount of Contract:
Address:		
		Business License:

Subcontractors List Rev 2013-03-04



TITLE 36 WAGE SCHEDULE



Laborers' & Mechanics' Minimum Rates of Pay

Labor for the project must be paid at the prevailing wage rates listed in the Alaska Department of Labor & Workforce Development, Laborers' & Mechanics' Minimum Rates of Pay, Wage & Hour Administration Pamphlet no 600.

The state of Alaska wage rates can be obtained at:

http://www.labor.state.ak.us/lss/pamp600.htm

Use the rates that are in effect ten days prior to Bid Opening.

A paper copy of the wage rates will be included in the executed Contract.



PERFORMANCE BOND



PERFORMANCE BOND

(Name of 0	Contractor)				
(Address of Contractor)					
a (Corporation, Partnership, or Individual)	_, hereinafter called Principal, and				
(Name o	f Surety)				
(Address	of Surety)				
hereinafter called Surety, are held and firmly bound unto					
(Name o	f Owner)				
(Address	of Owner)				
hereinafter called Owner, in the penal sum of(\$	United States, for the payment of which sum well an rs, administrators and successors, jointly and severally at whereas, the Principal entered into a certain contract.				

NOW, THEREFORE, if the Principal shall well, truly and faithfully perform its duties, all the undertakings, covenants, terms, conditions, and agreements of said contract during the original term thereof, and any extensions thereof which may be granted by the Owner, with or without notice to the Surety, and if he shall satisfy all claims and demands incurred under such contract, and shall fully indemnify and save harmless the Owner from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse and repay owner all outlay and expense which the owner may incur in making good any default, then this obligation shall be void; otherwise to remain in full force and effect .

PROVIDED, FURTHER, that the said Surety, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to the work to be performed thereunder or the specifications accompanying the same shall in any ways affects its obligation on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the work or to the specifications.

PROVIDED, FURTHER, that no final settlement between the Owner and the Contractor shall abridge the right of any beneficiary hereunder, who claims may be unsatisfied.

Performance Bond Rev 2013-03-04

IN WITNESS WHEREOF, this instrument is executed deemed an original, this the day of	I in three (3) counterparts, each one of which shall be
decined an original, this the day of	
	(Principal) (SEAL)
	(Principal Secretary)
ATTEST:	
	BY
(Witness as to Principal)	(Address)
(Address)	
	(0511)
	(Surety) (SEAL)
ATTEST:	BY(Attorney-in-Fact)
	(Altorrey-in-i act)
(Witness as to Surety)	(Address)
(Address)	
NOTE: If Contractor is Partnership, all partners should	execute bond.
IMPORTANT: Surety companies executing bonds must appe	ear on the Treasury Department's most current list (Circular 570 as
amended) and be authorized to transact business	s in the State where the project is located.

Performance Bond Rev 2013-03-04

PAYMENT BOND



PAYMENT BOND

	(Name of Contractor)
	(Address of Contractor)
a (Corporation, Partnership, or Individua	, hereinafter called Principal, and al)
	(Name of Surety)
	(Address of Surety)
hereinafter called Surety, are held and	firmly bound unto
	(Name of Owner)
	(Address of Owner)
hereinafter called Owner, in the pena (\$) in law truly to be made, we bind ourselves, of firmly by these presents.	Dollars, wful money of the United States, for the payment of which sum well and our heirs, executors, administrators and successors, jointly and severally,
	TION is such that whereas, the Principal entered into a certain contract y of, 202_, a copy of which is hereto attached and made a

NOW, THEREFORE, if the Principal shall promptly make payment to all persons, firms, subcontractors, and corporations furnishing materials for or performing labor in the prosecution of the work provided for in such contract, and any authorized extension or modification thereof, including all amounts due for materials lubricants, oil, gasoline, coal and coke, repairs on machinery, equipment and tools, consumed or used in connection with the construction of said work, and all insurance premiums on said work, and for all labor, performed in such work whether by subcontractor or other-wise, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said Surety, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to the work to be performed thereunder or the specifications accompanying the same shall in any ways affects its obligation on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the work or to the specifications.

PROVIDED, FURTHER, that no final settlement between the Owner and the Contractor shall abridge the right of any beneficiary hereunder, who claims may be unsatisfied.

Payment Bond Rev 2013-03-04

	(Principal)	(SEAL)
	(Principal Secretary)	()
ATTEST:	BY	
(Witness as to Principal)	(Address)	
(Address)		
	(Surety)	(SEAL)
ATTEST:	BY(Attorney-in-Fac	t)
(Witness as to Surety)	(Address)	
(Address)		
NOTE: If Contractor is Partnership, all partners s	hould execute bond.	
Surety companies executing bonds mu	st appear on the Treasury Departmen business in the State where the project is	nt's most current list (Circular 570 a

Payment Bond Rev 2013-03-04

CONTRACTOR'S RELEASE



CONTRACTOR'S RELEASE AND AFFIDAVIT OF PAYMENTS OF DEBTS AND CLAIMS ("Release")

PROJECT NAME: Sludge Press Replacement – Phase 1

The undersigned, being first duly sworn, deposes and says:
1. That pursuant to this contract for project
2. The Contractor further certifies he did not extend any loan, gratuity, or gift of money of any form whatsoever to any employee or agent of the City, that he did not rent or purchase any equipment or materials from any employee of the City, nor to the best of his knowledge, from any agent of any employee of the City, and that he has not made any promise to an employee or agent of the City to do or undertake any such action after completion of the subject contract.
3. Pursuant to the above-described contract and in consideration of the final payment in the amount of \$, the undersigned Contractor hereby releases and discharges the City of Kenai, its officers, agents and employees of and from any and all further claim, debt charge, demand, liability, or other obligation whatsoever under or arising from said contract whether known or unknown and whether or not ascertainable at the time of the execution of this instrument. This release is complete, final, binding and irrevocable.
4. The Contractor shall indemnify, defend, save and hold the City, its elected and appointed officers, agents and employees, harmless from any and all claims, demands, suits, o liability of any nature, kind or character including costs, expenses, and attorneys fees resulting from Contractor or Contractor's officers, agents, employees, partners, attorneys, suppliers, and subcontractors' performance or failure to perform this Agreement in any way whatsoever. This defense and indemnification responsibility includes claims alleging acts or omissions by the City or its agents which are said to have contributed to the losses, failure, violations, or damage However, Contractor shall not be responsible for any damages or claim arising from the sole negligence or willful misconduct of the City, its agents, or employees. Contractor and subcontractors shall also not be required to defend or indemnify the City for damage or loss that has been found to be attributed to an independent contractor directly responsible to the City under separate written contract.

CONTRACTOR'S RELEASE AND AFFIDAVIT OF PAYMENTS OF DEBTS AND CLAIMS ("Release")

If any portion of this Release is voided by law or court of competent jurisdiction, the remainder of this Release shall remain in full force and effect. IN WITNESS WHEREOF, this Release has been executed this day of , 202 . (Contractor's signature) Title_____ **ACKNOWLEDGMENT** STATE OF ALASKA SS THIRD JUDICIAL DISTRICT THIS IS TO CERTIFY that on this _____ day of ____ , 202 , before the undersigned, a Notary Public in and for the State of Alaska, duly commissioned and sworn, personally appeared _____ having produced satisfactory evidence of identification, and having acknowledged the voluntary and authorized execution of the foregoing instrument for the purposes therein mentioned, executed the above and foregoing instrument. Notary Public for Alaska My Commission Expires:

(NOTE: In case of a corporation, the attached Certificate of Authority must be completed by a

corporate officer other than the one who signs above.)

CONSENT OF SURETY TO FINAL PAYMENT





CONSENT OF SURETY COMPANY TO FINAL PAYMENT

PRO	JECT:	
CON	TRACT DATE:	
CON	TRACTOR:	
TO:	CITY OF KENAI 210 Fidalgo Avenu Kenai, AK 99611 Attn: Public Works	e
	•	Surety (insert name and address of Surety),
\$1. wheth	, and in th In giving this Cons ner said payment sho	d approve of the final payment to Contractor in the amount of e case of Surety, it is further agrees as follows: ent, Surety has made its own investigation to determine uld be made to Contractor and Surety has not relied on any
conse	ent to such payment.	of Kenai or its employees or agents which has induced it to
2.	Surety agrees that t	his payment shall not relieve Surety of any of its obligations to

the City of Kenai as set forth in its Labor and Material Payment and Performance Bonds

and Surety waives any and all claims against C to Contractor.	ity of Kenai for wrongful release of funds
IN WITNESS WHEREOF, said Surety Compa, 202	ny has set its hand this day of
	(Surety)
	(Signature of authorized representative)
	(Printed name and title)
STATE OF) ss)	LEDGMENT
	having produced satisfactory evidence of
	Notary Public for My Commission Expires:

NOTE TO SURETY: ATTACH PROOF OF POWER OF ATTORNEY OR OTHER DOCUMENTATION DEMOSTRATING SIGNATORY MAY BIND SURETY

CONTRACTOR'S BUSINESS LICENSE

(To be Submitted)



SAMPLE

Alaska Department of Commerce, Community, and Economic Development P.O. Box 110806, Juneau, Alaska 99811-0806

ALASKA BUSINESS LI	ICENSE
The licensee named below holds Alaska Business Lice	
Covering the period of: through _ Line of Business:	
Line of business.	
COMPANY NAME	:
ADDRESS	-
Owner:	
NAME OF OWNER	
This license shall not be taken as permission to do business in the stat	e without having complied with
The other requirements of the laws of the State of Alaska or	
Alaska Department of Comm	erce, Community, and Economic Development
	Commissioner:
This license must be posted in a conspicuous place at the business location	. It is not transferable or assignable.
	SAMPLE
	SAMPLE
No STATE OF ALASK	-
Effective: PERAPTMENT OF COMMERCE COMMUNITY	\mathbf{A}
Expires: DEPARTMENT OF COMMERCE, COMMUNITY DEVELOPMENT	A & ECONOMIC
Expires: DEPARTMENT OF COMMERCE, COMMUNITY	A & ECONOMIC
Expires: DEPARTMENT OF COMMERCE, COMMUNITY DEVELOPMENT	A & ECONOMIC
Expires: Expires: DEPARTMENT OF COMMERCE, COMMUNITY DEVELOPMENT Division of Occupational Licensin Division of Occupational Licen	A & ECONOMIC
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DEPARTMENT OF COMMERCE, COMMUNITY DEVELOPMENT Division of Occupational Licensin Division of Occupational Licen Certifies that	A & ECONOMIC g sing
Expires: Expires: DEPARTMENT OF COMMERCE, COMMUNITY DEVELOPMENT Division of Occupational Licensin Division of Occupational Licen	A & ECONOMIC g sing
DEPARTMENT OF COMMERCE, COMMUNITY DEVELOPMENT Division of Occupational Licensin Division of Occupational Licen Certifies that COMPANY NAM	A & ECONOMIC g sing
DEPARTMENT OF COMMERCE, COMMUNITY DEVELOPMENT Division of Occupational Licensin Division of Occupational Licen Certifies that	A & ECONOMIC g sing

Specialty

Commissioner:



SAMPLE INSURANCE CERTIFICATE

(Submit Original)





CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(les) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy certain policies may require an endorsement. A statement on this certificate does not confer rights to the

PRODUCER		CONTACT NAME:					
		PHONE (A/C, No. Ext):	FAX (A/C, No):	(C) (B			
		E-MAIL ADDRESS:					
		INSURER(S) AFFORDING COVERAGE					
		INSURER A 2					
INSURED		INSURER B:					
		INSURER C:					
		INSURER D:					
		INSURER E :					
		INSURER F:					
COVERAGES	CERTIFICATE NUMBER:		REVISION NUMBER:				
INDICATED, NOTWITH	HAT THE POLICIES OF INSURANCE LISTED BELOW STANDING ANY REQUIREMENT, TERM OR CONDITI ISSUED OR MAY PERTAIN, THE INSURANCE AFFO	ON OF ANY CONTRACT OR OTHE	ER DOCUMENT WITH RESPECT TO	WHICH THIS			

EXCLUSIONS AND CONDITIONS OF SUCH POLICIES, LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSF	TYPE OF INSURANCE	ADD	SUBR		POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMIT	s	
-	GENERAL LIABILITY X COMMERCIAL GENERAL LIABILITY							EACH OCCURRENCE DAMAGE TO RENTED PREMISES (Ea occurrence)	\$	1,000,000
A	SLAIMS MADE X OCCUR	х	х	7				MED EXP (Any one person)	\$	5,000
			+					PERSONAL & ADV INJURY	\$	1,000,000
								GENERAL AGGREGATE	\$	2,000,000
	GEN'L AGGREGATE LIMIT APPLIES PER:							PRODUCTS - COMP/OP AGG	\$	2,000,000
	X POLICY PRO-	1_		_				ACCUBING ANALS LINES	5	
	AUTOMOBILE LIABILITY							COMBINED SINGLE LIMIT (Ea accident)	\$	1,000,000
A	X ANY AUTO		-	L				BODILY INJURY (Per person)	\$	<u> </u>
A	ALL OWNED SCHEDULED AUTOS	X	x)				BODILY INJURY (Per accident)	\$	
	HIRED AUTOS NON-OWNED AUTOS	-	-					PROPERTY DAMAGE (Per accident)	\$	
								Underinsured motorist	\$	1,000,000
	X UMBRELLA LIAB OCCUR							EACH OCCURRENCE	\$	
A	EXCESS LIAB CLAIMS-MADE							AGGREGATE	\$	4,000,000
	DED TRETENTIONS 10,000								\$	
A	WORKERS COMPENSATION							X WC STATU- OTH-		
	ANY PROPRIETOR PARTNER/EXECUTIVE	N/A						E.L. EACH ACCIDENT	\$	1,000,000
	OFFICER/MEMBER EXCLUDED? (Mandatory in NH)	""	_					E.L. DISEASE - EA EMPLOYEE	\$	1,000,000
	If yes, describe under DESCRIPTION OF OPERATIONS below		X					E.L. DISEASE - POLICY LIMIT	\$	1,000,000

DESCRIPTION OF OPERATIONS (LOCATIONS / VEHICLES (Attach ACORD 101, Additional Remarks Schedule, if more space is required)

Re: PROJECT NAME

Certificate Holder is an Additional Insured on General Liability & Automobile policies, but only with respect to work done by or on behalf or the named insured for the project referenced. The Certificate Holder is granted Waiver of Subrogation on the General Liability, Automobile and Workers' Compensation policies as respects the referenced project

CERTIFICATE HOLDER	CANCELLATION
City of Kenai	SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.
210 Fidalgo Ave Kenai, AK 99611	AUTHORIZED REPRESENTATIVE

ACORD 25 (2010/05)



D. OWNER FURNISHED EQUIPMENT INFORMATION

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City of Kenai Screw Press

Andritz Project No. 844944

Screw Press Model C-5427

Factory: Andritz Separation, Inc.

1010 Commercial Blvd, South

Arlington, TX 76001

Project Manager: Taylor Dekle

Phone / Fax

(817) 419-1726 / (817) 465-5611

This manual is the confidential and proprietary information of Andritz Separation Inc. Any party accepting receipt of this manual does so on the express understanding and agreement that it will neither copy, reproduce, disclose to third parties or use this manual for any purpose other than those expressly agreed to by Andritz Separation Inc. in writing. Such party also agrees to indemnify Andritz Separation Inc. against any losses or damages suffered by Andritz Separation Inc. as a result of such parties improper reproduction, disclosure or use of this manual.



- 1.0 Expected Schedule
- 2.0 Scope of Supply
- 3.0 Design Criteria / Data Sheets
- 4.0 Warranty
- 5.0 Mechanical Drawings
- 6.0 Electrical Drawings
- 7.0 Sequence of Operation / Control System Description
- 8.0 Control Panel Component Cutsheets
- 9.0 Field Components Cutsheets
- 10.0 Motor Information
- 11.0 Compressor Information
- 12.0 Exceptions / Clarifications



1.0 Expected Schedule

Expected delivery to the project site is late-August/early-September, 2022.



2.0 Scope of Supply



Item	Qty.	Description
ITEM 1		SCREW PRESS EQUIPMENTSUPPLY
1	1 ea.	 ANDRITZ Screw Press Model C-5427: 304L stainless steel wetted parts 304L stainless steel screw shaft with helical flights 304L stainless steel split screen baskets with perforated plate screns Base frame made of epoxy coated carbon steel frame with internal surfaces lined with 304L stainless steel Inlet feed box made of epoxy coated carbon steel with internal surfaces lined with 304L stainless steel, with pressure sensor Outlet box made of epoxy coated carbon steel with internal surfaces lined with 304L stainless steel, with inspection hatch Covers made of fiberglass with stainless steel inspection hatches Pneumatic actuated counter pressure device supplied at the discharge of the pressure zone to increase the dryness of the sludge, made of epoxy coated carbon steel Dual sequential spray wash system made of 304L stainless steel 304L stainless steel inlet feed box with pressure sensor Planetary Gear reducer with 2 horsepower motor 230/460 Volt Bearings are L-10 for over 100,000 hours, grease lubricated Pneumatic Control Panel (machine mounted)
	4.5	Air compressor for pneumatic controls (shipped loose) Total controls Total contro
2	1 ea.	 Flocculation Tank and Mixer: 140 Gallon, 304 SS Tank and mixing shaft with blades 1 HP Nord Gearmotor Polymer injection ring

Andritz Project: 844944



Item	Qty.	Description
3	1 ea.	Screw Press Control Panel
		 NEMA 4X 304 SS enclosure, air conditioned Power input: 460 VAC, 3 Phase, 60 Hz Allen Bradley Compactlogix PLC Allen-Bradley PanelView Plus 7-10" OIT touch screen Allen Bradley PF 755 VFD for screw press Allen Bradley PF525 for tank mixer Motor starter for air compressor Control voltage transformer Main power disconnect switch E-stop Grace port
4	1 lot	 Special Tools and Spare Parts Included: One (1) set of Special Tools One (1) set bearings and bushings One (1) set wipers and mounting hardware One (1) set shower spray nozzles
5	1 lot	Drawings and Documentation: ANDRITZ will supply the following drawings and documents (one e-copy): • Arrangement drawings with dimensions for the ANDRITZ scope • Motor list • Written sequence of operation including all interlocks • Control panel layout • Electrical drawings • Mechanical drawings • Terminal box details • Operating and maintenance manuals (1 e-copy and 3 hard copies)
6	1 lot	Packing and Freight to Jobsite (not including unloading) Screw press, floc tank and control panel to be skidded and wrapped,
		with tools and spare parts packed in crates.

Andritz Project: 844944



Item	Qty.	Description
ITEM		SITE SERVICES FOR COMMISSIONING
7	1 lot	Manufacturer's Site Services for Commissioning Installation checkout, startup and commissioning, testing and training: allow 1 trip with 5 days on site



3.0 Design Criteria / Data Sheets



DESIGN CRITERIA AND SCREW PRESS SIZING

Design Criteria

Application	Municipal Sludge Dewatering
Sludge description	Aerobically Digested Sludge
Feed solids concentration	1.0 to 1.6 percent total solids
Feed solids capacity	240 lb/hr
Minimum cake solids concentration	>15% total solids
Minimum capture rate	92% of feed total solids
Maximum polymer usage	20 lbs active polymer per dry ton of feed solids
Allowable noise level while operating	89 dBA at 3 feet

Thickener Selection and Expected Performance

Screw Press Model	ANDRITZ C-5427 Screw Press
Number of Units	One (1)
Cake Solids Concentration	15-16% TS or passing Paint Filter Liquids Test
Solids Capture	93-95% TS
Polymer Dosage (Emulsion)	20-30 active pounds per dry ton of feed solids

Note:

Equipment sizing and performance based on ANDRITZ Lab Test L-14569

The sample that was received for lab testing had a feed solids concentration of 1.68% TS

Polymer dosage was higher than the specified dosage. Based on the lab test, we expect polymer dosage between 20-30 active lbs per ton depending on the sludge characteristics at the time.





General

The C-press specific robust design allows a high dewatering efficiency in a compact design. This technology mixes the advantages of different dewatering technologies such as fully automatic operation, completely enclosed design and compactness, low noise emission, low wash water consumption, high dryness efficiency, very low power consumption and low operating costs.

ANDRITZ specific basket design gives a strong advantage in terms of capture rate and maintenance costs. Mixing device allows to lower the power consumption. Unique washing system decreases water consumption.

The C-Press is an efficient dewatering technology for municipal and industrial applications.

Weight and dimensions

Size (L x W x H)	172.00 x 46.68 x 48.00 in
Weight (empty)	4,233 lbs
Weight (in operation)	6,834 lbs

Materials of construction

Screen baskets	1.4306 (AISI 304L)
Screw shaft	1.4306 (AISI 304L)
Frame	Carbon steel*
Inlet box and outlet b	ox Carbon steel*
Counter pressure de	vice Carbon steel
Coverage	Fiber glass
All wetted parts	1.4306 (AISI 304L)
Scraper	Polyurethane
Spray nozzle	1.4306 (AISI 304L)
Finishing	Blue RAL 5015 (Epoxy system)

*(Inner face cladded with 1.4306)

Option:

Raw Material	1.4404 (AISI 316L)
Covers	1.4306 (AISI 304L)
	or 1.4404 (AISI 316L)

Baskets

Inside diameter	540 mm
Number of baskets	3
Total length of baskets	2700 mm
Open area	30.6 / 21.5 / 13.5%
Ontion:	

Option:

Splitted basket on high pressure zone for easy maintenance in place

Screw

Pitch	500 mm
Number of screw flights	1

Frame

Profile	"C" folded plate
Anchors bolts	7/16 / 316
Lifting points	4

Counter pressure device

Cylinder type	ISO 15552 – VDMA24652	
Number of pneumatic cyli	nders 2	
Pressure range	0 – 87 psi	
Air consumption	6.0-6.4 cfm*	
Pneumatic panel	1	
(*) Air consumption lasts for 5-10 seconds to pressurize the pneumatic cylinders at start-up.		

Safety device

4...20Ma Pressure transmitter





Washing spray pipe

Quantity 2

Pressure 87 psi

Water consumption rate 48 gpm

Water consumption per hour 132 Gal

(With thickening zone/each hour and dewatering

zone/each two hours)

Water Quality 500µm (100ppm)

without Sulfite or / and Chloride

Washing sequence occurs during dewatering process

Sensor 2

Gear Motor

See table 1

Lubrication

Bearing & Spindle shalf (washing device)

with grease/ type: KP2K

Gear motor

Screw shaft Oil (synth. PAO iso VG 320 EP)

Washing device Oil (synth. PG 460)

Noise level

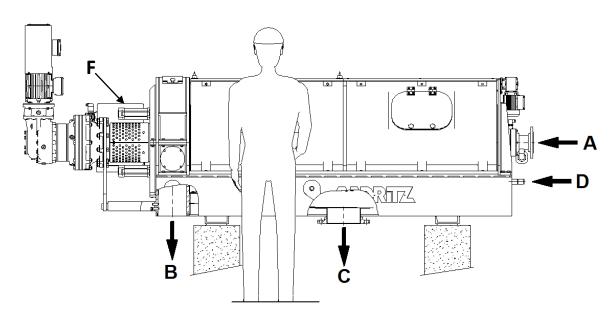
Noise < 70 dB(A) at 1 meter

Inline Flocculator

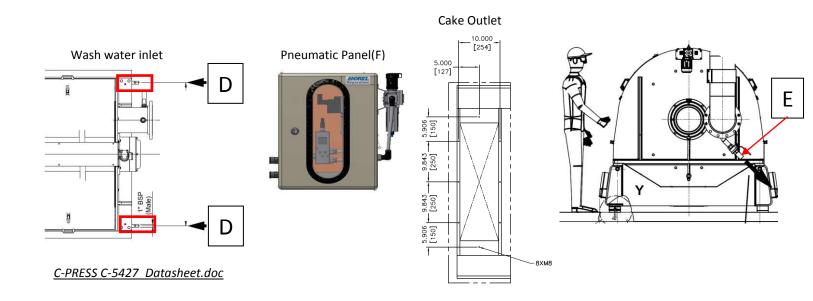
See table 2

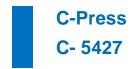


Connections



ITEM	DESCRIPTION	SIZE	Detail
Α	Inlet	3"-150# ANSI FLANGE	Flange
В	Cake outlet	28.50 x 9.38 in (8 x M8)	Rectangular hole
С	Filtrate outlet	8"-150# ANSI FLANGE	Flange
D	Wash water inlet	2 x (1" BSP Male)	Threaded
E	Sample taking point (feed)	OD 1.57"	Pipe
F	Pneumatic panel	300x200x150 – OD 8mm	Pipe







Gear motor & frequency inverter

		SCREW SHAFT	WASHING DEVICE			
		Gear motor				
Туре		Planetary	Helical worm gear			
Power	kW	1.5	0.12			
Voltage	V	230/400	230/400			
Rated current	Α	-	-			
Frequency	Hz	50	50			
Output speed gear motor	RPM	0.5 at 50 Hz	79			
Service factor		1.5	1.75			
Hollow shaft	Ø	105	16			
Motor protection type	IP	55	55			
Thermal Classification		F	F			
Efficiency Class		IE3	IE2			
Performance (50 / 75 / 100%Pn)	%	-	55 / 62,9 / 62,5%			
Weight	Kg	140	5.5			
Oil capacity	I	3.5	0.16			
Coupling		Shrink disc	key			
Option		Explosio	n proof			
FRE	QUEN	CY INVENTOR OPTION				
Nominal voltage	V	380500	N/A			
Power (high overload)	KW	1.5	N/A			
input frequency	Hz	5060 (+/-10%)	N/A			
Protection	IP	21 (for electrical cabinet) Or 54 (for external cabinet)	N/A			

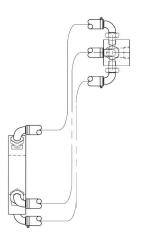
Table 1





Flocculation mixing device

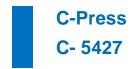
<u>Inlet Concentration < 20g/L</u>: Polymer injection ring



VENTURI MIXER										
TYPE	Dimensions (L/w/h)	Connection	Polymer connection	Weight (lbs)						
4" injection ring	9" x 9" x 3"	ISO DN100 PN10*	1" NPT Female threaded	20						

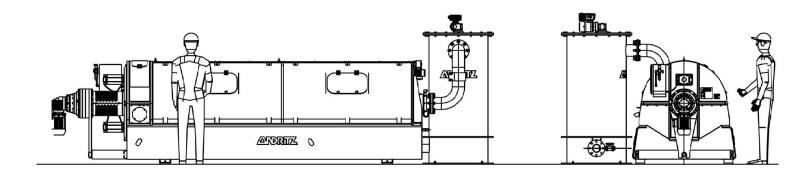
Table 2

^{*} The Venturi Mixer needs to be located 10 feet away from headbox.

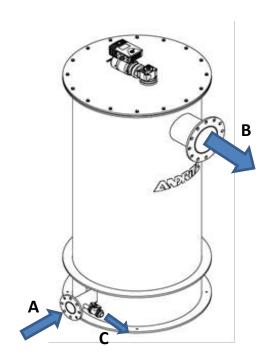




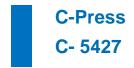
Inlet Concentration >20g/L: Dynamic Flocculation tank



DYNAMIC FLOCCULATOR											
Material			Black HDPE								
Capacity		Liters	520								
Total Width		mm	OD 800								
Total Height		mm	2151								
Empty weight		Kg	120								
Load weight		Kg	846								
GA Drawing		N° Drw	702519617								
Anchor			x4 - M12 /A4-70								
Power		kW	0,37								
Speed		RPM	100								
Frequency inven	ters		On board								
Inlet suldge A		mm	ISO DN 100 PN 10*								
Outlet Suldge B		mm	ISO DN 150 PN 10**								
Drain	С	mm	DN 25								



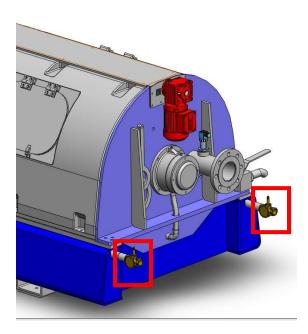
*Option: Flange 6"ANSI B16.5 – 150 Lbs **Option: Flange ANSI 8"ANSI B16.5 – 150 Lbs





Options:

• X2 Solenoid valves



- Air connection (suction) flange
- Splitted basket on high pressure zone for easy maintenance in place





4.0 Warranty



844944 City of Kenai

Andritz Separation Inc. Limited Warranty

1. Warranty

- (a) Seller warrants to Buyer that the Products manufactured by it will be delivered free from defects in material and workmanship. This warranty shall commence upon shipment of the Products and shall expire on the earlier to occur of 24 months from initial operation of the of the Products and 30 months from delivery thereof (the "Warranty Period"). If during the Warranty Period Buyer discovers a defect in material or workmanship of a Product and gives Seller written notice thereof within 10 days of such discovery, Seller will, at its option, either deliver to Buyer, on the same terms as the original delivery was made, according to INCOTERMS 2010, a replacement part or repair the defect in place. Any repair or replacement part furnished pursuant to this warranty are warranted against defects in material and workmanship for one period of 12 months from completion of such repair or replacement, with no further extension. Seller will have no warranty obligations for the Products under this Paragraph 3(a): (i) if the Products have not been stored, installed, operated and maintained in accordance with generally approved industry practice and with Seller's specific written instructions; (ii) if the Products are used in connection with any mixture or substance or operating condition other than that for which they were designed; (iii) if Buyer fails to give Seller such written 10 day notice; (iv) if the Products are repaired by someone other than Seller or have been intentionally or accidentally damaged; (v) for corrosion, erosion, ordinary wear and tear or in respect of any parts which by their nature are exposed to severe wear and tear or are considered expendable; or (vi) for expenses incurred for work in connection with the removal of the defective articles and reinstallation following repair or replacement.
- (b) THE EXPRESS WARRANTIES SELLER MAKES IN THIS PARAGRAPH (a) ARE THE ONLY WARRANTIES IT WILL MAKE. THERE ARE NO OTHER WARRANTIES, WHETHER STATUTORY, ORAL, EXPRESS OR IMPLIED. IN PARTICULAR, THERE ARE NO IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.
- (c) The remedies provided in Paragraph (a) are Buyer's exclusive remedy for breach of warranty.
- (d) With respect to any Product or part thereof not manufactured by Seller, Seller shall pass on to Buyer only those warranties made to Seller by the manufacturer of such Product or part which are capable of being so passed on. Remedy:

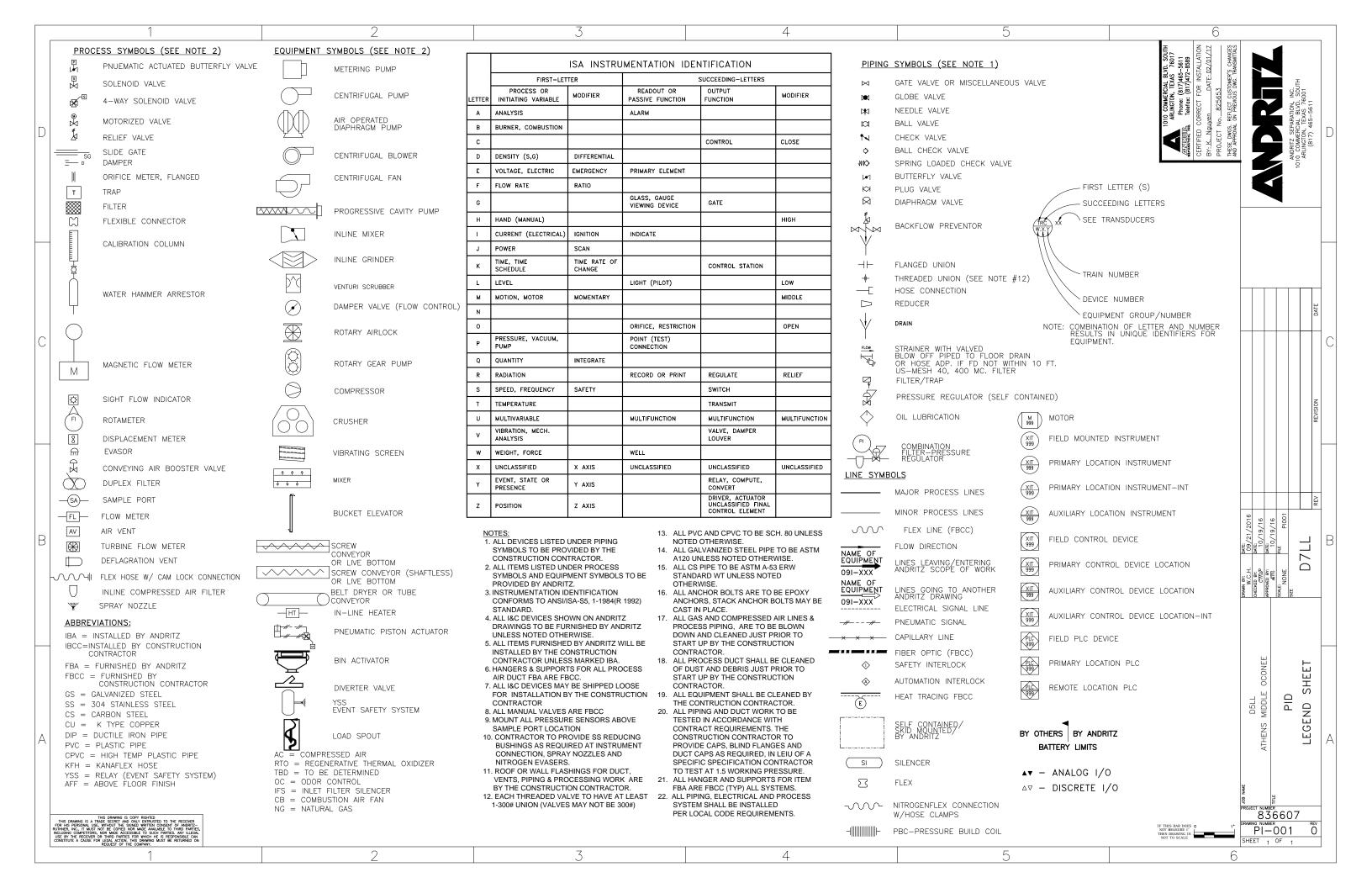
To report any problems or request for parts, contract our Spare Parts and Service Department at (817) 465-5611 or write to:

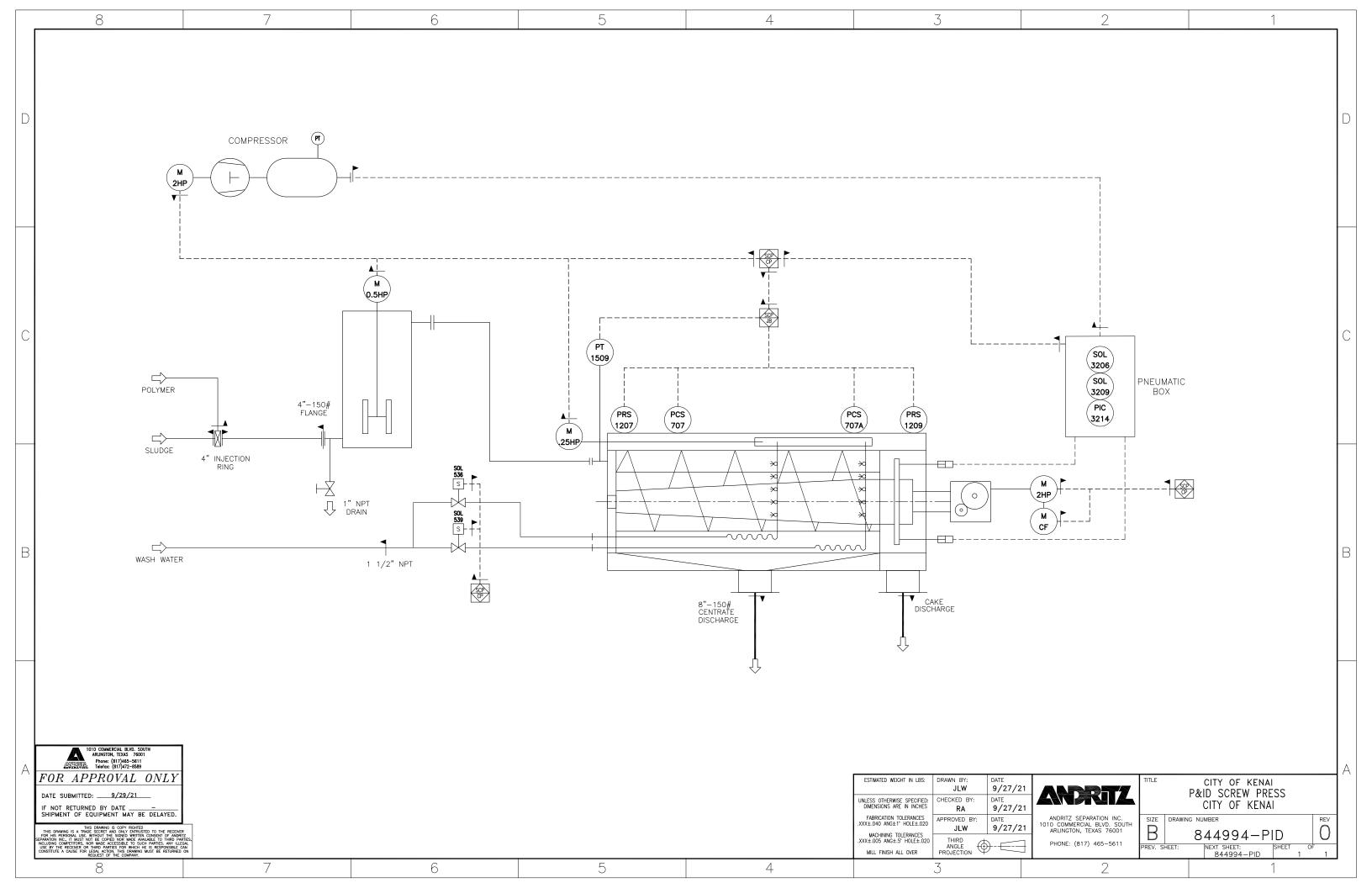
Andritz Separation Inc. 1010 Commercial Blvd. S. Arlington, Texas 76001

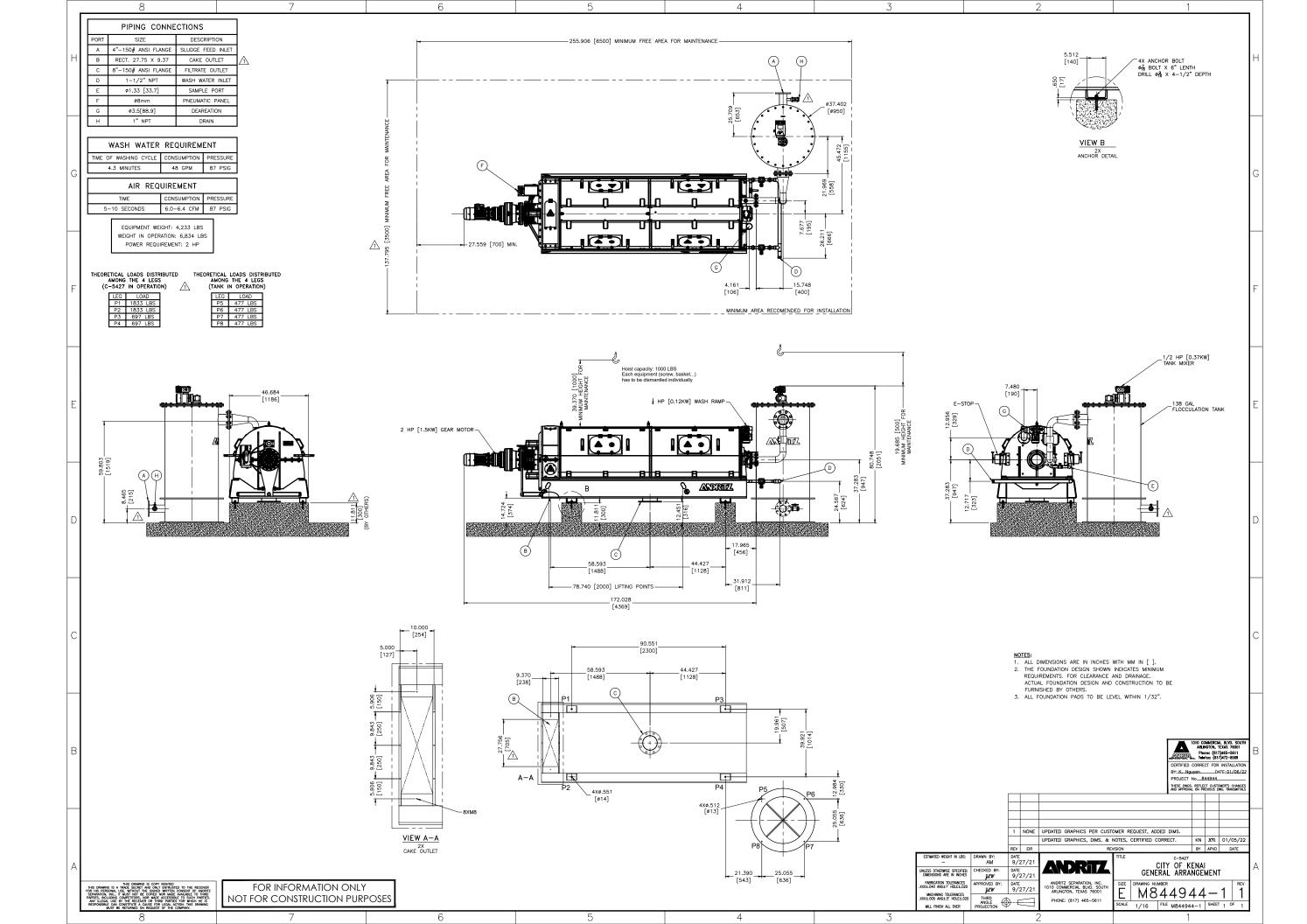


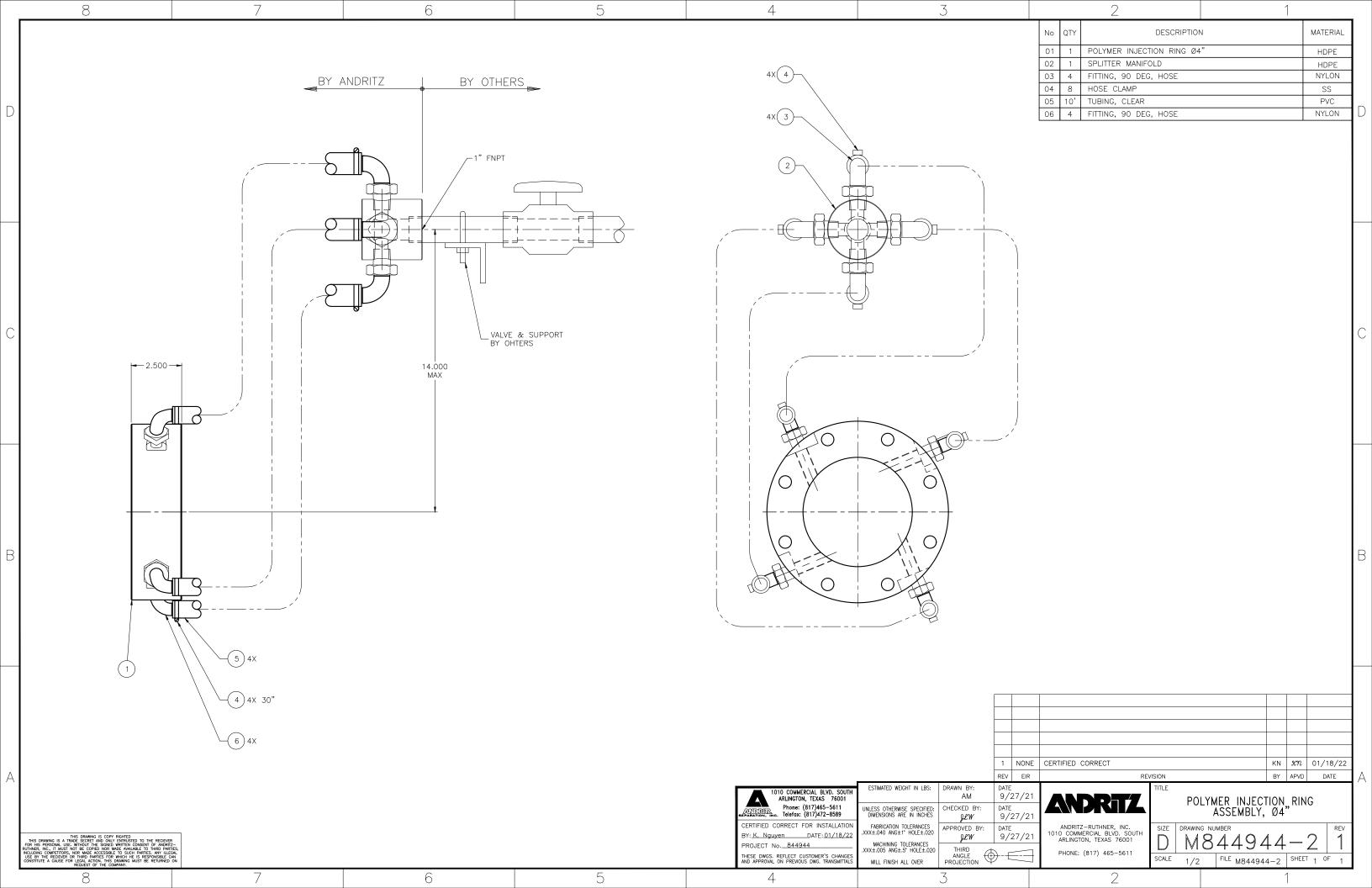


5.0 Mechanical Drawings



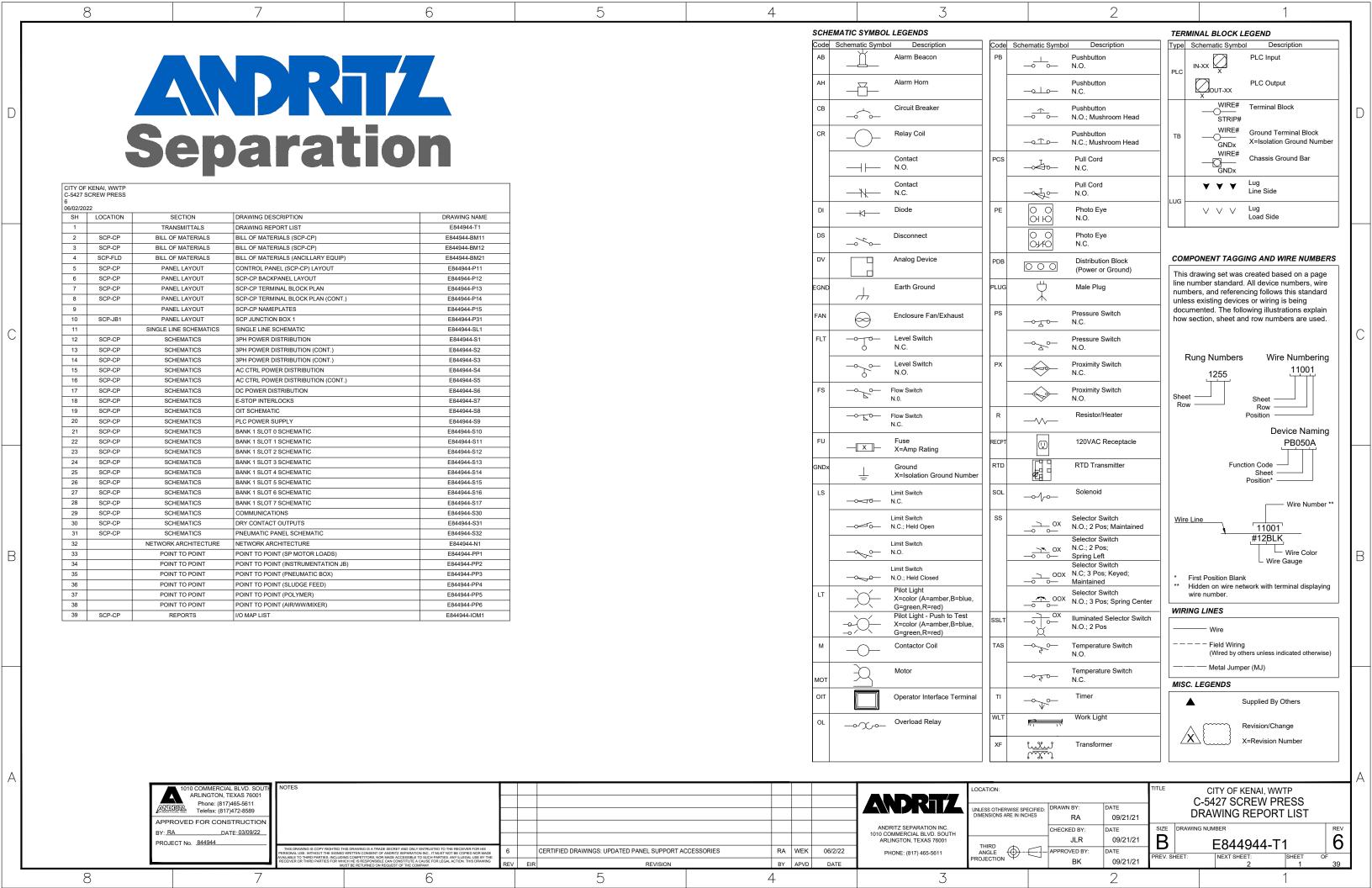






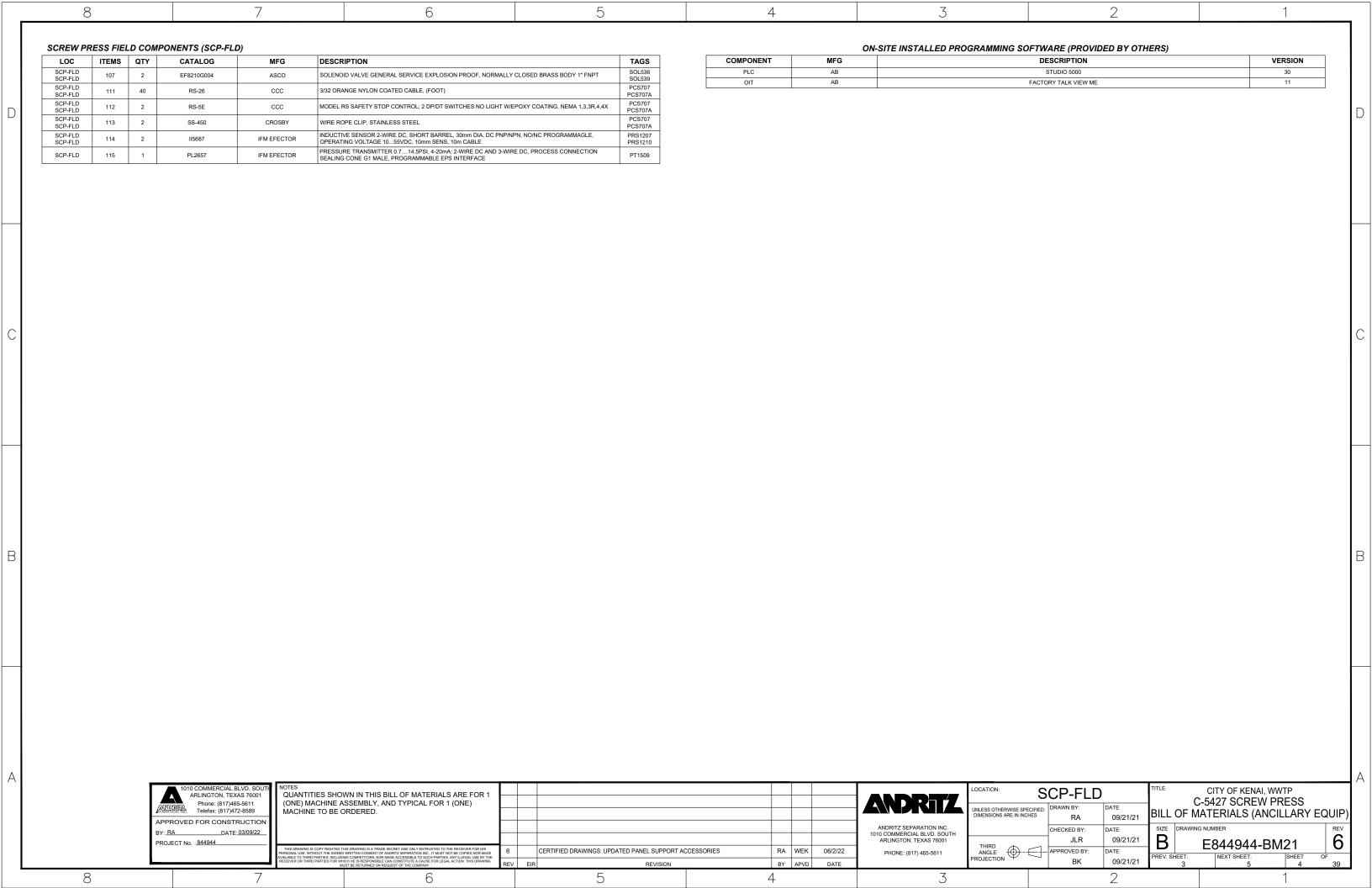


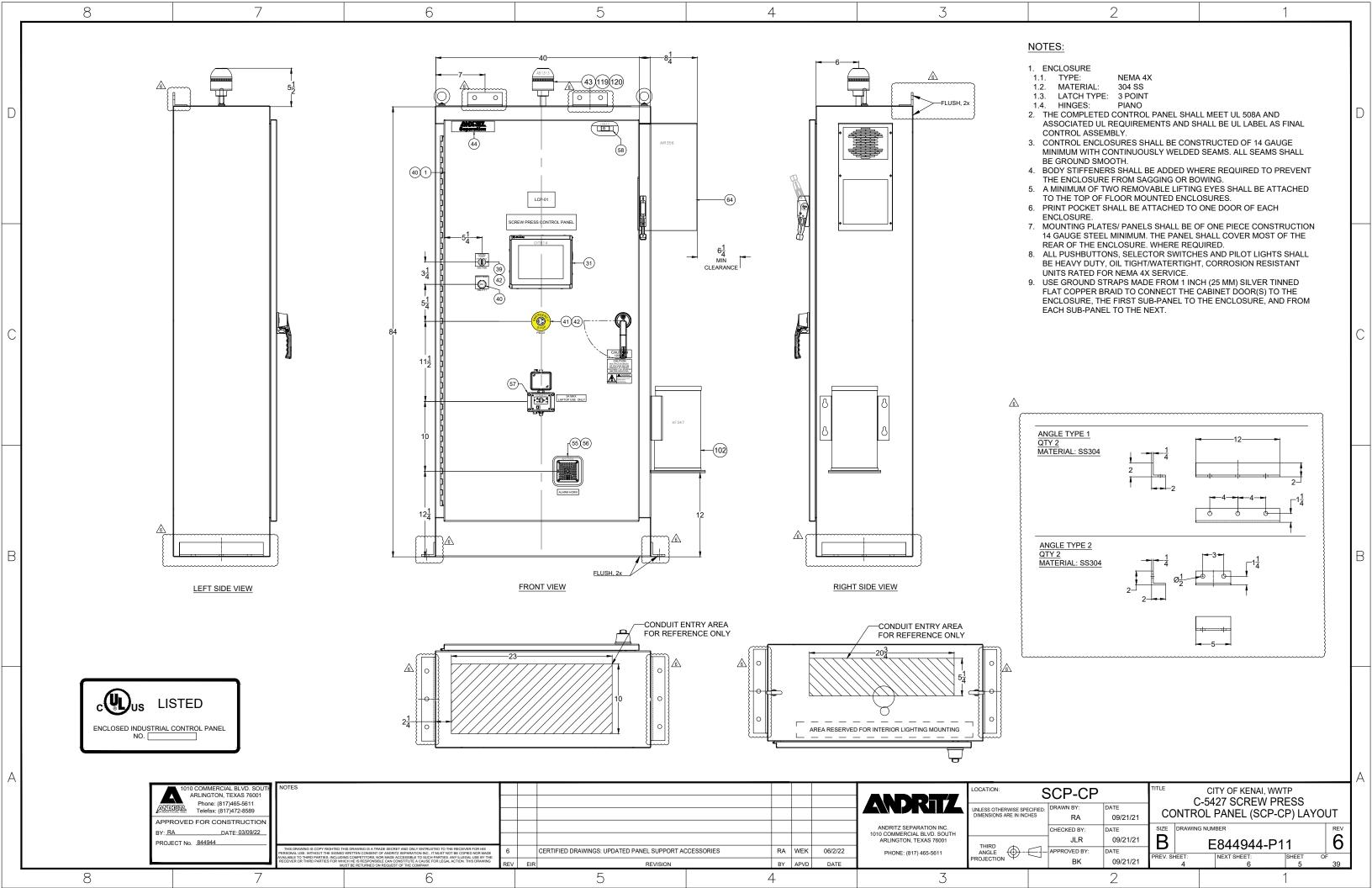
6.0 Electrical Drawings

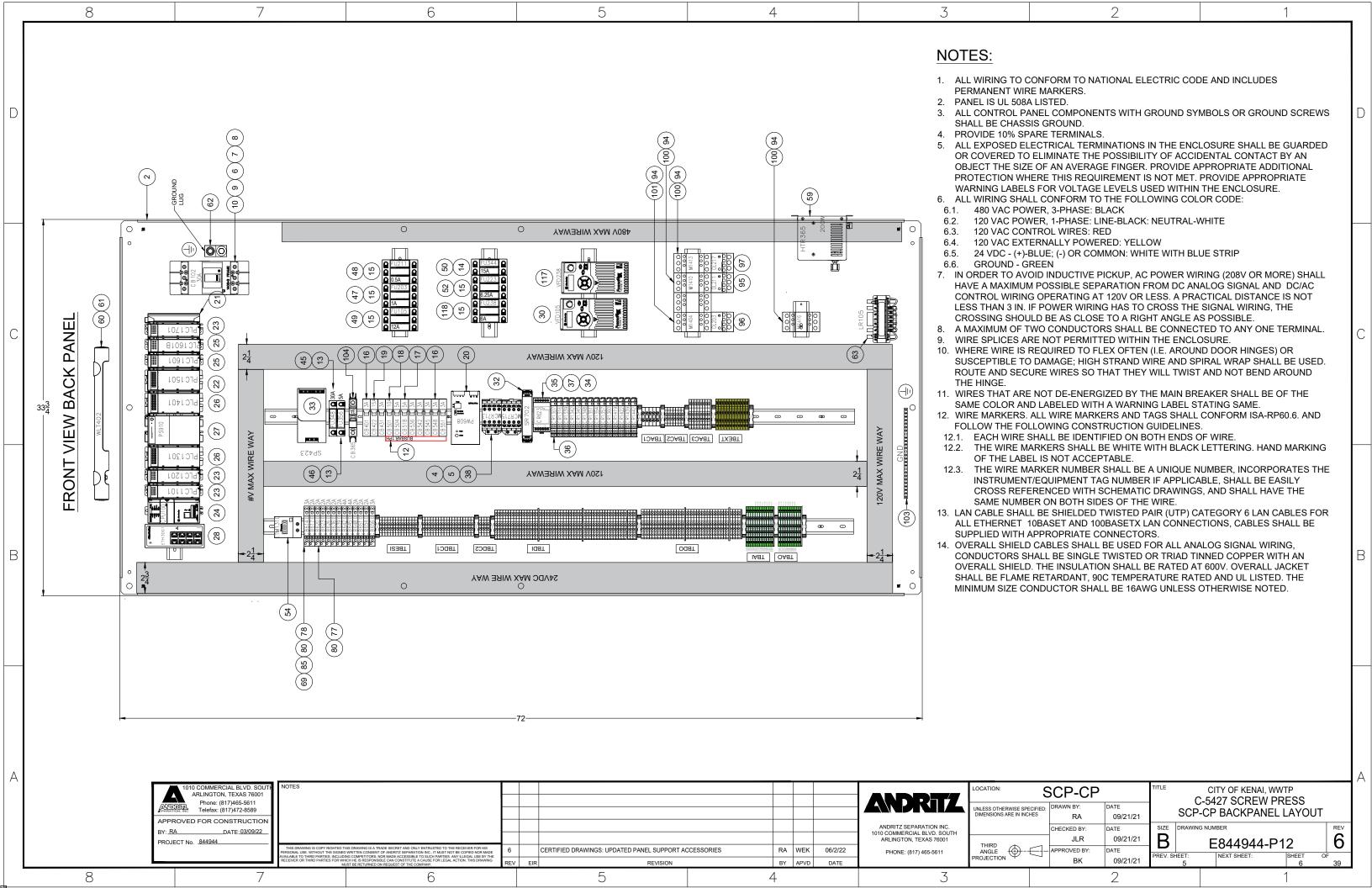


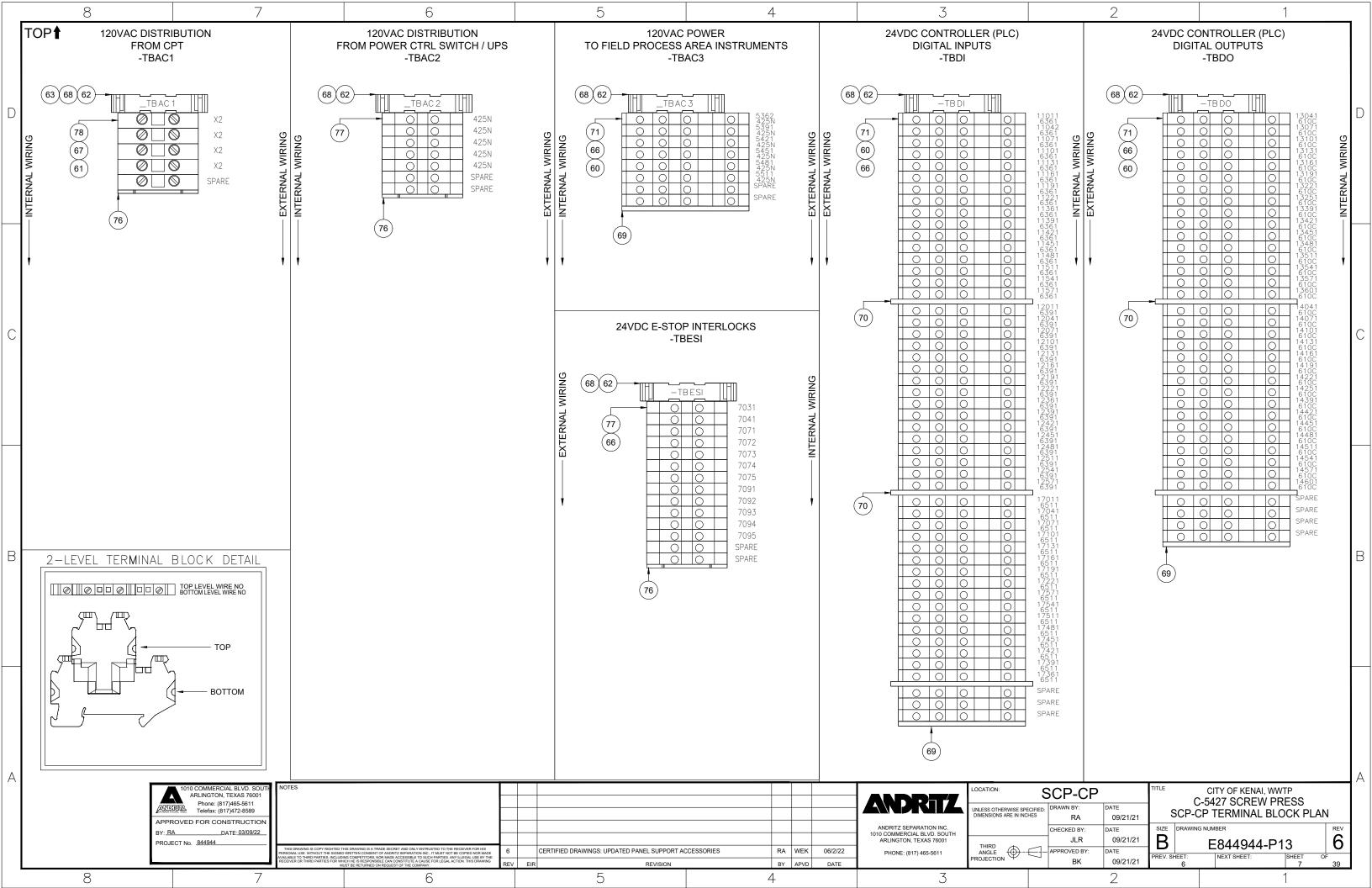
CREW PRI	ESS CON	ITROL F	PANEL COMPONENTS	(SCP-CP)			SCREW PR	RESS COM	NTROL F	PANEL COMPONEN	TS (SCP-CP)		
LOC	ITEMS	QTY	CATALOG	MFG	DESCRIPTION	TAGS	LOC	ITEMS	QTY	CATALOG	MFG	DESCRIPTION	TAGS
SCP-CP	1	1	A84XM4018SSN4	HOFFMAN	FREESTANDING ENCLOSURE, HEAVY DUTY STAINLESS STEEL, FOR FLANGE-MOUNT DISCONNECTS, NEM. 4X, 84"H x 40"W x 18"D	IA *NOTE 2	SCP-CP SCP-CP	36	14	700-HLT12Z24	AB	HL TYPE TERMINAL BLOCK RELAY, DPDT (C/O), 10A CONTACT RATING, W/SCREW TERMINALS, 24VDC, TOUCH SAFE, LIGHT INDICATOR, SURGE SUPPRESSOR	CR1307 CR1316
SCP-CP	2	1	A84PM40	HOFFMAN	BACKPANEL FOR 84X40 ENCLOSURES	*NOTE 2	SCP-CP SCP-CP						CR1339 CR1342
SCP-CP	4	2	100-FSD250	AB	SURGE SUPPRESSOR, DIODE MODULE, 12250VDC	MCR713	SCP-CP						CR1345
SCP-CP	-	2	100 0420	AD	ALIVILIADY CONTACT, CIDE MOLINE ONO	MCR715	SCP-CP SCP-CP						CR1348 CR1351
SCP-CP SCP-CP	5	2	100-SA20	AB	AUXILIARY CONTACT, SIDE MOUNT 2 NO	MCR713 MCR715	SCP-CP SCP-CP						CR1354 CR1357
SCP-CP	6	1	140G-G-MTL63.	AB	140G - G-FRAME, TERMINAL LUG, QTY 3, FCCu 6X14-2AWG	CB102	SCP-CP						CR1360
SCP-CP	7	1	140G-G-FCX04	AB	140G - FLEX-CABLE MECHANISM, NON-METALIC FLANGE HANDLE, 4 FT, FOR G-FRAME CIRCUIT BREAKERS	S CB102	SCP-CP SCP-CP						CR1419 CR1422
SCP-CP	8	1	140G-G-TC3L	AB	140G - FRAME-G, TERMINAL COVER, 3 POLE, QTY 2, LOW	CB102	SCP-CP SCP-CP						CR1439 CR1442
SCP-CP	9	2	140G-G-TLC13	AB	140G - G-FRAME, TERMINAL LUG, QTY 3, 1X14-1/0 (2.5-50)	CB102	SCP-CP	37	1	700-HN205	AB	SCREW TERMINAL TUBE BASE SOCKET, GUARDED TERMINAL CONSTRUCTION	CR623
SCP-CP	10	1	140G-G2C3-C30	AB	140G - MOLDED CASE CIRCUIT BREAKER, G-FRAME, 25KAIC, T/M - THERMAL MAGNETIC, RATED CURRENT		SCP-CP	38	2	700S-CF620EJC	AB	CF TYPE SAFETY CONTROL RELAY, 8 POLE, 24VDC ELECTRONIC COIL, STANDARD CONTACTS 6 N.O., 2 N.C.	MCR713
00. 0.		·			30A	05102	SCP-CP SCP-CP	39	1	800H-2HRWH2KB6AX	AB	30.5MM TYPE 4/4X/13 SEL. SWITCH-ILLUM, 2 POS, UNIVERSAL LED, 12-120VAC 50/60HZ, WHITE, STD KNOB	MCR715 SSLT436
SCP-CP	12	1	1492-A1B8	AB	SINGLE PHASE BUS BAR 80A, 57 DEVICES PER METER		301-01	39	'	00011-2111(VVI12(LDOAX	Ab	MAINT, KB6 MAINTAINED CAM, 1 NO 1 NC	33L1430
SCP-CP SCP-CP	13	2	1492-FB1C30-L	AB	1 POLE FUSE BLOCK - CLASS CC - WITH BLOWN FUSE INDICATOR - 110600V	FU348 FU356	SCP-CP	40	1	800HC-QRAH2BD1	AB	ILLUMINATED PUSH BUTTON - MOMENTARY, NEMA 4/4X, BLUE, 12-130V AC/DC, 1NO, FINGER SAFE GUARDS	PBLT711
SCP-CP	14	1	1492-FB2C30-L	AB	2 POLE FUSE BLOCK - CLASS CC	FU344	SCP-CP	41	1	800HC-TFRXT6A5S	AB	NON-ILLUMINATED PUSH BUTTON TRIGGER ACTION, TWO POSITION MAINTAINED, MUSHROOM HEAD, RED,	PB707
SCP-CP	15	5	1492-FB3C30-L	AB	3 POLE FUSE BLOCK - CLASS CC	FU105	SCP-CP	42	1	800T-XD1	AB	FINGER GUARDS ON TERMINALS, 2-NCLB SELF MONITORING CONTACTS 800T CONTACT BLOCK, SHALLOW BLOCK, 1 N.O.	PB707
SCP-CP SCP-CP						FU203 FU211	SCP-CP	42	2	800T-XD1M	AB	CONTACT BLOCK, MAX DUTY BLOCK 1 N.O.	SSLT436
SCP-CP						FU223	SCP-CP	43	1	855BS-N35BL4	AB		AB1313
SCP-CP	16	7	1492-SPM1C030	AB	SUPPLEMENTARY PROTECTORS, 1-POLE, TRIP CURVE C, 3 A, NO NEUTRAL	FU238 CB401		45	'	00000-N000L4	70	ROUND 90mm BEACON 1/2" CONDUIT MOUNT, STANDARD, 24/48V AC/DC FULL VOLTAGE, LED STROBE SELECTABLE SINGLE/DOUBLE FLASH, RED	MD1010
SCP-CP SCP-CP					, , , , , , , , , , , , , , , , , , ,	CB431 CB536	SCP-CP	44	1	300837153	ANDRITZ	ANDRITZ SEPARATION STD LOGO	
SCP-CP						CB542	SCP-CP	45	1	FNQ-R-30	BUSSMANN	FUSE - CLASS CC 30A	FU348
SCP-CP SCP-CP						CB545 CB548	SCP-CP	46	1	FNQ-R-5	BUSSMANN	FUSE - CLASS CC 5A	FU356
SCP-CP	47		4400 00140050	AD	CUIDDLENENTADY DOCTECTODO 4 DOLE TODO CUIDA E O CA NOVELEGO	CB551	SCP-CP	47	3	LP-CC-1	BUSSMANN	FUSE - CLASS CC 1A	FU203
SCP-CP SCP-CP	17	2	1492-SPM1C050	AB	SUPPLEMENTARY PROTECTORS, 1-POLE, TRIP CURVE C, 5 A, NO NEUTRAL	CB504 CB518	SCP-CP	48	3	LP-CC-1/2	BUSSMANN	FUSE - CLASS CC	FU211
SCP-CP	18	1	1492-SPM1C100	AB	SUPPLEMENTARY PROTECTORS, 1-POLE, TRIP CURVE C, 10 A, NO NEUTRAL	CB501	SCP-CP	49	3	LP-CC-12	BUSSMANN	FUSE - CLASS CC 12A	FU105
SCP-CP	19	1	1492-SPM1C150	AB	SUPPLEMENTARY PROTECTORS, 1-POLE, TRIP CURVE C, 15 A, NO NEUTRAL	CB422	SCP-CP	50	2	LP-CC-15	BUSSMANN	FUSE - CLASS CC 15A	FU344
SCP-CP	20	1	1606-XLE480EP	AB	SWITCHED MODE POWER SUPPLY, 1606 SERIES, INPUT 120/240VAC 1PH, OUTPUT: 24-28VDC, 480W, 20A	PW608	SCP-CP	52	3	LP-CC-6-1/4	BUSSMANN	FUSE - CLASS CC 6.25A	FU223
SCP-CP	21	1	1769-ECR	AB	COMPACT I/O END CAP RIGHT SIDE		SCP-CP	53	1	VPCI-111	CORTEC	CORROSION INHIBITOR FOR MOISTURE, AIRBORNE CONTAMINANTS, H2S, SO2, NH3, ETC. 11 CUBIC FEET	СР
SCP-CP	22	1	1769-IF8	AB	1768/1769 COMPACTLOGIX SYSTEM, 8 CHANNEL ANALOG CURRENT/VOLTAGE INPUT MODULE	PLC1501	SCP-CP	54	1	T32F717D	ENM	COVERAGE ELAPSED TIME METER 24VDC, DIN RAIL MOUNT	ETM1310
SCP-CP	23	3	1769-IQ16	AB	1769 COMPACTLOGIX PLC 1500 COMPACT SERIES DC INPUT MODULE 16 POINT SINK/SOURCE	PLC1101	SCP-CP	55	1	450-024-31	FEDERAL SIGNAL	450 VIBRATONE HORN, 24VDC, 109dBa @ 1m, UL RATING PER GASKET / RING USED, UL AND cUL LISTED,	AH1304
SCP-CP SCP-CP	<u></u>					PLC1201 PLC1701		55	'			CSA CERTIFIED	
SCP-CP	24	1	1769-L30ER	AB	COMPACTLOGIX 5370 L3 CONTROLLER, DUAL ETHERNET W/DLR CAPABILITY, 1MB MEMORY, 8 I/O	CPU1001	SCP-CP	56	1	TR-RING	FEDERAL SIGNAL	SURFACE MOUNT TRIM RING (FOR TYPE 12 AND TYPE 4X SURFACE MOUNTING APPLICATIONS)	AH1304
SCP-CP	25	2	1769-OF4	AB	EXPANSION, 16 ETHERNET IP NODES, WITH 1GB SD CARD 1768/1769 COMPACTLOGIX SYSTEM, 4 CHANNEL ANALOG CURENT/VOLTAGE OUTPUT MODULE	PLC1601	SCP-CP	57	1	P-R2-K2RF0	GRACE PORT	GFCI RECEPTACLE UL TYPE 4X GFCI/ RJ45 ETHERNET	PORT432
SCP-CP						PLC1601B	SCP-CP	58	1	ALFSWD	HOFFMAN	DOOR SWITCH, CONTACTS RATED 10A, 1NO, 1NC	LS623
SCP-CP SCP-CP	26	2	1769-OW16	AB	1769 COMPACTLOGIX RELAY OUTPUT MODULE 16 POINTS	PLC1301 PLC1401	SCP-CP	59	1	DAH2001A	HOFFMAN	ELECTRIC HEATER 200W, WITH ADJUSTABLE THERMOSTAT 0F TO 100F, 120VAC	HTR365
SCP-CP	27	1	1769-PA4	AB	COMPACT LOGIX SYSTEM, POWER SUPPLY 120/240VAC INPUT 4AMP@5VDC OUTPUT	PS910	SCP-CP	60	1	LEDA1S35	HOFFMAN	LED ENCLOSURE LIGHT, ON/OFF SWITCH, SCREW MOUNTED 90VAC-260VAC 13.82"	WLT402
SCP-CP	28	1	1783-US8T	AB	STRATIX 2000 UNMANAGED ETHERNET SWITCH, RJ45, 8 PORT	ETH3001	SCP-CP	61	1	LEDA20C	HOFFMAN	LED LIGHT INPUT CONNECTOR/CABLE ASSEMBLY 2000mm FOR AC LED LIGHTS	WLT402
SCP-CP	29	1	199-DR1	AB	ZINC/STEEL DIN RAIL EN 50022 (35mm x 7.5mm x 1m)		SCP-CP	62	1	S350-KIT	LUGS DIRECT	MECHANICAL LUG 350-6AWG	
SCP-CP	30	1	25B-D4P0N104	AB	AC DRIVE POWERFLEX 525, w/EMBEDDED ETHERNET/IP AND SAFETY 480VAC, 2HP 4.0A 3PH, NO FILTER,	VFD105	SCP-CP	63	1	RLW-03P405	MTE	RLW LINE/LOAD REACTOR IMPEDANCE 5%, 3.4A, OPEN REACTOR	LR105
SCP-CP	31	1	2711P-T10C22D9P	AB	PANELVIEW PLUS 7 PERFORMANCE TERMINAL, TOUCH SCREEN, 10.4 INCHES, TFT COLOR, TWO ETHERNE	ET OIT814	SCP-CP	64	1	13382344300	PFANNENBERG	AC UNIT DTS3081, COOLING CAPACITY 2000-3000 BTU/H, SS NEMA 4X, 115VAC 1PH	AIR356
SCP-CP	20	1	440R-S13R2	AB	PORTS, 24V DC, WINDOWS CE OS LICENSE, PERFORMANCE MODEL GUARDMASTER COMPATIBILITY INPUT SAFETY RELAY (CI), 1 DUAL CHANNEL UNIVERSAL INPUT 1 NC AUX	SR702	SCP-CP SCP-CP	65	13	0203250	PHOENIX CONTACT	SCREW CENTER JUMPER FBI 10-6, 10 POLES, INSULATED, FOR UK 5	TBAC2 TBAC3
	32	'			OUTPUT		SCP-CP						TBDC1
SCP-CP	33	1	4983-DC120-20	AB	SURGE AND FILTER PROTECTION, DIN RAIL MOUNT, COMBO UL 1449/UL 1283, 120V, 20A	SP423	SCP-CP SCP-CP						TBDI TBDO
SCP-CP	34	1	700-ADL1R	AB	DIODE WITH LED SURGE SUPPRESSOR, 6-24VDC	CR623	SCP-CP						TBDI
SCP-CP	35	1	700-HA33Z24-3-4	AB	HA TYPE TUBE BASE RELAY WITH 11 PIN TERMINALS, 24VDC COIL, 3PDT, 10A, PUSH TO TEST AND PILOT	CR623	SCP-CP SCP-CP	71	27	0824589	PHOENIX CONTACT	MARKER FOR TERMINAL BLOCK, WIDTH 6.2mm UT-4 / UK 5	TBDI TBAC2
					LIGHT		SCP-CP SCP-CP						TBAC3 TBDC1
							SCP-CP						TBDI
							SCP-CP SCP-CP						TBDO TBESI
							SCP-CP	66	2	0203263	PHOENIX CONTACT	FIXED BRIDGE 10 POSITION 8mm FOR UK 6	TBAC1
							SCP-CP	66	2	0203263	PHOENIX CONTACT	FIXED BRIDGE 10 POSITION 8mm FOR UK 6	IBACT
		_	1010 COMMERCIAL BLVI ARLINGTON, TEXAS Phone: (817)465-56 Telefax: (817)472-8t	76001 1. QU	JANTITIES SHOWN IN THIS BILL OF MATERIALS ARE IR 1 (ONE) MACHINE ASSEMBLY, AND TYPICAL FOR 1 NE) MACHINE TO BE ORDERED.						DRITZ	LOCATION: SCP-CP UNLESS OTHERWISE SPECIFIED: DRAWN BY: DATE DIMENSIONS ARE IN INCHES RA 09/21/21 DIMENSIONS ARE IN INCHES RA 09/21/21 DRAWN BY: DATE BILL OF MATERIALS	RESS
			PPROVED FOR CONSTRU		NE) MACHINE TO BE ORDERED. DEFMAN OR EQUAL					ANDD	ITZ SEPARATION INC.		(551 -01
		A	I I NOVED I ON CONSTINU	Z, Fit				1					
			Y: RA DATE: 03/	2						1010 COM	MERCIAL BLVD. SOUTH	CHECKED BY: DATE SIZE DRAWING NUMBER	
		В		09/22		DATED DANIEL CURROLET	ACCESCODIES	5.	A \A/E/	1010 COM ARLIN	MERCIAL BLVD. SOUTH NGTON, TEXAS 76001	JLR 09/21/21 B F844944-B	M11
		В	Y: RA DATE: 03/	09/22 THIS DRAWING	IS COPY RIGHTED THIS DRAWING IS A TRADE SECRET AND ONLY ENTRUSTED TO THE RECEIVER FOR HIS ITHOUT THE SIGNED WENTEN CONSENT OF ANDRITZ SEPARATION INC., IT MUST NOT BE COPIED NOR MADE 10 PARTIES, INCLUDING COMPETTIORS, NOR MADE ACCESSIBLE TO SUCH PARTIES. ANY ILLEGAL USES BY THE 10 PARTIES FOR HUMBER COM CONSTITUTE OF AUGIET ON LEGAL ACTION. THIS DRAWING REV. FIR. 8FEV. FIR.	PDATED PANEL SUPPORT A	ACCESSORIES	RA	A WEK	1010 COM ARLIN	MERCIAL BLVD. SOUTH	- -	M11

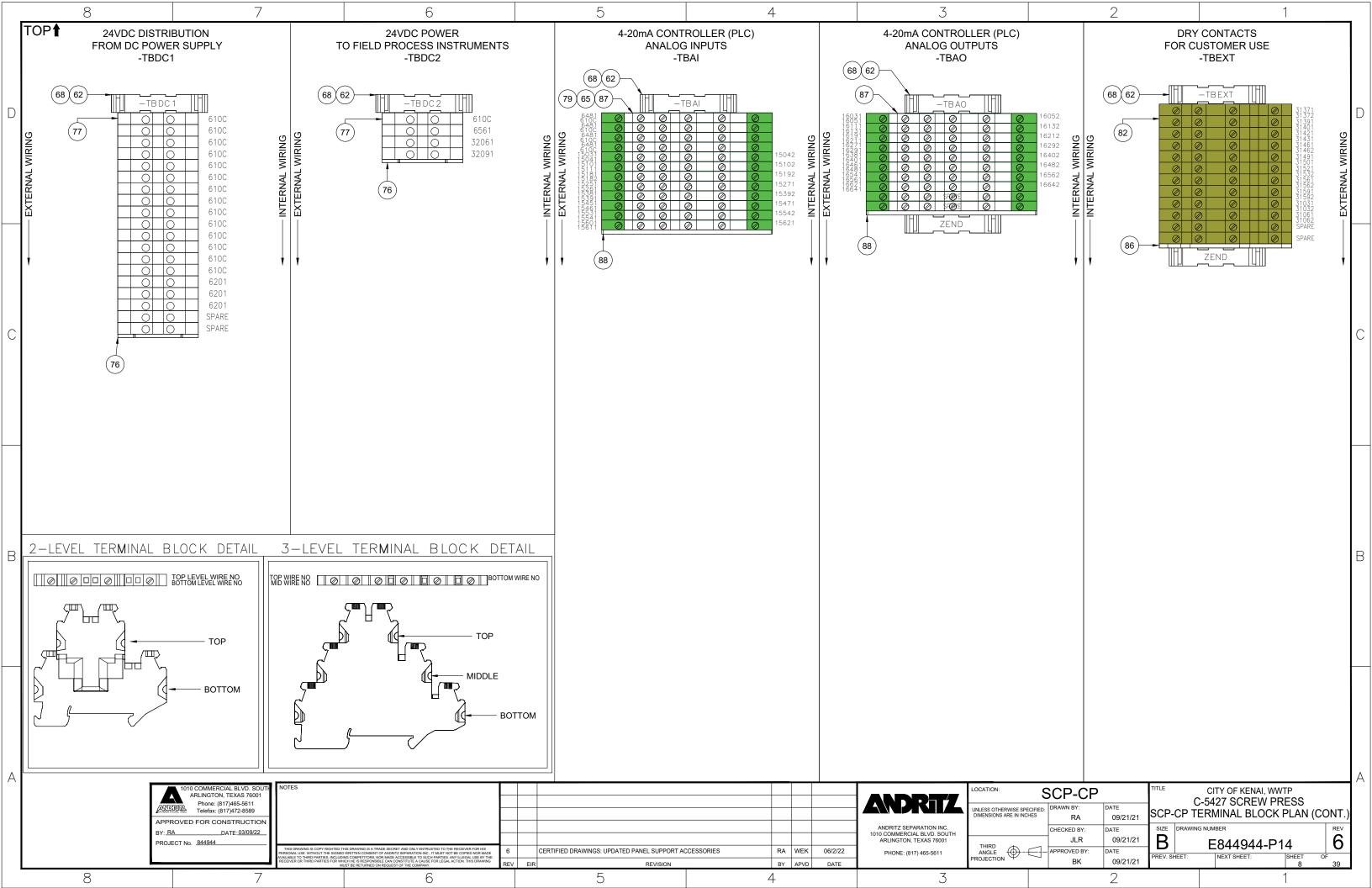
	8				7	6	5		4			3		2		1	
	SCREW PRE	ESS COI	NTROL P	PANEL COMPONENT	TS (SCP-CP)			SCREW PRI	ESS CON	ITROL PANEL COM	IPONENTS (SC	CP-CP)					
	LOC	ITEMS		CATALOG	MFG	DESCRIPTION	TAGS	LOC		QTY CATALO			CRIPTION			TAGS	
	SCP-CP SCP-CP SCP-CP	67	13	0800886	PHOENIX CONTACT	END BRACKET - E/NS 35 N	TBAC1 TBAC2 TBAC3	SCP-CP SCP-CP SCP-CP	82	45 3004362	2 PHC	DENIX CONTACT UNIVE	RSAL TERMINAL BLOCK - UK 5 N GF	RAY		TBAC2 TBDC1 TBDC2	
	SCP-CP SCP-CP SCP-CP						TBAI TBAO TBDC1	SCP-CP SCP-CP	83	5 3004524	4 PHC	DENIX CONTACT UNIVE	RSAL TERMINAL BLOCK - UK 6 N GF	RAY		TBESI TBAC1	
D	SCP-CP SCP-CP						TBDC2 TBDI	SCP-CP	84	3 3030226	6 PHC	DENIX CONTACT PLUG-	IN JUMPER FOR UT 2,5 TERMINAL E	LOCKS, 20 POSITIONS, RED		TBAI	D
	SCP-CP SCP-CP						TBDO TBESI	SCP-CP	85	1 303027			ELEMENT JUMPER 10 POSITIONS			CB614	
	SCP-CP SCP-CP	68	1	0808244	PHOENIX CONTACT	INSERT STRIP WHITE UNLABELED	TBEXT TBAC1	SCP-CP SCP-CP	86 87	1 3030323 8 3035467			IN JUMPER FOR UT 6 TERMINAL BL			TBAC1 TBEXT	
	SCP-CP	69	1	0809735	PHOENIX CONTACT	ZACK MARKER STRIP, FLAT, UNLABELED, 12mm	CB614	SCP-CP	91	1 3047293			OVER UT DOUBLE LEVEL D-UTTB 2			TBEXT	
	SCP-CP	70	5	0824581	PHOENIX CONTACT	MARKER FOR TERMINAL BLOCK, WIDTH 5.2mm UT-2,5	TBAI	SCP-CP SCP-CP	92	22 321430	1 PHC	DENIX CONTACT 3 LEVE	EL TERMINAL BLOCK WITH PE FOOT	UT 2,5-PE/L/L, 24A MAX		TBAI TBAO	
	SCP-CP	72	3 12	0824597 1004348	PHOENIX CONTACT PHOENIX CONTACT	MARKER FOR TERMINAL BLOCK, WIDTH 8.2mm UT-6 TERMINAL STRIP MARKER CARRIER	TBAC1	SCP-CP SCP-CP	93	2 3214314	4 PHC	DENIX CONTACT END C	OVER UT THREE LEVEL D-UT 2,5-3L	GRAY		TBAI TBAO	
	SCP-CP SCP-CP SCP-CP						TBAC2 TBAC3 TBAI	SCP-CP SCP-CP SCP-CP	94	10 LAD4DD	DL SCHN	NEIDER ELECTRIC TESYS	S DIODE COIL SUPPRESSOR, SNAP-	ON W/O TOOLS, FOR SIZE 00-1	DC CONTACTOR COIL, 24VDC	M1404 M1407 M1410	
	SCP-CP SCP-CP						TBAO TBDC1	SCP-CP SCP-CP SCP-CP								M1410 M1413 M1416	
	SCP-CP SCP-CP						TBDC2 TBDI	SCP-CP	95	1 LRD01	SCHN	NEIDER ELECTRIC THERM	MAL OVERLOAD RELAY FOR MOTOR	R TESYS - 0.1-0.16 A - CLASS 10	A	OL211	
	SCP-CP SCP-CP						TBDO TBESI	SCP-CP	96	1 LRD04			MAL OVERLOAD RELAY FOR MOTOR			OL203	
	SCP-CP SCP-CP	74	3	2771023	PHOENIX CONTACT	END COVER D-UKKB 3/5	TBEXT TBAC3	SCP-CP	97	1 LRD07		00-1	MAL OVERLOAD RELAY FOR MOTOR				
	SCP-CP SCP-CP			0==:0=	DUOTA NA COLUMN	DADTITION DI ATE ATE UNGO	TBDI TBDO	SCP-CP SCP-CP SCP-CP	100	3 T02BN13I	BD SCHN	NEIDER ELECTRIC TESYS	S N NON-REVERSING CONTACTOR,	NEMA SIZE 0, 600V MAX, COIL 2	24VDC	M1410 M1413 M1416	
	SCP-CP SCP-CP	75 76	5	2771065	PHOENIX CONTACT	PARTITION PLATE ATP-UKKB 3	TBDI TBDO	SCP-CP SCP-CP	101	1 T02BN23I	BD SCHN	NEIDER ELECTRIC TESYS	S N REVERSING CONTACTOR, NEMA	SIZE 0, 600V MAX, COIL 24VDC		M1416 M1404	
	SCP-CP SCP-CP	76	95	2771146	PHOENIX CONTACT	2LEVEL TERMINAL BLOCK - UKK 5 GRAY	TBDI TBACS	SCP-CP	102	1 HS5F3AS-			PSULATED TRANSFORMER 3KVA, 4		ONDARY, NEMA 4X	XF347	
С	SCP-CP SCP-CP						TBDI TBDO	SCP-CP	103	1 PK23GT			MENT GROUND BAR 23 TERMINALS			GND	С
	SCP-CP SCP-CP SCP-CP	77	9	2800837	PHOENIX CONTACT	THERMOMAGNETIC DEVICE CIRCUIT BREAKER 1 POSITION 2A SFB CUR	VE CB617 CB620 CB623	SCP-CP SCP-CP	104 116	1 1489-M1C0			IIT BREAKER, BRANCH, 3A E PROTECTIVE DEVICE 40kA 480VA	C DELTA 3P3W		CB365 SP125	
	SCP-CP SCP-CP						CB626 CB636	SCP-CP	117	1 25B-D1P4N	N104		RIVE POWERFLEX 525, W/EMBEDDED E A , NO FILTER	ETHERNET/IP AND SAFETY 48	0VAC, 0.5HP/0.4KW, 1.4A 3PH,	VFD238	
	SCP-CP SCP-CP						CB639 CB648	SCP-CP	118	3 LP-CC-6	6		- CLASS CC 6A			FU238	
	SCP-CP SCP-CP	78	2	2800838	PHOENIX CONTACT	THERMOMAGNETIC DEVICE CIRCUIT BREAKER 1 POSITION 3A SFB CUR		SCP-CP	119	1 S60500LT	Γ00	CALBRITE STAINI	LESS STEEL 316 CONDUIT HUB 1/2"			AB1313	
	SCP-CP SCP-CP	79	2	2800839	PHOENIX CONTACT	THERMOMAGNETIC DEVICE CIRCUIT BREAKER 1 POSITION 4A SFB CUR	CB656 VE CB642	SCP-CP	120	1 S40520CN	N00	CALBRITE STAINI	LESS STEEL 316 NIPPLE 1/2 NPT X 2	, H		AB1313	
	SCP-CP SCP-CP	80	13	2801305	PHOENIX CONTACT	BASE ELEMENT SCREW CONNECTION	CB645 CB614										
В	SCP-CP SCP-CP SCP-CP SCP-CP SCP-CP SCP-CP SCP-CP SCP-CP SCP-CP SCP-CP SCP-CP SCP-CP	81	5	3003020	PHOENIX CONTACT	END COVER D-UK 4/10	CB626 CB636 CB639 CB642 CB645 CB645 CB646 CB656 TBAC1 TBAC2 TBDC1 TBDC2 TBESI										В
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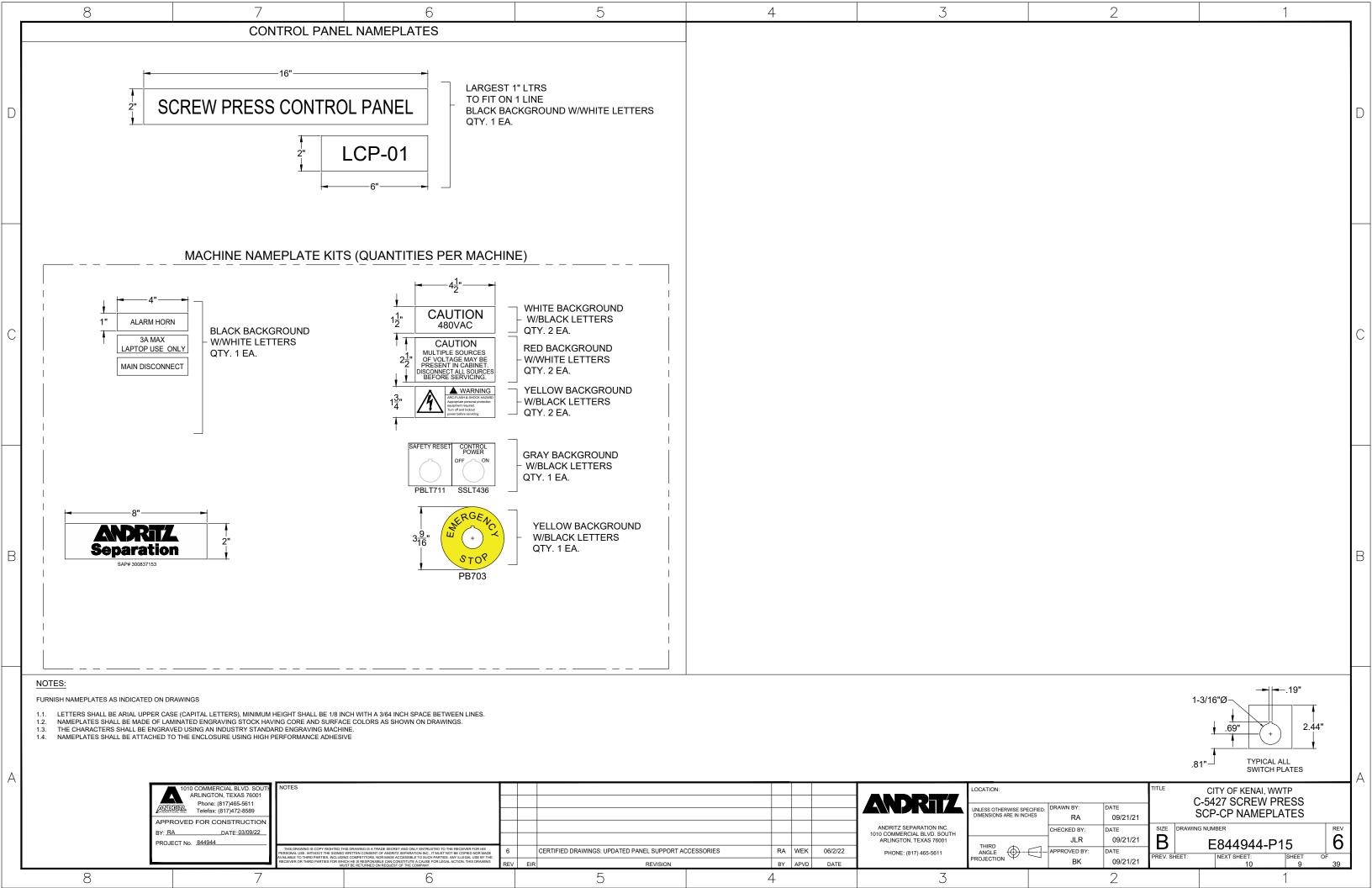


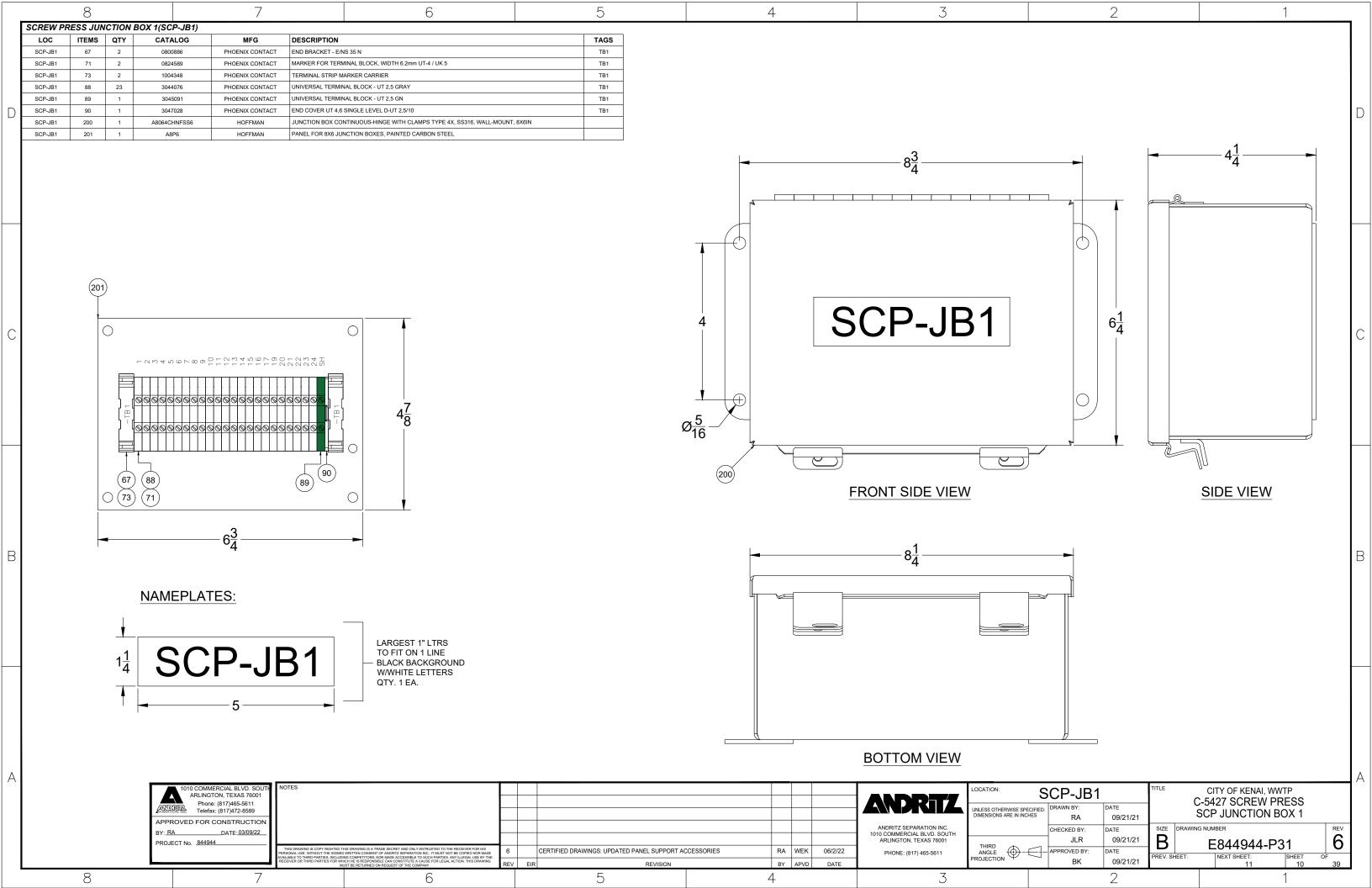


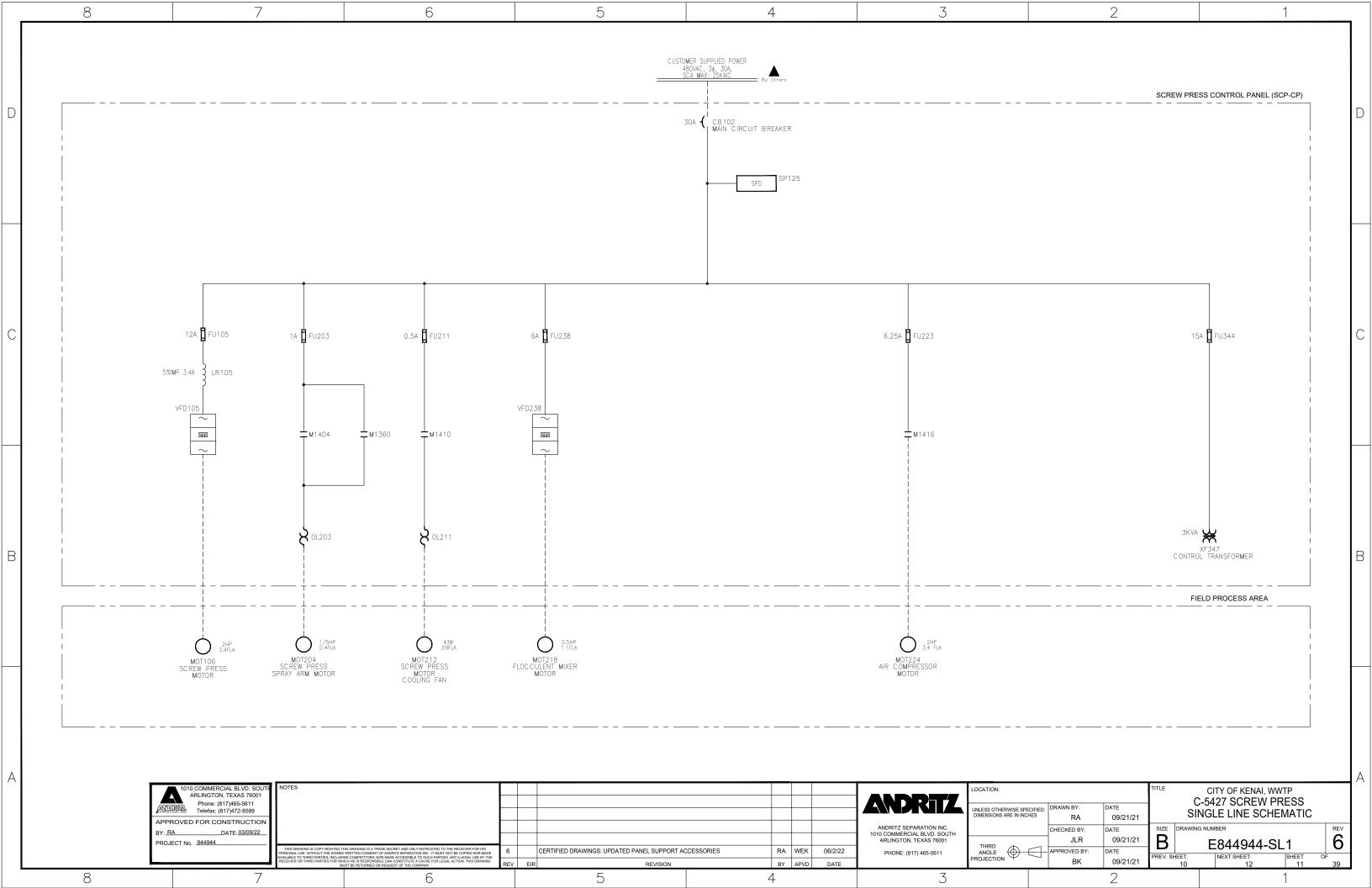


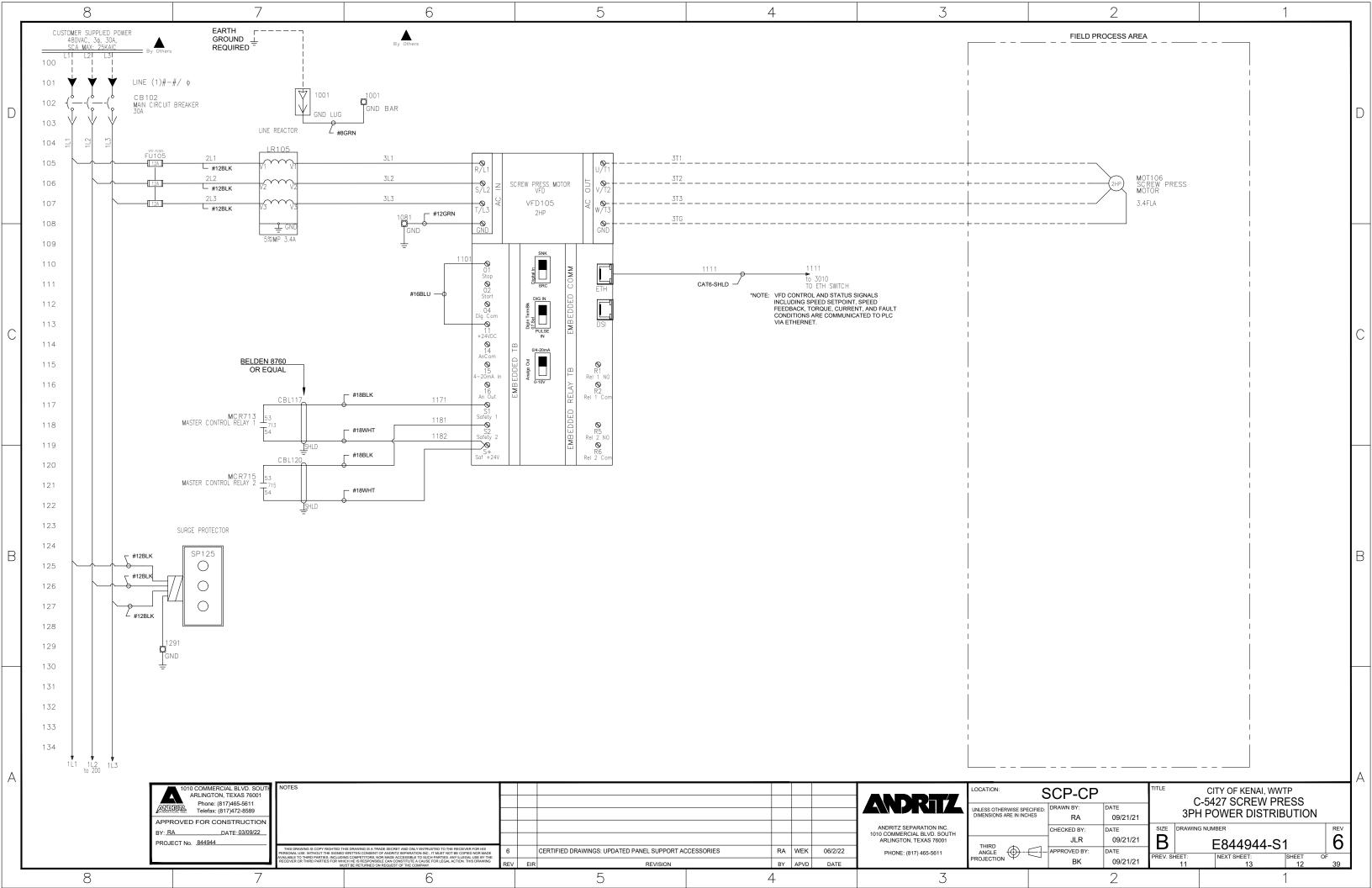


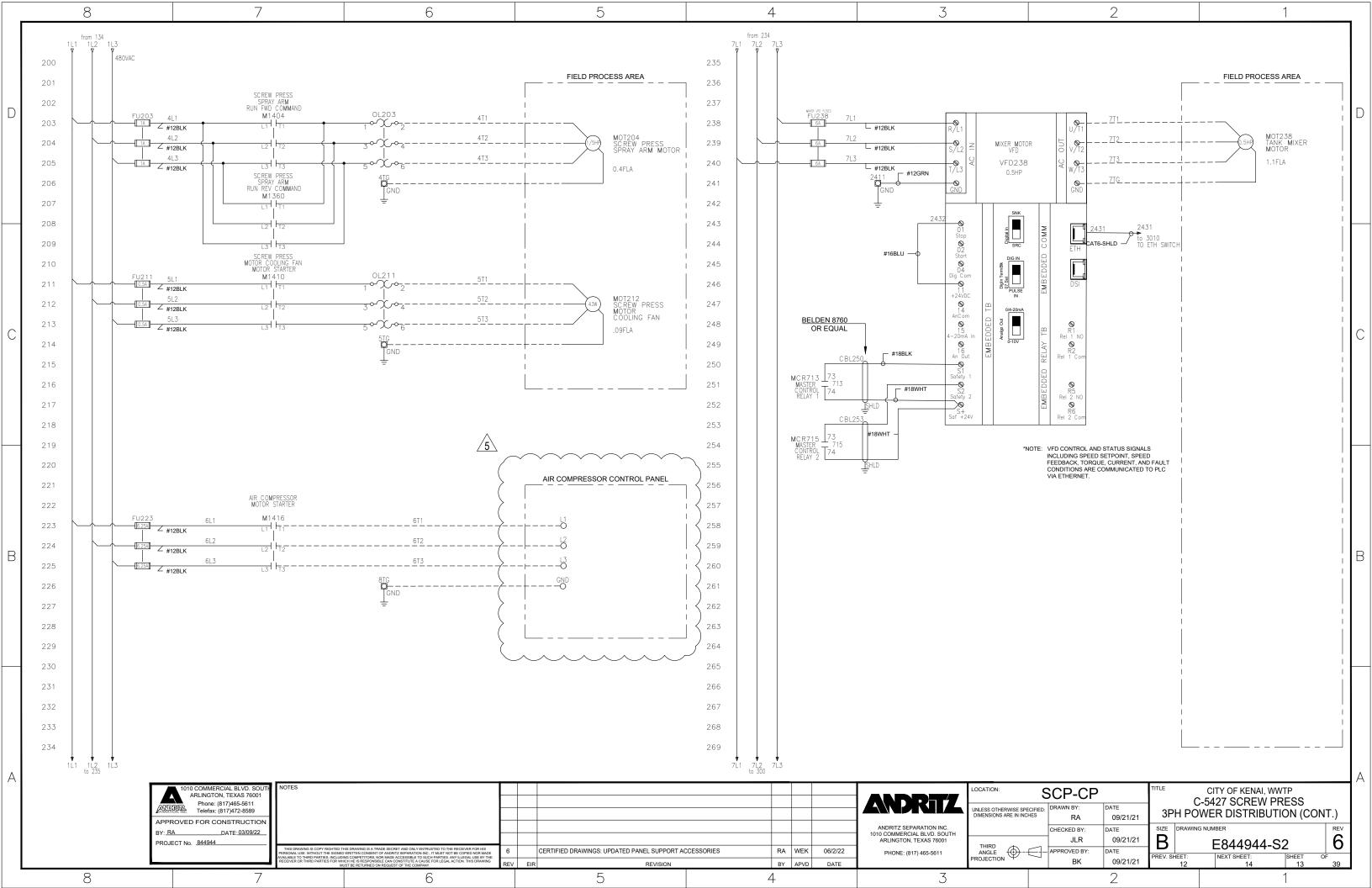


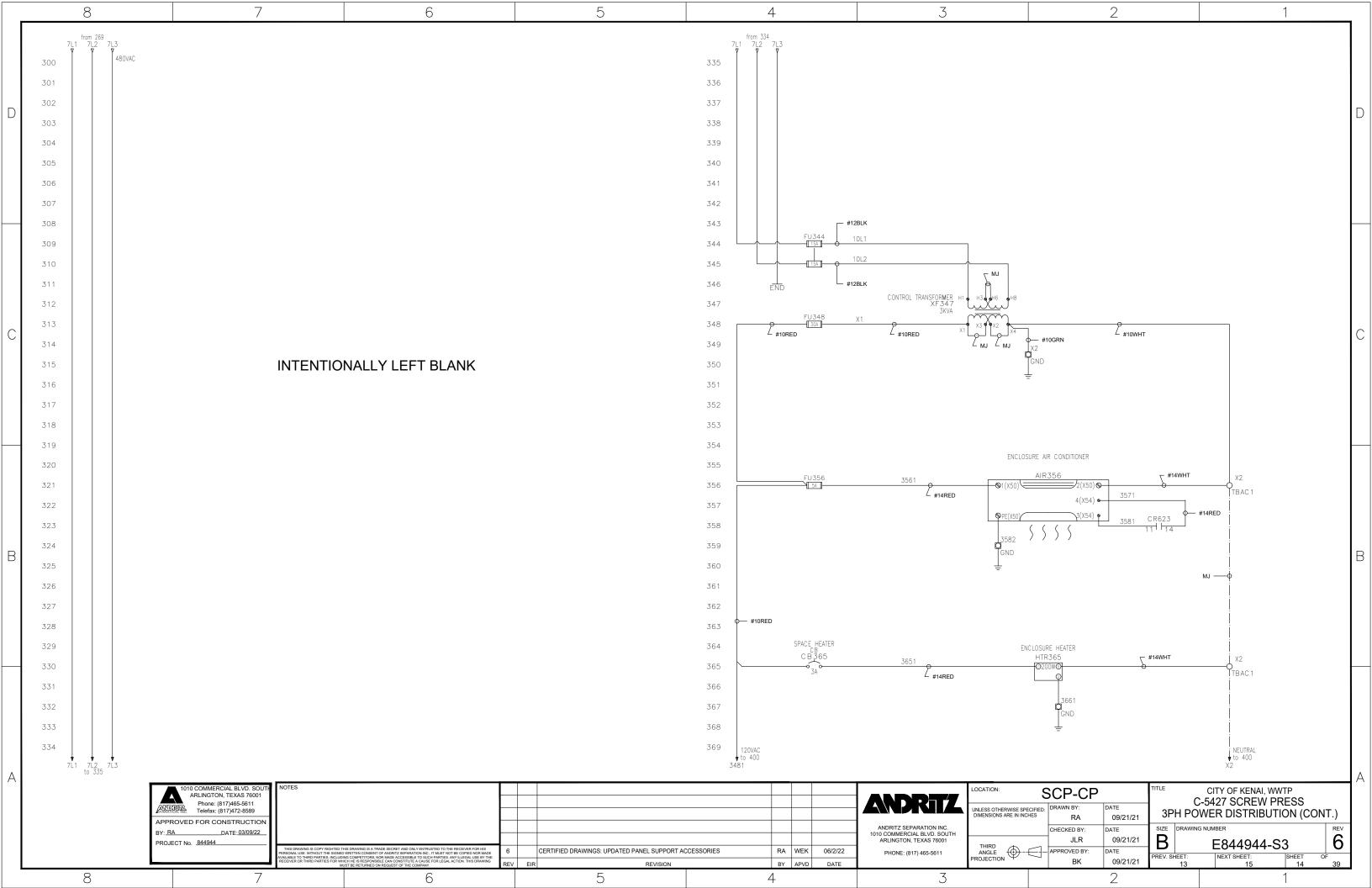


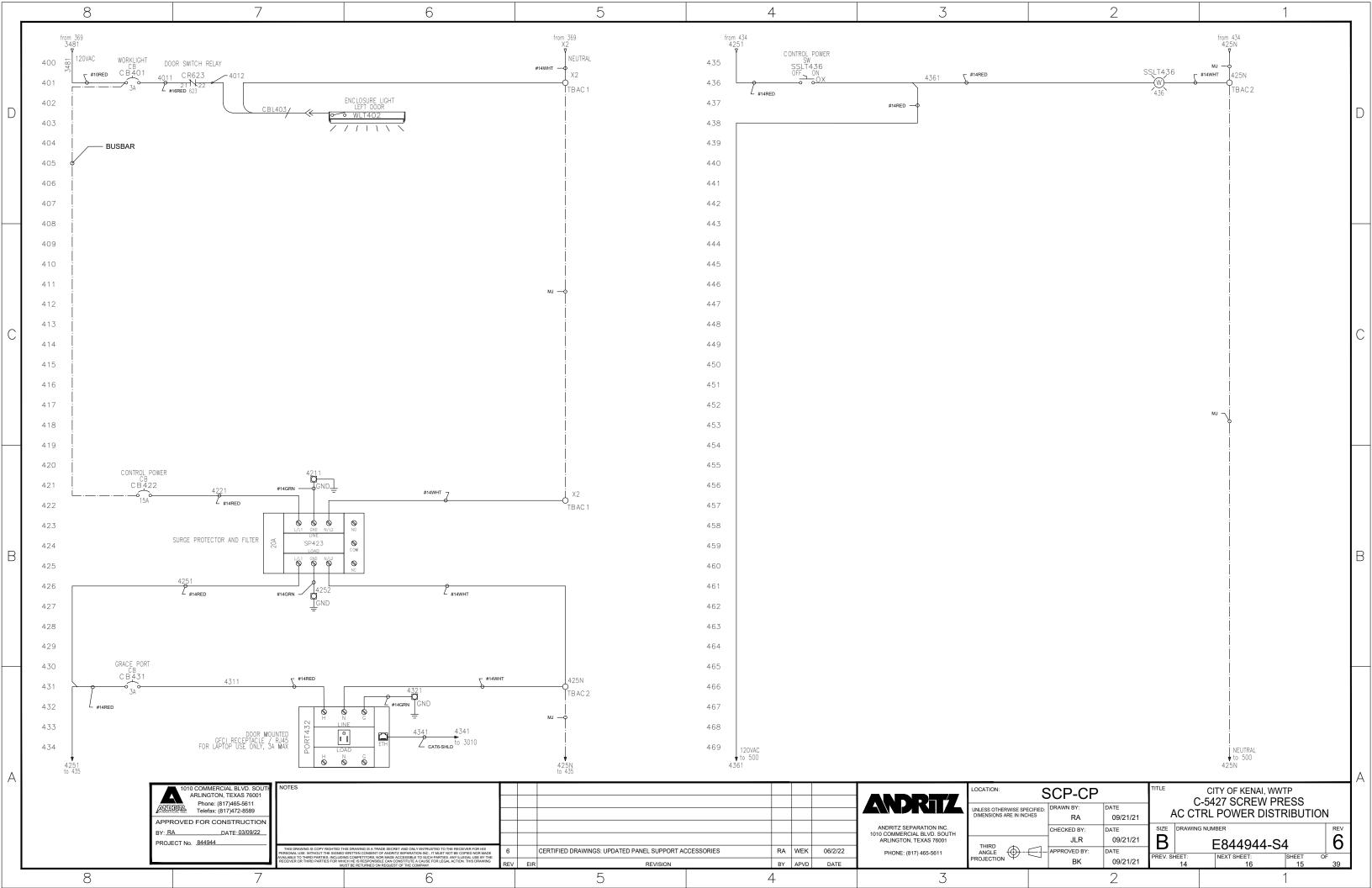


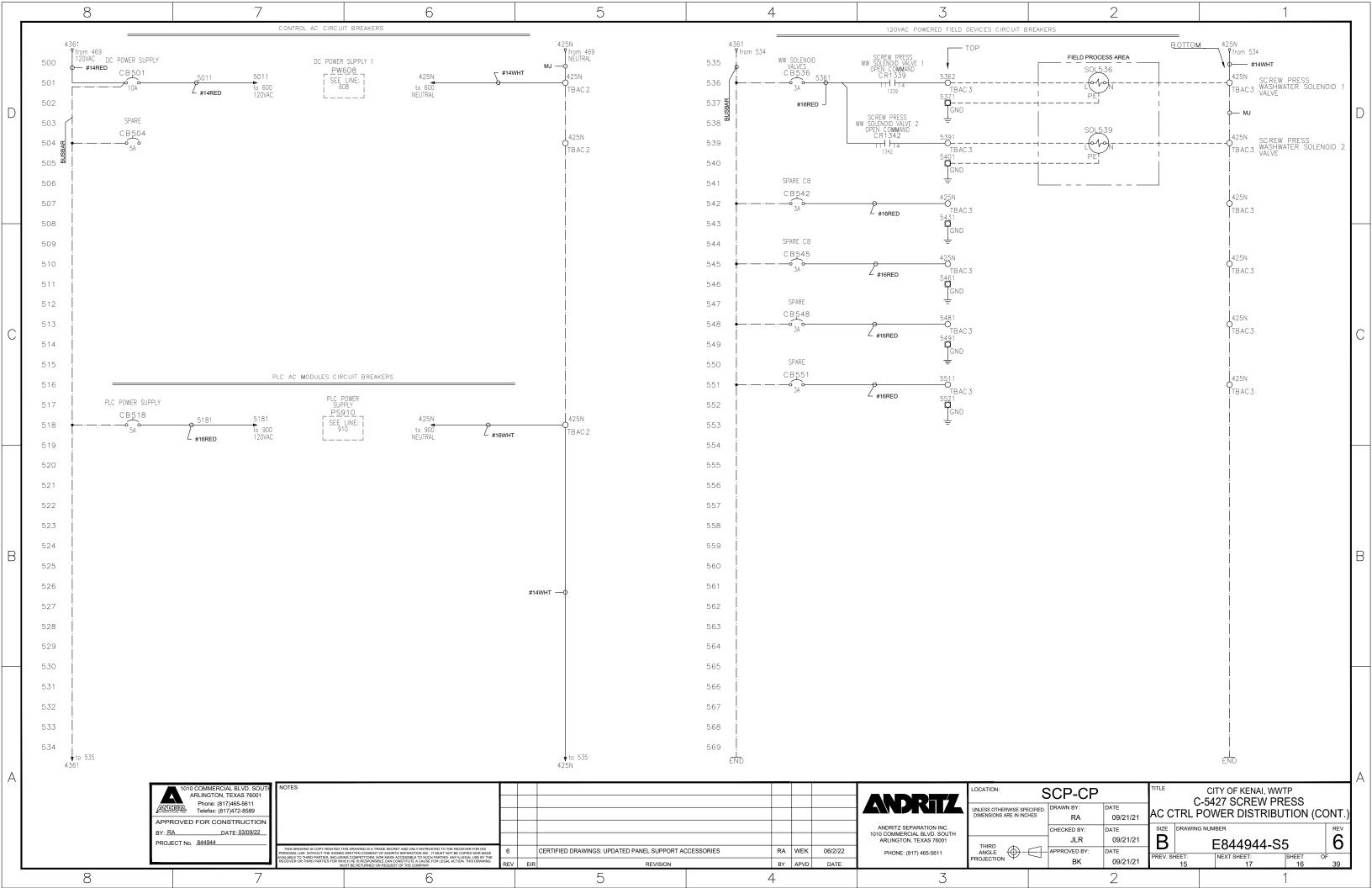


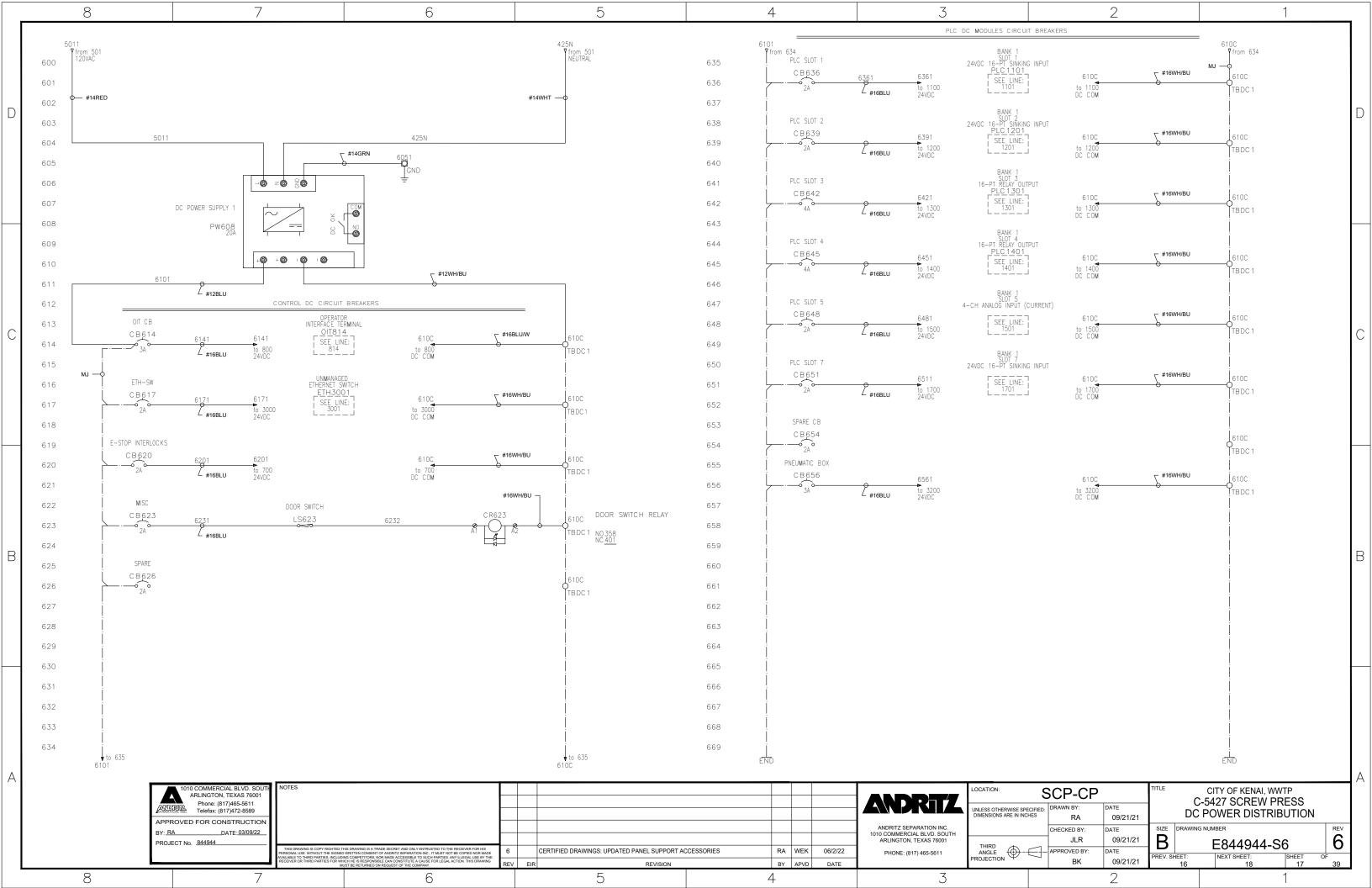


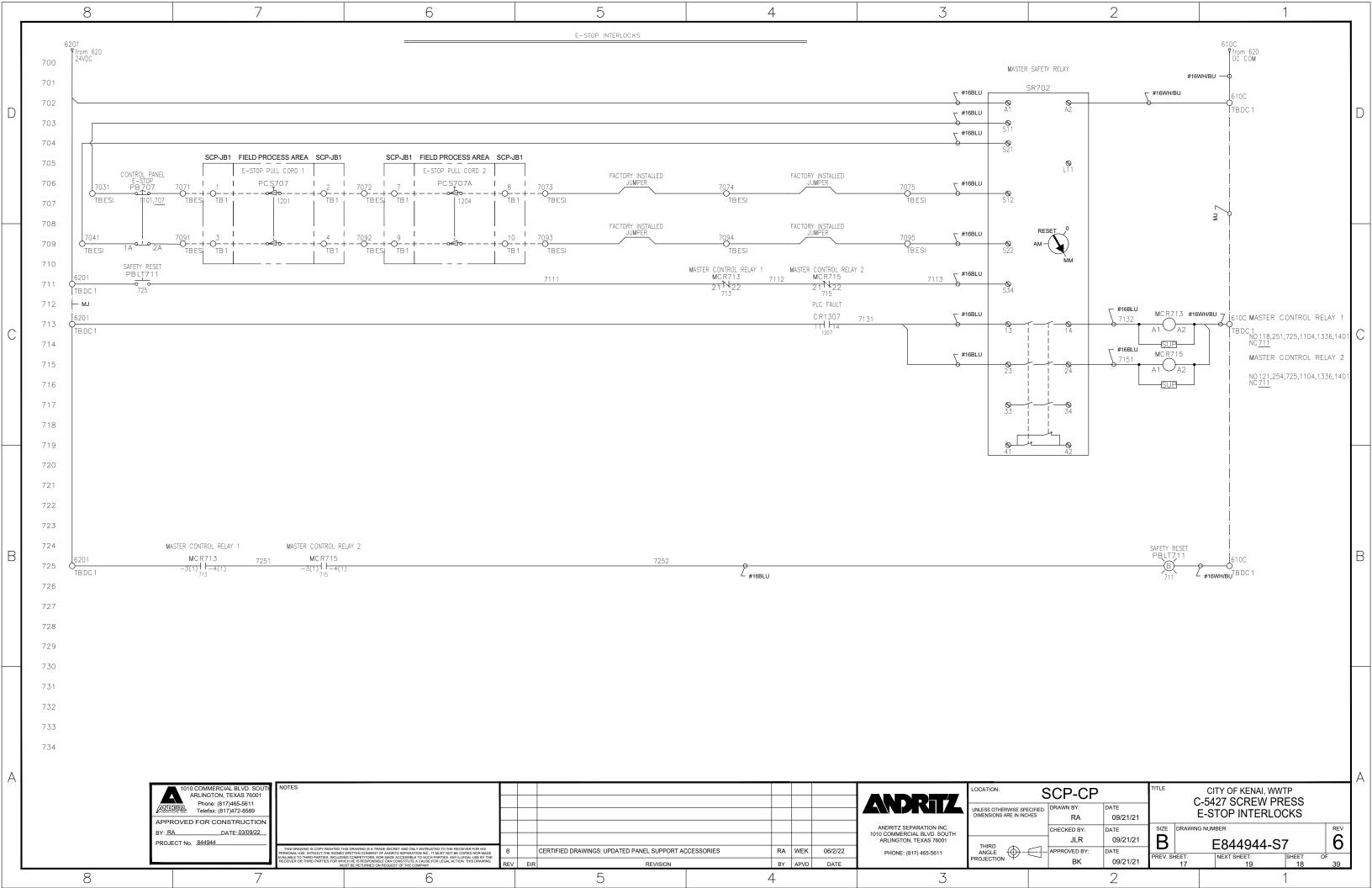


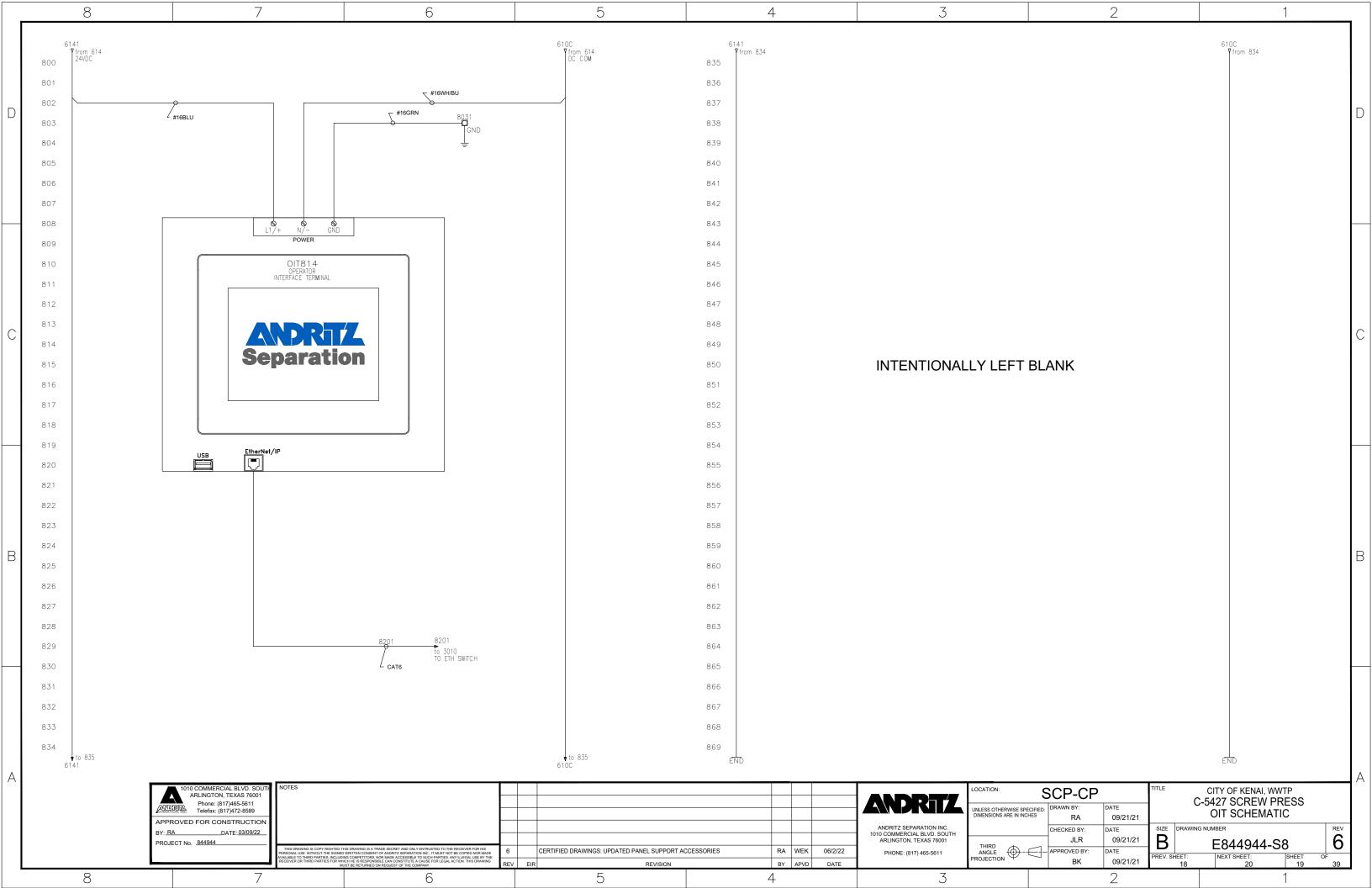


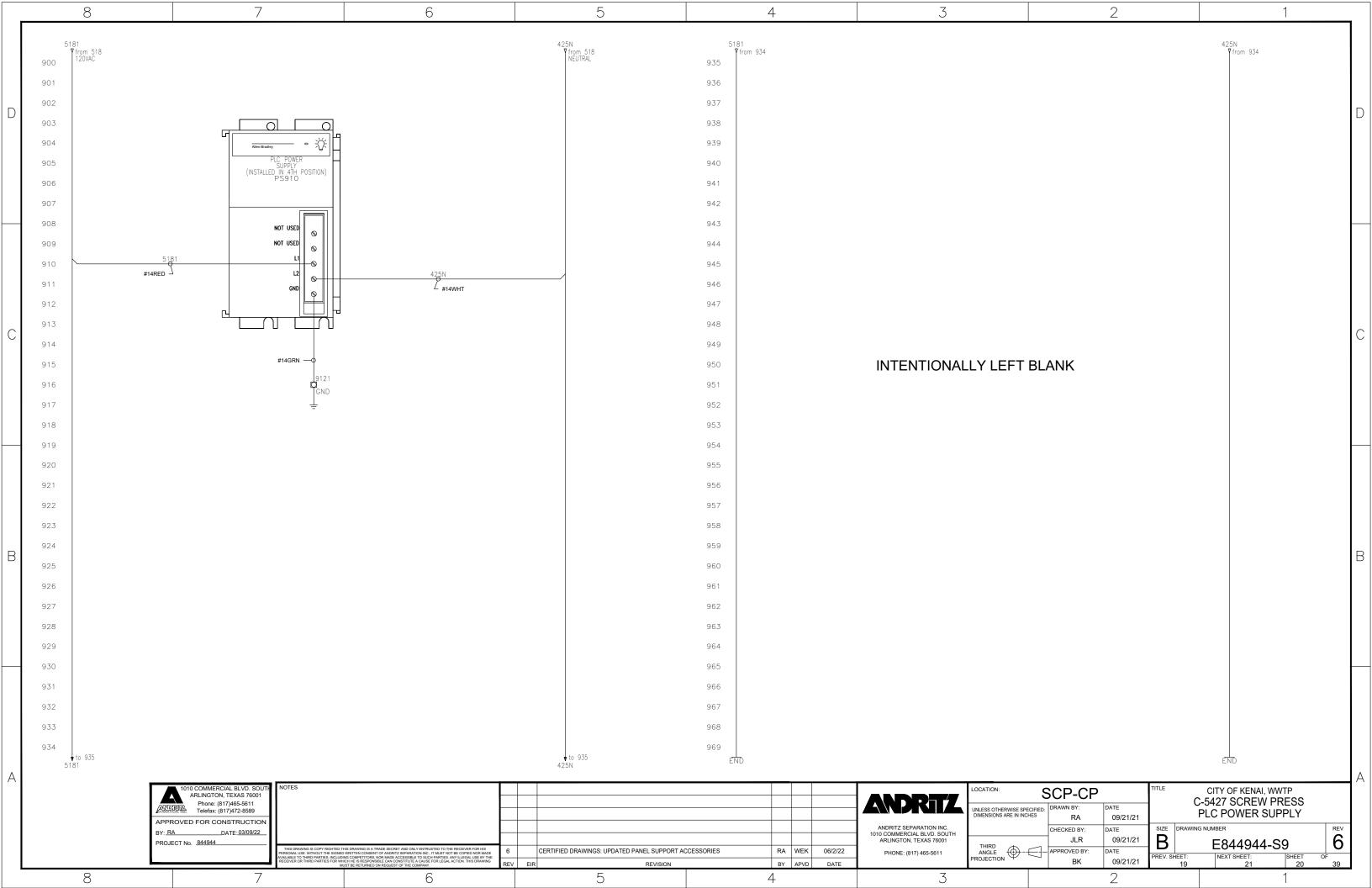


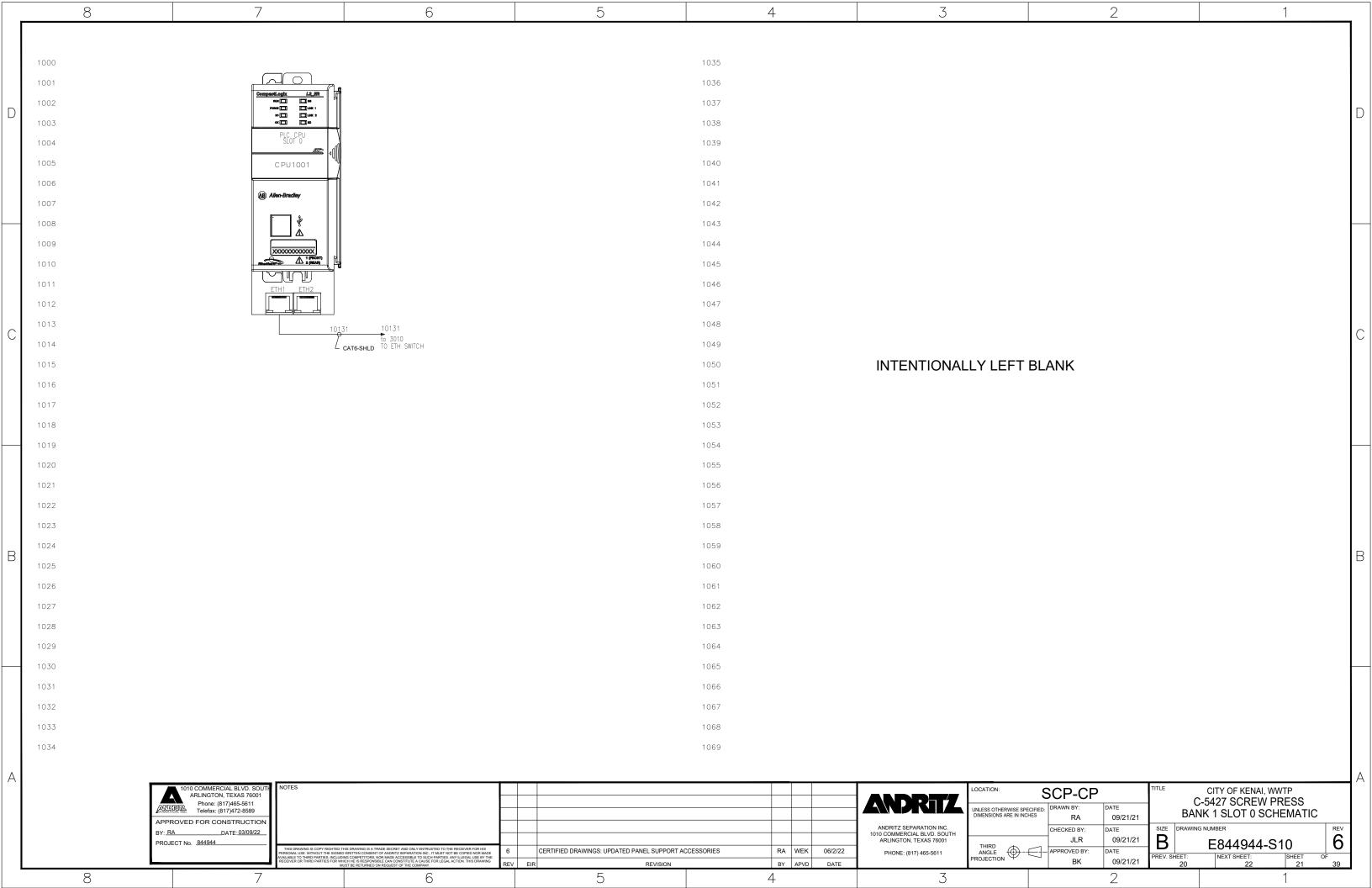


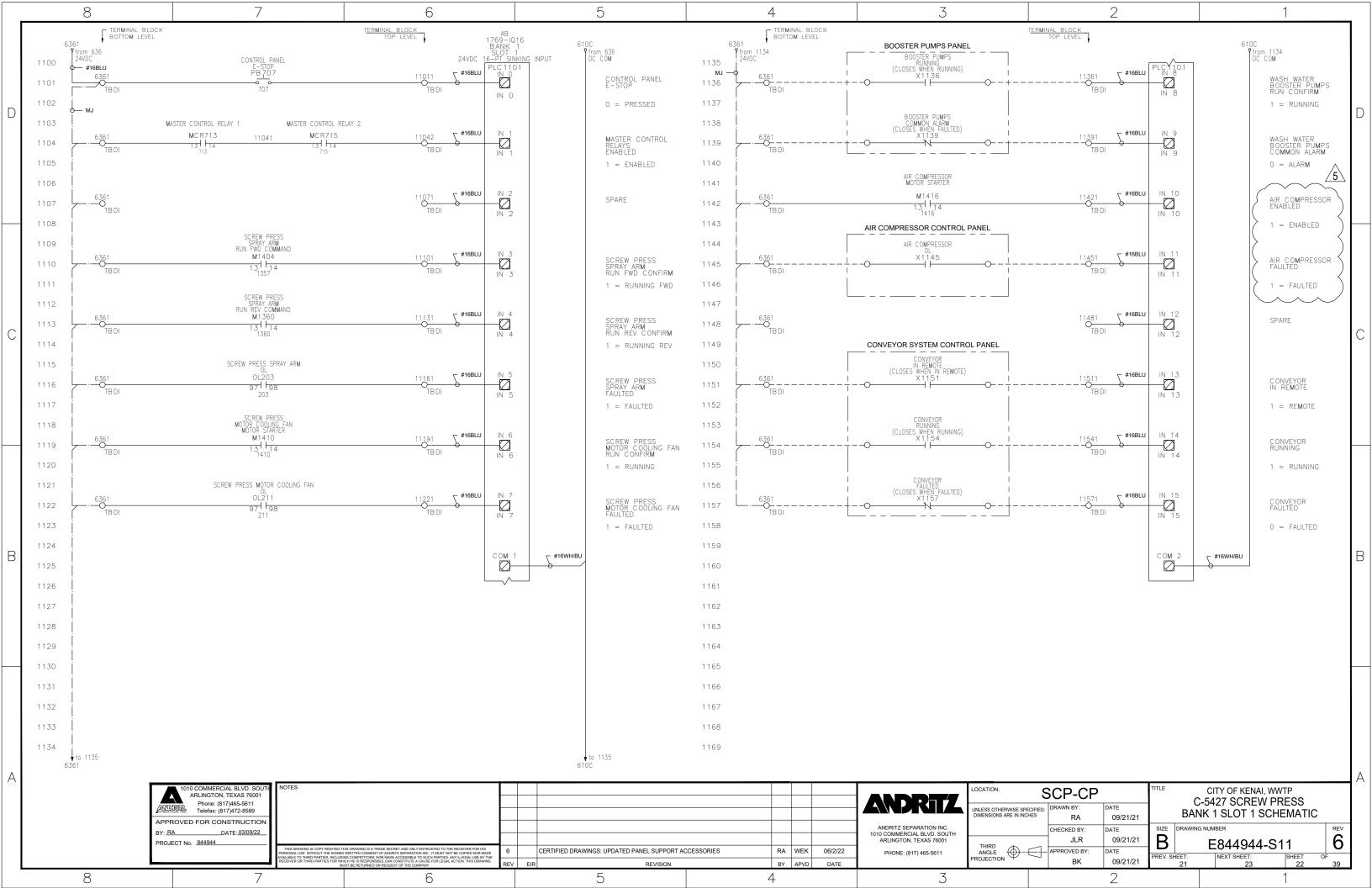


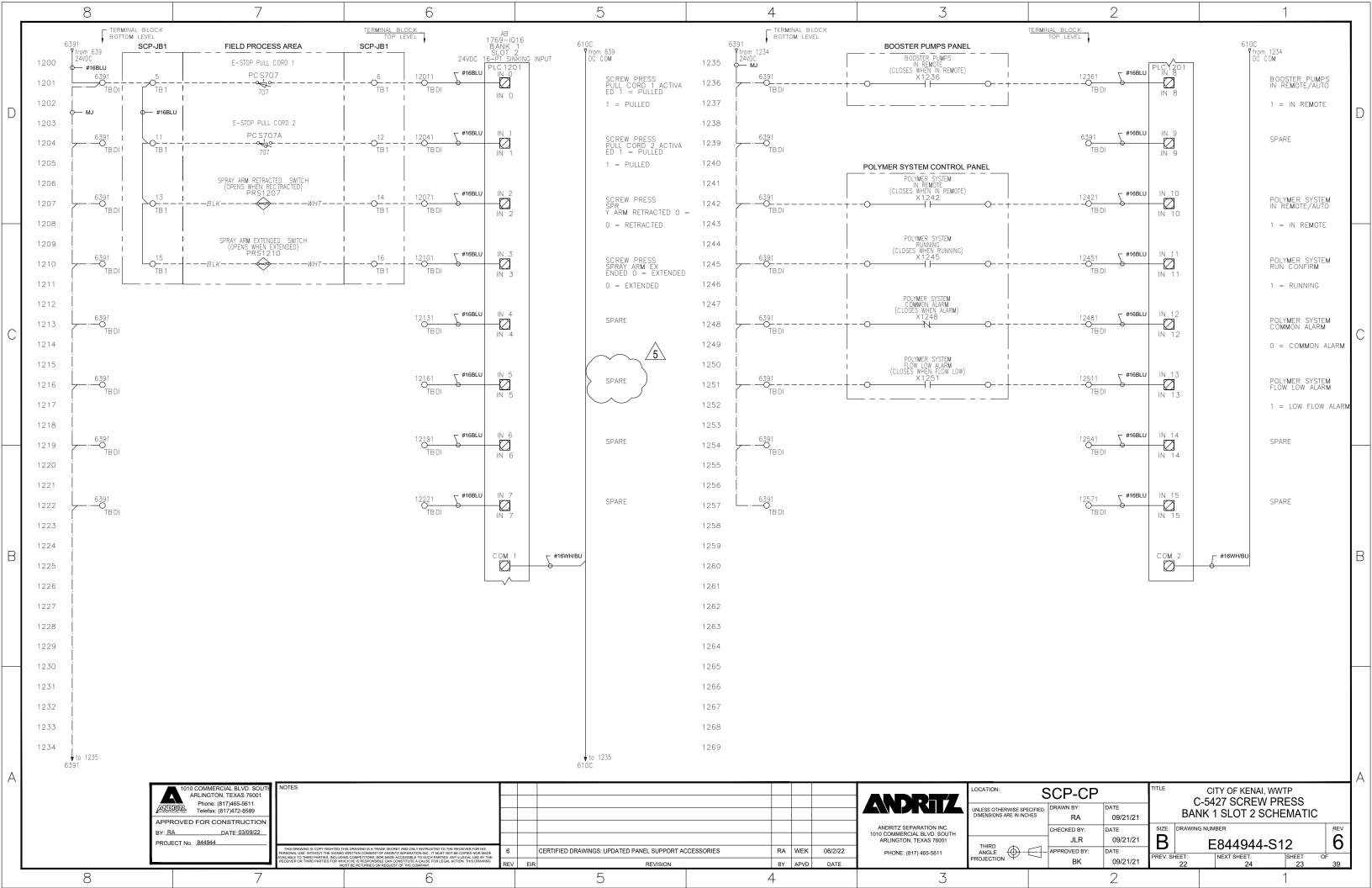


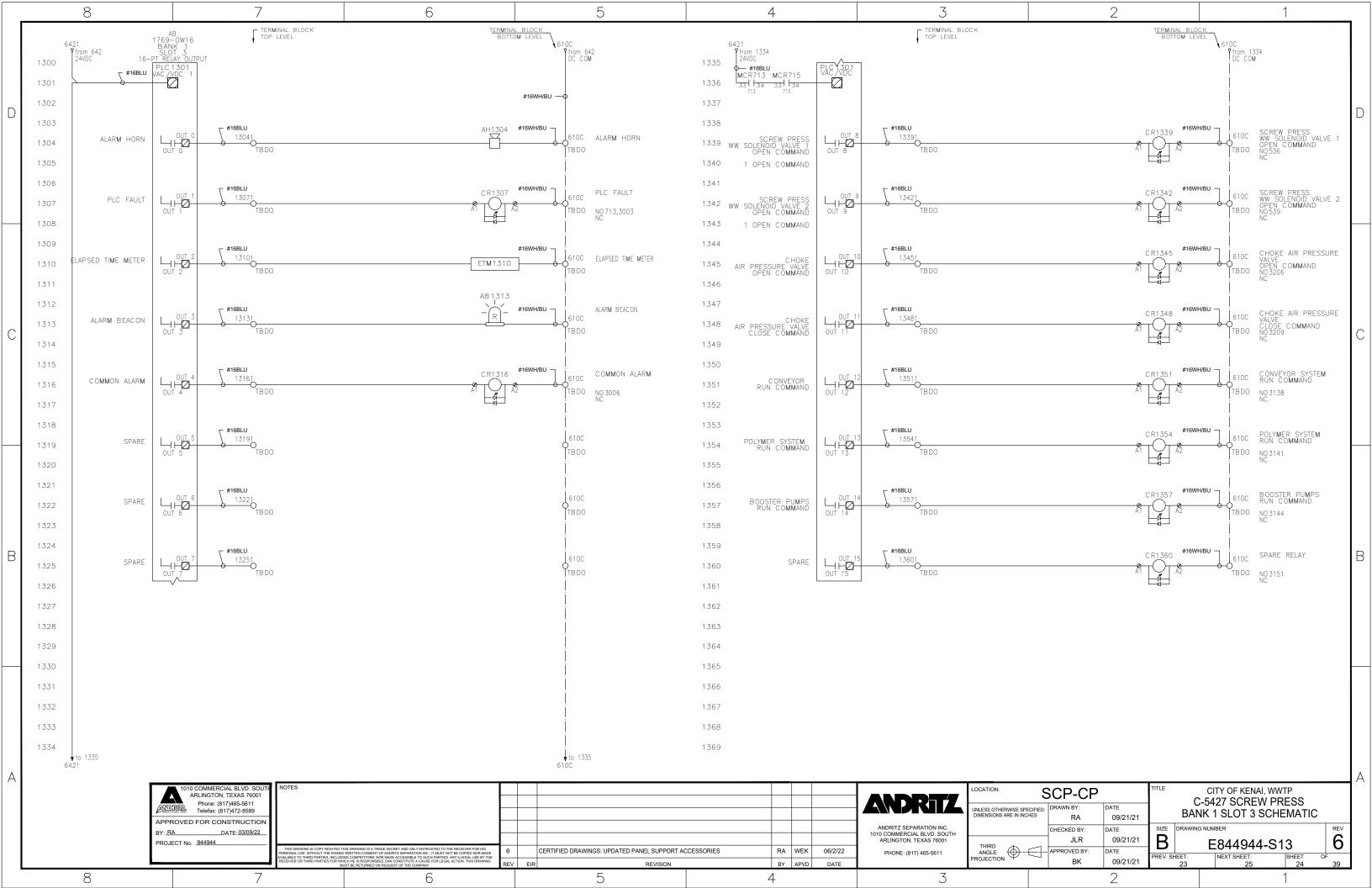


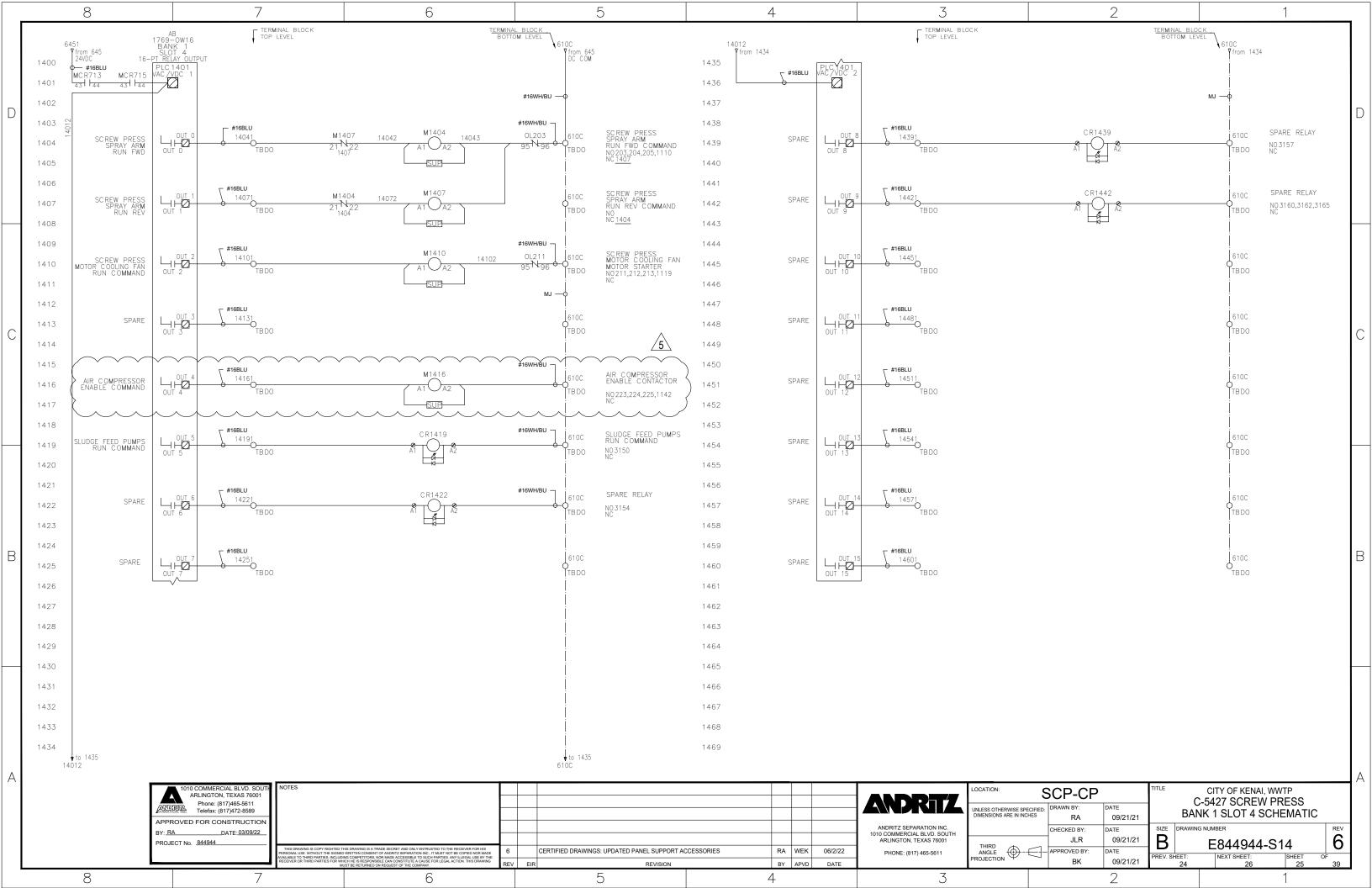


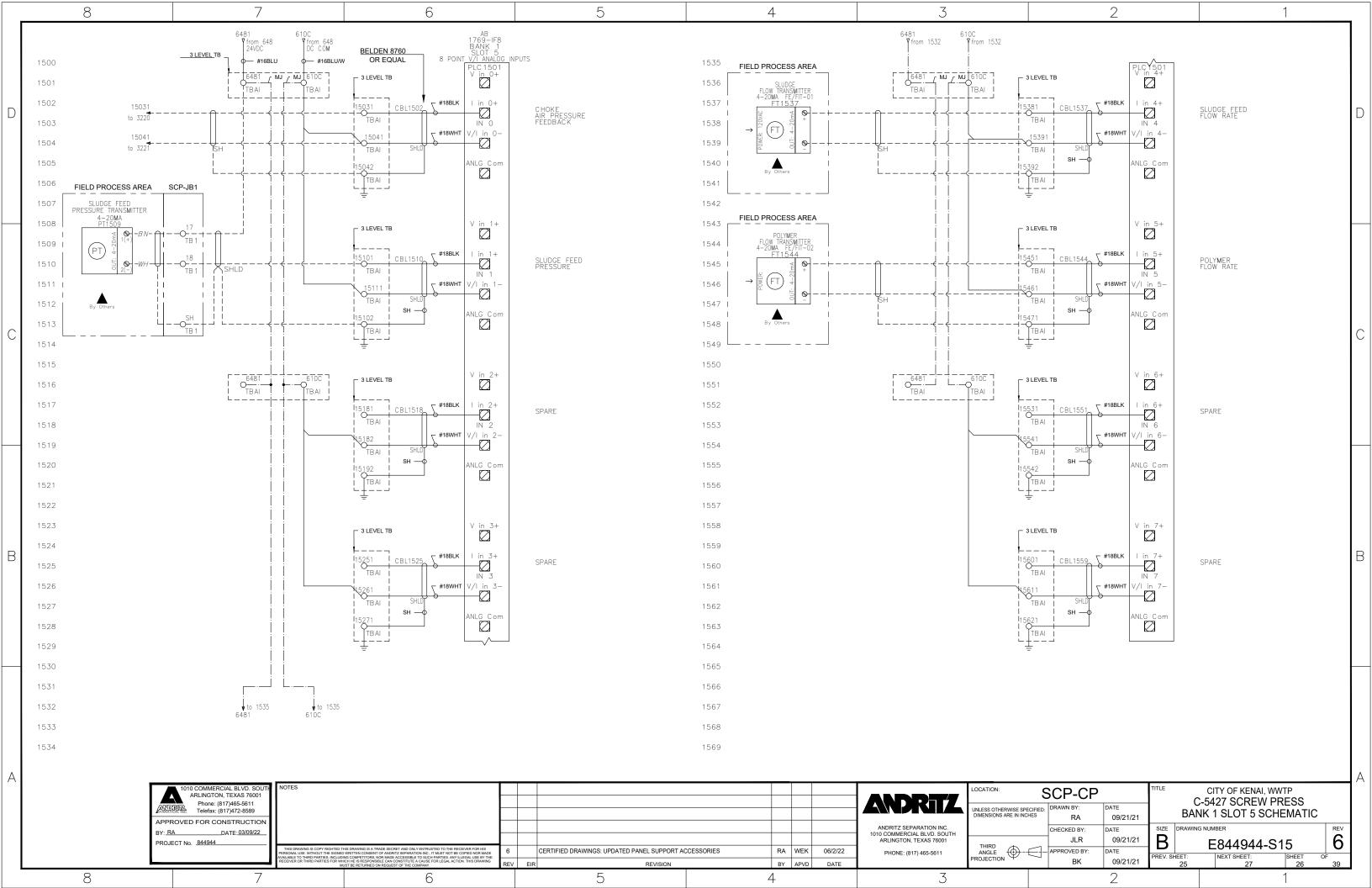


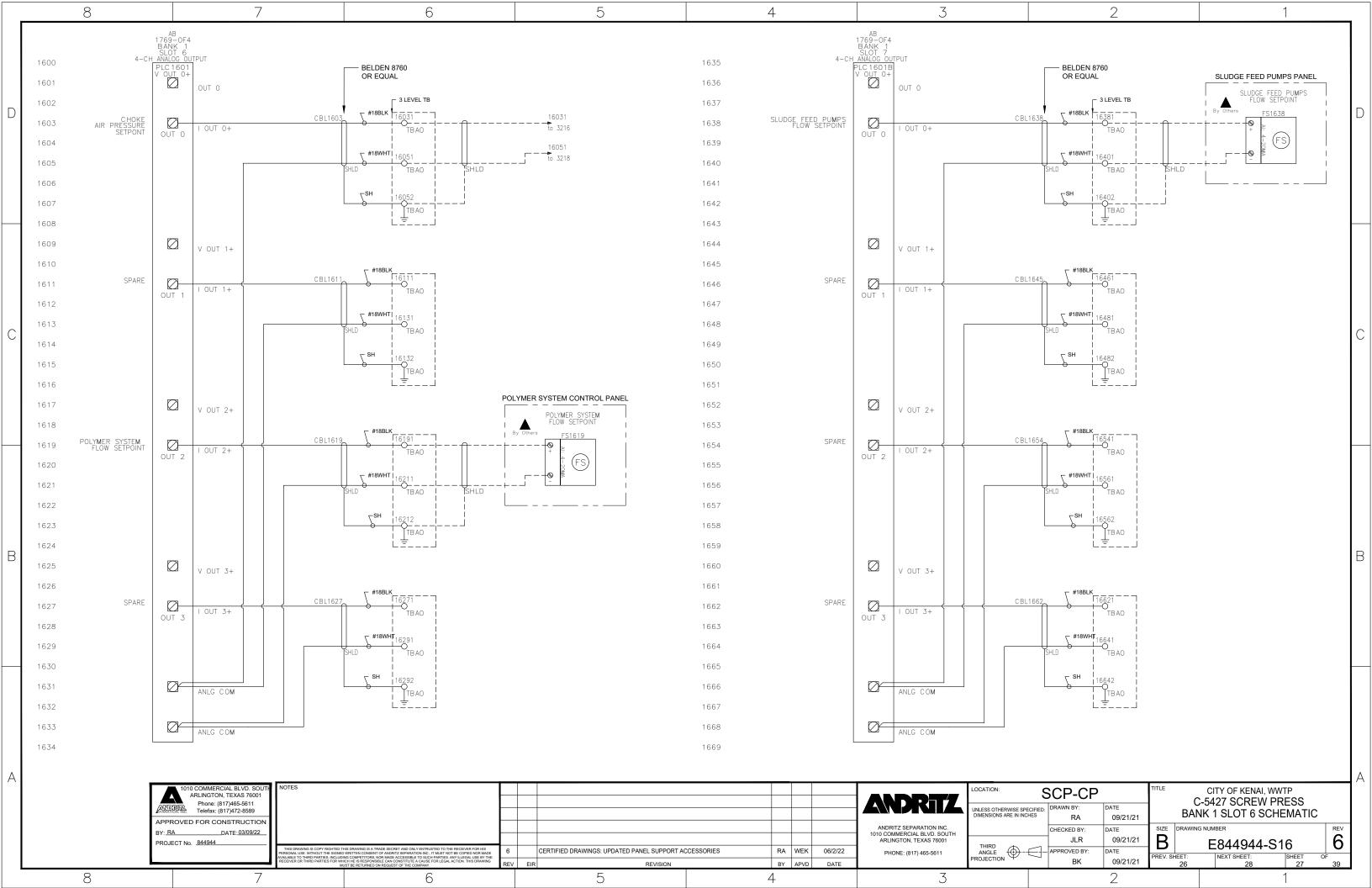


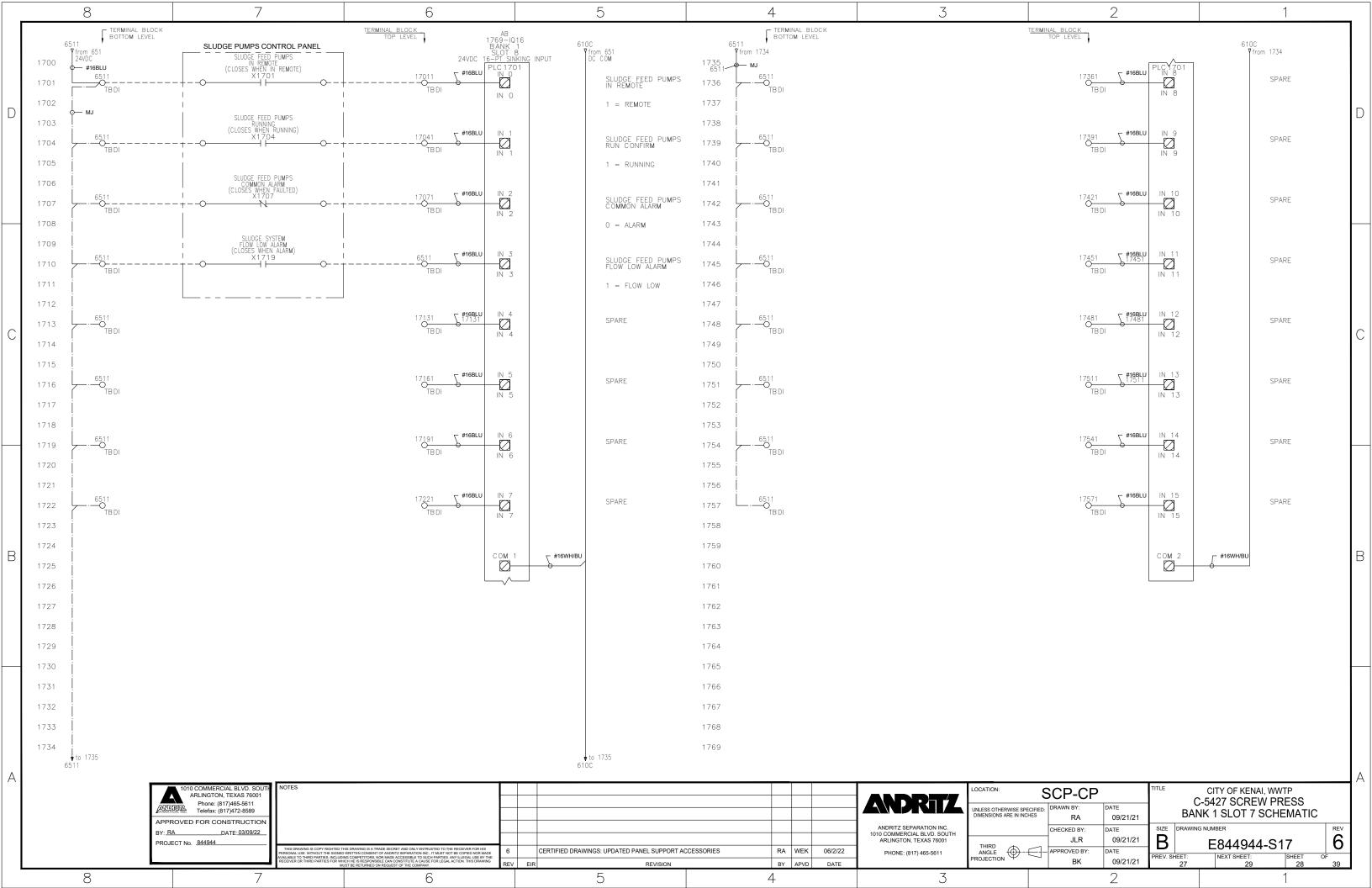


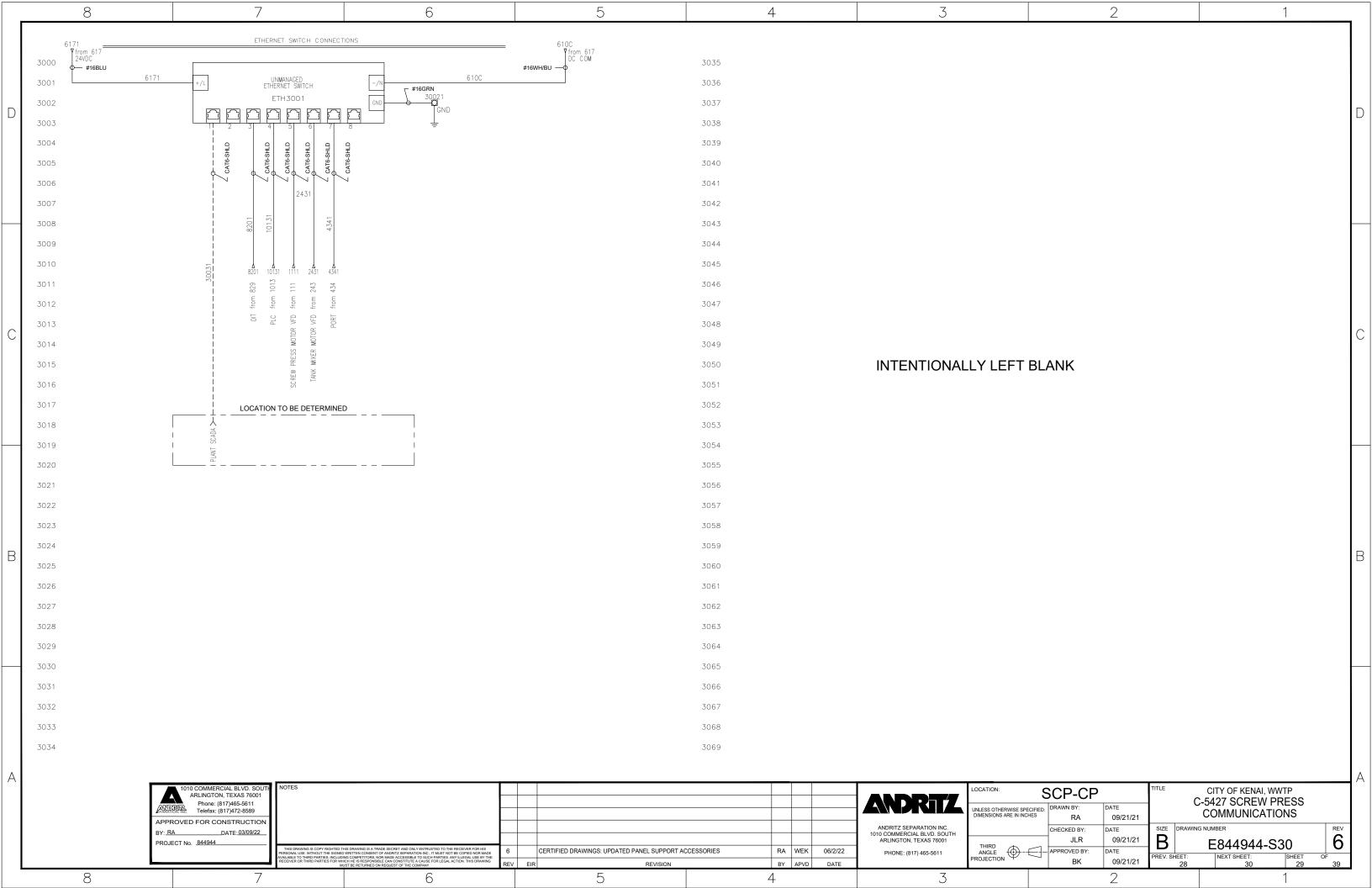


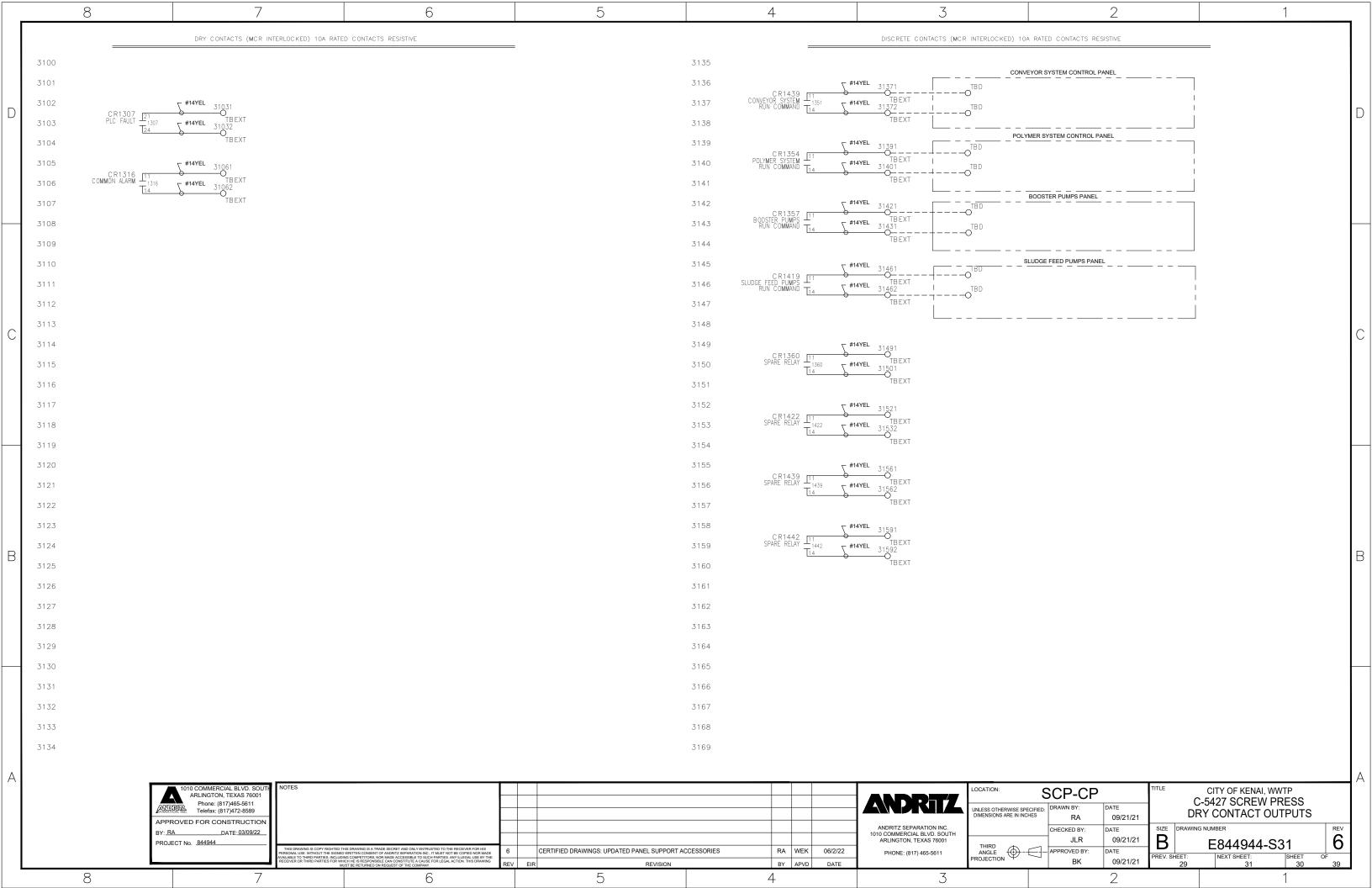


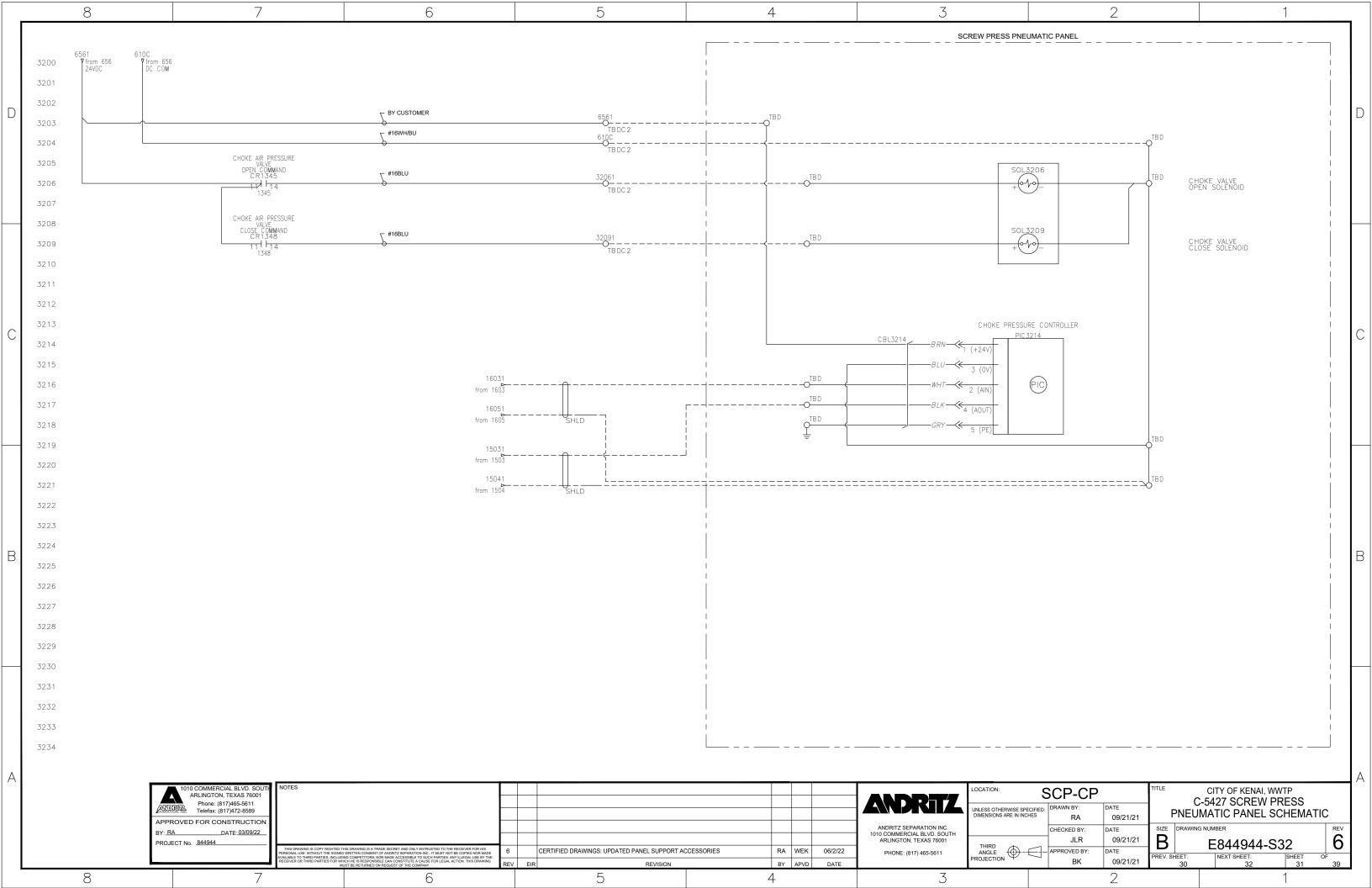


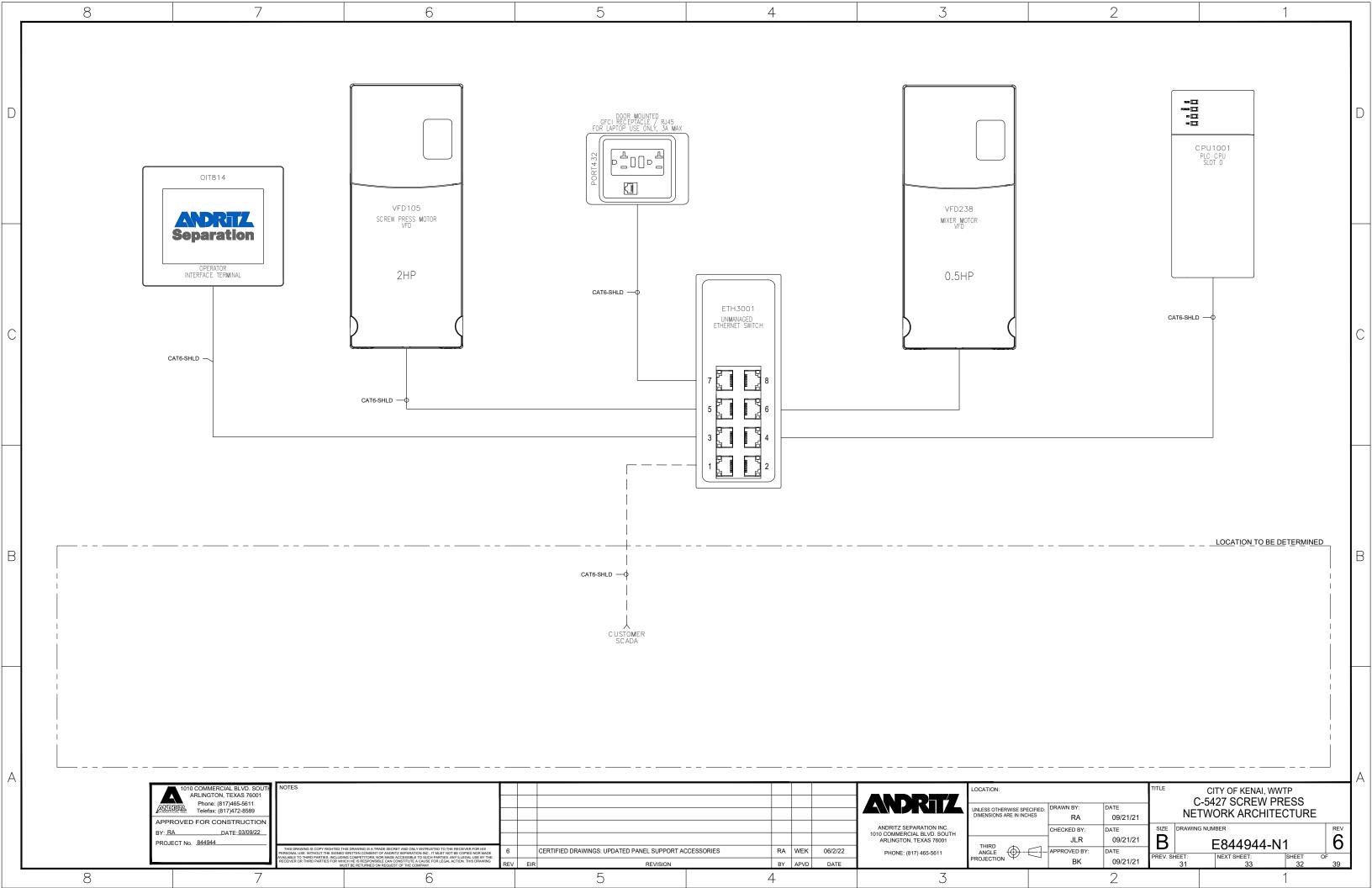


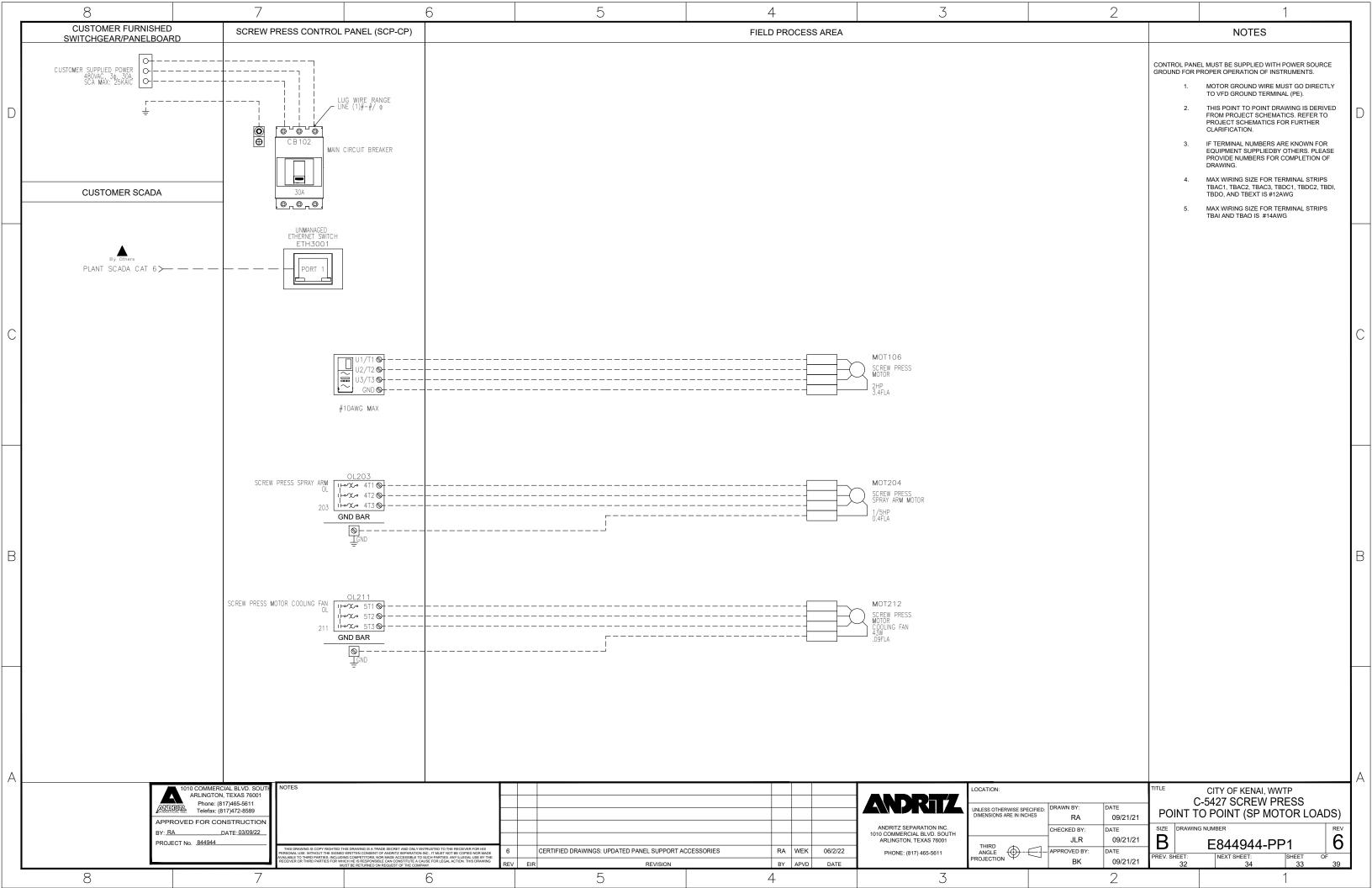


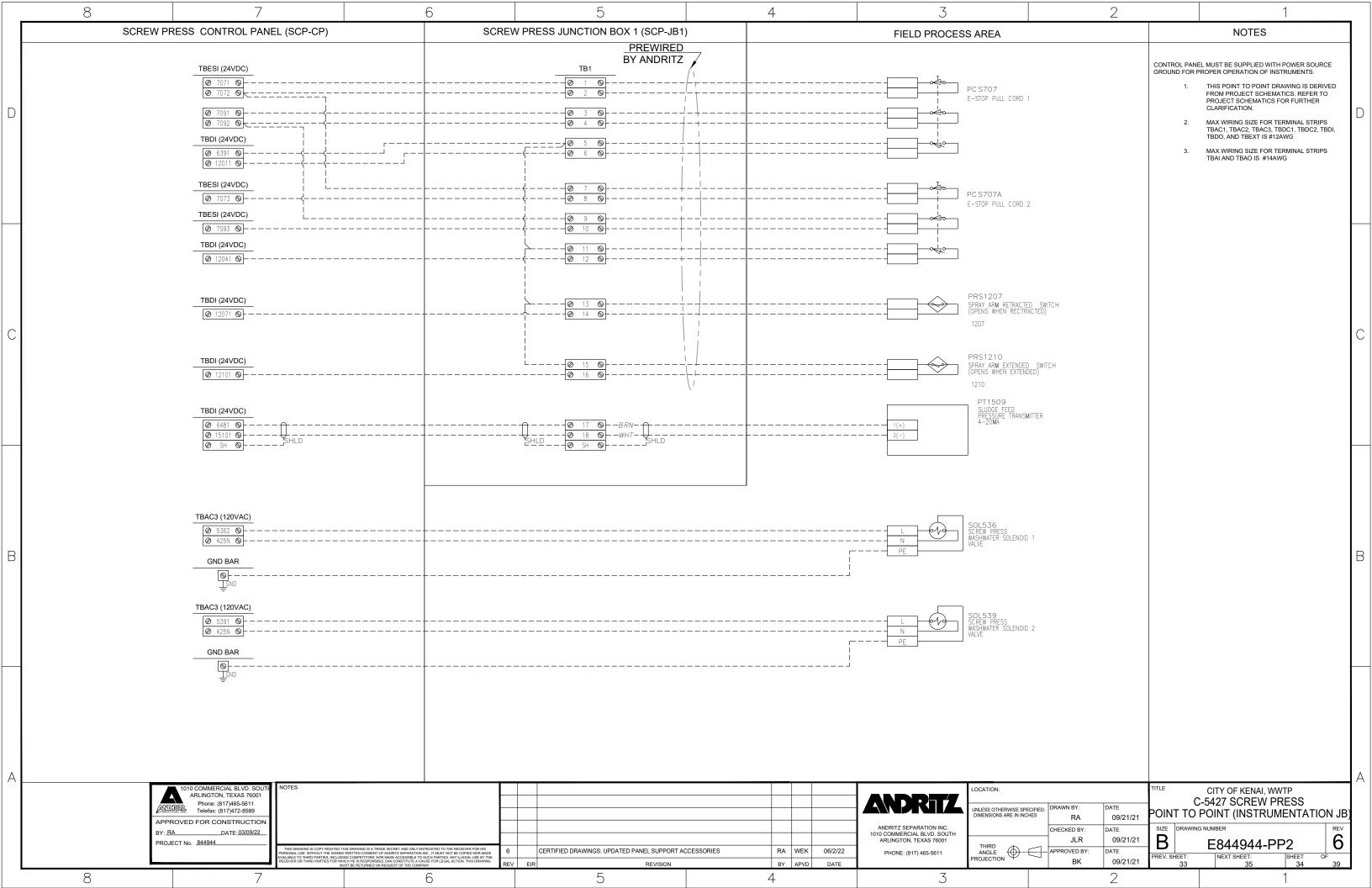


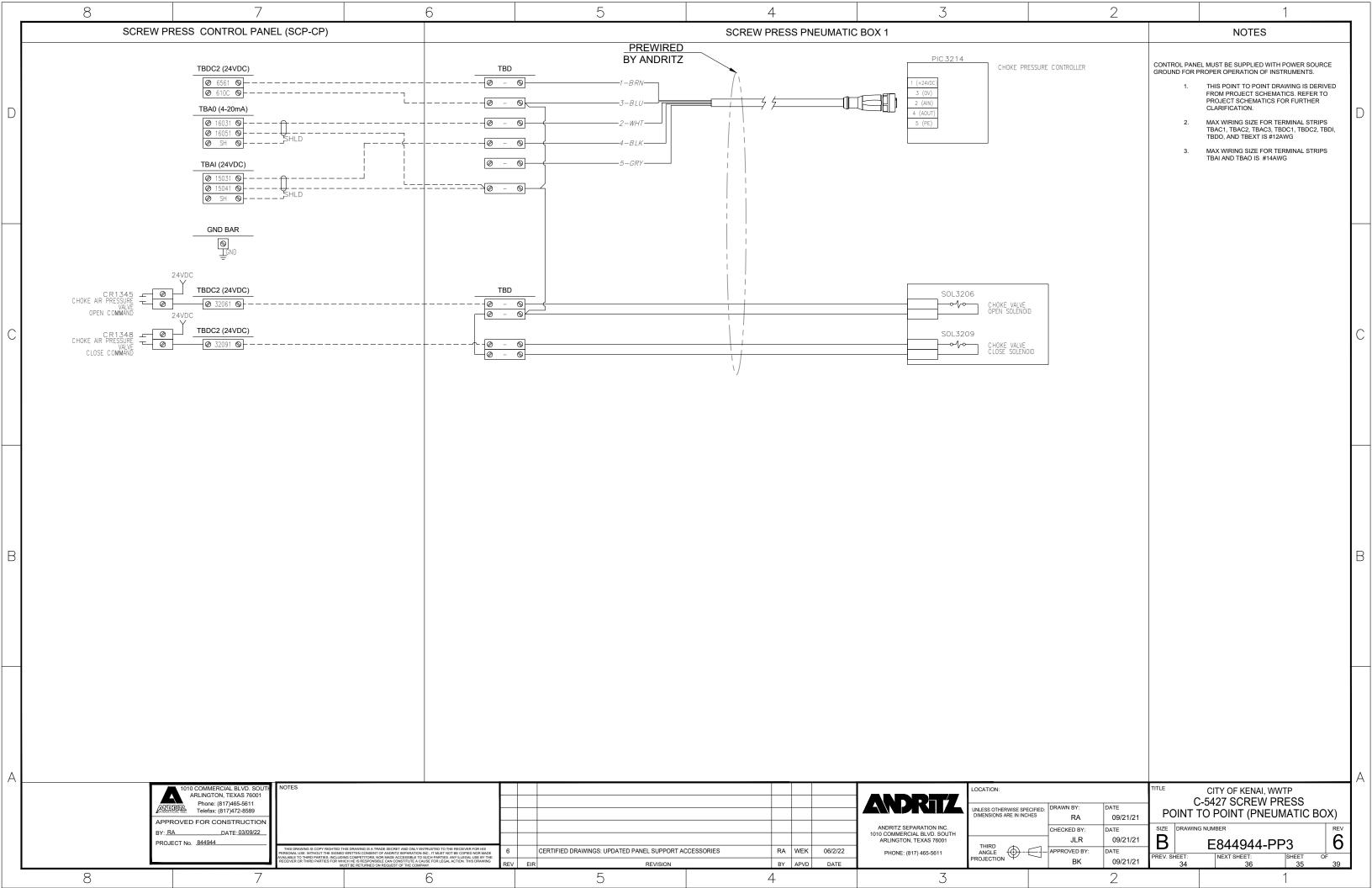


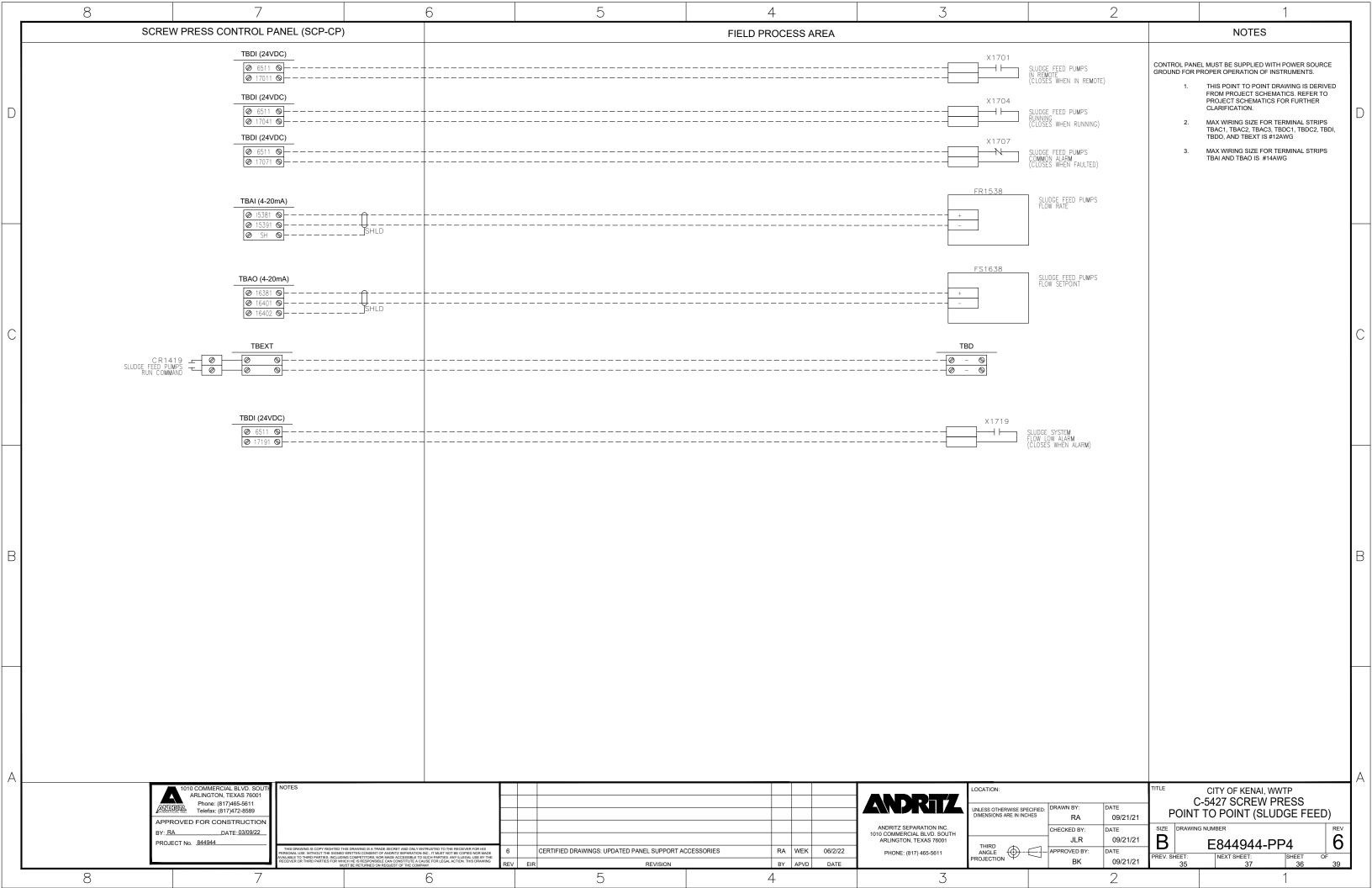


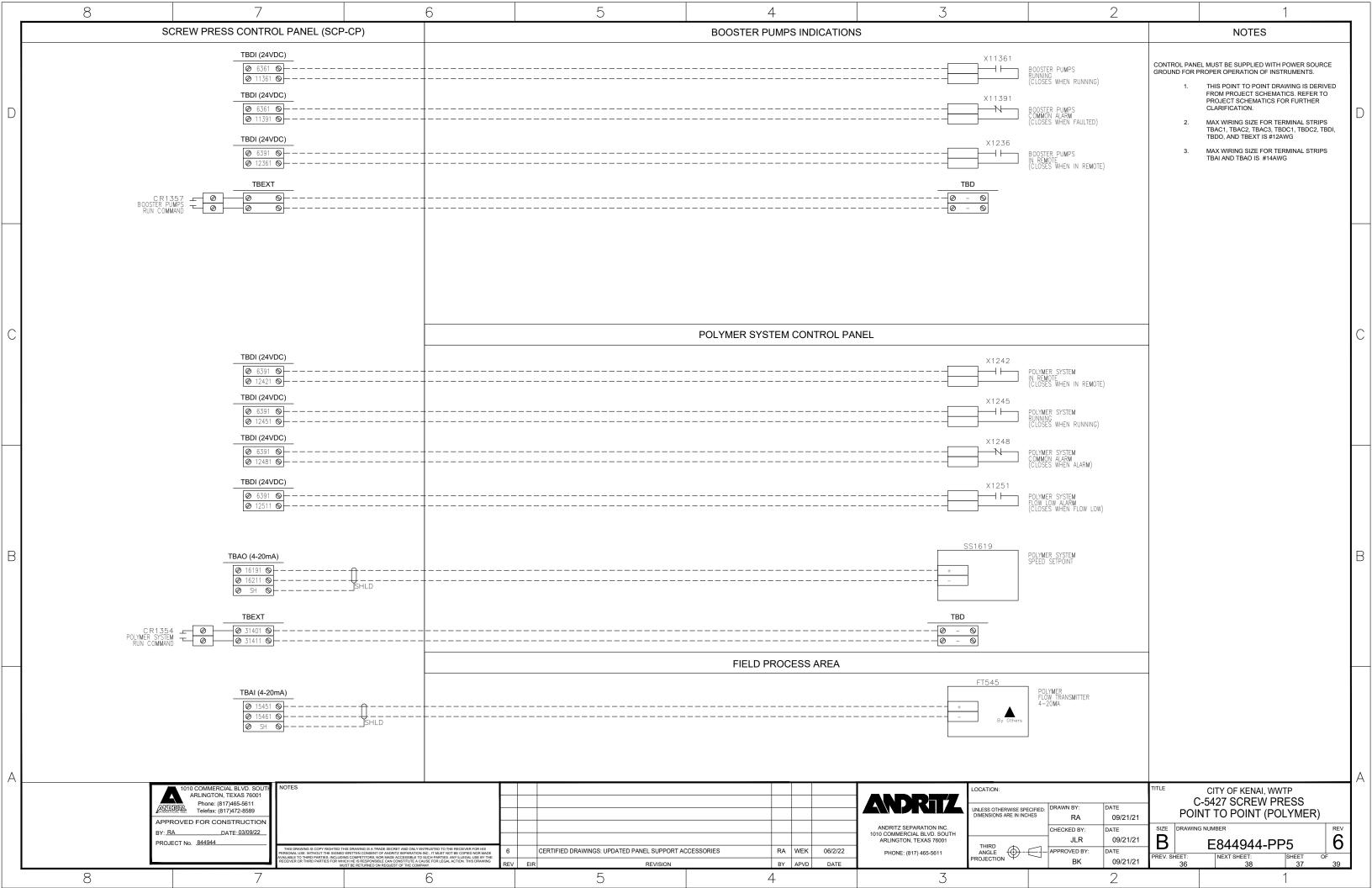


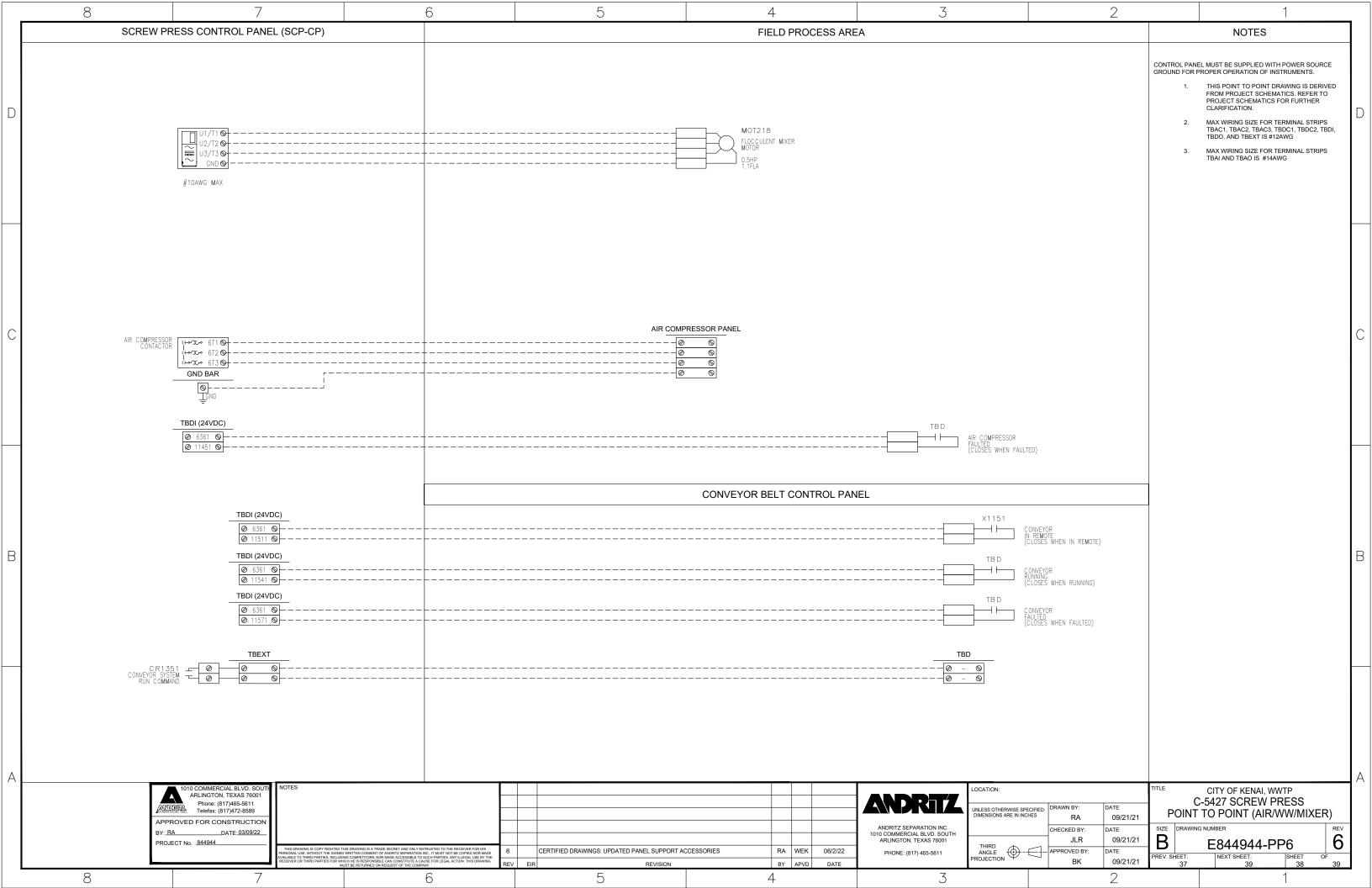












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	PLC HARE	DWIRED INPUT	OUTPUTS LIST					PLC HARD	WIRED INPU	T/OUTPUTS L	IST					
	LOCATION			DESCRIPTION		COMMENT	RUNG	LOCATION		CATALOG		DESCRIPTION		COMMENT	RUNG	ĺ
	SCP-CP	PLC1101	1769-IQ16 IN 0	CONTROL PANEL E-STOP		0 = PRESSED	1101	SCP-CP	PLC1401	1769-OW16		SCREW PRESS SPRAY ARM RUN			1404	i
	SCP-CP SCP-CP	PLC1101 PLC1101		MASTER CONTROL RELAYS E SPARE	ENABLED	1 = ENABLED	1104	SCP-CP SCP-CP	PLC1401 PLC1401			SCREW PRESS SPRAY ARM RUN SCREW PRESS MOTOR COOLING			1407	ĺ
	SCP-CP	PLC1101	IN 3	SCREW PRESS SPRAY ARM I	RUN EWD CONFIRM	1 = RUNNING FWD	1110	SCP-CP	PLC1401			SPARE	5 FAIN ROIN CONNINAIND		1413	
	SCP-CP	PLC1101	IN 4	SCREW PRESS SPRAY ARM I		1 = RUNNING REV	1113	SCP-CP	PLC1401			AIR COMPRESSOR ENABLE COM	IMAND		1416	\cup
	SCP-CP	PLC1101	IN 5	SCREW PRESS SPRAY ARM I		1 = FAULTED	1116	SCP-CP	PLC1401			SLUDGE FEED PUMPS RUN COM			1419	i
	SCP-CP	PLC1101	IN 6	SCREW PRESS MOTOR COO		1 = RUNNING	1119	SCP-CP	PLC1401			SPARE			1422	i
	SCP-CP	PLC1101	IN 7	SCREW PRESS MOTOR COO	DLING FAN FAULTED	1 = FAULTED	1122	SCP-CP	PLC1401		OUT 7	SPARE			1425	i
	SCP-CP	PLC1101	IN 8	WASH WATER BOOSTER PUR	MPS RUN CONFIRM	1 = RUNNING	1136	SCP-CP	PLC1401		OUT 8	SPARE			1439	i
	SCP-CP	PLC1101	IN 9	WASH WATER BOOSTER PUR	MPS COMMON ALARM	0 = ALARM	1139	SCP-CP	PLC1401		OUT 9	SPARE			1442	i
	SCP-CP	PLC1101	IN 10	AIR COMPRESSOR ENABLED	D	1 = ENABLED	1142	SCP-CP	PLC1401		OUT 10	SPARE			1445	i
	SCP-CP	PLC1101	IN 11	AIR COMPRESSOR FAULTED		1 = FAULTED	1145	SCP-CP	PLC1401		OUT 11	SPARE			1448	i
	SCP-CP	PLC1101		SPARE			1148	SCP-CP	PLC1401			SPARE			1451	<u> </u>
	SCP-CP	PLC1101	IN 13	CONVEYOR IN REMOTE		1 = REMOTE	1151	SCP-CP	PLC1401			SPARE			1454	i
	SCP-CP	PLC1101	IN 14	CONVEYOR RUNNING		1 = RUNNING	1154	SCP-CP	PLC1401			SPARE			1457	i
	SCP-CP	PLC1101	IN 15	CONVEYOR FAULTED	1 ACTIVA ED 1 - DUILLED	0 = FAULTED	1157	SCP-CP	PLC1401	4760 IF0	OUT 15	SPARE	DV.		1460	1
	SCP-CP SCP-CP	PLC1201	1769-IQ16 IN 0	SCREW PRESS PULL CORD 1		1 = PULLED	1201	SCP-CP	PLC1501	1769-IF8	IN 0	CHOKE AIR PRESSURE FEEDBAI SLUDGE FEED PRESSURE	ZN		1503	l
	SCP-CP SCP-CP	PLC1201 PLC1201	IN 1	SCREW PRESS PULL CORD 2 SCREW PRESS SPR Y ARM R		1 = PULLED 0 = RETRACTED	1204	SCP-CP SCP-CP	PLC1501 PLC1501		IN 1 IN 2	SPARE			1510 1518	l
	SCP-CP	PLC1201	IN 3	SCREW PRESS SPR Y ARM R		0 = EXTENDED	1210	SCP-CP	PLC1501		IN 3	SPARE			1516	l
	SCP-CP	PLC1201		SPARE SPARE			1213	SCP-CP	PLC1501			SLUDGE FEED FLOW RATE			1538	1
	SCP-CP	PLC1201	IN 5	SPARE			1216	SCP-CP	PLC1501			POLYMER FLOW RATE		+	1545	l l
С	SCP-CP	PLC1201	IN 6	SPARE			1219	SCP-CP	PLC1501			SPARE			1553	С
	SCP-CP	PLC1201	IN 7	SPARE			1222	SCP-CP	PLC1501		IN 7	SPARE			1560	l l
	SCP-CP	PLC1201	IN 8	BOOSTER PUMPS IN REMOTI	TE/AUTO	1 = IN REMOTE	1236	SCP-CP	PLC1601	1769-OF4	OUT 0	CHOKE AIR PRESSURE SETPON	Т		1603	l l
	SCP-CP	PLC1201	IN 9	SPARE			1239	SCP-CP	PLC1601		OUT 1	SPARE			1611	i i
	SCP-CP	PLC1201	IN 10	POLYMER SYSTEM IN REMO	DTE/AUTO	1 = IN REMOTE	1242	SCP-CP	PLC1601		OUT 2	POLYMER SYSTEM FLOW SETP	TAIC		1619	l l
	SCP-CP	PLC1201	IN 11	POLYMER SYSTEM RUN COM	NFIRM	1 = RUNNING	1245	SCP-CP	PLC1601		OUT 3	SPARE			1627	i i
	SCP-CP	PLC1201	IN 12	POLYMER SYSTEM COMMON	N ALARM	0 = COMMON ALARM	1248	SCP-CP	PLC1601B	1769-OF4	OUT 0	SLUDGE FEED PUMPS FLOW SE	TPOINT		1638	l l
	SCP-CP	PLC1201	IN 13	POLYMER SYSTEM FLOW LO	OW ALARM	1 = LOW FLOW ALARM	1251	SCP-CP	PLC1601B		OUT 1	SPARE			1646	l l
	SCP-CP	PLC1201	IN 14	SPARE			1254	SCP-CP	PLC1601B		OUT 2	SPARE			1654	l l
	SCP-CP	PLC1201	IN 15	SPARE			1257	SCP-CP	PLC1601B		OUT 3	SPARE			1662	\vdash
	SCP-CP	PLC1301	1769-OW16 OUT 0	ALARM HORN			1304	SCP-CP	PLC1701	1769-IQ16	IN 0	SLUDGE FEED PUMPS IN REMO	E	1 = REMOTE	1701	i i
	SCP-CP	PLC1301	OUT 1	PLC FAULT			1307	SCP-CP	PLC1701		IN 1	SLUDGE FEED PUMPS RUN CON	FIRM	1 = RUNNING	1704	l l
	SCP-CP	PLC1301		ELAPSED TIME METER			1310	SCP-CP	PLC1701			SLUDGE FEED PUMPS COMMON		0 = ALARM	1707	l l
	SCP-CP	PLC1301		ALARM BEACON			1313	SCP-CP	PLC1701			SLUDGE FEED PUMPS FLOW LO	W ALARM	1 = FLOW LOW	1710	i i
	SCP-CP	PLC1301		COMMON ALARM			1316	SCP-CP	PLC1701			SPARE			1713	l l
	SCP-CP	PLC1301		SPARE			1319	SCP-CP	PLC1701			SPARE			1716	i i
	SCP-CP SCP-CP	PLC1301 PLC1301	OUT 6 OUT 7	SPARE SPARE			1322 1325	SCP-CP	PLC1701 PLC1701		IN 6	SPARE SPARE			1719 1722	l l
В	SCP-CP	PLC1301	OUT 8		DID VALVE 1 OPEN COMMAND	1 OPEN COMMAND	1339	SCP-CP	PLC1701		IN 8	SPARE			1722	В
	SCP-CP	PLC1301	OUT 9		DID VALVE 2 OPEN COMMAND	1 OPEN COMMAND	1342	SCP-CP	PLC1701		IN 9	SPARE			1739	
	SCP-CP	PLC1301	OUT 10	CHOKE AIR PRESSURE VALV		T OT ETT COMMUNICATION	1345	SCP-CP	PLC1701			SPARE		+	1742	l l
	SCP-CP	PLC1301		CHOKE AIR PRESSURE VALV			1348	SCP-CP	PLC1701		IN 11	SPARE			1745	l l
	SCP-CP	PLC1301	OUT 12	CONVEYOR RUN COMMAND)		1351	SCP-CP	PLC1701		IN 12	SPARE			1748	l l
	SCP-CP	PLC1301		POLYMER SYSTEM RUN COM			1354	SCP-CP	PLC1701			SPARE			1751	1
	SCP-CP	PLC1301		BOOSTER PUMPS RUN COM	MAND		1357	SCP-CP	PLC1701		IN 14	SPARE			1754	1
	SCP-CP	PLC1301	OUT 15	SPARE			1360	SCP-CP	PLC1701		IN 15	SPARE			1757	1
A			1010 COMMERCIAL BLVD. SOL ARLINGTON, TEXAS 76001 Phone: (817)465-5611 Telefax: (817)472-8589 APPROVED FOR CONSTRUCTIO BY: RA DATE: 03/09/22 PROJECT No. 844944	N						4	ANDRITZ SEPARATIO 1010 COMMERCIAL BLVI ARLINGTON, TEXAS	N INC. D. SOUTH	CHECKED BY: DATE SIZE JLR 09/21/21	CITY OF KENAI, WWTP C-5427 SCREW PRESS I/O MAP LIST DRAWING NUMBER E844044 LOM1	s REV	
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L				AVAILABLE TO THIRD PARTIES, INCLUD RECEIVER OR THIRD PARTIES FOR WI-	DING COMPETITORS, NOR MADE ACCESSIBLE TO SUCH PARTIES, ANY ILLEGAL USE BY THE HIGH HE IS REPONDISELE CAN CONSTITUTE A CAUSE FOR LEGAL ACTION. THIS DRAWING MUST BE RETURNED ON REQUEST OF THE COMPANY.	REV EIR	REVISION		BY APVD	DATE		PROJECTION Ψ	BK 09/21/21 PREV.	SHEET: NEXT SHEET: SHEET 38		i
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7.0 Sequence of Operation (SEQ) / Control System Description (CSD)



SEQUENCE OF OPERATION

The C-press control system consists of a C-Press Main Control Panel (SCP-CP) which houses the variable frequency drive, PLC, and the operator interface terminal (OIT) as well as interlocking components. It is important to ensure that all control switches are in the proper position and equipment is ready to operate from the SCP-CP.

The SCP-CP or field mounted emergency stop(s) will de-energize the Safety Relay and Master Control Relays to interrupt all run commands for immediate shutdown.

To restart the system, the emergency stop must be manually reset and the Safety Reset button pressed.

OIT SCREENS

- Main this screen provides a system overview with operational status indicators, mode selection touch zones, sequence start and stop touch zones, and access to other system screens.
- Manual Control this screen provides start and stop touch zones and status indicators for each piece of equipment.
- Feed setup This screen provides set-point entry for the sludge feed pump and polymer systems speed references along with numerical and bar graph representations of both speed set-point and actual speed.
- System Monitor This screen provides numerical and bar graph representations of set-points and actual values of all system-monitored values along with C-press runtime.
- Alarms This screen provides indication for all system alarms.
- Setup1 this screen is password protected and provides entry for C-Press specific machine and motor data for PLC program use.
- Setup2 this screen is password protected and provides entry for C-Press sequence timer setpoints.
- Trends- This screen provides short term trending for process control use. Trends for torque %, sludge flow, C-press speed, and sludge feed pressure are available.
- C-press Setup- This screen provides setting of the torque, choke setpoint, and screw speed.
- Mixer This screen provides set-point entry for the tank mixer.

STARTING/STOPPING MODES

- On the "Main" screen, select the system-operating mode by touching one of the mode select touch zones. All equipment must be stopped to change modes; this will be indicated by the mode select enabled indicator. This screen also provides the operator with a visual of the auto stop countdown as well as a countdown to the next automatic washing, if enabled.
- Manual mode In this mode, system components can be started with their respective start pushbuttons on the "Manual Control" screen. Maintained running of components shall be allowed



when interlocks are satisfied. System components are stopped with their respective stop pushbuttons. Emergency stop will always stop all equipment.

This mode of operation is provided for maintenance purposes only and should not be left unattended.

• Auto mode – In this mode, start-up and shutdown can be controlled from the auto start/auto stop pushbuttons. Operating the auto start pushbutton will initiate the sequence of events described below. At any time while in the Auto mode the operator can begin a start-up or shutdown.

Operating the Auto Start pushbutton will initiate the following sequence of events: While Auto start is in progress the Auto start indicator light will flash "STARTING IN AUTO". After start-up is complete the indicator light will stay on steady "RUNNING IN AUTO".

1.	Air compressor starts	Instantly
2.	Choke air solenoid actuates	Instantly
3.	C-press main drive starts	After adjustable delay
4.	Cooling fan starts	After C-press drive starts
5.	Conveyor starts	After C-press drive starts
6.	Polymer blending system starts	After an operator settable time delay
7.	WAS pump starts	xx second delay from polymer starting
8.	Flocculent mixer starts	After sludge pump starts
9.	Solenoid valves 1 & 2 open/close	See washing during run below
10.	Wash water booster pump starts/stops	See washing during run below
11.	Spray arm extends/retracts	See washing during run below



Operating the Auto Stop pushbutton will initiate the following sequence of events:

1.	Sludge pump stops	Instantly
2.	Polymer system stops	Instantly
3	C-press switches to speed control if not automatically selected	Instantly
4.	Air solenoid closes (opens choke plate)	After an operator settable time delay
5.	Wash solenoid valves 1 and 2 open	When air solenoid closes
6.	Wash water booster pump runs	After solenoid valves 1 and 2 open
7.	Spray arm extends and then retracts	After wash water pump starts, spray arm will move to extend limit and then retract limit repeatedly
8.	Conveyor stops/starts in reverse	After an operator settable delay. (Dependent on customer specific installation)
9.	C-press stops	After completion of auto stop countdown
10.	Cooling fan stops	After adjustable off delay
11.	Wash water booster pump stops	After completion of auto stop countdown
12.	Wash solenoid valves 1 and 2 close	After completion of auto stop countdown
13.	Spray arm stops	After completion of auto stop countdown and the Arm has returned to the retracted position

Auto stop indicator light will flash "STOPPING IN AUTO" while in progress and go on steady "STOPPED IN AUTO" when complete.

The operator may skip the washing sequence and complete the shutdown by holding the auto stop pushbutton on the main C-press screen for 10 seconds.



Washing during automatic operation:

During automatic or manual operation, the operator may choose to do a one-time wash of the C-press. The operator may elect to wash the length of the C-press, one pass of the spray arm with both solenoid valve 1 open, solenoid valve 2 open, and the booster pump running.

During automatic operation the operator may choose to select a timed mode of washing, this mode is selected from the C-press main page. During the timed mode the C-press will wash the feed end and discharge end based on an operator settable run time.

OPERATING MODE

Speed control

The C-Press operates in speed control. The set-point is entered by touching the numeric display button, which brings up a numeric entry keypad. The set-point range is 0-1RPM * for speed control.

* - C-press speed maximum is limited on "Setup 1" screen.

Choke

The C-press choke has a pressure setpoint entry. To access set point entry, touch the C-press graphic on the main page, this will display the C-press control screen.

Feed Control

The speed set-points for the WAS pump and polymer system can be accessed by touching the WAS pump graphic on the main screen. This will display the "Feed Setup" screen. The set-point is entered by touching the numeric displays below the word set-point. This will bring up a numeric entry keypad. The set-point range will be determined at start up.

Feed Control Pause

There is a pause push-button located on the Main screen and the Feed Setup screen. These buttons when depressed will cause a temporary feed shutdown. To reactivate the feed system, depress the appropriate Resume pushbutton. When a centrifuge has been paused for 10 minutes the alarm horn will sound 3 times to draw attention to a "none processing" machine. The machine will auto stop after one hour in pause.

Software-manual/Hardware-manual Operation

It is considered Software-manual operation when all Hand-Off-Auto (HOA) switches are located in the auto position, and the manual mode of operation is selected from the C-press main page. When Software-manual operation is used all device start and stops will be from the C-press manual screen.



Hardware-manual operation is via the Hand-Off-Auto (HOA) switches located on the SCP-CP, operation in this mode has no interlocks except for the E-stops.

Both Software/Hardware-manual modes are intended for use in maintenance mode only.

ALARMS

Alarm conditions are indicated on the alarm screen and will cause the alarm horn to sound and beacon to flash. Pressing the silence pushbutton will silence the horn. Pressing the reset button will clear alarm indicator and allow system start-up if condition has been cleared. All alarms from the SCP-CP will be provided to Plant SCADA System via Ethernet /IP Connection.

The following fault conditions will immediately shutdown the complete system, and cause the alarm horn and the alarm beacon to flash this will happen in both auto and manual operation:

- Panel emergency stop
- Pullcord emergency stop
- MCR fault
- C-press VFD fault
- Air compressor fault
- Loss of air fault
- Conveyor fault
- High torque*
- Spray arm fault
- Cooling fan fault

The following fault conditions will cause the alarm horn to sound and the alarm beacon to illuminate and will initiate a feed pause in the auto mode, in manual mode the associated device will stop:

- Polymer system fault
- WAS pump fault
- High feed pressure fault
- Flocculent mixer fault
- Flocculent tank high level
- Wash water booster pump fault

The following fault conditions will cause the alarm beacon to illuminate and the horn to sound but will otherwise not affect operation:

Low water pressure alarm

^{*-} These alarm set-points are set on "Setup 1" screen.

C-5427 Screw Press



E844944_CSD-R0.Docx RA 9/21/2021

CONTROL SYSTEM DESCRIPTION

One Screw Press Machine will be supplied, which includes the following electrical controls.

ENCLOSURES

- 1. Control Panel (SCP-CP) Qty: 1
 - Enclosure Type Floor-mount, Nema 4X
 - Certification: UL Listed

The following major components will be mounted within the SCP-CP:

- Main power circuit breaker disconnect switch
- VFD fuse blocks with fuses.
- Power Distribution Block
- Motor Controls:
 - ⇒ Variable Frequency Drives:
 - ♦ Screw Motor Drive with Line Reactor
 - ♦ Flocculent Mixer Drive
 - ⇒ Motor Starters:
 - ♦ Spray Arm Motor (FVR)
 - ♦ Screw Motor Cooling Fan (FVNR)
 - ♦ Air Compressor (FVNR)
- Control voltage transformer
- Primary control voltage fuses
- 24VDC Power Supply
- PLC CompactLogix with I/O Cards
- Control relays
- Master Control Relays
- Safety Relay
- Line Surge Protector
- Unmanaged Ethernet Switch
- Screw Press Hour Meter
- Miniature circuit breakers
- Terminal strips for all external connections with other equipment
- Ground Bar
- Enclosure Lighting
- Enclosure Door Switch
- Enclosure Space Heater

C-5427 Screw Press



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The following controls will be mounted on the SCP-CP Enclosure door.

- System Control ON/OFF Selector Switch
- Safety Reset Pushbutton
- GFCI duplex power receptacle for Laptop use connection
- Emergency Stop: Maintained position, mushroom head pushbutton non-illuminated
- Main disconnect: Circuit breaker operator handle, lockable in off position
- Alarm Horn
- Operator Interface Terminal (Touch Screen)

The following controls will be mounted on the right side of SCP-CP Enclosure.

Air Conditioner

The following controls will be mounted on top of SCP-CP Enclosure.

Alarm Beacon

2. Screw Press Instrumentation Junction Box (SCP-JB1) Qty: 1

- Enclosure: Nema 4X
- Spray Arm Position Switches (2), Sludge Feed Pressure Transmitter, Safety Pull Cord Switches
 (2) will be wired complete to the Junction Box
- Mounted on Screw Press

3. Screw Press Pneumatic Box (SCP-PB) Qty: 1

- Enclosure: Nema 4
- Choke Pressure Controller, Choke Air On/Off Valve
- Mounted on Screw Press

OPERATOR INTERFACE

1. Operator Interface Terminal in SCP-CP:

The OIT will provide the following system controls and status indicators:

Screw Press
 Screw Press
 Panel E-Stop Active
 Pull Cords activated
 Hand/Off/Auto

Screw Drive
 Drive Speed (From VFD)

Screw DriveScrew DriveRunningFault

Screw Drive Motor Current

Screw Drive
 Drive Motor Temperature High

Screw Drive Off/ReadySpray Arm Extend/Retract



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Spray Arm
 Spray Arm
 Retracted
 Choke
 On/Off

Choke Pressure Setpoint Choke Pressure Feedback Screw Press WW Valve 1 Hand/Off/Auto Screw Press WW Valve 1 Open-Close Screw Press WW Valve 2 Hand/Off/Auto Screw Press WW Valve 2 Open-Close Sludge Flowmeter Flow Rate Sludge Pressure Transmitter Inlet Pressure Sludge Pump Running Sludge Pump Remote Sludge Pump Fault Polymer Flowmeter Flow Rate Polymer System Running Polymer System Remote

Polymer System
 Speed Command

Fault

Start/Stop

Polymer System

Polymer System

Polymer System Flow Rate **WAS Pump** Running WAS Pump Remote **WAS Pump** Fault Sludge Transfer Auger Running Sludge Transfer Auger Remote Air Compressor Start/Stop Air Compressor Running Air Compressor Fault Flocculent Tank Mixer Running Flocculent Tank Mixer Fault Alarm Silence Alarm Reset



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The following process status indicators shall be provided for the Screw Press control system via the Control Panel OIT:

- "Auto-Start"
- "Starting in Auto"
- "Running in Auto"
- "Stopping in Auto"
- "Paused for Process repairs"
- "Stopped in Manual"
- "Running in Manual"
- "Auto-Stop"
- Emergency stop "Fault"

The following quantifying indicators shall be provided for the Screw Press control system via the panel mounted OIT:

- Screw Press drive motor amps and % of full load
- Screw Press speed in "RPM" (Actual and Setpoint)
- Screw Press pressure in "PSI"
- Flocculent Tank Level
- Wake Time
- Torque PID Settings

SCREW PRESS CONTROL PANEL INTERFACE REQUIREMENTS

1. Power Requirements:

- SCP-CP Power input from customer supply:
 - \Rightarrow 480VAC, 3 Phase, 60 HZ, 30 Amps
 - ⇒ Maximum Available Short Circuit Current: 25KAIC
- Power output from SCP-CP to motors loads (480 VAC):
 - ⇒ Screw Drive Motor (2HP)
 - \Rightarrow Spray Arm Motor (1/5HP)
 - \Rightarrow Screw Drive Motor Cooling Fan (43W)
 - ⇒ Flocculent Mixer Motor (0.5HP)
 - ⇒ Air Compressor (2HP)
- Power Output from SCP-CP to Field Components
 - ⇒ Sludge Flow Transmitter (120VAC)
 - ⇒ Polymer Flow Transmitter (120VAC)

2. Network Interface

• Ethernet/IP For Screw Press and other non-Screw Press Equipment



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3. Inputs/Outputs

Discrete Inputs

- ⇒ From Dry Contacts
 - ♦ E-Stop Pull Cord (2)
 - ♦ Polymer System Running
 - ♦ Polymer System Faulted
 - ♦ Polymer System in Remote
 - ♦ Polymer System Running
 - ♦ Polymer System Faulted
 - ♦ Polymer System in Remote
- ⇒ From 120VAC Wetted Contacts
 - ♦ None.
- ⇒ From 24VDC Wetted Contacts
 - ♦ Spray Arm Retracted Switch
 - ♦ Spray Arm Extended Switch

Analog Inputs

- ⇒ 4-20mA
 - ♦ Choke Air Pressure Feedback
 - ♦ Sludge Feed Pressure
 - ♦ Sludge Flow
 - ♦ Polymer Flow

Discrete Outputs

- ⇒ Dry Contacts:
 - ♦ PLC Fault (For Customer use if required)
 - Common Alarm (For Customer use if required)
 - ♦ Polymer System Run Command
- ⇒ 24VDC Wetted Contacts:
 - ♦ Choke Air Valve Open
 - ♦ Choke Air Valve Closed
- ⇒ 120VAC Wetted Contacts:
 - ♦ Screw Press Wash Water Valve Open Command (2)

Analog Outputs

- ⇒ 4-20mA Outputs
 - ♦ Choke Air Pressure Setpoint
 - Polymer System Speed Setpoint



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4. Ethernet Communications

- The following Equipment will be communicated via Ethernet
 - ⇒ Sludge Feed Pump VFD
 - ⇒ Discharge Conveyor

SOFTWARE

- 1. The following Software versions will be used for Programming.
 - PLC
- ⇒ Studio 5000 v30
- Touch Screen
 - ⇒ FactoryTalk View ME 10



8.0 Control Panel Component Cutsheets



SCREW PRESS CONTROL PANEL CUTSHEETS



CONTINUOUS HINGE WITH 3-POINT LATCH, TYPE 4X



INDUSTRY STANDARDS

UL 508A Listed; Type 3R, 4, 4X, 12; File No. E61997 cUL Listed per CSA C22.2 No 94; Type 3R, 4, 4X, 12; File No. E61997

NEMA/EEMAC Type 3R, 4, 4X, 12, 13 IEC 60529, IP66 Meets NEMA Type 3RX requirements

APPLICATION

These enclosures feature Hoffman's exclusive POWERGLIDE Handle with 3-point latching, ideal for indoor or outdoor applications that require corrosion protection, convenient access, and padlocking security.

SPECIFICATIONS

- 14 gauge Type 304 or 316L stainless steel bodies and doors
- Seams continuously welded and ground smooth
- Seamless foam-in-place gasket Rolled lip around three sides of door
- Internal 3-point latch and Type 316L stainless steel padlocking POWERGLIDE Handle
- Remove door by pulling stainless steel continuous hinge pin
- Data pocket is high-impact thermoplastic
 Collar studs provided for mounting optional panels
- Exterior hardware on Type 316L stainless steel enclosures matches enclosure material
- Bonding provision on door; grounding stud on body

Door, sides, top and bottom have smooth #4 brushed finish. Handle is electropolished.

ACCESSORIES

Panels for Type 3R, 4, 4X, 12 and 13 Enclosures Steel and Stainless Steel Window Kits H20MIT Vent Drains, Type 4X H20MIT Thermoelectric Dehumidifier

MODIFICATION AND CUSTOMIZATION

Hoffman excels at modifying and customizing products to your specifications. Contact your local Hoffman sales office or distributor for complete information.

BULLETIN: A4SW3

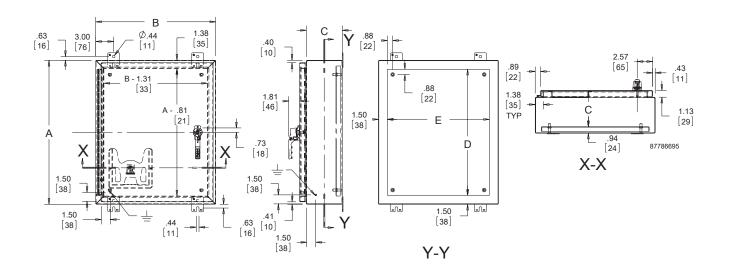
Standard Product

		Stainless	Ctool	Conductive	Stainless	Panel Size D x E	Data
Catalog Number	AxBxC in./mm	Stainless Steel Type	Steel Panel	Conductive Panel	Stainless Steel Panel	in./mm	Data Pocket
A24H2006SSLP3PT	24.00 x 20.00 x 6.00 610 x 508 x 152	304	A24P20	A24P20G	A24P20SS6	21.00 x 17.00 533 x 432	Small
A24H2006SS6LP3PT	24.00 x 20.00 x 6.00 610 x 508 x 152	316L	A24P20	A24P20G	A24P20SS6	21.00 x 17.00 533 x 432	Small
A24H2008SSLP3PT	24.00 x 20.00 x 8.00 610 x 508 x 203	304	A24P20	A24P20G	A24P20SS6	21.00 x 17.00 533 x 432	Small
A24H2008SS6LP3PT	24.00 x 20.00 x 8.00 610 x 508 x 203	316L	A24P20	A24P20G	A24P20SS6	21.00 x 17.00 533 x 432	Small
A24H2408SSLP3PT	24.00 x 24.00 x 8.00 610 x 610 x 203	304	A24P24	A24P24G	A24P24SS6	21.00 x 21.00 533 x 533	Small
A24H2408SS6LP3PT	24.00 x 24.00 x 8.00 610 x 610 x 203	316L	A24P24	A24P24G	A24P24SS6	21.00 x 21.00 533 x 533	Small
A30H2408SSLP3PT	30.00 x 24.00 x 8.00 762 x 610 x 203	304	A30P24	A30P24G	A30P24SS6	27.00 x 21.00 686 x 533	Large
A30H2408SS6LP3PT	30.00 x 24.00 x 8.00 762 x 610 x 203	316L	A30P24	A30P24G	A30P24SS6	27.00 x 21.00 686 x 533	Large
A30H3008SSLP3PT	30.00 x 30.00 x 8.00 762 x 762 x 203	304	A30P30	A30P30G	A30P30SS6	27.00 x 27.00 686 x 686	Large
A30H3008SS6LP3PT	30.00 x 30.00 x 8.00 762 x 762 x 203	316L	A30P30	A30P30G	A30P30SS6	27.00 x 27.00 686 x 686	Large
A36H2408SSLP3PT	36.00 x 24.00 x 8.00 914 x 610 x 203	304	A36P24	A36P24G	A36P24SS6	33.00 x 21.00 838 x 533	Large
A36H2408SS6LP3PT	36.00 x 24.00 x 8.00 914 x 610 x 203	316L	A36P24	A36P24G	A36P24SS6	33.00 x 21.00 838 x 533	Large
A36H3008SSLP3PT	36.00 x 30.00 x 8.00 914 x 762 x 203	304	A36P30	A36P30G	A36P30SS6	33.00 x 27.00 838 x 686	Large
A36H3008SS6LP3PT	36.00 x 30.00 x 8.00 914 x 762 x 203	316L	A36P30	A36P30G	A36P30SS6	33.00 x 27.00 838 x 686	Large
A48H3608SSLP3PT	48.00 x 36.00 x 8.00 1219 x 914 x 203	304	A48P36	A48P36G	A48P36SS6	45.00 x 33.00 1143 x 838	Large
A48H3608SS6LP3PT	48.00 x 36.00 x 8.00 1219 x 914 x 203	316L	A48P36	A48P36G	A48P36SS6	45.00 x 33.00 1143 x 838	Large
A24H2010SSLP3PT	24.00 x 20.00 x 10.00 610 x 508 x 254	304	A24P20	A24P20G	A24P20SS6	21.00 x 17.00 533 x 432	Small



Catalog Number	AxBxC in./mm	Stainless Steel Type	Steel Panel	Conductive Panel	Stainless Steel Panel	Panel Size D x E in./mm	Data Pocket
A24H2010SS6LP3PT	24.00 x 20.00 x 10.00 610 x 508 x 254	316L	A24P20	A24P20G	A24P20SS6	21.00 x 17.00 533 x 432	Small
A36H3010SSLP3PT	36.00 x 30.00 x 10.00 914 x 762 x 254	304	A36P30	A36P30G	A36P30SS6	33.00 x 27.00 838 x 686	Large
A36H3010SS6LP3PT	36.00 x 30.00 x 10.00 914 x 762 x 254	316L	A36P30	A36P30G	A36P30SS6	33.00 x 27.00 838 x 686	Large
A42H3010SSLP3PT	42.00 x 30.00 x 10.00 1067 x 762 x 254	304	A42P30	A42P30G	A42P30SS6	39.00 x 27.00 991 x 686	Large
A48H3610SSLP3PT	48.00 x 36.00 x 10.00 1219 x 914 x 254	304	A48P36	A48P36G	A48P36SS6	45.00 x 33.00 1143 x 838	Large
A48H3610SS6LP3PT	48.00 x 36.00 x 10.00 1219 x 914 x 254	316L	A48P36	A48P36G	A48P36SS6	45.00 x 33.00 1143 x 838	Large
A24H2412SSLP3PT	24.00 x 24.00 x 12.00 610 x 610 x 305	304	A24P24	A24P24G	A24P24SS6	21.00 x 21.00 533 x 533	Small
A24H2412SS6LP3PT	24.00 x 24.00 x 12.00 610 x 610 x 305	316L	A24P24	A24P24G	A24P24SS6	21.00 x 21.00 533 x 533	Small
A30H2412SSLP3PT	30.00 x 24.00 x 12.00 760 x 610 x 305	304	A30P24	A30P24G	A30P24SS6	27.00 x 21.00 686 x 533	Large
A30H2412SS6LP3PT	30.00 x 24.00 x 12.00 762 x 610 x 305	316L	A30P24	A30P24G	A30P24SS6	27.00 x 21.00 686 x 533	Large
A36H3012SSLP3PT	36.00 x 30.00 x 12.00 914 x 762 x 305	304	A36P30	A36P30G	A36P30SS6	33.00 X 27.00 838 x 686	Large
A36H3012SS6LP3PT	36.00 x 30.00 x 12.00 914 x 762 x 305	316L	A36P30	A36P30G	A36P30SS6	33.00 X 27.00 838 x 686	Large
A36H3612SSLP3PT	36.00 x 36.00 x 12.00 914 x 914 x 305	304	A36P36	A36P36G	A36P36SS6	33.00 x 33.00 838 x 838	Large
A36H3612SS6LP3PT	36.00 x 36.00 x 12.00 914 x 914 x 305	316L	A36P36	A36P36G	A36P36SS6	33.00 x 33.00 838 x 838	Large
A42H3612SSLP3PT	42.00 x 36.00 x 12.00 1067 x 914 x 305	304	A42P36	A42P36G	A42P36SS6	39.00 x 33.00 991 x 838	Large
A48H3612SSLP3PT	48.00 x 36.00 x 12.00 1219 x 914 x 305	304	A48P36	A48P36G	A48P36SS6	45.00 x 33.00 1143 x 838	Large
A48H3612SS6LP3PT	48.00 x 36.00 x 12.00 1219 x 914 x 305	316L	A48P36	A48P36G	A48P36SS6	45.00 x 33.00 1143 x 838	Large
A60H3612SSLP3PT	60.00 x 36.00 x 12.00 1524 x 914 x 305	304	A60P36	A60P36G	A60P36SS6	57.00 x 33.00 1448 x 838	Large
A60H3612SS6LP3PT	60.00 x 36.00 x 12.00 1524 x 914 x 305	316L	A60P36	A60P36G	A60P36SS6	57.00 x 33.00 1448 x 838	Large
A48H3616SSLP3PT	48.00 x 36.00 x 16.00 1219 x 914 x 406	304	A48P36	A48P36G	A48P36SS6	45.00 x 33.00 1143 x 838	Large
A48H3616SS6LP3PT	48.00 x 36.00 x 16.00 1219 x 914 x 406	316L	A48P36	A48P36G	A48P36SS6	45.00 x 33.00 1143 x 838	Large
A60H3616SSLP3PT	60.00 x 36.00 x 16.00 1524 x 914 x 406	304	A60P36	A60P36G	A60P36SS6	57.00 x 33.00 1448 x 838	Large
A60H3616SS6LP3PT	60.00 x 36.00 x 16.00 1524 x 914 x 406	316L	A60P36	A60P36G	A60P36SS6	57.00 x 33.00 1448 x 838	Large

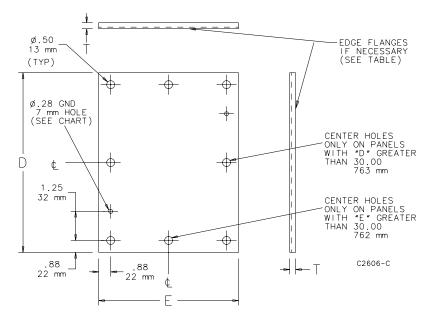
 $Purchase\ panels\ separately.\ Optional\ stainless\ steel,\ composite\ and\ aluminum\ panels\ are\ available\ for\ most\ sizes.$



nVent.com/H0FFMAN PH 763.422.2211 Spec-00090 J STAINLESS STEEL 2



		Panel Size	Panel Size	Panel Gauge	Edge			Number
Catalog Number	Material	D x E (in.)	D x E (mm)	or Thickness	Flanges	T (in.)	T (mm)	of Holes
A42P42G	Conductive steel	39.00 x 39.00	991 x 991	12 ga.	4	0.75	19	8
A48P24	Painted steel	45.00 x 21.00	1143 x 533	12 ga.	2	0.75	19	6
A48P24G	Conductive steel	45.00 x 21.00	1143 x 533	12 ga.	2	0.75	19	6
A48P30	Painted steel	45.00 x 27.00	1143 x 686	12 ga.	4	0.75	19	6
A48P30G	Conductive steel	45.00 x 27.00	1143 x 686	12 ga.	4	0.75	19	6
A48P36	Painted steel	45.00 x 33.00	1143 x 838	12 ga.	4	0.75	19	8
A48P36G	Conductive steel	45.00 x 33.00	1143 x 838	12 ga.	4	0.75	19	8
A48P36SS6	Stainless Steel	45.00 x 33.00	1143 x 838	12 ga.	4	0.75	19	8
A48P36AL	Aluminum	45.00 x 33.00	1143 x 838	0.10 in./3 mm	4	0.75	19	8
A48P42	Painted steel	45.00 x 39.00	1143 x 991	12 ga.	4	0.75	19	8
A48P42G	Conductive steel	45.00 x 39.00	1143 x 991	12 ga.	4	0.75	19	8
A48P48	Painted steel	44.00 x 44.00	1118 x 1118	10 ga.	4	0.88	22	8
A48P48G	Conductive steel	44.00 x 44.00	1118 x 1118	10 ga.	4	0.88	22	8
A54P42	Painted steel	50.00 x 38.00	1270 x 965	12 ga.	4	0.75	19	8
A54P42G	Conductive steel	50.00 x 38.00	1270 x 965	10 ga.	4	0.75	19	8
A60P24	Painted steel	57.00 x 21.00	1448 x 533	12 ga.	4	0.75	19	6
A60P24G	Conductive steel	57.00 x 21.00	1448 x 533	12 ga.	4	0.75	19	6
A60P30	Painted steel	57.00 x 27.00	1448 x 686	12 ga.	4	0.75	19	6
A60P30G	Conductive steel	57.00 x 27.00	1448 x 686	12 ga.	4	0.75	19	6
A60P36	Painted steel	57.00 x 33.00	1448 x 838	12 ga.	4	0.75	19	8
\60P36G	Conductive steel	57.00 x 33.00	1448 x 838	12 ga.	4	0.75	19	8
A60P36SS6	Stainless Steel	57.00 x 33.00	1448 x 838	12 ga.	4	0.75	19	8
A60P36AL	Aluminum	57.00 x 33.00	1448 x 838	0.10 in./3 mm	4	0.75	19	8
A60BFP42	Painted steel	56.00 x 38.00	1422 x 965	10 ga.	4	0.88	22	10
A60BFP42G	Conductive steel	56.00 x 38.00	1422 x 965	10 ga.	4	0.88	22	10
A60P48	Painted steel	56.00 x 44.00	1422 x 1118	10 ga.	4	0.88	22	12
A60P48G	Conductive steel	56.00 x 44.00	1422 x 1118	10 ga.	4	0.88	22	12
A60P60	Painted steel	56.00 x 56.00	1422 x 1422	10 ga.	4	0.88	22	10
A60P60G	Conductive steel	56.00 x 56.00	1422 x 1422	10 ga.	4	0.88	22	10
A72P36	Painted steel	69.00 x 33.00	1753 x 838	12 ga.	4	0.75	19	8
\72P36G	Conductive steel	69.00 x 33.00	1753 x 838	12 ga.	4	0.75	19	8
A72P60	Painted steel	68.00 x 56.00	1727 x 1422	10 ga.	4	0.88	22	12
A72P60G	Conductive steel	68.00 x 56.00	1727 x 1422	10 ga.	4	0.88	22	12
A72P72	Painted steel	68.00 x 68.00	1727 x 1727	10 ga.	4	0.88	22	10
A72P72G	Conductive steel	68.00 x 68.00	1727 x 1727	10 ga.	4	0.88	22	10



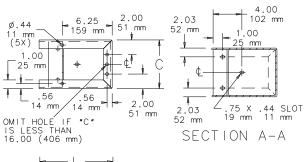


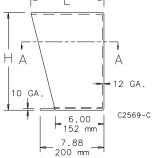
FLOOR STAND KIT, STAINLESS STEEL

Use to raise free-stand enclosure. To install, drill holes in the bottom of the enclosure and bolt the floor stands to the enclosure. Each kit includes two stands. Type 304 stainless steel. Maintains UL/cUL Type 4X rating when properly installed on a Hoffman Type 4X enclosure.

BULLETIN: A4SY

Catalog Number	H	C	L
	in./mm	in./mm	in./mm
AFK0612SS	6.00	12.06	9.09
	152	306	231
AFK0618SS	6.00	18.06	9.09
	152	459	231
AFK0624SS	6.00	24.06	9.09
	152	611	231
AFK1212SS	12.00	12.06	9.09
	305	306	231
AFK1218SS	12.00	18.06	9.09
	305	459	231
AFK1224SS	12.00	24.06	9.09
	305	611	231
AFK1812SS	18.00	12.06	9.09
	457	306	231
AFK1818SS	18.00	18.06	9.09
	457	459	231
AFK1824SS	18.00	24.06	9.09
	457	611	231
AFK2412SS	24.00	12.06	9.09
	610	306	231
AFK2418SS	24.00	18.06	9.09
	610	459	231
AFK2424SS	24.00	24.06	9.09
	610	611	231





100-FSD250

The cat. no. as listed is incomplete. Select a voltage suffix code from the table below to complete the cat. no. Example: 120V, 60 Hz:

Cat. No. 100-FL11⊗ becomes Cat. No. 100-FL11D.

Voltage* [V]	24	48	100	110	120	230240	240	277	380400	400415	440	480
50 Hz	K	Υ	KP	D	_	VA	KA	_	N	G	В	_
60 Hz	J	_	_	_	D	_	KA	Т	_	_	N	В

 $[\]star \ \mathsf{For} \ \mathsf{special} \ \mathsf{voltages}, \ \mathsf{consult} \ \mathsf{your} \ \mathsf{local} \ \mathsf{Rockwell} \ \mathsf{Automation} \ \mathsf{sales} \ \mathsf{office} \ \mathsf{or} \ \mathsf{Allen-Bradley} \ \mathsf{distributor}.$

Control Modules (For 100-C09...C97 contactors), Continued

0-00	Description		Voltage Range	Connection Diagrams	For Use With	Ca	t. No.	
	DC Interface (Electronic) • Interface between the (PLC) and the AC operatin the contactor.	g mechanism of	Input: 12V DC Output: 110240V AC	A1 E2 E1	100-C with AC coils 110 240V AC	100-JE12		
	Requires no additional on the relay coils	Input: 24V DC Output: 110240V AC	A2 N E1 A1 (K1M)			O-JE		
			Input: 48V DC Output: 110240V AC				D-JE48	
DEDE	Surge Suppressors • For limitation of coil	RC Module AC operating	2448V AC, 50/60 Hz	-L <u>2</u> ;1-	100-C with AC coils	§	100-FSC48	
	switching transients.Plug-in, coil mounted.	mechanism	110280V AC, 50/60 Hz			§	100-FSC280	
	 Suitable for 100-C contactor sizes, 997 A. RC, varistor, and diode versions. 		380480V AC, 50/60 Hz			§	100-FSC480	
		Varistor Module AC/DC operating	1255V AC/ 1277V DC		100-C with AC coils or 100-C09C43 with	§	100-FSV55	
		mechanism	56136V AC/ 78 180V DC		conventional DC coils	§	100-FSV136	
			137277V AC/ 181 350V DC				100-FSV277	
			278575V AC			§	100-FSV575	
		Diode Module DC operating mechanism	12250V DC	-[100-C09C43 with conventional DC coils	§	100-FSD250	

[§] For screwless terminals, insert "CR" after the "100-" in the catalog number. Example: Cat. No. 100-FSC48 becomes Cat. No. 100-CRFSC48.

Assembly Components (For 100-C09...C97 contactors)

Auxiliary Contacts (For 100-C09...C97 contactors)

	Description	N.O.	N.C.	Connection Diagrams	For Use With	Standard Auxiliary Contact Cat. No.‡	Bifurcated Auxiliary Contact Cat. No.
					100-C all	100-FA02	100-FAB02
		0	2		C30⊗00C97⊗00	100-FB02	100-FBB02
And lines				51 61 11 21 53 61 7 7 7 7 7 7 7 7 7	100-C all	100-FA11	100-FAB11
10 W 21 W K	Auxiliary Contact Blocks for Front	1	1	-FA02 -FB02 -FA11	C30⊗00C97⊗00	100-FB11	100-FBB1
0 0	Mounting*	•		13 21 23 31 53 63 14 22 24 32 54 64	C09⊗10C23⊗10	100-FC11	100-FCB1
	2- and 4-pole Quick and easy mounting without			-FB11 -FC11 -FA20	100-C all	100-FA20	100-FAB20
5 A	tools	2	0	13 23 57 65 17 25 14 24 58 66 18 26	C30⊗00C97⊗00	100-FB20	100-FBB2
14 NO 22 NG	Electronic-compatible contacts down to 17V, 5 mA			-	100-C all	100-FAL11	_
	Mechanically linked performance	1L	1L	51 61 71 81 53 61 71 81	C30⊗00C97⊗00	100-FBL11	
	between N.O. and N.C. poles and to	0	4	52 62 72 82 54 62 72 82	100-C all	100-FB04	100-FAB0
	the main contactor poles (except for L types)	1	3	-FA04 -FA13	100-C all	100-FA04 100-FA13	100-FAB1
	Models with equal function with	· ·	3	54 62 72 84 14 22 32 44	100-C all	100-FA13	100-FAB1
4464	several terminal numbering choices	2	2	-FA22 -FB22			
	1L = Late break N.C./early make N.O.	2		21 31 43 53 53 61 73 83	C30⊗00C97⊗00	100-FB22	100-FBB2
0	Bifurcated version for switching			122 132 144 154	C09⊗10C23⊗10	100-FC22	100-FCB2
9.0.0	down to 5V, 3 mA also available	3	1	23 31 43 53 53 63 73 83 53 61 75 61	100-C all	100-FA31	100-FAB3
					C09⊗10C23⊗10	100-FC31	100-FCB3
		4	0	_	100-C all	100-FA40	100-FAB4
		1+1L	1+1L		100-C all	100-FAL22	_
E		0	1	$\begin{vmatrix} \frac{1}{\overline{z}} - \\ \frac{1}{\overline{z}} - \\ \frac{1}{\overline{z}} \end{vmatrix}$	100-C all	100-SA01	_
y avs v	Auxiliary Contact Blocks for Side Mounting without Sequence Terminal Designations* • 1- and 2-pole	1	0	$\begin{vmatrix} \frac{-2}{1-} & \frac{-4}{8-} \\ -SA01 & -SA10 \end{vmatrix}$	100-C all	100-SA10	_
	Two-way numbering for right or left mounting on the contactor Quick and easy mounting without	0	2	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	100-C all	100-SA02	_
5	tools • Electronic-compatible contacts down to 17V, 10 mA • Mirror contact performance to the	1	1	$ \begin{vmatrix} -2 & -2 & -4 & -2 \\ -1 & 1 & -2 & -2 \end{vmatrix} $ -SA0 -SA11	100-C all	100-SA11	_
e an	main contactor poles 1L = Late break N.C./early make N.O.	2	0	$\begin{vmatrix} \frac{-3}{v} - \frac{-3}{v} \\ -\frac{-3}{v} - \frac{-3}{v} \end{vmatrix} = \begin{vmatrix} \frac{-7}{9} - \frac{-5}{9} \\ -\frac{-5}{9} - \frac{-5}{9} \end{vmatrix}$	100-C all	100-SA20	_
200		1L	1L	$ \begin{vmatrix} -4 & -4 \\ \varepsilon - \varepsilon - \end{vmatrix} - \frac{4}{9} $ -SA20 -SAL11	100-C all	100-SAL11	_
		0	1	$\begin{bmatrix} \frac{21}{\overline{c}\varepsilon} & & & \\ & \frac{13}{\overline{r}v} & & \\ & & - \end{bmatrix}$	100-C	100-SB01	_
and and	Auxiliary Contact Blocks for Side Mounting with Sequence Terminal Designations* • 1- and 2-pole	1	0	$ \begin{array}{c cccc} & \underline{22} & \underline{14} \\ \hline & \underline{87} & \underline{14} \\ & \underline{87} & \underline{87} & \underline{14} \\ & \underline{87} & \underline{87} & \underline{87} & \underline{87} \\ & \underline{87} & \underline{87} & \underline{87} & \underline{87} & \underline{87} \\ & \underline{87} & $	100-C®	100-SB10	_
	Two-way numbering for right or left mounting on the contactor Quick and easy mounting without	0	2	$\begin{bmatrix} \frac{11}{\overline{c}t} \begin{vmatrix} \frac{21}{\overline{c}c} \\ \frac{1}{\overline{c}t} \end{vmatrix} & \begin{vmatrix} \frac{13}{\overline{c}t} \end{vmatrix} \frac{21}{\overline{c}c} \\ -\frac{13}{\overline{c}t} \end{vmatrix}$	100-C®	100-SB02	_
	tools • Electronic-compatible contacts down to 17V, 10 mA	1	1		100-C®	100-SB11	_
100 Set	Mirror contact performance to the main contactor poles 1L = Late break N.C./early make N.O.	2	0	13 23 17 25 80 96 17 25 25 25 25 25 25 25 2	100-C∜	100-SB20	_
	14.0.	1L	1L	$\begin{vmatrix} \frac{14}{67} \frac{24}{66} & \frac{18}{26} \frac{26}{96} \\ -\text{SB20} & -\text{SBL11} \end{vmatrix}$	100-C ∜	100-SBL11	_

^{*} Max. number of auxiliary contacts that may be mounted:
AC and 24V DC electronic coil contactors — max. 4 N.O. contacts on the front of the contactor, 2 N.O. contacts on the side, 4 N.C. front or side, 6 total.
DC coil contactors — max. 4 N.O. contacts on the front of the contactor or max 2 N.O. contacts on the side, 4 N.C. front or side, 4 total.



^{*} Double numbering — Left-side mounting only is recommended for Cat. No. 100-C09...100-C23 due to double numbering.

[‡] For screwless terminals (front mount only), insert "CR" after the "100-" in the catalog number. Example: Cat. No. 100-FA02 becomes Cat. No. 100-CRFA02.

Molded Case Circuit Breakers

Accessories

Current Transformer for Neutral Current



Rated Current [A]	Frame Size	Cat. No.
300	K *	140G-K-NCTD30
400	K *	140G-K-NCTD40
600	M *	140G-M-NCTD60
800	M *	140G-M-NCTD80
4001600	N, NS	140G-N-NCTE16
10003200	R	140G-R-NCTE30

[★] Order with connector (Cat. No. 140G-K-CC).

Mechanical Accessories

Terminal Lugs

	Description	Frame Size	Cat. No. (Pkg. Qty. 3)	Cat. No. (Pkg. Qty. 4)
	Cu wire, MCCB only (1) 141/0 AWG or 2.570 mm ²		140G-G-TLC13	140G-G-TLC14
490	Cu wire, MCP only (1) 141/0 AWG or 1.570 mm ²	G	140G-G-TLC13A	-
	Multiple cable - Cu wire (6) 142 AWG or 2.535 mm ²		140G-G-MTL63	140G-G-MTL64
	Cu wire only (1) 141/0 AWG or 2.595 mm ²		140G-H-TLC13	140G-H-TLC14
Representative Photo	Multiple cable - Cu wire (6) 142 AWG or 2.535 mm ²	H	140G-H-MTL63	140G-H-MTL64
1 A A	Al or Cu wire (1) 141/0 AWG or 2.550 mm ²		140G-I-TLA13	140G-I-TLA14
	Al or Cu wire (1) 4300 MCM or 25150 mm ²		140G-I-TLA1A3	140G-I-TLA1A4
= -	Cu wire only (1) 10250 MCM or 6185 mm ²		140G-I-TLC13	140G-I-TLC14
Representative Photo	Multiple cable - Cu wire (6) 122 AWG or 2.535 mm ²		140G-I-MTL63	140G-I-MTL64
%	Al or Cu wire (1) 141/0 AWG or 2.550 mm ²		140G-J-TLA13	140G-J-TLA14
400	Al or Cu wire (1) 4300 MCM or 25150 mm ²		140G-J-TLA1A3	140G-J-TLA1A4
Name Wash	Al or Cu wire (1) 6 (Al)/10 (Cu)350 MCM or 2.5185 mm ² (Al)	J	140G-J-TLA1B3	140G-J-TLA1B4
	Cu wire only (1) 10350 MCM or 6185 mm ²		140G-J-TLC13	140G-J-TLC14
Representative Photo	Multiple cable - Cu wire (6) 122 AWG or 2.535 mm ²		140G-J-MTL63	140G-J-MTL64
. 6	Al or Cu wire (1) 250500 MCM or 120240 mm ²		140G-K-TLA13	140G-K-TLA14
e e	Al or Cu wire (2) 2/0250 MCM or 95120 mm ²		140G-K-TLA23	140G-K-TLA24
000	Cu wire only (1) 250500 MCM or 120240 mm ²	К	140G-K-TLC13	140G-K-TLC14
1	Cu wire only (2) 2/0250 MCM or 95120 mm ²		140G-K-TLC23	140G-K-TLC24
Representative Photo	Multiple cable - Cu wire (6) 61/0 AWG or 1650 mm ²		140G-K-MTL63	140G-K-MTL64
	Al or Cu wire (2) 250500 MCM or 120240 mm ²		140G-M-TLA23	140G-M-TLA24
10 10	Al or Cu wire (3) 2/0400 MCM or 70185 mm ²	М	140G-M-TLA33	140G-M-TLA34
000	Cu wire only (2) 3/0350 MCM or 85185 mm ²		140G-M-TLC23	140G-M-TLC24
Representative Photo	Cu wire only (3) 2/0350 MCM or 70185 mm ²		140G-M-TLC33	140G-M-TLC34
	Al or Cu wire (4) 4/0500 MCM or 70240 mm ²	N, NS	140G-N-TLA43	140G-N-TLA44
80 00 C	Cu wire only (4) 4/0500 MCM or 70240 mm ²	,	140G-N-TLC43	140G-N-TLC44
W COC	Al or Cu wire (6) 1/0750 MCM or 50400 mm ²	R	140G-R-TLA63	_
Representative Photo	Cu wire only (6) 1/0750 MCM or 50400 mm ²		140G-R-TLC63	_

Variable Depth Rotary Operating Kits

Rotary, Variable Depth Operators

- Supplied with external handle, operating shaft, and MCCB mounted operating mechanism.
- Refer to page 56 to select as components.
- Frames G, H, I, and J use a Bul. 140U P-style handle.
- Frames K, M, and N use a Bul. 140U medium style handle.

	Frame Size	Handle Color	Shaft Length	Cat. No.		
		Black	12 in. (30.48 mm)	140G-G-RVM12B		
	G, I	Red/Yellow	12 111. (30.46 11111)	140G-G-RVM12R		
	G, I	Black	21 in. (53.34 mm)	140G-G-RVM21B		
		Red/yellow	21 111. (33.34 11111)	140G-G-RVM21R		
		Black	10 in (20 40 mm)	140G-H-RVM12B		
		Red/yellow	12 in. (30.48 mm)	140G-H-RVM12R		
	H, J	Black	21 in. (53.34 mm)	140G-H-RVM21B		
Representative Photo		Red/yellow	21 111. (33.34 11111)	140G-H-RVM21R		
		Black	10.6 in (200 mm)	140G-K-RVM12B		
	К	Red/yellow	12.6 in. (320 mm)	140G-K-RVM12R		
		Black	00.0 in (F00 mans)	140G-K-RVM21B		
		Red/yellow	- 22.8 in. (580 mm)	140G-K-RVM21R		
		Black	12.6 in. (320 mm)	140G-M-RVM12B		
	M	Red/yellow	12.0 III. (320 IIIIII)	140G-G-RVM21R 140G-H-RVM12B 140G-H-RVM12R 140G-H-RVM21B 140G-H-RVM21R 140G-K-RVM12B 140G-K-RVM12R 140G-K-RVM21B		
	IVI	Black	00.0 in (F00 mm)	140G-M-RVM21B		
		Red/yellow	22.8 in. (580 mm)	140G-M-RVM21R		
•		Black	10.6 in (200 mm)	140G-N-RVM12B		
	N	Red/yellow	12.6 in. (320 mm)	140G-N-RVM12R		
	N	Black	00.0 in (F00 mm)	140G-N-RVM21B		
Representative Photo		Red/yellow	22.8 in. (580 mm)	140G-N-RVM21R		

Rotary, Variable Depth Operators with Internal NFPA 79 Operating Handle

- Supplied with external handle, NFPA handle with operating shaft, support bracket, and MCCB mounted operating mechanism.
- Refer to page 58 to select as components.
- Frames G, H, I, and J use a Bul. 140U P-style handle.
- Frames K, M, and N use a Bul. 140U medium style handle.

	Frame Size	Handle Color	Shaft Length	Cat. No.		
		Black	12 in. (30.48 mm)	140G-G-NVM12B		
	0.1	Red/yellow	Red/yellow			
	G, I	Black	01 in (F2 24 mans)	140G-G-NVM21B		
		Red/yellow	21 in. (53.34 mm)	140G-G-NVM21R		
		Black	10 :- (00 10)	m) 140G-H-NVM12B 140G-H-NVM12R m) 140G-H-NVM21B 140G-H-NVM21R m) 140G-K-NVM12B 140G-K-NVM12R 140G-K-NVM12R		
	H, J	Red/yellow	12 in. (30.48 mm)	140G-H-NVM12R		
	п, Ј	Black	01 in (F2 24 mans)	140G-H-NVM21B		
Representative Photo		Red/yellow	21 in. (53.34 mm)	140G-H-NVM21R		
		Black	— 12.6 in. (320 mm)	140G-K-NVM12B		
	К	Red/yellow		140G-K-NVM12R		
	N.	Black	00 0 in /F00 mans)	140G-K-NVM21B		
		Red/yellow	22.8 in. (580 mm)	140G-K-NVM21R		
		Black	10.0 (- (000)	140G-M-NVM12B		
6		Red/yellow	12.6 in. (320 mm)	140G-M-NVM12R		
	M	Black	00.0 : (500	140G-M-NVM21B		
		Red/yellow	22.8 in. (580 mm)	140G-G-NVM12R 140G-G-NVM21B 140G-G-NVM21R 140G-H-NVM12B 140G-H-NVM21B 140G-H-NVM21B 140G-K-NVM12B 140G-K-NVM12B 140G-K-NVM12B 140G-K-NVM21B 140G-K-NVM21B 140G-K-NVM21B 140G-M-NVM12B		
		Black	10.0 :- (000)	140G-N-NVM12B		
	N	Red/yellow	12.6 in. (320 mm)	140G-N-NVM12R		
	N	Black	00.0 : (500	140G-N-NVM21B		
Representative Photo		Red/yellow	22.8 in. (580 mm)	140G-N-NVM21R		



Phase Barriers

Phase barriers allow you to increase the insulation characteristics between the phases at the connections. Phase barriers provide additional electrical clearance between each phase when special connections extend past the circuit breaker housing. They are mounted from the front, even with the circuit breaker already installed.

-	Description	Frame Size	Length	3-Pole Cat. No. (Pkg. Qty. 4)	4-Pole Cat. No. (Pkg. Qty. 6)
			1 in. (25 mm)	140G-G-PB3M	140G-G-PB4M
		G, I	4 in. (100 mm)	140G-G-PB3L	140G-G-PB4M 140G-G-PB4L 140G-G-PB4H 140G-H-PB4M 140G-H-PB4L 140G-H-PB4H 140G-K-PB4L 140G-K-PB4L 140G-M-PB4L 140G-M-PB4L
			8 in. (200 mm)	140G-G-PB3H	140G-G-PB4H
	Provides additional clearance when		1 in. (25 mm)	140G-H-PB3M	140G-G-PB4M 140G-G-PB4L 140G-G-PB4H 140G-H-PB4M 140G-H-PB4L 140G-H-PB4H 140G-K-PB4L 140G-K-PB4L 140G-M-PB4L
	special connections that extend beyond	H, J	4 in. (100 mm)	140G-H-PB3L	140G-H-PB4L
	the frame of the MCCB are used.		8 in. (200 mm)	140G-H-PB3H	140G-H-PB4H
	 Frames G, H, I, J, and K are supplied with 25 mm barriers as standard. 	K, N, NS	4 in. (100 mm)	140G-K-PB3L	140G-G-PB4M 140G-G-PB4L 140G-G-PB4H 140G-H-PB4M 140G-H-PB4L 140G-H-PB4H 140G-K-PB4L 140G-K-PB4L 140G-K-PB4H
	WILIT 23 IIIIII DAITIEIS AS STAITUATU.	N, N, NO	8 in. (200 mm)	140G-K-PB3H	140G-K-PB4H
		М	4 in. (100 mm)	140G-M-PB3L	140G-M-PB4L
		R	4 in. (100 mm)	140G-R-PB3L ⁽¹⁾	140G-R-PB4L ⁽²⁾
		ľ.	8 in. (200 mm)	140G-R-PB3H ⁽¹⁾	140G-R-PB4H ⁽²⁾

- (1) Package Qty 2. Supplied for the line side only.
- (2) Package Qty 3. Supplied for the line side only.

Terminal Covers

The terminal shield prevents accidental contact with live parts, they also provide phase-to-phase insulation.

	Description	Frame Size	Height	3-Pole Cat. No. (Pkg. Qty. 2)	4-Pole Cat. No. (Pkg. Qty. 2)
		G	2 in. (50 mm)	140G-G-TC3H	140G-G-TC4H
		Н	2 in. (50 mm)	140G-H-TC3H	140G-H-TC4H
	Provide IP40 finger protection against	I	2.36 in. (60 mm)	140G-I-TC3H	140G-I-TC4H
9 8	accidental contact with live parts.	J	2.36 in. (60 mm)	140G-J-TC3H	140G-J-TC4H
	Terminal covers are pre-punched to ease installation.	K	2.36 in. (60 mm)	140G-K-TC3H	140G-K-TC4H
h h h	Supplied as standard with the selection of	М	2.36 in. (60 mm)	140G-M-TC3H	140G-M-TC4H
	multiple cable terminal lugs.	N, NS	2.76 in. (70 mm)	140G-N-TC3H	140G-N-TC4H

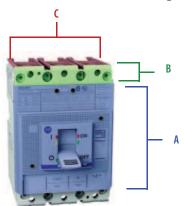
	Description	Frame Size	Cat. No. (Pkg. Qty. 2)
	Tampinal Cause and lift avoided a protection analyst tamparing with installed tampinal source	G, H, I, J	140G-G-TS
- h	 Terminal Cover seal kit provides protection against tampering with installed terminal cover. Supplied with two (2) screws and two (2) seals. 	K	140G-K-TS
-	 Sealing wire and lead to be supplied by the customer. Quantity one required for Line cover, one required for Load cover. 	M, N, NS	140G-M-TS

Ingress Protection

The table indicates the degrees of protection against intrusion and accidental contact according to IEC 60529.

Location	Without Terminal Covers	With High Terminal Covers ⁽¹⁾
A	IP40 ⁽²⁾	_
В	IP20 ⁽³⁾	IP40 ⁽²⁾
C	_	IP40 ⁽⁴⁾

- High terminal covers have a height of 60 mm and are designated with a suffix "H" in the catalog number (140G-G-TC3H)
- (2) Also with direct or variable depth rotary operator.
- (3) G through M frames.
- (4) After installation.



Variable Depth Rotary Operating Kits

When you install MCCBs as the main or feeder circuit breaker in an industrial control panel and you use a non-flanged enclosure, a common method of operating the circuit breaker using a rotary operator mechanism. The use of a rotary operator converts a rotary motion to a vertical motion that "toggles" the MCCB. In this situation, the rotary operator kit consists of:

- External operating handle
- · Operating shaft
- Circuit breaker-mounted rotary operating mechanism

Using these kits allows external operation of the circuit breaker with the capability of turning the circuit breaker on/off, or resetting it without having to open the enclosure. Traditionally, these kits are sold with an operating shaft that allows you to use the kit with enclosures of various depths. The operating handles will also provide status indication when the circuit breakers trip.

NFPA 79 Operators

A NFPA 79-compliant Internal Rotary Operating Handle Kit for Bulletin 140G MCCBs, and Bulletin 140MG MCPs and MPCBs is available to address current requirements of the NFPA 79 standard. The NFPA 79 kits are available for G-, H-, I-, J-, K-, M-, and N-Frame Circuit Breaker product lines.

Compliance with the current NFPA 79 standard enables you to maintain control of the main disconnecting means when the door is open; an issue for rotary-operated through-the-door disconnect switches and circuit breakers.

This standard requires that the rotary main disconnecting means be operable without the use of accessory tools or devices (independent of door position) and restates the requirement for an interlocking provision to prevent the closing of the disconnecting means while the enclosure door is open, unless the interlock is operated by a deliberate action. Without this requirement, rotary-operated devices may have a shaft protruding from the panel when the door is open. If the panel is powered and it is necessary to turn power off, it is difficult to de-energize the panel with the operating shaft alone. This standard is to reduce the possibility of personnel not being able to turn an energized panel off with the door opened.

Why is This Relatively Simple Product Important to You?

The trend in the market is moving toward building smaller and less-expensive control panels. To achieve this, many panel builders and OEMs have started using rotary operators because they are easier to install and the non-flanged enclosure is

Molded Case Circuit Breakers

Accessories

Current Transformer for Neutral Current



Rated Current [A]	Frame Size	Cat. No.
300	K *	140G-K-NCTD30
400	K *	140G-K-NCTD40
600	M *	140G-M-NCTD60
800	M *	140G-M-NCTD80
4001600	N, NS	140G-N-NCTE16
10003200	R	140G-R-NCTE30

[★] Order with connector (Cat. No. 140G-K-CC).

Mechanical Accessories

Terminal Lugs

	Description	Frame Size	Cat. No. (Pkg. Qty. 3)	Cat. No. (Pkg. Qty. 4
	Cu wire, MCCB only (1) 141/0 AWG or 2.570 mm ²		140G-G-TLC13	140G-G-TLC14
999	Cu wire, MCP only (1) 141/0 AWG or 1.570 mm ²	G	140G-G-TLC13A	
	Multiple cable - Cu wire (6) 142 AWG or 2.535 mm ²		140G-G-MTL63	140G-G-MTL64
	Cu wire only (1) 141/0 AWG or 2.595 mm ²		140G-H-TLC13	140G-H-TLC14
Representative Photo	Multiple cable - Cu wire (6) 142 AWG or 2.535 mm ²	H	140G-H-MTL63	140G-H-MTL64
	Al or Cu wire (1) 141/0 AWG or 2.550 mm ²		140G-I-TLA13	140G-I-TLA14
DOG	Al or Cu wire (1) 4300 MCM or 25150 mm ²		140G-I-TLA1A3	140G-I-TLA1A4
	Cu wire only (1) 10250 MCM or 6185 mm ²		140G-I-TLC13	140G-I-TLC14
Representative Photo	Multiple cable - Cu wire (6) 122 AWG or 2.535 mm ²		140G-I-MTL63	140G-I-MTL64
S.	Al or Cu wire (1) 141/0 AWG or 2.550 mm ²		140G-J-TLA13	140G-J-TLA14
440	Al or Cu wire (1) 4300 MCM or 25150 mm ²		140G-J-TLA1A3	140G-J-TLA1A4
Nan Nan	Al or Cu wire (1) 6 (Al)/10 (Cu)350 MCM or 2.5185 mm ² (Al)	J	140G-J-TLA1B3	140G-J-TLA1B4
	Cu wire only (1) 10350 MCM or 6185 mm ²		140G-J-TLC13	140G-J-TLC14
Representative Photo	Multiple cable - Cu wire (6) 122 AWG or 2.535 mm ²		140G-J-MTL63	140G-J-MTL64
	Al or Cu wire (1) 250500 MCM or 120240 mm ²		140G-K-TLA13	140G-K-TLA14
e e	Al or Cu wire (2) 2/0250 MCM or 95120 mm ²		140G-K-TLA23	140G-K-TLA24
000	Cu wire only (1) 250500 MCM or 120240 mm ²	К	140G-K-TLC13	140G-K-TLC14
21	Cu wire only (2) 2/0250 MCM or 95120 mm ²		140G-K-TLC23	140G-K-TLC24
Representative Photo	Multiple cable - Cu wire (6) 61/0 AWG or 1650 mm ²		140G-K-MTL63	140G-K-MTL64
	Al or Cu wire (2) 250500 MCM or 120240 mm ²		140G-M-TLA23	140G-M-TLA24
10 %	Al or Cu wire (3) 2/0400 MCM or 70185 mm ²	M	140G-M-TLA33	140G-M-TLA34
000	Cu wire only (2) 3/0350 MCM or 85185 mm ²		140G-M-TLC23	140G-M-TLC24
Representative Photo	Cu wire only (3) 2/0350 MCM or 70185 mm ²		140G-M-TLC33	140G-M-TLC34
	Al or Cu wire (4) 4/0500 MCM or 70240 mm ²	N, NS	140G-N-TLA43	140G-N-TLA44
	Cu wire only (4) 4/0500 MCM or 70240 mm ²	IN, ING	140G-N-TLC43	140G-N-TLC44
	Al or Cu wire (6) 1/0750 MCM or 50400 mm ²	R	140G-R-TLA63	_
Representative Photo	Cu wire only (6) 1/0750 MCM or 50400 mm ²		140G-R-TLC63	_



140G-G2C3-C30

Molded Case Circuit Breakers

Bulletin 140G/140MG









Molded Case Circuit Breakers

Catalog Number Explanation — 125 A, G-Frame

Complete Circuit Breaker Assemblies with Factory-Installed Options

Examples given in this section are not intended to be used for product selection. Use ProposalWorks to configure the molded case circuit breaker. Use these configurations only to select all factory-installed options for shunt trips, undervoltage release units, auxiliary contacts, and alarm contacts. Use the codes from Table g to add on to the molded case circuit breaker cat. no. selected on the previous pages to form a complete cat. no. for a complete assembly with factory-installed options.

140G
2

C

3

C30

 $\frac{140G}{a} - \frac{G}{b} = \frac{6}{c} = \frac{C}{d} = \frac{4}{e} - \frac{C70}{f} - \frac{SD}{g} - \frac{KA}{g}$



Cat. No. 140G-G6C3-D12

	a								
Bulletin No.									
Code	Description								
140G	Global Molded Case Circuit Breaker								

Protection Type

Code Description

C Fixed thermal/fixed magnetic

E Adjust thermal/fixed magnetic

S Molded case switch (Isolator)

d

Frame/Rating
Code Description
G 125 A, Fixed

 Poles

 Code
 Description

 3
 3 poles

 4
 4 poles

Interrupting Rating/Breaking Capacity (based on I_c at 480V)

Code Description

2 25 kA

3 35 kA

6 65 kA

	ı									
Current Range										
Code	Description									
С	e.g., C30 = 30 A									
D	e.g., D16 = 160 A									

	\boldsymbol{g}									
	Factory-Installed Internal Options •									
Shu	Shunt Trip and Undervoltage Release Units									
Code	Description									
SJ	Shunt Trip, 2430V AC/DC									
SK	Shunt Trip, 4860V AC/DC									
SD	Shunt Trip, 110127V AC; 110125V DC									
SA	Shunt Trip, 220240V AC; 220250V DC									
SB	Shunt Trip, 380440V AC									
SC	Shunt Trip, 480525V DC									
UJ	Undervoltage Release, 2430V AC/DC									
UR	Undervoltage Release, 48V AC/DC									
UD	Undervoltage Release, 110127V AC; 110125V DC									
UA	Undervoltage Release, 220240V AC; 220250V DC									
UB	Undervoltage Release, 380440V AC									
UC	Undervoltage Release, 480525V AC									
No Digit	No Selection									
	Auxiliary and Alarm Contacts									
Code	Description									
KA	KA 1 Aux. Contact, 250V									
TA	TA 1 Alarm Contact, 250V									
AA	1 Aux., 1 Alarm Contact, 250V									
ВА	2 Aux., 1 Alarm Contact, 250V									
AJ	1 Aux., 1 Alarm Contact, 24V									

 Select up to two internal options: 1 for left side mounting (shunt trip or undervoltage release), 1 for right (auxiliary or alarm contact). Consult your local Rockwell automation sales office or Allen-Bradley distributor for further assistance.



Assembled Molded Case Circuit Breakers — 125 A, G-Frame



Interrupting Rating/Breaking Capacity — Thermal-Magnetic Circuit Breakers

Interrupting Rating (50/60 Hz), UL 489/CSA C22.2-5, No. 5-02 [kA]					Breaking	Capacity (50		C 60947-2			Bre		apacity (D	OC),	
			220	V*	41	5V	440)V ★	69	0V	250V I pole in	- (500V DC (3- pole in series)		
240V	480V	600Y/ 347V	I _{cu} [kA]	$I_{ m cs}$ [% $I_{ m cu}$]	I _{cu} [kA]	I _{cs} [%I _{cu}]	I _{cu} [kA]	I _{cs} [%I _{cu}]	I _{cu} [kA]	$I_{ m cs}$ [% $I_{ m cu}$]	I _{cu} [kA]	$I_{ m cs}$ [% $I_{ m cu}$]	I _{cu} [kA]	$I_{ m cs}$ [% $I_{ m cu}$]	Interrupting Code‡
50	25	10	65	75	36	100	36	50	6	75	36	100	36	100	G2
65	35	14	85	75	50	75	50	50	8	50	50	100	50	100	G3
100	65	25	100	75	70	50	65	50	10	50	70	75	70	75	G6

[★] These ratings have not been tested for the CCC listing.

Thermal-Magnetic, Fixed Thermal-Fixed Magnetic

Rated	Thermal Trip	hermal Trip Magnetic Trip Interrupting Code G2 Interrupting Code G3		Interrupting Code G6				
Current	[A]	[A]	Cat.	No.	Cat.	No.	Cat.	No.
<i>I</i> _n [A]	$I_{r} = I_{n}$ (Fixed)	I_{m}	3 Poles	4 Poles	3 Poles	4 Poles	3 Poles	4 Poles
15	15	500	140G-G2C3-C15	140G-G2C4-C15	140G-G3C3-C15	140G-G3C4-C15	140G-G6C3-C15	140G-G6C4-C15
16	16	500	140G-G2C3-C16	140G-G2C4-C16	140G-G3C3-C16	140G-G3C4-C16	140G-G6C3-C16	140G-G6C4-C16
20	20	500	140G-G2C3-C20	140G-G2C4-C20	140G-G3C3-C20	140G-G3C4-C20	140G-G6C3-C20	140G-G6C4-C20
25	25	500	140G-G2C3-C25	140G-G2C4-C25	140G-G3C3-C25	140G-G3C4-C25	140G-G6C3-C25	140G-G6C4-C25
30	30	500	140G-G2C3-C30	140G-G2C4-C30	140G-G3C3-C30	140G-G3C4-C30	140G-G6C3-C30	140G-G6C4-C30
32	32	500	140G-G2C3-C32	140G-G2C4-C32	140G-G3C3-C32	140G-G3C4-C32	140G-G6C3-C32	140G-G6C4-C32
35	35	500	140G-G2C3-C35	140G-G2C4-C35	140G-G3C3-C35	140G-G3C4-C35	140G-G6C3-C35	140G-G6C4-C35
40	40	500	140G-G2C3-C40	140G-G2C4-C40	140G-G3C3-C40	140G-G3C4-C40	140G-G6C3-C40	140G-G6C4-C40
45	45	500	140G-G2C3-C45	140G-G2C4-C45	140G-G3C3-C45	140G-G3C4-C45	140G-G6C3-C45	140G-G6C4-C45
50	50	500	140G-G2C3-C50	140G-G2C4-C50	140G-G3C3-C50	140G-G3C4-C50	140G-G6C3-C50	140G-G6C4-C50
60	60	600	140G-G2C3-C60	140G-G2C4-C60	140G-G3C3-C60	140G-G3C4-C60	140G-G6C3-C60	140G-G6C4-C60
63	63	630	140G-G2C3-C63	140G-G2C4-C63	140G-G3C3-C63	140G-G3C4-C63	140G-G6C3-C63	140G-G6C4-C63
70	70	700	140G-G2C3-C70	140G-G2C4-C70	140G-G3C3-C70	140G-G3C4-C70	140G-G6C3-C70	140G-G6C4-C70
80	80	800	140G-G2C3-C80	140G-G2C4-C80	140G-G3C3-C80	140G-G3C4-C80	140G-G6C3-C80	140G-G6C4-C80
90	90	900	140G-G2C3-C90	140G-G2C4-C90	140G-G3C3-C90	140G-G3C4-C90	140G-G6C3-C90	140G-G6C4-C90
100	100	1000	140G-G2C3-D10	140G-G2C4-D10	140G-G3C3-D10	140G-G3C4-D10	140G-G6C3-D10	140G-G6C4-D10
110	110	1100	140G-G2C3-D11	140G-G2C4-D11	140G-G3C3-D11	140G-G3C4-D11	140G-G6C3-D11	140G-G6C4-D11
125	125	1250	140G-G2C3-D12	140G-G2C4-D12	140G-G3C3-D12	140G-G3C4-D12	140G-G6C3-D12	140G-G6C4-D12
160★	‡	1600	140G-G2E3-D16	140G-G2E4-D16	140G-G3E3-D16	140G-G3E4-D16	140G-G6E3-D16	140G-G6E4-D16

[★] IEC only

Molded Case Switch — UL489§

Rated	Magnetic Trip	Cat. No.					
Current	[A]						
<i>I</i> _n [A]	I_{m}	3 Poles	4 Poles				
125	1250	140G-G6S3-D12	140G-G6S4-D12				

[§] Does not provide overcurrent protection; may open above 1250 A.



Cat. No. 140G-G6C3-D12



[‡] See table below for Cat. No. selection

[‡] Adjustable thermal trip. 112 A min., 136 A med., 160 A max.

Molded Case Circuit Breakers

Specifications — G- and H-Frame

Specifications	— G- a	and H-I	rame			K					
				G-Frame					H-Fr	ame‡	
Max. Rated Current	[A]		125		160★	125 160*					
Rated insulation voltage, U _i , IEC	[V]			800		1000					
NEMA, UL, CSA											
Interrupting Rating Co	ode	G2	G3	G6	G2 G3 G6	H2	H3	H6	H0	H15	H2 H3 H6 H0 H15
240V AC, 50/60Hz	[kA]	50	65	100	50 65 100	65	100	150	200	200	65 100 150 200 200
480V AC, 50/60Hz	[kA]	25	35	65	25 35 65	25	35	65	100	150	25 35 65 100 150
600Y/347V AC, 50/60Hz	[kA]	10	14	25	10 14 25	_	_	_	_	_	_
600V AC, 50/60 Hz	[kA]	_	_	_	_	14	18	25	35	42	14 18 35 35 42
IEC 60947-2											
Rated ultimate short-o	circuit bre	aking capa	acity, I_{cu}								
220/230/240V AC, 50/60Hz	[kA]	65	85	100	65 85 100	65	85	100	150	200	65 85 100 150 200
380V AC, 50/60Hz	[kA]	36	50	70	36 60 70	36	50	70	120	150	26 50 70 120 150
415V AC, 50/60Hz	[kA]	36	50	70	36 50 70	36	50	70	120	150	36 50 70 120 150
440V AC, 50/60Hz	[kA]	36	50	65	36 50 65	36	50	65	100	150	36 50 65 100 150
500V AC, 50/60Hz	[kA]	30	36	50	36 50 65	30	36	50	60	70	30 36 50 60 70
525V AC, 50/60Hz	[kA]	22	35	35	22 35 35	20	25	30	36	50	20 25 30 36 50
690V AC, 50/60Hz	[kA]	6	8	10	6 8 10	10	12	15	18	20	10 12 15 18 20
250V DC, 2 Poles in Series	[kA]	36	50	70	36 50 70	36	50	70	85	100	36 50 70 85 100
500V DC, 2 Poles in Series	[kA]	_	_	_	_	_	_	_	_	_	_
500V DC, 3 Poles in Series	[kA]	36	50	70	36 50 70	36	50	70	85	100	36 50 70 85 100
750V DC, 3 Poles in Series	[kA]	_	_	_	_	_	_	_	_	_	_
Rated service short-c	ircuit brea	king capa	city, I _{cs}								
220/230/240V AC, 50/60Hz	[kA]	75% (50)	75%	75%	75% 75% 75%	100%	100%	100%	100%	100%	100% 100% 100% 100% 100%
380V AC, 50/60Hz	[kA]	100%	100%	75%	100% 100% 75%	100%	100% 100%	100%	100%	100%	100% 100% 100% 100% 100%
415V AC, 50/60Hz	[kA]	100%	75%	50%	100% 75% 50%	100%	100%	100%	100%	100%	100% 100% 100% 100% 100%
440V AC, 50/60Hz	[kA]	50%	50%	50%	50% 50% 50%	100%	100%	100%	100%	100%	100% 100% 100% 100% 100%
500V AC, 50/60Hz	[kA]	50%	50%	50%	50% 50% 50%	100%	100%	100%	100%	100%	100% 100% 100% 100% 100%
525V AC, 50/60Hz	[kA]	50%	50%	50%	50% 50% 50%	100%	100%	100%	100%	100%	100% 100% 100% 100% 100%
690V AC, 50/60Hz	[kA]	75%	50%	50%	75 50 50%	100%	100%	100%	75%	75%	100% 100% 100% 75% 75%
250V DC, 2 Poles in Series	[kA]	100%	100%	75%	100% 100% 75%	100%	100%	100%	100%	100%	100% 100% 100% 100% 100%
500V DC, 2 Poles in Series	[kA]	_	_	_	_	_	_	_	_	_	_
500V DC, 3 Poles in Series	[kA]	100%	100%	75%	100% 100% 75%	100%	100%	100%	100%	100%	100% 100% 100% 100% 100%
750V DC, 3 Poles in Series	[kA]	_	_	_	_	_	_	_	_	_	_
Mechanical Life	[No. Ops]			25 000						000	
	[Ops/hr]			240					2	40	
Electrical Life @ 415V AC	[No. Ops]			8000						000	
	[Ops/hr]			120					1:	20	
Ambient Temp. w/out derating	°F [°C]			04 °F [40 °		104 °F [40 °C]					
Storage Temperature	°F [°C]			76 °F [-40.		-40+176 °F [-40+80 °C]					
Dimensions	[mm]			es: 76.2x7						0x82.5x13	
[Width/Depth/Height]	[mm]	4 poles: 101.6x70x130						4	poles: 12	0x82.5x13	30

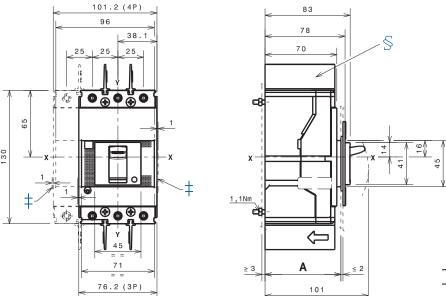
[★] IEC version with a 160 A I_{cu} rating



[‡] Cannot be reverse fed above 480V

Dimensions are in millimeters. Dimensions are not intended to be used for manufacturing purposes.

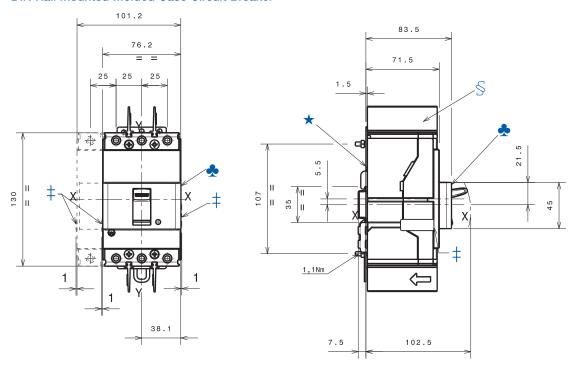
Panel Mounted Molded Case Circuit Breaker



Description	No. of Poles	Α
With flange	34	74
Without flange	34	71
	34	79

- ‡ Overall dimensions of optional wiring ducts
- § Required 25 mm insulating phase barriers provided

DIN Rail Mounted Molded Case Circuit Breaker

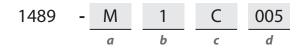


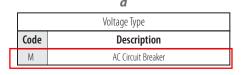
- ★ Mounting bracket ‡ Overall dimensions of optional wiring ducts § Required 25 mm insulating phase barriers provided
- ♣ Optional front cover for DIN Rail



Catalog Number Explanation

Note: Examples given in this section are for reference purposes. This basic explanation should not be used for product selection; some combinations may not produce a valid catalog number.





Poles					
Code	Description				
1	1-Pole				
2	2-Pole				
3	3-Pole				

Trip Curve

Code Trip Curve

C Trip Curve C

D Trip Curve D

	Rated Current (/n)
Code	Current [A]
005	0.5
010	1
016	1.6
020	2
030	3
040	4
050	5
060	6
070	7
080	8
100	10
130	13
150	15
160	16
200	20
250	25
300	30
320	32
350	35
400	40
500	50
600	60
630	63

Product Selection

1-Pole Circuit Breakers

Photo/Wiring Diagram	UL/CSA Max. Voltage	IEC/EN Max. Voltage	Continuous Current Rating (I_n) [A]	Trip Curve C Inductive 510 <i>I</i> _n Cat. No.	Trip Curve D Highly Inductive 1020 <i>I</i> _n Cat. No.																														
	-	-	0.5	1489-M1C005	1489-M1D005																														
			1	1489-M1C010	1489-M1D010																														
			1.6	1489-M1C016	1489-M1D016																														
			2	1489-M1C020	1489 M1D020																														
W.			3	1489-M1C030	1489-M1D030																														
•			4	1489-M1C040	1489-M1D040																														
NO. WISH			5	1489-M1C050	1489-M1D050																														
1 00 cm	277V AC, 48V DC		6	1489-M1C060	1489-M1D060																														
			7	1489-M1C070	1489-M1D070																														
N N			8	1489-M1C080	1489-M1D080																														
			10	1489-M1C100	1489-M1D100																														
			230V AC	230// VC	230V VC	230// 1/	230V AC	230V AC	230// 40	230V AC	230V VC	230V AC	230V AC	23U/ VC	230V AC	330V VC	230V VC	230V AC	13	1489-M1C130	1489-M1D130														
				15	1489-M1C150	1489-M1D150																													
			16	1489-M1C160	1489-M1D160																														
			20	1489-M1C200	1489-M1D200																														
			25	1489-M1C250	1489-M1D250																														
			30	1489-M1C300	1489-M1D300																														
			32	1489-M1C320	1489-M1D320																														
, [1			35	1489-M1C350	1489-M1D350																														
r.) 2	C Curve: 277V AC, 48V DC D Curve: 240V AC, 48V DC		40	1489-M1C400	1489-M1D400																														
1-pole			50	1489-M1C500	1489-M1D500																														
	240V AC, 48V DC		60	1489-M1C600	1489-M1D600																														
			63	1489-M1C630	1489-M1D630																														

Bus Bars 1492-SP Bus Bars

		Rated Current		Cat. No.
Description	Pins	[A] ‡	Pkg. Qty.	*
1-Phase	57	100 A	1	1492-A1B1
1-111026	57	80 A	1	1492-A1B8
1-Phase with	37	100 A	1	1492-A1B1H
aux. contact	37	80 A	1	1492-A1B8H
2-Phase	56	100 A	1	1492-A2B1
Z-riidse	56	80 A	1	1492-A2B8
2-Phase with	46	100 A	1	1492-A2B1H
aux. contact	46	80 A	1	1492-A2B8H
3-Phase	57	100 A	1	1492-A3B1
J-11105E	57	80 A	1	1492-A3B8
3-Phase with	48	100 A	1	1492-A3B1H
aux. contact	48	80 A	1	1492-A3B8H

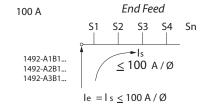
[★] cULus, UL508, EN 60947-1, CE Marked

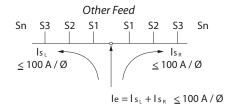
1492-SP Bus Bar Accessories

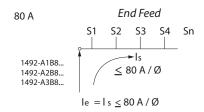
		Cat. No.
Description	Pkg. Qty.	*
Terminal Power Feed, 35 mm², offset lug	10	1492-AAT1
Terminal Power Feed, 35 mm ² , straight lug	10	1492-AAT1S
Terminal Power Feed, 35 mm ² , offset lug, low profile	10	1492-AAT1LP
Dedicated Power Feed, 50 mm ²	10	1492-AAT2
End Cover for 1-phase bus bar	10	1492-A1E
End Cover for 2- or 3-phase bus bar	10	1492-AME
Protective Shroud for unused pins	10	1492-AAP

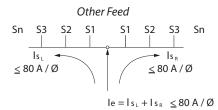
[★] cULus, UL508, EN 60947-1, CE Marked

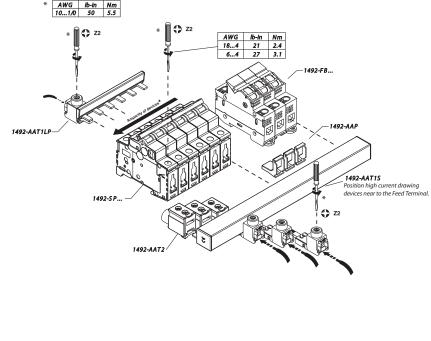
Feeder Terminal & Bus Bar Current Distribution









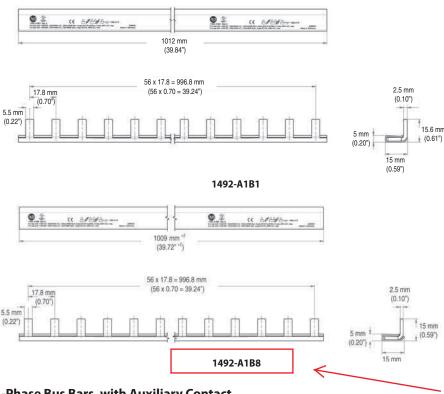


[‡] Refer to the diagrams below for Feeder Terminal & Bus Bar Current Distribution

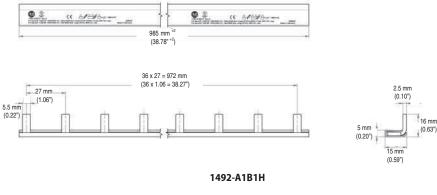
Bus Bar Approximate Dimensions

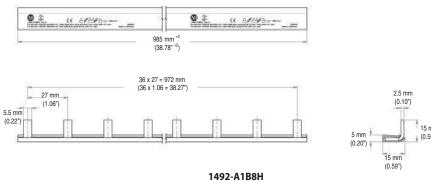
Note: Dimensions are shown in millimeters (inches). Dimensions are not intended for manufacturing purposes.

1-Phase Bus Bars



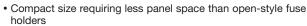
1-Phase Bus Bars, with Auxiliary Contact





Fuse Holders

Bulletin 1492-FB — DIN Rail Mounting Fuse Holders



- · Handle isolates the fuse from power when installing or removing fuse
- IP2 Front-finger protection per IEC/EN 60529
- Optional blown fuse indicators allow easy troubleshooting of electrical circuits
- Easy insertion/removal of fuses, no special tools required
- · Mounts on standard 35 mm DIN Rail
- Marker-ready
- · Terminals shipped in open position and are ready for wiring

Table of Contents

Product Selection this page Specifications......7-40 Approximate

Dimensions...... 7-40 **Standards Compliance**

UL 512 CSA 22.2 No. 39 EN/IEC 60947-3 EN/IEC 60269-2-1

Certifications

UL Listed E34648 **UR Recognized Component CSA Certified** CE Marked

Bulletin 1492-FB fuse holders provide a safe and convenient means for installation of class CC, J, and midget fuses. The class CC fuse holder is designed to reject a midget fuse or international 10 x 38 mm fuse. The class J fuse holder will reject all fuses other than a class J

The class CC and J holders are UL Listed and CSA Certified for branch circuit protection. Class CC and J fuses are excellent for wire protection, small motor loads, and group protection of small motor loads. The midget holders are UL Recognized and CSA Certified when supplementary (1-1/2 in. x 13/32 in.) fuses are applied. The midget fuse holder is also CE Marked for 10 x 38 mm IEC midget fuses.

The 1492-FB fuse holder family is designed for use in many OEM applications, such as power supplies, equipment protection, primary and secondary control transformers, solenoids, lighting and heater loads, and drives.

Product Selection

		For Class CC Fuse	For Clas	s J Fuse	For Midget Fuse	
		30 A∗	30 A	60 A	30 A	
	Description	Cat. No.	Cat. No.	Cat. No.	Cat. No.	
	1-Pole Fuse Block	1492-FB1C30	1492-FB1J30	1492-FB1J60	1492-FB1M30	
One-Pole	1-Pole Fuse Block with Indication, 110600V	1492-FB1C30-L	1492-FB1J30-L	1492-FB1J60-L	1492-FB1M30-L	
Offe-Pole	1-Pole Fuse Block with Indication, 1272V	1492-FB1C30-D1	_	_	1492-FB1M30-D1	
	Pieces per Carton	6				
	2-Pole Fuse Block	1492-FB2C30	1492-FB2J30	1492-FB2J60	1492-FB2M30	
Two-Pole	2-Pole Fuse Block with Indication	1492-FB2C30-L	1492-FB2J30-L	1492-FB2J60-L	1492-FB2M30-L	
	Pieces per Carton		3			
	3-Pole Fuse Block	1492-FB3C30	1492-FB3J30	1492-FB3J60	1492-FB3M30	
Three-Pole	3-Pole Fuse Block with Indication	1492-FB3C30-L	1492-FB3J30-L	1492-FB3J60-L	1492-FB3M30-L	
	Pieces per Carton			2		

^{*} All major fuse brands and current ranges have been evaluated for this fuse holder. Due to the heat they generate, the following fuses must be derated: Ferraz Shamut ATQR 1.25 I = 0.42 A max.

Ferraz Shamut ATQR 1.40 / = 0.47 A max.



Bulletin 1492-FB

Fuse Holders

Accessories/Specifications/Approximate Dimensions

Accessories

Description	Pkg. Quantity	Cat. No.
Fuseholder Identification Slide-in Markers*	E	1492-MC5X5
The following are blank cards. Squares slip into molded slot.	5	1492-MC6X5

^{*} Refer to terminal block marking systems on page 12-90.

Specifications

	CC	M	J30	J60
Product Type (n = number of poles)	1492-FBnC30 "B" 1492-FB1C30-D1 "B" 1492-FBnC30-L "B"	1492-FBnM30 "B" 1492-FB1M30-D1 "B" 1492-FBnM30-L "B"	1492-FBnJ30 "B" 1492-FBnJ30-L "B"	1492-FB <i>n</i> J60 "B" 1492-FB <i>n</i> J60-L "B"
For Fuse Type:	Class CC	Midget 13/32" x 1-1/2" (10 x 38 mm)	Clas	es J
Approvals	UL, CSA, CE	UR, CSA, CE	UL, CS	SA, CE
Maximum Voltage	600V	600V 690V(IEC)	60	0V
Maximum Current	30 A	30 A 32 A (IEC)	30 A	60 A
Maximum Current Withstand (UL/CSA)	200 kA sym	Fuse dependant 50 kA max UL	200 kA sym	
Operating Temperature Range			130 °F ⊦55 °C	
Conductor Material		Copper,	stranded	
Conductor Strip Length		3 in. mm)	0.79 (20 I	
Conductor Range 1 Wire per Terminal:		#184 AWG (0.7525 mm²)		#141 AWG (2.550 mm²)
Conductor Range 2 Wires* per Terminal:		3 AWG 10 mm²)	#186 AWG (0.7516 mm²)	#146 AWG (2.516 mm²)
Terminal Tightening Torque	#188 AWG: 22 lb∙in #64 AWG: 26 lb∙in 0.7525 mm²: 2.5 N∙m		35 II (4 N	

^{*} Both wires must be same size

Approximate Dimensions

Dimensions are in inches (millimeters). Dimensions are not intended to be used for manufacturing purposes.

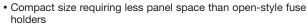


		For Class CC Fuse	For Class J Fuse		For Midget Fuse	
	Dimension	30 A	30 A	60 A	30 A	
Height		3.19 in. (81 mm)	4.65 in. (118 mm)	4.65 in. (118 mm)	3.19 in. (81 mm)	
Depth		2.51 in. (64 mm)	2.76 in. (70 mm)	3.23 in. (82 mm)	2.51 in. (64 mm)	
	One-Pole	0.71 in. (18 mm)	1.41 in. (36 mm)	1.57 in. (40 mm)	0.71 in. (18 mm)	
Width	Two-Pole	1.41 in. (36 mm)	2.83 in. (72 mm)	3.15 in. (80 mm)	1.41 in. (36 mm)	
	Three-Pole	2.13 in. (54 mm)	4.25 in. (108 mm)	4.72 in. (120 mm)	2.13 in. (54 mm)	



Fuse Holders

Bulletin 1492-FB — DIN Rail Mounting Fuse Holders



- · Handle isolates the fuse from power when installing or removing fuse
- IP2 Front-finger protection per IEC/EN 60529
- Optional blown fuse indicators allow easy troubleshooting of electrical circuits
- Easy insertion/removal of fuses, no special tools required
- · Mounts on standard 35 mm DIN Rail
- Marker-ready
- Terminals shipped in open position and are ready for wiring

Table of Contents

Product Selection this page Specifications......7-40 Approximate Dimensions...... 7-40

Standards Compliance

UL 512 CSA 22.2 No. 39 EN/IEC 60947-3 EN/IEC 60269-2-1

Certifications

UL Listed E34648 **UR Recognized Component CSA Certified** CE Marked

Bulletin 1492-FB fuse holders provide a safe and convenient means for installation of class CC, J, and midget fuses. The class CC fuse holder is designed to reject a midget fuse or international 10 x 38 mm fuse. The class J fuse holder will reject all fuses other than a class J

The class CC and J holders are UL Listed and CSA Certified for branch circuit protection. Class CC and J fuses are excellent for wire protection, small motor loads, and group protection of small motor loads. The midget holders are UL Recognized and CSA Certified when supplementary (1-1/2 in. x 13/32 in.) fuses are applied. The midget fuse holder is also CE Marked for 10 x 38 mm IEC midget fuses.

The 1492-FB fuse holder family is designed for use in many OEM applications, such as power supplies, equipment protection, primary and secondary control transformers, solenoids, lighting and heater loads, and drives.

Product Selection

		For Class CC Fuse	For Clas	s J Fuse	For Midget Fuse
		30 A∗	30 A	60 A	30 A
	Description	Cat. No.	Cat. No.	Cat. No.	Cat. No.
	1-Pole Fuse Block	1492-FB1C30	1492-FB1J30	1492-FB1J60	1492-FB1M30
One-Pole	1-Pole Fuse Block with Indication, 110600V	1492-FB1C30-L	1492-FB1J30-L	1492-FB1J60-L	1492-FB1M30-L
One-Pole	1-Pole Fuse Block with Indication, 1272V	1492-FB1C30-D1	_	_	1492-FB1M30-D1
	Pieces per Carton			6	
	2-Pole Fuse Block	1492-FB2C30	1492-FB2J30	1492-FB2J60	1492-FB2M30
Two-Pole	2-Pole Fuse Block with Indication	1492-FB2C30-L	1492-FB2J30-L	1492-FB2J60-L	1492-FB2M30-L
	Pieces per Carton		;	3	
	3-Pole Fuse Block	1492-FB3C30	1492-FB3J30	1492-FB3J60	1492-FB3M30
hree-Pole	3-Pole Fuse Block with Indication	1492-FB3C30-L	1492-FB3J30-L	1492-FB3J60-L	1492-FB3M30-L
	Pieces per Carton	2			

^{*} All major fuse brands and current ranges have been evaluated for this fuse holder. Due to the heat they generate, the following fuses must be derated: Ferraz Shamut ATQR 1.25 I = 0.42 A max. Ferraz Shamut ATQR 1.40 I = 0.47 A max.



Bulletin 1492-FB

Fuse Holders

Accessories/Specifications/Approximate Dimensions

Accessories

Description	Pkg. Quantity	Cat. No.
Fuseholder Identification Slide-in Markers*	E	1492-MC5X5
The following are blank cards. Squares slip into molded slot.	5	1492-MC6X5

^{*} Refer to terminal block marking systems on page 12-90.

Specifications

	CC	M	J30	J60
Product Type (n = number of poles)	1492-FBnC30 "B" 1492-FB1C30-D1 "B" 1492-FBnC30-L "B"	1492-FBnM30 "B" 1492-FB1M30-D1 "B" 1492-FBnM30-L "B"	1492-FBnJ30 "B" 1492-FBnJ30-L "B"	1492-FB <i>n</i> J60 "B" 1492-FB <i>n</i> J60-L "B"
For Fuse Type:	Class CC	Midget 13/32" x 1-1/2" (10 x 38 mm)	Clas	ss J
Approvals	UL, CSA, CE	UR, CSA, CE	UL, CS	SA, CE
Maximum Voltage	600V	600V 690V(IEC)	600V	
Maximum Current	30 A	30 A 32 A (IEC)	30 A	60 A
Maximum Current Withstand (UL/CSA)	200 kA sym	Fuse dependant 50 kA max UL	200 kA sym	
Operating Temperature Range			130 °F ⊦55 °C	
Conductor Material		Copper,	stranded	
Conductor Strip Length	0.43 (11	3 in. mm)	0.79 in. (20 mm)	
Conductor Range 1 Wire per Terminal:	#184 AWG (0.7525 mm²)		#181 AWG (0.7550 mm²)	#141 AWG (2.550 mm²)
Conductor Range 2 Wires∗ per Terminal:	#188 AWG (0.7510 mm²)		#186 AWG (0.7516 mm²)	#146 AWG (2.516 mm²)
Terminal Tightening Torque	#188 AWG: 22 lb∙in #64 AWG: 26 lb∙in 0.7525 mm²: 2.5 N∙m		35 II (4 N	

^{*} Both wires must be same size

Approximate Dimensions

Dimensions are in inches (millimeters). Dimensions are not intended to be used for manufacturing purposes.

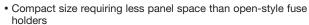


		For Class CC Fuse	For Clas	s J Fuse	For Midget Fuse
	Dimension	30 A	30 A	60 A	30 A
Height		3.19 in. (81 mm)	4.65 in. (118 mm)	4.65 in. (118 mm)	3.19 in. (81 mm)
Depth		2.51 in. (64 mm)	2.76 in. (70 mm)	3.23 in. (82 mm)	2.51 in. (64 mm)
	One-Pole	0.71 in. (18 mm)	1.41 in. (36 mm)	1.57 in. (40 mm)	0.71 in. (18 mm)
Width	Two-Pole	1.41 in. (36 mm)	2.83 in. (72 mm)	3.15 in. (80 mm)	1.41 in. (36 mm)
	Three-Pole	2.13 in. (54 mm)	4.25 in. (108 mm)	4.72 in. (120 mm)	2.13 in. (54 mm)



Fuse Holders

Bulletin 1492-FB — DIN Rail Mounting Fuse Holders



- · Handle isolates the fuse from power when installing or removing fuse
- IP2 Front-finger protection per IEC/EN 60529
- Optional blown fuse indicators allow easy troubleshooting of electrical circuits
- Easy insertion/removal of fuses, no special tools required
- · Mounts on standard 35 mm DIN Rail
- Marker-ready
- · Terminals shipped in open position and are ready for wiring

Table of Contents

Product Selection this page Specifications......7-40 Approximate Dimensions...... 7-40

Standards Compliance

UL 512 CSA 22.2 No. 39 EN/IEC 60947-3 EN/IEC 60269-2-1

Certifications

UL Listed E34648 **UR Recognized Component CSA Certified** CE Marked

Bulletin 1492-FB fuse holders provide a safe and convenient means for installation of class CC, J, and midget fuses. The class CC fuse holder is designed to reject a midget fuse or international 10 x 38 mm fuse. The class J fuse holder will reject all fuses other than a class J

The class CC and J holders are UL Listed and CSA Certified for branch circuit protection. Class CC and J fuses are excellent for wire protection, small motor loads, and group protection of small motor loads. The midget holders are UL Recognized and CSA Certified when supplementary (1-1/2 in. x 13/32 in.) fuses are applied. The midget fuse holder is also CE Marked for 10 x 38 mm IEC midget fuses.

The 1492-FB fuse holder family is designed for use in many OEM applications, such as power supplies, equipment protection, primary and secondary control transformers, solenoids, lighting and heater loads, and drives.

Product Selection

		For Class CC Fuse	For Clas	s J Fuse	For Midget Fuse	
		30 A∗	30 A	60 A	30 A	
Description		Cat. No.	Cat. No.	Cat. No.	Cat. No.	
	1-Pole Fuse Block	1492-FB1C30	1492-FB1J30	1492-FB1J60	1492-FB1M30	
One-Pole	1-Pole Fuse Block with Indication, 110600V	1492-FB1C30-L	1492-FB1J30-L	1492-FB1J60-L	1492-FB1M30-L	
One-Pole	1-Pole Fuse Block with Indication, 1272V	1492-FB1C30-D1	_	_	1492-FB1M30-D1	
	Pieces per Carton	6				
	2-Pole Fuse Block	1492-FB2C30	1492-FB2J30	1492-FB2J60	1492-FB2M30	
Two-Pole	2-Pole Fuse Block with Indication	1492-FB2C30-L	1492-FB2J30-L	1492-FB2J60-L	1492-FB2M30-L	
Pieces per Carton				3		
	3-Pole Fuse Block	1492-FB3C30	1492-FB3J30	1492-FB3J60	1492-FB3M30	
Three-Pole	3-Pole Fuse Block with Indication	1492-FB3C30-L	1492-FB3J30-L	1492-FB3J60-L	1492-FB3M30-L	
	Pieces per Carton		2	2		

^{*} All major fuse brands and current ranges have been evaluated for this fuse holder. Due to the heat they generate, the following fuses must be derated: Ferraz Shamut ATQR 1.25 I = 0.42 A max. Ferraz Shamut ATQR 1.40 I = 0.47 A max.



Bulletin 1492-FB

Fuse Holders

Accessories/Specifications/Approximate Dimensions

Accessories

Description	Pkg. Quantity	Cat. No.
Fuseholder Identification Slide-in Markers*	E	1492-MC5X5
The following are blank cards. Squares slip into molded slot.	5	1492-MC6X5

^{*} Refer to terminal block marking systems on page 12-90.

Specifications

	CC	M	J30	J60
Product Type (n = number of poles)	1492-FBnC30 "B" 1492-FB1C30-D1 "B" 1492-FBnC30-L "B"	1492-FBnM30 "B" 1492-FB1M30-D1 "B" 1492-FBnM30-L "B"	1492-FBnJ30 "B" 1492-FBnJ30-L "B"	1492-FB <i>n</i> J60 "B" 1492-FB <i>n</i> J60-L "B"
For Fuse Type:	Class CC	Midget 13/32" x 1-1/2" (10 x 38 mm)	Clas	ss J
Approvals	UL, CSA, CE	UR, CSA, CE	UL, CS	SA, CE
Maximum Voltage	600V	600V 690V(IEC)	600V	
Maximum Current	30 A	30 A 32 A (IEC)	30 A	60 A
Maximum Current Withstand (UL/CSA)	200 kA sym	Fuse dependant 50 kA max UL	200 kA sym	
Operating Temperature Range			130 °F ⊦55 °C	
Conductor Material		Copper,	stranded	
Conductor Strip Length	0.43 (11	3 in. mm)	0.79 in. (20 mm)	
Conductor Range 1 Wire per Terminal:	#184 AWG (0.7525 mm²)		#181 AWG (0.7550 mm²)	#141 AWG (2.550 mm²)
Conductor Range 2 Wires∗ per Terminal:	#188 AWG (0.7510 mm²)		#186 AWG (0.7516 mm²)	#146 AWG (2.516 mm²)
Terminal Tightening Torque	#188 AWG: 22 lb∙in #64 AWG: 26 lb∙in 0.7525 mm²: 2.5 N∙m		35 II (4 N	

^{*} Both wires must be same size

Approximate Dimensions

Dimensions are in inches (millimeters). Dimensions are not intended to be used for manufacturing purposes.

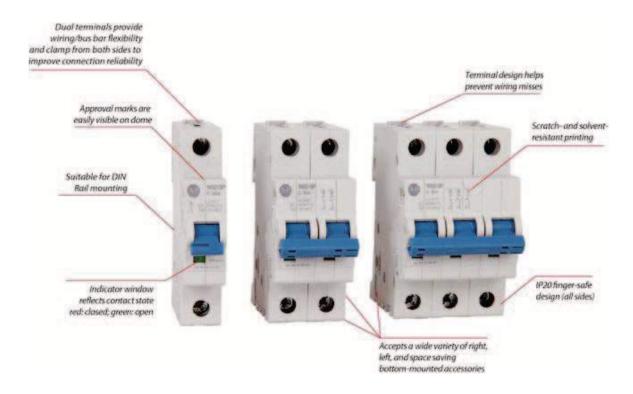


		For Class CC Fuse	For Clas	s J Fuse	For Midget Fuse
	Dimension	30 A	30 A	60 A	30 A
Height		3.19 in. (81 mm)	4.65 in. (118 mm)	4.65 in. (118 mm)	3.19 in. (81 mm)
Depth		2.51 in. (64 mm)	2.76 in. (70 mm)	3.23 in. (82 mm)	2.51 in. (64 mm)
	One-Pole	0.71 in. (18 mm)	1.41 in. (36 mm)	1.57 in. (40 mm)	0.71 in. (18 mm)
Width	Two-Pole	1.41 in. (36 mm)	2.83 in. (72 mm)	3.15 in. (80 mm)	1.41 in. (36 mm)
	Three-Pole	2.13 in. (54 mm)	4.25 in. (108 mm)	4.72 in. (120 mm)	2.13 in. (54 mm)



Supplementary Protector/Miniature Circuit Breaker

Bulletin 1492-SP — Supplementary Protectors



Bulletin 1492-SP thermal magnetic Supplementary Protectors provide overcurrent protection for equipment where branch circuit protection is already provided, or is not required. These devices are also Miniature Circuit Breakers as defined by IEC Standards.

These supplementary protectors are offered as a broad portfolio of pole variants, current ratings, and trip curves to match the appropriate level of protection for your application. They may be used with UL 508 Listed bus bars for convenience in panel assembly, a wide range of left-, right- and space saving bottom-mount accessories, and lock out attachments for safety during maintenance.

Features

- · Current limiting
- · Fast breaking time
- Existing installations can be easily upgraded to include an auxiliary using the bottom mounted auxiliary contact options, which require no DIN Rail space
- 40 °C calibration temperature (UL/CSA) eliminates need to derate for 508A industrial control panel installations
- Installation of up to six accessories on the same circuit breaker
- Dual terminals provide a more secure connection of up to four wires, or two wires and a bus bar
- Superior shock and vibration resistance to prevent nuisance tripping
- Terminal design helps prevent wiring misses by directing wires into the terminal openings, even while tightening
- Reversible line and load connections
- Single and multi-pole toggle mount lock out attachments available for Lockout/Tagout (LOTO)
- RoHS compliant and fully-recyclable device
- Suitable for extreme ambient conditions

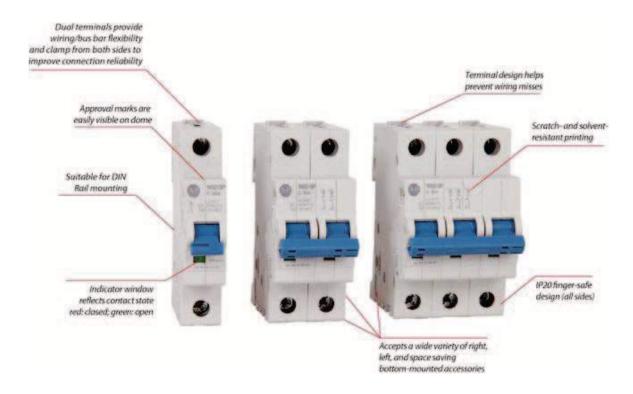
Photo/Wiring Diagram	Continuous Current Rating (I_n) [A]	Trip Curve B Resistive or Slightly Inductive 35 $I_{\rm n}$ Cat. No.	Trip Curve C Inductive 510 I _n Cat. No.	Trip Curve D Highly Inductive 1020 I _n Cat. No.
1194	0.5	1492-SPM1B005	1492-SPM1C005	1492-SPM1D005
•	1	1492-SPM1B010	1492-SPM1C010	1492-SPM1D010
10=	2	1492-SPM1B020	1492-SPM1C020	1492-SPM1D020
	3	1492-SPM1B030	1492-SPM1C030	1492-SPM1D030
	4	1492-SPM1B040	1492-SPM1C040	1492-SPM1D040
•	5	1492-SPM1B050	1492-SPM1C050	1492-SPM1D050
	6	1492-SPM1B060	1492-SPM1C060	1492-SPM1D060
	7	1492-SPM1B070	1492-SPM1C070	1492-SPM1D070
	8	1492-SPM1B080	1492-SPM1C080	1492-SPM1D080
	10	1492-SPM1B100	1492-SPM1C100	1492-SPM1D100
	13	1492-SPM1B130	1492-SPM1C130	1492-SPM1D130
	15	1492-SPM1B150	1492-SPM1C150	1492-SPM1D150
	16	1492-SPM1B160	1492-SPM1C160	1492-SPM1D160
	20	1492-SPM1B200	1492-SPM1C200	1492-SPM1D200
	25	1492-SPM1B250	1492-SPM1C250	1492-SPM1D250
, [1	30	1492-SPM1B300	1492-SPM1C300	1492-SPM1D300
ry.	32	1492-SPM1B320	1492-SPM1C320	1492-SPM1D320
1-pole	40	1492-SPM1B400	1492-SPM1C400	1492-SPM1D400
	50	1492-SPM1B500	1492-SPM1C500	1492-SPM1D500
	63	1492-SPM1B630	1492-SPM1C630	1492-SPM1D630

1-Pole + Neutral Supplementary Protectors*

Photo/Wiring Diagram	Continuous Current Rating (I_n) [A]	Trip Curve B Resistive or Slightly Inductive 35 $I_{\rm n}$ Cat. No.	Trip Curve C Inductive 510 I _n Cat. No.	Trip Curve D Highly Inductive $1020 I_n$ Cat. No.
	0.5	1492-SPM1B005-N	1492-SPM1C005-N	1492-SPM1D005-N
	1	1492-SPM1B010-N	1492-SPM1C010-N	1492-SPM1D010-N
	2	1492-SPM1B020-N	1492-SPM1C020-N	1492-SPM1D020-N
W. E.	3	1492-SPM1B030-N	1492-SPM1C030-N	1492-SPM1D030-N
	4	1492-SPM1B040-N	1492-SPM1C040-N	1492-SPM1D040-N
	5	1492-SPM1B050-N	1492-SPM1C050-N	1492-SPM1D050-N
4.0	6	1492-SPM1B060-N	1492-SPM1C060-N	1492-SPM1D060-N
	7	1492-SPM1B070-N	1492-SPM1C070-N	1492-SPM1D070-N
	8	1492-SPM1B080-N	1492-SPM1C080-N	1492-SPM1D080-N
	10	1492-SPM1B100-N	1492-SPM1C100-N	1492-SPM1D100-N
	13	1492-SPM1B130-N	1492-SPM1C130-N	1492-SPM1D130-N
	15	1492-SPM1B150-N	1492-SPM1C150-N	1492-SPM1D150-N
	16	1492-SPM1B160-N	1492-SPM1C160-N	1492-SPM1D160-N
	20	1492-SPM1B200-N	1492-SPM1C200-N	1492-SPM1D200-N
	25	1492-SPM1B250-N	1492-SPM1C250-N	1492-SPM1D250-N
11-IN	30	1492-SPM1B300-N	1492-SPM1C300-N	1492-SPM1D300-N
1-pole +N	32	1492-SPM1B320-N	1492-SPM1C320-N	1492-SPM1D320-N
	40	1492-SPM1B400-N	1492-SPM1C400-N	1492-SPM1D400-N
	50	1492-SPM1B500-N	1492-SPM1C500-N	1492-SPM1D500-N
	63	1492-SPM1B630-N	1492-SPM1C630-N	1492-SPM1D630-N

Supplementary Protector/Miniature Circuit Breaker

Bulletin 1492-SP — Supplementary Protectors



Bulletin 1492-SP thermal magnetic Supplementary Protectors provide overcurrent protection for equipment where branch circuit protection is already provided, or is not required. These devices are also Miniature Circuit Breakers as defined by IEC Standards.

These supplementary protectors are offered as a broad portfolio of pole variants, current ratings, and trip curves to match the appropriate level of protection for your application. They may be used with UL 508 Listed bus bars for convenience in panel assembly, a wide range of left-, right- and space saving bottom-mount accessories, and lock out attachments for safety during maintenance.

Features

- · Current limiting
- · Fast breaking time
- Existing installations can be easily upgraded to include an auxiliary using the bottom mounted auxiliary contact options, which require no DIN Rail space
- 40 °C calibration temperature (UL/CSA) eliminates need to derate for 508A industrial control panel installations
- Installation of up to six accessories on the same circuit breaker
- Dual terminals provide a more secure connection of up to four wires, or two wires and a bus bar
- Superior shock and vibration resistance to prevent nuisance tripping
- Terminal design helps prevent wiring misses by directing wires into the terminal openings, even while tightening
- Reversible line and load connections
- Single and multi-pole toggle mount lock out attachments available for Lockout/Tagout (LOTO)
- RoHS compliant and fully-recyclable device
- Suitable for extreme ambient conditions

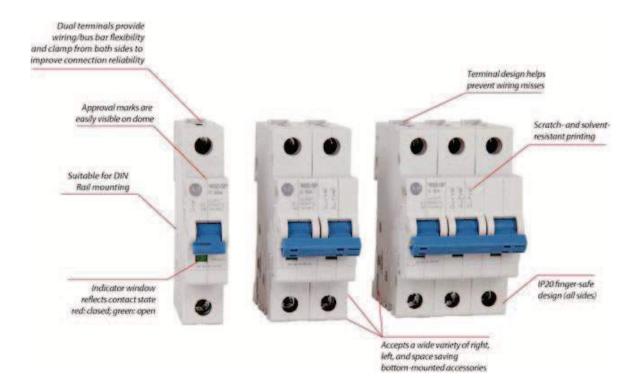
Photo/Wiring Diagram	Continuous Current Rating (I_{N}) [A]	Trip Curve B Resistive or Slightly Inductive 35 $I_{\rm n}$ Cat. No.	Trip Curve C Inductive 510 I _n Cat. No.	Highly Inductive
100	0.5	1492-SPM1B005	1492-SPM1C005	1492-SPM1D005
•	1	1492-SPM1B010	1492-SPM1C010	1492-SPM1D010
10=	2	1492-SPM1B020	1492-SPM1C020	1492-SPM1D020
	3	1492-SPM1B030	1492-SPM1C030	1492-SPM1D030
	4	1492-SPM1B040	1492-SPM1C040	1492-SPM1D040
•	5	1492-SPM1B050	1492-SPM1C050	1492-SPM1D050
	6	1492-SPM1B060	1492-SPM1C060	1492-SPM1D060
	7	1492-SPM1B070	1492-SPM1C070	1492-SPM1D070
	8	1492-SPM1B080	1492-SPM1C080	1492-SPM1D080
	10	1492-SPM1B100	1492-SPM1C100	1492-SPM1D100
	13	1492-SPM1B130	1492-SPM1C130	1492-SPM1D130
	15	1492-SPM1B150	1492-SPM1C150	1492-SPM1D150
	16	1492-SPM1B160	1492-SPM1C160	1492-SPM1D160
	20	1492-SPM1B200	1492-SPM1C200	1492-SPM1D200
	25	1492-SPM1B250	1492-SPM1C250	1492-SPM1D250
(]1	30	1492-SPM1B300	1492-SPM1C300	1492-SPM1D300
1-pole	32	1492-SPM1B320	1492-SPM1C320	1492-SPM1D320
	40	1492-SPM1B400	1492-SPM1C400	1492-SPM1D400
	50	1492-SPM1B500	1492-SPM1C500	1492-SPM1D500
	63	1492-SPM1B630	1492-SPM1C630	1492-SPM1D630

1-Pole + Neutral Supplementary Protectors*

Photo/Wiring Diagram	Continuous Current Rating (I_n) [A]	Trip Curve B Resistive or Slightly Inductive $35\ I_{\rm n}$ Cat. No.	Trip Curve C Inductive 510 I _n Cat. No.	Trip Curve D Highly Inductive $1020 I_n$ Cat. No.
	0.5	1492-SPM1B005-N	1492-SPM1C005-N	1492-SPM1D005-N
	1	1492-SPM1B010-N	1492-SPM1C010-N	1492-SPM1D010-N
	2	1492-SPM1B020-N	1492-SPM1C020-N	1492-SPM1D020-N
M. E.	3	1492-SPM1B030-N	1492-SPM1C030-N	1492-SPM1D030-N
	4	1492-SPM1B040-N	1492-SPM1C040-N	1492-SPM1D040-N
	5	1492-SPM1B050-N	1492-SPM1C050-N	1492-SPM1D050-N
-	6	1492-SPM1B060-N	1492-SPM1C060-N	1492-SPM1D060-N
	7	1492-SPM1B070-N	1492-SPM1C070-N	1492-SPM1D070-N
	8	1492-SPM1B080-N	1492-SPM1C080-N	1492-SPM1D080-N
	10	1492-SPM1B100-N	1492-SPM1C100-N	1492-SPM1D100-N
	13	1492-SPM1B130-N	1492-SPM1C130-N	1492-SPM1D130-N
	15	1492-SPM1B150-N	1492-SPM1C150-N	1492-SPM1D150-N
	16	1492-SPM1B160-N	1492-SPM1C160-N	1492-SPM1D160-N
	20	1492-SPM1B200-N	1492-SPM1C200-N	1492-SPM1D200-N
	25	1492-SPM1B250-N	1492-SPM1C250-N	1492-SPM1D250-N
1-pole +N	30	1492-SPM1B300-N	1492-SPM1C300-N	1492-SPM1D300-N
	32	1492-SPM1B320-N	1492-SPM1C320-N	1492-SPM1D320-N
	40	1492-SPM1B400-N	1492-SPM1C400-N	1492-SPM1D400-N
	50	1492-SPM1B500-N	1492-SPM1C500-N	1492-SPM1D500-N
	63	1492-SPM1B630-N	1492-SPM1C630-N	1492-SPM1D630-N

Supplementary Protector/Miniature Circuit Breaker

Bulletin 1492-SP — Supplementary Protectors



Bulletin 1492-SP thermal magnetic Supplementary Protectors provide overcurrent protection for equipment where branch circuit protection is already provided, or is not required. These devices are also Miniature Circuit Breakers as defined by IEC Standards.

These supplementary protectors are offered as a broad portfolio of pole variants, current ratings, and trip curves to match the appropriate level of protection for your application. They may be used with UL 508 Listed bus bars for convenience in panel assembly, a wide range of left-, right- and space saving bottom-mount accessories, and lock out attachments for safety during maintenance.

Features

- · Current limiting
- · Fast breaking time
- Existing installations can be easily upgraded to include an auxiliary using the bottom mounted auxiliary contact options, which require no DIN Rail space
- 40 °C calibration temperature (UL/CSA) eliminates need to derate for 508A industrial control panel installations
- Installation of up to six accessories on the same circuit breaker
- Dual terminals provide a more secure connection of up to four wires, or two wires and a bus bar
- Superior shock and vibration resistance to prevent nuisance tripping
- Terminal design helps prevent wiring misses by directing wires into the terminal openings, even while tightening
- Reversible line and load connections
- Single and multi-pole toggle mount lock out attachments available for Lockout/Tagout (LOTO)
- RoHS compliant and fully-recyclable device
- Suitable for extreme ambient conditions

Photo/Wiring Diagram	Continuous Current Rating (I_n) [A]	Trip Curve B Resistive or Slightly Inductive 35 $I_{\rm n}$ Cat. No.	Trip Curve C Inductive 510 I _n Cat. No.	Highly Inductive
100	0.5	1492-SPM1B005	1492-SPM1C005	1492-SPM1D005
•	1	1492-SPM1B010	1492-SPM1C010	1492-SPM1D010
10=	2	1492-SPM1B020	1492-SPM1C020	1492-SPM1D020
	3	1492-SPM1B030	1492-SPM1C030	1492-SPM1D030
	4	1492-SPM1B040	1492-SPM1C040	1492-SPM1D040
•	5	1492-SPM1B050	1492-SPM1C050	1492-SPM1D050
	6	1492-SPM1B060	1492-SPM1C060	1492-SPM1D060
	7	1492-SPM1B070	1492-SPM1C070	1492-SPM1D070
	8	1492-SPM1B080	1492-SPM1C080	1492-SPM1D080
	10	1492-SPM1B100	1492-SPM1C100	1492-SPM1D100
	13	1492-SPM1B130	1492-SPM1C130	1492-SPM1D130
	15	1492-SPM1B150	1492-SPM1C150	1492-SPM1D150
	16	1492-SPM1B160	1492-SPM1C160	1492-SPM1D160
	20	1492-SPM1B200	1492-SPM1C200	1492-SPM1D200
	25	1492-SPM1B250	1492-SPM1C250	1492-SPM1D250
(]1	30	1492-SPM1B300	1492-SPM1C300	1492-SPM1D300
r.	32	1492-SPM1B320	1492-SPM1C320	1492-SPM1D320
1-pole	40	1492-SPM1B400	1492-SPM1C400	1492-SPM1D400
	50	1492-SPM1B500	1492-SPM1C500	1492-SPM1D500
	63	1492-SPM1B630	1492-SPM1C630	1492-SPM1D630

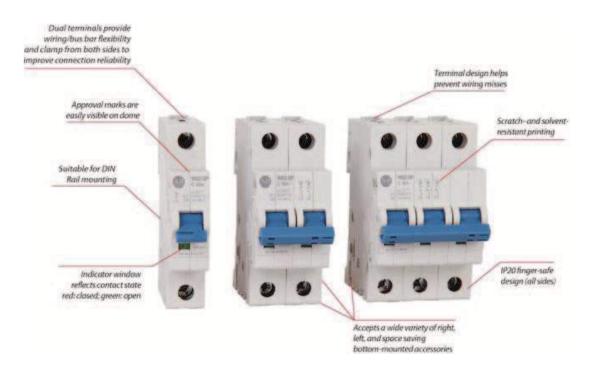
1-Pole + Neutral Supplementary Protectors*

Photo/Wiring Diagram	Continuous Current Rating (I_n) [A]	Trip Curve B Resistive or Slightly Inductive $35\ I_{\rm n}$ Cat. No.	Trip Curve C Inductive 510 I _n Cat. No.	Trip Curve D Highly Inductive $1020 I_n$ Cat. No.
	0.5	1492-SPM1B005-N	1492-SPM1C005-N	1492-SPM1D005-N
	1	1492-SPM1B010-N	1492-SPM1C010-N	1492-SPM1D010-N
	2	1492-SPM1B020-N	1492-SPM1C020-N	1492-SPM1D020-N
M. E	3	1492-SPM1B030-N	1492-SPM1C030-N	1492-SPM1D030-N
	4	1492-SPM1B040-N	1492-SPM1C040-N	1492-SPM1D040-N
	5	1492-SPM1B050-N	1492-SPM1C050-N	1492-SPM1D050-N
	6	1492-SPM1B060-N	1492-SPM1C060-N	1492-SPM1D060-N
	7	1492-SPM1B070-N	1492-SPM1C070-N	1492-SPM1D070-N
	8	1492-SPM1B080-N	1492-SPM1C080-N	1492-SPM1D080-N
	10	1492-SPM1B100-N	1492-SPM1C100-N	1492-SPM1D100-N
	13	1492-SPM1B130-N	1492-SPM1C130-N	1492-SPM1D130-N
	15	1492-SPM1B150-N	1492-SPM1C150-N	1492-SPM1D150-N
	16	1492-SPM1B160-N	1492-SPM1C160-N	1492-SPM1D160-N
	20	1492-SPM1B200-N	1492-SPM1C200-N	1492-SPM1D200-N
	25	1492-SPM1B250-N	1492-SPM1C250-N	1492-SPM1D250-N
11- IN	30	1492-SPM1B300-N	1492-SPM1C300-N	1492-SPM1D300-N
2	32	1492-SPM1B320-N	1492-SPM1C320-N	1492-SPM1D320-N
1-pole +N	40	1492-SPM1B400-N	1492-SPM1C400-N	1492-SPM1D400-N
	50	1492-SPM1B500-N	1492-SPM1C500-N	1492-SPM1D500-N
	63	1492-SPM1B630-N	1492-SPM1C630-N	1492-SPM1D630-N

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Supplementary Protector/Miniature Circuit Breaker

Bulletin 1492-SP — Supplementary Protectors



Bulletin 1492-SP thermal magnetic Supplementary Protectors provide overcurrent protection for equipment where branch circuit protection is already provided, or is not required. These devices are also Miniature Circuit Breakers as defined by IEC Standards.

These supplementary protectors are offered as a broad portfolio of pole variants, current ratings, and trip curves to match the appropriate level of protection for your application. They may be used with UL 508 Listed bus bars for convenience in panel assembly, a wide range of left-, right- and space saving bottom-mount accessories, and lock out attachments for safety during maintenance.

Features

- Current limiting
- Fast breaking time
- Existing installations can be easily upgraded to include an auxiliary using the bottom mounted auxiliary contact options, which require no DIN Rail space
- 40 °C calibration temperature (UL/CSA) eliminates need to derate for 508A industrial control panel installations
- Installation of up to six accessories on the same circuit breaker
- Dual terminals provide a more secure connection of up to four wires, or two wires and a bus bar
- Superior shock and vibration resistance to prevent nuisance tripping
- Terminal design helps prevent wiring misses by directing wires into the terminal openings, even while tightening
- Reversible line and load connections
- Single and multi-pole toggle mount lock out attachments available for Lockout/Tagout (LOTO)
- RoHS compliant and fully-recyclable device
- · Suitable for extreme ambient conditions

1-Pole Supplementary Protectors

Photo/Wiring Diagram	Continuous Current Rating (I_n) [A]	Trip Curve B Resistive or Slightly Inductive 35 $I_{\rm n}$ Cat. No.	Trip Curve C Inductive 510 I_n Cat. No.	Trip Curve D Highly Inductive $1020 I_n$ Cat. No.
100	0.5	1492-SPM1B005	1492-SPM1C005	1492-SPM1D005
	1	1492-SPM1B010	1492-SPM1C010	1492-SPM1D010
1077	2	1492-SPM1B020	1492-SPM1C020	1492-SPM1D020
	3	1492-SPM1B030	1492-SPM1C030	1492-SPM1D030
	4	1492-SPM1B040	1492-SPM1C040	1492-SPM1D040
•	5	1492-SPM1B050	1492-SPM1C050	1492-SPM1D050
	6	1492-SPM1B060	1492-SPM1C060	1492-SPM1D060
	7	1492-SPM1B070	1492-SPM1C070	1492-SPM1D070
	8	1492-SPM1B080	1492-SPM1C080	1492-SPM1D080
	10	1492-SPM1B100	1492-SPM1C100	1492-SPM1D100
	13	1492-SPM1B130	1492-SPM1C130	1492-SPM1D130
	15	1492-SPM1B150	1492-SPM1C150	1492-SPM1D150
	16	1492-SPM1B160	1492-SPM1C160	1492-SPM1D160
	20	1492-SPM1B200	1492-SPM1C200	1492-SPM1D200
	25	1492-SPM1B250	1492-SPM1C250	1492-SPM1D250
\1 1	30	1492-SPM1B300	1492-SPM1C300	1492-SPM1D300
rd .	32	1492-SPM1B320	1492-SPM1C320	1492-SPM1D320
1-pole	40	1492-SPM1B400	1492-SPM1C400	1492-SPM1D400
	50	1492-SPM1B500	1492-SPM1C500	1492-SPM1D500
	63	1492-SPM1B630	1492-SPM1C630	1492-SPM1D630

1-Pole + Neutral Supplementary Protectors*

Photo/Wiring Diagram	Continuous Current Rating (I_n) [A]	Trip Curve B Resistive or Slightly Inductive 35 $I_{\rm n}$ Cat. No.	Trip Curve C Inductive 510 I _n Cat. No.	Trip Curve D Highly Inductive 1020 I_n Cat. No.
	0.5	1492-SPM1B005-N	1492-SPM1C005-N	1492-SPM1D005-N
1000	1	1492-SPM1B010-N	1492-SPM1C010-N	1492-SPM1D010-N
	2	1492-SPM1B020-N	1492-SPM1C020-N	1492-SPM1D020-N
** <u>=</u> 3	3	1492-SPM1B030-N	1492-SPM1C030-N	1492-SPM1D030-N
	4	1492-SPM1B040-N	1492-SPM1C040-N	1492-SPM1D040-N
	5	1492-SPM1B050-N	1492-SPM1C050-N	1492-SPM1D050-N
4.2	6	1492-SPM1B060-N	1492-SPM1C060-N	1492-SPM1D060-N
	7	1492-SPM1B070-N	1492-SPM1C070-N	1492-SPM1D070-N
	8	1492-SPM1B080-N	1492-SPM1C080-N	1492-SPM1D080-N
	10	1492-SPM1B100-N	1492-SPM1C100-N	1492-SPM1D100-N
	13	1492-SPM1B130-N	1492-SPM1C130-N	1492-SPM1D130-N
	15	1492-SPM1B150-N	1492-SPM1C150-N	1492-SPM1D150-N
	16	1492-SPM1B160-N	1492-SPM1C160-N	1492-SPM1D160-N
	20	1492-SPM1B200-N	1492-SPM1C200-N	1492-SPM1D200-N
	25	1492-SPM1B250-N	1492-SPM1C250-N	1492-SPM1D250-N
/1-IN	30	1492-SPM1B300-N	1492-SPM1C300-N	1492-SPM1D300-N
4.7	32	1492-SPM1B320-N	1492-SPM1C320-N	1492-SPM1D320-N
1-pole +N	40	1492-SPM1B400-N	1492-SPM1C400-N	1492-SPM1D400-N
	50	1492-SPM1B500-N	1492-SPM1C500-N	1492-SPM1D500-N
	63	1492-SPM1B630-N	1492-SPM1C630-N	1492-SPM1D630-N



General Description

The Allen-Bradley Bulletin 1606-XLE power supplies are cost optimized without compromising quality, reliability and performance. Cat. No. 1606-XLE480EP offers high efficiency, electronic inrush current limitation, active PFC, and a wide operational temperature range. The small size is achieved by a synchronous rectification and further technological design details.

The Bulletin 1606-XLE line of power supplies includes all the essential basic functions. The devices have a power reserve of 20% included, which may even be used continuously at temperatures up to +45°C. Additionally, Cat. No. 1606-XLE480EP can deliver approximately 4 times the nominal output current for 15ms which helps to trip fuses on faulty output branches.

High immunity to transients and power surges as well as low electromagnetic emission, a DC-OK relay contact and a large international approval package for a variety of applications makes this unit suitable for nearly every situation.

CATALOG NUMBERS

	Power Supply	1606-XLE480EP	24-28V Standard unit
_		1606-XLE480EPC	Conformal coated
	Accessories	1606-XLC	Wall Mount Bracket
		1606-XLSRED40HE	Redundancy Module
		1606-XLSREDS40HE	Redundancy Module
		1606-XLSRED40	Redundancy Module

Power Supply

- AC 100-240V Wide-range Input
- Width only 65mm
- Efficiency up to 94.0%
- Excellent Partial Load Efficiency
- 20% Output Power Reserves
- Safe Hiccup^{PLUS} Overload Mode
- Easy Fuse Breaking due to High Overload Current (typ. 80A for 15ms)
- Active Power Factor Correction (PFC)
- Minimal Inrush Current Surge
- Full Power Between -25°C and +60°C
- DC-OK Relay Contact
- Current Sharing Feature for Parallel Use
- 3 Year Warranty

Specifications

Output voltage	DC 24V	
Adjustment range	24 - 28V	
Output current	20A	at 24V, amb <60°C
	24A	at 24V, amb <45°C
	17.1A	at 28V, amb $<$ 60°C
	20.6A	at 28V, amb <45°C
Output power	480W	ambient < 60°C
	576W	ambient <45°C
Output ripple	< 50mVpp	20Hz to 20MHz
AC Input voltage	AC 100-240V	-15%/+10%
Mains frequency	50-60Hz	±6%
AC Input current	4.36 / 2.33A	at 120 / 230Vac
Power factor	0.99 / 0.95	at 120 / 230Vac
AC Inrush current	typ. 9 / 7A peak	at 120 / 230Vac
Efficiency	92.7 / 94.0%	at 120 / 230Vac
Losses	37.8 / 30.6W	at 120 / 230Vac
Temperature range	-25°C to +70°C	operational
Derating	12W/°C	+60 to +70°C
	between 100-85Vac, s	see chapter 15, <u>Environment on</u>
	<u>page 13</u>	
Hold-up time	typ. 26 / 26ms	at 120 / 230Vac
Dimensions	65x124x127mm	WxHxD
Weight	1000g / 2.2lb	·

Certifications







3.AC-Input

AC input AC input range	nom. min. min.	AC 100-240V 100-264Vac 85-100Vac	continuou short term <u>Figure 15</u> -	or TN-, TT- and IT m is operation n or with output de i <u>-1 on page 13</u> , ge between 0 and 1	rating (1%/V) or with reduced ambient temperature, see
	min.	264-300Vac	< 500ms	je between o and 1	oovac
Allowed voltage L or N to earth	max.	300Vac		ıs, IEC 62103	
Input frequency	nom.	50-60Hz	±6%		
Turn-on voltage	typ.	84Vac	steady-sta	ate value, see <u>Figur</u>	<u>e 3-1</u>
Shut-down voltage	typ.	39Vac	steady-sta	ate value at 5A load	l, see <u>Figure 3-1</u>
	typ.	53Vac	steady-sta	ate value at 10A loa	d, see <u>Figure 3-1</u>
	typ.	74Vac	steady-state value at 20A load see Figure 3-1		d see <u>Figure 3-1</u>
		AC 100V	AC 120V	AC 230V	
Input current	typ.	5.25A	4.36A	2.33A	at 24V, 20A, see <u>Figure 3-3</u>
Power factor*)	typ.	0.99	0.99	0.95	at 24V, 20A, see <u>Figure 3-4</u>
Crest factor**)	typ.	1.5	1.5	1.65	at 24V, 20A
Start-up delay	typ.	850ms	850ms	650ms	see <u>Figure 3-2</u>
Rise time	typ.	85ms	85ms	85ms	at 24V, 20A const. current load, 0mF load capacitance,
	typ.	150ms	150ms	150ms	see <u>Figure 3-2</u> at 24V, 20A const. current load, 20mF load capacitance, see <u>Figure 3-2</u>
Turn-on overshoot	max.	200mV	200mV	200mV	see <u>Figure 3-2</u>

The power factor is the ratio of the true (or real) power to the apparent power in an AC circuit.

Fig. 3-1: Input voltage range

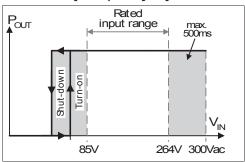


Fig. 3-3: Input current vs. output load at 24V

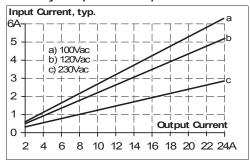


Fig. 3-2: Turn-on behaviour, definitions

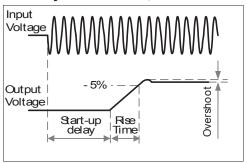
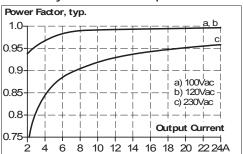


Fig. 3-4: Power factor vs. output load



^{**)} The crest factor is the mathematical ratio of the peak value to RMS value of the input current waveform.

6. Output

Output voltage	nom.	24V	
Adjustment range	min.	24-28V	guaranteed
	max.	30V****)	at clockwise end position of potentiometer
Factory settings	typ.	24.1V	±0.2%, at full load, cold unit, in "single use" mode
	typ.	24.1V	±0.2%, at full load, cold unit, in "parallel use" mode
	typ.	25.1V	at no load, cold unit, in "parallel use" mode
Line regulation	max.	10mV	85-300Vac
Load regulation	max.	100mV	in "single use" mode: static value, 0A \rightarrow 20A;
			see <u>Figure 6-1</u>
	typ.	1000mV	in "parallel use" mode: static value, $0A \rightarrow 20A$,
			see <u>Figure 6-2</u>
Ripple and noise voltage	max.	50mVpp	20Hz to 20MHz, 500hm
Output current	nom.	20A	at 24V, ambient temperature $<$ 60°C, see Figure 6-1
	nom.	24A ^{*)}	at 24V, ambient temperature $<$ 45°C, see Figure 6-1
	nom.	17.1A	at 28V, ambient temperature $<60^{\circ}$ C, see Figure 6-1
	nom.	20.6A ^{*)}	at 28V, ambient temperature <45°C, see <u>Figure 6-1</u>
	typ.	80A	up to 15ms, output voltage stays above 20V, see <u>Figure 6-4</u> , This peak current is
			available once every five seconds. Refer to Peak Current Capability on page 19 for
			more peak current measurements.
Output power	nom.	480W	continuously available
	nom.	576W ^{*)}	Power Boost ^{®*)}
Overload behaviour		cont. current	output voltage > 13Vdc, see <u>Figure 6-1</u>
		Hiccup ^{PLUS} mode**)	output voltage < 13Vdc, see <u>Figure 6-1</u>
Short-circuit current	min.	35A***)	load impedance <10m0hm, see <u>Figure 6-3</u>
	max.	45A***)	load impedance <10m0hm, see Figure 6-1
	max.	15A***)	average (R.M.S.) current, load impedance 50m0hm, see Figure 6-3
	min.	70A	up to 15ms, load impedance < 10m0hm, see Figure 6-4
	typ.	100A	up to 15ms, load impedance < 10m0hm, see <u>Figure 6-4</u>
Output capacitance	typ.	7 000μF	included inside the power supply

Power Boost This power/ current is continuously allowed up to an ambient temperature of 45°C. Above 45°C, do not use this power/ current longer than a duty cycle of 10% and/ or not longer than 1 minute every 10 minutes.

^{****)} This is the maximum output voltage which can occur at the clockwise end position of the potentiometer due to tolerances. It is not guaranteed value which can be achieved. The typical value is about 28.5V (in "single use" mode).



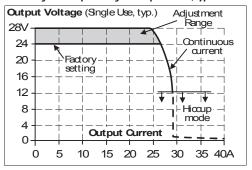


Fig. 6-3: Short-circuit on output, Hiccup $^{\it PLUS}$ mode, typ.

Fig. 6-2: Output voltage in "parallel use" mode, typ.

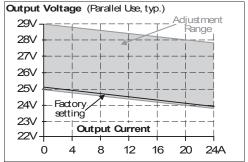
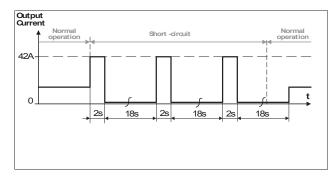
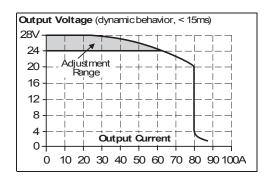


Fig. 6-4: Dynamic overcurrent capability, typ.

Hiccup^{PLUS} Mode At heavy overloads (when output voltage falls below 13V), the power supply delivers continuous output current for 2s. After this, the output is switched off for approx. 18s before a new start attempt is automatically performed. This cycle is repeated as long as the overload exists. If the overload has been cleared, the device will operate normally. See <u>Figure 6-3</u>
***) Discharge current of output capacitors is not included.





7. Hold-up Time

		AC 100V	AC 120V	AC 230V	
Hold-up Time	typ.	65ms	65ms	65ms	at 24V, 10A, see <u>Figure 7-1</u>
	min.	54ms	54ms	54ms	at 24V, 10A, see <u>Figure 7-1</u>
	typ.	26ms	26ms	26ms	at 24V, 20A, see <u>Figure 7-1</u>
	min.	21ms	21ms	21ms	at 24V, 20A, see <u>Figure 7-1</u>

Fig. 7-1: Hold-up time vs. input voltage

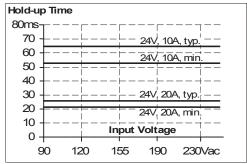
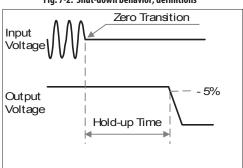


Fig. 7-2: Shut-down behavior, definitions

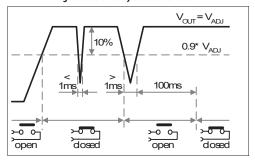


8. DC-OK Relay

This feature monitors the output voltage, which is produced by the power supply itself. It is independent of a back-fed voltage from a unit connected in parallel to the power supply output.

Contact closes	As soon as the output voltage reaches 90% of the adjusted output voltage level.					
Contact opens	As soon as the output voltage dips more than 10% below t	As soon as the output voltage dips more than 10% below the adjusted output voltage.				
	Short dips will be extended to a signal length of 100ms. Dip	Short dips will be extended to a signal length of 100ms. Dips shorter than 1ms will be ignored.				
Contact ratings	max. 60Vdc 0.3A, 30Vdc 1A, 30Vac 0.5A	max. 60Vdc 0.3A, 30Vdc 1A, 30Vac 0.5A resistive load				
	min. 1mA at 5Vdc	min. permissible load				
Isolation voltage	Refer to Dielectric Strength on page 14.					

Fig. 8-1: DC-ok relay contact behavior



9. Efficiency and Power Losses

		AC 100V	AC 120V	AC 230V	
Efficiency	typ.	92.0%	92.7%	94.0%	at 24V, 20A
	typ.	91.6%	92.4%	94.0%	at 24V, 24A (Power Boost)
Average efficiency*)	typ.	91.3%	92.0%	93.3%	25% at 5A, 25% at 10A,
,					25% at 15A. 25% at 20A
Power losses	typ.	6.5W	3.9W	2.6W	at 24V, 0A
	typ.	21.1W	20.1W	17.0W	at 24V, 10A
	typ.	41.7W	37.8W	30.6W	at 24V, 20A
	typ.	52.8W	47.4W	36.8W	at 24V, 24A (Power Boost)

^{*)} The average efficiency is an assumption for a typical application where the power supply is loaded with 25% of the nominal load for 25% of the time, 50% of the nominal load for another 25% of the time and with 100% of the nominal load for the rest of the time.

Fig. 9-1: Efficiency vs. output current at 24V, typ

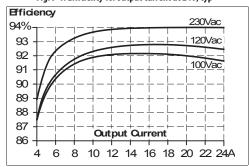


Fig. 9-3: Efficiency vs. input voltage at 24V, 20A, typ.

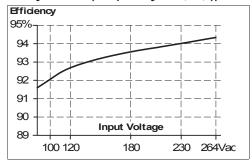


Fig. 9-2: Losses vs. output current at 24V, typ.

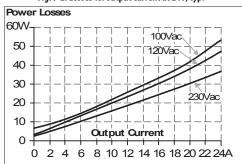
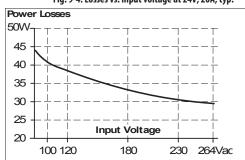


Fig. 9-4: Losses vs. input voltage at 24V, 20A, typ.



Compact I/O Accessories

Category	Cat. No.	Description
End cap	1769-ECL	Left-end cap for Compact I/O system
	1769-ECR	Right-end cap for Compact I/O system
Expansion cable	1769-CLL1	Left bank-to-left bank expansion 305 mm (1 ft)
	1769-CLL3	Left bank-to-left bank expansion 1 m (3.28 ft)
	1769-CRR1	Right bank-to-right bank expansion 305 mm (1 ft)
	1769-CRR3	Right bank-to-right bank expansion 1 m (3.28 ft)
	1769-CRL1	Right bank-to-left bank expansion 305 mm (1 ft)
	1769-CRL3	Right bank-to-left bank expansion 1 m (3.28 ft)
Replacement terminal block	1769-RTBN10	10-pin NEMA terminal block
	1769-RTBN18	18-pin NEMA terminal block
Replacement door labels	1769-RL1	Replacement door labels for digital I/O, 2 per kit
	1769-RL2	Replacement door labels for analog and specialty I/O, 2 per kit
Replacement doors	1769-RD	Door replacement kit, 2 per kit
Replacement connector kit	1746-N3	Connector kit to terminate a cable, which connects field I/O devices to 32-point I/O modules, 1 connector and 40 terminals

End Caps

The final I/O bank in Compact system needs an end cap on the end without the expansion cable. The 1769-L23x controller comes with a right-end cap, so you do not need to order one separately.

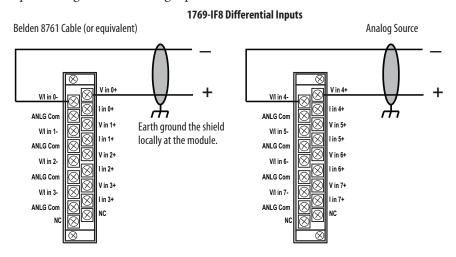
Table 114 - Technical Specifications - 1769-ECL, 1769-ECR

Attribute	1769-ECL	1769-ECR	
Current draw @ 5.1V	5 mA		
Current draw @ 24V	0 mA		
Weight, approx	130 g (0.286 lb)		
Location	Left end	Right end	
North American temperature code	T3C		
IEC temperature code	N/A	T4	
Enclosure type rating	None (open-style)	None (open-style)	

1769-IF8

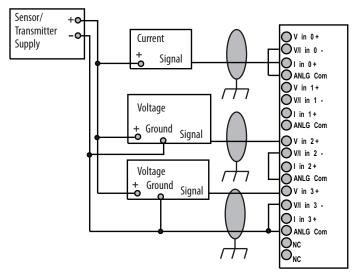


Compact voltage/current analog input module



1769-IF8 Single-ended Sensor/Transmitter Inputs

The sensor power supply must be rated Class 2.



Wiring for channels 4...7 are identical.

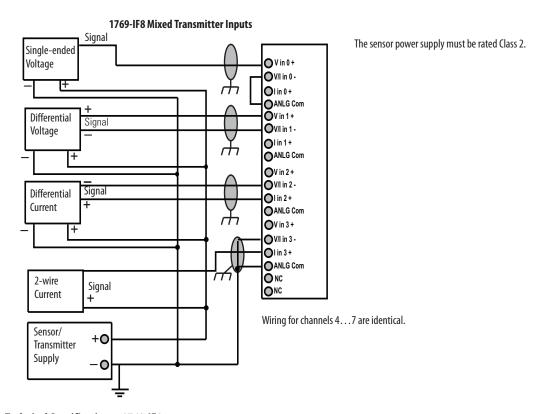


Table 22 - Technical Specifications - 1769-IF8

Attribute	1769-IF8
Inputs	8 differential or single-ended
Input range	±10V 010V 05V 15V 020 mA 420 mA
Full scale range ⁽¹⁾	±10.5V -0.510.5V -0.55.25V 0.55.25V 021 mA 3.221 mA
Current draw @ 5.1V	120 mA
Current draw @ 24V	70 mA
Converter type	Delta Sigma
Heat dissipation, max	3.24 W
Resolution ⁽²⁾	16 bits (unipolar) 15 bits plus sign (bipolar)
Rated working voltage ⁽³⁾	30V AC/30V DC
Common mode voltage range ⁽⁴⁾	±10V DC max per channel
Common mode rejection	> 60 dB @ 50 and 60 Hz with the 10 Hz filter selected
Normal mode rejection ratio	-50 dB @ 50 and 60 Hz with the 10 Hz filter selected
Input impedance	Voltage: 220 k Ω Current: 250 Ω
Accuracy ⁽⁵⁾	Voltage: ±0.2% full scale @ 25 °C (77 °F) Current: ±0.35% full scale @ 25 °C (77 °F)

Table 22 - Technical Specifications - 1769-IF8

Attribute	1769-IF8		
Accuracy drift with temperature	Voltage: ±0.003% per °C Current: ±0.0045% per °C		
Nonlinearity	±0.03%		
Repeatability ⁽⁶⁾	±0.03%		
Module error	Voltage: ±0.3% Current: ±0.5%		
Overload at input terminals, max ⁽⁷⁾	Voltage: ±30V DC continuous, 0.1 mA Current: ±32 mA continuous, ±7.6V DC		
Isolation voltage	500V AC or 710V DC for 1 minute (qualification test), group to bus 30V AC/30V DC working voltage (IEC Class 2 reinforced insulation)		
Weight, approx	450 g (0.99 lb)		
Dimensions (HxWxD), approx	118 x 52.5 x 87 mm (4.65 x 2.07 x 3.43 in.) Height with mounting tabs 138 mm (5.43 in.)		
Slot width	1.5		
Module location	DIN rail or panel mount		
Power supply	1769-PA2, 1769-PB2, 1769-PA4, 1769-PB4		
Power supply distance rating	8 modules		
Terminal screw torque	0.68 Nem (6 lbein)		
Retaining screw torque	0.46 Nom (4.1 lboin)		
Wire size	(2214 AWG) solid (2216 AWG) stranded		
Wire type	Cu-90 °C (194 °F)		
Replacement terminal block	1769-RTBN18 (1 per kit)		
Replacement door label	1769-RL2 series B (2 per kit)		
Replacement door	1769-RD (2 per kit)		
Vendor ID code	1		
Product type code	10		
Product code	38		
Enclosure type rating	None (open-style)		
	•		

⁽¹⁾ The over- or under-range flag comes on when the normal operating range (over/under) is exceeded. The module continues to convert the analog input up to the maximum full scale range. The flag automatically resets when within the normal operating range.

- (4) For proper operation, both the plus and minus input terminals must be within ± 10 V DC of analog common.
- (5) Includes offset, gain, nonlinearity, and repeatability error terms.
- (6) Repeatability is the ability of the input module to register the same reading in successive measurements for the same input signal.
- (7) Damage can occur to the input circuit if this value is exceeded.

Table 23 - Response Speed - 1769-IF8

Filter Frequency	Update Time Per Channel	Update Time Per Module
10 Hz	100 ms	400 ms
50 Hz	30 ms	120 ms
60 Hz	30 ms	120 ms
250 Hz	9 ms	36 ms
500 Hz	6 ms	24 ms

⁽²⁾ Resolution is dependent upon your filter selection. The maximum resolution is achieved with either the 50 or 60 Hz filter selected.

⁽³⁾ Rated working voltage is the maximum continuous voltage that can be applied at the input terminal, including the input signal and the value that floats above ground potential. For example, a 10V DC input signal and 20V DC potential above ground at the input terminal.

Table 24 - Certifications - 1769-IF8

Certification ⁽¹⁾	1769-IF8		
c-UL	C-UL certified (under CSA C22.2 No. 142) UL 508 listed Class I, Division 2 Group A,B,C,D Hazardous Locations (UL 1604, C-UL under CSA C22.2 No. 213)		
CE	CE compliant for all applicable directives		
C-Tick	Australian Radiocommunications Act, compliant with: - AS/NZS CISPR 11; Industrial Enclosure		

⁽¹⁾ When marked. See the Product Certification link at http://www.rockwellautomation.com/global/certification/overview.page for Declarations of Conformity, Certificates, and other certification details.

1769-IQ16

$Compact\ 24V\ DC\ sink/source\ input\ module$

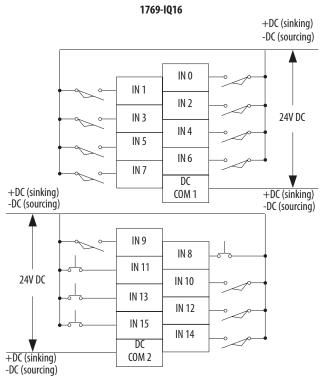


Table 35 - Technical Specifications - 1769-IQ16

Attribute	1769-IQ16
Inputs	16 (8 points/group)
Voltage category	24V DC sink/source
Operating voltage range	1030V DC @ 30 °C (86 °F) 1026.4V DC @ 60 °C (140 °F)
Input delay, on	8 ms
Input delay, off	8 ms
Current draw @ 5.1V	115 mA
Heat dissipation, max	3.55 W
Off-state voltage, max	5V DC
Off-state current, max	1.5 mA
On-state voltage, min	10V DC
On-state current, min	2 mA
Inrush current, max	250 mA
Input impedance, nom	3 kΩ
Isolation voltage	Verified by one of the following dielectric tests: 1200V AC for 1 s or 1697V DC for 1 s, input point to bus and group to group 75V DC working voltage (IEC Class 2 reinforced insulation)
Weight, approx	270 g (0.60 lb)
Dimensions (HxWxD), approx	118 x 35 x 87 mm (4.65 x 1.38 x 3.43 in.) Height with mounting tabs 138 mm (5.43 in.)
Slot width	1

Table 35 - Technical Specifications - 1769-IQ16

Attribute	1769-IQ16
Module location	DIN rail or panel mount
Power supply	1769-PA2, 1769-PB2, 1769-PA4, 1769-PB4
Power supply distance rating	8 modules
Terminal screw torque	0.68 N●m (6 lb●in)
Retaining screw torque	0.46 N●m (4.1 lb●in)
Wire size	(2214 AWG) solid (2216 AWG) stranded
Wire type	Cu-90 °C (194 °F)
IEC input compatibility	Type 1+
Replacement terminal block	1769-RTBN18 (1 per kit)
Replacement door label	1769-RL1 (2 per kit)
Replacement door	1769-RD (2 per kit)
Vendor ID code	1
Product type code	7
Product code	67
Enclosure type rating	None (open-style)

Table 36 - Certifications - 1769-IQ16

Certification ⁽¹⁾	1769-IQ16	
c-UL	C-UL certified (under CSA C22.2 No. 142) UL 508 listed Class I, Division 2 Group A,B,C,D Hazardous Locations (UL 1604, C-UL under CSA C22.2 No. 213)	
CE	CE compliant for all applicable directives	
C-Tick	Australian Radiocommunications Act, compliant with: AS/NZS CISPR 11; Industrial Enclosure	

⁽¹⁾ When marked. See the Product Certification link at http://www.rockwellautomation.com/global/certification/overview.page for Declarations of Conformity, Certificates, and other certification details.



CompactLogix System

Catalog Numbers:

- Armor Compact GuardLogix 5370
- Armor CompactLogix 5370
- Compact GuardLogix 5370
- CompactLogix 5370
- CompactLogix 5380









Characteristic	CompactLogix™ 5380 Controllers		CompactLogix 5370 L3 Controllers Compact GuardLogix 5370 L3 Controllers Armor CompactLogix 5370 L3 Controllers Armor Compact GuardLogix 5370 Controllers			
Controller tasks:	• 32 • 1000 programs/task		32 1000 programs/task			
Event tasks	Consumed tag, EVENT instruction changes, and motion events	triggers, Module Input Data	Consumed tag, EVENT instruction triggers and motion ev	vents		
User memory	5069-L306ER, 5069-L306ERM	0.6 MB	1769-L30ER, 1769-L30ER-NSE, 1769-L30ERM	1 MB		
	5069-L310ER, 5069-L310ER- NSE, 5069-L310ERM	1 MB	1769-L33ER, 1769-L33ERM, 1769-L33ERMO	2 MB		
	5069-L320ER, 5069-L320ERM	2 MB	1769-L36ERM, 1769-L36ERMO, 1769-L37ERMO	3 MB		
	5069-L330ER, 5069-L330ERM	3 MB	1769-L30ERMS	1 MB + 0.5 MB safety		
	5069-L340ER, 5069-L340ERM	4 MB	1769-L33ERMS, 1769-L33ERMOS	2 MB + 1 MB safety		
	5069-L350ERM	5 MB	1769-L36ERMS, 1769-L36ERMOS, 1769-L37ERMOS	3 MB + 1.5 MB safety		
	5069-L380ERM	8 MB				
	5069-L3100ERM	10 MB				
Built-in ports	2 - EtherNet/IP ports, 10 Mpbs/100 Mbps/1 Gbps 1 port USB client		Dual-port EtherNet/IP 1 port USB Client			
Communication options	EtherNet/IP USB Client		EtherNet/IP Embedded switch Single IP address DeviceNet USB Client			
Controller connections	_		256 connections			
Network nodes	Studio 5000 Logix Designer appli	cation, version 30 or later				
	5069-L306ER, 5069-L306ERM	16	1769-L30ER, 1769-L30ER-NSE, 1769-L30ERM, 1769-L30ERMS	8		
	5069-L310ER, 5069-L310ER- NSE, 5069-L310ERM	24	1769-L33ER, 1769-L33ERM, 1769-L33ERMS, 1769-L33ERMO, 1769-L33ERMOS	16		
	5069-L320ER, 5069-L320ERM	40	1769-L36ERM, 1769-L36ERMS, 1769-L36ERMO, 1769-L36ERMOS	48		
	5069-L330ER, 5069-L330ERM	50	1769-L37ERMO, 1769-L37ERMOS	64		
	5069-L340ER, 5069-L340ERM	55		•		
	5069-L350ERM	60				
	5069-L380ERM	70				
	5069-L3100ERM 80					
Controller redundancy	None		Backup via DeviceNet - CompactLogix 5370 L3 Controllers and Compact GuardLogix 5370 L3 controllers only			
Integrated motion	EtherNet/IP		EtherNet/IP			
Conformal coating	Custom ⁽¹⁾		Custom ⁽¹⁾	Custom ⁽¹⁾		

⁽¹⁾ Contact the Rockwell Automation specialty products group for availability.

CompactLogix Controllers

The CompactLogix platform brings together the benefits of a common programming environment, common networks, and common control engine in a small footprint with high performance. Combined with 1769 Compact I/O or COMPACT 5000 I/O modules, the CompactLogix platform is perfect for tackling smaller, machine-level control applications, with or without simple motion, with unprecedented power and scalability. A CompactLogix platform is ideal for systems that require standalone and system-connected control over EtherNet/IP, ControlNet, or DeviceNet networks.



For detailed specifications, see the following publications:

- CompactLogix 5380 Controllers Specifications Technical Data, publication <u>5069-TD002</u>
- CompactLogix Controllers Specifications Technical Data, publication <u>1769-TD005</u>

Characteristic	CompactLogix 5380 Controllers	CompactLogix 5370 L1 Controllers	CompactLogix 5370 L2 Controllers	CompactLogix 5370 L3 Controllers	Armor CompactLogix Controllers	Armor Compact GuardLogix Controllers
Controller application	High-performance applications Local COMPACT 5000 I/O modules	Small applications Embedded 1734 I/O modules	Small applications Embedded 1769 Compact I/O modules	General-purpose	On-Machine™	On-Machine
Controller tasks	32; 1000 programs/task	32; 1000 programs/task	32; 1000 programs/task	32; 1000 programs/task	32; 1000 programs/task	32; 1000 programs/task
Event tasks	Consumed tag, EVENT instruction triggers, Module Input Data changes, and motion events	Consumed tag, EVENT instruction, embedded inputs, axis, and motion event triggers	Consumed tag, EVENT instruction, axis, and motion event triggers	Consumed tag, EVENT instruction, axis, and motion event triggers	Consumed tag, EVENT instruction, axis, and motion event triggers	Consumed tag, EVENT instruction, axis, and motion event triggers
User memory	5069-L306ER, 5069-L306ERM: 0.6 MB 5069-L310ER, 5069-L310ER-NSE, 5069-L310ERM: 1 MB 5069-L320ER, 5069-L320ERM: 2 MB 5069-L330ER, 5069-L330ERM: 3 MB 5069-L340ERM: 4 MB 5069-L350ERM: 5 MB 5069-L350ERM: 5 MB 5069-L380ERM: 8 MB 5069-L3100ERM: 10 MB	1769 -L16ER-BB1B: 384 KB 1769-L18ER-BB1B, 1769-L18ERM-BB1B: 512 KB 1769-L19ER-BB1B: 1 MB	1769-L24ER-QB1B, 1769-L24ER-QBFC1B: 750 KB 1769-L27ERM-QBFC1B: 1 MB	• 1769-L30ER, 1769-L30ERM, 1769-L30ER-NSE: 1 MB • 1769-L33ERM: 2 MB • 1769-L36ERM: 3 MB • 1769-L30ERMS: 1 MB + 0.5 MB safety • 1769-L33ERMS: 2 MB + 1 MB safety • 1769-L36ERMS: 3 MB + 1.5 MB safety	• 1769-L33ERMO: 2 MB • 1769-L36ERMO, 1769-L37ERMO: 3 MB	1769-L33ERMOS: 2 MB + 1 MB safety 1769-L36ERMOS, 1769-L37ERMOS: 3 MB + 1.5 MB safety
Built-in ports	• 2 EtherNet/IP ⁽¹⁾ • 1 USB	• 2 EtherNet/IP ⁽²⁾ • 1 USB	• 2 EtherNet/IP ⁽²⁾ • 1 USB	• 2 EtherNet/IP ⁽²⁾ • 1 USB	• 2 EtherNet/IP ⁽²⁾ • 1 USB	• 2 EtherNet/IP ⁽²⁾ • 1 USB
Communication options	Dual-port EtherNet/IP USB Client	Dual-port EtherNet/IP USB Client	Dual-port EtherNet/IP DeviceNet USB Client	Dual-port EtherNet/IP (standard and safety) DeviceNet (standard) USB Client	Dual-port EtherNet/ IP (standard and safety) DeviceNet (standard)	Dual-port EtherNet/IP (standard and safety) DeviceNet (standard)

⁽¹⁾ CompactLogix 5380 controllers support Dual-IP mode and DLR/Linear mode. Mode use is user-configurable.

⁽²⁾ CompactLogix 5370 controllers have two EtherNet/IP ports to connect to an EtherNet/IP network. The ports carry the same network traffic as part of the embedded switch of the controller. The controller uses only one IP address.

CompactLogix 5370 L3 Controllers

In a CompactLogix 5370 L3 controller system, the 1769 Compact I/O modules can be placed to the left and the right of the power supply. As many as eight modules can be placed on each side of the power supply. The CompactLogix 5370 L3 controller comes with:



- Dual EtherNet/IP ports for linear and ring topologies.
- USB port for firmware updates and programming.
- Support for 1769 Compact I/O.

Use the 1769-L30ER-NSE controller for mining applications. You can deplete the residual stored energy of the 1769-L30ER-NSE controller to 200 μ J or less before you transport it into or out of a mine. The 1769-L30ER-NSE controller does not maintain the real-time clock on power cycle.

Characteristic	1769-L30ER	1769-L30ERM	1769-L30ER-NSE	1769-L33ER	1769-L33ERM	1769-L36ERM
Available user memory	1 MB	1 MB	1 MB No capacitor	2 MB	2 MB	3 MB
Memory card	1784-SD1 (1 GB), shipp 1784-SD2 (2 GB)	ed with controller				
Communication ports	• 2 EtherNet/IP • 1 USB					
EtherNet/IP connections	• 256 EtherNet/IP • 120 TCP	• 256 EtherNet/IP • 120 TCP	• 256 EtherNet/IP • 120 TCP	• 256 EtherNet/IP • 120 TCP	• 256 EtherNet/IP • 120 TCP	• 256 EtherNet/IP • 120 TCP
EtherNet/IP nodes in one Logix Designer application, max	16			32		48
Integrated motion on an EtherNet/IP network	_	Supports up to 4 axes	_	_	Supports up to 8 axes	Supports up to 16 axes
Module expansion capacity	8 1769 modules 1 bank of modules			16 1769 modules 2 banks of modules		30 1769 modules 3 banks of modules
Battery	None					
Power supply distance rating	4 modules 4 modules 4 modules				4 modules	
Programming software support	 Version 20 - For controllers that use firmware revision 20. Version 21 or later - For controllers that use firmware revision 21 or later. 					

These controllers replace previous catalog numbers.

New Controller ⁽¹⁾	Replaces Previous Controller	Differences
1769-L30ER 1769-L30ERM 1769-L30ER-NSE	1769-L31 1769-L32C ⁽²⁾ 1769-L32E	Additional memory Integrated motion on EtherNet/IP support (1769-L30ERM, 1769-L33ERM, 1769-L36ERM) USB port instead of RS-232 port
1769-L33ER 1769-L33ERM	1769-L35CR ⁽²⁾ 1769-L35E	Dual-port EtherNet/IP support SD card instead of CompactFlash card
1769-L36ERM	Any previous 1769-L3x controller	

⁽¹⁾ IMPORTANT: Typically, you can use any of the new controllers that are listed in each row as replacements for any of the previous controllers that are listed in the corresponding cell to the right. For example, you can replace a 1769-L32E controller with a 1769-L32ER, 1769-L32ERM, or 1769-L32ER-NSE controller.

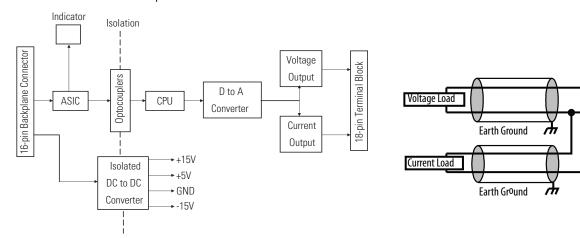
In some rare cases, system configuration helps to prevent controller replacement as shown in the previous table. For example, if your system uses a 1769–L32E controller with 12 expansion modules, you cannot replace that controller with a 1769–L30ER, 1769–L30ERM, or 1769–L30ERM, or 1769–L30ERM, or 1769–L30ERM controller. Those controllers support no more than 8 expansion modules. You must replace the 1769–L32E controller with a 1769–L33ERM, or 1769–L30ERM controller.

We recommend that before you upgrade your controllers, consider your application requirements to verify that the replacements that are listed previously apply.

 $[\]begin{tabular}{ll} (2) & Requires converting from ControlNet connections to EtherNet/IP connections. \end{tabular}$

1769-0F4

Compact voltage/current output analog module Simplified Schematic



O V out 3+

O I out 3+

O V out 2+

O I out 2+

ANLG Com

ANLG Com

V out 0+ O I out 0+ O V out 1+

O lout 1+

Table 66 - Technical Specifications - 1769-0F4

Attribute	1769-0F4
Outputs	4 single-ended
Output range	±10V 010V 05V 15V 020 mA 420 mA
Full scale range ⁽¹⁾	±10.5V -0.510.5V -0.55.25V 0.55.25V 021 mA 3.221 mA
Resolution	15 bits plus sign unipolar and bipolar
Current draw @ 5.1V	120 mA
Current draw @ 24V	170 mA
Heatt dissipation, max	2.86 W
Conversion rate (all channels), max	Interrupts not enabled: 2.5 ms Interrupts enabled: 3.8 ms
Step response to 63% ⁽²⁾	2.9 ms
Resistive load	Current: 0600Ω (includes wire resistance) Voltage: $1\mathrm{K}\Omega$ or greater
Inductive load, max	0.1 mH (current load) 1.0 μF (voltage load)
Field calibration	None required
Accuracy ⁽³⁾	0.5% full scale at 25 °C (77 °F)
Accuracy drift with temperature	±0.0086% of full scale per ℃
Output ripple ⁽⁴⁾	±0.05% @ 050 kHz

Table 66 - Technical Specifications - 1769-0F4

Attribute	1769-0F4
Nonlinearity	±0.05%
Repeatability ⁽⁵⁾	±0.05%
Module error 060 °C (32140 °F)	+/-0.8% of full scale
Output impedance	Voltage output: $<$ 1 Ω Current output: $>$ 1 $M\Omega$
Open and short-circuit protection	Yes
Short-circuit protection, max	40 mA
Output overvoltage protection	Yes
Output response at system power up and power down	2.51.0V DC spike for < 15 ms
Rated working voltage ⁽⁶⁾	30V AC/30V DC
Isolation voltage	510V AC or 720V DC for 1 minute (qualification test), output group to bus 30V AC/30V DC working voltage (IEC Class 2 reinforced insulation)
Weight, approx	280 g (0.61 lb)
Dimensions (HxWxD), approx	118 x 35 x 87 mm (4.65 x 1.38 x 3.43 in.) Height with mounting tabs 138 mm (5.43 in.)
Slot width	1
Module location	DIN rail or panel mount
Power supply	1769-PA2, 1769-PB2, 1769-PA4, 1769-PB4
Optional 24V DC Class 2 power supply voltage range ⁽⁷⁾	20.426.4V DC
Power supply distance rating	8 modules
Terminal screw torque	0.68 N•m (6 lb•in)
Retaining screw torque	0.46 N•m (4.1 lb•in)
Wire size	(2214 AWG) solid (2216 AWG) stranded
Wire type	Cu-90 °C (194 °F)
Replacement terminal block	1769-RTBN18 (1 per kit)
Replacement door label	1769-RL2 (2 per kit)
Replacement door	1769-RD (2 per kit)
Vendor ID code	1
Product type code	10
Product code	48
Input words	5
Output words	5
Configuration words	32
Enclosure type rating	None (open style)

⁽¹⁾ The over- or under-range flag will come on when the normal operating range (over/under) is exceeded. The module will continue to convert the analog input up to the maximum full scale range. The flag automatically resets when within the normal operating range.

⁽²⁾ Step response is the period of time between when the D/A converter was instructed to go from minimum to full range until the device is at 63% of full range.

⁽³⁾ Includes offset, gain, drift, nonlinearity, and repeatability error terms.

⁽⁴⁾ Output ripple is the amount a fixed output varies with time, assuming a constant load and temperature.

- (5) Repeatability is the ability of the output module to reproduce output readings when the same controller value is applied to it consecutively, under the same conditions and in the same direction.
- (6) Rated working voltage is the maximum continuous voltage that can be applied at the input terminal, including the input signal and the value that floats above ground potential (for example, 10V DC input signal and 20V DC potential above ground).
- (7) If the optional 24V DC Class 2 power supply is used, the 24V DC current draw from the bus is 0 mA.

Table 67 - Certifications - 1769-0F4

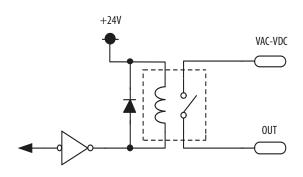
Certification ⁽¹⁾	1769-0F4
c-UL	C-UL certified (under CSA C22.2 No. 142) UL 508 listed Class I, Division 2 Group A,B,C,D Hazardous Locations (UL 1604, C-UL under CSA C22.2 No. 213)
Œ	CE compliant for all applicable directives
C-Tick	C-Tick compliant for all applicable directives AustralianRadiocommunications Act, compliant with: • • AS/NZS cispr 11; Industrial Enclosure

⁽¹⁾ When marked. See the Product Certification link at http://www.ab.com for Declarations of Conformity, Certificates, and other certification details.

1769-0W16

Compact AC/DC relay contact module

Simplified Output Circuit Diagram



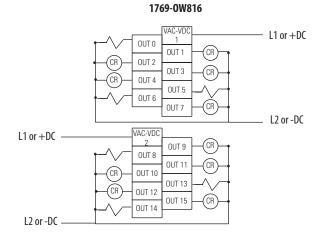


Table 98 - Technical Specifications - 1769-0W16

Attribute	1769-0W16
Outputs	16 normally open (8 points/group)
Operating voltage range	5265V AC 5125V DC
Delay, on	10 ms
Delay, off	10 ms
Current draw @ 5.1V	205 mA
Current draw @ 24V	180 mA
Heat dissipation, max	4.75 W
Off-state leakage, max	0 mA
On-state current, min	10 mA @ 5V DC
Current per point, max	2.5 A
Current per module, max	20 A
Isolation voltage	Verified by one of the following dielectric tests: 1836V AC for 1 s or 2596V DC for 1 s, output point to bus 265V AC working voltage (IEC Class 2 reinforced insulation) Verified by one of the following dielectric tests: 1836V AC for 1 s or 2596V DC for 1 s, group to group 265V AC working voltage (basic insulation) 150V AC working voltage (IEC Class 2 reinforced insulation)
Weight, approx	450 g (0.99 lb)
Dimensions (HxWxD), approx	118 x 52.5 x 87 mm (4.65 x 2.07 x 3.43 in.) Height with mounting tabs 138 mm (5.43 in.)
Slot width	1.5
Module location	DIN rail or panel mount
Power supply	1769-PA2, 1769-PB2, 1769-PA4, 1769-PB4
Power supply distance rating	8 modules
Terminal screw torque	0.68 N•m (6 lb•in)
Retaining screw torque	0.46 N•m (4.1 lb•in)
Wire size	(2214 AWG) solid (2216 AWG) stranded
Wire type	Cu-90 °C (194 °F)

Table 98 - Technical Specifications - 1769-0W16

Attribute	1769-0W16
Replacement terminal block	1769-RTBN18 (1 per kit)
Replacement door label	1769-RL1 (2 per kit)
Replacement door	1769-RD (2 per kit)
Vendor ID code	1
Product type code	7
Product code	85
Enclosure type rating	None (open style)

Table 99 - Relay Contact Ratings - 1769-0W16

Volts, max Continuous Amps per		Amperes ⁽¹⁾		Voltamperes		NEMA ICS 2-125
	Point, max	Make	Break	Make	Break	
240V AC	2.5 A	7.5 A	0.75 A	1800VA	180VA	C300
120V AC		15 A	1.5 A			
125V DC	1.0 A	0.22 A ⁽²⁾		28VA		R150
24V DC	2.0 A	1.2 A ⁽²⁾		28VA		_

⁽¹⁾ If you connect surge suppressors across your external inductive load, you extend the life of the relay contacts.

Table 100 - Certifications - 1769-0W16

Certification ⁽¹⁾	1769-0W16
c-UL	C-UL certified (under CSA C22.2 No. 142) UL 508 listed Class I, Division 2 Group A,B,C,D Hazardous Locations (UL 1604, C-UL under CSA C22.2 No. 213)
CE	CE compliant for all applicable directives
C-Tick	C-Tick compliant for all applicable directives Australian Radiocommunications Act, compliant with: AS/NZS CISPR 11; Industrial Enclosure

⁽¹⁾ When marked. See the Product Certification link at http://www.rockwellautomation.com/global/certification/overview.page for Declarations of Conformity, Certificates, and other certification details.

⁽²⁾ For DC voltage applications, the make/break ampere rating for relay contacts can be determined by dividing 28VA by the applied DC voltage. For example, 28VA/48V DC = 0.58 A. For DC voltage applications less than 48V, the make/break ratings for relay contacts cannot exceed 2 A.

1769 Compact I/O Power Supplies

Each 1769-L3x controller and additional bank of I/O modules requires a 1769 power supply. Place 1769 I/O modules to the left or right of the 1769 power supply. As many as eight I/O modules can be placed on each side of the power supply.

Each 1769 module also has a power supply distance rating (the number of modules from the power supply). Each module must be located within its distance rating. See the specifications for the module to determine its distance rating.

Technical Specifications - 1769 Compact I/O Power Supplies

Attribute	1769-PA2	1769-PB2	1769-PA4	1769-PB4			
Input voltage range	85265V AC	19.231.2V DC	85265V AC or 170265V AC, switch selectable	19.231.2V DC			
Input voltage, nom	120V/220V AC	24V DC	120V/220V AC	24V DC			
Power consumption	100 VA @ 120V AC	50 VA @ 24V DC	200 VA @ 120V AC	100 VA @ 24V DC			
	130 VA @ 240V AC		240 VA @ 240V AC				
Power dissipation	8 W @ 60° C (140° F)	7.5 W @ 60° C (140° F)	18 W @ 60° C (140° F)	14.5 W @ 60° C (140° F)			
Current capacity @ 5V	2.0 A	2.0 A	4.0 A	4.0 A			
Current capacity @ 24V	0.8 A	0.8 A	2.0 A	2.0 A			
Inrush current, max	25 A @ 132V AC	30 A @ 31.2V DC	25 A @ 132V AC	30 A @ 31.2V DC			
Isolation voltage	265V (continuous), reinforced insulation type (IEC Class 1 grounding required) Routine tested @ 2596V DC for 1 s, AC power input to system and AC power input to 24V DC user power	75V (continuous), reinforced insulation type (IEC Class 1 grounding required) Routine tested at 1697V DC for 1 s, DC power input to system	265V (continuous), reinforced insulation type (IEC Class 1 grounding required) Routine tested at 2596V DC for 1 s, AC power input to system	75V (continuous), reinforced insulation type (IEC Class 1 grounding required) Routine tested at 1697V DC for 1 s, DC power input to system			
Fuse type	Wickmann 19195-3.15A	Wickmann 19193-6.3A	Wickmann 19195-3.15A	Wickmann 19193-6.3A			
	Littelfuse 02183.15MXP	Littelfuse 021706.3MXP	Littelfuse 02183.15MXP	Littelfuse 021706.3MXP			
Weight, approx.	525 g (1.16 lb)		630 g (1.39 lb)				
Dimensions (HxWxD), approx.	118 x 70 x 87 mm (4.65 x 2.7	76 x 3.43 in.)	1				
Module location	DIN rail or panel mount						
Mounting screw torque	1.16 N•m (10 lb•in) - use M	4 or #8 screws					
Power supply distance rating	8	8					
	8 I/O modules can be conne	8 I/O modules can be connected on either side of the power supply for a maximum of 16 modules					
Wire category ⁽¹⁾	1 - on power ports	2 - on power ports	1 - on power ports	2 - on power ports			
Wire size	14 AWG (2.5 mm²) solid cop	per wire rated at 90 °C (194 °	F) or greater, 1.2 mm (3/64 in.)) insulation max			
North American temperature code	T3C						
IEC temperature code	_	T4	_	T4			
Enclosure type rating	None (open-style)	1	1	1			

Use this conductor category information for planning conductor routing as described in the system level installation manual. See the Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1.

Certifications - 1769 Compact Power Supplies



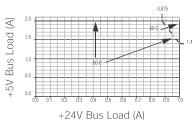
Certification ⁽¹⁾	1769-PA2, 1769-PA4	1769-PB2, 1769-PB4		
c-UL-us	IL Listed for Class 1, Division 2 Group A,B,C,D Hazardous Locations, certified for U.S. and Canada. See UL File 10314			
CE	European Union 2004/108/EC EMC Directive, compliant EN 61000-6-2; Industrial Immunity EN 61000-6-4; Industrial Emissions	with:		
C-Tick	Australian Radiocommunications Act, compliant with: AS/NZS CISPR 11; Industrial Emissions			
		European Union 94/9/EC ATEX Directive, compliant with: • EN 60079-15; Potentially Explosive Atmospheres, Protection "n" (Zone 2) • EN 60079-0; General Requirements (Zone 2)		

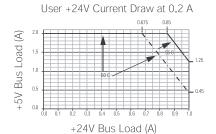
⁽¹⁾ When marked. See the Product Certification link at http://www.ab.com for Declarations of Conformity, Certificates, and other certification details.

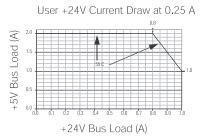
Power Requirements and Transformer Sizing - 1769 CompactLogix Power Supplies

1769-PA2 Output Derating

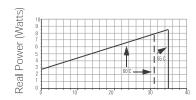






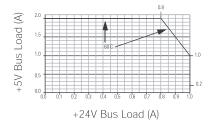


1769-PA2 Power Disspation

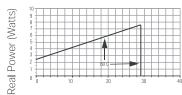


Bus +5V, +24V, and User Load (Watts)

1769-PB2 Output Derating



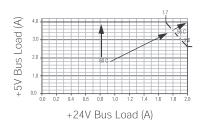
1769-PB2 Power Dissipation



Bus +5V, +24V, and User Load (Watts)

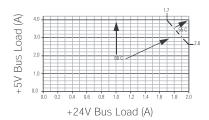
1769-PA4 Output Derating

Total Output: 68 W @ 55 °C (131 °F) or below 61 W @ 60 °C (140 °F) or below

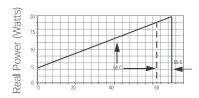


1769-PB4 Output Derating

Total Output: 68 W @ 55 °C (131 °F) or below 61 W @ 60 °C (140 °F) or below

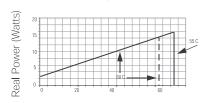


1769-PA4 Power Disspation



Bus +5V, +24V, and User Load (Watts)

1769-PB4 Power Disspation



Bus +5V, +24V, and User Load (Watts)

70 mm (2.76 in.) 87 mm (3.42 in.) 131.7 mm (5.18 in.)

Mounting Dimensions - 1769 CompactLogix Power Supplies

Notes:



Stratix Ethernet Device Specifications

Stratix 5400 Catalog Numbers 1783-HMS4C4CGN, 1783-HMS8T4CGN, 1783-HMS8S4CGN, 1783-HMS4T4E4CGN, 1783-HMS16T4CGN, 1783-HMS4S8E4CGN, 1783-HMS8TG4CGN, 1783-HMS8SG4CGN, 1783-HMS4EG8CGN, 1783-HMS16TG4CGN, 1783-HMS8TG8EG4CGN, 1783-HMS4SG8EG4CGN, 1783-HMS8TG4CGR, 1783-HMS8SG4CGR, 1783-HMS4EG8CGR, 1783-HMS16TG4CGR, 1783-HMS8TG8EG4CGR, 1783-HMS4SG8EG4CGR, Stratix 5410 Catalog Numbers 1783-IMS28NDC, 1783-IMS28NAC, 1783-IMS28RDC, 1783-IMS28RAC, 1783-IMXDC, 1783-IMXAC, Stratix 5700 Catalog Numbers 1783-BMS4S2SGL, 1783-BMS4S2SGA, 1783-BMS06SL, 1783-BMS06SA, 1783-BMS06TL, 1783-BMS06TA, 1783-BMS06SGL, 1783-BMS06SGA, 1783-BMS06TGL, 1783-BMS06TGA, 1783-BMS10CL, 1783-BMS10CA, 1783-BMS10CGL,1783-BMS10CGA, 1783-BMS10CGP, 1783-BMS10CGN, 1783-BMS12T4E2CGL, 1783-BMS12T4E2CGP, 1783-BMS12T4E2CGNK, 1783-BMS20CL, 1783-BMS20CA, 1783-BMS20CGL, 1783-BMS20CGP, 1783-BMS20CGN, 1783-BMS20CGPK, ArmorStratix 5700 Catalog Numbers 1783-ZMS8TA, 1783-ZMS16TA, 1783-ZMS24TA, 1783-ZMS4T4E2TGP, 1783-ZMS8T8E2TGP, 1783-ZMS4T4E2TGN, 1783-ZMS8T8E2TGN, Stratix 8000 and Stratix 8300 Catalog Numbers 1783-MS06T, 1783-MS10T, 1783-RMS06T, 1783-RMS10T, 1783-MX04E, 1783-MX04T04E, 1783-MX04S, 1783-MX08S, 1783-MX08T, 1783-MX08F, Stratix 6000 Catalog Numbers 1783-EMS08T, 1783-EMS04T, Embedded Switch Technology Catalog Numbers 1783-ETAP, 1783-ETAP1F, 1783-ETAP2F, Configurable NAT Router Catalog Number 1783-NATR, Stratix 2000 Catalog Numbers 1783-US4T1F, 1783-US4T1H, 1783-US5T, 1784-US5TG, 1783-US6T2F, 1783-US6T2H, 1783-US6TG2CG, 1783-US7T1F, 1783-US7T1H, 1783-US8T, 1783-US14T2S, 1783-US16T, Stratix 5100 Catalog Numbers 1783-WAPAK9, 1783-WAPEK9, 1783-WAPZK9, 1783-WAPCK9, Stratix 5900 Catalog Number 1783-SR

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Stratix 5700 Ethernet Managed Switches	12	
ArmorStratix 5700 Ethernet Managed Switches	21	
Stratix 8000 and Stratix 8300 Ethernet Managed Switches	26	
Stratix 6000 Ethernet Managed Switches	33	
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Stratix 5100 Wireless Access Point/Workgroup Bridge	49	
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Stratix 2000 Ethernet Unmanaged Switches

Cat. No.	Description	Total Ports	RJ45 Ports	Fiber Ports	SFP Slots
1783-US4T1F	4 ports RJ45 10/100 1 port fiber multi mode	5	4	1 multi mode	1
1783-US4T1H	4 ports RJ45 10/100 1 port fiber single mode	5	4	1 single mode	1
1783-US5T	5 ports RJ45 10/100	5	5	_	_
1783-US5TG	5 ports RJ45 10/100/1000	5	5	_	_
1783-US6T2F	6 ports RJ45 10/100 2 port fiber multi mode	8	6	2 multi mode	2
1783-US6T2H	6 ports RJ45 10/100 2 port fiber single mode	8	6	2 single mode	2
1783-US6TG2CG	6 ports RJ45 10/100/1000	8	6	2 GB combo	2
1783-US7T1F	7 ports RJ45 10/100 1 port fiber multi mode	8	7	1 multi mode	1
1783-US7T1H	7 ports RJ45 10/100 1 port fiber single mode	8	7	1 single mode	1
1783-US8T	8 ports RJ45 10/100	8	8	_	_
1783-US14T2S	14 ports RJ45 10/100	16	14	2	2
1783-US16T	16 ports RJ45 10/100	16	16	_	_

Table 33 - Technical Specifications - Stratix 2000 Switches

Attribute	1783-US4T1F 1783-US4T1H	1783-US5TG	1783-US6T2F 1783-US6T2H 1783-US7T1F 1783-US7T1H	1783-US6TG2CG	1783-US14T2S	1783-US16T	1783-US5T	1783-US8T
Inrush current, max	_			•		•	2.2 A	
Power supply voltage	24V (1860V DC,	1830V AC 50/60	O Hz), Class 2/SELV				1	
Current rating	230.5 mA	432.1 mA	442.3 mA	1242.7 mA	663.2 mA	555.5 mA	250 mA	361 mA
Power dissipation, max	2.841 W	5.491 W	5.927 W	13.643 W	7.991 W	6.72 W	2 W @ 24V AC/ DC	4.04 W @ 24V AC/DC
Isolation voltage	30V (continuous), No isolation betw Type tested at 500	een individual ne	type, power to netw twork channels	ork channels				
Ethernet connections ⁽¹⁾		RJ45 connector according to IEC 60603-7, 2-pair or 4-pair Category 5e minimum cable according to TIA 568-B.1 or Category 5 cable according to ISO/IEC 24702 rated 82 °C (180 °F) min				to TIA 568-B.1 or	RJ45 connector of 60603-7, 2-pair Category 5e min according to TIA Category 5 cable ISO/IEC 24702	or 4-pair imum cable 568-B.1 or
DC power connections		0.822.5 mm ² (1814 AWG) twisted-pair copper wire suitable for 82 °C (180 °F) above surrounding ambient temperature outside the enclosure					0.752.5 mm ² (1814 AWG) copper wire suit (86 °F) above su ambient temper enclosure	twisted-pair able for 30 °C rrounding

Table 33 - Technical Specifications - Stratix 2000 Switches

Attribute	1783-US4T1F 1783-US4T1H	1783-US5TG	1783-US6T2F 1783-US6T2H 1783-US7T1F 1783-US7T1H	1783-US6TG2CG	1783-US14T2S	1783-US16T	1783-US5T	1783-US8T		
Functional earth connection	2.5 mm ² (14 AWG) copper wire suitable for 82 °C (180 °F) above surrounding ambient temperature outside the enclosure, with a suitable ring terminal							2.5 mm ² (14 AWG) copper wire suitable for 30 °C (86 °F) above surrounding ambient temperature outside the enclosure, with a suitable ring terminal		
Torque, max recommended	1.82 N•m (16 lb•ir	1.82 N-m (16 lb-in) on power /functional earth connector								
Wiring category ⁽²⁾		1 - on power ports 2 - on communication ports								
Enclosure type rating	None (open-style)									
North American temp code	T4 T5									
IEC temp code	T4 T5									

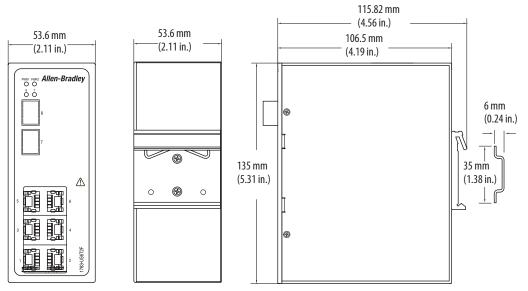
⁽¹⁾ See $\underline{page 55}$ for recommended products.

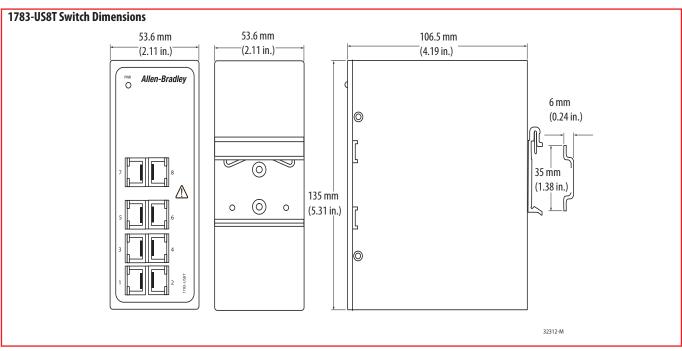
Table 34 - Environmental Specifications - Stratix 2000 Switches

Attribute	1783-US4T1F, 1783-US4T1H, 1784-US5TG, 1783-US6T2F, 1783-US6T2H, 1783-US6TG2CG, 1783-US7T1F, 1783-US7T1H, 1783-US14T2S, 1783-US16T	1783-US5T	1783-US8T
Temperature, operating IEC 60068-2-1 (Test Ad, Operating Cold), IEC 60068-2-2 (Test Bd, Operating Dry Heat), IEC 60068-2-14 (Test Nb, Operating Thermal Shock)	-4070 °C (-40158 °F)	060 °C (32140 °F)	
Temperature, surrounding air, max	70 °C (158 °F)	60 °C (140 °F)	
Temperature, nonoperating IEC 60068-2-1 (Test Ab, Unpackaged Nonoperating Cold) IEC 60068-2-2 (Test Bb, Unpackaged Nonoperating Dry Heat) IEC 60068-2-14 (Test Na, Unpackaged Nonoperating Thermal Shock)	-4085 °C (-40185 °F)	-4085 °C (-40185	°F)
Relative humidity IEC 60068-2-30 (Test Db, Unpackaged Damp Heat)	595% noncondensing	595% noncondensin	g
Vibration IEC 60068-2-6 (Test Fc, Operating)	2 g @ 10150 Hz	2 g @ 10150 Hz	2 g @ 10500 Hz
Operating shock IEC 60068-2-27 (Test Ea, Unpackaged Shock)	15 g		
Nonoperating shock IEC 60068-2-27 (Test Ea, Unpackaged Shock)	30 g		
Emissions CISPR11 (IEC 61000-6-4)	Class A		
ESD immunity IEC 61000-4-2	8 kV contact discharges 15 kV air discharges	8 kV contact discharges 15 kV air discharges	6 kV contact discharges 8 kV air discharges
Radiated RF immunity IEC 61000-4-3	10V/m with 1 kHz sine-wave 80% AM from 802000 MHz 3V/m with 1 kHz sine-wave 80% AM from 20002700 MHz		,

⁽²⁾ Use this conductor category information for planning conductor routing. Refer to Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1.

1783-US6T2F, 1783-US6T2H, 1783-US7T1F, 1783-US7T1H Switch Dimensions





PowerFlex Low Voltage Drives Selection Guide

AB Allen-Bradley

Powerful Performance. Flexible Control.

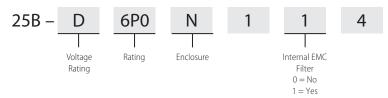


Allen-Bradley • Rockwell Software

Additional Information

PowerFlex 520-Series Technical Data, publication 520-TD001 PowerFlex 520-Series User Manual, publication 520-UM001

Catalog Number Explanation



Product Selection

100...120V AC, Single-Phase Input, Three-Phase Output Drives, 50/60 Hz

		Drive F	No Filter	with Integral EMC Filter			
Norma	Normal Duty Heavy Duty		Output Current				
kW	Нр	kW	Нр	A	Frame Size	Cat. No.	Cat. No.
0.4	0.5	0.4	0.5	2.5	А	25B-V2P5N104	_
0.75	1	0.75	1	4.8	В	25B-V4P8N104	_
1.1	1.5	1.1	1.5	6	В	25B-V6P0N104	_

200...240V AC, Single-Phase Input, Three-Phase Output Drives, 50/60 Hz

		Drive F	No Filter	with Integral EMC Filter (1)			
Normal Duty		Heavy Duty		Output Current			
kW	Нр	kW	Нр	Α	Frame Size	Cat. No.	Cat. No.
0.4	0.5	0.4	0.5	2.5	А	25B-A2P5N104	25B-A2P5N114
0.75	1	0.75	1	4.8	А	25B-A4P8N104	25B-A4P8N114
1.5	2	1.5	2	8	В	25B-A8P0N104	25B-A8P0N114
2.2	3	2.2	3	11	В	25B-A011N104	25B-A011N114

⁽¹⁾ This filter is suitable for use with cable lengths up to 10 meters (32.8 feet) for C2 spec and 20 meters (65.6 feet) for C3 spec.

200...240V AC, Three-Phase, 50/60 Hz

		Drive I	No Filter	with Integral EMC Filter			
Norm	Normal Duty Heavy		y Duty Output Current				
kW	Нр	kW	Нр	Α	Frame Size	Cat. No.	Cat. No.
0.4	0.5	0.4	0.5	2.5	А	25B-B2P5N104	_
0.75	1	0.75	1	5	А	25B-B5P0N104	-
1.5	2	1.5	2	8	А	25B-B8P0N104	_
2.2	3	2.2	3	11	А	25B-B011N104	-
4	5	4	5	17.5	В	25B-B017N104	-
5.5	7.5	5.5	7.5	24	C	25B-B024N104	-
7.5	10	7.5	10	32.2	D	25B-B032N104	-
11	15	11	15	48.3	E	25B-B048N104	_
15	20	11	15	62.1	E	25B-B062N104	_

380...480V AC, Three-Phase, 50/60 Hz

		Drive I	Ratings			No Filter	with Integral EMC Filter (1)
Norn	nal Duty	Heav	/ Duty	Output Current			
kW	Нр	kW	Нр	A	Frame Size	Cat. No.	Cat. No.
0.4	0.5	0.4	0.5	1.4	А	25B-D1P4N104	25B-D1P4N114
0.75	1	0.75	1	2.3	А	25B-D2P3N104	25B-D2P3N114
1.5	2	1.5	2	4	А	25B-D4P0N104	25B-D4P0N114
2.2	3	2.2	3	6	А	25B-D6P0N104	25B-D6P0N114
4	5	4	5	10.5	В	25B-D010N104	25B-D010N114
5.5	7.5	5.5	7.5	13	C	25B-D013N104	25B-D013N114
7.5	10	7.5	10	17	C	25B-D017N104	25B-D017N114
11	15	11	15	24	D	25B-D024N104	25B-D024N114
15	20	11	15	30	D	25B-D030N104	25B-D030N114
18.5	25	15	20	37	E	25B-D037N114 ⁽²⁾	25B-D037N114
22	30	18.5	25	43	E	25B-D043N114 ⁽²⁾	25B-D043N114

⁽¹⁾ This filter is suitable for use with cable lengths up to 10 meters (32.8 feet) for C2 spec and 20 meters (65.6 feet) for C3 spec.

525...600V AC, Three-Phase, 50/60 Hz

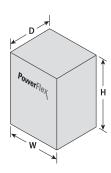
		Drive l		No Filter	with Integral EMC Filter		
Norn	nal Duty	Heav	y Duty	Output Current			
kW	Нр	kW	Нр	A	Frame Size	Cat. No.	Cat. No.
0.4	0.5	0.4	0.5	0.9	А	25B-E0P9N104	_
0.75	1	0.75	1	1.7	А	25B-E1P7N104	-
1.5	2	1.5	2	3	А	25B-E3P0N104	_
2.2	3	2.2	3	4.2	А	25B-E4P2N104	_
4	5	4	5	6.6	В	25B-E6P6N104	_
5.5	7.5	5.5	7.5	9.9	C	25B-E9P9N104	_
7.5	10	7.5	10	12	C	25B-E012N104	_
11	15	11	15	19	D	25B-E019N104	_
15	20	11	15	22	D	25B-E022N104	_
18.5	25	15	20	27	Е	25B-E027N104	_
22	30	18.5	25	32	E	25B-E032N104	_

Approximate Dimensions and Weights

Dimensions are in mm (in.) - weights are in kg (lb)

IP20, NEMA/UL Type Open

Frame	Н	W	D	Weight
А	152.0 (5.98)	72.0 (2.83)	172.0 (6.77)	1.10 (2.4)
В	180.0 (7.08)	87.0 (3.42)	172.0 (6.77)	1.60 (3.5)
C	220.0 (8.66)	109.0 (4.29)	184.0 (7.24)	2.30 (5.1)
D	260.0 (10.23)	130.0 (5.11)	212.0 (8.34)	3.20 (7.1)
E	300.0 (11.81)	185.0 (7.28)	279.0 (10.98)	12.90 (28.4)



⁽²⁾ With EMC filter.



2711P-T10C22D9P

PanelView Plus 7 Performance Terminals

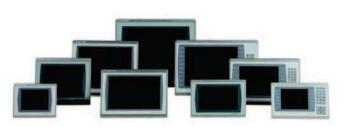
Catalog Numbers 2711P-T7C22D9P, 2711P-T7C22D9P-B, 2711P-T7C22A9P, 2711P-T7C22A9P-B, 2711P-B7C22D9P-B, 2711P-B7C22D9-B, 2711P-B7C22D9-B, 2711P-B7C22D9-B, 2711P-B7C2D9-B, 2711P-B7C22D9-B, 2711P-B7C22D9-B, 2711P-B7C22D9-B, 2711P-B7 2711P-B7C22A9P, 2711P-B7C22A9P-B, 2711P-T9W22D9P, 2711P-T9W22D9-B, 2711P-T9W22A9P, 2711P-T9W22A9P-B, 2711P-T10C22D9P, 2711P-T10C22D9P-B, 2711P-T10C22A9P, 2711P-T10C22A9P-B, 2711P-B10C22D9P, 2711P-B10C22D9P-B, 2711P-B10C22A9P, 2711P-B10C22A9-B, 2711P-T12W22D9P, 2711P-T12W22D9P-B, 2711P-T12W22A9P, 2711P-T12W22A9P, 2711P-T15C22D9P-B, 2711P-T15C2D9P-B, 2711P-T15C2D9-B, 2711P-T15C2D9-B, 2711P-T15CD9-B, 2711P-T15CD9-B, 2711P-T15CD9-B, 2711P-T15CD9-B, 2711P-T15CD9-B, 2 2711P-T15C22A9P-B, 2711P-B15C22D9P, 2711P-B15C22D9P-B, 2711P-B15C22A9P, 2711P-B15C22A9P-B, 2711P-T19C22D9P, 2711P-T19C22D9P-B, 2711P-T19C22A9P, 2711P-T19C22A9P-B

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Environmental Specifications	2
Certifications	3
Technical Specifications	4
Product Dimensions	7
Accessories	8
HMI Software	9
Additional Resources	10

Summary of Changes

Торіс	Page
Updated system memory to 512 MB RAM and 512 MB storage. Updated user memory to 80 MB, approx, nonvolatile storage for applications.	4, 5, 6

The PanelView™ Plus 7 Performance terminals are operator interface devices. They monitor and control devices that are attached to ControlLogix® and CompactLogix™ 5370 controllers on an EtherNet/IP network. Animated graphic and text displays provide operators a view into the operating state of a machine or process. Operators interact with the control system by using touch screen or keypad input.









Features include the following:

- FactoryTalk® View Machine Edition software, version 8.1, provides a familiar environment for creating HMI applications
- Windows CE operating system with desktop access for configuration and third-party applications
- Connection to ControlLogix or CompactLogix 5370 controllers
- Ethernet communication that can support Device Level Ring (DLR), linear, or star network topologies
- Web browser, Microsoft file viewers, text editor, PDF viewer, remote desktop connection, and media player on the terminal desktop

Environmental Specifications

This table lists environmental specifications for the PanelView Plus 7 Performance terminals.

Attribute	Value				
Temperature, operating (1)	055 °C (32131 °F)				
Temperature, nonoperating	-25+70 °C (-13+158 °F)				
Heat dissipation ⁽²⁾	7-in. DC (touch, and touch with keypad), 51 BTU (typical) 7-in. AC (touch, and touch with keypad), 53 BTU (typical) 9-in. DC, 55 BTU (typical) 9-in. AC, 58 BTU (typical) 10-in. DC (touch, and touch with keypad), 51 BTU (typical) 10-in. AC (touch, and touch with keypad), 56 BTU (typical) 12-in. DC, 60 BTU (typical) 12-in. AC, 67 BTU (typical) 15-in. DC (touch, and touch with keypad), 61 BTU (typical) 15-in. AC (touch, and touch with keypad), 68 BTU (typical) 19-in. DC, 114 BTU (typical)				
Altitude, operating	2000M				
Relative humidity	595% without condensation				
Vibration	0.012 pk-pk, 1057 Hz 2 g peak at 57500 Hz ⁽³⁾				
Shock, operating	15 g at 11 ms				
Shock, nonoperating	30 g at 11 ms				
Enclosure ratings	NEMA and UL Type 12, 13, 4X, also rated IP66 as Classified by UL				

⁽¹⁾ The 19-inch terminals (2711P-T19C22D9P, 2711P-T19C22D9P-B, 2711P-T19C22A9P, and 2711P-T19C22A9P-B) are rated up to 50 °C (122 °F) operating temperature.

⁽²⁾ Typical BTU measurements were taken at 25 °C (77 °F).

⁽³⁾ The 15-inch and 19-inch terminals (2711P-T15C22D9P, 2711P-T15C22D9P-B, 2711P-T15C22A9P, 2711P-T15C22A9P-B, 2711P-B15C22D9P, 2711P-B15C22D9P-B, 2711P-T19C22D9P-B, 2711P-T19C22D9P-B, 2711P-T19C22D9P, 2711P-T19C22D9P-B, 2711P-T19C2D9P-B, 2711P-T19C2D9P-B, 2711P-T19C2D9P-B, 2711P-T19C2D9P-B, 2711P-T19C2D9P-B, 2711P-T19C2D9P-B, 2711P-T19C2D9P-B, 2711P-T1

Certifications

This table lists certifications for the PanelView Plus 7 Performance terminals.

Certification ⁽¹⁾	Value
cULus	cULus Listed Industrial Control Equipment for use in Hazardous Locations (E10314) per standards ANSI / ISA 12.12.01 and CSA C22.2 No. 213. rated: • Class I, Div 2, Groups A, B, C, D Enclosure type ratings per UL50 and CSA C22.2 No. 94.2-07. Enclosure ingress protection classified by UL per IEC 60529.
CE (EMC)	European Union 2004/108/EC EMC Directive, compliant with: • EN 61000-6-2; Industrial Immunity • EN 61000-6-4; Industrial Emissions • EN 61131-2; Programmable Controllers
CE (LVD)	European Union 2006/95/EC Low Voltage Directive, compliant with: • EN 61131-2; Programmable Controllers
RCM	Australian Radiocommunications Act, compliant with: • AS/NZS CISPR 11; Industrial Emissions
RoHS	China RoHS, Turkey RoHS, European RoHS
KCC	Certificate of compliance
EtherNet/IP	ODVA conformance tested to EtherNet/IP specifications

⁽¹⁾ When marked. See the Product Certification link at http://www.rockwellautomation.com/global/certification/overview.page for Declarations of Conformity, Certificates, and other certification details.

Technical Specifications

The tables in this section provide technical specifications for the PanelView Plus 7 Performance terminals.

PanelView Plus 7 Performance 7-in and 9-in Terminals

Attribute	7-in. 2711PT7C22D9P, 27 2711P-T7C22A9P, 2	Touch 711PT7C22D9P-B ⁽¹⁾ 2711P-T7C22A9P-B	2711P-B7C22D9P, 2	with Keypad 711P-B7C22D9P-B ⁽¹⁾ 2711P-B7C22A9P-B	2711P-T9W22D9P	n. Touch , 2711P-T9W22D9P-B ⁽¹⁾ P, 2711P-T9W22A9P-B		
Operator input	Touch		Touch with keypad		Touch			
Display type	TFT Color							
Display size, diagonal	6.5-in.				9-in. widescreen			
Viewing area (W x H)	132 x 99 mm (5.2 x 3.9 in.)				196 x 118 mm (7.7 x 4.6 in	.)		
Display resolution	640 x 480 VGA, 18-bit color	graphics			800 x 480 WVGA, 18-bit co	lor graphics		
Aspect ratio	4:3				5:3			
Brightness, typical	300 cd/m ² (Nits)							
Backlight life	White light-emitting diode Life: 50,000 h min at 40 °C		backlight is not replaceable					
Touch screen	Analog resistive Actuation rating: 1 million Operating force: 100 grams							
Battery (real-time clock backup)	Accuracy: +/-2 minutes pe Battery life: 4 years min at Replacement: CR2032 lithin	25 °C (77 °F)						
Memory: • System • User	• 512 MB RAM and 512 MB • 80 MB, approx, nonvolat							
Secure Digital (SD) card slot	One SD card slot for external storage; supports cat. no. 1784-SDx cards							
USB ports: • Host • Device	Two USB high-speed 2.0 One high-speed 2.0 devi-	host ports (type A) support ce port (type B) that will be	t removable flash drives for ext functional in a future release	ernal storage				
Operating system	Windows CE with Extended	Features and MS Office Vie	ewers (includes FTP, VNC client	server, ActiveX controls, PDF	reader, third-party device su	pport)		
Ethernet ports	Two 10/100Base-T, Auto M	DI/MDI-X Ethernet ports th	at support Device Level Ring (I	DLR), linear, or star network	topologies			
Software	FactoryTalk View Studio for	Machine Edition, FactoryTa	alk ViewPoint, version 2.6 or la	ter				
Electrical								
Input voltage	24V DC nom (1830V DC)	100240V AC	24V DC nom (1830V DC)	100240V AC	24V DC nom (1830V DC)	100240V AC		
Power consumption	50 W max (2.1 A at 24V DC)	105VA	50 W max (2.1 A at 24V DC)	105VA	50 W max (2.1 A at 24V DC)	105VA		
Power supply	Supports (SELV) and (PELV) 24V DC supplies (2)	_	Supports (SELV) and (PELV) 24V DC supplies ⁽²⁾	_	Supports (SELV) and (PELV) 24V DC supplies (2)	_		
Mechanical								
Weight, approx	1.2 kg (2.65 lb)		1.47 kg (3.25 lb)		1.58 kg (3.48 lb)			
Dimensions, approx (H x W x D)	170 x 212 x 69.6 mm 6.69 x 8.35 x 2.74 in.		179 x 285 x 69.6 mm 7.05 x 11.22 x 2.74 in.		190 x 280 x 69.6 mm 7.48 x 11.02 x 2.74 in.			
Cutout dimensions, approx (H x W)	142 x 184 mm 5.59 x 7.24 in.		142 x 237 mm 5.59 x 9.33 in.		162 x 252 mm 6.38 x 9.92 in.			
	ı							

⁽¹⁾ Catalog numbers with a -B extension denote terminals that exclude the Allen-Bradley brand marking. Customers can put their own brand labels on these terminals.

⁽²⁾ DC-powered terminals support safety extra low voltage (SELV) and protective extra low voltage (PELV) 24V DC power supplies such as cat. nos. 1606-XLP95E, 1606-XLP100E, 2711P-RSACDIN.

PanelView Plus 7 Performance 10-in and 12-in Terminals

Attribute	2711P-T10C22D9P, 27	Touch 711P-T10C22D9P-B ⁽¹⁾ 2711P-T10C22A9P-B	2711P-B10C22D9P, 2	with Keypad 711P-B10C22D9P-B ⁽¹⁾ 2711P-B10C22A9P-B	2711P-T12W22D9P, 2	.Touch 711P-T12W22D9P-B ⁽¹⁾ 2711P-T12W22A9P-B		
Operator input	Touch		Touch with keypad		Touch			
Display type	TFT Color							
Display size, diagonal	10.4-in.	0.4-in. 12.1-in.						
Viewing area (W x H)	211 x 158 mm (8.3 x 6.2 in.)				261 x 163 mm (10.3 x 6.4 in	.)		
Display resolution	800 x 600 SVGA, 18-bit colo	r graphics			1280 x 800 WXGA, 18-bit co	lor graphics		
Aspect ratio	4:3				16:10			
Brightness, typical	300 cd/m ² (Nits)							
Backlight life	White light-emitting diode, Life: 50,000 h min at 40 °C (acklight is not replaceable					
Touch screen	Analog resistive Actuation rating: 1 million p Operating force: 100 grams	resses						
Battery (real-time clock backup)	Accuracy: +/-2 minutes per month. Battery life: 4 years min at 25 °C (77 °F) Replacement: CR2032 lithium coin cell							
Memory: • System • User	• 512 MB RAM and 512 MB • 80 MB, approx, nonvolatil							
Secure Digital (SD) card slot	One SD card slot for external storage; supports cat. no. 1784-SDx cards							
USB ports: • Host • Device	Two USB high-speed 2.0 h one high-speed 2.0 device	ost ports (type A) support r e port (type B) that will be f	emovable flash drives for extern unctional in a future release	al storage				
Operating system	Windows CE with Extended	Features and MS Office Viev	vers (includes FTP, VNC client ser	ver, ActiveX controls, PDF rea	der, third-party device support)		
Ethernet ports	Two 10/100Base-T, Auto MD	I/MDI-X Ethernet ports that	support Device Level Ring (DLR), linear, or star network topo	logies			
Software	FactoryTalk View Studio for I	Machine Edition, FactoryTall	ViewPoint, version 2.6 or later					
Electrical								
nput voltage	24V DC nom (1830V DC)	100240V AC	24V DC nom (1830V DC)	100240V AC	24V DC nom (1830V DC)	100240V AC		
Power consumption	50 W max (2.1 A at 24V DC)	105VA	50 W max (2.1 A at 24V DC)	105VA	50 W max (2.1 A at 24V DC)	105VA		
Power supply	Supports (SELV) and (PELV) 24V DC supplies ⁽²⁾	_	Supports (SELV) and (PELV) 24V DC supplies ⁽²⁾	_	Supports (SELV) and (PELV) 24V DC supplies (2)	_		
Mechanical	•	•	•	•	•			
Weight, approx	2.28 kg (5.03 lb)		2.58 kg (5.69 lb)		2.54 kg (5.60 lb)			
Dimensions, approx (H x W x D)	252 x 297 x 69.6 mm 9.92 x 11.69 x 2.74 in.		252 x 385 x 69.6 mm 9.92 x 15.16 x 2.74 in.		240 x 340 x 69.6 mm 9.69 x 13.39 x 2.74 in.			
Cutout dimensions, approx (H x W)	224 x 269 mm 8.82 x 10.59 in.		224 x 335 mm 8.82 x 13.19 in.		218 x 312 mm 8.58 x 12.28 in.			

⁽¹⁾ Catalog numbers with a -B extension denote terminals that exclude the Allen-Bradley brand marking. Customers can put their own brand labels on these terminals.
(2) DC-powered terminals support safety extra low voltage (SELV) and protective extra low voltage (PELV) 24V DC power supplies such as cat. nos. 1606-XLP95E, 1606-XLP100E, 2711P-RSACDIN.

PanelView Plus 7 Performance 15-in and 19-in Terminals

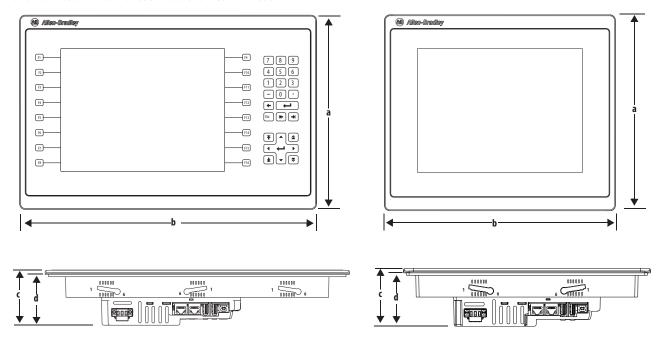
Attribute	2711P-T15C22D9P, 27	Touch 711P-T15C22D9P-B ⁽¹⁾ 2711P-T15C22A9P-B	2711P-B15C22D9P, 2	with Keypad 711P-B15C22D9P-B ⁽¹⁾ 2711P-B15C22A9P-B	2711P-T19C22D9P, 2	. Touch 711P-T19C22D9P-B ⁽¹ 2711P-T19C22A9P-B		
Operator input	Touch		Touch with keypad		Touch			
Display type	TFT Color				·			
Display size, diagonal	15-in.	15-in. 19-in.						
Viewing area (W x H)	304 x 228 mm (12.0 x 9.0 in	04 x 228 mm (12.0 x 9.0 in.) 376 x 301 mm (14.8 x 11.9 in.)						
Display resolution	1024 x 768 XGA, 18-bit color	r graphics			1280 x 1024 SXGA, 18-bit co	olor graphics		
Aspect ratio	4:3				5:4			
Brightness, typical	300 cd/m ² (Nits)				•			
Backlight life	White light-emitting diode, Life: 50,000 h min at 40 °C (, backlight is not replaceable					
Touch screen	Analog resistive Actuation rating: 1 million p Operating force: 100 grams	resses						
Battery (real-time clock backup)	Accuracy: +/-2 minutes per Battery life: 4 years min at 2 Replacement: CR2032 lithiu	5 °C (77 °F)						
Memory: • System • User	• 512 MB RAM and 512 MB • 80 MB, approx, nonvolatil	storage e storage for applications						
Secure Digital (SD) card slot	One SD card slot for external storage; supports cat. no. 1784-SDx cards							
USB ports: • Host • Device	• Two USB high-speed 2.0 h • One high-speed 2.0 device	ost ports (type A) suppor e port (type B) that will be	t removable flash drives for extern e functional in a future release	nal storage				
Operating system	Windows CE with Extended	Features and MS Office Vi	ewers (includes FTP, VNC client ser	ver, ActiveX controls, PDF re	ader, third-party device support)		
Ethernet ports	Two 10/100Base-T, Auto MD	I/MDI-X Ethernet ports th	at support Device Level Ring (DLR), linear, or star network top	oologies			
Software	FactoryTalk View Studio for I	Machine Edition, FactoryT	alk ViewPoint, version 2.6 or later					
Electrical								
Input voltage, DC	24V DC nom (1830V DC)	100240V AC	24V DC nom (1830V DC)	100240V AC	24V DC nom (1830V DC)	100240V AC		
Power consumption, DC	50 W max (2.1 A at 24V DC)	105VA	50 W max (2.1 A at 24V DC)	105VA	50 W max (2.1 A at 24V DC)	105VA		
Power supply	Supports (SELV) and (PELV) 24V DC supplies ⁽²⁾	_	Supports (SELV) and (PELV) 24V DC supplies ⁽²⁾	_	Supports (SELV) and (PELV) 24V DC supplies ⁽²⁾	_		
Mechanical								
Weight, approx	3.69 kg (8.14 lb)		4.14 kg (9.13 lb)		5.62 kg (12.40 lb)			
Dimensions, approx (H x W x D)	318 x 381 x 69.6 mm 12.52 x 15.00 x 2.74 in		329 x 484 x 69.6 mm 12.95 x 19.06 x 2.74 in			411 x 485 x 69.6 mm 16.18 x 19.09 x 2.74 in		
Cutout dimensions, approx (H x W)	290 x 353 mm 11.42 x 13.90 in		290 x 418 mm 11.42 x 16.46 in		383 x 457 mm 15.08 x 17.99 in			

⁽¹⁾ Catalog numbers with a -B extension denote terminals that exclude the Allen-Bradley brand marking. Customers can put their own brand labels on these terminals.
(2) DC-powered terminals support safety extra low voltage (SELV) and protective extra low voltage (PELV) 24V DC power supplies such as cat. nos. 1606-XLP95E, 1606-XLP100E, 2711P-RSACDIN.

Product Dimensions

The table provides product dimensions. The 10.4-inch touch and combination keypad with touch devices are shown for illustrative purposes. All other terminal sizes look similar.

PanelView Plus 7 Performance Dimensions - 10.4-in. Model



Product Dimensions - PanelView Plus 7 Performance Terminals

Terminal Size	Input Type	Height (a) mm (in.)	Width (b) mm (in.)	Overall Depth (c) mm (in.)	Mounted Depth (d) mm (in.)	
6.5-in.	Key/touch	179 (7.05)	285 (11.22)			
0.5-111.	Touch	170 (6.69)	212 (8.35)			
9-in.	Touch	190 (7.48)	280 (11.02)			
10.4-in.	Key/touch	252 (9.92)	385 (15.16)	69.6 (2.74)	63.6 (2.50)	
10.4-111.	Touch	252 (9.92)	297 (11.69)			
12.1-in.	Touch	246 (9.69)	340 (13.39)			
15-in.	Key/touch	329 (12.95)	484 (19.06)			
13-1[].	Touch	318 (12.52)	381 (15.00)			
19-in.	Touch	411 (16.18)	485 (19.09)			

TIP When mounted in a panel, the front of the bezel extends less than 6.36 mm (0.25 in.) from the front of the panel.

Accessories

The tables in this section list accessories for the PanelView Plus 7 Performance terminals.

Protective Overlays

Cat. No. ⁽¹⁾	Display Size	Operator Input		
Cat. No.	Display Size	Touch	Key and Touch	
2711P-RGT7SP	6.5-in.	•		
2711P-RGB7P	0.5-111.		•	
2711P-RGT9SP	9-in. (wide)	•		
2711P-RGT10SP	10.4-in.	•		
2711P-RGB10P	10.4-111.		•	
2711P-RGT12SP	12.1-in. (wide)	•		
2711P-RGT15SP	15-in.	•		
2711P-RGB15P	15-111.		•	
2711P-RGT19P	19-in.	•		

⁽¹⁾ Three overlays are shipped with each catalog number.

Power Supplies and Power Terminal Blocks

Cat. No.	Description	Quantity
1606-XLP95E	DIN rail power supply, 2428V DC output voltage, 95 W	1
1606-XLP100E	DIN rail power supply, 2428V DC output voltage, 100 W	1
2711P-RSACDIN	DIN rail power supply, AC-to-DC, 85265V AC, 4763 Hz	1
2711P-RTBAP	3-pin AC power terminal block	10
2711P-RTBDSP	3-pin DC power terminal block	10

Mounting Hardware

Cat. No.	Description	Quantity
2711P-RMCP ⁽¹⁾	Mounting levers (black)	16

⁽¹⁾ Catalog number 2711P-RMCP mounting levers are used with PanelView Plus 7 Performance terminals. Do not use gray mounting levers; they are not compatible with PanelView Plus 7 Performance terminals.

Secure Digital (SD) Cards

Cat. No.	Description
1784-SD1	1 GB SD card
1784-SD2	2 GB SD card
2711C-RCSD	USB to SD adapter for SD card

Battery Replacement

Cat. No.	Description	Quantity	
2711P-RY2032	Lithium coin cell battery, CR2032 equivalent	1	

HMI Software

All PanelView Plus 7 terminals are configured with FactoryTalk View Studio software and have an integrated runtime system called FactoryTalk View Machine Edition Station.

Machine Edition Station runs projects that are developed with FactoryTalk View Studio software and is included on all PanelView Plus 7 terminals.

Two versions of FactoryTalk View Studio software support application development for PanelView Plus 7 terminals.



Cat. No. ⁽¹⁾	Description				
9701-VWSTMENE	FactoryTalk View Studio for Machine Edition software - Configuration software for developing and testing machine-level human machine interface (HMI) applications. Includes RSLinx® Enterprise and KEPServer Enterprise software.				
9701-VWSTENE	FactoryTalk View Studio software - Configuration software for developing and testing machine-level and supervisory-level human machine interface (HMI) applications.				

⁽¹⁾ To order localized versions of the software, replace EN in the catalog number with DE for German, FR for French, JP for Japanese, or ZH for Chinese.

You can import PanelView Standard/PanelBuilder® 32 and PanelView applications into FactoryTalk View Studio software as Machine Edition applications by using the Machine Edition Import Wizard. The Import Wizard steps you through a few options such as scaling to a new screen resolution size, and then converts objects, text, tags, and communication configurations to ones that are available in Machine Edition.



FactoryTalk ViewPoint software, an add-on to FactoryTalk View Studio software, allows plant managers, production supervisors, system integrators, and other key stakeholders to view and control real-time plant floor operations remotely from a web browser. FactoryTalk ViewPoint enabled displays are fully scalable and animated in the browser. The remote user can also view displays that are not the active display of the terminal.

Each PanelView Plus 7 terminal contains one license that supports one client connection to the terminal. No additional software is required.

For a complete list of available HMI software, visit http://www.rockwellautomation.com/rockwellsoftware.

Additional Resources

These documents contain more information about related products from Rockwell Automation.

Resource	Description
PanelView Plus 7 Performance Terminals User Manual, publication <u>2711P-UM008</u>	Provides instructions on how to install, configure, and operate the PanelView Plus 7 Performance terminals.
Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1	Provides general guidelines on how to install a Rockwell Automation industrial system.
Product Certifications website, http://www.rockwellautomation.com/global/certification/overview.page	Provides declarations of conformity, certificates, and other certification details.

You can view or download publications at http://www.rockwellautomation.com/global/literature-library/ overview.page. To order paper copies of technical documentation, contact your local Allen-Bradley distributor or Rockwell Automation sales representative.

Notes:

Rockwell Automation Support

Use the following resources to access support information.

Technical Support Center	Knowledgebase Articles, How-to Videos, FAQs, Chat, User Forums, and Product Notification Updates.	www.rockwellautomation.com/knowledgebase	
Local Technical Support Phone Numbers	Locate the phone number for your country.	www.rockwellautomation.com/global/support/get-support- now.page	
Direct Dial Codes Find the Direct Dial Code for your product. Use th code to route your call directly to a technical supplengineer.		www.rockwellautomation.com/global/support/direct- dial.page	
Literature Library	Installation Instructions, Manuals, Brochures, and Technical Data.	www.rockwellautomation.com/literature	
Product Compatibility and Download Center (PCDC)	Get help determining how products interact, check features and capabilities, and find associated firmware.	www.rockwellautomation.com/global/support/pcdc.page	

Documentation Feedback

Your comments will help us serve your documentation needs better. If you have any suggestions on how to improve this document, complete the How Are We Doing? form at http://literature.rockwellautomation.com/idc/groups/literature/documents/du/ra-du002_-en-e.pdf.

 $Rockwell \ Automation \ maintains \ current \ product \ environmental \ information \ on \ its \ website \ at \ \underline{http://www.rockwellautomation.com/rockwellautomation/about-us/sustainability-ethics/product-environmental-compliance.page.$

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440R-S13R2

Bul. 440R — Guardmaster® Safety Relays (DI, DIS, SI, CI, GLP, EM, and EMD)



Selection Guide







Next Generation Guardmaster® Safety Relays

DI, DIS, SI, CI, GLP, EM, and EMD



Description

The new generation of Guardmaster® safety relays addresses the broad scope of applications in the intricate safety world with a range of devices. Designed to meet new functional safety standards, such as EN ISO 13849-1 and EN 62061, the new family offers key functions to simplify installation and system complexity. A broad range of safety devices such as safety interlock switches, emergency stop devices, pressure sensitive safety mats, and OSSD devices such as safety light curtains are all compatible with the same relay without additional configuration. The functionality of two standard safety relays can be achieved in one Dual Input (DI) device, allowing connection of two dual-channel input devices into one safety relay.

A TÜV-approved single rotary switch sets the required function of the safety relay and eliminates the typical redundant switch setting process. Selectable functions include simple logic, reset, timing, and diagnostics.

The single-wire safety connection simplifies cascading and expanding safety functions by linking relays with a single-wire connection. A dynamic signal from device to device provides a linkage in accordance with SIL 3, PLe, allowing easy addition of extra I/O, which can be configured with simple logic combinations. Flexible AND/OR logic can be configured simply in a single relay or through a combination of relays via single-wire connection.

The family includes a module designed specifically for guardlocking applications. The GLP uses two proximity sensors to monitor machine motion, and unlocks the gate when safe speed is attained.

Expansion modules are available with four immediate or timedelayed outputs. The time delay module can be configured for on delay, off delay, or jog.

Features

- Suitable for applications up to PLe, SIL 3 Per ISO13849-1
- Stop Category 0 and Stop Category 1
- · One or two dual-channel inputs
- Two or three safety contacts
- · One auxiliary contact
- · Cross-fault monitoring
- Rotary switch configures auto/manual or monitored manual reset
- Same rotary switch configures AND/OR logic of input to device
- Removable terminals
- Can be used with interlocks, light curtains, safety mats, E-stops, and SensaGuard™ switches
- Single-wire safety output connects to single-wire safety input relays while maintaining SIL 3, PLe
- · Guardlocking with proximity sensors
- Timed ON delay, OFF delay, and Jog outputs on EMD

Specifications

Specifications			
Safety Ratings			
Standards	IEC 60204-1, EN ISO 13849-1, EN ISO 12100, IEC 61508		
Safety Classification	DI/DIS/CI/SI/EM/EMD: Suitable up to PLe and CAT4 per EN ISO 13849-1:2006, SIL CL3 per IEC 61508:2010/IEC62061:2006 depending on architecture and application characteristics GLP: Suitable up to PLd and CAT3 per EN ISO 13849-1:2006, SIL CL2 per IEC 61508:2010 /IEC62061:2006 depending on architecture and application characteristics		
Certifications	CE Marked for all applicable directives, cULus Listed and TÜV		
Functional Safety Data	See next page		
Power Supply			
Input Power Entry	24V DC (-15+10%)		
Power Consumption	DI/SI: 2.5 W DIS: 2 W CI/EM/EMD: 3.5 W GLP: 2.5 W		
Inputs			
Safety Inputs	DI/DIS: 2 dual N.C., 2 dual OSSD, or safety mats and 1 single-wire safety input SI/CI: 1 dual N.C., 1 dual OSSD, or safety mats GLP: 1 dual N.C. or 1 dual OSSD and 1 single/wire safety EM/EMD: 1 single-wire safety input		
Input Simultaneity	Infinite		
Input Resistance, Max.	900 Ω		
Reset	Configured automatic/manual or monitored manual		
Reset Pulse Duration	250 ms3 s		
Power ON Delay Time	DI/DIS/SI/CI/EM/EMD: 5.5 s GLP: 11 s		
Recovery Time	DI/DIS/SI/CI: 100 ms EM/EMD: 150 ms		
Response Time (Safety Outputs)	DI: 35 ms (40 ms with mat input) DIS: 25 ms (30 ms with mat input) SI/CI: 35 ms (45 ms with mat input) GLP: overspeed detection time = 3/(speed limit [Hz]) EM/EMD: 35 ms		
Response Time (Single- Wire Safety Outputs)	DI/DIS: 25 ms (30 ms with mat input) SI/CI: 25 ms (35 ms with mat input) GLP/EM/EMD: 25 ms		
Outputs			
Safety Outputs	DI/SI: 2 N.O. CI: 3 N.O. DIS: 2 PNP (14, 24); 2 Decoupled (34, 44) EM: 4 N.O. EMD: 4 N.O. delayed DIS/GLP: 2 PNP safety, 2 PNP Lock		
Solid State Output Rating	DIS: 2 x 1.5 A; 2 x 0.5 A; Total: max. 4 A GLP: 2 x 0.5 A; 2 x 0.3 A; Total: max 1.5 A		
Contact Material	DI: AgNi + 0.2μ Au SI/CI/EM/EMD: AgNi		
Auxiliary Contacts	DI/DIS/SI/GLP/EM/EMD: 1 PNP; 50 mA max CI: 1 N.C.		
Thermal CurrentI _{lth}	1 x 6 A		
Rated Impulse withstand Voltage	2500V		
Switching Current @ Voltage, Min.	DI/SI/CI/EM/EMD: 10 mA/10V		
Fuses, Output	Relay Outputs: 6 A low blow or 10 A quick blow Power Supply GLP: 4A gG, tripping characteristic B or C		
Mechanical Life	DI/SI/CI/EM/EMD: 10,000,000 operations		



Specifications, continued

Utilization Category					
Inductive: AC-15	DI: 3 A/250V AC SI/CI: 1.5 A/250V AC EM/EMD: 1.5 A/250V AC				
Inductive: DC-13	DI: 4 A/24V DC (0.1 Hz) SI/CI: 2 A/24V DC (0.1 Hz) EM/EMD: 2 A/24V DC				
Output Rating	DIS: 14, 24: 1.5 A each 34, 44: 0.5 A each GLP: X14, X24: 0.5 A each 51, L61: 0.3 A each				
Environmental and Physic	al Characteristics				
Enclosure Type Rating/ Terminal Protection	IP40 (NEMA 1)/IP20				
Operating Temperature [C (F)]	-5+55 ° (23131 °)				
Vibration	1055 Hz, 0.35 mm				
Shock	10 g, 16 ms 100 shocks				
Mounting	35 mm DIN Rail				
Weight [g (lb)]	DI: 180 (0.40) DIS: 150 (0.33) SI: 150 (0.33) CI: 225 (0.5) GLP: 150 (0.33) EM: 225 (0.50) EMD: 220 (0.49)				
Terminals	Removable (Screw)				
Conductor Size, Max.	0.24 mm ² (2412 AWG)				

Functional Safety Data ★

Note: Subject to change. For up-to-date information, visit http://www.ab.com/safety/

MT	PFH _D	
DI	355 yr	4.35 x 10 ⁻⁹
DIS	484 yr	4.39 x 10 ⁻⁹
SI	262 yr	3.98 x 10 ⁻⁹
CI	164 yr	4.26 x 10 ⁻⁹
GLP	395 yr	7.18 x 10 ⁻⁹
EM	190 yr	1.81 x 10 ⁻⁹
EMD	165 yr	4.4 x 10 ⁻⁹

- ★ Usable for ISO 13849-1: 2006 and IEC 62061. Data is based on the following assumptions:
- Mission time/proof test interval of 20 yr
- Functional test at least once within six-month period
- -The PFH $_{\rm D}$ given is the sum of the PFH $_{\rm D}$ of the electronic aspects and the PFH $_{\rm D}$ resulting from the B10d values of the two output relays based on 1 operation/hour, 365 days a year, 24 hours a day (8760 operations/year) at AC15 1 A 230V AC or at DC13 1.5 A 24V DC.

Product Selection Safety Relays

Relay Type	No. of Inputs	Inputs	Immediate Safety Outputs	Delayed Safety Outputs	Time Delay	Immediate Auxiliary Outputs	Power Supply	Cat. No.
Dual Input (DI)	2 dual-	1 N.C., 2	2 N.O.					440R-D22R2
Dual Input Solid-State Output (DIS)	channel	N.C., OSSD, Safety Mat	2 S.S.	_	_	1 S.S.	24V	440R-D22S2
Single Input (SI)	1 dual-	1 N.C., 2	2 N.O.					440R-S12R2
Compatible Input (CI)	channel	N.C., OSSD, Safety Mat	3 N.O.	_ _	1 S.S.	24V	440R-S13R2	
Guardlocking Proximity (GLP)	1 dual- channel 2 PNP	2 N.C., OSSD	2 S.S.	_		1 S.S.	24V	440R-GL2S2P
Expansion Module (EM)			4 N.O.	_	_			440R-EM4R2
Expansion Module Time Delayed (EMD)	1 single-wire safety	_	_	_	100 ms 300 s on or off delay 100 ms 20 s jog	1 S.S.	24V	440R-EM4R2D

Accessories

Description	Cat. No.
Bag of four, 4-pin screw terminals	440R-ATP4

LED Indicators

Indicator on Housing	Function	LED Color(s)
PWR/FAULT	Status and diagnostics	Green/Red
IN1	Status of safety output IN1	Green
IN2	Status of safety output IN2	Green
LOGIC IN	Status of single wire safety input	Green
OUT	Status of safety output	Green
LOCK‡	Status of the lock command	Green
B1★	Status and diagnostics	Green

[‡] GLP only



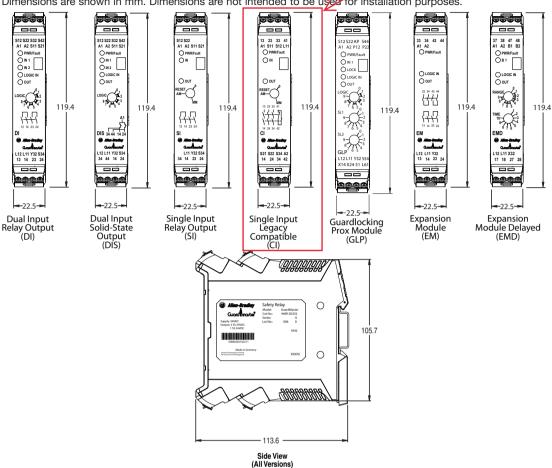
[★]B1 on EMD only

Next Generation Guardmaster® Safety Relays

DI, DIS, SI, CI, GLP, EM, and EMD

Approximate Dimensions

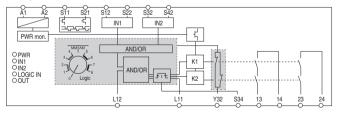
Dimensions are shown in mm. Dimensions are not intended to be used for installation purposes.



Block Diagrams

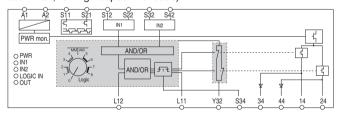
Dual Input Relay (DI)

Safety Outputs (N.O.): 13-14, 23-24



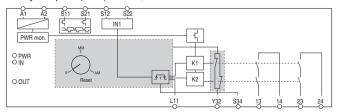
Dual Input Solid State Output Relay (DIS)

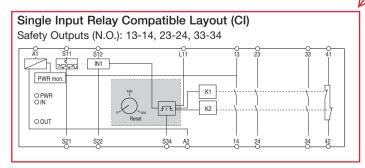
Safety Outputs (PNP N.O.): 14 & 24 (1.5 A each max), 34 & 44 (0.5 A each max, for high capacitive loads)



Single Input Relay (SI)

Safety Outputs (N.O.): 13-14, 23-24



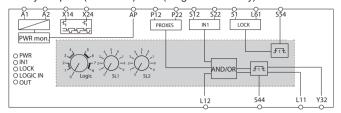


DI, DIS, SI, CI, GLP, EM, and EMD

Block Diagrams, continued

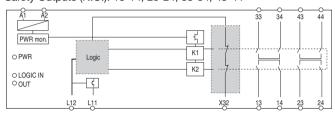
Guardlocking with Proximity Sensors (GLP)

Safety Outputs (PNP N.O.): L11 (Single Wire Safety)



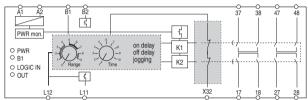
Expansion Module Relay (EM)

Safety Outputs (N.O.): 13-14, 23-24, 33-34, 43-44



Expansion Module Delayed Output Relay (EMD)

Delayed Safety Outputs (N.O.): 17-18, 27-28, 37-38,47-48



Common Terminals

Terminals	Relay	Description
A1, A2	All	Power
S12, S22	DI, DIS, SI, CI	IN1: Safety input 1
S32, S42	DI, DIS	IN2: Safety input 2
S11, S21	DI, DIS, SI, CI	Test outputs for safety inputs
S34	DI, DIS, SI, CI	Monitoring feedback loop for reset
S44	GLP	Lock request and reset
S54	GLP	Unlock request
Y32	DI, DIS, SI, GLP	Auxiliary PNP semiconductor output
41-42	CI	Auxiliary N.C. relay output
X32	EM, EMD	Feedback PNP semiconductor output
L12	DI, DIS, EM, EMD	Single wire safety input
L11	All	Single wire safety output
B1, B2	EMD	Configuration for retriggering/jogging
51, L61	GLP	Lock command to solenoid
X14, X24	GLP	Multifunction safety outputs
AP, P12, P22	GLP	Proximity sensor power and inputs

Note: Output terminals described by image.

Auxiliary/Feedback Output Behavior

	DI, DIS, SI	CI	EM, EMD
Unit Status	Y32	41-42	X32
Active & healthy	Off	Open	Off
Inactive & healthy	24V DC	Closed	24V DC
Fault	24V DC	Closed	Off

		GLP				
	Unit Status	Y	32			
	Cat 1 Stop	Off upon unlock request	24V DC active & healthy			
	Safe Limited Speed	24V DC upon unlock request	Off active & healthy			
-	Fault	Off	Off			

Next Generation Guardmaster® Safety Relays

DI, DIS, SI, CI, GLP, EM, and EMD

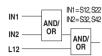
Logic

The logic between the two safety inputs IN1 (S12, S22) and IN2 (S32, S42) and the single-wire safety input (L12) can be configured to the four options shown below, in either manual monitored or automatic/manual reset configurations (yielding eight settings total). L12 will only recognize a valid test pattern from the L11 output of a Guardmaster device. Any other signal to that port will be detected as a fault. (A high signal is considered to be true in this logic. So if an input is to be ignored or muted, OR logic should be used).

Note: In case only one safety input is used the second one can be left open if it is configured for OR. An AND conjunction requires this input to be wired to S11 and S21. In case L12 is not in use, this input needs to be configured for OR.

Manual Monitored Reset
1 (IN1 OR IN2) OR L12
2 (IN1 AND IN2) OR L12
3 (IN1 OR IN2) AND L12
4 (IN1 AND IN2) AND L12

Automatic / Manual Reset 5 (IN1 OR IN2) OR L12 6 (IN1 AND IN2) OR L12 7 (IN1 OR IN2) AND L12 8 (IN1 AND IN2) AND L12



Configuration

Setting the Logic Function/Reset Mode — DI, DIS, SI, and CI

- Start configuration/overwrite: with power off, turn rotary switch to position 0 and unit is powered up. After power-up test, PWR LED will flash red.
- Set configuration: turn rotary switch to desired position. IN1 LED blinks new setting. Note: Position is not stored until PWR LED is solid green.
- 3. Lock in configuration by cycling unit power.
- 4. Configuration must be confirmed before operation. A white rectangle on face of device is provided to record unit setting.

Enable program mode



Set operation mode





A Record setting

Setting the Time Delay — EMD

- 1. Start configuration/overwrite: with power off , turn rotary switch RANGE to position 0 and power unit up. After power-up test, PWR LED will flash red.
- 2. Set configuration: turn rotary switch to desired position, both RANGE and TIME. LED B1 indicates position of RANGE and Logic IN of TIME.

Note: Position is set when "PWR" LED is solid green.

- 3. Lock in configuration by cycling unit power.
- 4. Configuration must be confirmed before operation. A white space on face of device is provided to record unit setting.

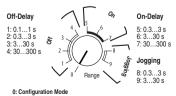
Note: When in off-delay mode, terminals B1 and B2 are used to modify the settings of retriggering. The terminals are not used in on-delay mode. Terminal B1 is used for the pulse source when the relay is in single pulse jogging mode.

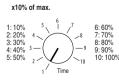
OFF-DELAY (RANGE 1, 2, 3, 4): Time delay starts when single-wire safety input L12 changes from HIGH to LOW. Delayed safety outputs remain active until the set time has lapsed. The unit is safe against time extension. Restart the unit by cycling the safety input L12, LOW to HIGH.

- RETRIGGERABLE (JUMPER B1-B2): In off-delay mode, the device can be set to retriggerable setting. In retrigger mode, if the safety
 input is triggered and cleared within the duration of the time delay then the timing request is ignored and the safety output contacts will
 remain closed. Retrigger setting can only be done in off-delay mode and can be set by running a jumper wire from terminal B1 to B2
 (corresponds with MSR178 and MSR132ED delayed outputs).
- NON-RETRIGGERABLE (NO JUMPER): In off-delay mode, if retriggerable setting is not configured (terminals B1 and B2 are left vacant)
 the full time delay will lapse and the safety output contacts will open before the relay can be reset (corresponds with MSR178 and
 MSR132ED delayed outputs).

ON-DELAY (RANGE 5, 6, 7): Time delay starts when the single-wire safety input changes from LOW to HIGH. Safety outputs are activated after time has lapsed and L12 is still HIGH.

SINGLE-PULSE JOGGING: The safety outputs are activated when both, the single-wire safety input L12 and B1 are HIGH. It remains active until the set time has lapsed. When one of the inputs changes to LOW, the safety outputs are deactivated immediately. B1 acts as an automatic/manual start to trigger the Jog function while L12 monitors the safety device through a base unit. If there is any malfunction, the JOG switch should be replaced.







DI, DIS, SI, CI, GLP, EM, and EMD

Configuration, continued

Setting the Guardlocking Prox Logic Function — GLP

Logic Setting	Lock Command	Application	Logic	
0	Start-up Configura	ation Mode (X14 and X2	4 - safety outputs)	
1		Catagon, 1 Ston	Logic In Off	
2	Power To Release	Category 1 Stop	Logic In AND	
3		Cafa Limited Canad	Logic In Off	
4		Safe Limited Speed	Logic In AND	
5				
6	- Reserved for Future Use			
7				
8				
9	Alternate Start-up Co	nfiguration Mode (X14 a	and X24 - test outputs)	

The GLP supports a power to release locking command:

• During normal operation, the lock command signal (51/L61) to the guardlocking device is unpowered to maintain the gate in a locked state. Press the Unlock request to start the timer. After the configured time delay expires, the lock command is powered to allow the safety gate to be opened.

The GLP is designed for two types of applications:

- Category 1 Stop: When the Unlock request is made, the Y32 output turns off to allow the stopping function to begin. When the GLP detects that the speed is below the stopped speed, the lock command changes state (depending on whether Power-To-Release or Power-To-Lock was configured).
- Safe Limited Speed: When the Unlock request is made, the Y32 output turns ON to allow slow speed operation. When the GLP detects that the speed is below the SL1 speed, the unlock command is turned ON.

Setting the configuration:

- 1. Start configuration/overwrite: With power off, turn rotary switch LOGIC to position 0 to configure X14 and X24 as saftey outputs, or position 9 to configure X14 and X24 as pulse test outputs for safety inputs. Power unit up. After power-up test, PWR LED will flash red.
- 2. Set configuration: Turn all three rotary switches to desired position, LOGIC, SLS, and MAX. IN1 indicates position of LOGIC, and Logic IN of SLS and Lock of MAX.

Note: Position is set when PWR LED is solid green.

- 3. Lock in configuration by cycling unit power.
- 4. Configuration must be confirmed before operation. A white rectangle on face of device is provided to record unit setting.
 - Enable configuration mode



Set operation mode (Logic, SLS and MAX)





0: 0.5 Hz 1: 1 Hz 2: 2 Hz 3: 3 Hz 4: 4 Hz



5: 5 Hz 6: 6 Hz 7: 7 Hz 8: 8 Hz 9: 10 Hz

Safe Maximum Speed (MAX)



5: 200 Hz 6: 500 Hz 7: 1000 Hz 8: 2000 Hz 9: 3000 Hz

Cycle power to store



Record setting





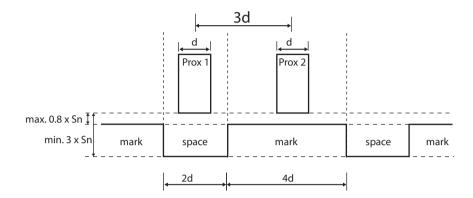
Next Generation Guardmaster® Safety Relays

DI, DIS, SI, CI, GLP, EM, and EMD

Proximity Sensor Configuration

The GLP is designed to operate with two PNP sensors.

- 1. The proximity sensors can detect a geartooth arrangement where the ratio of the space to mark is 2:4.
- 2. The space must be at least twice the diameter of the sensor. The mark must be at least twice the width of the space.
- 3. The proximity sensors must be set back from the mark no further than 80% of their rated sensing distance, Sn. **Note**: The distance of 0.5 Sn is required to achieve maximum speed.
- 4. The depth of the space must be at least 3 times the rated sensing distance.
- 5. The distance between the sensors must ensure that both sensors are not off at the same time.





DIN Rail Combination Filter and Surge Protective Device 4983-DC

Bulletin 4983-DC is the combination of a filter and a surge protective device. The Bulletin 4983-DC product meets both UL 1449 and UL 1283. This product allows transient and noise protection in one small package.

Features

- Small combination (filter and SPD) package size
- Features Isatrol technology
- All-mode transient protection with exceptional Line to Neutral value of 25 kA
- LED power indication
- Form C contact for remote status indication
- DIN Rail mountable



Product Selection

AC Network	Connection Frequency [Hz]	Operating Discharge Operating Current 8/20 µs Voltage (I _{max}) [kA]		Discharge Protection		L1449 Voltage rotection ating (VPR) [V AC]		Ampacity [A]	Cat. No.													
				(MCOV) (Uc) [V AC]	L/G	L/N	N/G	[kA]		L/N	N/G	L-L										
	L/G, L/N, N/G												3.0	4983-DC120-03								
120V AC		47 63	150					600	400	600	-	5.0	4983-DC120-05									
									400	000		10	4983-DC120-10									
			4763		10	25	10	3					20	4983-DC120-20								
	Ed, Dil, NG	L/ G, L/ N, N/ G	L/ G, L/ N, N/ G	L/U, L/IV, IV/U	L/ G, L/ N, N/ G	L/G, L/N, N/G	L/ G/ L/ N/ N/ G	L/ G/ L/ N/ N/ G	L/d, L/N, N/d 4705	74, L/N, N/4 4703	L/d, L/N, N/d 4703] 10	23	10	, 					3.0	4983-DC240-03
240V AC		320	220									1200 -		800	5.0	4983-DC240-05						
			320					1200			000	10	4983-DC240-10									
															20	4983-DC240-20						

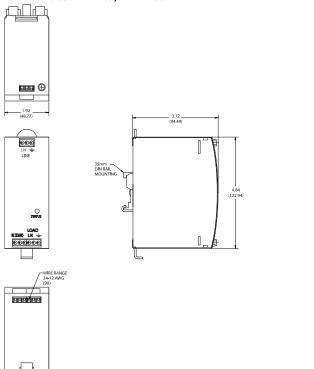
Specifications

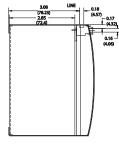
Connection/Mounting Type	Series/DIN Rail mount
Enclosure	Metal, DIN Rail mount, product label
Approximate Weight	3 A — 1 lb 5 A — 1 lb 10 A — 1.5 lbs 20 A — 1.5 lbs
Modes of Protection	Line — Neutral Line — Line Line — PE Neutral — PE
Certifications	UR Recognized, CSA, CE Marked
Typical Cat. A Ringwave Rating	< 60V peak
Typical Cat. B Ringwave Rating	< 100V peak
Status Indication	Single green LED indicating MOV integrity Single form C contact (10 A @ 250V AC, 5 A @ 100V DC)
Response Time	Normal mode: < 0.5 ns Common Mode: < 5 ns
Operating Temperature	-40+60 °C derate linearly to 60% @ +70 °C
Fusing	Appropriate external fusing is required
Frequency Response 100 kHz50 MHz	Normal Mode (100 kHz50 MHz) — 90 dB min. Common Mode (550MHz) — 60 dB min. 50 kHz cut-off frequency

Approximate Dimensions

Dimensions are shown in inches (millimeters). Dimensions are not intended for manufacturing purposes.

Cat. Nos. 4983-DCxxx-03, -DCxxx-05



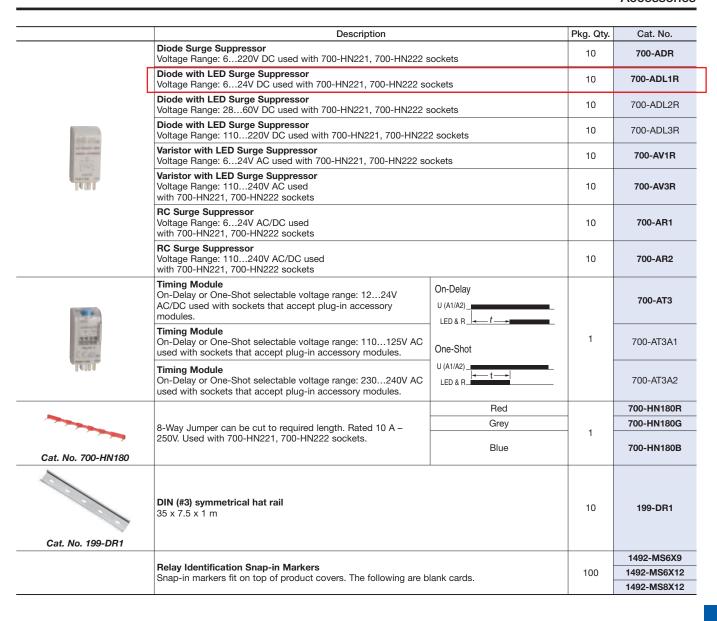


Additional Resources

These documents contain additional information concerning related products from Rockwell Automation.

Resource	Description
Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1	Provides general guidelines for installing a Rockwell Automation industrial system.
Product Certifications website, <u>rok.auto/certifications</u> .	Provides declarations of conformity, certificates, and other certification details.

You can view or download publications at http://www.rockwellautomation.com/global/literature-library/overview.page.



Note: Spring clamp sockets are also available. Cat. No. 700-HN223 for Cat. No. 700-HK36 and Cat. No. 700-HN224 for 700-HK32.

Bulletin 700-HK Slim Line Relay, Socket, and Retainer Clip Reference Chart

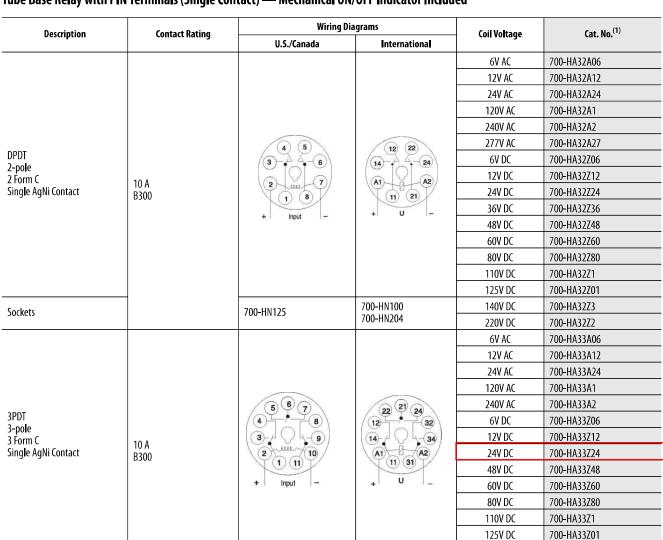
Relay Type	Socket Cat. No.	Retainer Clip Cat. No.	
700-HK32	700-HN122, 700-HN222, 700- HN224	- Provided	
700-HK36	700-HN121, 700-HN221, 700- HN223		



700-HA General-purpose Relay

- 10 A contact rating
- DPDT, 3PDT
- Pin-style terminals
- Standard ON/OFF flag indicator
- Options: LED, push-to-test and manual override, socket-mounted surge suppressor module, or multi-function timer
- Contact choices: standard silver nickel, or bifurcated silver nickel with gold plating

Tube Base Relay with PIN Terminals (Single Contact) — Mechanical ON/OFF Indicator Included⁽¹⁾



⁽¹⁾ LED Option: Add suffix (-4) to the selected 700-HA Relay Cat. No., except for the 240V AC Units, add (-4L). Push-to-test, Manual Override, and LED Option: Add suffix (-3-4) to the selected 700-HA Relay Cat. No., except for the 240V AC units, add (-3-4L). Push-to-test and Manual Override option: Add suffix (-3) to the selected 700-HA relay.

LED not available for 220V DC and 277V AC coils.

700-HN126

700-HN101

700-HN205

140V DC

220V DC

700-HA33Z3

700-HA33Z2



Sockets

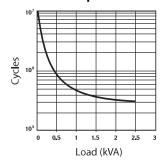
⁽¹⁾ For Time Modules and Surge Suppressor Modules, see Accessories.

Specifications - 700-HA Relays

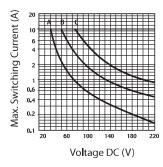
Attribute	<u> </u>		700-HA				
		Electrical Ratings					
Pilot Duty Rating ⁽¹⁾			NEMA B300				
Rated Thermal Current ($I_{ m th}$)		H/	A = 10 A - 120V, 240V; HAX = 6 A - 120V, 240V				
Rated Insulation Voltage (<i>U</i> ;)			250 V IEC — 300 V UL/CSA				
	Inductive	Make Break Hp					
	muuttive	▶][◀	◄][▶				
Contacts	120VAC	30 A	3 A	1/3			
contacts	240VAC	15 A	1.5 A	1			
	General-purpose		10 A, 240V AC				
	Resistive		10 A, 30V DC				
Min. Low Energy Permissible Lo	ad		HA = 10V, 5 mA HAX = 5V, 2 mA				
Permissible Coil Voltage Variatio	on	Pickup:80110% of nom voltage	at 50 Hz, 80 110% of nom voltage at 60 Hz,	80110% of nom voltage at DC			
	AC Coils	50 Hz	60 H	Z			
CoilConsumption±10%	Inrush	3.3VA	2.85\	/A			
ton ton bump tion = 10 /0	Sealed	2.2VA	1.9V	A			
	DC Coils		1.3 W				
Must Dropout Voltage			20% of nom V AC; 10% of nom V DC				
Max. Contact Resistance			50 M Ω (700-HA), 30 M Ω (700-HAX)				
Design Specification/Test Requir	rements						
		Electrical					
Pole-to-Pole			2000V				
Contact to Coil		2000V					
Electrical Life (Operating)			100 000 min.				
		Mechanical					
Degree of Protection (Open Type	e) IEC 529		IP 40				
Mechanical Lifecycles (AC/DC)			$> 20 \times 10^6 / 50 \times 10^6$				
Switching Frequency Operation	S		3600/HR				
Coil Voltages		See Product Selection					
Operating Time	Pickup	12 ms					
	Dropout	12 ms					
Maximum Operating Rate			4 Ops/s				
Vibration	Endurance	56					
	Operational		2.5 G				
Shock	Endurance		50 G				
	Operational		9 G				
		Environmental					
Temperature	Operating	AC/DC	-4 0+	-70°C			
-	Storage	AC/DC	- 40+	100°C			
Altitude			2000 m (6560 ft)				
		Construction					
Insulating Material			Molded High-Dielectric Material				
Enclosure			Transparent Dust Cover				
Contact Material		700-HA:	10 A — A	AgNi			
		700-HAX: 6 A — Bifurcated/Gold Plating AgNi					
Terminal Markings on Socket			In accordance with EN50 0005				
Sockets		8-Pin Socket — 700-HN100, -HN125, -HN204, 11-Pin Socket — 700-HN101, -HN126, -HN205					
Certifications	ctrifications cURus Recognized (File No. E3125, Guide NLDX2/NLDX8), cULus Listed when NLDX/NLDX7), CE Marked, CSA Certified, UI						
		UL508, CSA C22.2 No. 14, EN 61810-1					

⁽¹⁾ See <u>NEMA Ratings and Test Values on page 5</u>

Relay Performance Graphs



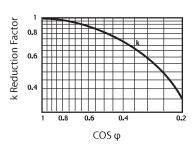
Contact life vs. AC1 load at 1,800 cycles/h



Breaking capacity for DC1 load at 1,800 cycles/h

$$\begin{split} A &= load \ applied \ to \ one \ contact \\ B &= load \ applied \ to \ two \ contacts \ in \ series \end{split}$$

C = load applied to three contacts in series



Load reduction factor vs. $\cos\phi$

Specifications - 700-HT3 Time Module

	Attribute 700-HT3					
		Electrical Ratings				
Operating Voltage Range	2	12240V AC (50/60	Hz) 12240V DC			
Power Consumption		0.1 W (12V) 1.0 W (230V)				
		Mechanical				
Degree of Protection of I	nput (B1) Terminal	IP 20 (Guarder	d Terminal)			
Input Terminal Wire Rang	ge	1.0 x 0.2 mm ² 2.5 mm ² 2.5 mm ² 1.5 mm ²	² (24 AWG14 AWG) ² (24 AWG16 AWG)			
Input Terminal Torque Ra	inge	0.450.8 Nm ((47 lb-in.)			
Status Indicator		Rec	I			
Repeat Accuracy ⁽¹⁾		±19	6			
RecoveryTime		<50 (ms			
Selectable Timing Range	es		Three DIP switches, seven ranges (set from 5100% of range): 1 s, 10 s, 100 s, 10 min, 100 min, 10 h, 100 h			
Selectable Timing Modes		Three DIP switches, eight modes: 1. PowerOn—Delay 2. Power On One-Shot 3. Power On Repeat Cycle, On Start 4. Signal On-Delay and Signal Off-Delay	5. Signal Off-Delay 6. Signal On-One-Shot 7. Signal Off-One-Shot 8. Signal On and Signal Off Watchdog Monitor			
Adjustable Trimmer Scal	e Accuracy	±5% of Tim	ne Range			
Environmental						
T	Operating	−20 °C…+50 °C (-	-4 °F+122 °F)			
Temperature	Storage	−55 °C…+85 °C (-	–67…+185 °F)			
Altitude		2000 m (6560 ft)				
Construction		,				
Enclosure		Gray Plastic Housing				
Mounting with Socket O	nly	8- or 11-Pin Socket with Module Plug				
Sockets		700-HN204 (8-Pin with Plug), 700-HN205 (11-Pin with Plug)				
Certifications		cURus Recognized (File No. E14843, Guide NRNT2/NRNT8), CE Marked				
Standards		UL508, CSA C22.2 No	o. 14, EN 61810-1			

⁽¹⁾ At constant voltage and temperature.

700-HLT12Z24

Interposing/Isolation Relays

Product Overview/Catalog Number Explanation



Bulletin 700-HL 2-Pole "Terminal Block Relay"

- Relay and socket assembled interface modules for high density interposing or isolation applications
- Screw terminal and spring-clamp bases
- 10 A relay, choice of silver or gold contacts
- DPDT (relay)
- Built-in retainer clip and snap-in marker lever
- Standard LED, reverse polarity protection, and surge protection
- Externally replaceable relay modules

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Dimensions 9-53

Standards Compliance and Certifications

See Specification table in this section, page 9-52.

Catalog Number Explanation

Series Type
Code Description
HL Terminal Block relay

Terminal Type
Code Description
1 Screw Terminal
2 Spring Clamp Terminal

C

 E

 Supply Voltage

 Code
 Description

 Z12
 12V DC

 Z24
 24V DC

 Z48
 48V DC

 U24
 24V AC/DC

 U1
 110...125V AC/DC

220...240V AC/DC

Gold-Plated Contact Option

Code Description

Blank None

X Gold Plate

 f_*

B Relay Type
Code Description
T EM Relay

Code Description

2 DPDT (2 C/O), 14 mm

d

* For Gold-plated contacts: Add the letter "X" at the end of the catalog number. Example: Cat. No. 700-HLT12Z24 with gold plated contacts is catalog number 700-HLT12Z24X. The following relays are available with the gold-plated contact option: 700-HLT_2Z24, 700-HLT_2U24, 700-HLT_2U1, and 700-HLT_2U2.

U2



Coil Surge Protection

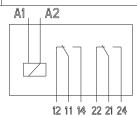
Standard built-in Features:

- LED
 Reverse Polarity Protection for DC Inputs





Specifications



Output Type	DPDT (2 C/O); I _{th} = 10 A
Recommended Tightening Torque	0.6 N•m max. (5.3 lb•in.)
Wire Range	Screw Terminal: 0.22.5 mm² (#2414 AWG), Spring Terminal: 0.22.5 mm² (#2414 AWG)
Approvals	cULus, cURus, CE

Assembled Devices	Pkg. Quantity	Cat. No. (Screw Terminals)	Cat. No. (Spring Clamp Terminals)
	Ir	nput Voltage	
12V DC	10	700-HLT12Z12	700-HLT22Z12
24V DC	10	700-HLT12Z24*	700-HLT22Z24*
48V DC	10	700-HLT12Z48	700-HLT22Z48
24V AC/DC	10	700-HLT12U24*	700-HLT22U24*
110/125V AC/DC	10	700-HLT12U1*	700-HLT22U1*
220240V AC/DC	10	700-HLT12U2*	700-HLT22U2*

* For Gold-plated contacts: Add the letter "X" at the end of the catalog number. Example: Cat. No. 700-HLT12Z24 with gold plated contacts is Cat. No. 700-HLT12Z24X. The following relays are available with the gold-plated contact option: 700-HLT_2Z24, 700-HLT_2U14, 700-HLT_2U14, and 700-HLT_2U12.

	Description	Pkg. Quantity	Socket Input Voltage	Cat. No.
			12V DC	700-TBR212
			24V AC/DC	700-TBR224*
111	Replacement Relays Order must be for 20 relays or multiples of 20.	20	48V DC	700-TBR248
Cat. No. 700-TBR224			110/125V AC/DC 220240V AC/DC	700-TBR2110*
-			Cold	or
and the state of t	8-Way Jumper	1	Red	700-TBJ08R
	Can be cut to required length. $I_{th} = 10 \text{ A max per 8-way jumper.}$	ı	Grey	700-TBJ08G
Cat. No. 700-TBJ08B			Blue	700-TBJ08B
Cat. No. 700-HN177	End Barrier Used for visual inspection of groups, safe separation of neighboring 700-HL modules that end with jumpers.	10	Black	700-HN177
	Snap-in Marker These snap-in markers have a 6 x 12 mm surface and snap into the ejection lever for the relay.	100	Blank Standard 1492- MS6X12 Custom	1492-MS6X12 www.ab.com/ catalogs for information

^{*} For gold-plated contacts: Add the letter "X" at the end of the catalog number. For example: if Cat. No. 700-TBR224 is required with gold plating, the new cat. no. is 700-TBR224X.

^{*} Go to http://www.ab.com/software/, click on "Terminal Marking System and WinABMS" to download software. Create custom text, save file, and e-mail to your local Rockwell Automation sales office or Allen-Bradley distributor. Note: Terminal Block Relay bases are not sold separately.

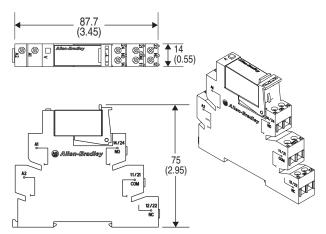
	Cat.	No. 700-HLT2	2-Pole (Relay Ou	tput)					
		Electrica	l Ratings						
Rated Thermal Current (Ith)		2-Pole — 10 A							
Rated Insulation Voltage (Ui)		250V IEC, 300V UL/CSA							
	Inductive V AC	120V AC	AC-15, 3.0A B 300, 3.0 A		1/4	4 HP (186 W), 1-phase			
		240V AC		, 3.0 A , 1.5 A	1/2	1/2 HP (373 W), 1-phase			
Contacts		24V DC	DC-13	, 2.0 A					
Oomaolo	Inductive V DC	125V DC	DC-13	, 0.3 A					
		250V DC	DC-13	, 0.2 A					
	Resistive	250V AC	10) A					
	Make, Break and	24V DC	10) A					
	Continuous	250V DC	0.28	8 A					
Min. Permissible Contact Ratings		12V, 1	0 mA (120 mW) f	or Silver Contac	ts, 5V, 1 mA (50	mW) for Gold Co	ontacts		
Permissible Coil Voltage Variation		Pickup:	85110%	of Nominal Volta of Nominal Volta 5 of Nominal Vol	age at 60 Hz	Must Dropout Voltage:	10% of Nominal Voltage at A0 5% of Nominal Voltage at D0		
	Desi	an Specification	n/Test Requirem	ents					
		Pole to Pole (VRMS)			1000V				
Dielectric Withstand Voltage		Contact to Coil (VRMS)			5000V				
		Adjacent Contacts (VRMS)			2500V				
Input Voltage		12V AC/DC	24V AC/DC	48V DC	120V AC/DC	240V AC/DC			
Impedance (Ohms)		1 K	2 K	3 K	34 K	72 K			
Power Consumption	AC	N/A	0.5V A	N/A	0.4V A	0.8V A			
Tower Consumption	DC	0.4 W	0.5 W	0.8 W	0.5 W	0.7 W			
±10%									
		Mech	anical						
Degree of Protection					20				
Mechanical Life Operations		3 x 10 ⁷							
			250V A	AC/24V DC, 8 A	Resistive: 100 0	00 min.			
			2	24V DC, 10 A Re	esistive: 6000 mi	n.			
Electrical Life Operations									
			25	UV DC, 0.28 A F	Resistive: 6000 n	nin.			
			25	0V AC, 10 A Re	sistive: 30 000 n	nin.			
Switching Frequency Operations (no-load)				1200 cy	/cles/sec				
Coil Voltages				See Overview/F	Product Selection	ı			
Operating Time at Naminal Vallage at 20,000	20)	Pickup			typical 10 ms				
Operating Time at Nominal Voltage at 20 °C (n	115)	Dropout			typical 10 ms				
Maximum Operating Rate (full load = 6 A)				6 cycl	es/min.				
		Enviror	nmental						
Tomporatura		Operating			-40+60 °C				
Temperature		Storage -40+100 °C							
Altitude				2000 m	(6560 ft)				
		Const	ruction						
				Molded High-D	ielectric Materia				
Insulating Material						lation environme	nt		
Insulating Material Enclosure		Г	iciay i ii ii ii iiax						
		г	loldy I II II II II II II II II II II II II		AgNi 90/10 + Au				
Enclosure			lotay III II III III	AgNi 90/10 or /	AgNi 90/10 + Au with EN50 0005				
Enclosure Contact Material		r		AgNi 90/10 or A	with EN50 0005				

^{*} Performance Data - See this catalog, Important 3

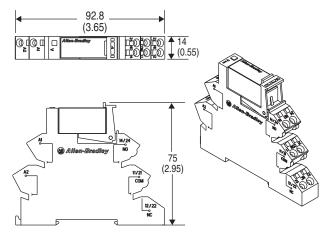


Approximate Dimensions

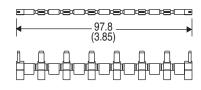
Approximate dimensions are shown in millimeters (inches). Approximate dimensions are not intended to be used for manufacturing purposes.



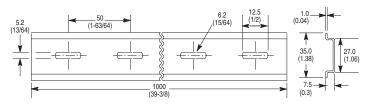
Bulletin 700-HL Screw Terminal Design
Single Wire: 0.14 mm²...2.5 mm² (#26 AWG...14 AWG)
Double Wire: 2 x 0.14 mm²...2 x 1.5 mm² (2 x #26 AWG...2 x 16 AWG)
Wire Type: Solid or stranded, copper only
Strip Length: 9 mm (11/32 in). Torque: 0.5 N•m (4.4 lb•in)



Bulletin 700-HL Spring Terminal Design
Single Wire: 0.2 mm²...2.5 mm² (#24 AWG...#14 AWG)
Wire Type: Solid or stranded, copper only
Strip Length: 9 mm (11/32 in)



Bulletin 700-TBJ08_ 8-Way Jumper



Cat. No. 199-DR1 DIN Mounting Rail Series B Cat. No. 199-DR4 DIN Mounting Rail Series B Has No Mounting Holes

Cat. No.	А	В	С	D	Approx. Shipping Wt.
199-DR1	35	27	7.5	1.02	1.85 kg
	(1-3/8)	(1-1/16)	(19/64)	(1/64)	(4.07 lb) (10/pkg)
199-DR4	35	27	15	2.3	3.68 kg
	(1-3/8)	(1-1/16)	(19/32)	(3/32)	(8 lb) (5/pkg)

9

Accessories

	Description	Pkg. Qty.	Cat. No.
Cat. No. 700-HN100	Screw Terminal Tube Base Socket — Panel or DIN Rail Mounting; Guarded Terminal Construction. 8-Pin for use with DPDT Bulletin 700-HA Relays, -HX Timing Relays, -HT (On-Delay) and -HRM, -HRC and -HV (Repeat Cycle) Timing Relays.	10	700-HN100
Cat. No. 700-HN125	Screw Terminal Tube Base Socket — Panel or DIN Rail Mounting; Open Style Construction. 8-Pin for use with DPDT Bulletin 700-HA Relays, -HT (On-Delay) and -HRM, -HRC, and -HV (Repeat Cycle) Timing Relays. No retainer clip required.	10	700-HN125
Cat. No. 700-HN101	Screw Terminal Tube Base Sockets — Panel or DIN Rail Mounting; Guarded Terminal Construction. 11-pin for use with 3PDT 700-HA relays.	10	700-HN101
Cat. No. 700-HN126	Screw Terminal Tube Base Sockets — Panel or DIN Rail Mounting; Open Style Terminal Construction. 11-pin for use with 3PDT 700-HA relays. No retainer clip required.	10	700-HN126
	8-Pin Socket — Can Be Used With or Without Timing Attachment or Surge Suppressor Screw Terminal Tube Base Sockets — panel or DIN Rail mounting. Guarded terminal construction. Used with DPDT Bulletin 700-HA Relays.	10	700-HN204
Cat. No. 700-HN205	11-Pin Socket — Can Be Used With or Without Timing Module or Surge Suppressor. Screw Terminal Tube Base Sockets — panel or DIN Rail mounting. Guarded terminal construction. Used with 3PDT Bulletin 700-HA relays.	10	700-HN205
Cat. No. 199-DR1	DIN (#3) symmetrical hat rail 35 x 7.5 x 1 m	10	199-DR1





Product Profile

Safety Control Relays Designed To Meet Worldwide Safety Standards

Bulletin 700S-CF Bulletin 700S-P

Rockwell Automation introduces a new category of relays designed to meet the latest and emerging worldwide safety standards. These safety control relays offer special features to enable you to design safe control circuits with current ratings up to 20 Amps.

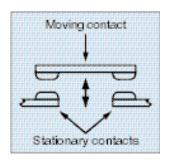
Bulletin 700S Safety Control Relays provide mechanically-linked contacts on all poles. Mechanically-linked contacts are required in feedback circuits for modern safety applications, such as e-stops, safety gates, light curtains, and master control relays.

Mechanically-Linked Contacts

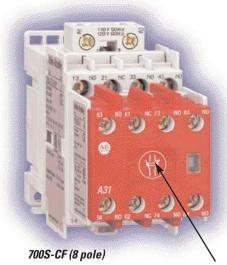
This feature allows detection of a welded contact condition. Mechanically-linked contacts are linked together, they are not independent. If a N.O. contact welds, all N.C. contacts remain open. If a N.C. contact welds, all N.O. contacts remain open.

Double-Break Contacts

This design provides better protection against contact welding than a single break design. It offers greater DC load breaking capability and better isolation. This feature also provides separation of N.O. and N.C. circuits. Double-break contacts open the circuits in two places, creating two air gaps and reducing the probability of welded contacts by more that 50% compared to a single-break design.



Double-break contacts reduce the probability of a welded contact.



IEC mechanically-linked symbol



700S-P (4-12 pole)

Easy Identification

The red faceplate allows easy identification of safety devices. This face place displays the IEC 60947-5-1 mechanically-linked symbol.

Anti-Tamper

The anti-tamper feature ensures the long-term integrity of your safety system. All contact blocks are permanently fixed to ensure that the safety function is not jeopardized. Manual operation and field modifications are prevented.



Bulletin 700S-CF

- Positively guided/mechanically linked contacts
- Mechanically-linked contacts symbol prominently displayed on front
- Red face plate
- 8 poles, all permanently attached
- Ideal for use in safety circuits
- AC and DC operating coils
- SUVA third-party certification

TABLE OF CONTENTS

Description Page	Description Page
Product Selection	Specifications
Dimensions	

Description

Bulletin 700S-CF Safety Control Relays provide mechanically linked, positively guided contacts, which are required in feedback circuits for modern safety applications. The positively guided N.C. auxiliary contacts will not change state if a N.O. contact welds. Use with safety relays to expand output capability.

Conformity to Standards

IEC 947-5-1 EN 50011, EN 50005, EN 50022 UL 508 VDE 0660 CSA C22.2 Part 14

Approvals

CE Certified CSA Certified UL Listed, File E14840, Guide NKCR SUVA Third Party Certified

Your order must include:

- Cat. No. of the relays required, complete with coil suffix.
- Cat. No. of adder decks, timers and accessories required.
- If required, the part number of replacement coils.

Allen-Bradley 3

Product Selection

Type S-CF Safety Control Relays — 8-Pole AC and DC Coil Voltages





Connection Diagrams		Contacts		700S-CF				
				AC Coils	DC Coils			
Main Contacts	Auxiliary Contacts		1	Cat. No.	Cat. No. ①			
		N.O.	N.C.					
K1 A1	53 61 73 83 54 62 74 84	6	2	700S-CF620⊗C	700S-CF620Z⊗C			
K1 A1 13 21 33 43 A2 A2 14 22 34 44	53 61 71 83	5	3	700S-CF530⊗C	700S-CF530Z⊗C			
K1 A1 13 21 33 43 K1 A2 14 22 34 44	53 [61 71 81 54 62 72 82	4	4	700S-CF440⊗C	700S-CF440Z⊗C			
K1 A1 13 21 33 43 K1 A2 14 22 34 44	51 [61 71 81 -777- 52 62 72 82	3	5	700S-CF350⊗C	700S-CF350Z⊗C			

⊗ AC Coil Voltage Suffix Code

Voltage	12	24	32	36	42	48	100	100- 110	110	120	127	200	200- 220	208	208- 240	220- 230
50 Hz	R	K	V	W	Χ	Υ	KP	-	D	Р	S	KG	-	-	-	F
60 Hz	Q	J	-	V	-	Χ	1	KP	_	D	1	1	KG	Н	L	-
50/60 Hz	-	KJ	-	_	-	KY	KP	-	KD	-	ı	KG	-	-	ı	-

Voltage	230	230- 240	240	277	347	380	380- 400	400	400- 415	440	480	500	550	600
50 Hz	-	VA	Т	-	-	-	N	-	G	В	-	М	С	-
60 Hz	-	-	Α	Т	I	Е	-	-	-	N	В	-	-	С
50/60 Hz	KF	-	KA	_	_	_	_	KN	-	KB	_	-	_	_

⊗ DC Coil Voltage Suffix Code ●

Voltage	9	12	24	36	48	60	64	72	80	110	115	125	220	230	250
Standard	R	Q	J	W	Υ	Z	В	G	Е	D	Р	S	Α	F	Т
With diode suppressor	_	_	DJ	_	_	_	_	_	_	_	_	_	_	_	_

•When ordering DJ coil with built-in surge suppression, remove Z from the Cat. No. Example: Cat. No. 700S-CF440Z⊗C becomes Cat. No. 700S-CF440DJC.



700S-CF620EJC

Safety Control Relay, 8 Pole, 3 N.O. / 1 N.C. Base, 3 N.O. / 1 N.C. Auxiliary, 24V DC (w/Elec. Coil)

Contact Sales/Distributor for availability

Add Note

4 Allen-Bradley

General

		Cat. No. 700S-CF main poles	front auxiliary contacts
Contact Ratings — NEMA		A600, P600	A600, Q600
UL General Purpose Current		20A	!0A
<u> </u>	17 – 19.9V	30 mA	
Minimum Contact Rating			
Contact Batings IFC	20 – 24V	20 mA	C A
Contact Ratings — IEC AC-15 (solenoids,	24V	15 A	6 A
contactors) at rated	48V	15 A	6 A
voltage IEC 947, EN 60947	120V	14 A 10 A	6 A 5 A
ILC 341, LIV 00341	240V	5 A	3 A
	400/415V 480V/500V	2.5 A	3 A 1.6 A
	480V/500V 600V	2.5 A 1.8 A	1.6 A 1.2 A
4000	690V	1 A	1.0 A
40°C	/ _{th}	20 A	10 A
AC-12	230V	10 kW	
(Control of AC resistive	400V	17 kW	
oads)	690V	30 kW	
EC 947, EN 60°C 60947	/th	20 A	6 A
00341	230V	8 kW	
	400V	14 kW	
	690V	24 kW	
	24V	12 A	12 A
DC-12	48V	9 A	9 A
Control of DC resistive	60V	5.0 A	3.5 A
loads) IEC 947	110V	3.5 A	3.5 A
EN 60947	125V	3.0 A	3.0 A
	220V	0.55 A	0.55 A
00.40.150.045	440V	0.2 A	0.2 A
DC-13 IEC 947, EN 60947,			
Solenoids and			
contactors	24V	5 A	5 A
	48V	2 A	2 A
	60V	1.5 A	1.5 A
	125V	0.7 A	0.55 A
	220V	0.25 A	0.25 A
	440V	0.12 A	0.12 A
	600V	0.1 A	0.1 A
Avg-Mechanical Life (ops)	[Mil]	15	15
Average- Electrical AC-15 Life (240V, 3 A) (ops)	[Mil]	1.1	0.75
Terminal Cross-Sections			
1 Criminal 01033-36600113		25	
Terminal Type			
Terminal Size per IEC 947-1		2 x A4	2 x A4
Solid/ Conductor Stranded 1 Or 2 Conductor	[mm²] [mm²]	1.56 14	0.52.5 0.752.5
	[0,446]	16 10	1814
Max. Wire Size per UI /CSA	IAVVI		
Max. Wire Size per UL/CSA Tightening Torque	[AWG] [lbin.]	1610 8.922	8.913.3

• For sixteen or more strands, end ferrule is required	0	For sixteen or i	nore strands.	end ferrule is	required.
--	---	------------------	---------------	----------------	-----------

	_		
3	Y	1	
ĺ	7)	
		7	1

Mechanically -linked Contacts @

			Yes	Yes				
Location of	State of N.C. Contacts if N.O. contact welds							
welded N.O. contacts	Main	Front aux.	Left side aux.	Right side aux.				
Main	Open	Open	Open	Open				
Front aux.	Open	Open 6	Open	Open				
Left side aux.	Open	Open	Open	Open				
Right side aux.	Open	Open	Open	Open				
	welded N.O. contacts Main Front aux. Left side aux. Right side	welded N.O. contacts Main Open Front aux. Open Left side aux. Right side Open	welded N.O. contacts Main Front aux. Main Open Open 6 Front aux. Open Open 6 Left side aux. Right side Open Open 6	Location of welded N.O. Contacts if N.O. contacts if N.O.				

 Defined in IEC 947-5-1 annex L. Mechanically-linked is a relationship between contacts of opposite types (i.e., N.O. and N.C.).
 If the accessory is a pneumatic timer or latch, there is no mechanically-linked guidance; the accessory contacts are independent.

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Control Circuit

			Cat. No. 700S-CF
Operating Volta	ige		
AC 50/60 Hz	Pickup	[x U _s]	0.851.1
	Dropout	[x U _s]	0.30.6
DC 0	Pickup	[x U _s]	0.81.1
	Dropout	[x U _s]	0.10.6
Coil Consumpti	on at nominal volta	age	
AC 50/60 Hz	Inrush	[VA/W]	70/50
	Seal	[VA/W]	8/2.6
DC	Inrush/Seal warm coil	[W]	6.5
	Inrush/Seal cold coil	[W]	8.5
Operating Time	S		
AC 50/60 Hz	Pickup Time	[ms]	1530
	Dropout Time	[ms]	1060
DC	Pickup Time	[ms]	4070
	Dropout Time	[ms]	715
With integrated s	suppression	[ms]	1420
With diode suppression		[ms]	7095

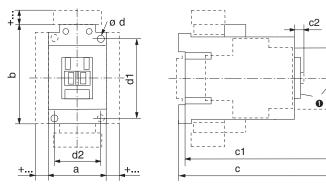
[●] For 9V DC, code ZR, use operating voltage 0.65... 1.3 x U_s. For 24V DC, code ZJ or DJ, use operating voltage 0.7... 1.25 x U_s.

General

	Cat. No. 700S-CF
Rated Insulation Voltage Ui	
IEC	690V
UL; CSA	600V
Dielectric Withstand Voltage	2500V
Rated Impulse Strength U _{imp}	8 kV @
Rated Voltage U _e	
AC	115, 230, 400, 500, 690V
DC	24, 48, 110, 220, 440V
Short-Circuit Protection IEC 947-5 Fuse-Type GG	20 A
Rated Frequency	50/60 Hz, DC
Ambient Temperature	
Storage	–55+80°C (–67176°F)
Operation at nominal current	-25+60°C (-13140°F) ❸4
Corrosion Resistance	humid-alternating climate, cyclic, per IEC 68-2-30 and DIN 50 016, 56 cycles
Altitude	2000 m above mean sea level, per IEC 947-4
Type of Protection	IP2X in connected state
Finger Protection	safe from touch by fingers and back of hand per VDE 0106, Part 100

- **2** 8 kV for main poles, 6 kV for front aux. contacts.
- 40 degree max. for 700S-CF350 with DC coil.
- Operation in 70°C ambient is permitted with current reduction of 15% below rated values

Allen-Bradley 6



AC Safety Control Relays

а	b	С	c1	c2	Ød	d1	d2	Cat. No. ①
45	81	119.5	114.5	6	2 - 4.5	60	35	700S-CF
(1-25/32)	(3-3/16)	(4-3/4)	(4-43/64)	(1/4)	(2 - 3/16)	(2-23/64)	(1-25/64)	

DC Safety Control Relays

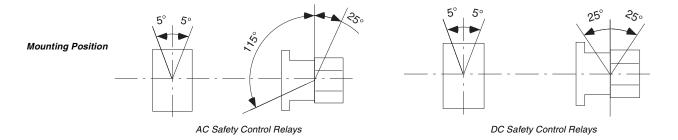
а	b	С	c1	c2	Ød	d1	d2	Cat. No. ①
45	81	145.5	140.5	6	2 - 4.5	60	35	700S-CF
(1-25/32)	(3-3/16)	(5-49/64)	(5-37/64)	(1/4)	(2 -3/16)	(2-23/64)	(1-25/64)	7005-CF

• All Cat. Nos. are factory stocked.

Accessories

Safety Control Relays with	mm	(inches)
Auxiliary contact block for side mounting 1- or 2-pole	a + 9	(a + 23/64)
Electronic Timing Module on coil terminal side	b + 24	(b + 15/16)
Mechanical Interlock on side of contactor	a + 9	(a + 23/64)
Interface Module on coil terminal side	b + 9	(b + 23/64)
Surge Suppressor on coil terminal side	b + 3	(b + 1/8)
Labeling with label sheet	+ 0	(+ 0)
marking tag sheet with clear cover	+ 0	(+ 0)
marking tag adapter for System Bul. 1492W	+ 5.5	(+ 7/32)

Mounting Positions



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2-Position Knob/Lever Type Selector Switch Devices, Illuminated



Standard Knob Operator
Cat. No. 800T-16HR2KB6AX



Knob Lever Operator
Cat. No. 800H-16HRR17KB6AX

							Type 4/13	Type 4/4X/13
				Operator	Position		Standard Knob	Standard Knob
Туре	Lamp Type	Volts	Knob Color	\bigcirc	\bigcirc	M = Maintained S = Spring Return	Cat. No.	Cat. No.
	Opera	itor Only*		No Co	ntacts	M M	800T-00HX2KB6	800H-00HRX2KB6
						M M	800T-24HR2KB6AX	800H-24HRR2KB6AX
Full Voltage	Incandescent	24V AC/DC	Red			S→M 	800T-24HR4KL8AX	800H-24HRR4KL8AX
Full Voltage						M←S	800T-24HR5KL8AX	800H-24HRR5KL8AX
	No Lamp	0250V AC/DC	No Knob	X	O X	M M	800T-25HXN2KB6AX	800H-25HRXN2KB6AX
					M M	800T-2HRH2KB6AX	800H-2HRRH2KB6AX	
Universal	LED	12130V AC/DC	Red			S→M 	800T-2HRH4KL8AX	800H-2HRRH4KL8AX
						M←S	800T-2HRH5KL8AX	800H-2HRRH5KL8AX
						M M	800T-16HR2KB6AX	800H-16HRR2KB6AX
	Incandescent					S→M 	800T-16HR4KL8AX	800H-16HRR4KL8AX
		1007/ 40 50/60 11-	DI			M←S	800T-16HR5KL8AX	800H-16HRR5KL8AX
Transformer		120V AC 50/60 Hz	Red	X	O X	M M	800T-16HRH2KB6AX	800H-16HRRH2KB6AX
	LED				^	S→M®	800T-16HRH4KL8AX	800H-16HRRH4KL8AX
						M←S	800T-16HRH5KL8AX	800H-16HRRH5KL8AX
	No Lamp	120V AC 50/60 Hz	No Knob	1		ММ	800T-16HXN2KB6AX	800H-16HRXN2KB6AX

Н

Note: X = Closed/O = Open

* Operator H

800

16

2

H

HR

R

W

2

g

2

KB6

KB6

1st Level

2nd Level



	a				
Protection Rating					
Code	Description				
Т	Metal, Type 4/13				
Н	Plastic, Type 4/4X/13				

b

Finger-Safe Guards					
Code	Description				
Blank	No guards				
С	Guards on terminals				

С			
Power Module Type and Voltage			
Full	Voltage — Incandescent		
Code	Description		
12	12V AC/DC		
24	24V AC/DC		
48	48V AC/DC		
	Universal — LED		
2	12130V AC/DC		
Transformer			
16	120V AC 50/60 Hz		
26	240V AC 50/60 Hz		
For other voltages, please contact your local Rockwell Automation sales office or Allen-Bradley			

distributor.

	No. of Positions				
Bul.		Bul.			
800T		800H			
Type	Description	Type			
4/13		4/4X/13			
Code	\1.	Code			
Н	2-position	HR			
	•				

е

Knob Color				
Code	Color			
Α	Amber			
В	Blue			
С	Clear			
G	Green			
R	Red			
W	White			
Х	No knob			

f

	Illumination Options			
	Code	Description		
ĺ	Blank	Incandescent		
I	Н	LED		

Table 1. Selector Switch Cam Targets

1 9 - 1					
Can	Cam Description (2-Position)				
Target					
		Contact Block			
		Code₩			
0	X	D, H, V, R, 5			
X	0	E, U, W, S, 6			

Operator Function and Knob Type Standard Knob or No Knob Code Operator Function 2 Maintained 4 Spring return from left Spring return from right 5 Knob Lever 17 Maintained 18 Spring return from left Spring return from right

h			
Cam Options			
	2-Position		
Code	Operator Function		
KB6	Maintained Cam		
KL8	Spring Return Cam		

Table 2. Contact Block Code Reduction Rules

Contact Block Substitution				
Code				
Standard				
Α				
М				
N				

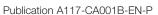
	Code Description						
	Blank (both pos.)	No contacts					
	Standard						
D 1 N.O.							
ا	Е	1 N.C.					
Ų	Α	1 N.O 1 N.C.					
Π	Χ	No contacts in this position					
٦	F	Pen <i>TUFF</i> (Low Voltage)					
	Н	1 N.O.					
	/U	1 N.C.					
	F	1 N.O 1 N.C.					
		Class 1, Div. 2/Zone 2					
		Logic Reed					
	V	1 N.O.					
	W	1 N.C.					
	Т	1 N.O 1 N.C.					
		Sealed Switch					
	R	1 N.O.					
	S	1 N.C.					
	Р	1 N.O 1 N.C.					
	Stackable Sealed Switch						
	5	1 N.O.					
	6	1 N.C.					
	7	1 N.O 1 N.C.					

Contact Blocks.

- . Contact blocks used on white side only.
- #Target tables are reversed for spring return from left operators.

X = Closed/O = Open

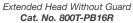
www.ab.com/catalogs Preferred availability cat. nos. are **bold**.



Push Button Operators

Momentary Contact Push Button Devices, Illuminated







Extended Head without Guard Cat. No. 800H-PRB16R

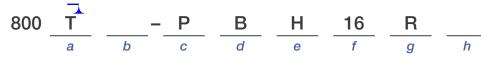
				Type 4/13		Type 4/4X/13	
				Extended Head Without Guard*	Extended Head With Guard*	Extended Head without Guard*	Extended Head with Guard*
Type	Lamp Type	Volts	Color	Cat. No.	Cat. No.	Cat. No.	Cat. No.
	Operator Onl	y≉		800T-SB00XX	800T-SA00XX	800H-SRB00XX	800H-SRA00XX
			Red	800T-QB24R	800T-QA24R	800H-QRB24R	800H-QRA24R
Full Voltogo	Incandescent	24V AC/DC	Green	800T-QB24G	800T-QA24G	800H-QRB24G	800H-QRA24G
Full Voltage			Amber	800T-QB24A	800T-QA24A	800H-QRB24A	800H-QRA24A
	No Lamp	0250V AC/DC	No Lens	800T-QBN25	800T-QAN25	800H-QRBN25	800H-QRAN25
	LED	12130V AC/DC	Red	800T-QBH2R	800T-QAH2R	800H-QRBH2R	800H-QRAH2R
Universal			Green	800T-QBH2G	800T-QAH2G	800H-QRBH2G	800H-QRAH2G
			Amber	800T-QBH2A	800T-QAH2A	800H-QRBH2A	800H-QRAH2A
	Incandescent	- 120V AC, 50/60 Hz	Red	800T-PB16R	800T-PA16R	800H-PRB16R	800H-PRA16R
			Green	800T-PB16G	800T-PA16G	800H-PRB16G	800H-PRA16G
			Amber	800T-PB16A	800T-PA16A	800H-PRB16A	800H-PRA16A
Transformer	LED		Red	800T-PBH16R	800T-PAH16R	800H-PRBH16R	800H-PRAH16R
			Green	800T-PBH16G	800T-PAH16G	800H-PRBH16G	800H-PRAH16G
			Amber	800T-PBH16A	800T-PAH16A	800H-PRBH16A	800H-PRAH16A
	No Lamp		No Lens	800T-PBN16	800T-PAN16	800H-PRBN16	800H-PRAN16

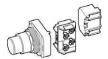
- * Includes as standard one Cat. No. 800T-XA (1 N.O. 1 N.C.) contact block.
- * Operator only supplied without power module, lamp, lens cap, or contact blocks.

Code

Blank

Н





a

Protection Rating			
Code	Description		
Т	Metal, Type 4/13		
Н	Plastic, Type 4/4X/13		

b

Finger-Safe Guards		
Code	Description	
Blank	No guards	
С	Guards on terminals	

С

Power Module Type				
800T Type 4/13	Description	800H Type 4/4X/13		
Code		Code		
Р	Transformer (or dual input)	PR		
Q	Full voltage/ Universal	QR		

d

Head Type			
Code	Description		
Α	Extended head with guard		
В	Extended head without guard		
М	Mushroom		
MJ	Jumbo mushroom		

Description
Incandescent
LED
Dual Input
Diode type‡

D Diode type‡
T Transformer — relay type
TH Transformer — relay type
LED

Illumination Options

	Voltage						
	Transformer						
	Code	Description					
	16	120V AC, 50/60 Hz					
	26	240V AC, 50/60 Hz					
	46	480V AC, 50/60 Hz					
	56	600V AC, 50/60 Hz					
	Full	Voltage — Incandescent					
	12	12V AC/DC					
\	24	24V AC/DC					
	48	48V AC/DC					
	10	120V AC/DC					
	20	240V AC/DC					
	Universal — LED						
7	2	12130V AC/DC					
-1	Dual Input						
	16	120V AC					
	24	24V AC/DC≻					

g

	Lens Color				
Code	Description				
Blank	No lens with standard contacts 1 N.O 1 N.C.				
Х	No lens if ordering any contacts other than standard 1 N.O 1 N.C.				
Α	Amber				
В	Blue				
С	Clear				
G	Green				
R	Red				
W	White				

d C. ıy	
C.	
ıy	
C.	

	Contact Block(s)				
Code	Description				
Х	No contacts				
	Standard				
Blank	1 N.O 1 N.C.				
D1	1 N.O.				
PenTUFF (Low Voltage)					
AV	1 N.O 1 N.C.				
	Class 1, Div. 2/Zone 2				
	Logic Reed				
AR	1 N.O 1 N.C.				
	Sealed Switch				
AP	1 N.O 1 N.C.				
S	Stackable Sealed Switch				
AY	1 N.O 1 N.C.				

- ‡ Diode type dual input provides circuit isolation via opposing diodes. Not recommended for use with solid-state outputs.
- Dual input diode only.

10

Specifications*

		Electrical Ratings		
Contact ratings		Refer to the contact ratings tables on page 10-4.		
Dielectric strength		2200V for one minute, 1300V for one minute (Logic Reed)		
Electrical design life cycles		1 000 000 at max. rated load, 200 000 at max. rated load (Logic Reed)		
		Mechanical Ratings		
Vibration		102000 Hz, 1.52 mm displacement (peak-to-peak) max./		
Shock		1/2 cycle sine wave for 11 ms ≥ 25 G (contact fragility) and no damage at 100 G		
Degree of protection		Type 1/4/12/13 (800T); Type 1/4/4X/12/13 (800H); EN/IEC 60529 IP66/65		
Mechanical design life cycles	3			
	(Momentary, non-illuminated)	10 000 000 min.		
Push buttons	(Momentary, illuminated)	250 000 min.		
	(Push-pull/twist-to-release)	250 000 min.		
Calaatan aurit-t	(Non-illuminated)	1 000 000 min.		
Selector switches	(Illuminated, key-operated)	200 000 min.		
Potentiometers		25 000 min.		
All other devices		200 000 min.		
Contact operation		Shallow, mini, and low-voltage contact blocks: Slow, double make and break Logic Reed and sealed switch contact blocks: Single break magnetic		
Wire gauge/Terminal screw torque		#1814 AWG (#1810 Max Duty) / 68 lb•in		
Typical operating forces Operators without contact blocks		Flush, extended button, standard mushroom, jumbo plastic mushroom: 2 lbs max. Jumbo and extended aluminum mushroom head: 3.95 lbs max. Maintained selector switch: 3.6 in•lb max.		
Spring return selector swit	ches	3.6 in•lb to stop, 0.2 in•lb to return		
Illuminated push buttons a	and push-to-test pilot lights	5 lb max.		
2-position push-pull		8.0 lb max. push or pull		
3-position push-pull		8 lb max. push to in position or pull to center position (15 lb max. pull to out position		
Twist-to-release or push-p	ull	9 lbs max. push or pull 30 in∙oz max. twist, 6 in∙oz minimum return		
Potentiometer		Rotational torque 312 in•oz; stopping torque 12 in•lb (minimum)		
	Standard	1 lb		
	Logic Reed	1 lb max.		
	Sealed switch	3 lb max. at 0.205 in. plunger travel		
Contact blocks	Stackable sealed switch	1 lb max.		
	MaxDuty	1.4 lb max.		
	PenTUFF	1.4 lb max.		
	Self Monitoring	1.6 lb		
		Environment		
T .	Operating	-40+131 °F (-40+55 °C)		
Temperature range Storage		-40+185 °F (-40+85 °C)		
the absence of moistu Rockwell Automation s	es below freezing are based on re and liquids. Consult your local sales office or Allen-Bradley ower temperature applications.			
Humidity		5095% RH from 77140 °F (2560 °C) per Procedure IV of MIL-STD-810C, Method 507.1 cycling test		

^{*} Performance Data — See Important- 3.

10

Standard Contact Ratings

Minimum: 24V, 24 mA

Maximum thermal continuous current I^{th} 10 A AC/2.5 A DC. Bulletin 800T units with 800T-XA contacts have ratings as follows:

Max. Opertnl.	Utilization Category		Rated Operational Currents		
Volts U _e	IEC	NEMA	Volts U _e	Make	Break
AC 600	AC-15	A600	120600 72120 2472	7200VA 60 A 60 A	720VA 720VA 10 A
DC 600	DC-13	Q600	28600 2428*	69VA 2.5 A	

For applications below 24V/24 mA, PenTUFF or Logic Reed contacts are recommended.

Sealed Switch Contact Ratings

Minimum: 5V, 1 mA

Maximum continuous current I_{th} 5 A. Bulletin 800T units have control circuit ratings with sealed switch contact blocks as follows:

Max. Opertnl.	Utilization Category		Rated Operational Currents		
Volts U _e	IEC	NEMA	Volts U _e	Make	Break
AC 600	AC-15	B600	120600 0120	3600VA 30 A	360VA 3 A
DC 300	DC-13	P300	24300 024	138VA 5.0 A	

Stackable Sealed Switch Contact Ratings

Minimum: 5V, 10 mA (digital); 24V, 1 mA (analog)

Maximum continuous current $I_{\rm th}$ 2.5 A. Bulletin 800T units have control circuit ratings with sealed switch contact blocks as follows:

Max. Opertnl.	Utilization Category		Rated Operational Currents		
Volts U _e	IEC	NEMA	Volts U _e	Make	Break
AC 300	AC-15	C300	120300 0120	1800VA 15 A	180VA 1.5 A
DC 150	DC-13	Q150	24150 024	69VA 2.5 A	

Logic Reed Contact Ratings

Minimum — DC: 5V, 1 mA

Maximum — DC: 30V, 0.06 A, AC: 150V, 0.15 A

Should only be used with resistive loads.

Materials Used in 800H Type 4X Operators Thermoplastic Polyester (Fiberglass Reinforced)

- Bushings
- Mounting Rings
- Sockets

Thermoplastic Polyester

• Non-illuminated button caps

Transparent Amorphous Nylon

- · Pilot light lens cap
- Illuminated button caps

Glass Filled Crystalline Nylon

• Thrust washer

Mineral Filled Nylon

• Trim washer

Nitrile (Synthetic Rubber)

· Gaskets and internal seals

PenTUFF™ (Low Voltage) Contact Ratings

Minimum DC: 5V, 1 mA

Maximum thermal continuous current I_{th} 2.5 A AC/1.0 A DC. Bulletin 800T units with 800T-XAV contacts have ratings as follows:

Max. Opertnl.	Utilization Category		Rated Operational Currents		
Volts U _e	IEC	NEMA	Volts U _e	Make	Break
AC 300	AC-15	C300	120300 0120	1800VA 15 A	180VA 1.5 A
DC 150	DC-13	R150	24150 024	28 1.0	VA) A

Snap Action Contact Ratings

Max. Opertnl.	Contact Rating	Rated Operational Currents		
Volts U _e	Designation	Volts U _e	Make	Break
AC 300	A300	120300 2472	7200VA 60 A	720VA 10 A
DC 250	_	230250 115125	0.2 A 0.4 A	

MaxDuty Contact Rating

Maximum thermal continuous current $I_{\rm th}$ 24 A. Pilot Duty — 120V AC, 12 A; 24V DC, 10 A Motor Ratings — 120V AC, 1.5 Hp; 240V AC, 3 Hp; 24V DC, 10 A FLA/60 A LRA

Time Delay Contacts

Max. Opertnl.	Contact Rating	Rated 0	Operational C	Currents
Volts U _e	Designation	Volts U _e	Make	Break
AC 120	B150	120	3600VA	360VA

Note: This device is not rated for DC applications. Adjustment range: $0.5...15 \text{ s} \pm 25\% I_{th} = 5 \text{ A}$



2-Position Red Trigger Action Twist-to-Release, Non-Illuminated

- Tamper resistant front-of-panel mounting and non-removable operator head
- Compliant with global E-stop standards, including EN ISO 13850 and EN 60947-5-5









Cat. No. 800T-TFXJET6

Cat. No. 800T-TFXLET6

Cat. No. 800T-TFXK6

Cat. No. 800H-TFRXT6

Operator Position				Type 4/13				
			45 mm Plastic	63 mm Metal	Key Release	45 mm Plastic		
Contact Type	Out	In	Cat. No.∗⊕‡	Cat. No.∗§	Cat. No.∗♣	Cat. No.**		
No contacts	_	_	800T-TFXT6	800T-TFXLT6	800T-TFXK6	800H-TFRXT6		
1 N.C.	Х	0	800T-TFXT6D2	800T-TFXLTD2	800T-TFXK6D2	800H-TFRXT6D2		
1 N.O 1 N.C.	O X	X O	800T-TFXT6A	800T-TFXLT6A	800T-TFXK6A	800H-TFRXT6A		
1 S.M.C.B.►	Х	0	800TC-TFXT6D4S	800TC-TFXLT6D4S	800TC-TFXK6D4S	800HC-TFRXT6D4S		

- * For finger-safe contact block terminals, add a C to the cat. no. Example: Cat. No. 800TC-TFXT6 or 800HC-TFRXT6.
- To order a device with a jumbo (60 mm) plastic head add the letter J after X. Example: Cat. No. 800T-TFXJT6A or 800H-TFRXJT6A.
- ‡ To order a jumbo head device with "E-STOP" printed on the cap add the letters JE after X. Example: Cat. No. 800T-TFXJET6 or 800H-TFRXJET6.
- § To order a device with "E-STOP" engraved on the cap add the letter E after L. Example: Cat. No. 800TC-TFXLET6D4S.
- A Provided with two DO18 keys.
- ➤ Self-monitoring contact block.

800	Н	С	- T	FRX	Т	6	A5S
800	Т	-	- T	FX	Т	6	D2
-	a	<u></u>			d		<u>е</u>

а

Protection Rating		
Code	Description	
Т	Metal, Type 4/13	
Н	Plastic, Type 4/4X/13	

b

	Finger-Safe Guards		
Code	Description		
Blank	No guards		
С	Guards on terminals		

C

Head Type‡			
800T Type 4/13	Description		
Code		Code	
FX	Standard (45 mm) mushroom head	FRX	
FXJ	Jumbo (60 mm) mushroom head	FRXJ	
FXJE	Jumbo (60 mm) mushroom head with "E-STOP"	FRXJE	
FXK	45 mm mushroom head key release	_	
FXL	63 mm anodized aluminum head	_	
FXLE	63 mm anodized aluminum head with "E-STOP"	_	

d

Release Function		
Code	Color	
Blank	Key releaseื	
Т	Twise release	

Note: X = Closed/O = Open

 \sharp Configurable only with **FXK** head type.

Contact Block(s)					
Operator	Position				
		Description			
Out	ln				
_	_	No contacts on operator			
		Standard			
0		1 N.O.			
		1 N.C.			
Х		1 N.C.L.B.			
O X	X O	1 N.O 1 N.C.			
O X	X	1 N.O 1 N.C.L.B.			
X X	0	2 N.C.L.B.			
		PenTUFF (Low Voltage)			
0	Х	1 N.O.			
Х	0	1 N.C.			
Х	0	1 N.C.L.B.			
O X	X O	1 N.O 1 N.C.			
		Class 1, Div. 2/Zone 2			
		Logic Reed			
0	Х	1 N.O.			
Х	0	1 N.C.			
O X	X O	1 N.O 1 N.C.			
		Sealed Switch			
0	Х	1 N.O.			
Х	0	1 N.C.			
O X	X O	1 N.O. 1 N.C.			
Stackable Sealed Switch					
0	Х	1 N.O.			
Х	0	1 N.C.			
O X	X O	1 N.O 1 N.C.			
	Out — O X X X O X X X O X X X O X X	Out In			



The new 800T MaxDuty™ contact blocks from Rockwell Automation are the solution to your higher-current switching needs. For use with 800T and 800H 30 mm push buttons, the new MaxDuty™ contacts can switch twice as much current as typical "pilot duty" contacts. In addition, they are also suitable for starting and stopping small horsepower-rated motors. The net result can be lower product/installation costs, reduced maintenance/downtime, and increased safety. So don't settle for "standard duty" or "heavy duty" contacts when your application demands 800T MaxDuty™ contacts.

Features/Specifications

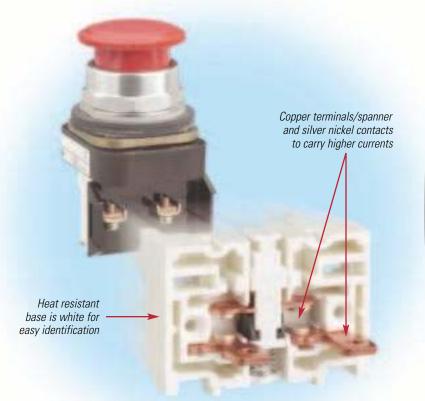
- Carry 24 A continuous current (I_{th}=24 A)
- Switch 12 A @ 120V AC, 10 A @ 24V DC (pilot duty – Inductive Loads)
- Start/Stop Motors: 1.5 Hp @ 120V AC 3 Hp @ 240V AC 10 A FLA/60 A LRA @ 24V DC
- Available in N.O., N.C. or N.C.L.B. configurations
- Finger safe version available
- Same physical package and mounting as 800T shallow blocks
- Terminals accept up to 10 AWG wires
- Use with all existing 800T and 800H push button operators
- Available as accessory or as assembled onto push button operator
- cUL_{US} listed





800T MaxDutyTM **Contact Blocks**

Switch up to 12 A – Start/Stop up to 3 Hp Motors



Internal view of MaxDuty™ block

Applications/Benefits

• Longer Electrical Life.

Use MaxDuty™ contacts in existing push button applications for longer contact life than "standard duty" or "heavy duty" contacts, thereby reducing maintenance/downtime and lowering product life-cycle costs.

Increased Safety.

Higher MaxDuty™ contact ratings reduce chance of contacts welding in existing E-Stop applications. Also, E-Stops may now possibly be wired in power circuit to directly break line/load, rather than relying on control relay contacts to open.

• Lower Cost.

Displace small contactors, load/cam switches, or interposing relays in applications such as lighting, heating, 24V DC, etc. MaxDuty™ contacts can even displace manual motor starters in single-phase motor starting/stopping applications where overload protection is either not required or is built into the motor. Realize the lower product cost, reduced panel space, and ease of installation of push buttons as compared to these other products.





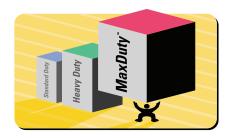
Ratings Comparison

			Pilot Duty/Inductive Loads				Motor Rated		
		Continuous	120\	/ AC	24V	DC	120V AC	240V AC	24V DC
C	ontacts	Amps Ith	Make	Break	Make	Break	Нр	Нр	FLA/LRA
Ту	pical Competitive	10 A	60 A	6 A	5 A	5 A	_	_	_
N	ew A-B MaxDuty™	24 A	120 A	12 A	10 A	10 A	1.5 Hp	3 Нр	10 A/60 A

Easy Ordering

Catalog Number	Description
Contact Blocks	-
800T-XD1M	N.O. MaxDuty™ Contact Block
800T-XD2M	N.C. MaxDuty [™] Contact Block
800T-XD4M	N.C.L.B. MaxDuty™ Contact Block
800TC-XD1M	Finger-Safe N.O. MaxDuty™ Contact Block
800TC-XD2M	Finger-Safe N.C. MaxDuty™ Contact Block
800TC-XD4M Finger-Safe N.C.L.B. MaxDuty™ Contact Block	
Assembled Push Buttons	
800T-A1D1M	Flush, Momentary, Green Push Button with N.O. MaxDuty™ Contacts
800T-A2D1M	Flush, Momentary, Black Push Button with N.O. MaxDuty™ Contacts
800T-B6D2M	Extended, Momentary, Red Push Button with N.C. MaxDuty™ Contacts
800T-D6D2M	Mushroom, Momentary, Red Push Button with N.C. MaxDuty™ Contacts
800T-H2D1M	2-Position Maintained Selector Switch with N.O. MaxDuty™ Contacts
800T-J2AM	3-Position Maintained Selector with N.O. and N.C. MaxDuty™ Contacts
800T-FX6D4M	2-Position, Red Push-Pull with N.C.L.B. MaxDuty™ Contacts
800T-FXT6D4M	2-Position, Red Push-Pull-Twist-Release with N.C.L.B. MaxDuty™ Contacts

- Other assembled push button configurations available. Contact your local A-B distributor.
- Maintained push buttons are recommended for motor starting/stopping applications.
- MaxDuty™ contacts are not recommended for applications below 24V/100 mA.



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Round Beacons

Product Selection



Bulletin 855BS, 855BM, 855BL — Industrial Round Beacons

- Six colors available
- LED illumination functions:
- Single-color LED with user-selectable steady burning or flashing
- Three-color LED (red, green, amber)
- LED Strobe with user-selectable single or double flash
- Halogen functions: steady, flashing, or rotating
- Xenon function: strobe
- · Surface, NPT conduit, or tube mounting options
- UL Type 4/4X/13, IP65

Table of Contents

90 mm Beacons...... this page 120 mm Beacons 11-25 160 mm Beacons 11-26 Accessories...... 11-27 Specifications...... 11-30 Approx. Dimensions . 11-31

Standards Compliance

UL 508 EN/IEC 60947-1 EN/IEC 60947-5-1 CSA 22.2 No. 14

Certifications

cULus Listed (File No. E14840, Guides NKCR, NKCR7) CE Marked

Product Selection

Bulletin 855BS — 90 mm Beacons

BL 855BS 35 S 855BS 10 RH3 b a C

	Base Type
Code	Description
S	Surface mount∗
N	1/2 in. NPT conduit mount
T	25 mm tube mount§
	S

b

	Voltage			
	Code	Description		
	12	12V AC/DC		
	24	24V AC/DC		
	10	120V AC		
	20	240V AC		
٠	35	24/48V AC/DC		
	45	120/240V AC/DC		

		Function
	Code	Description
	DH	Steady halogen
	FH	Flashing halogen
	RH	Rotating halogen
	BR	Xenon tube strobe‡
	SL	LED single color selectable steady/flash>
	ML	LED three color#❖
>	BL	LED strobe selectable single/double flash+

d

		LED/Lens Color
	Code	Description
	345	Green, red, amber❖
	3	Green
>	4	Red
	5	Amber
	6	Blue
	7	Clear
	8	Yellow

- * Surface mount base must be installed with rough wall plate for UL Type 4/4X/13 rating, otherwise UL Type 1 only.

- * Surface mount base must be installed with rough wan plate for our type 4.7% fortaling, stress...

 † Not available in 12V AC/DC.

 § 25 mm tube mount is UL Recognized, other mounting types are UL Listed.

 > SL function uses 35 (16...60V AC/16...80V DC) and 45 (90...250V AC/DC) voltage codes only.

 #ML function uses 35, 119...52V AC/16...60V DC), 10, and 20 voltage codes only.

 † BL function uses 35 (19...52V AC/16...60V DC), 10, and 20 voltage codes only.

- . Green, Red, Amber color combination is only valid for the three color LED selection (ML).

90 mm Beacons

Base Type	Voltage	Function	Color	Cat. No.
		Steady Halogen	Red	855BS-S24DH4
		Steady Halogen	Amber	855BS-S24DH5
	24V AC/DC	Datating Halagan	Red	855BS-S24RH4
	24V AC/DC	Rotating Halogen	Amber	855BS-S24RH5
		Xenon Strobe	Red	855BS-S24BR4
Surface Mount*		Aeriori Strobe	Amber	855BS-S24BR5
Surface Mount*		Steady Halogen	Red	855BS-S10DH4
		Steady Halogeri	Amber	855BS-S10DH5
	120V AC	Datating Halagan	Red	855BS-S10RH4
	120V AC	Rotating Halogen	Amber	855BS-S10RH5
		Xenon Strobe	Red	855BS-S10BR4
			Amber	855BS-S10BR5
	24V AC/DC	Steady Halogen	Red	855BS-N24DH4
			Amber	855BS-N24DH5
		Rotating Halogen	Red	855BS-N24RH4
			Amber	855BS-N24RH5
		Xenon Strobe	Red	855BS-N24BR4
1/2 in. NPT Conduit			Amber	855BS-N24BR5
Mount		Chardy Halaman	Red	855BS-N10DH4
		Steady Halogen	Amber	855BS-N10DH5
	120V AC	Rotating Halogen	Red	855BS-N10RH4
	120V AC	notating Halogen	Amber	855BS-N10RH5
		Xenon Strobe	Red	855BS-N10BR4
		Velioti Priobe	Amber	855BS-N10BR5

90 mm LED Beacons

Base Type	Base Type Voltage Function		Color	Cat. No.
			Red	855BS-S35SL4
	24/48V AC/DC		Amber	855BS-S35SL5
		Single Color LED	Blue	855BS-S35SL6
		Single-Color LED	Red	855BS-S45SL4
	120/240V AC/DC		Amber	855BS-S45SL5
Surface Mount∗			Blue	855BS-S45SL6
Surface Mount*	24V AC/DC	Three-Color LED	Green, Red, Amber	855BS-S24ML345
	120V AC	Three-Color LED	Green, Red, Amber	855BS-S10ML345
			Red	855BS-S35BL4
	24/48V AC/DC	Single/Double Strobe LED	Amber	855BS-S35BL5
		Single/Double Strobe LED	Blue	855BS-S35BL6
	120V AC		Red	855BS-S10BL4
			Red	855BS-N35SL4
	24/48V AC/DC		Amber	855BS-N35SL5
		Single-Color LED	Blue	855BS-N35SL6
		- Single-Color LED	Red	855BS-N45SL4
	120/240V AC/DC		Amber	855BS-N45SL5
1/2 in. NPT Conduit Mount			Blue	855BS-N45SL6
1/2 III. NF1 Conduit Mount	24V AC/DC	Three-Color LED	Green, Red, Amber	855BS-N24ML345
	120V AC	Tillee-Color LED	Green, Red, Amber	855BS-N10ML345
			Red	855BS-N35BL4
	24/48V AC/DC	Single/Double Strobe LED	Amber	855BS-N35BL5
		Sirigle/Double Strobe LED	Blue	855BS-N35BL6
	120V AC		Red	855BS-N10BL4

^{*} When used outdoors, surface mount base must be installed with rough wall plate for NEMA Type 4/4X/13 rating, otherwise NEMA Type 1 only.



SAP# 300837153

LIMITRON™ FNQ-R Class CC 600Vac, 1/4-30A, time-delay fuses





Catalog symbol:

· FNQ-R-(amp)

Description:

Advanced protection Class CC current-limiting, time-delay fuses.

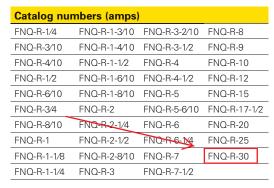
Specifications:

Ratings

- Volts
 - 600Vac
 - 300Vdc (15 & 20A)
- · Amps 1/4-30A
- IB
 - 200kA Vac RMS Sym.
 - 20kA Vdc (15 & 20A)

Agency information

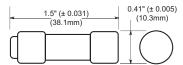
- UL® Listed, Std. 248-4, Class CC, Guide JDDZ, File F4273
- CSA® Certified, Class CC CSA, Class 1422-01, File 53787-HRC-MISC
- · CF
- · RoHS compliant*
- * FNQ-R-1/4 not RoHS complaint.



Carton quantity:

Amp rating	Carton qty.
1/4-30	10

Dimensions - in:



Features:

- Provides 10X better current limitation to help prevent equipment damage caused by shortcircuit events
- 200kA interrupting rating complies with NEC® Section 110.9 for today's large capacity systems.
- Fast-acting fuse helps prevent equipment damage caused by short-circuit events.
- Rejection type fuse fits both standard and rejection-style holders.
- The Class CC FNQ-R Limitron fuse meets the needs of control circuit transformer protection.
- FNQ-R fuses can be sized according to NEC® and UL requirements and still allow the high inrush currents, with significantly more timedelay than the UL minimum value of 12 seconds at 200% for Class CC fuses.
- Ideal for critical industrial or commercial applications that have specific current limitation requirements.



Applications:

- · Branch circuits
- · Line protection
- · Small control transformers
- · Industrial control

Recommended fuse blocks and holders:

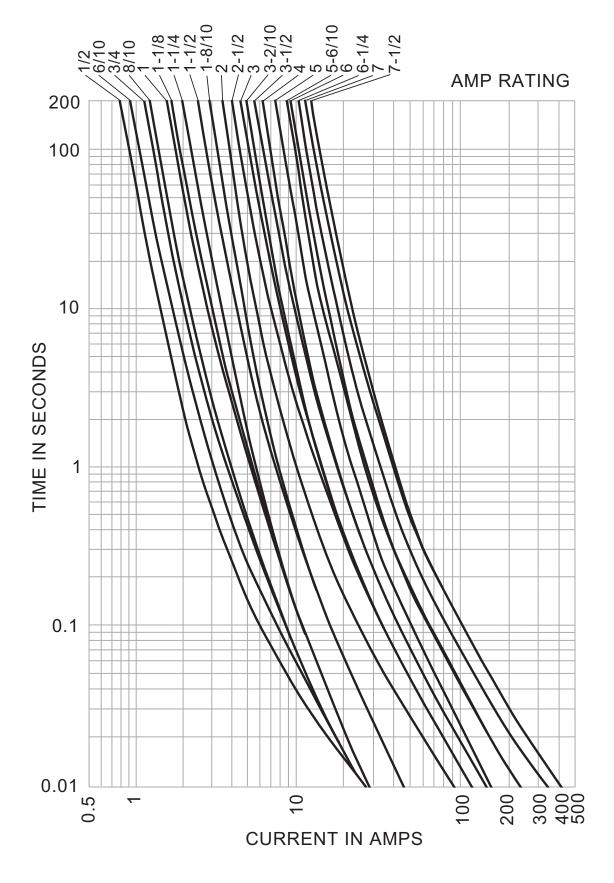
Fuse amps	1-Pole	2-Pole	3-Pole	
0-30	BCM603-1_	BCM603-2_	BCM603-3_	
	DIN-F	ail holders		
	CHCC1D_	CHCC2D_	CHCC3D_	
0-30	_	_	OPM-NG	
	_	_	OPM-1038_	
	_	_	OPM-1038_SW	
	Panel m	ount holders		
0-30	HPS	_	_	
	HPF	_	_	
In-line holders				
0-30	_	HEY	_	
	HEZ	_	_	

For additional information on Class CC fuse blocks and holders, see data sheets:

- · Modular open blocks # 10241 (BCM)
- DIN-Rail holders No. 3185 (CHCC), No. 1109 (OPM), No. 1102 (OPM-1038), No. 1103 (OPM-1038_SW)
- · Panel mount holders No. 2113 (HPS), No. 2114 (HPF)
- · In-line holders No. 2126 (HEY), No. 2130 (HEZ)

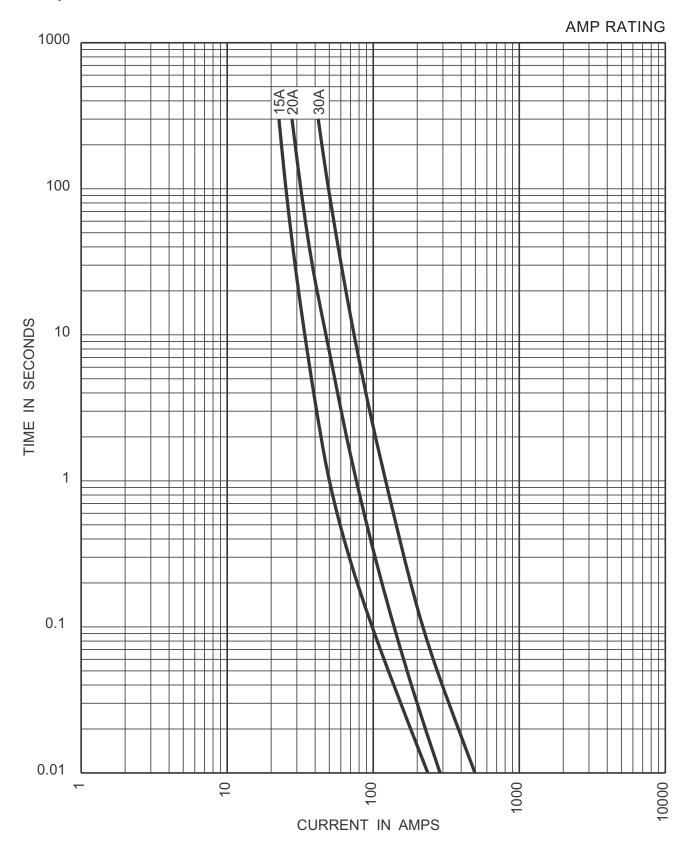
Time-current curves - average melt:

1/2 to 71/2 amps



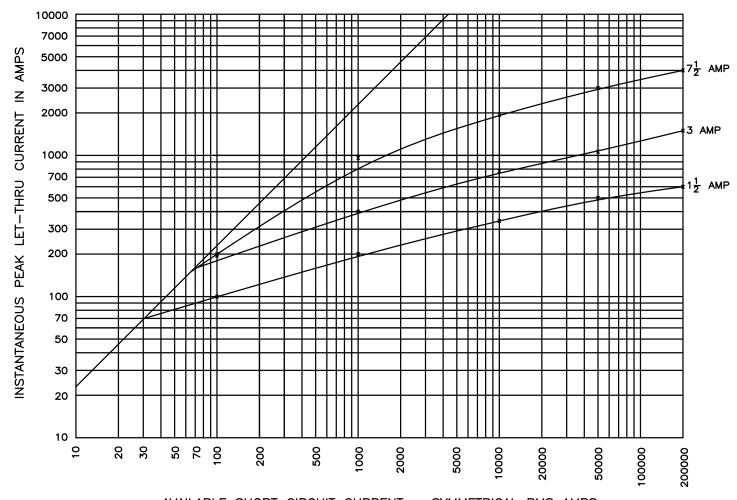
Time-current curves - average melt:

15 to 30 Amps



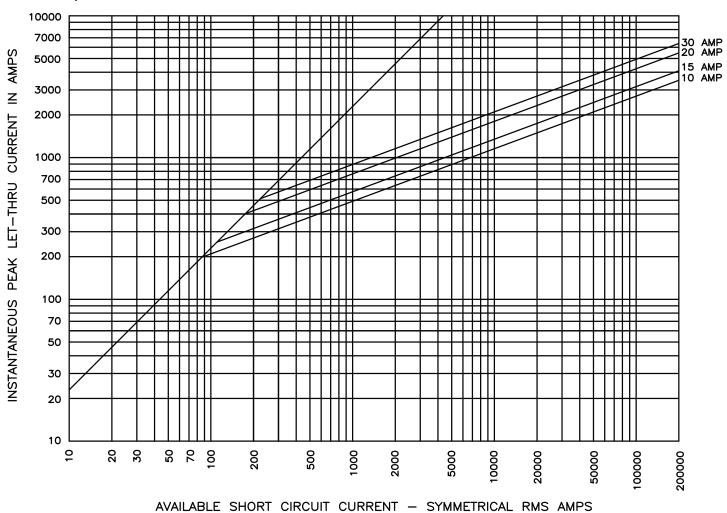
Current-limitation curves:

1-1/2 to 7-1/2 amps



Current-limitation curves:

10 to 30 amps



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LIMITRON™ FNQ-R Class CC 600Vac, 1/4-30A, time-delay fuses





Catalog symbol:

FNQ-R-(amp)

Description:

Advanced protection Class CC current-limiting, time-delay fuses.

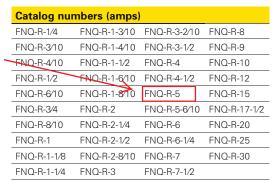
Specifications:

Ratings

- · Volts
 - 600Vac
 - 300Vdc (15 & 20A)
- · Amps 1/4-30A
- IF
 - 200kA Vac RMS Sym.
 - 20kA Vdc (15 & 20A)

Agency information

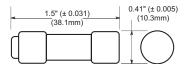
- UL® Listed, Std. 248-4, Class CC, Guide JDDZ, File F4273
- CSA® Certified, Class CC CSA, Class 1422-01, File 53787–HRC-MISC
- CF
- · RoHS compliant*
- * FNQ-R-1/4 not RoHS complaint.



Carton quantity:

Amp rating	Carton qty.
1/4-30	10

Dimensions - in:



Features:

- Provides 10X better current limitation to help prevent equipment damage caused by shortcircuit events
- 200kA interrupting rating complies with NEC® Section 110.9 for today's large capacity systems.
- Fast-acting fuse helps prevent equipment damage caused by short-circuit events.
- Rejection type fuse fits both standard and rejection-style holders.
- The Class CC FNQ-R Limitron fuse meets the needs of control circuit transformer protection.
- FNQ-R fuses can be sized according to NEC® and UL requirements and still allow the high inrush currents, with significantly more timedelay than the UL minimum value of 12 seconds at 200% for Class CC fuses.
- Ideal for critical industrial or commercial applications that have specific current limitation requirements.



Applications:

- · Branch circuits
- · Line protection
- · Small control transformers
- · Industrial control

Recommended fuse blocks and holders:

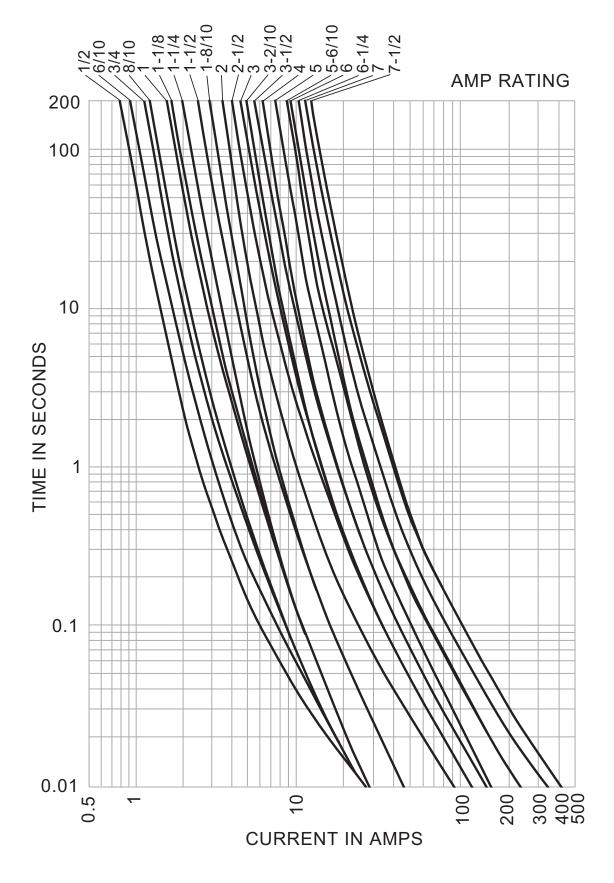
Fuse amps	1-Pole	2-Pole	3-Pole	
0-30	BCM603-1_	BCM603-2_	BCM603-3_	
	DIN-F	ail holders		
	CHCC1D_	CHCC2D_	CHCC3D_	
0-30	_	_	OPM-NG	
	_	_	OPM-1038_	
	_	_	OPM-1038_SW	
	Panel m	ount holders		
0-30	HPS	_	_	
	HPF	_	_	
In-line holders				
0-30	_	HEY	_	
	HEZ	_	_	

For additional information on Class CC fuse blocks and holders, see data sheets:

- · Modular open blocks # 10241 (BCM)
- DIN-Rail holders No. 3185 (CHCC), No. 1109 (OPM), No. 1102 (OPM-1038), No. 1103 (OPM-1038_SW)
- · Panel mount holders No. 2113 (HPS), No. 2114 (HPF)
- · In-line holders No. 2126 (HEY), No. 2130 (HEZ)

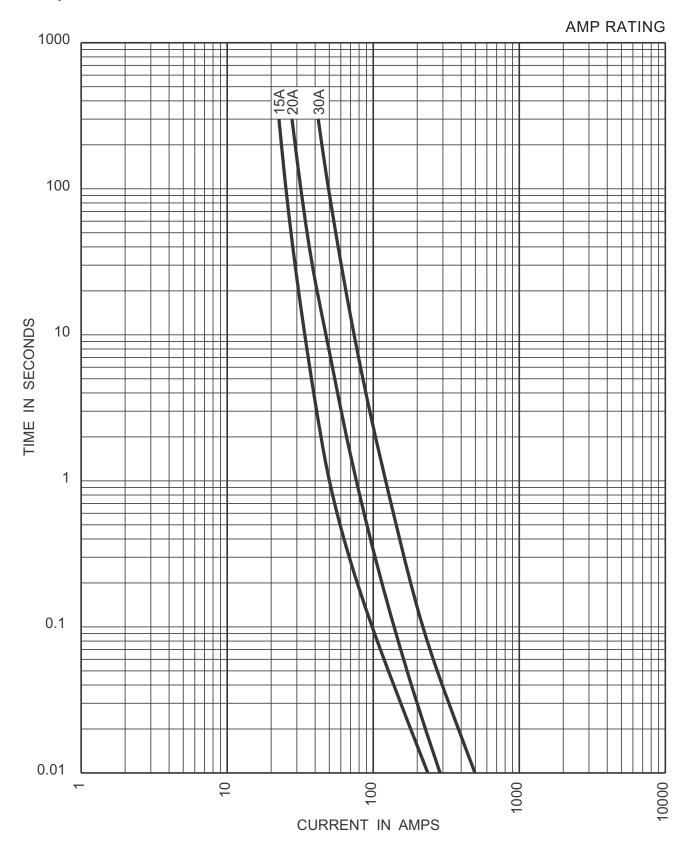
Time-current curves - average melt:

1/2 to 71/2 amps



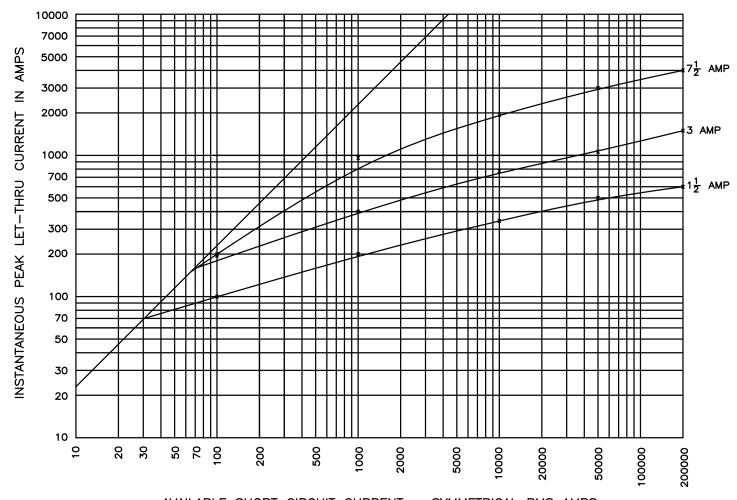
Time-current curves - average melt:

15 to 30 Amps



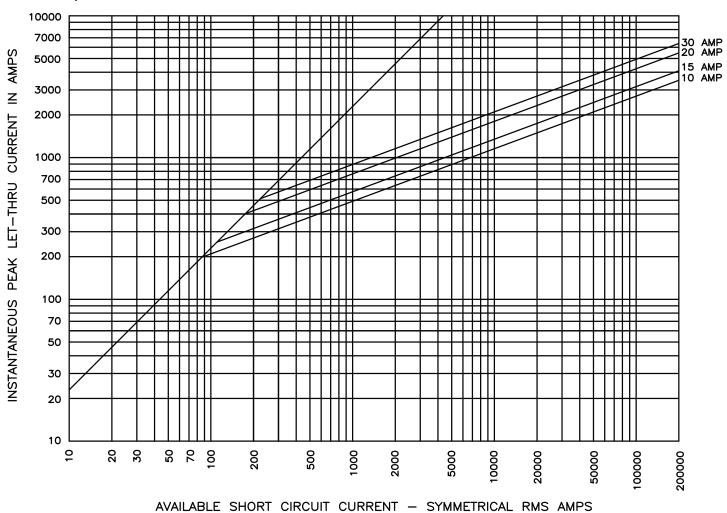
Current-limitation curves:

1-1/2 to 7-1/2 amps



Current-limitation curves:

10 to 30 amps



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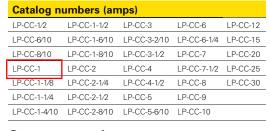




Low-Peak™ LP-CC Class CC 600Vac/300Vdc, 1/2-30A time-delay fuses







Carton quantity:

Dimensions - in (mm)

Amp rating	Carton qty.
1/4-30	10

Catalog symbol:

LP-CC-(amp)

Description:

Ultimate protection Class CC current-limiting, timedelay fuses. Time-delay – 12 seconds (minimum) at 200% of rated current.

Specifications:

Ratings

- Volts
 - 600Vac,
 - 300Vdc (1/2-2-8/10A, 20-30A)
 - 150Vdc (3-15A)
- · Amps 1/2-30A
- IR
 - 200kA Vac RMS Sym.
 - 20kA Vdc

Agency information

- UL® Listed Class CC, Std. 248-4, Guide JDDZ, File E4273
- CSA® Certified; Class 1422-02, File 53787
- RoHS compliant (20-30A)

0.41" (± 0.005) 1.5" (± 0.031) (10.3mm) (38.1mm)

Features:

- 200kA interrupting rating complies with NEC® Section 110.9 for today's large capacity
- Fast short-circuit protection and dual-element. time-delay performance provide ultimate protection.
- Reduces existing fuse inventory by up to 33% when upgrading to Low-Peak fuses.
- Consistent 2:1 ampacity ratios for all Low-Peak fuses make selective coordination easy.
- Time-delay characteristic avoids unwanted fuse openings from surge currents while fast response speed under short-circuit conditions provides a high degree of current limitation.
- Current-limitation protects downstream components against damaging thermal and magnetic effects of short-circuit currents.
- A superior, all-purpose, space-saving branch circuit fuse that meets most protection requirements up to 30A.
- Very compact, with a physical size only 13/32" x 1 1/2" (10.3 x 38.1mm) with rejction tip.
- Proper sizing can provide "no damage" Type 2 coordinated protection for NEMA and IEC motor controllers.
- Can be used where either a time-delay or a fast-acting fuse is needed, making selection easier and reducing spare fuse inventories for substantial cost reduction.
- Superior protection for small horsepower motor circuits.



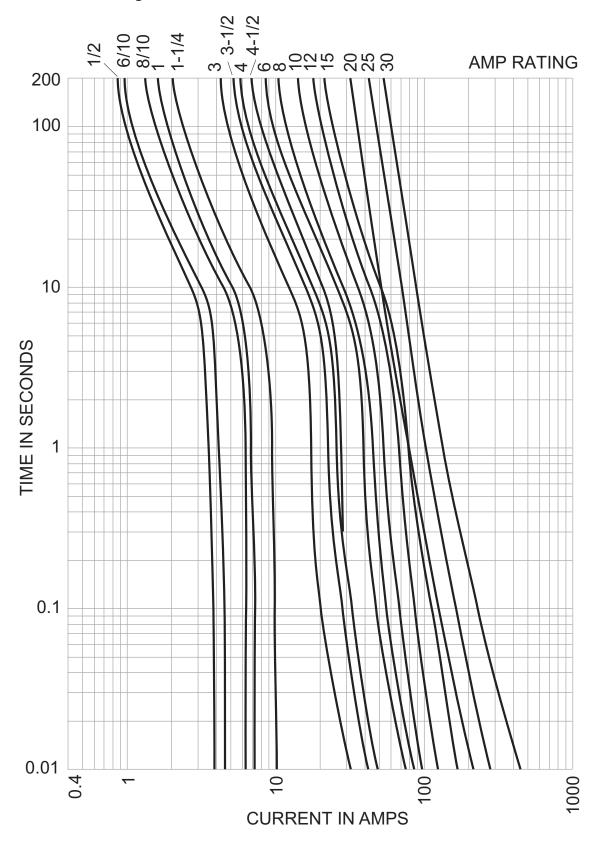
Recommended fuse blocks and holders:

Fuse amps	1-Pole	2-Pole	3-Pole			
	Modular open blocks					
0-30	BCM603-1_	BCM603-2_	BCM603-3_			
	DIN-F	Rail holders				
	CHCC1D_	CHCC2D_	CHCC3D_			
0-30	_	_	OPM-NG			
	_	_	OPM-1038_			
	_	_	OPM-1038_SW			
	Panel mount holders					
0-30	-30 HPS		_			
	HPF	_	_			
In-line holders						
0-30	_	HEY	_			
	HEZ	_	_			

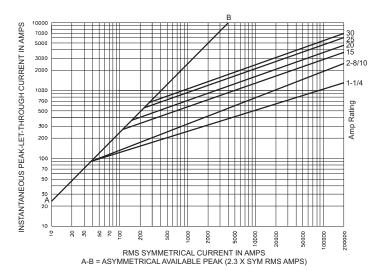
For additional information on Class CC fuse blocks and holders, see data sheets:

- · Modular open blocks # 10241 (BCM)
- DIN-Rail holders No. 3185 (CHCC), No. 1109 (OPM), No. 1102 (OPM-1038), No. 1103 (OPM-1038_SW)
- · Panel mount holders No. 2113 (HPS), No. 2114 (HPF)
- · In-line holders No. 2126 (HEY), No. 2130 (HEZ)

Time-current curves - average melt:



Current-limitation curves:



Current-limiting effects:

Prospective	Let-through current (apparent RMS symmetrical vs. fuse rating)					
S.C.C.	1 1/4A	2 8/10A	15A	20A	25A	30A
1000	100	135	240	305	380	435
3000	140	210	350	440	575	580
5000	165	255	420	570	690	710
10,000	210	340	540	700	870	1000
20,000	260	435	680	870	1090	1305
30,000	290	525	800	1030	1300	1520
40,000	315	610	870	1150	1390	1700
50,000	340	650	915	1215	1520	1820
60,000	350	735	1050	1300	1650	1980
80,000	390	785	1130	1500	1780	2180
100,000	420	830	1210	1600	2000	2400
200,000	525	1100	1600	2000	2520	3050

NOTE: To calculate I_p (I_{peak}) multiply I_{RMS} value by 2.3.

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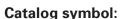




Low-Peak™ LP-CC Class CC 600Vac/300Vdc, 1/2-30A time-delay fuses







LP-CC-(amp)

Description:

Ultimate protection Class CC current-limiting, time-delay fuses. Time-delay – 12 seconds (minimum) at 200% of rated current.

Specifications:

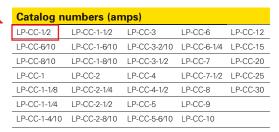
Ratings

- Volts
 - 600Vac,
 - 300Vdc (1/2-2-8/10A, 20-30A)
 - 150Vdc (3-15A)
- Amps 1/2-30A
- · IR
 - 200kA Vac RMS Sym.
 - 20kA Vdc

Agency information

- UL[®] Listed Class CC, Std. 248-4, Guide JDDZ, File E4273
- · CSA® Certified; Class 1422-02, File 53787
- · CE
- · RoHS compliant (20-30A)

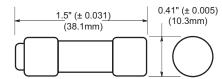




Carton quantity:

Amp rating	Carton qty.
1/4-30	10

Dimensions - in (mm)



Features:

- 200kA interrupting rating complies with NEC® Section 110.9 for today's large capacity systems
- Fast short-circuit protection and dual-element, time-delay performance provide ultimate protection.
- Reduces existing fuse inventory by up to 33% when upgrading to Low-Peak fuses.
- Consistent 2:1 ampacity ratios for all Low-Peak fuses make selective coordination easy.
- Time-delay characteristic avoids unwanted fuse openings from surge currents while fast response speed under short-circuit conditions provides a high degree of current limitation.
- Current-limitation protects downstream components against damaging thermal and magnetic effects of short-circuit currents.
- A superior, all-purpose, space-saving branch circuit fuse that meets most protection requirements up to 30A.
- Very compact, with a physical size only 13/32" x 1 1/2" (10.3 x 38.1mm) with rejction tip.
- Proper sizing can provide "no damage" Type 2 coordinated protection for NEMA and IEC motor controllers.
- Can be used where either a time-delay or a fast-acting fuse is needed, making selection easier and reducing spare fuse inventories for substantial cost reduction.
- Superior protection for small horsepower motor circuits.

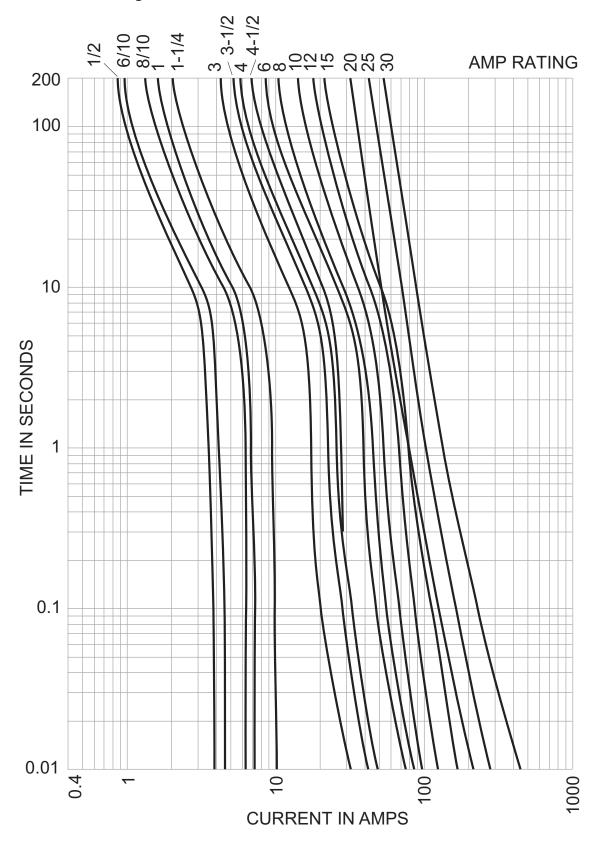
Recommended fuse blocks and holders:

Fuse amps	1-Pole	2-Pole	3-Pole			
	Modular open blocks					
0-30	BCM603-1_	BCM603-2_	BCM603-3_			
	DIN-F	Rail holders				
	CHCC1D_	CHCC2D_	CHCC3D_			
0-30	_	_	OPM-NG			
	_	_	OPM-1038_			
	_	_	OPM-1038_SW			
	Panel mount holders					
0-30	-30 HPS		_			
	HPF	_	_			
In-line holders						
0-30	_	HEY	_			
	HEZ	_	_			

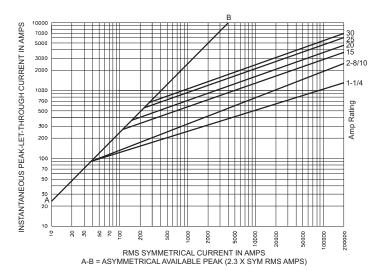
For additional information on Class CC fuse blocks and holders, see data sheets:

- · Modular open blocks # 10241 (BCM)
- DIN-Rail holders No. 3185 (CHCC), No. 1109 (OPM), No. 1102 (OPM-1038), No. 1103 (OPM-1038_SW)
- · Panel mount holders No. 2113 (HPS), No. 2114 (HPF)
- · In-line holders No. 2126 (HEY), No. 2130 (HEZ)

Time-current curves - average melt:



Current-limitation curves:



Current-limiting effects:

Prospective	Let-through current (apparent RMS symmetrical vs. fuse rating)					
S.C.C.	1 1/4A	2 8/10A	15A	20A	25A	30A
1000	100	135	240	305	380	435
3000	140	210	350	440	575	580
5000	165	255	420	570	690	710
10,000	210	340	540	700	870	1000
20,000	260	435	680	870	1090	1305
30,000	290	525	800	1030	1300	1520
40,000	315	610	870	1150	1390	1700
50,000	340	650	915	1215	1520	1820
60,000	350	735	1050	1300	1650	1980
80,000	390	785	1130	1500	1780	2180
100,000	420	830	1210	1600	2000	2400
200,000	525	1100	1600	2000	2520	3050

NOTE: To calculate I_p (I_{peak}) multiply I_{RMS} value by 2.3.

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Low-Peak™ LP-CC Class CC 600Vac/300Vdc, 1/2-30A time-delay fuses





Catalog symbol:

LP-CC-(amp)

Description:

Ultimate protection Class CC current-limiting, time-delay fuses. Time-delay – 12 seconds (minimum) at 200% of rated current.

Specifications:

Ratings

- Volts
 - 600Vac,
 - 300Vdc (1/2-2-8/10A, 20-30A)
 - 150Vdc (3-15A)
- · Amps 1/2-30A
- · IR
 - 200kA Vac RMS Sym.
 - 20kA Vdc

Agency information

- UL[®] Listed Class CC, Std. 248-4, Guide JDDZ, File E4273
- · CSA® Certified; Class 1422-02, File 53787
- · CE
- · RoHS compliant (20-30A)

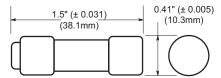


Catalog numbers (amps)						
LP-CC-1/2	LP-CC-1-1/2	LP-CC-3	LP-CC-6	LP-CC-12		
LP-CC-6/10	LP-CC-1-6/10	LP-CC-3-2/10	LP-CC-6-1/4	LP-CC-15		
LP-CC-8/10	LP-CC-1-8/10	LP-CC-3-1/2	LP-CC-7	LP-CC-20		
LP-CC-1	LP-CC-2	LP-CC-4	LP-CC-7-1/2	LP-CC-25		
LP-CC-1-1/8	LP-CC-2-1/4	LP-CC-4-1/2	LP-CC-8	LP-CC-30		
LP-CC-1-1/4	LP-CC-2-1/2	LP-CC-5	LP-CC-9			
LP-CC-1-4/10	LP-CC-2-8/10	LP-CC-5-6/10	LP-CC-10			

Carton quantity:

Amp rating	Carton qty.
1/4-30	10

Dimensions - in (mm)



Features:

- 200kA interrupting rating complies with NEC® Section 110.9 for today's large capacity systems
- Fast short-circuit protection and dual-element, time-delay performance provide ultimate protection.
- Reduces existing fuse inventory by up to 33% when upgrading to Low-Peak fuses.
- Consistent 2:1 ampacity ratios for all Low-Peak fuses make selective coordination easy.
- Time-delay characteristic avoids unwanted fuse openings from surge currents while fast response speed under short-circuit conditions provides a high degree of current limitation.
- Current-limitation protects downstream components against damaging thermal and magnetic effects of short-circuit currents.
- A superior, all-purpose, space-saving branch circuit fuse that meets most protection requirements up to 30A.
- Very compact, with a physical size only 13/32" x 1 1/2" (10.3 x 38.1mm) with rejection tip.
- Proper sizing can provide "no damage" Type 2 coordinated protection for NEMA and IEC motor controllers.
- Can be used where either a time-delay or a fast-acting fuse is needed, making selection easier and reducing spare fuse inventories for substantial cost reduction.
- Superior protection for small horsepower motor circuits.

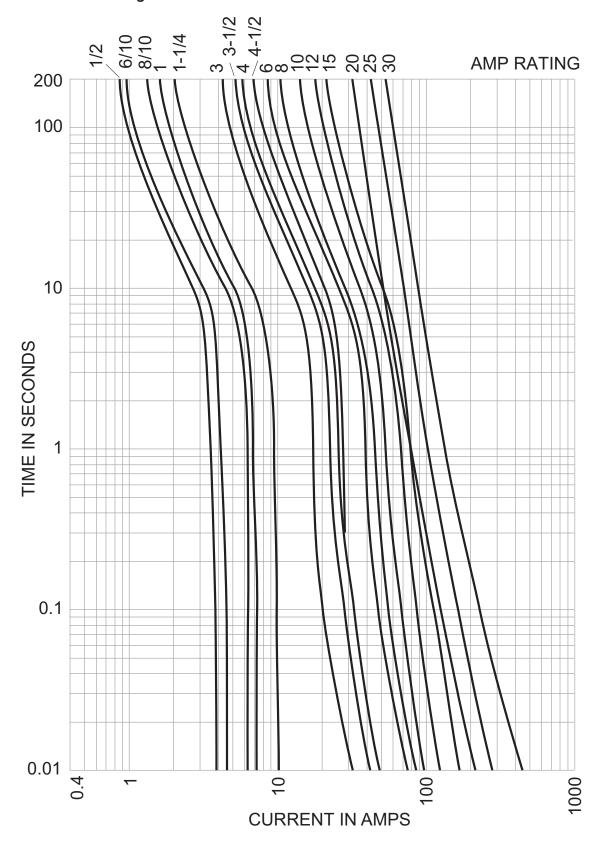
Recommended fuse blocks and holders:

Fuse amps	1-Pole	2-Pole	3-Pole				
Modular open blocks							
0-30	BCM603-1_	BCM603-2_	BCM603-3_				
DIN-Rail holders							
	CHCC1D_	CHCC2D_	CHCC3D_				
0-30	_	_	OPM-NG				
	_	_	OPM-1038_				
	_	_	OPM-1038_SW				
Panel mount holders							
0-30	HPS	_	_				
	HPF	_	_				
In-line holders							
0-30	_	HEY	_				
	HEZ	_	_				

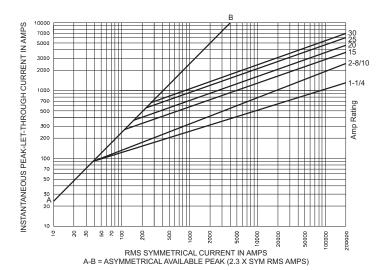
For additional information on Class CC fuse blocks and holders, see data sheets:

- · Modular open blocks # 10241 (BCM)
- DIN-Rail holders No. 3185 (CHCC), No. 1109 (OPM), No. 1102 (OPM-1038), No. 1103 (OPM-1038_SW)
- · Panel mount holders No. 2113 (HPS), No. 2114 (HPF)
- · In-line holders No. 2126 (HEY), No. 2130 (HEZ)

Time-current curves - average melt:



Current-limitation curves:



Current-limiting effects:

Prospective		ough curr ent RMS s		rical vs. f	use ratin	g)
S.C.C.	1 1/4A	2 8/10A	15A	20A	25A	30A
1000	100	135	240	305	380	435
3000	140	210	350	440	575	580
5000	165	255	420	570	690	710
10,000	210	340	540	700	870	1000
20,000	260	435	680	870	1090	1305
30,000	290	525	800	1030	1300	1520
40,000	315	610	870	1150	1390	1700
50,000	340	650	915	1215	1520	1820
60,000	350	735	1050	1300	1650	1980
80,000	390	785	1130	1500	1780	2180
100,000	420	830	1210	1600	2000	2400
200,000	525	1100	1600	2000	2520	3050

NOTE: To calculate I_p (I_{peak}) multiply I_{RMS} value by 2.3.

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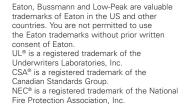
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Low-Peak™ LP-CC Class CC 600Vac/300Vdc, 1/2-30A time-delay fuses





Catalog symbol:

LP-CC-(amp)

Description:

Ultimate protection Class CC current-limiting, timedelay fuses. Time-delay – 12 seconds (minimum) at 200% of rated current.

Specifications:

Ratings

- · Volts
 - 600Vac,
 - 300Vdc (1/2-2-8/10A, 20-30A)
 - 150Vdc (3-15A)
- · Amps 1/2-30A
- · 1F
 - 200kA Vac RMS Sym.
 - 20kA Vdc

Agency information

- UL® Listed Class CC, Std. 248-4, Guide JDDZ, File E4273
- · CSA® Certified; Class 1422-02, File 53787
- · CE
- · RoHS compliant (20-30A)

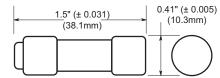


Catalog numbers (amps)				
LP-CC-1/2	LP-CC-1-1/2	LP-CC-3	LP-CC-6	LP-CC-12
LP-CC-6/10	LP-CC-1-6/10	LP-CC-3-2/10	LP-CC-6-1/4	LP-CC-15
LP-CC-8/10	LP-CC-1-8/10	LP-CC-3-1/2	LP-CC-7	LP-CC-20
LP-CC-1	LP-CC-2	LP-CC-4	LP-CC-7-1/2	LP-CC-25
LP-CC-1-1/8	LP-CC-2-1/4	LP-CC-4-1/2	LP-CC-8	LP-CC-30
LP-CC-1-1/4	LP-CC-2-1/2	LP-CC-5	LP-CC-9	
LP-CC-1-4/10	LP-CC-2-8/10	LP-CC-5-6/10	LP-CC-10	

Carton quantity:

Amp rating	Carton qty.
1/4-30	10

Dimensions - in (mm)



Features:

- 200kA interrupting rating complies with NEC® Section 110.9 for today's large capacity systems.
- Fast short-circuit protection and dual-element, time-delay performance provide ultimate protection.
- Reduces existing fuse inventory by up to 33% when upgrading to Low-Peak fuses.
- Consistent 2:1 ampacity ratios for all Low-Peak fuses make selective coordination easy.
- Time-delay characteristic avoids unwanted fuse openings from surge currents while fast response speed under short-circuit conditions provides a high degree of current limitation.
- Current-limitation protects downstream components against damaging thermal and magnetic effects of short-circuit currents.
- A superior, all-purpose, space-saving branch circuit fuse that meets most protection requirements up to 30A.
- Very compact, with a physical size only 13/32" x 1 1/2" (10.3 x 38.1mm) with rejction tip.
- Proper sizing can provide "no damage" Type 2 coordinated protection for NEMA and IEC motor controllers.
- Can be used where either a time-delay or a fast-acting fuse is needed, making selection easier and reducing spare fuse inventories for substantial cost reduction.
- Superior protection for small horsepower motor circuits.

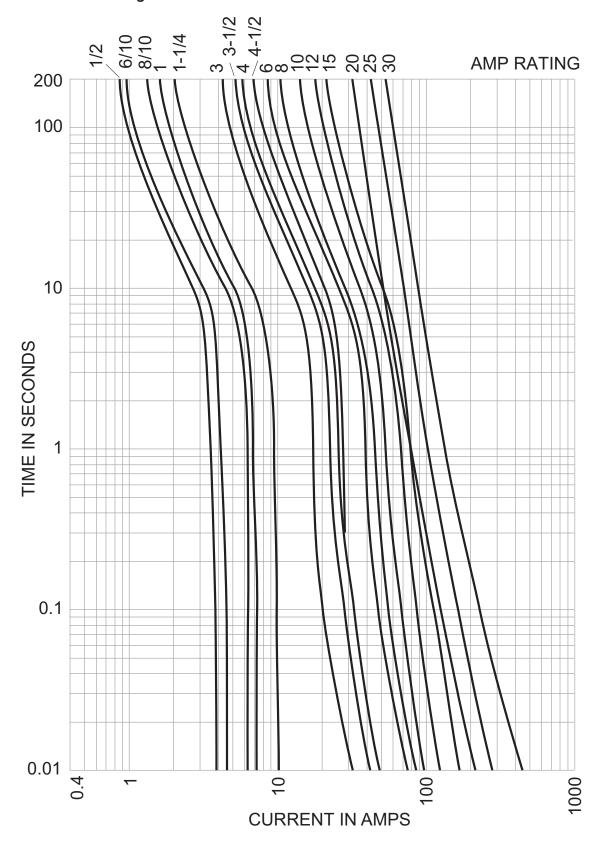
Recommended fuse blocks and holders:

Fuse amps	1-Pole	2-Pole	3-Pole				
	Modular open blocks						
0-30	BCM603-1_	BCM603-2_	BCM603-3_				
	DIN-R	ail holders					
	CHCC1D_	CHCC2D_	CHCC3D_				
0-30	_	_	OPM-NG				
	_	_	OPM-1038_				
	_	_	OPM-1038_SW				
Panel mount holders							
0-30	HPS	_	_				
	HPF	_	_				
In-line holders							
0-30	_	HEY	_				
	HEZ	_	_				

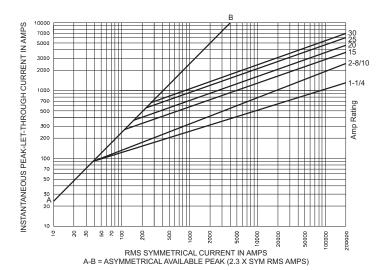
For additional information on Class CC fuse blocks and holders, see data sheets:

- · Modular open blocks # 10241 (BCM)
- DIN-Rail holders No. 3185 (CHCC), No. 1109 (OPM), No. 1102 (OPM-1038), No. 1103 (OPM-1038_SW)
- · Panel mount holders No. 2113 (HPS), No. 2114 (HPF)
- · In-line holders No. 2126 (HEY), No. 2130 (HEZ)

Time-current curves - average melt:



Current-limitation curves:



Current-limiting effects:

Prospective		ough curr ent RMS s		rical vs. f	use ratin	g)
S.C.C.	1 1/4A	2 8/10A	15A	20A	25A	30A
1000	100	135	240	305	380	435
3000	140	210	350	440	575	580
5000	165	255	420	570	690	710
10,000	210	340	540	700	870	1000
20,000	260	435	680	870	1090	1305
30,000	290	525	800	1030	1300	1520
40,000	315	610	870	1150	1390	1700
50,000	340	650	915	1215	1520	1820
60,000	350	735	1050	1300	1650	1980
80,000	390	785	1130	1500	1780	2180
100,000	420	830	1210	1600	2000	2400
200,000	525	1100	1600	2000	2520	3050

NOTE: To calculate I_p (I_{peak}) multiply I_{RMS} value by 2.3.

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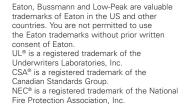
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Low-Peak™ LP-CC Class CC 600Vac/300Vdc, 1/2-30A time-delay fuses





Catalog symbol:

LP-CC-(amp)

Description:

Ultimate protection Class CC current-limiting, time-delay fuses. Time-delay – 12 seconds (minimum) at 200% of rated current.

Specifications:

Ratings

- · Volts
 - 600Vac,
 - 300Vdc (1/2-2-8/10A, 20-30A)
 - 150Vdc (3-15A)
- · Amps 1/2-30A
- · IR
 - 200kA Vac RMS Sym.
 - 20kA Vdc

Agency information

- UL® Listed Class CC, Std. 248-4, Guide JDDZ, File E4273
- CSA® Certified; Class 1422-02, File 53787
- · CE
- · RoHS compliant (20-30A)

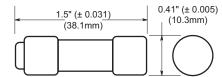


Catalog numbers (amps)					
LP-CC-1/2	LP-CC-1-1/2	LP-CC-3	LP-CC-6	LP-CC-12	
LP-CC-6/10	LP-CC-1-6/10	LP-CC-3-2/10	LP-CC-6-1/4	LP-CC-15	
LP-CC-8/10	LP-CC-1-8/10	LP-CC-3-1/2	LP-CC-7	LP-CC-20	
LP-CC-1	LP-CC-2	LP-CC-4	LP-CC-7-1/2	LP-CC-25	
LP-CC-1-1/8	LP-CC-2-1/4	LP-CC-4-1/2	P-CC-8	LP-CC-30	
LP-CC-1-1/4	LP-CC-2-1/2	LP-CC-5	LP-CG-9		
LP-CC-1-4/10	LP-CC-2-8/10	LP-CC-5-6/10	LP-CC-10		

Carton quantity:

Amp rating	Carton qty.
1/4-30	10

Dimensions - in (mm)



Features:

- 200kA interrupting rating complies with NEC® Section 110.9 for today's large capacity systems.
- Fast short-circuit protection and dual-element, time-delay performance provide ultimate protection.
- Reduces existing fuse inventory by up to 33% when upgrading to Low-Peak fuses.
- Consistent 2:1 ampacity ratios for all Low-Peak fuses make selective coordination easy.
- Time-delay characteristic avoids unwanted fuse openings from surge currents while fast response speed under short-circuit conditions provides a high degree of current limitation.
- Current-limitation protects downstream components against damaging thermal and magnetic effects of short-circuit currents.
- A superior, all-purpose, space-saving branch circuit fuse that meets most protection requirements up to 30A.
- Very compact, with a physical size only 13/32" x 1 1/2" (10.3 x 38.1mm) with rejection tip.
- Proper sizing can provide "no damage" Type 2 coordinated protection for NEMA and IEC motor controllers.
- Can be used where either a time-delay or a fast-acting fuse is needed, making selection easier and reducing spare fuse inventories for substantial cost reduction.
- Superior protection for small horsepower motor circuits.

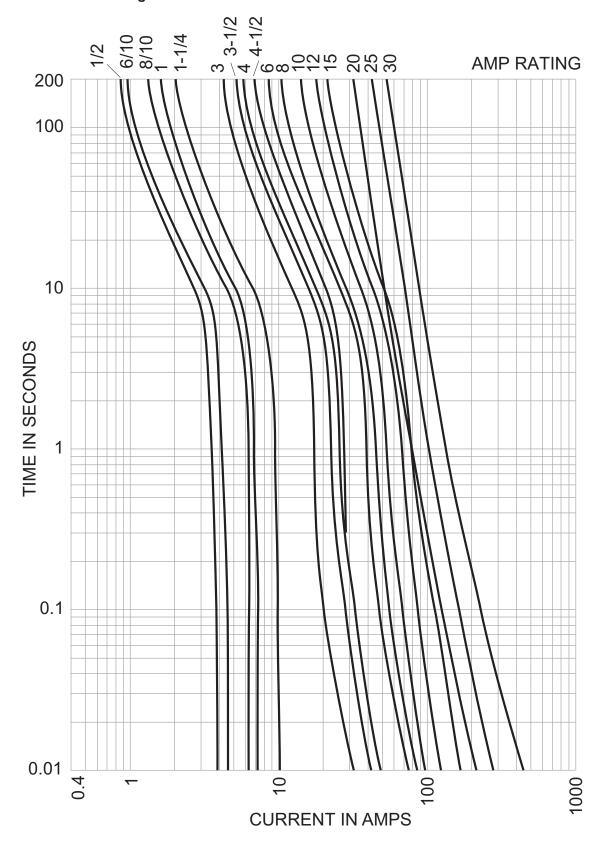
Recommended fuse blocks and holders:

Fuse amps	1-Pole	2-Pole	3-Pole			
Modular open blocks						
0-30	BCM603-1_	BCM603-2_	BCM603-3_			
DIN-Rail holders						
	CHCC1D_	CHCC2D_	CHCC3D_			
0-30	_	_	OPM-NG			
0-30	_	_	OPM-1038_			
	_	_	OPM-1038_SW			
Panel mount holders						
0.20	HPS	_	_			
0-30	HPF	_	_			
In-line holders						
0-30	_	HEY	_			
	HEZ	_	_			

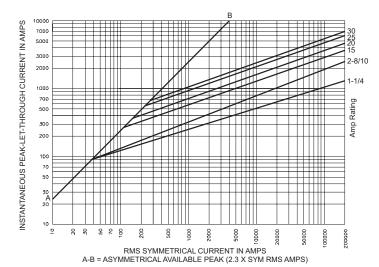
For additional information on Class CC fuse blocks and holders, see data sheets:

- · Modular open blocks # 10241 (BCM)
- DIN-Rail holders No. 3185 (CHCC), No. 1109 (OPM), No. 1102 (OPM-1038), No. 1103 (OPM-1038_SW)
- · Panel mount holders No. 2113 (HPS), No. 2114 (HPF)
- · In-line holders No. 2126 (HEY), No. 2130 (HEZ)

Time-current curves - average melt:



Current-limitation curves:



Current-limiting effects:

435 580 710
580 710
710
000
305
520
700
820
980
2180
2400
3050
2

NOTE: To calculate I_p (I_{peak}) multiply I_{RMS} value by 2.3.

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Low-Peak™ LP-CC Class CC 600Vac/300Vdc, 1/2-30A time-delay fuses





Catalog symbol:

LP-CC-(amp)

Description:

Ultimate protection Class CC current-limiting, timedelay fuses. Time-delay – 12 seconds (minimum) at 200% of rated current.

Specifications:

Ratings

- Volts
 - 600Vac,
 - 300Vdc (1/2-2-8/10A, 20-30A)
 - 150Vdc (3-15A)
- · Amps 1/2-30A
- · 1F
 - 200kA Vac RMS Sym.
 - 20kA Vdc

Agency information

- UL® Listed Class CC, Std. 248-4, Guide JDDZ, File E4273
- CSA® Certified; Class 1422-02, File 53787
- · CE
- · RoHS compliant (20-30A)

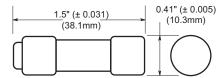


Catalog numbers (amps)				
LP-CC-1/2	LP-CC-1-1/2	LP-CC-3	LP-CC-6	LP-CC-12
LP-CC-6/10	LP-CC-1-6/10	LP-CC-3-2/10	LP-CC-6-1/4	LP-CC-15
LP-CC-8/10	LP-CC-1-8/10	LP-CC-3-1/2	LP-CC-7	LP-CC-20
LP-CC-1	LP-CC-2	LP-CC-4	LP-CC-7-1/2	LP CC-25
LP-CC-1-1/8	LP-CC-2-1/4	LP-CC-4-1/2	LP-CC-8	LP-CC 30
LP-CC-1-1/4	LP-CC-2-1/2	LP-CC-5	LP-CC-9	
LP-CC-1-4/10	LP-CC-2-8/10	LP-CC-5-6/10	LP-CC-10	

Carton quantity:

Amp rating	Carton qty.
1/4-30	10

Dimensions - in (mm)



Features:

- 200kA interrupting rating complies with NEC® Section 110.9 for today's large capacity systems.
- Fast short-circuit protection and dual-element, time-delay performance provide ultimate protection.
- Reduces existing fuse inventory by up to 33% when upgrading to Low-Peak fuses.
- Consistent 2:1 ampacity ratios for all Low-Peak fuses make selective coordination easy.
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- Current-limitation protects downstream components against damaging thermal and magnetic effects of short-circuit currents.
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- Very compact, with a physical size only 13/32" x 1 1/2" (10.3 x 38.1mm) with rejction tip.
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- Can be used where either a time-delay or a fast-acting fuse is needed, making selection easier and reducing spare fuse inventories for substantial cost reduction.
- Superior protection for small horsepower motor circuits.

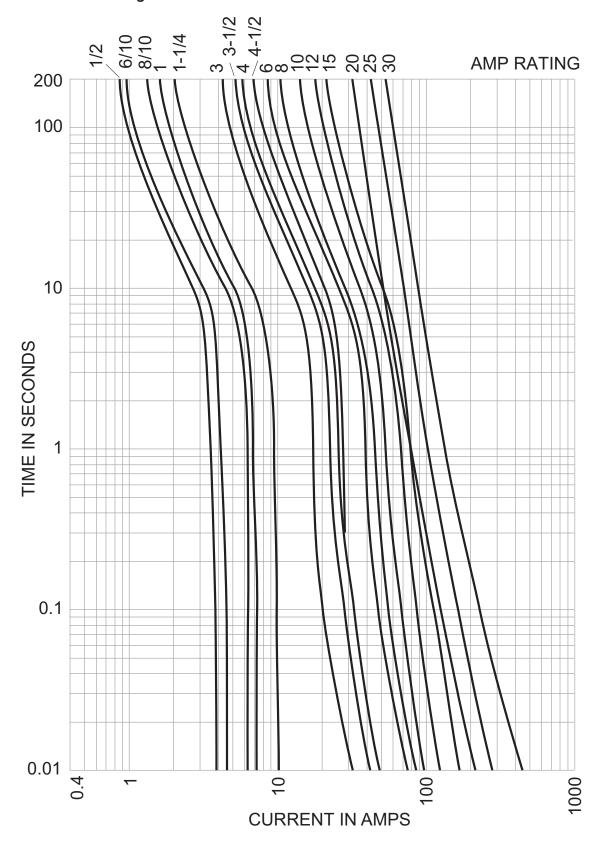
Recommended fuse blocks and holders:

Fuse amps	1-Pole	2-Pole	3-Pole				
	Modular open blocks						
0-30	BCM603-1_	BCM603-2_	BCM603-3_				
	DIN-R	ail holders					
	CHCC1D_	CHCC2D_	CHCC3D_				
0-30	_	_	OPM-NG				
	_	_	OPM-1038_				
	_	_	OPM-1038_SW				
Panel mount holders							
0-30	HPS	_	_				
	HPF	_	_				
In-line holders							
0-30	_	HEY	_				
	HEZ	_	_				

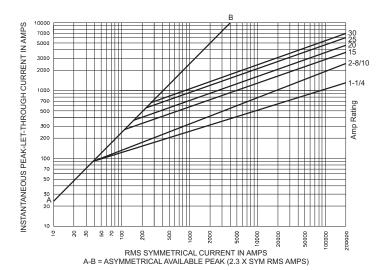
For additional information on Class CC fuse blocks and holders, see data sheets:

- · Modular open blocks # 10241 (BCM)
- DIN-Rail holders No. 3185 (CHCC), No. 1109 (OPM), No. 1102 (OPM-1038), No. 1103 (OPM-1038_SW)
- · Panel mount holders No. 2113 (HPS), No. 2114 (HPF)
- · In-line holders No. 2126 (HEY), No. 2130 (HEZ)

Time-current curves - average melt:



Current-limitation curves:



Current-limiting effects:

Prospective	Let-through current (apparent RMS symmetrical vs. fuse rating)					
S.C.C.	1 1/4A	2 8/10A	15A	20A	25A	30A
1000	100	135	240	305	380	435
3000	140	210	350	440	575	580
5000	165	255	420	570	690	710
10,000	210	340	540	700	870	1000
20,000	260	435	680	870	1090	1305
30,000	290	525	800	1030	1300	1520
40,000	315	610	870	1150	1390	1700
50,000	340	650	915	1215	1520	1820
60,000	350	735	1050	1300	1650	1980
80,000	390	785	1130	1500	1780	2180
100,000	420	830	1210	1600	2000	2400
200,000	525	1100	1600	2000	2520	3050

NOTE: To calculate I_p (I_{peak}) multiply I_{RMS} value by 2.3.

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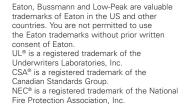
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VPCI-111

VpCI®-111 Emitter, Patented



PRODUCT DESCRIPTION

VpCl®-111 emitters are unique devices designed to provide corrosion protection for metal components and parts enclosed in non-ventilated control boxes, cabinets or tool boxes up to 11 cubic feet (312 liters). The Vapor phase Corrosion Inhibitor (VpCl®) emits vapors, which form a molecular layer on internal metal surfaces to protect critical, complex, and expensive electronic equipment during operation, shipping, or storage. VpCl®-111 is patented with a breathable Tyvek® membrane cover through which corrosion inhibitors are slowly released. VpCl®-111 provides long term protection against corrosion even in the presence of adverse conditions including salt, moisture, airborne contaminants, H₂S SO₂, NH₃, and others.

*Tyvek is a registered trademark of DuPont™

TYPICAL APPLICATIONS

- Operating, packaged, and stored electrical equipment
- Marine navigation and communication equipment
- Aerospace electrical controls
- Electric motors
- Switching equipment
- Fuse boxes and power boxes
- Medical equipment
- Electrical wireways and terminal boxes
- Scientific and measuring instruments
- Telecommunications equipment and remote electronics devices

FEATURES

- Economical to use
- Provides continuous protection for up to 24 months during operation and/or shutdown
- · Effective in polluted and humid environments
- Does not interfere with electrical, optical, or mechanical performance
- Multi-metal protection
- Quick and easy installation
- Very convenient to install
- Non-toxic and safe to handle
- Compact and space-saving
- Free of nitrites, halogens, and phosphates
- No spraying, wiping, or dipping required
- VOC values meet Southern California Clean Air Act and other National and local regulations
- Self-stick back
- Self-stick date label
- NSN# 6850-01-408-9025
- Accepted by FDA for corrosion protection of electrical and electronic equipment within food processing plants
- Canadian Food Inspection Agency acceptance for indirect food contact
- Approved for U.S. military and NATO
- Product contains powder that is a commercial equivalent to MIL-1-22110C
- IBM approval # 44V542



METHOD OF APPLICATION

VpCI®-111 is extremely simple and convenient to install. VpCI®-111 emitters should be installed as early as possible, preferably during manufacturing or assembly. Simply select a space within enclosed device where corrosion protection would be useful. Verify that the surface on which the device will be installed is clean and free of debris. Peel off the protective peel strip from the bottom of the device and attach it to the clean surface. The peel strip can be separated to reveal a self-adhesive sticker on which the installation and replacement dates can be noted. VpCI®-111 emitters can be installed in any position. For volumes greater than 11ft³ (312 L), install more than one VpCI®-111. If the enclosure is not totally air-tight or if the access doors are opened frequently, replace the VpCI®-111 emitter more often than every two years. After periods of heavy maintenance, replace the emitter. For additional protection, spray the enclosure very lightly with ElectriCorr®VpCl®-238.

PACKAGING AND STORAGE

Products should not be exposed to temperatures of over 185°F (85°C). VpCI®-111 is available in 10 individually wrapped emitters per carton.

STANDARD TEST METHODS

	NACE TM0208-2008	Vapor Inhibiting Ability	
NACE RP0487-2000		Selection of Rust Preventives	
	MIL-I-22110C	Vapor Inhibiting Ability	

PROPERTIES

Appearance Green cup with Tyvek® lid 11 ft³ (312 Liters) emitter Protection

Standard size Plastic device cup with breathable membrane 2.25 in. diameter x

1.27 in H (5.7 cm x 3.2 cm)

FOR INDUSTRIAL USE ONLY KEEP OUT OF REACH OF CHILDREN **KEEP CONTAINER TIGHTLY CLOSED** NOT FOR INTERNAL CONSUMPTION **CONSULT SAFETY DATA SHEET FOR MORE** INFORMATION

LIMITED WARRANTY

statements, technical information and recommendations contained herein are based on tests Cortec® Corporation believes to be reliable, but the accuracy or completeness thereof is not guaranteed.

Cortec® Corporation warrants Cortec® products will be free from defects when shipped to customer. Cortec® Corpora tion's obligation under this warranty shall be limited to replacement of product that proves to be defective. To obtain replacement product under this warranty, the customer must notify Cortec® Corporation of the claimed defect within six months after shipment of product to customer. All freight charges for replacement products shall be paid by customer

Cortec® Corporation shall have no liability for any injury, loss or damage arising out of the use of or the inability to

BEFORE USING, USER SHALL DETERMINE THE SUITABILITY OF THE PRODUCT FOR ITS INTENDED USE,

AND USER ASSUMES ALL RISK AND LIABILITY WHATSOEVER IN CONNECTION THEREWITH. No representation or recommendation not contained herein shall have any force or effect unless in a written document signed by an officer of Cortec® Corporation.

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ENM Counting Instruments > Electrical Counters > E6B Electrical Counter - Two-Hole Panel Mount > T14 DC Powered Hour Meter II. > T14

DC Powered Hour Meter I. > T18 AC Powered Hour Meter III. > T18 AC Powered Hour Meter II. > T32 AC/DC DIN Rail Mount Hour Meter > Item
T32F717D

Item # T32F717D T32 AC/DC DIN Rail Mount Hour Meter



T32 AC/DC DIN Rail Mount Hour Meter T32 DC DIN Rail Mount Hour Meter

Specifications

opeomodions -					
Series	T32				
Display	7-Digit				
Voltage	12-24 V DC				
Reset	None				
Size	1.89W x 1.89H x 1.65D Inch				
Weight	2.4 oz.				
Mounting Style	DIN Rail Mount				
Power	180 W				



DESIGNED FOR ROUTINE SIGNALING

- Range of up to 200 feet
- Coded or sustained tones
- Model 350 12, 24, 120 and 240VAC; Model 450 – 12, 24, 125 and 250VDC
- Model 350 produces 100dBa at 10¹
- Model 450 produces 99dBa at 10¹
- Type 4X when installed with Panel Mount Gasket Kit or Weatherproof Backbox (Model WB); Type 4X and Type 12 when installed with Surface Mount Trim Ring (Model TR)
- UL and cUL Listed, CSA Certified and FM Approved



Vibratone® Horns

Models 350 and 450

The Models 350 and 450 Vibratone Horns produce a very loud horn tone by the electro-mechanical vibration of a diaphragm. Capable of reproducing coded blasts or sustained tones through the use of a number of control devices from a push button to a PLC. Federal Signal's Vibratone horn is excellent for general alarm, start and dismissal, coded paging, and process control signaling in areas of high ambient noise levels.

The Vibratone Model 350 is available in AC voltages; 12VAC, 24VAC, 120VAC and 240VAC. The Model 350 produces 100dBa @ 10', except the 12VAC model, which produces 94dBa @ 10'.

The Model 450 is available in DC voltages; 12VDC, 24VDC, 125VDC and 250VDC. The Model 450 produces 99dBa @ 10'.

Vibratone mounting options provide for surface, flush or semi-flush mounting on walls, panels, in cabinets, on 4-inch square outlet boxes, or in concrete and deep wall constructions.

Installed on the front of a Vibratone Horn, the optional Model PR Projector or Model PR2 Double Projector direct sound output straight ahead or to the sides, optimizing sound output for long, narrow rooms or corridors.

Vibratone horns are UL and cUL Listed, CSA Certified and FM Approved. They are designed and approved for use in Type 4X applications when installed with the Panel Mount Gasket Kit or Weatherproof Backbox (Model WB). They are approved for Type 4X and Type 12 applications when installed with the Surface Mount Trim Ring (Model TR, illustrated on page 124).

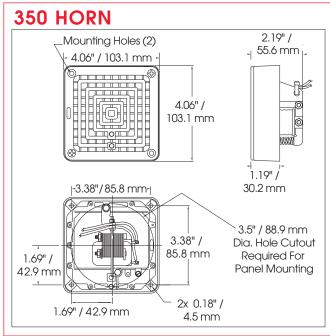
Each Vibratone horn is enclosed in a zinc die-cast housing and sealed with grey powder-coat paint. The Model 350 features a stainless steel diaphragm. The Model 450 utilizes an aluminum diaphragm and heavy duty contacts. The rugged construction of the Vibratone horns resists vandalism and the effects of harsh industrial environments.

Compact size, loud output and heavy-duty construction make the VibraTone horns ideal for industrial and institutional signaling applications.

		Operating	Decibels @	
Model	Voltage	Current	10'	1m
350-012-30	12VAC 50/60Hz	0.90 amps	94	104
350-024-30	24VAC 50/60Hz	0.90 amps	100	110
350-120-30	120VAC 50/60Hz	0.18 amps	100	110
350-240-30	240VAC 50/60Hz	0.09 amps	100	110
450-012-30	12VDC	0.13 amps	93	103
450-012-31	12VDC	0.50 amps	99	109
450-024-31	24VDC	0.25 amps	99	109
450-125-30	125VDC	0.05 amps	99	109
450-250-30	250VDC	0.03 amps	99	109

VIBRATONE® HORNS (350/450)







SPECIFICATIONS

Operating Temperature:	-65°F to 150°F	-54°C to 66°C
Net Weight:	1.4 lbs.	0.6 kg
Shipping Weight:	1.5 lbs.	0.7 kg
Height:	4.0"	102.0 mm
Width:	4.0"	102.0 mm
Depth:	2.5"	64.0 mm

lbs. (0,91 kg)

weight 1 lb. (0.45 kg)

SF

TR

WB

FB	Wall box for flush mounting the Vibratone® horn in stud, 4" block, or other shallow wall construction; 43/s" square box; 27/s" deep; shipping weight 2 lbs. (0.91 kg)
FBL	Same as FB, but $3^{13}/_{16}$ " deep for 6" x 8" concrete block, cinder block or other deep wall construction; shipping wt. 3 lbs. (1.36 kg)
FG	Flush grille which attaches to the basic unit and serves as the cover of the plastered-in FB flush box; 6 " H x 6 " W x $1/6$ " D; shipping wt. 1 lb. (0.45 kg)
K8435666A	Optional Panel Mounting Gasket Kit includes a gasket and hardware for surface or flush mounting the horn for NEMA Type 4X applications.
PR	Projector which concentrates sound into a basic area when attached to the basic model 350/450 units; 4" H x 4" W x 6" D; shipping weight 1 lb. (0.45 kg)
PR2	Double projector directs sounds to both sides when attached to the basic model

350/450 units; ideal for use in hallways; 4" H x 111/2" W x 4" D; shipping weight 2

Stamped surface plate used for installations on plastered-in 4" outlet switch boxes

Gasketed trim ring allowing surface mount installations of 350/450 units while main-

Cast aluminum neoprene-gasketed weatherproof housing for outside use, complete with mounting lugs; tapped for 1/2", 3/4" conduit; 43/8" square box; 2" deep mounting

for semi-flush mountings; 6"H x 6" W x 1/2" D; shipping

taining Type12 and Type 4X rating of enclosure.

lugs on 41/2" centers; shipping weight 1 lb. (0.45 kg)

HOW TO ORDER

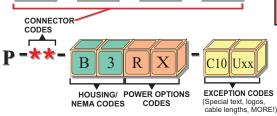
- Specify model and voltage
- Specify accessories from list
- Please refer to Model Number Index 350/450 beginning on page 374

REPLACEMENT PARTS

<u>Description</u>	<u>Part Number</u>
Panel Mount Gasket Kit	K8435666A
Coil (120VAC only)	KFC1516C
Volume Control Kit (350 Horn only)	K8435663B
Gasket for WB	K8435696A

P-R2-K2RF0 R2 R33 R62

GracePort® Ethernet Port Connector Code Data Sheet













CONNECTOR CODE	DESCRIPTION
R2	CATEGORY 5 RJ45 F/F BULKHEAD
R26	CATEGORY 5 RJ45 F/IDT BULKHEAD
R33	CATEGORY 5 SHIELDED RJ45 F/F BULKHEAD
R62	CATEGORY 6 RJ45 F/F BULKHEAD

INSTALLATION

GracePorts® are intended to be mounted in or on an enclosure product. Installation should be performed by a qualified technician and adhere to applicable regulatory codes. These devices are for mounting on the flat surface of enclosures having the same type of environmental rating.

SPECIFICATIONS: ELECTRICAL

Low voltage (data), limited to 30 VDC High voltage supply (for computer use only) 120 VAC, 15A (UL), 5A (CSA) 230-240 VAC, 16A (CE only)

SPECIFICATIONS: MECHANICAL

Housing: Cast aluminum base Latch: Type 304 Stainless Steel (1CR18NI19) Cover: Polycarbonate, UV rated, V-O Flame rated Gasket: Thermoplastic elastomer Insert Material: Acrylic UL94HB

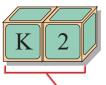




UL RECOGNIZED: E207344 (Outdoor Use)
CSA: LR110845 (not for interrupting circuit)
CE: EN61010/EN60950 (Foreign Power Outlets)

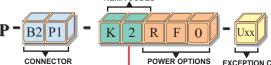


5001 Tremont Avenue Davenport, IA 52807 (800) 280-9517 Fax: (563) 386-9639



HOUSING/ NEMA CODES

Panel Mount Housing Dimensions UL Type 4X - IP65 Ratings



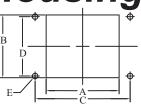
POWER OPTIONS EXCEPTION CODES CODES cable lengths, MORE!)

2Nema 4X (IP-65) ..UL Type 4 (IP-65) (Nema 12/4) ..UL Type 12

.UL Type 4X, Type 304 Stainless Steel .UL Type 4X, Type 316 Stainless SteelUL Type 7-9

8......UL Type 3R
Every Enclosure Type Available





Mounting

Housing Dimensions (inches [mm])

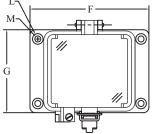
CODES

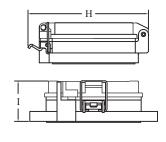
Code		Weight (oz)	А	В	С	D	ΕØ
	В	3.8	2.06∓.010 [52.4∓.2]	1.42∓.010 [36.0∓.2]	2.76=.004 [70.0=.1]	1.26=.004 [32.0=.1]	.18+.010 [4.5+.2]
	F	5.1	3.36∓.010 [85.4∓.2]	1.42∓.010 [36.0∓.2]	4.03±.004 [102.4±.1]	1.26=.004 [32.0=.1]	.18+.010 [4.5+.2]
	H	5.9	4.42 = .010 [112.4 = .2]	1.42 = .010 [36.1 = .2]	5.12±.004 [130.0±.1]	1.26 = .004 [32.0 = .1]	.18+.010 [4.5+.2]
	K	10.8	3.39 = .010 [86.0 = .2]	2.91 = .010 [74.0 = .2]	4.41 = .004 [112.0 = .1]	2.76 = .004 [70.0 = .1]	.26+.010 [6.5+.2]
Ţ	M	13.2	4.80∓.010 [122.0∓.2]	3.15∓.010 [80.0∓.2]	5.83∓.004 [148.0∓.1]	2.76=.004 [70.0=.1]	.26+.010 [6.5+.2]

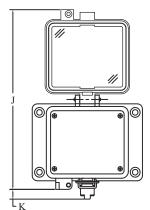
Overall Housing Din

Co	Code Dimensions (Inches [min])								
		F	G	Н		J	K	LØ	Mø
	В	3.15 [80.0]	1.72 [43.6]	3.20 [81.2]	1.60 [40.7]	4.33 [110.1]	.96 [24.4]	N/A	.18∓.004 [4.5∓.1]
	F	4.45 [113.0]	1.72 [43.6]	3.20 [81.2]	1.60 [40.7]	4.87 [123.7]	.57 [14.4]	N/A	.18∓.004 [4.5∓.1]
	H	5.51 [140.0]	1.72 [43.6]	3.20 [81.2]	1.60 [40.7]	4.87 [123.7]	.57 [14.4]	N/A	.18∓.004 [4.5∓.1]
	K	5.08 [129.0]	3.54 [90.0]	4.79 [121.6]	1.60 [40.7]	8.28 [210.2]	.45 [11.4]	.45 [11.5]	.26=.004 [6.5=.1]
Į	M	6.50 [165.0]	3.78 [96.0]	5.02 [127.6]	1.60 [40.7]	8.52 [216.4]	.57 [14.4]	.45 [11.5]	.26∓.004 [6.5∓.1]

Drawings available at www.graceport.com









INSTALLATION

GracePorts® are intended to be mounted in or on an enclosure product. Installation should be performed by a qualified technician and adhere to applicable regulatory codes. These devices are for mounting on the flat surface of enclosures having the same type environmental ratings.

All installations:

- 1) Cut panel opening and mount GracePort® assembly to enclosure with gasket. 2) Connect low voltage interface wiring according to documentation provided with unit.
- On units configured for optional AC power:
- 1) Connect outlet device as per code. Note: It is the responsibility of the installer to ensure adequate separation of high and low voltage circuits in the end-use product.
- 2) Ensure that the metal housing is reliably grounded using grounding means provided.

SPECIFICATIONS: ELECTRICAL

Low voltage (data), limited to 30 VDC High voltage supply (for computer use only) 120 VAC, 15A (UL), 5A (CSA) 230-240 VAC, 16A (CE only)

SPECIFICATIONS: MECHANICAL

Housing: Cast aluminum base Latch: Type 304 Stainless Steel (1CR18NI19) Cover: Polycarbonate, UV rated, V-O Flame rated Gasket: Thermoplastic elastomer Insert Material: Acrylic UL94HB









HOUSING CODE: B 2

HOUSING CODE: F 2

HOUSING CODE:

HOUSING CODE:

UL RECOGNIZED: E207344 Type 4, IP-65 (Outdoor Use) CSA: LR110845 (not for interrupting circuit) CE: EN61010/EN60950 (Foreign Power Outlets)

HOUSING CODE: M 2



5001 Tremont Avenue Davenport, IA 52807 (800) 280-9517 Fax: (563) 386-9639



REMOTE DOOR SWITCHES



- Remote door switch activates the light when the enclosure door is opened
- Mounts on enclosure frame and includes mounting hardware
 Mounting plate is 14 gauge steel
- Mounting plate is 14 gauge stee with a plated finish
- Can be hard-wired to the PANELITE LED or Fluorescent light or connected via the PANELITE Door Switch Cable

BULLETIN: A80LT, P20

Catalog Number	Description
ALFSWD	Door switch assembly (order connection cable separately)
PLFSWD	Door switch assembly for PROLINE™ (order connection cable separately)

TOUCH-SAFE UL LIGHT SWITCH



APPLICATION

The Touch-Safe light switch is designed to be used with Hoffman™ light kits (AC and DC). It provides a UL listed touch-safe switch that can be used on many enclosure types and includes hardware for most applications. The light switch maintains enclosure overall rating up to UL 508A Type 4X or 12.

FEATURES

- UL listed for a touch-safe wire connection
- Easily mounted to various enclosure types; common bracket and hardware included for many enclosure types (NEMA, CONCEPT™ /FUSION™ G7, PROLINE™, Freestanding Type 12)
- Cable PG compression hub
- Wide operating temperature range: -49°F to +158°F (-45°C to 70°C)
- Rugged die-cast anodized zinc construction
- Connection 3 cage clamps for solid and stranded wire AWG 20-14 (0.5-2.5mm²)
- Protection class I (grounded)

BULLETIN: A80LT

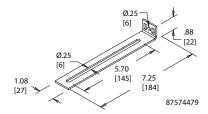
Catalog Number	Max. Cable Dia.	Max. Voltage
LDSWITCH	.375 in.	250 AC / 48 DC

MOUNTING BRACKET KIT FOR LIGHT PACKAGE

Kit simplifies mounting light package in Hoffman PROLINE™ disconnect enclosures. Includes brackets, all mounting hardware and complete instructions.

BULLETIN: A80LT

Catalog Number	Description	
PDLFBRKT	Mounting Bracket Kit	

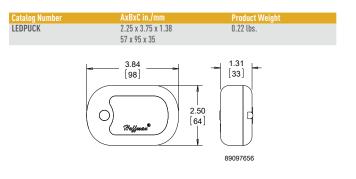


LED PUCK LIGHT



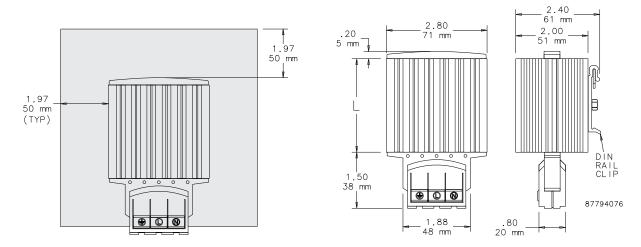
The LED Puck Light is ideal for remote and darkened applications. This versatile light provides mounting flexibility; it can be magnetically attached to flat steel surfaces or can be hung with a swivel hook. This small form factor, light-weight LED light provides superior lighting performance with minimal power consumption. It can be used as a three-LED flashlight or as a 24-LED work light with operating temperature of 40 F to 120 F (4 C to 48 C). An on/off switch is incorporated in the light and three AAA batteries are included.

BULLETIN: A80LT





Clearance Range for DAH601



ELECTRIC HEATERS





INDUSTRY STANDARDS

UL 508A Component Recognized; File No. E61997

CSA Certified, CSA File No. LR42186 CE

APPLICATION

Protect mechanical, electrical and electronic equipment from low temperatures, condensation and corrosion with this thermostatically controlled, fan-driven heater that maintains a stable enclosure temperature.

Fan draws cool air from the bottom of the enclosure and passes this air across the thermostat and heating element before being released into enclosure cavity. Heated air is discharged through the top of the heater unit.

SPECIFICATIONS

- Aluminum housing
- Thermostat range adjustable from 0 F to 100 F (-18 C to 38 C)
- Four 10-32 x self-tapping screws are included with each heater
- · Ball bearing fan
- Terminal strip with clamp connector that accepts both solid and stranded wire

FINISH

· Brushed aluminum

A CAUTION

These electric heaters are not designed for use in dusty, dirty, corrosive, or hazardous locations. Portions of the heater can get hot. Adequate protection must be taken to protect people from potential burns, and to protect other components from this heat. nVent recommends this heater only be installed in a totally-enclosed metal enclosure.

DO NOT INSTALL HEATERS ON WOOD PANELS. Heat sensitive components should not be placed near the heater discharge area since this air can be quite warm. The clearance range defines the space that must be kept free of these components for proper and safe operation of the heater.



Performance Data 100 and 200 Watt Heaters

CATALOG NUMBERS				
	DAH1001A	DAH1002A	DAH2001A	DAH2002A
ELECTRICAL DATA				
Rated Voltage	115	230	115	230
Frequency (Hz)	50/60	50/60	50/60	50/60
Power Consumption (Watts)	100	100	200	200
Nominal Current (Amps)	0.98	0.49	1.89	0.95
HEATING PERFORMANCE				
Watts	100	100	200	200
UNIT CONSTRUCTION				
Weight (lb./kg)	1.6/0.73	1.6/0.73	1.6/0.73	1.6/0.73
X (in./mm)	4.00/102	4.00/102	6.00/152	6.00/152

Performance Data 400 and 800 Watt Heaters

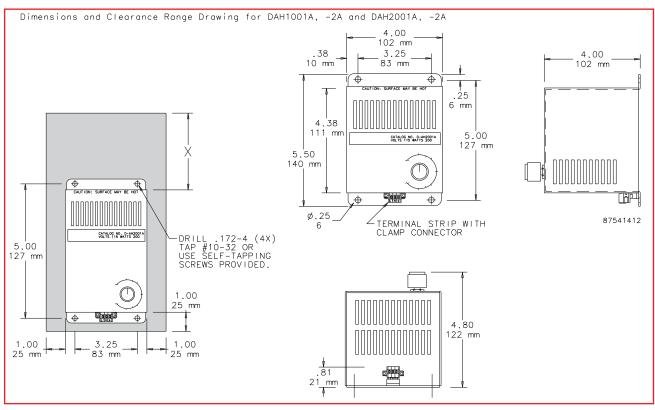
CATALOG NUMBERS				
	DAH4001B	DAH4002B	DAH8001B	DAH8002B
ELECTRICAL DATA				
Rated Voltage	115	230	115	230
Frequency (Hz)	50/60	50/60	50/60	50/60
Power Consumption (Watts)	400	400	800	800
Nominal Current (Amps)	3.72	1.86	7.37	3.69
HEATING PERFORMANCE				
Watts	400	400	800	800
UNIT CONSTRUCTION				
Weight (lb./kg)	2.2/1.00	2.2/1.00	2.2/1.00	2.2/1.00
X (in./mm)	6.00/152	6.00/152	8.00/203	8.00/203

Performance Data 1300 Watt Heaters

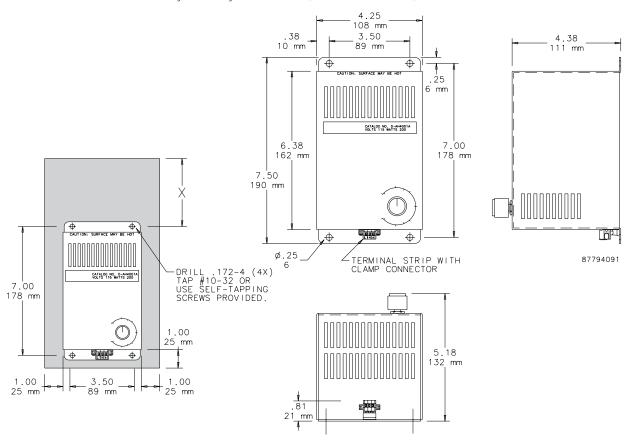
DAH13001C	DAH13002C
115	230
50/60	50/60
1300	1300
11.5	5.7
1300	1300
3.4/1.54	3.4/1.54
8.00/203	8.00/203
	115 50/60 1300 11.5 1300

THERMAL MANAGEMENT Spec-00051 P SUBJECTTO CHANGE WITHOUT NOTICE NVENT.COM/HOFFMAN





Dimensions and Clearance Range Drawing for DAH4001B, -2B and DAH8001B, -2B



NVENT.COM/HOFFMAN PH 763.422.2211 Spec-00051 P THERMAL MANAGEMENT 6

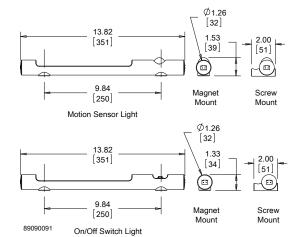


LED LIGHT KIT



LED light kits provide interior enclosure lighting. These light kits are ideal for remote and darkened enclosure applications. The light can be mechanically fastened with included hardware to maintain enclosure UL listing (up to Type 4X), or can be magnetically attached to flat steel surfaces. The lights have auto-sensing circuitry (AC voltage 90 VAC to 260 VAC and DC voltage 20 VDC to 60 VDC). LED lights are light-weight and in a small form factor while providing 900 LM of 6500K light. Power consumption for all models is 5 watts.

BULLETIN: A80LT



Catalog Number	AxBxC in./mm	Weight (oz)	Weight (gm)	Mounting Style	Power Source	Activation	Voltage
LEDA1M35	1.34 x 1.26 x 13.82 34 x 32 x 351	4.8	135	Magnetic	AC	On/off switch	90 VAC-260 VAC
LEDA2M35	1.54 x 1.26 x 13.82 39 x 32 x 351	5.0	140	Magnetic	AC	IR Motion Sensor	90 VAC-260 VAC
LEDA1S35	1.42 x 2.05 x 13.82 36 x 52 x 351	4.8	135	Screw	AC	On/off switch	90 VAC-260 VAC
LEDA2S35	1.63 x 2.05 x 13.82 41 x 52 x 351	5.0	140	Screw	AC	IR Motion Sensor	90 VAC-260 VAC
LEDD1M35	1.34 x 1.26 x 13.82 34 x 32 x 351	4.8	135	Magnetic	DC	On/off switch	20 VDC-60 VDC
LEDD2M35	1.54 x 1.26 x 13.82 39 x 32 x 351	5.0	140	Magnetic	DC	IR Motion Sensor	20 VDC-60 VDC
LEDD1S35	1.42 x 2.05 x 13.82 36 x 52 x 351	4.8	135	Screw	DC	On/off switch	20 VDC-60 VDC
LEDD2S35	1.63 x 2.05 x 13.82 41 x 52 x 351	5.0	140	Screw	DC	IR Motion Sensor	20 VDC-60 VDC

LED LIGHT INPUT CONNECTOR/CABLE ASSEMBLY



The input connector/cable assembly is used to provide supply power to the LED light. Pre-assembled connector/cable assembly with

 $78.7\mbox{-in.}$ [2000 mm] long cable whip. Cables are constructed of 16 AWG copper wire.

BULLETIN: A80LT

Catalog Number	A in./mm	Power Source	Use with
LEDA20C	78.74 2000	AC	AC LED Lights
LEDD20C	78.74 2000	DC	DC LED Lights

LED LIGHT EXTENSION CONNECTOR/CABLE ASSEMBLY



The extension connector/cable assembly is used to connect adjacent LED lights (daisy chain). Up to 10 LED lights can be ganged or connected in series. Pre-assembled connector/cable assembly with 39.4-in. (1000 mm) long cable between input and output connectors. Cables are constructed of 16 AWG copper wire.

BULLETIN: A80LT

Catalog Number	A in./mm	Power Source	Use with
LEDA10E	39.37 1000	AC	AC LED Lights
LEDD10E	39.37 1000	DC	DC LED Lights

_/



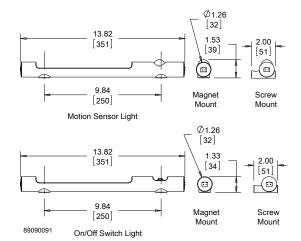
LED LIGHT KIT





LED light kits provide interior enclosure lighting. These light kits are ideal for remote and darkened enclosure applications. The light can be mechanically fastened with included hardware to maintain enclosure UL listing (up to Type 4X), or can be magnetically attached to flat steel surfaces. The lights have auto-sensing circuitry (AC voltage 90 VAC to 260 VAC and DC voltage 20 VDC to 60 VDC). LED lights are light-weight and in a small form factor while providing 900 LM of 6500K light. Power consumption for all models is 5 watts.

BULLETIN: A80LT



				Mounting			
Catalog Number	AxBxC in./mm	Weight (oz)	Weight (gm)	Style	Power Source	Activation	Voltage
LEDA1M35	1.34 x 1.26 x 13.82 34 x 32 x 351	4.8	135	Magnetic	AC	On/off switch	90 VAC-260 VAC
LEDA2M35	1.54 x 1.26 x 13.82 39 x 32 x 351	5.0	140	Magnetic	AC	IR Motion Sensor	90 VAC-260 VAC
LEDA1S35	1.42 x 2.05 x 13.82 36 x 52 x 351	4.8	135	Screw	AC	On/off switch	90 VAC-260 VAC
LEDA2S35	1.63 x 2.05 x 13.82 41 x 52 x 351	5.0	140	Screw	AC	IR Motion Sensor	90 VAC-260 VAC
LEDD1M35	1.34 x 1.26 x 13.82 34 x 32 x 351	4.8	135	Magnetic	DC	On/off switch	20 VDC-60 VDC
LEDD2M35	1.54 x 1.26 x 13.82 39 x 32 x 351	5.0	140	Magnetic	DC	IR Motion Sensor	20 VDC-60 VDC
LEDD1S35	1.42 x 2.05 x 13.82 36 x 52 x 351	4.8	135	Screw	DC	On/off switch	20 VDC-60 VDC
LEDD2S35	1.63 x 2.05 x 13.82 41 x 52 x 351	5.0	140	Screw	DC	IR Motion Sensor	20 VDC-60 VDC

LED LIGHT INPUT CONNECTOR/CABLE ASSEMBLY



The input connector/cable assembly is used to provide supply power to the LED light. Pre-assembled connector/cable assembly with

 $78.7\mbox{-in.}$ [2000 mm] long cable whip. Cables are constructed of 16 AWG copper wire.

BULLETIN: A80LT

Catalog Number	A in./mm	Power Source	Use with
LEDA20C	78.74	AC	AC LED Lights
	2000		
LEDD20C	78.74	DC	DC LED Lights
	2000		•

LED LIGHT EXTENSION CONNECTOR/CABLE ASSEMBLY



The extension connector/cable assembly is used to connect adjacent LED lights (daisy chain). Up to 10 LED lights can be ganged or connected in series. Pre-assembled connector/cable assembly with 39.4-in. (1000 mm) long cable between input and output connectors. Cables are constructed of 16 AWG copper wire.

BULLETIN: A80LT

Catalog Number	A in./mm	Power Source	Use with
LEDA10E	39.37 1000	AC	AC LED Lights
LEDD10E	39.37 1000	DC	DC LED Lights

S350-Kit



350 kcmil-6 AWG wire range, and FLEX wire class G-K including mm2 class 5, 1 barrel, aluminum or copper wire, CU9AL, 90C temperature rating, one mounting hole of .343 inch dia 5/16" bolt, UL Listed, CSA Certified.



Supplied with 5/16-18 UNC x ¾ long Steel zinc plated RoHS hex head cap screw and (1) 5/16 SAE flat washer steel zinc plated RoHS.

EXAMPLES OF S350-KITS FULLY ASSEMBLED IN KITTED PROJECTS







TO BE ADDED WITH OTHER AVALIABLE KIT OPTIONS.
See website for current pricing. https://lugsdirect.com







- Proven performance in the field
- Reliable and economical
- Compact and lightweight
- Ideal for OEMs, integrators and panel builders

Smaller, lighter protection.

Our RLW Line/Load Reactors are a state-of-the-art solution for absorbing everyday power line disturbances that can damage or shut down variable frequency drives (VFDs) and other sensitive equipment. They work on both the line side and load side to give you an economical way to reduce nuisance tripping, reduce harmonic distortion and minimize long lead effects. Their epoxy impregnated design also reduces audible noise, and improves structural and moisture integrity.

Put an end to power spike issues and minimize downtime with our RLW Line/Load Reactors from MTE.



Power quality. Solved.

Stop nuisance tripping and harmonic distortion with our RLW Reactors.

Our RLW Reactors are the state-of-the art filtering solution for virtually any 4 or 6-pulse rectifier or power conversion unit. There are units available for amperage ratings from 0.5A to 750A. Our 3% impedance option is 90% effective and our 5% option extends spike protection to 99%.

Smaller size and weight makes these units ideal for OEMs, integrators and panel builders.

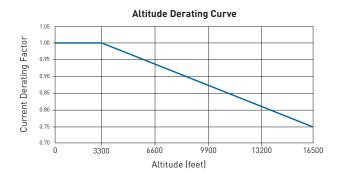
Wider range of impedance values for accurate and cost-effective selection.

DIN Rail mounting options for easy panel installation.

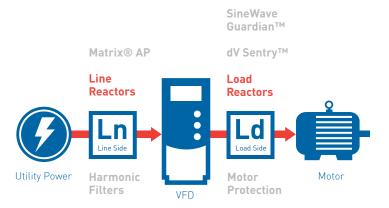
UL/cUL LISTED and CE marked for all your installation requirements.

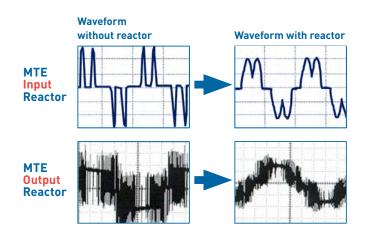
Preliminary Performance Specifications:

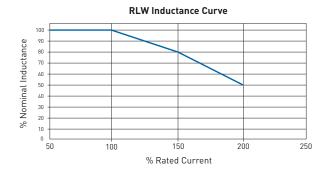
Impedance Levels	1.5%, 3% and 5%
Continuous Service Factor	100%
Overload Rating - Line Side	150% of RMS rating for 1 minute 200% of RMS rating for 10 seconds
Voltage Range	208V - 690V
Current Range	0.5A - 750A
Temperature Rise	140°C
Ambient Temperature	-40 to 50°C
Altitude Maximum without de-rating	1,000 meters
Fundamental Frequency	50/60 Hz
Inductance Curve	100% at 100% Current 80% at 150% Current 50% at 200% Current







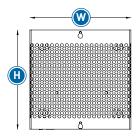






ENCLOSURES

FIGURE 1





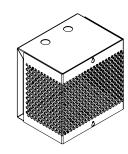
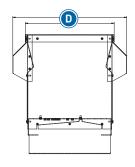
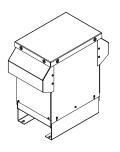


FIGURE 2

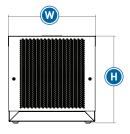


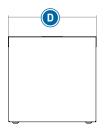




NOTE: HOODS ONLY ON NEMA 3R ENCLOSURES

FIGURE 3





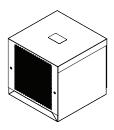
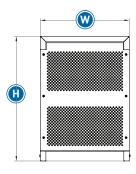
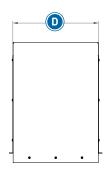
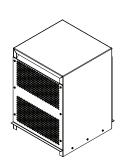


FIGURE 4







SELECTION TABLES





Phase	Input Voltage & Hz	% Impedance	0.25 HP 0.18 kw	0.33 HP 0.25 kw	0.5 HP 0.37 kw	0.75 HP 0.55 kw	1.0 HP 0.75 kw	1.5 HP 1.1 kw	2.0 HP 1.5 kw	3.0 HP 2.2 kw	5.0 HP 3.7 kw	7.5 HP 5.5 kw	10.0 HP 7.5 kw	15.0 HP 11.0 kw	20.0 HP 15.0 kw	25.0 HP 18.5 kw
Tiluse	Q.112	mpedance	0.10 KW	0.20 KW	0.07 km		e Phase Inpi				0.7 KW	0.0 ки	7.0 KW	11.0 km	10.0 KW	IC.O KW
3 Phase	208V 60 Hz	3%	RLW- 01P601	RLW- 02P101	RLW- 03P401	RLW- 04P801	RLW- 04P801	RLW- 07P601	RLW- 07P601	RLW- 001101	RLW- 002101	RLW- 002801	RLW- 003501	RLW- 005501	RLW- 008301	RLW- 010401
3 Phase	208V 60 Hz	5%	RLW- 02P103	RLW- 03P403	RLW- 03P40 3	RLW- 04P803	RLW- 07P603	RLW- 001103	RLW- 001103	RLW- 001403	RLW- 002803	RLW- 003503	RLW- 002801	RLW- 004601	RLW- 008303	RLW- 010403
3 Phase	240V 60 Hz	3%	RLW- 01P601	RLW- 02P101	RLW- 02P101	RLW- 03P401	RLW- 04P801	RLW- 001103	RLW- 07P601	RLW- 001101	RLW- 002803	RLW- 002101	RLW- 002801	RLW- 005501	RLW- 006501	RLW- 008301
3 Phase	240V 60 Hz	5%	RLW- 01P603	RLW- 02P103	RLW- 03P403	RLW- 04P803	RLW- 04P803	RLW- 07P603	RLW- 07P603	RLW- 001103	RLW- 002103	RLW- 002803	RLW- 003503	RLW- 005503	RLW- 006503	RLW- 008303
3 Phase	400V 50 Hz	3%	RLW- 0P7505	RLW- 0P7503	RLW- 01P605	RLW- 02P103	RLW- 03P405	RLW- 03P403	RLW- 04P803	RLW- 07P605	RLW- 001105	RLW- 001405	RLW- 002105	RLW- 002805	RLW- 003503	RLW- 003503
3 Phase	400V 50 Hz	5%	RLW- 0P7506	RLW- 0P7505	RLW- 01P606	RLW- 02P106	RLW- 03P406	RLW- 03P405	RLW- 04P806	RLW- 07P606	RLW- 001106	RLW- 001406	RLW- 002106	RLW- 002806	RLW- 003505	RLW- 003505
3 Phase	480V 60 Hz	3%	RLW- 01P105	RLW- 01P606	RLW- 01P103	RLW- 01P603	RLW- 02P103	RLW- 04P805	RLW- 03P403	RLW- 04P803	RLW- 07P603	RLW- 001103	RLW- 001403	RLW- 002103	RLW- 002803	RLW- 003503
3 Phase	480V 60 Hz	5%	RLW- 0P7506	RLW- 01P106	RLW- 01P105	RLW- 01P605	RLW- 02P105	RLW- 03P405	RLW- 03P405	RLW- 04P805	RLW- 07P605	RLW- 001105	RLW- 001405	RLW- 002105	RLW- 002805	RLW- 003505
3 Phase	600V 60 Hz	3%	RLW- 0P7506	RLW- 01P106	RLW- 01P606	RLW- 02P106	RLW- 02P105	RLW- 03P405	RLW- 04P806	RLW- 04P805	RLW- 07P605	RLW- 001105	RLW- 001103	RLW- 002105	RLW- 002805	RLW- 002803
3 Phase	600V 60 Hz	5%	RLW- 00P506	RLW- 0P7506	RLW- 01P106	RLW- 01P606	RLW- 02P106	RLW- 03P406	RLW- 03P406	RLW- 04P806	RLW- 07P606	RLW- 001106	RLW- 001106	RLW- 002106	RLW- 002806	RLW- 002806
3 Phase	690V 50 Hz	2%	-	-	-	-	-	-	-	RLW- 03P403	RLW- 04P803	RLW- 07P603	RLW- 001105	RLW- 001403	RLW- 002105	RLW- 002103
3 Phase	690V 50 Hz	3%	-	-	-	-	-	-	-	RLW- 03P406	RLW- 04P805	RLW- 07P606	RLW- 001106	RLW- 001405	RLW- 002106	RLW- 002105
							Single F	Phase Input A	Applicaitons							
1 Phase	400V 50 Hz	5%	RLW- 01P105	RLW- 01P606	RLW- 02P105	RLW- 03P405	RLW- 04P805	RLW- 07P606	RLW- 07P605	RLW- 001106	RLW- 001405	RLW- 002105	RLW- 002805	RLW- 004605	RLW- 005505	RLW- 006505
1 Phase	480V 60 Hz	5%	RLW- 01P606	RLW- 01P605	RLW- 02P105	RLW- 03P405	RLW- 04P806	RLW- 07P606	RLW- 07P606	RLW- 001106	RLW- 001405	RLW- 002105	RLW- 002805	RLW- 004605	RLW- 005505	RLW- 006505
1 Phase	600V 60 Hz	5%	RLW- 01P106	RLW- 01P105	RLW- 01P605	RLW- 03P406	RLW- 03P406	RLW- 04P806	RLW- 04P805	RLW- 07P606	RLW- 001106	RLW- 002105	RLW- 002106	RLW- 003505	RLW- 004605	RLW- 005505
					ı	_	Three Phas	e Output Sel	lected by Mo	tor		ı		ı		
3 Phase	480V 60 Hz	1.5%	RLW- 01P103	RLW- 01P101	RLW- 01P603	RLW- 02P101	RLW- 03P403	RLW- 04P803	RLW- 04P803	RLW- 07P603	RLW- 001103	RLW- 001401	RLW- 002103	RLW- 002803	RLW- 003501	RLW- 004601
3 Phase	600V 60 Hz	1.5%	RLW- 0P7503	RLW- 01P103	RLW- 01P605	RLW- 02P103	RLW- 02P103	RLW- 03P403	RLW- 03P403	RLW- 07P605	RLW- 001105	RLW- 001403	RLW- 001403	RLW- 002802	RLW- 002803	RLW- 003503
3 Phase	690V 50 Hz	1.5%	-	-	-	-	-	-	-	RLW- 04P805	RLW- 07P605	RLW- 001105	RLW- 001105	RLW- 002105	RLW- 002105	RLW- 002805

Impedance Rating:

1.5% impedance reactors are the recommended maximum impedance for load side reactor applications.

3% impedance reactors are typically sufficiant to absorb power line spikes and motor current surges. They will prevent nuisance tripping of drives or circuit breakers in most applications.

5% impedance reactors are best for reducing harmonic currents and frequencies. Use them when you must reduce VFD drive generated harmonics, and to reduce motor operating temperature.

RLW Reactors







30.0 HP 22.0 kw	40.0 HP 30.0 kw	50.0 HP 37.5 kw	60.0 HP 45.0 kw	75.0 HP 55.0 kw	100.0 HP 75.0 kw	125.0 HP 93.0 kw	150.0 HP 112.0 kw	200.0 HP 150.0 kw	250.0 HP 187.0 kw	300.0 HP 225.0 kw	350.0 HP 262.0 kw	400.0 HP 300.0 kw	500.0 HP 375.0 kw	600.0 HP 450.0 kw	700.0 HP 550.0 kw	800.0 HP 600.0 kw
Three Phase Input Applications Selected by Motor																
RLW- 010401	RLW- 013001	RLW- 016001	RLW- 020001	RLW- 025001	RLW- 041401	RLW- 041401	RLW- 051501	RLW- 060001	RLW- 075001	-	-	-	-	-	-	-
RLW- 008301	RLW- 010401	RLW- 013001	RLW- 025003	RLW- 020001	RLW- 032201	RLW- 032201	RLW- 041401	RLW- 051501	RLW- 075001	-	-	-	-	-	-	-
RLW- 010401	RLW- 013001	RLW- 016001	RLW- 016001	RLW- 020001	RLW- 025001	RLW- 041401	RLW- 041401	RLW- 051501	RLW- 075001	RLW- 075001	-	-	-	-	-	-
RLW- 010403	RLW- 013003	RLW- 016003	RLW- 020003	RLW- 025003	RLW- 032203	RLW- 041403	RLW- 051503	RLW- 060003	RLW- 075003	RLW- 075001	-	-	-	-	-	-
RLW- 004603	RLW- 006503	RLW- 008303	RLW- 008303	RLW- 010403	RLW- 016003	RLW- 020003	RLW- 020003	RLW- 032203	RLW- 041403	RLW- 041403	RLW- 051503	RLW- 051503	RLW- 075003	-	-	-
RLW- 004605	RLW- 006505	RLW- 008305	RLW- 008305	RLW- 010405	RLW- 016005	RLW- 020005	RLW- 020005	RLW- 032205	RLW- 041405	RLW- 041405	RLW- 051505	RLW- 060005	RLW- 075005	-	-	-
RLW- 004603	RLW- 006503	RLW- 006503	RLW- 008303	RLW- 010403	RLW- 013003	RLW- 016003	RLW- 020003	RLW- 025003	RLW- 032203	RLW- 041403	RLW- 051503	RLW- 051503	RLW- 075003	RLW- 075003	-	-
RLW- 004605	RLW- 005505	RLW- 006505	RLW- 008305	RLW- 010405	RLW- 013005	RLW- 016005	RLW- 020005	RLW- 025005	RLW- 032205	RLW- 041405	RLW- 041405	RLW- 051505	RLW- 060005	RLW- 075005	-	-
RLW- 003503	RLW- 004603	RLW- 005503	RLW- 006503	RLW- 008303	RLW- 010403	RLW- 013003	RLW- 016003	RLW- 020003	RLW- 025003	RLW- 032203	RLW- 032203	RLW- 041403	RLW- 051503	RLW- 060003	RLW- 075003	-
RLW- 003505	RLW- 004605	RLW- 005505	RLW- 006505	RLW- 008305	RLW- 010405	RLW- 013005	RLW- 016005	RLW- 020005	RLW- 025005	RLW- 032205	RLW- 032205	RLW- 041405	RLW- 051505	RLW- 060005	RLW- 075005	-
RLW- 002803	RLW- 003503	RLW- 004603	RLW- 005503	RLW- 006503	RLW- 008303	RLW- 010403	RLW- 013003	RLW- 016003	RLW- 020003	RLW- 025003	RLW- 032205	RLW- 032203	RLW- 041403	RLW- 051503	RLW- 051503	RLW- 060003
RLW- 002806	RLW- 003505	RLW- 004605	RLW- 005505	RLW- 006505	RLW- 008305	RLW- 010405	RLW- 013005	RLW- 016005	RLW- 020005	RLW- 025005	RLW- 032207	RLW- 032205	RLW- 041405	RLW- 051505	RLW- 051505	RLW- 060005
							Sinç	gle Phase In	put Applicai	tons						
RLW- 008305	RLW- 010405	RLW- 013005	RLW- 016005	RLW- 020005	RLW- 025005	RLW- 032205	RLW- 041405	RLW- 060005	RLW- 060005	RLW- 075005	-	-	-	-	-	-
RLW- 008305	RLW- 010405	RLW- 013005	RLW- 016005	RLW- 020005	RLW- 025005	RLW- 032205	RLW- 032205	RLW- 051505	RLW- 060005	RLW- 075005	RLW- 075005	-	-	-	-	-
RLW- 006505	RLW- 008305	RLW- 010405	RLW- 013005	RLW- 016005	RLW- 020005	RLW- 025005	RLW- 025005	RLW- 041405	RLW- 051505	RLW- 051505	RLW- 060005	RLW- 075005	-	-	-	-
							Three F	Phase Outpu	t Selected b	y Motor						
RLW- 005501	RLW- 006501	RLW- 008301	RLW- 010401	RLW- 013003	RLW- 016001	RLW- 020001	RLW- 025001	RLW- 032201	RLW- 041401	RLW- 051501	RLW- 060001	RLW- 060001	RLW- 075001	-	-	-
RLW- 004603	RLW- 005501	RLW- 006503	RLW- 008303	RLW- 010403	RLW- 013003	RLW- 016001	RLW- 020003	RLW- 025003	RLW- 032201	RLW- 041403	RLW- 051503	RLW- 051503	RLW- 060003	RLW- 075001	-	-
RLW- 003505	RLW- 004605	RLW- 005505	RLW- 006503	RLW- 008305	RLW- 010405	RLW- 013005	RLW- 016005	RLW- 020005	RLW- 025005	RLW- 032205	RLW- 032205	RLW- 041405	RLW- 051503	RLW- 060005	RLW- 075005	RLW- 075003

TECHNICAL DATA:





The RLW Reactors are available in 208-690 VAC / Three-Phase and Single-Phase Applications

Open					Open						
Open Part	Amps	Inductance		Open Weight	Size (In.)	Open Part	Amps	Inductance		Open Weight	Size (In.)
Number	Rating	mh	Watts Loss	(lbs.)	(H x W x D)	Number	Rating	mh	Watts Loss	(lbs.)	(H x W x D)
RLW-00P501	0.5	22	2.3	1.5	3.7 X 4.5 X 1.5	RLW-004605	46	1	179.3	24	8.3 X 9 X 4.8
RLW-00P503	0.5	46	3.6	1.6	3.7 X 4.5 X 1.5	RLW-004607	46	1.6	250	26.6	8.3 X 9 X 5.1
RLW-00P505	0.5	74	4.8	1.7	3.7 X 4.5 X 1.5	RLW-005501	55	0.3	67.5	18	6 X 7.2 X 4
RLW-00P506	0.5	92	5.4	1.7	3.7 X 4.5 X 1.5	RLW-005503	55	0.5	109.7	20	6 X 7.2 X 4.25
RLW-0P7501	0.75	15	4.2	1.5	3.7 X 4.5 X 1.5	RLW-005505	55	0.8	149.7	26	7 X 9 X 6.5
RLW-0P7503	0.75	31	6.6	1.6	3.7 X 4.5 X 1.5	RLW-005507	55	1.3	283	35	7 X 9 X 7.25
RLW-0P7505	0.75	49	8.8	1.6	3.7 X 4.5 X 1.5	RLW-006501	65	0.2	87.4	18	6 X 7.2 X 4
RLW-0P7506	0.75	61	10.1	1.6	3.7 X 4.5 X 1.5	RLW-006503	65	0.4	105.3	22	6 X 7.2 X 4.25
RLW-01P101	1.1	10	4.8	1.5	3.7 X 4.5 X 1.5	RLW-006505	65	0.6	214.5	26	7 X 9 X 6.5
RLW-01P103	1.1	21	7.8	1.6	3.7 X 4.5 X 1.5	RLW-006507	65	1.1	191	44	7 X 9 X 7.25
RLW-01P105	1.1	33	10.1	1.6	3.7 X 4.5 X 1.5	RLW-008301	83	0.2	119.3	19	6 X 7.2 X 4.25
RLW-01P106	1.1	42	11.9	1.7	3.7 X 4.5 X 1.5	RLW-008303	83	0.3	155.1	26	7 X 9 X 6.5
RLW-01P601	1.6	6.9	6.9	1.6	3.7 X 4.5 X 1.5	RLW-008305	83	0.5	197.5	35	7 X 9 X 6.75
RLW-01P603	1.6	14	10.9	1.6	3.7 X 4.5 X 1.5	RLW-008307	83	0.9	240	54	7 X 9 X 7.25
RLW-01P605	1.6	23	15	1.7	3.7 X 4.5 X 1.5	RLW-010401	104	0.1	94	22	6 X 7.2 X 6.5
RLW-01P606	1.6	29	17.7	1.8	3.7 X 4.5 X 1.5	RLW-010403	104	0.2	199.5	28	7 X 9 X 7
RLW-02P101	2.1	5.3	9	1.6	3.7 X 4.5 X 1.5	RLW-010405	104	0.4	208.6	41	7 X 9 X 7.25
RLW-02P103	2.1	11	14.3	1.7	3.7 X 4.5 X 1.5	RLW-010407	104	0.7	256	57	7 X 9 X 7.75
RLW-02P105	2.1	18	19.6	1.8	3.7 X 4.5 X 1.5	RLW-013001	130	0.1	131.5	26	7.5 X 9.25 X 6.75
RLW-02P106	2.1	22	22.3	1.8	3.7 X 4.5 X 1.5	RLW-013003	130	0.2	152.5	37	7.5 X 9.25 X 6.75
RLW-03P401	3.4	3.2	12.3	1.6	3.7 X 4.5 X 1.5	RLW-013005	130	0.3	197.6	52	7.5 X 9.25 X 8.25
RLW-03P403	3.4	6.8	19.6	1.8	3.7 X 4.5 X 1.5	RLW-013007	130	0.6	480	80	8.75 X 10.8 X 9
RLW-03P405	3.4	11	13.8	2.7	5 X 4.4 X 2.8	RLW-016001	160	0.1	109.5	34	7.5 X 9.25 X 6.75
RLW-03P406	3.4	14	23	2.8	5 X 4.4 X 2.8	RLW-016003	160	0.2	194.5	49	7.5 X 9.25 X 8.25
RLW-04P801	4.8	2.3	19.2	1.7	3.7 X 4.5 X 1.5	RLW-016005	160	0.3	309.3	53	7.5 X 9.25 X 8.25
RLW-04P803	4.8	4.8	26.5	1.8	3.7 X 4.5 X 1.5	RLW-016007	160	0.5	561	75	8.75 X 10.8 X 9.5
RLW-04F805	4.8	7.7	31.5	2.7	5 X 4.4 X 2.8	RLW-020001	200	0.1	158.5	34	7.5 X 9.25 X 7
RLW-04P806	4.8	10	37.5	4	5 X 4.4 X 3.1	RLW-020003	200	0.1	223.5	49	7.5 X 9.25 X 8.25
RLW-07P601	7.6	1.5	40.1	1.7	3.7 X 4.5 X 1.5	RLW-020005	200	0.2	293	75	8.25 X 10.8 X 9
RLW-07P603	7.6	3	37.2	2.7	5 X 4.4 X 2.8	RLW-020007	200	0.3	509	91	8.75 X 10.8 X 10
RLW-07P605	7.6	4.8	47.8	4.1	5 X 4.4 X 3.1	RLW-025007	250	0.1	275.6	35	7.5 X 9.25 X 7.5
RLW-07P606	7.6	6	53.8	4.1	5 X 4.4 X 3.1	RLW-025003	250	0.1	284.2	55	7.5 X 9.25 X 8.5
RLW-07F 000	11	1	26.8	2.7	5 X 4.4 X 2.8	RLW-025005	250	0.1	402	75	8.75 X 10.8 X 9
RLW-001101	11	2.1	40.9	4.2	5 X 4.4 X 3.1	RLW-025007	250	0.2	465	121	8.5 X 10.8 X 11.75
RLW-001105	11	3.3	54.4	5.3	5 X 4.4 X 3.5	RLW-023007	322	0.3	300	57	7.5 X 9.25 X 9
RLW-001106 RLW-001401	11	4.2	59.1	6.5	5.8 X 6 X 2.9	RLW-032203	322	0.1	383	76	8.75 X 10.8 X 8.5
	14	0.8	32.7	2.8	5.3 X 4.4 X 2.8	RLW-032205	322	0.1	494	108	8.75 X 9 X 11
RLW-001403	14	1.6	48.2	4.3	5 X 4.4 X 3.1 5.8 X 6 X 2.9	RLW-032207	322	0.2	780	172	11.5 X 14.4 X 12.5
RLW-001405	14	2.6	60.6	6.5		RLW-041401	414	0	333	78	8.75 X 9 X 9.5
RLW-001406	14	3.3	66	8.8	5.8 X 6 X 3.3	RLW-041403	414	0.1	531	98	8.75 X 9 X 11.5
RLW-002101	21	0.5	38.3	4.2	5.3 X 4.4 X 3.3	RLW-041405	414	0.1	588	125	8.75 X 9 X 12.5
RLW-002103	21	1.1	57.4	6.6	6.1 X 6 X 2.9	RLW-041407	414	0.2	1007	210	11.5 X 14.4 X 13.5
RLW-002105	21	1.8	73.5	9.2	6.1 X 6 X 3.3	RLW-051501	515	0	314	81	8.75 X 9 X 9.5
RLW-002106	21	2.2	78	13.3	7 X 7.2 X 3.8	RLW-051503	515	0.1	496	118	8.75 X 9 X 12
RLW-002801	28	0.4	48.2	5.1	5.3 X 4.4 X 3.5	RLW-051505	515	0.1	695	193	11.5 X 14.4 X 13.5
RLW-002803	28	0.8	66.8	8.8	6.1 X 6 X 3.3	RLW-051507	515	0.2	1096	248	11.5 X 14.4 X 13.75
RLW-002805	28	1.3	93.8	13.7	6.1 X 6 X 3.3	RLW-060001	600	0	375	86	8.75 X 9 X 10.5
RLW-002806	28	1.6	110.6	14.3	7 X 7.2 X 3.8	RLW-060003	600	0	747	144	11.5 X 14.4 X 12.5
RLW-003501	35	0.4	68.6	10	6 X 6 X 3.5	RLW-060005	600	0.1	780	204	11.5 X 14.4 X 13.75
RLW-003503	35	0.7	102.9	13	6 X 7.2 X 3.75	RLW-060007	600	0.1	1190	292	11.5 X 14.4 X 15.5
RLW-003505	35	1.2	121.9	18	6 X 7.2 X 4.3	RLW-075001	750	0	468	105	8.75 X 9 X 11.5
RLW-003507	35	2.1	204	18.3	8.3 X 9 X 4.6	RLW-075003	750	0	838	179	11.5 X 14.4 X 12.5
RLW-004601	46	0.3	77.9	13	6 X 7.2 X 3.75	RLW-075005	750	0.1	858	245	11.5 X 14.4 X 15
RLW-004603	46	0.6	99.8	17	6 x 7.2 x 4.3	RLW-075007	750	0.1	1426	348	11.5 X 14.4 X 22

Note: drawing dimensions are for reference only. See MTECORP.com for detailed information.

RLW Reactors







		NEMA 1/2		
			Size (In.)	
Part Number	Weight (lbs.)	Cabinet	(H x W x D)	Ref Figure
RLW-00P511	8.5	CAB-8	8 X 8 X 6	1
RLW-00P513	8.6	CAB-8	8 X 8 X 6	1
RLW-00P515	8.7	CAB-8	8 X 8 X 6	1
RLW-00P516	8.7	CAB-8	8 X 8 X 6	1
RLW-0P7511	8.5	CAB-8	8 X 8 X 6	1
RLW-0P7513	8.6	CAB-8	8 X 8 X 6	1
RLW-0P7515	8.6	CAB-8	8 X 8 X 6	1
RLW-0P7516	8.6	CAB-8	8 X 8 X 6	1
RLW-01P111	8.5	CAB-8	8 X 8 X 6	1
RLW-01P113	8.6	CAB-8	8 X 8 X 6	1
RLW-01P115	8.6	CAB-8	8 X 8 X 6	1
RLW-01P116	8.7	CAB-8	8 X 8 X 6	1
RLW-01P611	8.6	CAB-8	8 X 8 X 6	1
RLW-01P613	8.6	CAB-8	8 X 8 X 6	1
RLW-01P615	8.7	CAB-8	8 X 8 X 6	1
RLW-01P616	8.8	CAB-8	8 X 8 X 6	1
RLW-02P111	8.6	CAB-8	8 X 8 X 6	1
RLW-02P113	8.7	CAB-8	8 X 8 X 6	1
RLW-02P115	8.8	CAB-8	8 X 8 X 6	1
RLW-02P116	8.8	CAB-8	8 X 8 X 6	1
RLW-03P411	8.6	CAB-8	8 X 8 X 6	1
RLW-03P413	8.8	CAB-8	8 X 8 X 6	1
RLW-03P415	9.7	CAB-8	8 X 8 X 6	1
RLW-03P416	9.8	CAB-8	8 X 8 X 6	1
RLW-04P811	8.7	CAB-8	8 X 8 X 6	1
RLW-04P813	8.8	CAB-8	8 X 8 X 6	1
RLW-04P815	9.7	CAB-8	8 X 8 X 6	1
RLW-04P816	11	CAB-8	8 X 8 X 6	1
RLW-07P611	8.7	CAB-8	8 X 8 X 6	1
RLW-07P613	9.7	CAB-8	8 X 8 X 6	1
RLW-07P615	11.1	CAB-8	8 X 8 X 6	1
RLW-07P616	11.2	CAB-8	8 X 8 X 6	1
RLW-001111	9.7	CAB-8	8 X 8 X 6	1
RLW-001113	11.2	CAB-8	8 X 8 X 6	1
RLW-001115	12.3	CAB-8	8 X 8 X 6	1
RLW-001116	13.5	CAB-8	8 X 8 X 6	1
RLW-001411	9.8	CAB-8	8 X 8 X 6	1
RLW-001413	11.3	CAB-8	8 X 8 X 6	1
RLW-001415	13.5	CAB-8	8 X 8 X 6	1
RLW-001416	26.8	CAB-13V	13 X 13 X 13	3
RLW-002111	22.2	CAB-13V	13 X 13 X 13	3
RLW-002113	24.6	CAB-13V	13 X 13 X 13	3
RLW-002115	27.2	CAB-13V	13 X 13 X 13	3
RLW-002116	31.3	CAB-13V	13 X 13 X 13	3
RLW-002811	23.1	CAB-13V	13 X 13 X 13	3
RLW-002813	26.8	CAB-13V	13 X 13 X 13	3
RLW-002815	31.7	CAB-13V	13 X 13 X 13	3
RLW-002816	32.3	CAB-13V	13 X 13 X 13	3
RLW-003511	28	CAB-13V	13 X 13 X 13	3
RLW-003513	31	CAB-13V	13 X 13 X 13	3
RLW-003515	36	CAB-13V	13 X 13 X 13	3
RLW-003517	36.3	CAB-13V	13 X 13 X 13	3
RLW-004611	31	CAB-13V	13 X 13 X 13	3
RLW-004613	35	CAB-13V	13 X 13 X 13	3

		NEMA 1/2			NEMA 1/2							
			Size (In.)		Size (In.)							
Part Number	Weight (lbs.)	Cabinet	(H x W x D)	Ref Figure	Part Number	Weight (lbs.)	Cabinet	(H x W x D)	Ref Figure			
RLW-00P511	8.5	CAB-8	8 X 8 X 6	1	RLW-004615	42	CAB-13V	13 X 13 X 13	3			
RLW-00P513	8.6	CAB-8	8 X 8 X 6	1	RLW-004617	44.6	CAB-13V	13 X 13 X 13	3			
RLW-00P515	8.7	CAB-8	8 X 8 X 6	1	RLW-005511	36	CAB-13V	13 X 13 X 13	3			
RLW-00P516	8.7	CAB-8	8 X 8 X 6	1	RLW-005513	38	CAB-13V	13 X 13 X 13	3			
RLW-0P7511	8.5	CAB-8	8 X 8 X 6	1	RLW-005515	44	CAB-13V	13 X 13 X 13	3			
RLW-0P7513	8.6	CAB-8	8 X 8 X 6	1	RLW-005517	53	CAB-13V	13 X 13 X 13	3			
RLW-0P7515	8.6	CAB-8	8 X 8 X 6	1	RLW-006511	36	CAB-13V	13 X 13 X 13	3			
RLW-0P7516	8.6	CAB-8	8 X 8 X 6	1	RLW-006513	40	CAB-13V	13 X 13 X 13	3			
RLW-01P111	8.5	CAB-8	8 X 8 X 6	1	RLW-006515	44	CAB-13V	13 X 13 X 13	3			
RLW-01P113	8.6	CAB-8	8 X 8 X 6	1	RLW-006517	62	CAB-13V	13 X 13 X 13	3			
RLW-01P115	8.6	CAB-8	8 X 8 X 6	1	RLW-008311	37	CAB-13V	13 X 13 X 13	3			
RLW-01P116	8.7	CAB-8	8 X 8 X 6	1	RLW-008313	44	CAB-13V	13 X 13 X 13	3			
RLW-01P611	8.6	CAB-8	8 X 8 X 6	1	RLW-008315	53	CAB-13V	13 X 13 X 13	3			
RLW-01P613	8.6	CAB-8	8 X 8 X 6	1	RLW-008317	72	CAB-13V	13 X 13 X 13	3			
RLW-01P615	8.7	CAB-8	8 X 8 X 6	1	RLW-010411	40	CAB-13V	13 X 13 X 13	3			
RLW-01P616	8.8	CAB-8	8 X 8 X 6	1	RLW-010413	46	CAB-13V	13 X 13 X 13	3			
RLW-02P111	8.6	CAB-8	8 X 8 X 6	1	RLW-010415	59	CAB-13V	13 X 13 X 13	3			
RLW-02P113	8.7	CAB-8	8 X 8 X 6	1	RLW-010417	75	CAB-13V	13 X 13 X 13	3			
RLW-02P115	8.8	CAB-8	8 X 8 X 6	1	RLW-013011	44	CAB-13V	13 X 13 X 13	3			
RLW-02P116	8.8	CAB-8	8 X 8 X 6	1	RLW-013013	55	CAB-13V	13 X 13 X 13	3			
RLW-03P411	8.6	CAB-8	8 X 8 X 6	1	RLW-013015	70	CAB-13V	13 X 13 X 13	3			
RLW-03P413	8.8	CAB-8	8 X 8 X 6	1	RLW-013017	98	CAB-13V	13 X 13 X 13	3			
RLW-03P415	9.7	CAB-8	8 X 8 X 6	1	RLW-016011	52	CAB-13V	13 X 13 X 13	3			
RLW-03P416	9.8	CAB-8	8 X 8 X 6	1	RLW-016013	67	CAB-13V	13 X 13 X 13	3			
RLW-04P811	8.7	CAB-8	8 X 8 X 6	1	RLW-016015	77	CAB-17V	24 X 17 X 18.4	4			
RLW-04P813	8.8	CAB-8	8 X 8 X 6	1	RLW-016017	99	CAB-17V	24 X 17 X 18.4	4			
RLW-04P815	9.7	CAB-8	8 X 8 X 6	1	RLW-020011	58	CAB-17V	24 X 17 X 18.4	4			
RLW-04P816	11	CAB-8	8 X 8 X 6	1	RLW-020013	73	CAB-17V	24 X 17 X 18.4	4			
RLW-07P611	8.7	CAB-8	8 X 8 X 6	1	RLW-020015	99	CAB-17V	24 X 17 X 18.4	4			
RLW-07P613	9.7	CAB-8	8 X 8 X 6	1	RLW-020017	115	CAB-17V	24 X 17 X 18.4	4			
RLW-07P615	11.1	CAB-8	8 X 8 X 6	1	RLW-025011	59	CAB-17V	24 X 17 X 18.4	4			
RLW-07P616	11.2	CAB-8	8 X 8 X 6	1	RLW-025013	79	CAB-17V	24 X 17 X 18.4	4			
RLW-001111	9.7	CAB-8	8 X 8 X 6	1	RLW-025015	99	CAB-17V	24 X 17 X 18.4	4			
RLW-001113	11.2	CAB-8	8 X 8 X 6	1	RLW-025017	145	CAB-17V	24 X 17 X 18.4	4			
RLW-001115	12.3	CAB-8	8 X 8 X 6	1	RLW-032211	81	CAB-17V	24 X 17 X 18.4	4			
RLW-001116	13.5	CAB-8	8 X 8 X 6	1	RLW-032213	220	CAB-26C	47 X 27 X 25	2			
RLW-001411	9.8	CAB-8	8 X 8 X 6	1	RLW-032215	252	CAB-26C	47 X 27 X 25	2			
RLW-001413	11.3	CAB-8	8 X 8 X 6	1	RLW-032217	316	CAB-26C	47 X 27 X 25	2			
RLW-001415	13.5	CAB-8	8 X 8 X 6	1	RLW-041411	222	CAB-26C	47 X 27 X 25	2			
RLW-001416	26.8	CAB-13V	13 X 13 X 13	3	RLW-041413	242	CAB-26C	47 X 27 X 25	2			
RLW-002111	22.2	CAB-13V	13 X 13 X 13	3	RLW-041415	269	CAB-26C	47 X 27 X 25	2			
RLW-002113	24.6	CAB-13V	13 X 13 X 13	3	RLW-041417	354	CAB-26C	47 X 27 X 25	2			
RLW-002115	27.2	CAB-13V	13 X 13 X 13	3	RLW-051511	225	CAB-26C	47 X 27 X 25	2			
RLW-002116	31.3	CAB-13V	13 X 13 X 13	3	RLW-051513	262	CAB-26C	47 X 27 X 25	2			
RLW-002811	23.1	CAB-13V	13 X 13 X 13	3	RLW-051515	337	CAB-26C	47 X 27 X 25	2			
RLW-002813	26.8	CAB-13V	13 X 13 X 13	3	RLW-051517	392	CAB-26C	47 X 27 X 25	2			
RLW-002815	31.7	CAB-13V	13 X 13 X 13	3	RLW-060011	230	CAB-26C	47 X 27 X 25	2			
RLW-002816	32.3	CAB-13V	13 X 13 X 13	3	RLW-060013	288	CAB-26C	47 X 27 X 25	2			
RLW-003511	28	CAB-13V	13 X 13 X 13	3	RLW-060015	348	CAB-26C	47 X 27 X 25	2			
RLW-003513	31	CAB-13V	13 X 13 X 13	3	RLW-060017	436	CAB-26C	47 X 27 X 25	2			
RLW-003515	36	CAB-13V	13 X 13 X 13	3	RLW-075011	249	CAB-26C	47 X 27 X 25	2			
RLW-003517	36.3	CAB-13V	13 X 13 X 13	3	RLW-075013	323	CAB-26C	47 X 27 X 25	2			
RLW-004611	31	CAB-13V	13 X 13 X 13	3	RLW-075015	389	CAB-26C	47 X 27 X 25	2			
RLW-004613	35	CAB-13V	13 X 13 X 13	3	RLW-075017	492	CAB-26C	47 X 27 X 25	2			

The power quality experts.

MTE Corporation was formed in 1982 by bringing together Milwaukee Transformer Co., Transformer Design Inc., Hytran Inc., and Milwaukee Electronics Corporation – companies that specialized in different fields of magnetics and transformer design and were long established in their respective fields. This allowed us to build the best magnetics company in the country by capitalizing on the individual strengths of each, while bringing a new dimension in management, marketing and quality.

MTE vaulted into a leadership role in power quality with its unique AC reactor design and passive filter expertise. We continued to grow as a leader with innovative DC Link Chokes, Harmonic Filters, Motor Protection Filters and SineWave Filters. Our team of professional design engineers has over 100 years of collective experience in the magnetics industry and is complemented by as much experience in manufacturing. Our engineers utilize state-of-the-art platforms and best-in-class simulation/modeling tools so that new designs meet your application needs. At MTE, we know power quality because power quality is all we do.

An SL Industries company. Better together.

MTE Corporation was acquired by SL Industries (NYSE:SLI) on November 1, 2006. SL Industries through its subsidiaries, designs, manufactures and markets power electronics, motion control, power protection, power quality electromagnetic and specialized communication equipment that is used in a variety of medical, commercial and military aerospace, computer, datacom, industrial, telecom, transportation, utility, rail and highway equipment applications.

mtecorp.com

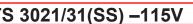


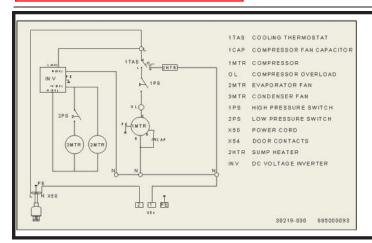


MTE Corporation

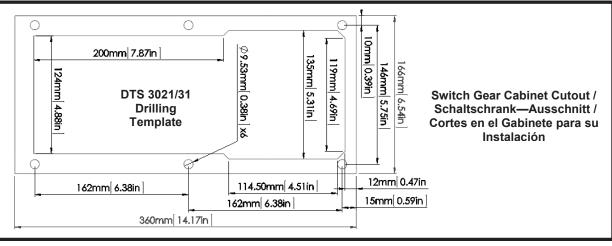
N83 W13330 Leon Road • Menomonee Falls, WI 53051 (800) 455-4MTE • (262) 253-8200

DTS 3021/31(SS) -115V





Circuit Diagram/ Schaltplan/ Diagrama de Circuito





Door contact: No external voltage

Türkontakt: Keine Fremdspannung anlegen

Contacto seco de la puerta: Sin voltaje externo



Read this manual completely and carefully before installing the unit. This manual is an integral part of the scope of delivery and must be kept until the unit is disposed of.

Lesen Sie dieses Beiblatt vollständig und aufmerksam durch, bevor das Gerät installiert wird. Das Beiblatt ist fester Bestandteil des Lieferumfangs und muß bis zum Abbau des Gerätes aufbewahrt werden.

Lea este manual completo y cuidadosamente antes de instalar la unidad. Este manual es parte integral del alcance de la entrega y debe ser guardado hasta después de su vida útil.



Prior to mounting, ensure that: the separation of the units from one another and from the wall should not be less than 200 mm; air inlet and outlet are not obstructed on the inside of the enclosure.

Vor der Montage ist zu beachten, daß der Abstand der Geräte zueinander bzw. zur Wand mindestens 200 mm beträgt; Luftein- und -austritte innen nicht verbaut sind

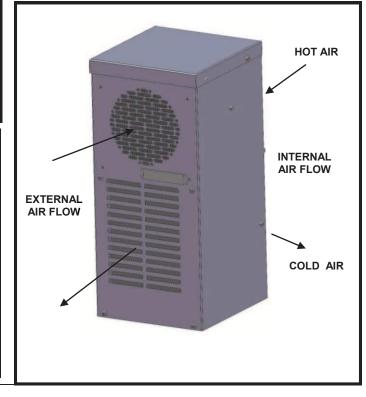
Antes de instalar, asegúrese que: La separación entre unidades o de de otro objeto no debe ser menor de 200 mm. Ya que la entrada y salida del aire, se obstruye en el interior del gabinete.



left and right sides. Seitliche Dichtung – muss auf die Befestigungslöcher links und rechts geklebt

Sello superior - asegúrese de que el material de sello se encuentre alineado en los lados

Sealing / Dichtung / Lacre Isometric View Enclosure / Isometrische Ansicht Schaltschrank / Vista Isometrica del Gabinete



Technical Data / Technische Daten / Datos Técnicos

Model		DTS 3021/31	(SS) 115V	
Cooling data / Kältetechnische Daten / Datos de enfriamiento		DTS 3021	DTS 3031(SS)	
Cooling capacity / Kälteleistung / Capacidad de Enfriamiento *	eistung / Capacidad de Q ₀ A35(+95°F) / A35(+95°F)		350W (1194	4 BTUH)
Refrigerant type / Kältemittel-Typ / Tipo de refrigerante	*		R – 13	34a
Refrigerant amount / Kältemittelmenge / Cantidad de re	frigerante *		145 g / 5.	.11 oz
Adjustable thermostat setting 1TAS (factory set) / Thermostateinstellung (1TAS) (werkseitig eingestellt) / Termóstato ajustable que fija 1TAS (set de fabrica)		50°F – 104°F Facto [10°C – 40°C Facto	, ,	
Ambient air temperature / Umgebungslufttemperatur / T	emperatura del aire am	nbiente	+ 8°C / + 46°F(- 40 °C/ - 4	40 °F) 45°C / 114°F
Enclosure internal temp. / Schaltschrank-Innentemp. / 1	emperatura interna del	I gabinete	50°F - 104°F [1	10°C - 40°C]
Air volume, external circulation / Luftvolumenstrom, äußerer Kreislauf / Volumen de aire, circulación externa		169 m³/h (9	99 cfm)	
Air volume, internal circulation / Luftvolumenstrom, innerer Kreislauf / Volumen de aire, circulación interno		64 m³/h (3	37 cfm)	
Condensation discharge / Kondensatabscheidung / Descarga de la condensación		½" pipe Coi	nnection	
Electrical data / Elektrische Kenndaten / Da	tos Eléctricos			
Rated voltage / Nennspannung / Voltaje *		115 V + /	7 - 10%	
Mains frequency / Nennfrequenz / Frecuencia principa	*		60 ⊦	łz
Operating range / Funktionsbereich / Rango de operación		103 V	127 V	
Power consumption / Leistungsaufnahme / Consumo de	e energía *	P _{el} A35/A35	243 \	N
Current capacity / Nennstrom / Consumo de corriente	*	I nom max	2.1 /	4
Starting current / Anlaufstrom / Consumo de corriente	al arranque	I Start max	5 A	
Line Cord / Netzanschluß / Cordon de linea *		Cord Connection	- 5-15P Nema	
EMI/RFI suppression		CE		
	Max Fusing for Uni		15 Amps Protection (Use Time Delay Fuse or Circuit Breake	er)
		S	hort Circuit Rating 5000 A	

Dimensions / Abmessungen / Dimensiones	DTS 3021	DTS 3031(SS)
Height / Höhe / Alto	393.7 mr	n [15.50"]
Width / Breite / Ancho	177.8 m	m [7.00"]
Depth / Tiefe / Profundidad	228.6 m	m [9.00"]
Weight / Gewicht / Peso	30 lbs (13.6 kg)
Installation attitude / Einbaulage / Tipo de instalación	Ver	tical
Unit construction / Gerätekonstruktion / Construcción de la Unidad		erzinkt/ Acero Galvanizado Or hl 304/ Acero Inoxidable 304
Corrosion protection / Korrosionsschutz / Protección anti-corrosión	Galvanized, Electrost ANSI61, Baked Verzinkt, elektrostati ANSI61, gebrannt l Galvanizado, polvo el	atically powder coated: (200C / 392°F) / sch pulverbeschichtet pei (200°C / 392°F) /
Protection classification (against the enclosure, under correct operating conditions)/ Schutzart (gegenüber dem Schaltschrank, bei bestimmungsgemäßen Einsatz)/ Clasificación de la protección (Para el gabinete, bajo condiciones de operación correctas)	Type 12 IP 54 (EN 60529)	Type 3R/4 (4x) IP 56 (EN 60529)

^{*}ID Plate Information / Daten auf Typschild / Información de la placa de identificación

Spare parts / Ersatzteile / Piezas de repuesto

Please order your spare parts only with the *Pfannenberg*-parts-number. Bitte geben Sie bei der Bestellung von Ersatzteilen die *Pfannenberg*-Teilenummer an. . Pida por favor sus partes de repuesto solamente con el número de pieza de *Pfannenberg*.

	DTS 3021/31(SS)
Condenser fan / Kondensator Lüfter / Ventilador del condensador	18881100001
Evaporator fan / Verdampfer Lüfter / Ventilador del evaporador	18881100001
Thermostat / Thermostat / Termóstat	18883000001
Power Supply / Stromversorgung / de suministro de energía	18883000012



Fixed bridge - FBI 10- 6 - 0203250

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Fixed bridge, Pitch: 6 mm, Number of positions: 10, Color: silver



Key Commercial Data

Packing unit	1 STK
GTIN	4 017918 098070
GTIN	4017918098070
Weight per Piece (excluding packing)	15.940 g
Custom tariff number	85389099
Country of origin	China

Technical data

Technical data

Color	silver
Material	Copper
Number of positions	10
Pitch	6 mm

Environmental Product Compliance

China RoHS	Environmentally friendly use period: unlimited = EFUP-e
	No hazardous substances above threshold values



Fixed bridge - FBI 10- 6 - 0203250

Classifications

eCl@ss

eCl@ss 4.0	27141199
eCl@ss 4.1	27141199
eCl@ss 5.0	27141140
eCl@ss 5.1	27141140
eCl@ss 6.0	27141140
eCl@ss 7.0	27141140
eCl@ss 8.0	27141140
eCl@ss 9.0	27141140

ETIM

ETIM 2.0	EC000489
ETIM 3.0	EC000489
ETIM 4.0	EC000489
ETIM 5.0	EC000489
ETIM 6.0	EC000489

UNSPSC

UNSPSC 6.01	30211829
UNSPSC 7.0901	39121426
UNSPSC 11	39121426
UNSPSC 12.01	39121426
UNSPSC 13.2	39121426

Approvals

Approvals

Approvals

EAC

Ex Approvals

Approval details

EAC [FI

EAC-Zulassung



Fixed bridge - FBI 10- 6 - 0203250

Accessories

Accessories

Cutting tools

Cutting tool - CUTFOX FB - 1205985



One-hand bridge cutter, for fixed bridges FBI 10-6, FBI 10-8, FBI 10-10, FBI 10-12

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Fixed bridge - FBI 10- 8 - 0203263

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Fixed bridge, Number of positions: 10, Color: silver



Key Commercial Data

Packing unit	1 pc
GTIN	4 017918 099053
Weight per Piece (excluding packing)	25.42 g
Custom tariff number	85389099
Country of origin	China

Technical data

Technical data

Color	silver
Material	Copper
Number of positions	10
Pitch	8.00 mm

Classifications

eCl@ss

eCl@ss 4.0	27141199
eCl@ss 4.1	27141199
eCl@ss 5.0	27141140
eCl@ss 5.1	27141140
eCl@ss 6.0	27141140



Fixed bridge - FBI 10-8 - 0203263

Classifications

eCl@ss

eCl@ss 7.0	27141140
eCl@ss 8.0	27141140

ETIM

ETIM 2.0	EC000489
ETIM 3.0	EC000489
ETIM 4.0	EC000489
ETIM 5.0	EC000489

UNSPSC

UNSPSC 6.01	30211829
UNSPSC 7.0901	39121426
UNSPSC 11	39121426
UNSPSC 12.01	39121426
UNSPSC 13.2	39121426

Approvals

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Approvals

EAC

Ex Approvals

Approvals submitted

Approval details

EAC

Accessories

Accessories

Cutting tools



End clamp - E/NS 35 N - 0800886

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End clamp, width: 9.5 mm, color: gray

Product Features

✓ Large-surface labeling

Key Commercial Data

Packing unit	1 pc
Minimum order quantity	50 pc
GTIN	4 017918 129309
Weight per Piece (excluding packing)	14.8 g
Custom tariff number	39269097
Country of origin	Germany

Technical data

Dimensions

Height	32.8 mm
Length	48.6 mm
Width	9.5 mm

General

Material	PA
Color	gray
Tightening torque, min	0.4 Nm
Tightening torque max	0.5 Nm

Standards and Regulations

Flammability rating according to UL 94	V2



Insert strip - ESL 44X7 - 0808244

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Insert strip, Sheet, white, unlabeled, can be labeled with: Office printing systems, Plotter, Perforated, Mounting type: Insert, Lettering field: 44 x 7 mm



Figure shows the ESL 29 x 8 version

Product Features

- Insert labels for plastic cable markers
- The material file can be downloaded under the CLIP PROJECT software under Downloads "Software update Marking".



Key Commercial Data

Packing unit	1 pc
Minimum order quantity	10 pc
Weight per Piece (excluding packing)	13.58 g
Custom tariff number	39206219
Country of origin	Germany

Technical data

Dimensions

Length (b)	44 mm
Width (a)	7 mm

Ambient conditions

Ambient temperature (operation)	-40 °C 100 °C
---------------------------------	---------------

General

Note	Print image may vary depending on laser printer
Color	white
Components	free from silicone and halogen
Material	Polyester foil
Wipe resistance	DIN EN 61010-1 (VDE 0411-1)



Insert strip - ESL 44X7 - 0808244

Technical data

General

Number of individual labels	136
Number of individual labels per row	4
Marking mounting type	Insert

Standards and Regulations

Wipe resistance	DIN EN 61010-1 (VDE 0411-1)

Classifications

eCl@ss

eCl@ss 4.0	24190219
eCl@ss 4.1	24190219
eCl@ss 5.0	27141137
eCl@ss 5.1	27141137
eCl@ss 6.0	27141137
eCl@ss 7.0	27141137
eCl@ss 8.0	27141137
eCl@ss 9.0	27141137

ETIM

ETIM 2.0	EC000761
ETIM 3.0	EC000761
ETIM 4.0	EC000761
ETIM 5.0	EC000761

UNSPSC

UNSPSC 6.01	30211811
UNSPSC 7.0901	39121410
UNSPSC 11	39121410
UNSPSC 12.01	39121410
UNSPSC 13.2	39121410

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Zack Marker strip, flat - ZBF 12:UNBEDRUCKT - 0809735

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Zack Marker strip, flat, Strip, white, unlabeled, can be labeled with: PLOTMARK, CMS-P1-PLOTTER, mounting type: snap into flat marker groove, for terminal block width: 12 mm, lettering field size: 5.15 x 12.15 mm

Your advantages

- ☑ Can be labeled with CMS computer marking system or by hand using B-STIFT
- Sealing caps with external or inner thread
- Printed or unprinted marking labels
- ☑ Consists of five individual labels with 17.5 mm pitch
- Labeling service: Phoenix Contact can custom-label all zack marker strip markers according to your requirements
- ✓ Flat zack marker strips



Key Commercial Data

Packing unit	1 pc
Minimum order quantity	10 pc
GTIN	4 017918 591694
GTIN	4017918591694
Weight per Piece (excluding packing)	0.660 g
Custom tariff number	39269097
Country of origin	Germany

Technical data

Dimensions

Width (a)	12 mm

Ambient conditions

Ambient temperature (operation)	-40 °C 100 °C

04/01/2019 Page 1



Marker for terminal blocks - UC-TM 5 CUS - 0824581

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Marker for terminal blocks, Sheet, white, Labeled according to customer specifications, Mounting type: Snap into tall marker groove, For terminal block width: 5.2 mm, Lettering field: 10.5 x 4.6 mm



Why buy this product

- The UC-TM ... UniCard labeling range includes markers for products with tall marker grooves
- The multi-section marking strips are easy to fit and can be easily separated if required
- Labeling service: Phoenix Contact can custom-label all UniCard markers according to your requirements
- The markers, which are supplied in uniform sheets, can be labeled quickly and easily using the BLUEMARK LED



Key commercial data

Packing unit	1
Minimum order quantity	10
Catalog page	Page 51 (CL2-2011)
GTIN	4 046356 359092
Weight per Piece (excluding packing)	8.7 GRM
Country of origin	GERMANY

Technical data

General

Width (a)	5 mm
Color	white
Inflammability class according to UL 94	V2
Wipe resistance	DIN EN 61010-1 (VDE 0411-1)
Ambient temperature (operation)	-40 °C 120 °C
Components	free from silicone and halogen
Material	PA
Number of individual labels	96



Marker for terminal blocks - UC-TM 5 CUS - 0824581

Technical data

General

Number of individual labels per row	12
•	

Classifications

eclass

eCl@ss 4.0	24190208
eCl@ss 4.1	24190208
eCl@ss 5.0	27149103
eCl@ss 5.1	27149103
eCl@ss 6.0	27149103

etim

ETIM 2.0	EC000761
ETIM 3.0	EC000761
ETIM 4.0	EC000761

unspsc

UNSPSC 6.01	30211811
UNSPSC 7.0901	39121410
UNSPSC 11	39121410
UNSPSC 12.01	39121410
UNSPSC 13.2	39121410

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Marker for terminal blocks - UC-TM 6 CUS - 0824589

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Marker for terminal blocks, can be ordered: by sheet, white, labeled according to customer specifications, Mounting type: Snap into tall marker groove, for terminal block width: 6.2 mm, Lettering field: 5.6 x 10.5 mm



Why buy this product

- The UC-TM ... UniCard labeling range includes markers for products with tall marker grooves
- Labeling service: Phoenix Contact can custom-label all UniCard markers according to your requirements
- The multi-section marking strips are easy to fit and can be easily separated if required
- The markers, which are supplied in uniform sheets, can be labeled quickly and easily using the BLUEMARK LED



Key Commercial Data

Packing unit	1 STK
GTIN	4 046356 359184
GTIN	4046356359184
Weight per Piece (excluding packing)	15.000 g
Custom tariff number	49119900
Country of origin	Poland

Technical data

Dimensions

Width (a)	6 mm
-----------	------

Ambient conditions

Ambient temperature (operation)	-40 °C 120 °C



Marker for terminal blocks - UC-TM 6 CUS - 0824589

Technical data

Ambient conditions

I Recommended storage conditions	23°C/50% relative humidity. Storage in a dry and dark place in the original packaging is recommended.
	packaging is recommended.

General

Color	white
Components	free from silicone and halogen
Flammability rating according to UL 94	V2
Material	PA
Wipe resistance	DIN EN 61010-1 (VDE 0411-1)
Number of individual labels	80
Number of individual labels per row	10
RoHS compliant	Yes
Printability	UV LED technology
Device	5147999 BLUEMARK CLED
Test for substances that would hinder coating with paint or varnish	VW PV 3.10.7:2005-02
Result	Test passed
Test specification weathering-resistance	Following ISO 4892-2:2013-03
Test duration	96 h
Wipe resistance test result	Test passed
Salt spray test specification	DIN EN 60068-2-11:2000-02
Test duration	96 h
Salt spray testing result	Test passed
Wipe resistance of test specification inscriptions	DIN EN 61010-1 (VDE 0411-1):2011-07
Result	Test passed
Marking mounting type	Snap into tall marker groove

Standards and Regulations

Wipe resistance	DIN EN 61010-1 (VDE 0411-1)
Flammability rating according to UL 94	V2

Drawings





Marker for terminal blocks - UC-TM 8 CUS - 0824597

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Marker for terminal blocks, can be ordered: by sheet, white, labeled according to customer specifications, mounting type: snap into tall marker groove, for terminal block width: 8.2 mm, lettering field size: 7.6 x 10.5 mm



Why buy this product

- The UC-TM ... UniCard labeling range includes markers for products with tall marker grooves
- The multi-section marking strips are easy to fit and can be easily separated if required
- ☑ Labeling service: Phoenix Contact can custom-label all UniCard markers according to your requirements
- The markers, which are supplied in uniform sheets, can be labeled quickly and easily using the BLUEMARK LED

- The format automatically ensures printing with a high degree of positioning accuracy



Key Commercial Data

Packing unit	1 STK
GTIN	4 046356 359290
GTIN	4046356359290
Weight per Piece (excluding packing)	15.000 g
Custom tariff number	49119900
Country of origin	Poland

Technical data

Dimensions

Width (a)	8 mm
-----------	------

Ambient conditions

Ambient temperature (operation)	-40 °C 120 °C

03/23/2018 Page 1 / 4



Marker for terminal blocks - UC-TM 8 CUS - 0824597

Technical data

Ambient conditions

I Recommended storage conditions	23°C/50% relative humidity. Storage in a dry and dark place in the original packaging is recommended.
----------------------------------	---

General

Color	white
Туре	high
Components	free from silicone and halogen
Flammability rating according to UL 94	V2
Material	PA
RoHS compliant	Yes
Wipe resistance	DIN EN 61010-1 (VDE 0411-1)
Number of individual labels	56
Number of individual labels per row	7
Printability	UV LED technology
Device	5147999 BLUEMARK CLED
Test for substances that would hinder coating with paint or varnish	VW PV 3.10.7:2005-02
Result	Test passed
Test specification weathering-resistance	Following ISO 4892-2:2013-03
Test duration	96 h
Wipe resistance test result	Test passed
Salt spray test specification	DIN EN 60068-2-11:2000-02
Test duration	96 h
Salt spray testing result	Test passed
Wipe resistance of test specification inscriptions	DIN EN 61010-1 (VDE 0411-1):2011-07
Result	Test passed
Marking mounting type	snap into tall marker groove
Result	Test passed
Oxygen index (DIN EN ISO 4589-2)	28,2%
Class I	3
Class F	2
R22	HL 1 - HL 2
R23	HL 1 - HL 2
R24	HL 1 - HL 2

Standards and Regulations

Wipe resistance	DIN EN 61010-1 (VDE 0411-1)
Flammability rating according to UL 94	V2
Fire protection for rail vehicles (DIN EN 45545-2) R22	HL 1 - HL 2 HL 1 - HL 2 HL 1 - HL 2
Fire protection for rail vehicles (DIN EN 45545-2) R23	HL 1 - HL 2 HL 1 - HL 2 HL 1 - HL 2



Terminal strip marker carrier - KLM-A - 1004348

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Terminal strip markers, for strip marking, adjustable height, for use with end clamps E/UK, E/NS 35 N or CLIPFIX 35, lettering field size: 44 x 7 mm

The illustration shows a combination of versions KLM-A, and ESL 44 x 7



Key Commercial Data

Packing unit	1 pc
Minimum order quantity	100 pc
GTIN	4 017918 012038
Weight per Piece (excluding packing)	1.8 g
Custom tariff number	39269097
Country of origin	Germany

Technical data

Dimensions

Length (b)	46 mm
Width (a)	9.5 mm

Ambient conditions

Ambient temperature (operation)	-40 °C 80 °C
, , ,	

General

Color	transparent
Components	free from silicone and halogen
Flammability rating according to UL 94	НВ
Material	ABS
Marking mounting type	Plug in



End cover - D-UKKB 3/5 - 2771023

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End cover, Length: 67 mm, Width: 2.5 mm, Height: 62 mm, Color: gray



Key commercial data

Packing unit	1 pc
GTIN	4 017918 068172
Weight per Piece (excluding packing)	5.068 GRM
Custom tariff number	85389099
Country of origin	Germany

Technical data

General

Color	gray
Dimensions	
Width	2.5 mm
Length	67 mm

62 mm

62 mm

Classifications

Height NS 35/7,5

eCl@ss

Height

eCl@ss 4.0	27141199
eCl@ss 4.1	27141199
eCl@ss 5.0	27141145



End cover - D-UKKB 3/5 - 2771023

Classifications

eCl@ss

eCl@ss 5.1	27141145
eCl@ss 6.0	27141133
eCl@ss 7.0	27141133
eCl@ss 8.0	27141133

ETIM

ETIM 2.0	EC000886
ETIM 3.0	EC000886
ETIM 4.0	EC000886
ETIM 5.0	EC000886

UNSPSC

UNSPSC 6.01	30211827
UNSPSC 7.0901	39121424
UNSPSC 11	39121424
UNSPSC 12.01	39121424
UNSPSC 13.2	39121424

61461 66 16.2	00121424
Approvals	
Approvals	
Approvals	
GOST	
Ex Approvals	
Approvals submitted	
Approval details	
GOST	



catalog



Order No. 2771065



http://eshop.phoenixcontact.de/phoenix/treeViewClick.do?UID=2771065

Partition plate, Length: 75 mm, Width: 2.5 mm, Height: 67 mm,

Color: gray

Commercial data				
EAN	4017918068189			
Pack	50 pcs.			
Customs tariff	85472000			
Weight/Piece	0.006232 KG			
Catalog page information	Page 357 (CL-2009)			



WEEE/RoHS-compliant since: 01/01/2003



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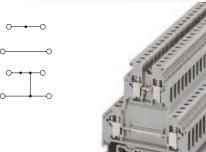
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UK universal modular terminal blocks







PA V0

D-UKKB 3/5

D-UKKB 3/5 BU



4 (4) mm², 32 A, double-level terminal block

4 (4) mm², 32 A, double-level terminal block, both levels can be bridged

® . SAN us @ KETA ■ 및 ® Less ClassNK ® © CCA

4 (4) mm², 32 A, 800 V, double-level terminal block, both levels can be bridged



V0

Technical data						
Width	Length	Height NS 35/7,	5			
6.2	56	62				
Width	Length	Height NS 32				
6.2	56	67				
I _{max.} [A]	U _{max.} [V]	max. Ø [mm ²]	AWG			
32	500	0.2 - 4	24 - 12			
IEC 60947-7-1						
IEC	UL/CUL	CSA	IEC/ EN 60079-7			
500	600	300	-			
32 / 4	30 / -	25/-	-			
4	-	-	-			
24 - 12	26-10	28-10	-			
solid	stranded	Fer	rule			
		Without / with	plastic sleeve			
0.2 - 4	0.2 - 4	0.25 - 4	0.25 - 2.5			
0.2 - 1.5	0.2 - 1.5	0.25 - 1.5	-			
			0.5 - 1.5			
4	2.5					
8 M3 0.6 - 0.8 PA						

Technical data						
Width	Length	Height NS 35/7,	5			
6.2	67	62				
Width	Length	Height NS 32				
6.2	67	67				
I _{max.} [A]	U _{max.} [V]	max. Ø [mm ²]	AWG			
32	500	0.2 - 4	24 - 12			
IEC 60947-7-1						
IEC	UL/CUL	CSA	IEC/ EN 60079-7			
500	600	600	-			
32 / 4	30 / -	25 / -	-			
4	-	-	-			
24 - 12	26-10	28-10	-			
solid	stranded	Fer	rule			
		Without / with	plastic sleeve			
0.2 - 4	0.2 - 4	0.25 - 4	0.25 - 2.5			
0.2 - 1.5	0.2 - 1.5	0.25 - 1.5	-			
			0.5 - 1.5			
4	2.5					
8 M3 0.6 - 0.8						

KEMA 00ATEX2100 U						
Technical data						
Width	Length	Height NS 35/7,	5			
6.2	84.5	64				
Width	Length	Height NS 32				
6.2	84.5	69				
I _{max.} [A]	U _{max.} [V]	max. Ø [mm²]	AWG			
32	800	0.2 - 4	24 - 12			
IEC 60947-7-1			€x>			
IEC	UL/CUL	CSA	IEC/ EN 60079-7			
800	600	-	750			
32 / 4	20 / -	-	-			
4	-	-	-			
24 - 12	28-12	-	-			
solid	stranded	Fer Without / with	rule plastic sleeve			
0.2 - 4	0.2 - 4	0.25 - 4	0.25 - 2.5			
0.2 - 2.5	0.2 - 2.5	0.25 - 2.5	-			
			0.5 - 1.5			
4	2.5					
8 M3 0.6 - 0.8 PA						

Ordering data

Ordering data				
Туре	I _{max}	Order No.	Pcs./ Pkt.	
UKK 5		2774017	50	
UKK 5 BU		2774091	50	
UKK 5-PV		2791388	50	
Accessories				

Ordering data					
Туре	I _{max}	Order No.	Pcs. / Pkt.		
UKKB 5		2771146	50		
UKKB 5 BU		3216053	50		
Accessories					

2771023

2771104

50

ZB 6 (see Catalog 5)

	Туре	I _{max}	Order No.	Pcs. / Pkt.
]	UXKK 4		2780014	50
	Access	sories		
	FBI 10- 6	24 A	0203250	10

Accessories					
D-UKK 3/5		2770024	50		
D-UKK 3/5 BU		2770105	50		
DP-UKK 3/5		2770794	50		
FBI 10- 6	32 A	0203250	10		
15110 0	0271	0200200	10		
EB 2-6	28 A	0201155	100		
EB 3-6	28 A	0201142	100		
EB 10- 6	28 A	0201139	10		
10001 40 0	04.4	0004505	40		
ISSBI 10-6 IS-K 4	24 A	0301505 1302338	10 100		
13-N 4		1302338	100		
TS-KK 3		2770215	50		
ATP-UKK 3/5		2778521	50		
SF-SL 0,6X3,5-100 S-VDE		1212587	10		
ZB 6 (see Catalog 5)					

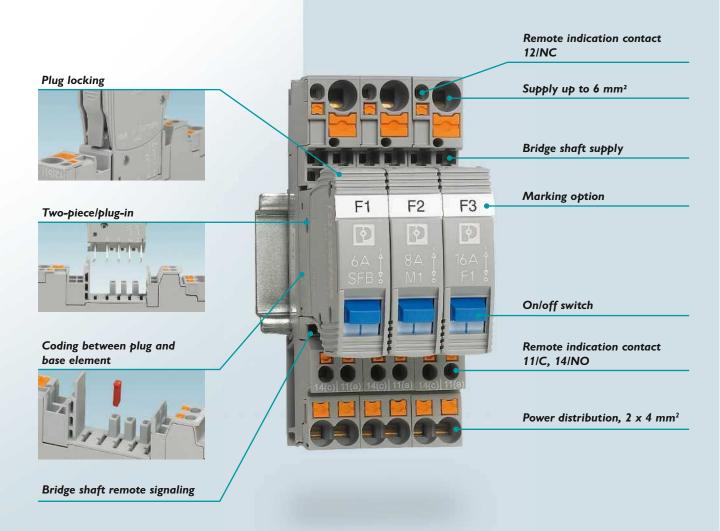
DP-UKKB 3/ 5	2770804	50
FBI 10- 6	2 A 0203250	10
EB 3-6 21 EB 10-6 21	8 A 0201155 8 A 0201142 8 A 0201139 4 A 0301505	100 100 10
IS-K 4	1302338	100
TS-KK 3	2770215	50
ATP-UKKB 3	2771065	50
SF-SL 0,6X3,5-100 S-VDE	1212587	10
ZB 6 (see Catalog 5)		

Thermomagnetic device circuit breakers

The thermomagnetic device circuit breakers are used in information and communication technology as well as process engineering. Due to the various tripping characteristics, the circuit breakers can be used in a range of applications. The reactivation and immediate remote signaling of the operating state ensure availability.

Your advantages:

- Compact design with precise nominal current levels
- Sophisticated remote signaling concept enables monitoring from any location
- Maximum overcurrent protection over long cable paths thanks to SFB tripping characteristic
- Supply/remote signaling can be bridged with CLIPLINE complete accessories
- Protect 230/240 V AC control voltage with the aid of the M1 characteristic curve (based on characteristic C)
- · Variable connection technology: either push-in or screw connection



Tripping characteristics

With thermomagnetic device circuit breakers, the tripping time depends on the type of overload. In the event of an overload, the load is disconnected from the power supply by means of time-delayed thermal

tripping. If there is a high overload current or even a short circuit, the magnetic tripping interrupts the circuit in a matter of milliseconds. Protective devices should be selected with the most suitable characteristic curve in

relation to the area of application, the load, and the protection requirements.

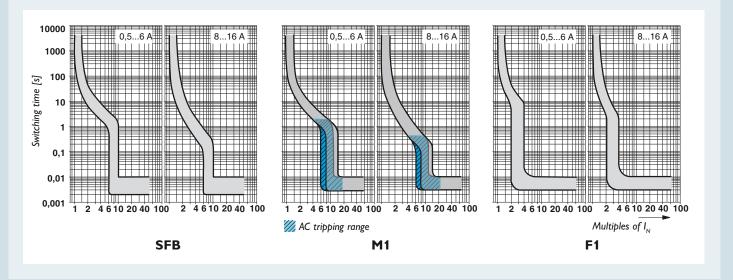
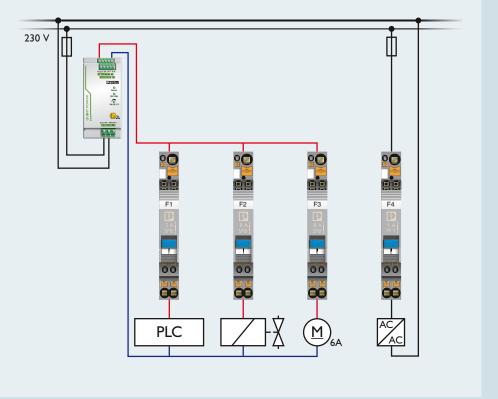


Illustration of application

Thermomagnetic device circuit breakers are ideal for protecting programmable controllers, valves, motors and frequency inverters, for example.



Thermomagnetic device circuit breakers, 1 and 2-pos.

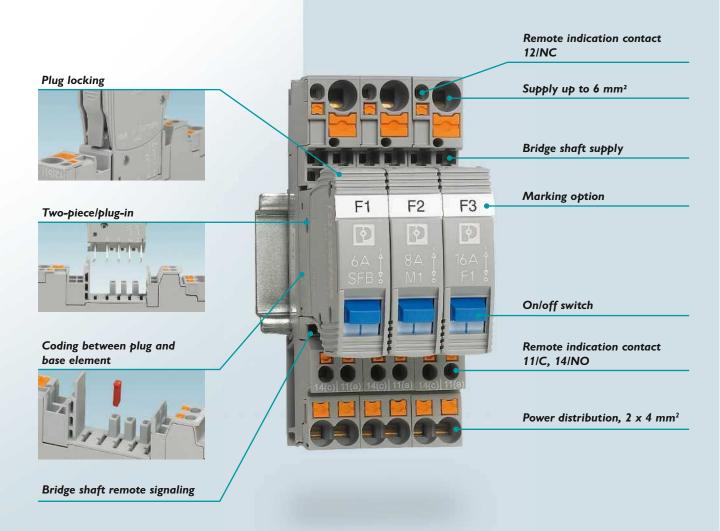
Produc	t code		CB device circuit breakers	
Fuse type Function Number of positions		TM thermomagnetic		
		1 changeover contact		
		1		
Characteristic		SFB	M1	F1
	0.5 A	CB TM1 0.5A SFB P Order No. 2800835	CB TM1 0.5A M1 P Order No. 2800846	CB TM1 0.5A F1 P Order No. 2800857
	1 A	CB TM1 1A SFB P Order No. 2800836	CB TM1 1A M1 P Order No. 2800847	CB TM1 1A F1 P Order No. 2800858
	2 A	CB TM1 2A SFB P Order No. 2800837	CB TM1 2A M1 P Order No. 2800848	CB TM1 2A F1 P Order No. 2800859
	3 A	CB TM1 3A SFB P Order No. 2800838	CB TM1 3A M1 P Order No. 2800849	CB TM1 3A F1 P Order No. 2800860
Trent	4 A	CB TM1 4A SFB P Order No. 2800839	CB TM1 4A M1 P Order No. 2800850	CB TM1 4A F1 P Order No. 2800861
Nominal current	5 A	CB TM1 5A SFB P Order No. 2800840	CB TM1 5A M1 P Order No. 2800851	CB TM1 5A F1 P Order No. 2800862
Z Love Z	6 A	CB TM1 6A SFB P Order No. 2800841	CB TM1 6A M1 P Order No. 2800852	CB TM1 6A F1 P Order No. 2800863
	8 A	CB TM1 8A SFB P Order No. 2800842	CB TM1 8A M1 P Order No. 2800853	CB TM1 8A F1 P Order No. 2800864
	10 A	CB TM1 10A SFB P Order No. 2800843	CB TM1 10A M1 P Order No. 2800854	CB TM1 10A F1 P Order No. 2800865
	12 A	CB TM1 12A SFB P Order No. 2800844	CB TM1 12A M1 P Order No. 2800855	CB TM1 12A F1 P Order No. 2800866
	16 A	CB TM1 16A SFB P Order No. 2800845	CB TM1 16A M1 P Order No. 2800856	CB TM1 16A F1 P Order No. 2800867
Fu	nction		2 changeover contacts	
Number of po	sitions		2	
Characteristic	curve	SFB	M1	F1
7.00	0.5 A	CB TM2 0.5A SFB P Order No. 2800868	CB TM2 0.5A M1 P Order No. 2800879	CB TM2 0.5A F1 P Order No. 2800890
	1 A	CB TM2 1A SFB P Order No. 2800869	CB TM2 1A M1 P Order No. 2800880	CB TM2 1A F1 P Order No. 2800891
	2 A	CB TM2 2A SFB P Order No. 2800870	CB TM2 2A M1 P Order No. 2800881	CB TM2 2A F1 P Order No. 2800892
	3 A	CB TM2 3A SFB P Order No. 2800871	CB TM2 3A M1 P Order No. 2800882	CB TM2 3A F1 P Order No. 2800893
Trent tuent	4 A	CB TM2 4A SFB P Order No. 2800872	CB TM2 4A M1 P Order No. 2800883	CB TM2 4A F1 P Order No. 2800894
Nominal current	5 A	CB TM2 5A SFB P Order No. 2800873	CB TM2 5A M1 P Order No. 2800884	CB TM2 5A F1 P Order No. 2800895
פֿענענע	6 A	CB TM2 6A SFB P Order No. 2800874	CB TM2 6A M1 P Order No. 2800885	CB TM2 6A F1 P Order No. 2800896
	8 A	CB TM2 8A SFB P Order No. 2800875	CB TM2 8A M1 P Order No. 2800886	CB TM2 8A F1 P Order No. 2800897
	10 A	CB TM2 10A SFB P Order No. 2800876	CB TM2 10A M1 P Order No. 2800887	CB TM2 10A F1 P Order No. 2800898
	12 A	CB TM2 12A SFB P Order No. 2800877	CB TM2 12A M1 P Order No. 2800888	CB TM2 12A F1 P Order No. 2800899
	16 A	CB TM2 16A SFB P Order No. 2800878	CB TM2 16A M1 P Order No. 2800889	CB TM2 16A F1 P Order No. 2800900

Thermomagnetic device circuit breakers

The thermomagnetic device circuit breakers are used in information and communication technology as well as process engineering. Due to the various tripping characteristics, the circuit breakers can be used in a range of applications. The reactivation and immediate remote signaling of the operating state ensure availability.

Your advantages:

- Compact design with precise nominal current levels
- Sophisticated remote signaling concept enables monitoring from any location
- Maximum overcurrent protection over long cable paths thanks to SFB tripping characteristic
- Supply/remote signaling can be bridged with CLIPLINE complete accessories
- Protect 230/240 V AC control voltage with the aid of the M1 characteristic curve (based on characteristic C)
- · Variable connection technology: either push-in or screw connection



Tripping characteristics

With thermomagnetic device circuit breakers, the tripping time depends on the type of overload. In the event of an overload, the load is disconnected from the power supply by means of time-delayed thermal

tripping. If there is a high overload current or even a short circuit, the magnetic tripping interrupts the circuit in a matter of milliseconds. Protective devices should be selected with the most suitable characteristic curve in

relation to the area of application, the load, and the protection requirements.

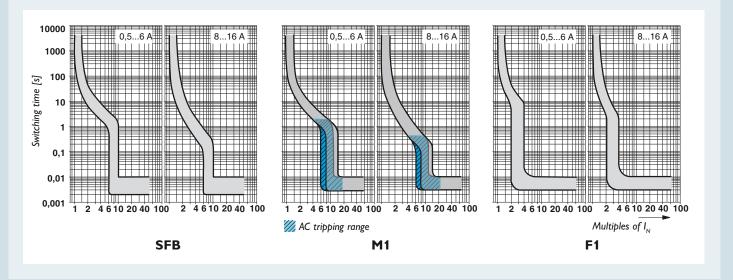
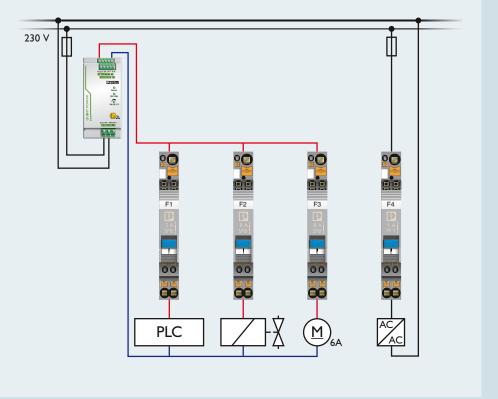


Illustration of application

Thermomagnetic device circuit breakers are ideal for protecting programmable controllers, valves, motors and frequency inverters, for example.



Thermomagnetic device circuit breakers, 1 and 2-pos.

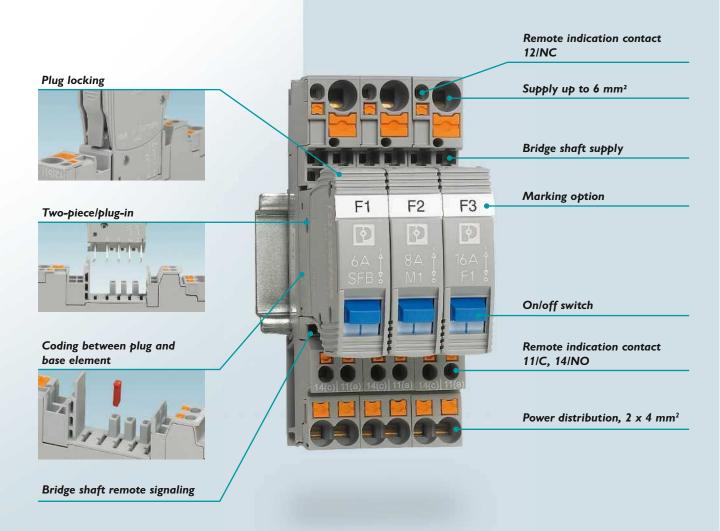
Produc	t code		CB device circuit breakers	
Fuse type Function Number of positions		TM thermomagnetic		
		1 changeover contact		
		1		
Characteristic		SFB	M1	F1
	0.5 A	CB TM1 0.5A SFB P Order No. 2800835	CB TM1 0.5A M1 P Order No. 2800846	CB TM1 0.5A F1 P Order No. 2800857
	1 A	CB TM1 1A SFB P Order No. 2800836	CB TM1 1A M1 P Order No. 2800847	CB TM1 1A F1 P Order No. 2800858
	2 A	CB TM1 2A SFB P Order No. 2800837	CB TM1 2A M1 P Order No. 2800848	CB TM1 2A F1 P Order No. 2800859
	3 A	CB TM1 3A SFB P Order No. 2800838	CB TM1 3A M1 P Order No. 2800849	CB TM1 3A F1 P Order No. 2800860
Trent	4 A	CB TM1 4A SFB P Order No. 2800839	CB TM1 4A M1 P Order No. 2800850	CB TM1 4A F1 P Order No. 2800861
Nominal current	5 A	CB TM1 5A SFB P Order No. 2800840	CB TM1 5A M1 P Order No. 2800851	CB TM1 5A F1 P Order No. 2800862
Z Love Z	6 A	CB TM1 6A SFB P Order No. 2800841	CB TM1 6A M1 P Order No. 2800852	CB TM1 6A F1 P Order No. 2800863
	8 A	CB TM1 8A SFB P Order No. 2800842	CB TM1 8A M1 P Order No. 2800853	CB TM1 8A F1 P Order No. 2800864
	10 A	CB TM1 10A SFB P Order No. 2800843	CB TM1 10A M1 P Order No. 2800854	CB TM1 10A F1 P Order No. 2800865
	12 A	CB TM1 12A SFB P Order No. 2800844	CB TM1 12A M1 P Order No. 2800855	CB TM1 12A F1 P Order No. 2800866
	16 A	CB TM1 16A SFB P Order No. 2800845	CB TM1 16A M1 P Order No. 2800856	CB TM1 16A F1 P Order No. 2800867
Fu	nction		2 changeover contacts	
Number of po	sitions		2	
Characteristic	curve	SFB	M1	F1
7.00	0.5 A	CB TM2 0.5A SFB P Order No. 2800868	CB TM2 0.5A M1 P Order No. 2800879	CB TM2 0.5A F1 P Order No. 2800890
	1 A	CB TM2 1A SFB P Order No. 2800869	CB TM2 1A M1 P Order No. 2800880	CB TM2 1A F1 P Order No. 2800891
	2 A	CB TM2 2A SFB P Order No. 2800870	CB TM2 2A M1 P Order No. 2800881	CB TM2 2A F1 P Order No. 2800892
	3 A	CB TM2 3A SFB P Order No. 2800871	CB TM2 3A M1 P Order No. 2800882	CB TM2 3A F1 P Order No. 2800893
Trent tuent	4 A	CB TM2 4A SFB P Order No. 2800872	CB TM2 4A M1 P Order No. 2800883	CB TM2 4A F1 P Order No. 2800894
Nominal current	5 A	CB TM2 5A SFB P Order No. 2800873	CB TM2 5A M1 P Order No. 2800884	CB TM2 5A F1 P Order No. 2800895
Py Jy	6 A	CB TM2 6A SFB P Order No. 2800874	CB TM2 6A M1 P Order No. 2800885	CB TM2 6A F1 P Order No. 2800896
	8 A	CB TM2 8A SFB P Order No. 2800875	CB TM2 8A M1 P Order No. 2800886	CB TM2 8A F1 P Order No. 2800897
	10 A	CB TM2 10A SFB P Order No. 2800876	CB TM2 10A M1 P Order No. 2800887	CB TM2 10A F1 P Order No. 2800898
	12 A	CB TM2 12A SFB P Order No. 2800877	CB TM2 12A M1 P Order No. 2800888	CB TM2 12A F1 P Order No. 2800899
	16 A	CB TM2 16A SFB P Order No. 2800878	CB TM2 16A M1 P Order No. 2800889	CB TM2 16A F1 P Order No. 2800900

Thermomagnetic device circuit breakers

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tripping. If there is a high overload current or even a short circuit, the magnetic tripping interrupts the circuit in a matter of milliseconds. Protective devices should be selected with the most suitable characteristic curve in

relation to the area of application, the load, and the protection requirements.

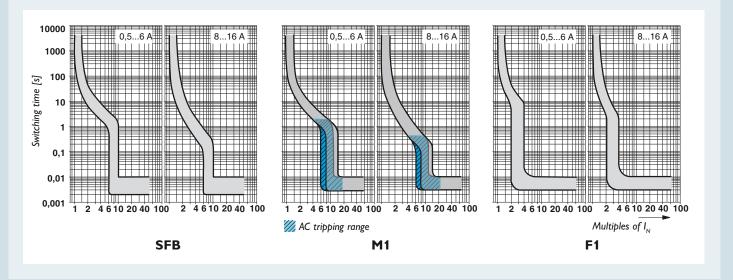
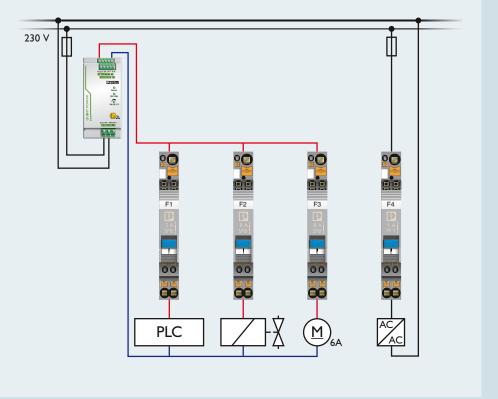


Illustration of application

Thermomagnetic device circuit breakers are ideal for protecting programmable controllers, valves, motors and frequency inverters, for example.



Thermomagnetic device circuit breakers, 1 and 2-pos.

Product code Fuse type Function Number of positions		CB device circuit breakers		
		TM thermomagnetic		
		1 changeover contact		
		1		
Characterist		SFB	M1	F1
	0.5 A	CB TM1 0.5A SFB P Order No. 2800835	CB TM1 0.5A M1 P Order No. 2800846	CB TM1 0.5A F1 P Order No. 2800857
- 4	1 A	CB TM1 1A SFB P Order No. 2800836	CB TM1 1A M1 P Order No. 2800847	CB TM1 1A F1 P Order No. 2800858
	2 A	CB TM1 2A SFB P Order No. 2800837	CB TM1 2A M1 P Order No. 2800848	CB TM1 2A F1 P Order No. 2800859
	3 A	CB TM1 3A SFB P Order No. 2800838	CB TM1 3A M1 P Order No. 2800849	CB TM1 3A F1 P Order No. 2800860
Leut .	4 A	CB TM1 4A SFB P Order No. 2800839	CB TM1 4A M1 P Order No. 2800850	CB TM1 4A F1 P Order No. 2800861
Nominal cu	5 A	CB TM1 5A SFB P Order No. 2800840	CB TM1 5A M1 P Order No. 2800851	CB TM1 5A F1 P Order No. 2800862
EoZ	6 A	CB TM1 6A SFB P Order No. 2800841	CB TM1 6A M1 P Order No. 2800852	CB TM1 6A F1 P Order No. 2800863
	8 A	CB TM1 8A SFB P Order No. 2800842	CB TM1 8A M1 P Order No. 2800853	CB TM1 8A F1 P Order No. 2800864
	10 A	CB TM1 10A SFB P Order No. 2800843	CB TM1 10A M1 P Order No. 2800854	CB TM1 10A F1 P Order No. 2800865
	12 A	CB TM1 12A SFB P Order No. 2800844	CB TM1 12A M1 P Order No. 2800855	CB TM1 12A F1 P Order No. 2800866
	16 A	CB TM1 16A SFB P Order No. 2800845	CB TM1 16A M1 P Order No. 2800856	CB TM1 16A F1 P Order No. 2800867
Fu	nction		2 changeover contacts	
Number of po	sitions	2		
Characteristic	curve	SFB	M1	F1
100	0.5 A	CB TM2 0.5A SFB P Order No. 2800868	CB TM2 0.5A M1 P Order No. 2800879	CB TM2 0.5A F1 P Order No. 2800890
	1 A	CB TM2 1A SFB P Order No. 2800869	CB TM2 1A M1 P Order No. 2800880	CB TM2 1A F1 P Order No. 2800891
	2 A	CB TM2 2A SFB P Order No. 2800870	CB TM2 2A M1 P Order No. 2800881	CB TM2 2A F1 P Order No. 2800892
	3 A	CB TM2 3A SFB P Order No. 2800871	CB TM2 3A M1 P Order No. 2800882	CB TM2 3A F1 P Order No. 2800893
Trent	4 A	CB TM2 4A SFB P Order No. 2800872	CB TM2 4A M1 P Order No. 2800883	CB TM2 4A F1 P Order No. 2800894
Nominal current	5 A	CB TM2 5A SFB P Order No. 2800873	CB TM2 5A M1 P Order No. 2800884	CB TM2 5A F1 P Order No. 2800895
	6 A	CB TM2 6A SFB P Order No. 2800874	CB TM2 6A M1 P Order No. 2800885	CB TM2 6A F1 P Order No. 2800896
99990	8 A	CB TM2 8A SFB P Order No. 2800875	CB TM2 8A M1 P Order No. 2800886	CB TM2 8A F1 P Order No. 2800897
	10 A	CB TM2 10A SFB P Order No. 2800876	CB TM2 10A M1 P Order No. 2800887	CB TM2 10A F1 P Order No. 2800898
	12 A	CB TM2 12A SFB P Order No. 2800877	CB TM2 12A M1 P Order No. 2800888	CB TM2 12A F1 P Order No. 2800899
	16 A	CB TM2 16A SFB P Order No. 2800878	CB TM2 16A M1 P Order No. 2800889	CB TM2 16A F1 P Order No. 2800900

Accessories



Screw connection
technology
CB 1/10-1/10 UT-BE
Order No. 2801305

base element	
Push-in connection technology	Solder base element for PCBs
CB 1/6-2/4 PT-BE Order No. 2800929	CB S-BE Order No. 2905067

Note: supply can be loaded with up to 41 A if two bridges are connected.



Product code	
	CB PT Bridge Order No. 2801014

Bridge plug for base element CB RC Bridge Order No. 2801616

Bridge between 1 and 2 Bridge between 11 and 14



Product code		Base element and jumpers	
	2	FBL 2-6	Order No. 3030336
positions	3	FBL 3-6	Order No. 3030242
osit	4	FBL 4-6	Order No. 3030255
of	5	FBL 5-6	Order No. 3030349
Number	10	FBL 10-6	Order No. 3030271
<u></u> 20	20	FBL 20-6	Order No. 3030365
	50	FBL 50-6	Order No. 3032224

	Front cutting tool for jumpers
CUTFOX-FBL Order No. 1212124	

For more bridges and marking material, see main catalog or website.

Product code



End cover - D-UK 4/10 - 3003020

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End cover, Length: 42.5 mm, Width: 1.8 mm, Height: 35.9 mm, Color: gray

Key Commercial Data

Packing unit	50 pc
Minimum order quantity	50 pc
GTIN	4 017918 090425
Weight per Piece (excluding packing)	2.06 g
Custom tariff number	85389099
Country of origin	Germany

Technical data

General

Color	gray
Material	PA 6.6
Flammability rating according to UL 94	V0

Dimensions

Width	1.8 mm
Length	42.5 mm
Height	35.9 mm

General

Relative insulation material temperature index (Elec., UL 746 B)	130 °C
Temperature index of insulation material (DIN EN 60216-1 (VDE 0304-21))	130 °C
Static insulating material application in cold	-60 °C

Standards and Regulations

Flammability rating according to UL 94	V0

UK universal terminal blocks

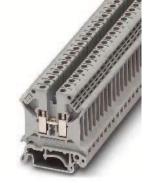












2.5 (4) mm², 24 A, feed-through terminal block 2.5 (4) mm², 32 A, feed-through terminal block

4 (6) mm², 41 A, feed-through terminal block

KEMA 06ATEX0119 U / IECEx KEM 06.0034U

Technical data					
Width	Length	Height NS 35/7	,5		
5.2	42.5	42			
Width	Length	Height NS 32			
5.2	42.5	47			
I _{max.} [A]	U _{max.} [V]	Max. Ø [mm²]	AWG (UL)		
24	800	0.2 - 4	30-12		
IEC 60947-7-1			€ x		
IEC	UL	CSA	IEC/ EN 60079-7		
800	300	300	550		
24 / 2.5	20 / -	20 / -	22 / 2.5		
2.5	-	-	0.2-2.5		
24 - 12	30-12	28-12	24 - 12		
Solid	Stranded	Ferrule			
			plastic sleeve		
0.2 - 4	0.2 - 2.5	0.25 - 2.5	0.25 - 1.5		
0.2 - 1	0.2 - 1	0.25 - 1	-		
-	-	-	0.5 - 1.5		
2.5	2.5	-	-		
7					
M3					
0.6 - 0.8					
PA					

® . SAL us [H[KEUR FABS # 61 KR	्र स्थिति ClassNK	O CCA
Ex: Ex on us		

KEMA 98ATEX1651 U / IECEx KEM 06.0034U

Technical data				
Width	Length	Height NS 35/7,	5	
5.2	42.5	47		
Width	Length	Height NS 32		
5.2	42.5	52		
I _{max.} [A]	U _{max.} [V]	Max. Ø [mm²]	AWG (UL)	
32	800	0.2 - 4	28-12	
IEC 60947-7-1			€ x	
IEC	UL	CSA	IEC/ EN 60079-7	
800	600	600	690	
24 / 2.5	20 / -	20 / -	23 / 2.5	
2.5	-	-	0.2-2.5	
24 - 12	28-12	28-12	24 - 12	
Solid	Stranded		rule	
			plastic sleeve	
0.2 - 4	0.2 - 2.5	0.25 - 2.5	0.25 - 1.5	
0.2 - 1.5	0.2 - 1.5	0.25 - 1.5	-	
-	-	-	0.5 - 1	
4	2.5	-	-	
8 M3 0.6 - 0.8 PA V0				

8
M3
0.6 - 0.8
PA
V0

Ordering data			
Туре	I _{max}	Order No.	Pcs. / Pkt.
UK 2,5 N		3003347	50
UK 2,5 N BU		3003350	50

V2

Accessories ¹)			
D-UK 2,5 D-UK 2,5 BU		3001022 3001103	50 50
FBRI 10-5 N	24 A	2770642	10
EBL 10- 5	24 A	2303132	10
USBR 2-7	18 A	2303239	1
TS-KK 3		2770215	50
ATP-UK		3003224	50
PSB 3/10/4		0601292	10
PSBJ 3/13/4		0201304	10
SF-SL 0,6X3,5-100 S-VDE		1212587	10
ZB 5 (see Catalog 5)			

Ordering data			
Туре	I _{max}	Order No.	Pcs. / Pkt.
UK 3 N		3001501	50
UK 3 N BU		3001514	50

Accessories ¹)			
D-UK 4/10 D-UK 4/10 BU		3003020 3003101	50 50
FBRI 10-5 N	30 A	2770642	10
EBL 10- 5	24 A	2303132	10
тѕ-к		1302215	50
ATP-UK		3003224	50
PSB 3/10/4		0601292	10
PSBJ 3/13/4		0201304	10
SF-SL 0,6X3,5-100 S-VDE		1212587	10
ZB 5 (see Catalog 5)			

(I) SAN SETTI KEUR (II) KRY LEW ClassNK (II) (II) CCA CB.
Ex: 🔃 🖺
KEMA 98ATEX1651 U / IECEx KEM 06.0034U

Technical data				
Width	Length	Height NS 35/7,	5	
6.2	42.5	47		
Width	Length	Height NS 32		
6.2	42.5	52		
I _{max.} [A]	U _{max.} [V]	Max. Ø [mm²]	AWG (UL)	
41	800	0.2 - 6	30-10	
IEC 60947-7-1			⟨£x⟩	
IEC	UL	CSA	IEC/ EN 60079-7	
800	600	600	690	
32 / 4	30 / -	30 / -	30.5 / 4	
4	-	-	0.2-4	
24 - 10	30-10	28-10	24 - 10	
Solid	Stranded	Fer	rule	
		without/with plastic sleeve		
0.2 - 6	0.2 - 4	0.25 - 4	0.25 - 2.5	
0.2 - 1.5	0.2 - 1.5	0.25 - 1.5	-	
-	-	-	0.5 - 2.5	
4	4	-	-	
8 M3				

Ordering data			
Type I _{max}	Order No.	Pcs. / Pkt.	
UK 5 N	3004362	50	
UK 5 N BU	3004388	50	

Accessories ¹)			
D-UK 4/10 D-UK 4/10 BU		3003020 3003101	50 50
FBI 10- 6	41 A	0203250	10
EB 10- 6	32 A	0201139	10
USBR 2-7	34 A	2303239	1
ISSBI 10-6 IS-K 4	30 A	0301505 1302338	10 100
TS-K		1302215	50
ATP-UK		3003224	50
PSB 3/10/4		0601292	10
PSBJ 3/13/4		0201304	10
SF-SL 0,6X3,5-100 S-VDE		1212587	10
ZB 6 (see Catalog 5)			



Feed-through terminal block - UK 6 N - 3004524

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Feed-through terminal block, nom. voltage: 800 V, nominal current: 41 A, connection method: Screw connection, number of connections: 2, cross section:0.2 mm² - 10 mm², AWG: 24 - 8, width: 8.2 mm, color: gray, mounting type: NS 35/7,5, NS 35/15, NS 32

Why buy this product

- Mall universal terminal blocks in the UK... series can also be used in the Ex e area according to IEC/EN 60079 as standard
- The corresponding EC-type examination numbers for Ex approval can be found in the technical connection data



Key Commercial Data

Packing unit	1 STK
Minimum order quantity	50 STK
GTIN	4 017918 090821
GTIN	4017918090821
Weight per Piece (excluding packing)	14.000 g
Custom tariff number	85369010
Country of origin	China

Technical data

General

	<u>, </u>
Number of levels	1
Number of connections	2
Potentials	1
Nominal cross section	6 mm ²
Color	gray
Insulating material	PA



Feed-through terminal block - UK 6 N - 3004524

Classifications

UNSPSC

UNSPSC 7.0901	39121410
UNSPSC 11	39121410
UNSPSC 12.01	39121410
UNSPSC 13.2	39121410

Approvals

Approvals

Approvals

Ex Approvals

 ${\sf IECEx\,/\,ATEX\,/\,UL\,\,Recognized\,/\,\,cUL\,\,Recognized\,/\,\,EAC\,\,Ex\,/\,\,GL\,/\,\,cULus\,\,Recognized}$

Approval details

CSA	(3P	http://www.csa	http://www.csagroup.org/services-industries/product-listing/	
mm²/AWG/kcmil			26-8	
Nominal current IN			50 A	
Nominal voltage UN			600 V	

UL Recognized	http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/index.htm	FILE E 60425
mm²/AWG/kcmil	26-8	
Nominal current IN	50 A	
Nominal voltage UN	600 V	



Plug-in bridge - FBS 20-5 - 3030226

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Plug-in bridge, Pitch: 5.2 mm, Number of positions: 20, Color: red

Product Features

■ The 2- to 50-pos. jumpers can bridge up to 50 terminal blocks in the two bridge shafts of the CLIPLINE complete system in one step



Key Commercial Data

Packing unit	1 pc
Minimum order quantity	10 pc
Weight per Piece (excluding packing)	17.6 g
Custom tariff number	85389099
Country of origin	Germany

Technical data

Technical data

Color	red
Material	Copper
Number of positions	20
Pitch	5.20 mm
Maximum load current	24 A (The current values for the jumpers can deviate when used in different modular terminal blocks. The precise values can be found in the accessories data for the respective modular terminal blocks.)

Classifications

eCl@ss

eCl@ss 4.0	27141199
eCl@ss 4.1	27141199



Plug-in bridge - FBS 20-5 - 3030226

Classifications

eCl@ss

_	
eCl@ss 5.0	27141140
eCl@ss 5.1	27141140
eCl@ss 6.0	27141140
eCl@ss 7.0	27141140
eCl@ss 8.0	27141140
eCl@ss 9.0	27141140

ETIM

ETIM 2.0	EC000489
ETIM 3.0	EC000489
ETIM 4.0	EC000489
ETIM 5.0	EC000489

UNSPSC

EAC

UNSPSC 6.01	30211829
UNSPSC 7.0901	39121426
UNSPSC 11	39121426
UNSPSC 12.01	39121426
UNSPSC 13.2	39121426

Approvals	
Approvals	
Approvals	
EAC	
Ex Approvals	
Approvals submitted	
Approval details	



Plug-in bridge - FBS 20-5 - 3030226

Accessories

Accessories

Cutting tools

Front cutter - CUTFOX-FBS - 1212124



Cutting tool, for separating individual jumper bars from FBS ... plug-in bridges and EB ... insertion bridges

Protective cap

Protective cap - FBSC - 3012325



Covering hood, provides reliable shock protection when using cut-to-length FBS ...-5 and FBS ...-6 bridges, color: red

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Plug-in bridge - FBS 10-6 - 3030271

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Plug-in bridge, Pitch: 6.2 mm, Length: 23 mm, Width: 60.3 mm, Number of positions: 10, Color: red

Why buy this product

The 2- to 50-pos. jumpers can bridge up to 50 terminal blocks in the two bridge shafts of the CLIPLINE complete system in one step



Key Commercial Data

Packing unit	1 STK
Minimum order quantity	10 STK
GTIN	4 017918 188580
GTIN	4017918188580
Weight per Piece (excluding packing)	10.140 g
Custom tariff number	85389099
Country of origin	Germany

Technical data

Technical data

Color	red
Material	Copper
Number of positions	10
Pitch	6.2 mm
Maximum load current	32 A (The current values for the jumpers can deviate when used in different modular terminal blocks. The precise values can be found in the accessories data for the respective modular terminal blocks.)
Flammability rating according to UL 94	V0



FBS 10-8

Order No.: 3030323



http://eshop.phoenixcontact.de/phoenix/treeViewClick.do?UID=3030323

Plug-in bridge, Number of positions: 10, Color: red

Commercial data			
GTIN (EAN)	4 017918 188634		
sales group	A690		
Pack	10 pcs.		
Customs tariff	85389099		
Catalog page information	Page 330 (CL-2009)		

Product notes

WEEE/RoHS-compliant since: 01/01/2003



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UTTB 4 YE

Order No.: 3035467



http://eshop.phoenixcontact.de/phoenix/treeViewClick.do?UID=3035467

Double-level terminal block with screw connection, cross section: 0.14 mm² - 6 mm², AWG: 26- 10, width: 6.2 mm, color: Yellow

Commercial data		
GTIN (EAN)	4046356305648	
Note	Made-to-order	
sales group	A832	
Pack	50 pcs.	
Customs tariff	85369010	
Weight/Piece	0.020362 KG	

Product notes WEEE/RoHS-compliant since: 07/27/2007



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Certificates / Approvals







Certification CSA, CUL, GL, UL

Certification Ex: IECEx, KEMA-EX

CSA		
Nominal voltage U _N		600 V
Nominal current I _N		30 A
AWG/kcmil		26-10
CUL		
Nominal volta	age U _N	600 V
Nominal curre	ent I _N	30 A
AWG/kcmil		26-10
UL		
Nominal volta	age U _N	600 V
Nominal curre	ent I _N	30 A
AWG/kcmil		26-10
Accessories	3	
Item	Designation	Description
Assembly		
3047316	ATP-UTTB 2,5/4	Partition plate, Length: 74.3 mm, Width: 2.2 mm, Height: 70 mm, Color: gray
3047293	D-UTTB 2,5/4	End cover, Length: 69.9 mm, Width: 2.2 mm, Height: 57.5 mm, Color: gray
Bridges		
3030336	FBS 2-6	Plug-in bridge, Number of positions: 2, Color: red
3030242	FBS 3-6	Plug-in bridge, Number of positions: 3, Color: red
3030255	FBS 4-6	Plug-in bridge, Number of positions: 4, Color: red
3030349	FBS 5-6	Plug-in bridge, Number of positions: 5, Color: red
3030271	FBS 10-6	Plug-in bridge, Number of positions: 10, Color: red
3030365	FBS 20-6	Plug-in bridge, Number of positions: 20, Color: red
3032224	FBS 50-6	Plug-in bridge, Number of positions: 50, Color: red
General		
3047303	DP-UTTB 2,5/4	Spacer plate, Length: 69.9 mm, Width: 2.6 mm, Height: 33 mm, Color: gray



D-UTTB 2,5/4

Order No.: 3047293



http://eshop.phoenixcontact.de/phoenix/treeViewClick.do?UID=3047293

End cover, Length: 69.9 mm, Width: 2.2 mm, Height: 57.5 mm,

Color: gray

Commercial data		
EAN	4017918997267	
Pack	50 pcs.	
Customs tariff	85389099	
Weight/Piece	0.004635 KG	
Catalog page information	Page 40 (CL-2009)	

Product notes

WEEE/RoHS-compliant since: 01/18/2005



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2.5 mm² UT... screw connection terminal blocks

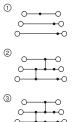
Feed-through, multi-conductor, and multi-level terminal blocks and ground terminals



1) For additional accessories and technical data, see page 30.







(F) 20**17** 20 10



28 A, double-level terminal block with PE foot

24 A, three-level terminal block and ground terminal

(F) su **442** (B)

Dimensions	
	[mm]
Max. electrical data	
Max. bridge current	[A]
Rated data	
Rated voltage	[V]
Nominal current / cross section	[A] / [mm ²]

Technical data ¹)			
Width	Length	Height	
5.2	69.9	65 (NS 35/7,5)	
I _{max.} [A]	U _{max.} [V]	max. Ø [mm²]	AWG (UL)
28 24 (FBS) / 17.5 (500 FBSR)	0.14 - 4	26-12
IEC	UL/CUL	CSA	Ex
500	600	600	-
24 / 2.5	20 / -	20/-	-

Technical data ¹)				
Width	Length	Height		
5.2 90 77.5 (NS 35/7,5)				
I _{max.} [A]	U _{max.} [V]	max. Ø [mm²]	AWG (UL)	
24	500	0.14 - 4	26-12	
19 (FBS) / 17.5 (FBSR)				
IEC	UL/CUL	CSA	Ex	
500	600	600	-	
19 / 2.5	20/-	20/-	-	

Description	Color
Terminal block	gray
upper level blue	gray
upper level blue	gray
With potential distribution	gray
Ground terminal	green/yellow
	_

Ground terminal	green/yellow
Cover, width 2.2 mm	gray
Spacer plate	gray

Ordering data			
Туре		Order No.	Pcs. / Pkt.
UTTB 2,5-PE/L UTTB 2,5-PE/N UTTB 2,5-L/N	① ① ②	3044678 3046731 3044681	50 50 50
Accessories ¹)			

sories¹)	
3047293	50
3047303	50
	3047293

Ordering data		
Туре	Order No.	Pcs. / Pkt.
UT 2,5-3L ①	3214259	50
UT 2,5-3PV ②	3214262	50
UT 2,5-3PE ③	3214275	50
Accessories ¹)		
D-UT 2,5-3L	3214314	50

Multi-level terminal blocks

Notes:

1) For additional accessories and technical data, see page 30.







.**₹1**2 ∪s [∏] **③**



24 A, three-level terminal block with PE foot

24 A, three-level terminal block with LED display

(F) su **(AP**s

Dimensions	
	[mm]
Max. electrical data	
Max. bridge current	[A]
Rated data	
Rated voltage	[V]
Nominal current / cross section	[A] / [mm ²]

Technical data ¹)			
Width	Length	Height	
5.2	90	77.5 (NS 35/7,	5)
I _{max.} [A]	U _{max.} [V]	max. Ø [mm²]	AWG (UL)
24	500	0.14 - 4	26-12
19 (FBS) / 17	7.5 (FBSR)		
IEC	UL/CUL	CSA	Ex
500	600	600	-
19 / 2.5	20 / -	20 / -	-

Technical data ¹)			
Width	Length	Height	
5.2	90	77.5 (NS 35/7,	5)
I _{max.} [A]	U _{max.} [V]	max. Ø [mm²]	AWG (UL)
24	500	0.14 - 4	26-12
19 (FBS) / 17.	5 (FBSR)		
IEC	UL/CUL	CSA	Ex
500	600	24	-
19 / 2.5	20 / -	20	-

140/1/mai ourrent/ orose section	[/1]/[!!!!!]
Description	Color
Terminal block	gray
upper level blue	gray
Terminal block , with LED for 12 - 30 V DC, 0.7 - 2.4 mA	gray
Cover, width 2.2 mm	gray

Ordering data			
Туре		Order No.	Pcs. / Pkt.
UT 2,5-PE/L/L	1	3214301	50
UT 2,5-PE/L/N	1	3214291	50
Accessories ¹)			
D-UT 2,5-3L		3214314	50

Ordering data			
Туре		Order No.	Pcs. / Pkt.
UT 2,5-3L-LA24RD/O-M	1	3214288	50
Accessories ¹)			
D-UT 2,5-3L		3214314	50



Cover - D-UT 2,5-3L - 3214314

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Cover, Length: 90 mm, Width: 2.2 mm, Height: 69.8 mm, Color: gray

Key commercial data

Packing unit	0
Minimum order quantity	50
Catalog page	Page 46 (CL1-2011)
GTIN	4 046356 575461
Custom tariff number	85389099
Country of origin	POLAND

Technical data

Product type	End cover
Approval	GOST

Classifications

eclass

eCl@ss 4.0	27141111
eCl@ss 4.1	27141199
eCl@ss 5.0	27141133
eCl@ss 5.1	27141133
eCl@ss 6.0	27141133

etim

ETIM 3.0	EC000886
ETIM 4.0	EC000886

unspsc

UNSPSC 6.01	30211709
UNSPSC 7.0901	39121421
UNSPSC 11	39121421
UNSPSC 12.01	39121421



Cover - D-UT 2,5-3L - 3214314

Classifications

unspsc

UNSPSC 13.2	39121421
Approvals	
Certificates	
Certification	
GOST	
Certification EX	
Certification submitted	
Approval details	
GOST	

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Product data sheet Characteristics

LAD4DDL TESYS U-LINE TRANSIENT SUPPRESSOR



Product availability: Stock - Normally stocked in distribution facility

Price*: 26.20 USD



Main

Range of product	TeSys D TeSys D control relay	
Range	TeSys	
Device short name	LAD4	
Product or component type	Suppressor module	
Product compatibility	LC1D09D38 (3P) LC1DT20DT40 (4P) LC1D098D258 (4P) CAD32, CAD50	

Complementary

Mounting location	Side
Mounting mode	By clips
Suppressor technology	Flywheel diode
[Uc] control circuit voltage	24250 V DC
Maximum peak voltage	1 Uc
Product weight	0.03 lb(US) (0.012 kg)
Compatibility code	LAD4

Environment

Ambient air temperature for operation	-13131 °F (-2555 °C)
Ambient air temperature for storage	-40176 °F (-4080 °C)

Ordering and shipping details

Category	22341 - CONTACTOR,D,K,&F ACCESS	
Discount Schedule	112	
GTIN	00785901825838	
Nbr. of units in pkg.	1	
Package weight(Lbs)	0.02	
Returnability	Υ	
Country of origin	FR	

Offer Sustainability

Sustainable offer status	Green Premium product	
RoHS (date code: YYWW)	Compliant - since 0725 - Schneider Electric declaration of conformity Schneider- Electric declaration of conformity	
REACh	Reference not containing SVHC above the threshold	
Product environmental profile	Available	
Product end of life instructions	Need no specific recycling operations	

Contractual warranty

<u> </u>	
Warranty period	18 months

Product Life Status : Commercialised

Product data sheet Characteristics

LRD01

TeSys LRD thermal overload relays - 0.1...0.16 A - class 10A



Product availability: Stock - Normally stocked in distribution facility

Price*: 60.00 USD



Main

Range	TeSys
Product name	TeSys LRD
Product or component type	Differential thermal overload relay
Device short name	LRD
Relay application	Motor protection
Product compatibility	LC1D25 LC1D09 LC1D12 LC1D18 LC1D38 LC1D32
Network type	DC AC
Thermal protection adjustment range	0.10.16 A
[Ui] rated insulation voltage	Power circuit 600 V CSA Power circuit 600 V UL Power circuit 690 V IEC 60947-4-1

Complementary

Network frequency	0400 Hz	
Mounting support	Plate, with specific accessories Rail, with specific accessories Under contactor	
Tripping threshold	1.14 +/- 0.06 Ir IEC 60947-4-1	
[Ith] conventional free air thermal current	5 A signalling circuit	
Permissible current	3 A 120 V AC-15 signalling circuit 0.22 A 125 V DC-13 signalling circuit	
[Ue] rated operational voltage	690 V AC 0400 Hz	
[Uimp] rated impulse withstand voltage	6 KV	
Phase failure sensitivity	Tripping current 130 % of Ir on two phase, the last one at 0	
Control type	Red push-button stop Blue push-button reset	
Temperature compensation	-4140 °F (-2060 °C)	

Dec 12, 2019

Connections - terminals	Control circuit screw clamp terminals 2 0.000.00 in² (12.5 mm²) flexible without cable end
	Control circuit screw clamp terminals 2 0.000.00 in² (12.5 mm²) flexible with cable end
	Control circuit screw clamp terminals 2 0.000.00 in² (12.5 mm²) solid without cable end
	Power circuit screw clamp terminals 1 0.000.02 in ² (1.510 mm ²) flexible without-cable end
	Power circuit screw clamp terminals 1 0.000.01 in ² (14 mm ²) flexible with cable end
	Power circuit screw clamp terminals 1 0.000.01 in² (16 mm²) solid without cable end
Tightening torque	Control circuit 15.05 lbf.in (1.7 N.m) screw clamp terminals Power circuit 15.05 lbf.in (1.7 N.m) screw clamp terminals
Width	1.77 ln (45 mm)
Depth	2.76 ln (70 mm)
Net weight	0.27 Lb(US) (0.124 kg)

Environment

Livilorition	
Protective treatment	TH IEC 60068
IP degree of protection	IP20 IEC 60529
Ambient air temperature for operation	-4140 °F (-2060 °C) without derating IEC 60947-4-1
Ambient air temperature for storage	-76158 °F (-6070 °C)
Flame retardance	V1 UL 94
Mechanical robustness	Vibrations6 Gn IEC 60068-2-6 Shocks15 Gn for 11 ms IEC 60068-2-7
Dielectric strength	6 KV 50 Hz IEC 60255-5
Standards	EN 60947-4-1 EN 60947-5-1 IEC 60947-5-1 IEC 60947-4-1 UL 508 ATEX D 94/9/CE CSA C22.2 No 14
Product certifications	RINA BV CCC GL UL GOST CSA DNV LROS (Lloyds register of shipping) ATEX INERIS

Ordering and shipping details

Category	22347 - CONTACTOR,D-LINE,OVERLOADS-NEW
Discount Schedule	112
GTIN	00785901206682
Package weight(Lbs)	0.14 Kg (0.31 lb(US))
Returnability	Yes
Country of origin	FR



Offer Sustainability

Sustainable offer status	Green Premium product
California proposition 65	WARNING: This product can expose you to chemicals including: Antimony oxide & Antimony trioxide which is known to the State of California to cause Carcinogen harm. For more information go to www.p65warnings.ca.gov
REACh Regulation	☑ REACh Declaration
EU RoHS Directive	Compliant EEU RoHS Declaration
Mercury free	Yes
RoHS exemption information	₫Yes
China RoHS Regulation	☑ China RoHS Declaration
Environmental Disclosure	Product Environmental Profile
Circularity Profile	☑ End Of Life Information

Contractual warranty

Warranty	18 months	

Product Life Status:	Commercialised	
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Product data sheet Characteristics

LRD04

TeSys LRD, thermal overload relay, 0.4 to 0.63 A, class 10A



Product availability: Stock - Normally stocked in distribution facility

Price*: 60.00 USD



Main

Range	TeSys
Product name	TeSys LRD
Product or component type	Differential thermal overload relay
Device short name	LRD
Relay application	Motor protection
Product compatibility	LC1D25 LC1D38 LC1D32 LC1D18 LC1D12 LC1D09
Network type	AC DC
Thermal protection adjustment range	0.40.63 A
[Ui] rated insulation voltage	Power circuit 600 V CSA Power circuit 600 V UL Power circuit 690 V IEC 60947-4-1

Complementary

Network frequency	0400 Hz	
Mounting support	Plate, with specific accessories Rail, with specific accessories Under contactor	
Tripping threshold	1.14 +/- 0.06 lr IEC 60947-4-1	
[Ith] conventional free air thermal current	5 A signalling circuit	
Permissible current	3 A 120 V AC-15 signalling circuit 0.22 A 125 V DC-13 signalling circuit	
[Ue] rated operational voltage	690 V AC 0400 Hz	
[Uimp] rated impulse withstand voltage	6 KV	
Phase failure sensitivity	Tripping current 130 % of Ir on two phase, the last one at 0	
Control type	Red push-button stop Blue push-button reset	
Temperature compensation	-4140 °F (-2060 °C)	

Dec 12, 2019

Connections - terminals	Control circuit screw clamp terminals 2 0.000.00 in² (12.5 mm²) flexible without cable end
	Control circuit screw clamp terminals 2 0.000.00 in² (12.5 mm²) flexible with cable end
	Control circuit screw clamp terminals 2 0.000.00 in² (12.5 mm²) solid without cable end
	Power circuit screw clamp terminals 1 0.000.02 in ² (1.510 mm ²) flexible without-cable end
	Power circuit screw clamp terminals 1 0.000.01 in ² (14 mm ²) flexible with cable end
	Power circuit screw clamp terminals 1 0.000.01 in² (16 mm²) solid without cable end
Tightening torque	Control circuit 15.05 lbf.in (1.7 N.m) screw clamp terminals Power circuit 15.05 lbf.in (1.7 N.m) screw clamp terminals
Width	1.77 ln (45 mm)
Depth	2.76 ln (70 mm)
Net weight	0.27 Lb(US) (0.124 kg)

Environment

Livilorition		
Protective treatment	TH IEC 60068	
IP degree of protection	IP20 IEC 60529	
Ambient air temperature for operation	-4140 °F (-2060 °C) without derating IEC 60947-4-1	
Ambient air temperature for storage	-76158 °F (-6070 °C)	
Flame retardance	V1 UL 94	
Mechanical robustness	Vibrations6 Gn IEC 60068-2-6 Shocks15 Gn for 11 ms IEC 60068-2-7	
Dielectric strength	6 KV 50 Hz IEC 60255-5	
Standards	ATEX D 94/9/CE EN 60947-5-1 EN 60947-4-1 IEC 60947-4-1 IEC 60947-5-1 UL 508 CSA C22.2 No 14	
Product certifications	RINA GL UL ATEX INERIS CSA GOST LROS (Lloyds register of shipping) DNV CCC BV	

Ordering and shipping details

ordoring and oripping dotains		
Category	22347 - CONTACTOR,D-LINE,OVERLOADS-NEW	
Discount Schedule	l12	
GTIN	00785901206712	
Package weight(Lbs)	0.15 Kg (0.32 lb(US))	
Returnability	Yes	
Country of origin	FR	



Offer Sustainability

Sustainable offer status	Green Premium product
California proposition 65	WARNING: This product can expose you to chemicals including: Antimony oxide & Antimony trioxide which is known to the State of California to cause Carcinogen harm. For more information go to www.p65warnings.ca.gov
REACh Regulation	☑ REACh Declaration
EU RoHS Directive	Compliant EEU RoHS Declaration
Mercury free	Yes
RoHS exemption information	₫Yes
China RoHS Regulation	☑ China RoHS Declaration
Environmental Disclosure	Product Environmental Profile
Circularity Profile	☑ End Of Life Information

Contractual warranty

<u></u>	
Warranty	18 months

Product Life Status :	Commercialised	
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LRD07

TeSys LRD thermal overload relays - 1.6...2.5 A class 10A

Product availability: Stock - Normally stocked in distribution facility

Price* : 60.00 USD



Main

s LRD ential thermal overload relay protection 25 12 32
ential thermal overload relay protection 25 12
protection 25 12
25 12
25 12
12
38 18 09
2.5 A
power circuit conforming to CSA power circuit conforming to UL power circuit conforming to IEC 60947-4-1

Complementary

Network frequency	0400 Hz	
Mounting support	Plate with specific accessories Rail with specific accessories Under contactor	
Tripping threshold	1.14 +/- 0.06 Ir conforming to IEC 60947-4-1	
[lth] conventional free air thermal current	5 A for signalling circuit	
Permissible current	3 A at 120 V AC-15 for signalling circuit 0.22 A at 125 V DC-13 for signalling circuit	
System Voltage	690 V AC 0400 Hz	

[Uimp] rated impulse withstand voltage	6 kV
Phase failure sensitivity	Tripping current 130 % of Ir on two phase, the last one at 0
Control type	Red push-button stop Blue push-button for reset mode
Temperature compensation	-4140 °F (-2060 °C)
Connections - terminals	Control circuit: screw clamp terminals 2 cable(s) 00 in² (12.5 mm²) - cable stiffness: flexible - without cable end Control circuit: screw clamp terminals 2 cable(s) 00 in² (12.5 mm²) - cable stiffness: flexible - with cable end Control circuit: screw clamp terminals 2 cable(s) 00 in² (12.5 mm²) - cable stiffness: solid - without cable end Power circuit: screw clamp terminals 1 cable(s) 00.02 in² (1.510 mm²) - cable stiffness: flexible - without cable end Power circuit: screw clamp terminals 1 cable(s) 00.01 in² (14 mm²) - cable stiffness: flexible - with cable end Power circuit: screw clamp terminals 1 cable(s) 00.01 in² (14 mm²) - cable stiffness: solid - without cable end
Tightening torque	Control circuit: 15.04 lbf.in (1.7 N.m) - on screw clamp terminals Power circuit: 15.04 lbf.in (1.7 N.m) - on screw clamp terminals
Width	1.77 in (45 mm)
Depth	2.76 in (70 mm)
Product weight	0.27 lb(US) (0.124 kg)

Environment

Environment	
Protective treatment	TH conforming to IEC 60068
IP degree of protection	IP20 conforming to IEC 60529
Ambient air temperature for operation	Without derating conforming to IEC 60947-4-1
Ambient air temperature for storage	-76158 °F (-6070 °C)
Flame retardance	V1 conforming to UL 94
Mechanical robustness	Vibrations 6 Gn IEC 60068-2-6 Shocks 15 Gn for 11 ms IEC 60068-2-7
Dielectric strength	6 kVat 50 Hz conforming to IEC 60255-5
Standards	EN 60947-4-1 CSA C22.2 No 14 UL 508 ATEX D 94/9/CE IEC 60947-5-1 IEC 60947-4-1 EN 60947-5-1
Product certifications	BV GL DNV CCC CSA ATEX INERIS GOST UL RINA LROS (Lloyds register of shipping)

Ordering and shipping details

Category	22347 - CONTACTOR,D-LINE,OVERLOADS-NEW
Discount Schedule	l12
GTIN	00785901206743
Nbr. of units in pkg.	1
Package weight(Lbs)	0.320000000000001
Returnability	Υ
Country of origin	FR

Offer Sustainability

Sustainable offer status	Green Premium product

RoHS (date code: YYWW)	Compliant - since 0631 - Schneider Electric declaration of conformity	
REACh	Reference not containing SVHC above the threshold	
	Reference not containing SVHC above the threshold	
Product environmental profile	Available	
Product end of life instructions	Available	
Contractual warranty		
Warranty period	18 months	

Product data sheet Characteristics

LRD08

TeSys LRD thermal overload relays - 2.5...4 A - class 10A



Product availability: Stock - Normally stocked in distribution facility

Price*: 60.00 USD



Main

Range	TeSys
Product name	TeSys LRD
Product or component type	Differential thermal overload relay
Device short name	LRD
Relay application	Motor protection
Product compatibility	LC1D09 LC1D12 LC1D18 LC1D25 LC1D32 LC1D38
Network type	AC DC
Thermal protection adjustment range	2.54 A
[Ui] rated insulation voltage	600 V power circuit conforming to CSA 600 V power circuit conforming to UL 690 V power circuit conforming to IEC 60947-4-1

Complementary

Network frequency	0400 Hz	
Mounting support	Plate with specific accessories Rail with specific accessories Under contactor	
Tripping threshold	1.14 +/- 0.06 Ir conforming to IEC 60947-4-1	
[Ith] conventional free air thermal current	5 A for signalling circuit	
Permissible current	3 A at 120 V AC-15 for signalling circuit 0.22 A at 125 V DC-13 for signalling circuit	
System Voltage	690 V AC 0400 Hz	
[Uimp] rated impulse withstand voltage	6 kV	
Phase failure sensitivity	Tripping current 130 % of Ir on two phase, the last one at 0	
Control type	Red push-button stop Blue push-button for reset mode	
Temperature compensation	-4140 °F (-2060 °C)	

Jan 25, 2019

Connections - terminals	Control circuit: screw clamp terminals 2 cable(s) 12.5 mm² flexible without cable end Control circuit: screw clamp terminals 2 cable(s) 12.5 mm² flexible with cable end Control circuit: screw clamp terminals 2 cable(s) 12.5 mm² solid without cable end
	Power circuit: screw clamp terminals 1 cable(s) 1.510 mm² flexible without cable end
	Power circuit: screw clamp terminals 1 cable(s) 14 mm² flexible with cable end Power circuit: screw clamp terminals 1 cable(s) 16 mm² solid without cable end
Tightening torque	Control circuit : 1.7 N.m on screw clamp terminals Power circuit : 1.7 N.m on screw clamp terminals
Width	1.77 in (45 mm)
Depth	2.76 in (70 mm)
Product weight	0.27 lb(US) (0.124 kg)
Compatibility code	LRD

Environment

Protective treatment	TH conforming to IEC 60068
IP degree of protection	IP20 conforming to IEC 60529
Ambient air temperature for operation	-4140 °F (-2060 °C) without derating conforming to IEC 60947-4-1
Ambient air temperature for storage	-76158 °F (-6070 °C)
Flame retardance	V1 conforming to UL 94
Mechanical robustness	Vibrations 6 Gn IEC 60068-2-6 Shocks 15 Gn for 11 ms IEC 60068-2-7
Dielectric strength	6 kVat 50 Hz conforming to IEC 60255-5
Standards	ATEX D 94/9/CE EN 60947-4-1 EN 60947-5-1 IEC 60947-4-1 IEC 60947-5-1 UL 508 CSA C22.2 No 14
Product certifications	ATEX INERIS BV CCC CSA DNV GL GOST LROS (Lloyds register of shipping) RINA UL

Ordering and shipping details

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Category	22347 - CONTACTOR,D-LINE,OVERLOADS-NEW
Discount Schedule	l12
GTIN	00785901206750
Nbr. of units in pkg.	1
Package weight(Lbs)	0.31
Returnability	Υ
Country of origin	FR

Offer Sustainability

Sustainable offer status	Green Premium product
RoHS (date code: YYWW)	Compliant - since 0631 - Schneider Electric declaration of conformity Schneider-Electric declaration of conformity
REACh	Reference not containing SVHC above the threshold
Product environmental profile	Available
Product end of life instructions	Available
California proposition 65	WARNING: This product can expose you to chemicals including:



Substance 1	Antimony oxide & Antimony trioxide, which is known to the State of California to cause cancer.
More information	For more information go to www.p65warnings.ca.gov
Contractual warranty	
Warranty period	18 months
	Commercialised



Product data sheet Characteristics

T02BN13BD

Contactor TeSys NEMA Sz0 3P 24VDC

Product availability: Stock - Normally stocked in distribution facility

Price*: 280.00 USD



Main

Product or component type	Contactor
Range of product	TeSys N
Contactor application	Non-reversing
NEMA size	0
Motor power hp	3 hp 230 V AC 5 hp 460 V AC 5 hp 575 V AC 3 hp 200 V AC
NEMA degree of protection	Not rated (open device)
Control circuit	Common control circuit
[Uc] control circuit voltage	24 V DC
Auxiliary contact composition	1 NO + 1 NC
Poles description	3P
Phase	3 phases
Line Rated Current	18 A
Product certifications	CE CSA UL listed
System Voltage	600 V AC
Electrical connection	Screw clamp terminals

Ordering and shipping details

Category	21196 - TESYS N CONTACTORS SIZES 00 - 2	
Discount Schedule	CP1	
GTIN	00785901514176	·
Nbr. of units in pkg.	1	:
Package weight(Lbs)	1.28	
Returnability	Υ	
Country of origin	FR	

Offer Sustainability

California proposition 65	WARNING: This product can expose you to chemicals including:
Substance 1	Antimony oxide & Antimony trioxide, which is known to the State of California to cause-cancer.
More information	For more information go to www.p65warnings.ca.gov

|--|

Product data sheet Characteristics

T02BN23BD

Rev. Contactor TeSys NEMA Sz0 3P 24VDC

Product availability: Stock - Normally stocked in distribution facility

Price*: 692.00 USD



Product or component type	Contactor	
Range of product	TeSys N	
Contactor application	Reversing	
NEMA size	0	
Motor power hp	3 hp 230 V AC 5 hp 460 V AC 5 hp 575 V AC 3 hp 200 V AC	
NEMA degree of protection	Not rated (open device)	;
Control circuit	Common control circuit	
[Uc] control circuit voltage	24 V DC	
Auxiliary contact composition	1 NO + 1 NC	
Poles description	3P	
Phase	3 phases	
Line Rated Current	18 A	
Product certifications	CE CSA UL listed	
System Voltage	600 V AC	
Electrical connection	Screw clamp terminals	

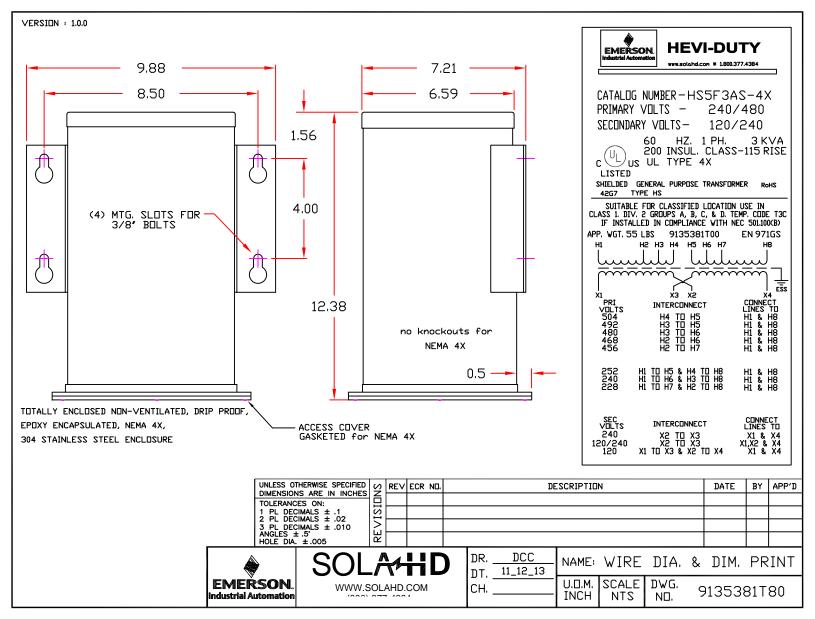
Ordering and shipping details

		.≘
Category	21196 - TESYS N CONTACTORS SIZES 00 - 2	eubst
Discount Schedule	CP1	
GTIN	00785901515869	pe
Nbr. of units in pkg.	1	ni Di
Package weight(Lbs)	2.83999999999999	<u>.w</u>
Returnability	Υ	ation
Country of origin	FR	

Offer Sustainability

 	
California proposition 65	WARNING: This product can expose you to chemicals including:

Substance 1	Antimony oxide & Antimony trioxide, which is known to the State of California to cause cancer.
More information For more information go to www.p65warnings.ca.gov	



Product data sheet Characteristics

PK23GTA LOAD CENTER EQUIPMENT GROUND BAR ASSY

Product availability: Stock - Normally stocked in distribution facility



Price*: 21.30 USD



Main

Product line	QO	
Product type	Load Center Grounding Bar	

Ordering and shipping details

Category	00102 - QO LC ACCESSORIES	
Discount Schedule	DE3A	
GTIN	00785901026433	
Nbr. of units in pkg.	20	
Package weight(Lbs)	0.22	
Returnability	Υ	
Country of origin	US	

Offer Sustainability

RoHS (date code: YYWW)	Compliant - since 0934 - Schneider Electric declaration of conformity Schneider Electric declaration of conformity	
REACh	Reference not containing SVHC above the threshold Reference not containing SVHC above the threshold	
Product end of life instructions	Need no specific recycling operations	
California proposition 65	WARNING: Cancer and Reproductive Harm - www.P65Warnings.ca.gov	

Contractual warranty

	•	
Warranty period	18 months	

Effective June 2016 Supersedes January 2014

BUSSMANN SERIES

Up to 400 A Class J ferrule and knifeblade power distribution fuse blocks





30 and 60 amp modular ferrule blocks.

100, 200 and 400 amp modular knifeblade blocks

Catalog symbols:

- JM60030- MW
- JM60060-_MW_
- JM60100-_MW_
- JM60200-_MW_
- JM60400-_MW_

Description:

Bussmann® series Class J fuse block features power distribution capability.

This patented design simplifies panel layouts and uses up to 65 percent less panel space. Additionally, it lowers inventory costs while reducing installation time and labor by an average of 33 percent.

Furthermore, this design uses fewer wire connections, reducing watts loss and overall operating temperature of the panel.

Features and benefits:

- Combination power distribution block and fuse block reduces wire connections and total panel components, using up to 65 percent less panel space and reducing installation time and labor by an average of 33 percent when compared with traditional fuse block/power distribution block solutions.
- A 200,000 amp withstand rating helps achieve a higher assembly short-circuit current rating (SCCR) for compliance with NEC® sections 110.10, 409.110(4), 409.22, 440.4(B), 670.3(A)(4) and 670.5.
- Optional see-through cover enhances safety with IP20 finger-safe protection, lockout/tagout capability and open circuit indication.
- Available in 1-, 2- and 3-pole configurations to meet stocking requirements.
- To reduce inventory, assembly time and labor, modular single-pole blocks snap-together for tool-less assembly of multiple poles at point of use.
- Blocks rated up to 60 amps feature DIN-Rail and panel mount versatility, which allows one product to be used for multiple applications without incurring additional inventory cost.



Specifications:

Fuse class

Class J

Ratings

Volts: 600 V

· Amps: up to 400 A

• Withstand rating (SCCR): 200 kA Sym RMS

Agency information

Blocks:

UL® Listed E14853 – IZLT

CSA® Certified 47235 — 6225-01

• Covers: UL Listed UL E58836 - JDVS

· RoHS compliant

Poles

• 1-, 2-, 3-pole

Mounting

- 30 and 60 amp blocks DIN-Rail and panel mount
- 100, 200 and 400 amp blocks panel mount only

Flammability ratings

Blocks: UL 94V0, self-extinguishing

· Covers: UL 94HB, self-extinguishing

Operating and storage temperature range

Blocks: -40°C to +120°C

· Covers:

Non-indicating -40°C to +120°C

• Indicating -20°C to +90°C

Materials

· Base: Thermoplastic

· Terminals: Tin-plated aluminum

Conductors

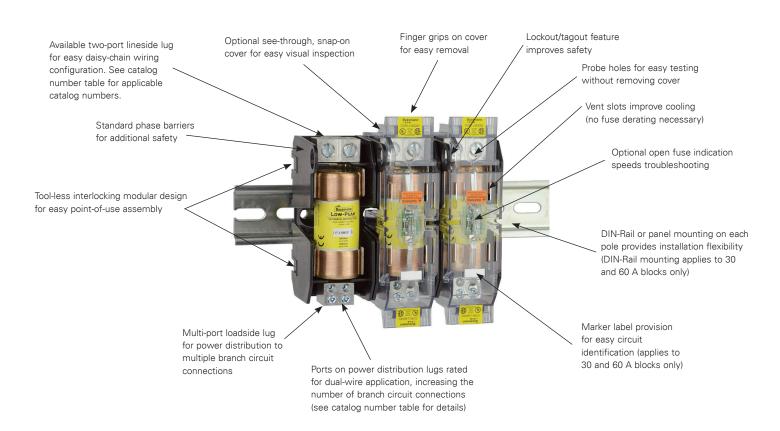
• 75°C/90°C Cu/Al (unless otherwise noted)

Accessories:

- Optional IP20 finger-safe covers in indicating and non-indicating versions. Order one for each pole.
- Universal marker labels for 30 and 60 amp blocks, Bussmann series catalog number TM26CB.
- DIN-Rail end stops for blocks rated up to 60 A, Bussmann series catalog numbers BRKT-ND or BRKT-NDSCRW2.

Recommended fuses (order separately)

Description	Amps	Data sheet no.
Ultimate protection Low-Peak™ LPJ	up to 60	1006
time-delay fuses	70 to 600	1007
Advanced protection Limitron™ JKS	up to 60	1026
fast-acting fuses	70 to 600	1027
High speed Class J DFJ drive fuses	up to 600	1048



Catalog numbers:

Mathematic		Fuse			Lineside (conducto	Loadside (conductors per port)																			
MRO0000-1MW12	Catalog no.		amp	Poles	Conductors	-	Torque AWG		Conductors	-															
Melonosoum	JM60030-1MW14			1			2-3	5.6 (50)			Cu (1) 8	3.4 (30)													
MRO0000-MMV12	JM60030-2MW14		to 20	2	- Cu 2-14	1	4-6	5.1 (45)		4	Cu (1) 10-14	2.8 (25)													
M60060-MW12 M60060-MW12 M60060-MW12 M60060-MW12 M60060-MW12 M60060-MW12 M60060-MW12 M60060-MW12 M60060-MW12 M60060-MW12 M60060-MW12 M7 M7 M7 M7 M7 M8 M8 M	IN 460020 2N 4VA/14	- N/A	up to 30	2	Al 2-8	ı	8	4.5 (40)		4	Cu (2) 12-14	3.4 (30)													
M60000-2MW12 M12-8 M12	310160030-31010014	_		3			10-14	4.0 (35)	1 (1)		Al (1) 8-10	3.4 (30)													
M60660-3MW14	JM60060-1MW12 [†]			1			2-4	5.6 (50)			2-3	5.6 (50)													
Melono-Ministration Mathematical Ministration Mathem	JM60060-2MW12 [†]			2	_ _ Cu 2-14	2	6-10	4.5 (40)	Cu 2-14	1	4-6	5.1 (45)													
M60060-1MW14	IN 460060 2N 4N 412†	_		2	Al 2-8	2	10.14	17/15)	Al 2-8	ı	8	4.5 (40)													
	JIVI60060-3IVIVV 12"			3			12-14	1.7 (15)			10-14	4.0 (35)													
M60060-3MW14	JM60060-1MW14 [†]	_		1		1	2-3	5.6 (50)			Cu (1) 8	3.4 (30)													
M60060-3MW14 M60060-3MW14	JM60060-2MW14 [†]	- CVR-J-60060	35 - 60	2	- Cu 2-14		4-6	5.1 (45)		4	Cu (1) 10-14	2.8 (25)													
M60060-1MW24	IN 460060 2N 4VA/14†	CVRI-J-60060**	35 - 60	2	Al 2-8	ı	8	4.5 (40)		4	Cu (2) 12-14	3.4 (30)													
$ \frac{1}{10000000000000000000000000000000000$	JIVI60060-3IVIVV 141			3			10-14	4.0 (35)	7 11 (17) 10 001		Al (1) 8-10	3.4 (30)													
M60100-1MW14	JM60060-1MW24	_		1			2-4	5.6 (50)			Cu (1) 8	3.4 (30)													
M60100-1MW14	JM60060-2MW24	_		2	- Cu 2-14	2	6-10	4.5 (40)	Cu (2) 12-14*** Al (1) 8 Str	4	Cu (1) 10-14	2.8 (25)													
M60100-1MW14 CVR.J-60100-M CVRIJ-60100-M CVRIJ-60100-M CVRIJ-60100-M CVRIJ-60100-M CVRIJ-60100-M CVRIJ-60100-M CVRIJ-60100-M CVRIJ-60100-M CVRIJ-60200-M	IN 460060 2N 4N 424	_		2	Al 2-8		10 14	1 7 /15\		4	Cu (2) 12-14	3.4 (30)													
$ \frac{1}{10000000000000000000000000000000000$	310100000-31010024			3			12-14	1.7 (15)			AI (1) 8-10	3.4 (30)													
M60100-3MW16	JM60100-1MW14	_		1		1	1/0-3; Cu (2) 4-6	5.6 (50)	Al (1) 4-8	4	4-6	4.0 (35)													
M60100-3MW16	JM60100-2MW14		70 100	2			4-6; Cu (2) 8	5.0 (45)			8	2.8 (25)													
M60200-1MW16 JM60200-2MW16 CVR-J-60200-M** 110-200 2	IN/160100-3N/IN/1/	CVRI-J-60100-M**	70 - 100	3			8; Cu (2) 10-14	4.5 (40)		4	Cu 10-14	2.3 (20)													
M60200-2MW16	31000100-31010014						10-14	4.0 (35)			(2) 10-14	3.4 (30)													
M60200-2MW16	JM60200-1MW16			1			2E0komil 1	42 (275)			4-6	4.0 (35)													
JM60200-3MW16 3 2-6 31 (275) Cu (2) 10-14 3.4 (30) JM60400-1MW16 2 2 2 3 5.6 (50) JM60400-2MW16 2 2 2 3 3 3 4 5 JM60400-3MW16 CVR-J-60400-M	JM60200-2MW16	– CVR-J-60200-M	110 000	2	- Cu/Al (1) 250kcmil-6	4	250KCITIII-1	42 (375)		6	8	2.8 (25)													
M60400-1MW16	IN 4000000 ON 414 /40	CVRI-J-60200-M**	110-200			Cu (2) 2-6	Cu (2) 2-6	Cu (2) 2-6	Cu (2) 2-6	Cu (2) 2-6	Cu (2) 2-6	Cu (2) 2-6	Cu (2) 2-6	Cu (2) 2-6	Cu (2) 2-6	Cu (2) 2-6	Cu (2) 2-6	Cu (2) 2-6	ı	0.0	04 (075)		О	10-14	2.3 (20)
M60400-1MW16 1	JIVI60200-3IVIVV16			3			2-6	31 (275)			(2) 10-14	3.4 (30)													
Cu/Al (1) 600kcmil-4 Cu/Al (2) 3/0-4 1 500kcmil-4 Cu/Al (2) 3/0-4 1 500kcmil-4 Cu/Al (2) 3/0-4 57 (500) Cu (1) 2-14 Al (1) 2-8 Cu (2) 8-14*** 6 (2) 8 4.5 (40)	JM60400-1MW16			1			600kcmil	57 (500)			2-3	5.6 (50)													
M60400-3MW16	JM60400-2MW16	_		2	- -																				
CVR-J-60400-M CVRI-J-60400-M** 225-400 CU(2) 3/0-4 Al (2) (3/0-4 Al (3/0) CU(2) 8-14*** (2) 10-14 4.0 (35)						1	500kcmil-4	51 (450)	1	6															
M60400-1MW26	JM60400-3MW16			3	Cu/Ai (2) 3/0-4			57 (500)	Cu (2) 8-14***	5	10-14	4.0 (35)													
M60400-1MW26 1 2 350kcmil-1 42 (375) Cu (1) 2-14 4.0 (35) Cu (2) 8-14*** 2-3 5.6 (50) 4-6 5.0 (45) (4-6) 5.0 (45) (4-6) 5.0 (45) (4-6) 5.0 (45) (4-6) 5.0 (45) (4-6) 5.0 (45) (4-6) 5.0 (45) (4-6) 5.0 (45) (4-6) 5.0 (45) (4-6) 5.0 (45) (4-6) 5.0 (45) (4-6) (4-6) 5.0 (45) (4-6)			225-400				AI (2) (3/U-4	34 (300)	1		(2) 10-14	4.5 (40)													
350kcmil-1 42 (375) Cu (1) 2-14 B 4.5 (40) Cu/Al 350kcmil-6 2 JM60400-3MW26 3 Cu (2) 8-14*** 2-6 31 (275) Cu (1) 2-14 Al (1) 2-8 6 (2) 8 4.5 (40) 10-14 4.0 (35)		_			_							5.6 (50)													
Cu/Al 350kcmil-6 2 JM60400-3MW26 3 Cu/Al 350kcmil-6 2 2-6 31 (275) Cu (1) 2-14 Al (1) 2-8 6 (2) 8 4.5 (40) Cu (2) 8-14*** 10-14 4.0 (35)	JM60400-2MW26	_				2		-		350kcmil-1 4	42 (375)														
JM60400-3MW26 3 Cu (2) 8-14*** 2-6 31 (275) Cu (2) 8-14***					Cu/Al 350kcmil-6	2	200	42 (3/5)		6															
2-6 31 (275)	JM60400-3MW26			3	Sap a cookernii o																				
							2-6	31 (275)			(2) 10-14	4.5 (40)													

Order one cover per pole.

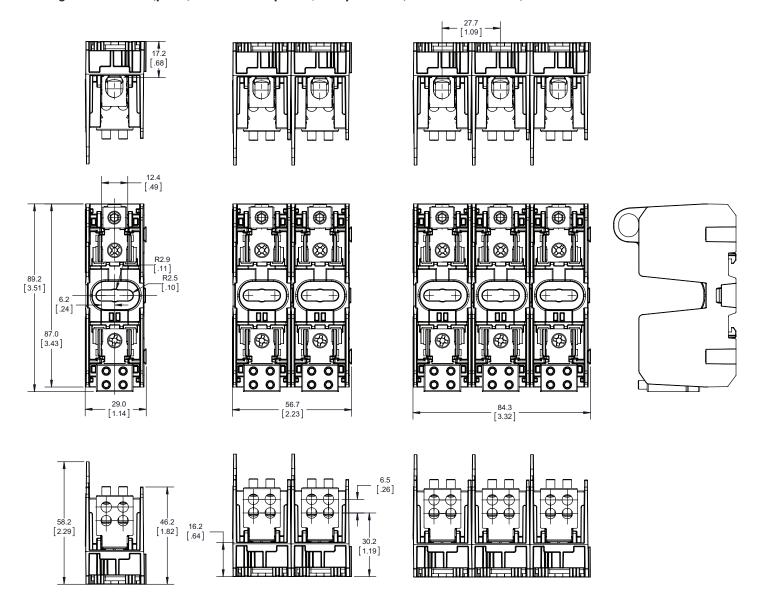
 With open fuse indication. 90 V minimum and closed circuit required for illumination.

 Dual wire rated lugs with same wire size and stranding.

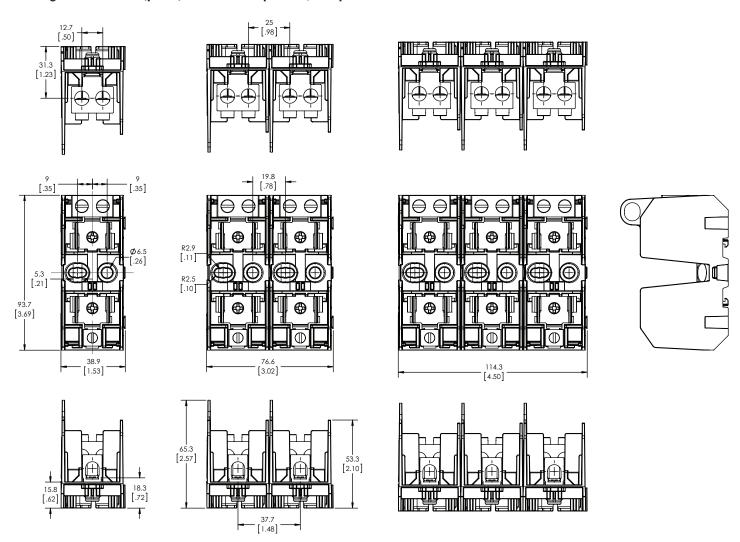
 Rated for 75°C Cu/Al conductors. Conductors with higher ratigns may be used with appropriate derating.

30 A dimensions — mm (in)

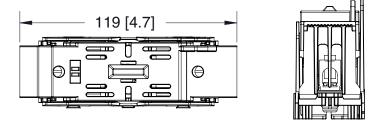
Catalog nos. JM60030-(poles)MW14 — One port in, four ports out (covers not available)



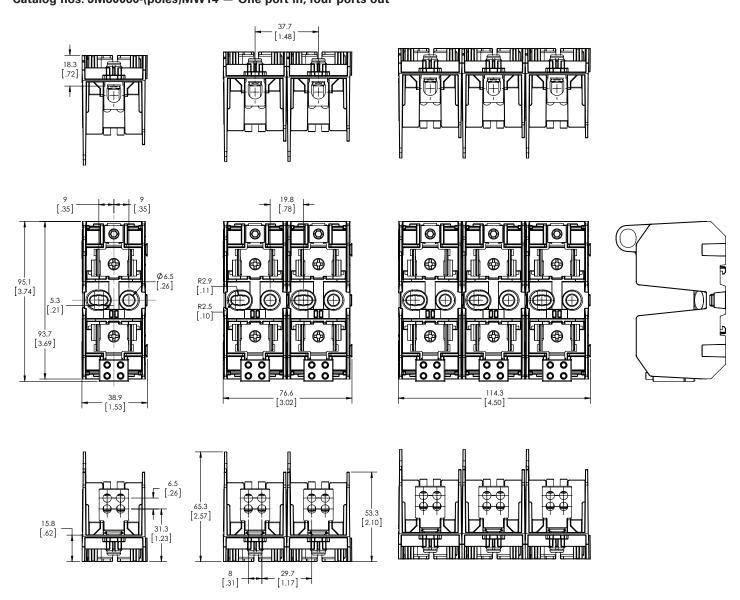
60 A dmensions — mm (in) Catalog nos. JM60060-(poles)MW12 — Two ports in, one port out



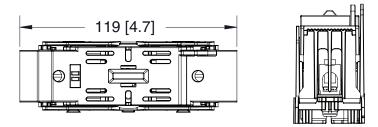
With optional cover, see catalog number table on page three for available versions



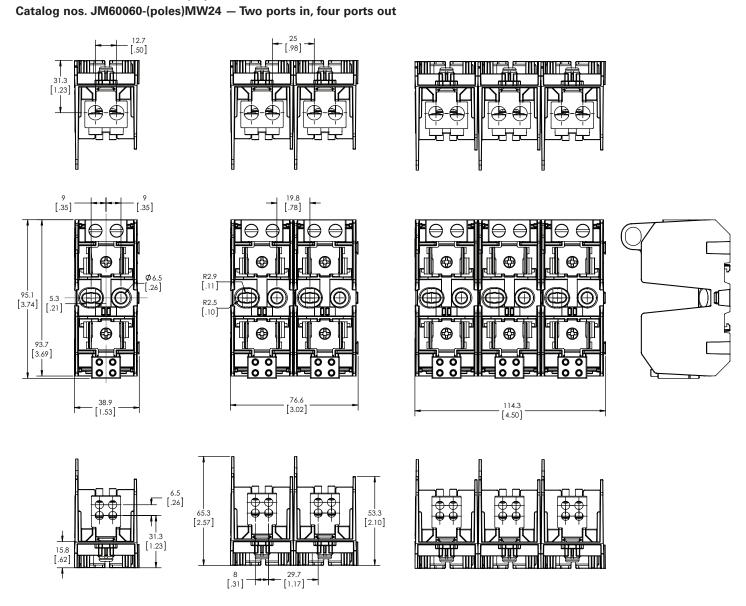
60 A dimensions — mm (in) Catalog nos. JM60060-(poles)MW14 — One port in, four ports out



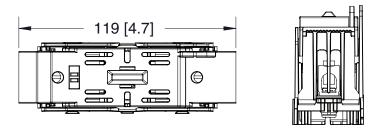
With optional cover, see catalog number table on page three for available versions



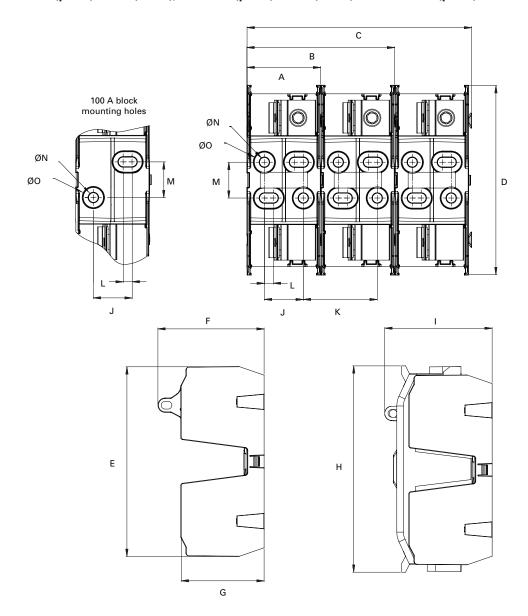
60 A dimensions — mm (in)



With optional cover, see catalog number table on page three for available versions

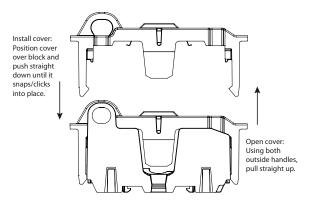


100, 200 and 400 A dimensions — mm (in)
Catalog nos. JM60100-(poles)MW14 (100 A), JM60200-(poles)MW16 (200 A) and JM60400-(poles)MW16/26 (400 A)

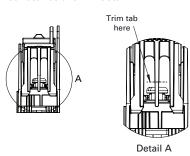


Block size		Α	В	С	D	Е	F	G	Н	-1	J	K	L	M	ØN	ØO
100 A	in	2.0	4.0	6.0	5.5	5.5	2.8	2.2	6.0	2.8	0.9	2.0	0.4	1.1	0.4	0.5
100 A	mm	51	102	153	139	139	72	55	152	72	22	51	10	29	9	13
200 4	in	2.6	5.3	8.0	6.8	6.8	3.8	3.0	7.3	3.8	1.4	2.6	0.3	1.3	0.4	0.7
200 A	mm	67	134	203	172	172	97	75	186	97	35	67	8	32	9	19
400 A	in	3.5	7.0	10.6	8.0	8.0	4.8	4.1	8.7	4.8	2.0	3.5	0.3	1.6	0.4	0.7
	mm	88	177	268	202	202	121	105	220	121	50	88	8	41	9	19

Installing/removing covers on 30 to 400 amp blocks

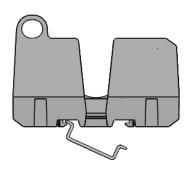


For larger conductors, trim center tab at notch as show in detail A.

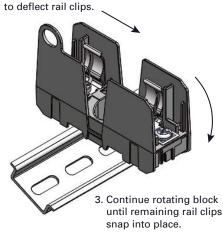


Installing 30 and 60 amp blocks on a 35mm DIN-Rail

1. Place one edge of DIN-Rail into rail clips on one side of the block.



2. Rotate and push block down



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<u>JM60030-1MW14</u> <u>JM60030-2MW14</u> <u>JM60060-3MW12</u> <u>JM60030-3MW14</u> <u>JM60060-1MW14</u> <u>JM60060-2MW14</u> <u>JM60060-3MW24</u>
Product data sheet Characteristics

SDSA4040D

Surge Protect - 40kA - 480VAC delta - 3P3W - T4X

Product availability: Stock - Normally stocked in distribution facility



Price**: 257.92 USD



Main

Product	Surge protection device

Complementary

		:
Surge Current	40 kA	
Voltage Rating	480 V delta AC	
Number of Phases	3 phase	
Wiring Configuration	3-wire	
Connection	Wire AWG 12 copper	:
MCOV	180 V	:
Nominal Discharge Current	10 kA	:
SCCR	200 kA	
Local Signalling	Status LED normal operation	
Mounting Support	Panel mounting	
Height	3.07 in (78 mm)	
Width	3.62 in (92 mm)	
Depth	2.64 in (67 mm)	-

Environment

Enclosure Rating	NEMA 4X	
Enclosure Material	black plastic	
Standards	UL 1449:ed. 4 CSA C22.2 No 8:1986	
Ambient Operating	149 °F (65 °C)	

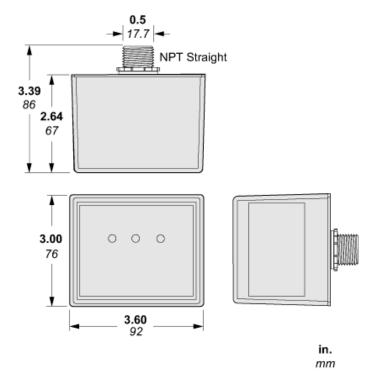
Ordering and shipping details

Category	08462 - SURGE PROTECTION SDSA
Discount Schedule	DE1B
GTIN	00785901599920
Package weight(Lbs)	0.43 kg (0.94 lb(US))
Returnability	Yes
Country of origin	MX

Offer Sustainability

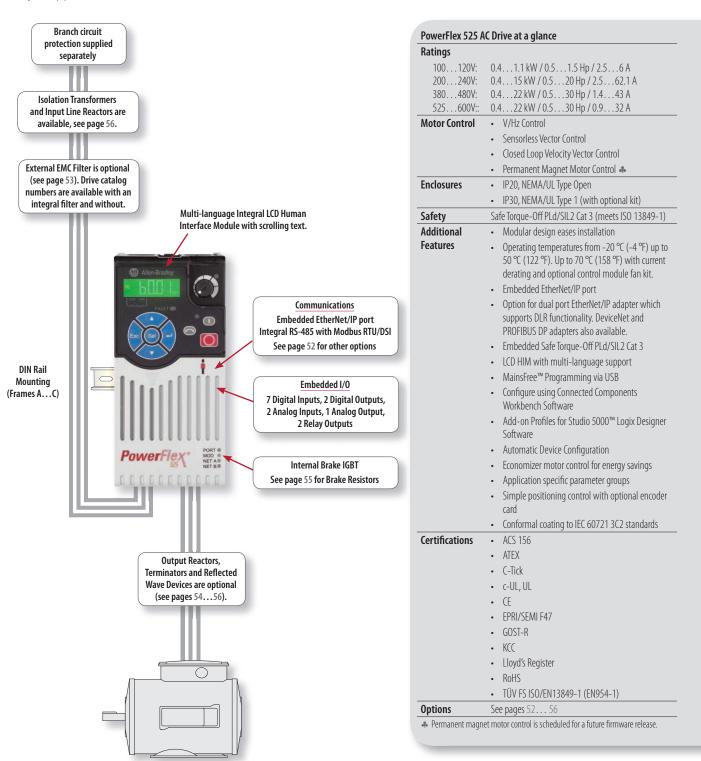
California proposition 65	WARNING: This product can expose you to chemicals including: DINP and DIDP which is known to the State of California to cause Carcinogen and Reproductive harm. For more information go to www.p65warnings.ca.gov
REACh Regulation	REACh Declaration
REACh free of SVHC	Yes
EU RoHS Directive	Compliant EU RoHS Declaration
Mercury free	Yes
RoHS exemption information	Yes
China RoHS Regulation	China RoHS declaration Product out of China RoHS scope. Substance declaration for your information.

Approximate Dimensions



PowerFlex 525 AC Drive

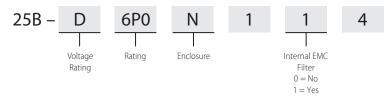
PowerFlex 525 AC drives feature an innovative, modular design offering fast and easy installation and configuration. These cost-effective compact drives come with embedded EtherNet/IP™ communications, safety, USB configuration and a high ambient operating temperature capability. PowerFlex 525 AC drives also provide a variety of motor control algorithms including volts per hertz, sensorless vector control and closed loop velocity vector control, making these drives ideal for a vast array of applications.



Additional Information

PowerFlex 520-Series Technical Data, publication 520-TD001 PowerFlex 520-Series User Manual, publication 520-UM001

Catalog Number Explanation



Product Selection

100...120V AC, Single-Phase Input, Three-Phase Output Drives, 50/60 Hz

		Drive F	No Filter	with Integral EMC Filter			
Norm	al Duty	Heavy	/ Duty	Output Current			
kW	Нр	kW	Нр	Α	Frame Size	Cat. No.	Cat. No.
0.4	0.5	0.4	0.5	2.5	А	25B-V2P5N104	-
0.75	1	0.75	1	4.8	В	25B-V4P8N104	-
1.1	1.5	1.1	1.5	6	В	25B-V6P0N104	_

200...240V AC, Single-Phase Input, Three-Phase Output Drives, 50/60 Hz

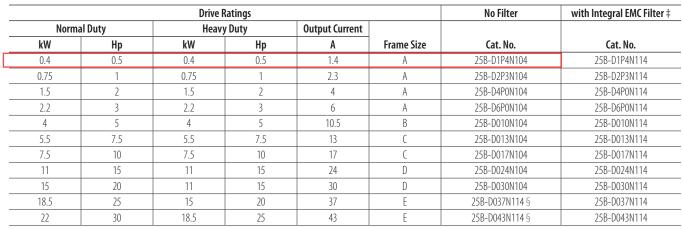
		Drive F	No Filter	with Integral EMC Filter‡			
Norma	al Duty	Heavy	/ Duty	Output Current			
kW	Нр	kW	Нр	Α	Frame Size	Cat. No.	Cat. No.
0.4	0.5	0.4	0.5	2.5	А	25B-A2P5N104	25B-A2P5N114
0.75	1	0.75	1	4.8	А	25B-A4P8N104	25B-A4P8N114
1.5	2	1.5	2	8	В	25B-A8P0N104	25B-A8P0N114
2.2	3	2.2	3	11	В	25B-A011N104	25B-A011N114

This filter is suitable for use with cable lengths up to 10 meters (32.8 feet) for C2 spec and 20 meters (65.6 feet) for C3 spec.

200...240V AC, Three-Phase, 50/60 Hz

		Drive I	No Filter	with Integral EMC Filter			
Norm	nal Duty	Heav	y Duty	Output Current			
kW	Нр	kW	Нр	Α	Frame Size	Cat. No.	Cat. No.
0.4	0.5	0.4	0.5	2.5	А	25B-B2P5N104	_
0.75	1	0.75	1	5	А	25B-B5P0N104	_
1.5	2	1.5	2	8	А	25B-B8P0N104	_
2.2	3	2.2	3	11	А	25B-B011N104	_
4	5	4	5	17.5	В	25B-B017N104	_
5.5	7.5	5.5	7.5	24	C	25B-B024N104	_
7.5	10	7.5	10	32.2	D	25B-B032N104	_
11	15	11	15	48.3	E	25B-B048N104	_
15	20	11	15	62.1	E	25B-B062N104	_

380...480V AC, Three-Phase, 50/60 Hz



[†] This filter is suitable for use with cable lengths up to 10 meters (32.8 feet) for C2 spec and 20 meters (65.6 feet) for C3 spec.

525...600V AC, Three-Phase, 50/60 Hz

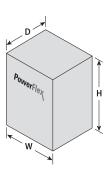
		Drive F	No Filter	with Integral EMC Filter			
Norma	al Duty	Heavy	/ Duty	Output Current			
kW	Нр	kW	Нр	A	Frame Size	Cat. No.	Cat. No.
0.4	0.5	0.4	0.5	0.9	А	25B-E0P9N104	_
0.75	1	0.75	1	1.7	А	25B-E1P7N104	_
1.5	2	1.5	2	3	А	25B-E3P0N104	_
2.2	3	2.2	3	4.2	А	25B-E4P2N104	_
4	5	4	5	6.6	В	25B-E6P6N104	_
5.5	7.5	5.5	7.5	9.9	C	25B-E9P9N104	_
7.5	10	7.5	10	12	C	25B-E012N104	_
11	15	11	15	19	D	25B-E019N104	_
15	20	11	15	22	D	25B-E022N104	_
18.5	25	15	20	27	E	25B-E027N104	_
22	30	18.5	25	32	E	25B-E032N104	-

Approximate Dimensions and Weights

Dimensions are in mm (in.) - weights are in kg (lb)

IP20, NEMA/UL Type Open

Frame	Н	W	D	Weight
А	152.0 (5.98)	72.0 (2.83)	172.0 (6.77)	1.10 (2.4)
В	180.0 (7.08)	87.0 (3.42)	172.0 (6.77)	1.60 (3.5)
C	220.0 (8.66)	109.0 (4.29)	184.0 (7.24)	2.30 (5.1)
D	260.0 (10.23)	130.0 (5.11)	212.0 (8.34)	3.20 (7.1)
E	300.0 (11.81)	185.0 (7.28)	279.0 (10.98)	12.90 (28.4)



[§] With EMC filter.



Low-Peak™ LP-CC Class CC 600Vac/300Vdc, 1/2-30A time-delay fuses





Catalog symbol:

LP-CC-(amp)

Description:

Ultimate protection Class CC current-limiting, time-delay fuses. Time-delay – 12 seconds (minimum) at 200% of rated current.

Specifications:

Ratings

- · Volts
 - 600Vac,
 - 300Vdc (1/2-2-8/10A, 20-30A)
 - 150Vdc (3-15A)
- · Amps 1/2-30A
- · IR
 - 200kA Vac RMS Sym.
 - 20kA Vdc

Agency information

- UL® Listed Class CC, Std. 248-4, Guide JDDZ, File E4273
- CSA® Certified; Class 1422-02, File 53787
- · CE
- · RoHS compliant (20-30A)

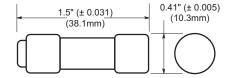


Catalog n	umbers (an	nps)		
LP-CC-1/2	LP-CC-1-1/2	LP-CC-3	LP-CC-6	LP-CC-12
LP-CC-6/10	LP-CC-1-6/10	LP-CC-3-2/10	LP-CC-6-1/4	LP-CC-15
LP-CC-8/10	LP-CC-1-8/10	LP-CC-3-1/2	LP-CC-7	LP-CC-20
LP-CC-1	LP-CC-2	LP-CC-4	LP-CC-7-1/2	LP-CC-25
LP-CC-1-1/8	LP-CC-2-1/4	LP-CC-4-1/2	LP-CC-8	LP-CC-30
LP-CC-1-1/4	LP-CC-2-1/2	LP-CC-5	LP-CC-9	
LP-CC-1-4/10	LP-CC-2-8/10	LP-CC-5-6/10	LP-CC-10	

Carton quantity:

Amp rating	Carton qty.
1/4-30	10

Dimensions - in (mm)



Features:

- 200kA interrupting rating complies with NEC® Section 110.9 for today's large capacity systems.
- Fast short-circuit protection and dual-element, time-delay performance provide ultimate protection.
- Reduces existing fuse inventory by up to 33% when upgrading to Low-Peak fuses.
- Consistent 2:1 ampacity ratios for all Low-Peak fuses make selective coordination easy.
- Time-delay characteristic avoids unwanted fuse openings from surge currents while fast response speed under short-circuit conditions provides a high degree of current limitation.
- Current-limitation protects downstream components against damaging thermal and magnetic effects of short-circuit currents.
- A superior, all-purpose, space-saving branch circuit fuse that meets most protection requirements up to 30A.
- Very compact, with a physical size only 13/32" x 1 1/2" (10.3 x 38.1mm) with rejction tip.
- Proper sizing can provide "no damage" Type 2 coordinated protection for NEMA and IEC motor controllers.
- Can be used where either a time-delay or a fast-acting fuse is needed, making selection easier and reducing spare fuse inventories for substantial cost reduction.
- Superior protection for small horsepower motor circuits.

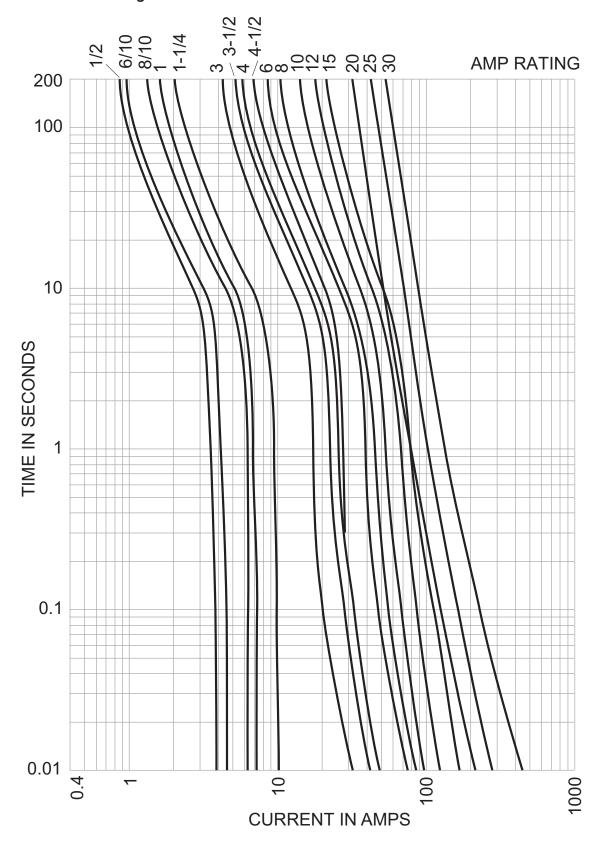
Recommended fuse blocks and holders:

Fuse amps	1-Pole	2-Pole	3-Pole
	Modular	open blocks	
0-30	BCM603-1_	BCM603-2_	BCM603-3_
	DIN-R	ail holders	
	CHCC1D_	CHCC2D_	CHCC3D_
0-30	_	_	OPM-NG
	_	_	OPM-1038_
	_	_	OPM-1038_SW
	Panel m	ount holders	
0-30	HPS	_	_
	HPF	_	_
	In-lin	e holders	
0-30	_	HEY	_
	HEZ	_	_

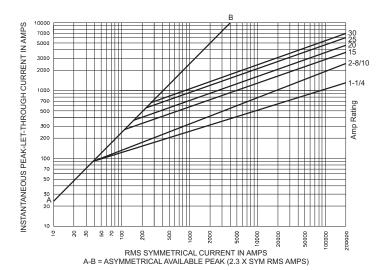
For additional information on Class CC fuse blocks and holders, see data sheets:

- · Modular open blocks # 10241 (BCM)
- DIN-Rail holders No. 3185 (CHCC), No. 1109 (OPM), No. 1102 (OPM-1038), No. 1103 (OPM-1038_SW)
- · Panel mount holders No. 2113 (HPS), No. 2114 (HPF)
- · In-line holders No. 2126 (HEY), No. 2130 (HEZ)

Time-current curves - average melt:



Current-limitation curves:



Current-limiting effects:

Prospective		ough curr ent RMS s		rical vs. f	use ratin	g)
S.C.C.	1 1/4A	2 8/10A	15A	20A	25A	30A
1000	100	135	240	305	380	435
3000	140	210	350	440	575	580
5000	165	255	420	570	690	710
10,000	210	340	540	700	870	1000
20,000	260	435	680	870	1090	1305
30,000	290	525	800	1030	1300	1520
40,000	315	610	870	1150	1390	1700
50,000	340	650	915	1215	1520	1820
60,000	350	735	1050	1300	1650	1980
80,000	390	785	1130	1500	1780	2180
100,000	420	830	1210	1600	2000	2400
200,000	525	1100	1600	2000	2520	3050

NOTE: To calculate I_p (I_{peak}) multiply I_{RMS} value by 2.3.

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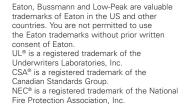
Eaton

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9.0 Field Component Cutsheets



SCREW PRESS FIELD COMPONENTS CUTSHEETS



EF8210G004 Pποι Operated

General Service Solenoid Valves

Brass or Stainless Steel Bodies 3/8" to 2 1/2" NPT

Features

- Wide range of pressure ratings, sizes, and resilient materials provide long service life and low internal leakage.
- High Flow Valves for liquid, corrosive, and air/inert gas service.
- Industrial applications include:
- Laundry equipment - Car wash - Air compressors - Industrial water control
- Pumps

Construction

Va	Valve Parts in Contact with Fluids											
Body	Brass	304 Stainless Steel										
Seals and Discs	NBR (or PTFE										
Disc-Holder	i	PA										
Core Tube	305 Stai	nless Steel										
Core and Plugnut	430F Sta	inless Steel										
Springs	302 Stai	nless Steel										
Shading Coil	Copper	Silver										

Electrical

			ating and consumption	on	Spare Coil Part Number						
Standard Coil and			AC		General	Purpose	Explosionproof				
Class of Insulation	DC Watts	Watts	VA Holding	VA Inrush	AC	DC	AC	DC			
F	-	6.1	16	40	238210	-	238214	-			
F	11.6	10.1	25	70	238610	238710	238614	238714			
F	16.8	16.1	35	180	272610	97617	272614	97617			
F	-	17.1	40	93	238610	-	238614	-			
F	-	20	43	240	99257	-	99257	-			
F	-	20.1	48	240	272610	-	272614	-			
Н	30.6	-	-	-	-	74073	-	74073			
F	40.6	-	-	-	-	238910		238914			

Standard Voltages: 24, 120, 240, 480 volts AC, 60 Hz (or 110, 220 volts AC, 50 Hz). 6, 12, 24, 120, 240 volts DC. Must be specified when ordering. Other voltages available when required.

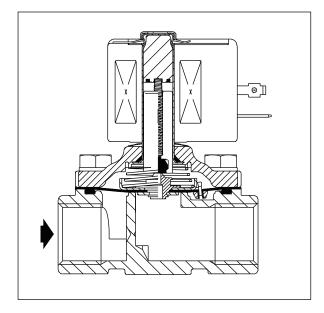
Solenoid Enclosures

Standard: Red-Hat II - Watertight, Types 1, 2, 3, 3S, 4, and 4X; Red-Hat - Type I.

Optional: Red-Hat II - Explosionproof and Watertight, Types 3, 3S, 4, 4X, 6, 6P, 7, and 9; Red-Hat - Explosionproof and Watertight, Types 3, 4, 4X, 7, and 9.

(To order, add prefix "EF" to catalog number, except Catalog Numbers 8210B57, 8210B58, and 8210B59. Valves not available with Explosionproof enclosures.)





Nominal Ambient Temperature Ranges:

Red-Hat II/

Red-Hat AC: 32°F to 125°F (0°C to 52°C) Red-Hat II DC: 32°F to 104°F (0°C to 40°C) Red-Hat DC: 32°F to 77°F (0°C to 25°C) (104°F/40°C occasionally)

Approvals:

CSA certified. Red-Hat II meets applicable CE directives.



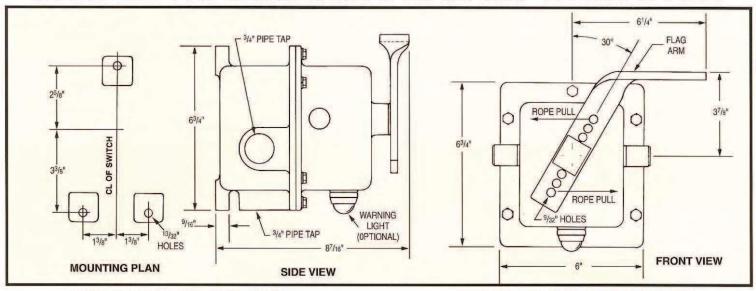
Specifications (English units)

				Ор		Pressure D	ifferer		•		. Fluid				_			Class	Rating/ of Coil
					Max.			Max.		Ten	ıp. °F	Brass	s Body		Stainles	s Steel E	Body	Insula	tion ⑦
Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Min.	Air- Inert Gas	Water	Light Oil @ 300 SSU	Air- Inert Gas	Water	Light Oil @ 300 SSU	AC	DC	Catalog Number	Constr. Ref. No. 4	UL ⑤ Listing	Catalog Number	Constr. Ref. No. 4	UL ⑤ Listing	AC	DC
NORMALL	Y CLOSE	D (Closed	when	de-en	ergized)	, NBR or P	TFE ②	Seatin	g				•						
3/8	3/8	1.5	1	150	125	-	40	40	-	180	150	8210G73 ③	1P	•	8210G36 ③	1P	•	6.1/F	11.6/F
3/8	5/8	3	0	150	150	-	40	40	-	180	150	8210G93	5D	0	-	-	-	10.1/F	11.6/
3/8	5/8	3	5	200	150	135	125	100	100	180	150	8210G1	6D	0	-	-	-	6.1/F	11.6/
3/8	5/8	3	5	300	300	300	-	-	-	175	-	8210G6	5D	0	-	-	-	17.1/F	-
1/2	7/16	2.2	1	150	125	-	40	40	-	180	150	8210G15 ③	2P	•	8210G37 ③	2P	•	6.1/F	11.6/
1/2	5/8	4	0	150	150	-	40	40	-	180	150	8210G94	5D	0	-	-	-	10.1/F	11.6/
1/2	5/8	4	0	150	150	125	40	40	-	175	150	-	-	-	8210G87	7D	•	17.1/F	11.6/
1/2	5/8	4	5	200	150	135	125	100	100	180	150	8210G2	6D	0	-	-	-	6.1/F	11.6/
1/2	5/8	4	5	300	300	300	-	-	-	175	-	8210G7	5D	0	_	-	_	17.1/F	
1/2	5/8	4	5	300	300	-	300	300	_	180	125	8210G227	5D	0	_	-	_	17.1/F	40.6/1
3/4	5/8	4.5	0	150	150	125	40	40		175	150	02100227	- 30	-	8210G88	7D	•	17.1/F	11.6/
															0210000				
3/4	3/4	5	5	125	125	125	100	90	75	180	150	8210G9	9D	0	-	-	-	6.1/F	11.6/
3/4	3/4	5	0	150	150	-	40	40	-	180	150	8210G95	8D	0	-	-	-	10.1/F	11.6/
3/4	3/4	6.5	5	250	150	100	125	125	125	180	150	8210G3	11D	0	-	-	-	6.1/F	11.6/
3/4	3/4	6	0	-	-	-	200	180	180	-	77	8210B26 ② ‡	10P	-	-	-	-	-	30.6/
3/4	3/4	6	0	350	300	200	-	-	-	200	-	8210G26 ② ‡	40P	•	-	-	-	16.1F	-
1	1	13	0	-	-	-	100	100	80	-	77	8210B54 ‡	31D	-	8210D89	15D	-	-	30.6/1
1	1	13	0	150	125	125	-	-	-	180	-	8210G54	41D	•	8210G89	45D	•	16.1/F	-
1	1	13	5	150	150	100	125	125	125	180	150	8210G4	12D	0	-	-	-	6.1/F	11.6/
1	1	13.5	0	300	225	115	-	-	-	200	-	8210G27 ‡	42P	•	-	-	-	20.1/F	-
1	1	13.5	10	300	300	300	-	-		175	-	8210G78	3P	-	-	-	-	17.1/F	-
1 1/4	1 1/8	15	0	-	-	-	100	100	80	-	77	8210B55 ‡	32D	-	-	-	-	-	30.6/1
1 1/4	1 1/8	15	0	150	125	125	-	-	-	180	-	8210G55	43D	•	-	-	-	16.1/F	-
1 1/4	1 1/8	15	5	150	150	100	125	125	125	180	150	8210G8	16D	0	-	-	-	6.1/F	11.6/
1 1/2	1 1/4	22.5	0	-	-	-	100	100	80	-	77	8210B56 ‡	33D	-	_	-	-	-	30.6/1
1 1/2	1 1/4	22.5	0	150	125	125	-			180	-	8210G56 ‡	44D	•	_	-	-	16.1/F	-
1 1/2	1 1/4	22.5	5	150	150	100	125	125	125	180	150	8210G22	18D	•	-	-	-	6.1/F	11.6/
2	1 3/4	43	5	150	125	90	50	50	50	180	150	8210G100	20P	•	_	_	_	6.1/F	11.6/
2 1/2	1 3/4	45	5	150	125	90	50	50	50	180	150	8210G101	21P	•	-	_	-	6.1/F	11.6/
												02100101	217		-	_	_	0.1/F	11.0/
	- `	·				R Seating	`				<u> </u>	0040000	000					10.4/5	44.07
3/8	5/8	3	0	150	150	125	125	125	80	180	150	8210G33	23D	•	-	-	-	10.1/F	11.6/
3/8	5/8	3	5	250	200	200	250	200	200	180	180	8210G11 ® ⑨	39D	•	-	-	-	10.1/F	11.6/
1/2	5/8	4	0	150	150	125	125	125	80	180	150	8210G34	23D	•	-	-	-	10.1/F	11.6/
1/2	5/8	3	0	150	150	100	125	125	80	180	150	-	-	-	8210G30	37D	•	10.1/F	11.6/
1/2	5/8	4	5	250	200	200	250	200	200	180	180	8210G12 ® ⑨	39D	•	-	-	-	10.1/F	11.6/
3/4	3/4	5.5	0	150	150	125	125	125	80	180	150	8210G35	25D	•	-	-	-	10.1/F	
3/4	5/8	3	0	150	150	100	125	125	80	180	150	-		-	8210G38	38D	•	10.1/F	11.6/
3/4	3/4	6.5	5	-	-	-	250	200	200	-	180	8210C13	24D	•	-	-	-	-	16.8/
3/4	3/4	6.5	5	250	200	200	-	-	-	180	-	8210G13	46D	•	-	-	-	16.1/F	-
1	1	13	0	125	125	125	-	-	-	180	-	8210B57 @ ®	34D	•	-	-	-	20/F	-
1	1	13	5	-	-	-	125	125	125	-	180	8210D14	26D	•	-	-	-	-	16.8/
1	1	13	5	150	150	125	-	-	-	180	-	8210G14	47D	•	-	-	-	16.1/F	-
1 1/4	1 1/8	15	0	125	125	125	-	-	-	180	-	8210B58 6 10	35D	•	-	-	-	20/F	-
1 1/4	1 1/8	15	5	-	-	-	125	125	125	-	180	8210D18	28D	•	-	-	-	-	16.8/
1 1/4	1 1/8	15	5	150	150	125	-	-	-	180	-	8210G18	48D	•	_	-	-	16.1/F	
1 1/2	1 1/4	22.5	0	125	125	125		-	-	180	-	8210B59 © ®	36D	•	-		-	20/F	-
1 1/2		22.5	5	123	123	120				-		8210D32	29D	•			-	-	
	1 1/4						125	125	125		180			_	-				16.8/
1 1/2	1 1/4	22.5	5	150	150	125	- 405	-	-	180	-	8210G32	49D	•	-	-	-	16.1/F	-
2	1 3/4	43	5	-	-	-	125	125	125	-	150	8210103	30P	•	-	-	-	-	16.8/
2	1 3/4	43	5	125	125	125	-	-	-	180	-	8210G103	50P	•	-	-	-	16.1/F	-
2 1/2	1 3/4	45	5	-	-	-	125	125	125	-	150	8210104	27P	•	-	-	-	-	16.8/
2 1/2	1 3/4	45	5	125	125	125	-	-	-	180	-	8210G104	51P	•	-			16.1/F	-

- Notes: ① 5 psi on Air; 1 psi on Water.
 ② Valve provided with PTFE main disc.
 ③ Valve includes Ultem (G.E. trademark) piston.
 ④ Letter "D" denotes diaphragm construction; "P" denotes piston construction.
 ⑤ Safety Shutoff Valve; General Purpose Valve.
 Refer to Engineering Section (Approvals) for details.
- Valves not available with Explosionproof enclosures.
 On 50 hertz service, the watt rating for the 6.1/F solenoid is 8.1 watts.
 AC construction also has PA seating.
 No disc-holder.
 Stainless Steel disc-holder.
 Must have solenoid mounted vertical and upright.

RS-26

MODEL RS DIMENSIONAL INFORMATION



TECHNICAL INFORMATION

MODEL	DESCRIPTION
RS-1	One SP/DT micro switch
RS-2	Two SP/DT micro switches ULISTED
RS-2L	Two SP/DT micro switches with external signal light includes 110V lamp
RS-1X	Explosion proof with one SP/DT micro switch for NEMA 7 and 9
RS-2X	Explosion proof with two SP/DT micro switches for NEMA 7 and 9
RSB-1 RSB-2	One SP/DT switch w/cable break detection Wuster Two SP/DT switches w/cable break detection
RSB-1X RSB-2X	Explosion proof, 1 SP/DT & cable break detection Explosion proof, 2 SP/DT & cable break detection

Standard Construction – rubber gaskets seal unit for outside applications listed by Underwriter Laboratories for for NEMA 4 dust-tight and raintight construction. Applies to units RS-1, RS-2, and RS-2L.

Housing – aluminum or cast iron. Epoxy coating available. **Conduit Opening** – 3/4" NPT standard. 1" NPT optional. Standard units have three conduit openings, explosion proof have one at the bottom.

Actuating Arm – Red epoxy coated steel handle with stainless steel shaft.

Internal Cam and Wear Plate - hardened steel.

External Hardware - stainless steel

Switches – SP/DT micro switches. Rated 20 amp at 125, 250 or 480V AC. Switches may be wired for single throw operation, either normally open or normally closed as required. DP/DT micro switches also available.

INSTALLATION INSTRUCTIONS

- The controls should be mounted on a flat surface using the three mounting holes on the bottom half of the housing. The holes are designed for 3/8" bolts.
- Each switch can cover a maximum of 200' of conveyor 100' in each direction. Safety considerations dictate that not more than 100' of cable be attached on each side. More cable might result in too much slack, delaying actuation.
- The eyebolts supporting the cable should be placed at intervals from 8-10'. Care must be taken that the cable does not become too slack. However, if the cable is too tight, false actuation of the switch might occur.
- 4. The Model RS control is designed for pilot duty. The control circuit should be wired through the motor starter circuit of the conveyor or other equipment to be controlled. Do not wire the unit directly into a heavy duty motor circuit.
- 5. The unit should be tested after installation by actuation of the cable. The protected equipment should stop and alarms should sound as required with a minimum of effort on the cable. Cable tension can be adjusted if necessary by changing the location of the cable on the handle.



OPTIONAL CABLE AND FITTINGS







SAFETY CABLE

3/s2"x7x7 preformed, galvanized aircraft cable. Protective coating in either orange coated vinyl or nylon. 3/16" O.D.



		· ·	nstrument Data Sheet
	1	Product	Safety Stop Switch / Pull Cord Switch
Camanal	2	Model Number	RS-5
General	3	Manufacturer	Conveyor Components Company
	4		, ,
	_	Certified Ambient	
	5	Temperature Rating	40 °C [104 °F]
	_	Functional Ambient	-50 to 40 °C [-58 to 104 °F] (increased actuation force may be
	6	Temperature	required below -30 °C [-22 °F])
	7	Enclosure Material	319 cast aluminum
Environment	8	Enclosure Rating (UL)	NEMA Type 1, 3, 3R, 4, 4X
	9	Enclosure Rating (CSA)	NEMA Type 3, 4, 4X
			3 holes at Ø ¹³ / ₃₂ " [10 mm] (Vertical surface mounting standard,
	10	Mounting	bracket available for horizontal surfaces)
	11		,
	12	Switch Type	DPDT x 2
	13	Contact Type	Dry contact
	14	Contact Rating	15A @ 125V or 250V AC; ¾ hp @ 125V AC; 1 ½ hp @ 250V AC
	15	Electrical Action	Latching (via actuator)
Switch	16	Electrical Connection	¾" NPT x 3
	17	Indicating Lamp	None
	18	, , , , , , , , , , , , , , , , , , ,	
	19		
	20	Туре	Pull cord switch
			Maximum 100' [30.5 m] on each side of the unit (maximum 200'
	21	Cable Length	[61 m] total)
			Ø ³ / ₃₂ " [2 mm] 7x7 galvanized aircraft cable: orange vinyl or nylon
	22	Cable Material	coated to Ø ³ / ₁₆ " [5 mm] OD
	23	Mechanism	Lever with rotating cam
Actuator	24	Non-activated Position	Rotated fully clockwise
	25	Activated Position	Rotated fully counter-clockwise
	26	Range of Travel	60° counter-clockwise from non-activated position
	27	Action	Latching (To reset, push lever inward and rotate clockwise)
	28	Actuation Force	Field adjustable
	29		
Options	30	Finish	Uncoated (standard) or epoxy coating (option E)
	31	Safety Cable	Orange vinyl (RS-25) or nylon (RS-26) coated cable available
		•	RS-27: 1" eye X 6" [150 mm] long, two nuts and lockwasher
	32	Cable Support Eye Bolt	included
Accessories	33	Cable End Fitting	RS-28
	34	Conduit Plug	RS 29: ¾" metal conduit plug; square head
	35	Mounting Bracket	RS-30 available for horizontal surface mount
	36		
	37	UL Certification File	NMFT.E83971
Certifications	38	CSA Certification File	71174
	39	231.22.2	
			Conveyor Components Company
			Division of Material Control, Inc.
		/(;/	130 Seltzer Road, PO Box 167
Manufacturer	40		Croswell, MI 48422 USA
			(810) 679-4211
			info@conveyorcomponents.com
			www.conveyorcomponents.com
			1

Notes: 1. Cable must be supported with eyebolts. Maximum spacing: 10' [3 m].

2. Maximum of 100' [30.5 m] of cable may be attached to each side of the unit; 200' [61 m] total.

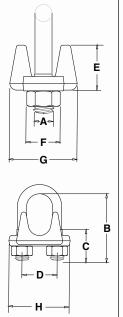


G-450
Red-U-Bolt®, Clip
Crosby Clips, all sizes 1/4" and larger,
meet the performance requirements of
Federal Specification FF-C-450 TYPE
1 CLASS 1, except for those provisions
required of the contractor. For
additional information, see page 452.

- Each base has a Product Identification Code (PIC) for material traceability, the name CROSBY or CG, and a size
 forged into it.
- Based on the catalog breaking strength of wire rope, Crosby wire rope clips have an efficiency rating of 80% for 1/8" 7/8" sizes, and 90% for sizes 1" through 3-1/2".
- Entire Clip is Galvanized to resist corrosive and rusting action.
- Sizes 1/8" through 2-1/2" and 3" have forged bases.
- All Clips are individually bagged or tagged with proper application instructions and warning information.
- Clip sizes up through 1-1/2" have rolled threads.
- Meets or exceeds all requirements of ASME B30.26 including identification, ductility, design factor, proof load
 and temperature requirements. Importantly, these wire rope clips meet other critical performance requirements
 including fatigue life, impact properties and material traceability, not addressed by ASME B30.26.
- Look for the Red-U-Bolt®, your assurance of Genuine Crosby Clips.







G-430	CIUSI	by Clips										
	0.		Std.	Weight				Dimen				
Rope		G-450	Package	Per 100				(in				
(in.)	(mm)	Stock No.	Qty.	(lbs.)	Α	В	С	D	E	F	G	Н
1/8	3-4*	1010015	100	6	.22	.72	.44	.47	.37	.38	.81	.99
3/16*	5*	1010033	100	10	.25	.97	.56	.59	.50	.44	.94	1.18
1/4	6-7	1010051	100	19	.31	1.03	.50	.75	.66	.56	1.19	1.43
5/16	8	1010079	100	28	.38	1.38	.75	.88	.73	.69	1.31	1.66
3/8	9-10	1010097	100	48	.44	1.50	.75	1.00	.91	.75	1.63	1.94
7/16	11	1010113	50	78	.50	1.88	1.00	1.19	1.13	.88	1.91	2.28
1/2	12-13	1010131	50	80	.50	1.88	1.00	1.19	1.13	.88	1.91	2.28
9/16	14-15	1010159	50	109	.56	2.25	1.25	1.31	1.34	.94	2.06	2.50
5/8	16	1010177	50	110	.56	2.25	1.25	1.31	1.34	.94	2.06	2.50
3/4	18-20	1010195	25	142	.62	2.75	1.44	1.50	1.39	1.06	2.25	2.84
7/8	22	1010211	25	212	.75	3.12	1.62	1.75	1.58	1.25	2.44	3.16
1	24-26	1010239	10	252	.75	3.50	1.81	1.88	1.77	1.25	2.63	3.47
1-1/8	28-30	1010257	10	283	.75	3.88	2.00	2.00	1.91	1.25	2.81	3.59
1-1/4	32-34	1010275	10	438	.88	4.44	2.22	2.34	2.17	1.44	3.13	4.13
1-3/8	36	1010293	10	442	.88	4.44	2.22	2.34	2.31	1.44	3.13	4.19
1-1/2	38	1010319	10	544	.88	4.94	2.38	2.59	2.44	1.44	3.41	4.44
1-5/8	41-42	1010337	Bulk	704	1.00	5.31	2.62	2.75	2.66	1.63	3.63	4.75
1-3/4	44-46	1010355	Bulk	934	1.13	5.75	2.75	3.06	2.92	1.81	3.81	5.24
2	48-52	1010373	Bulk	1300	1.25	6.44	3.00	3.38	3.03	2.00	4.44	5.88
2-1/4	56-58	1010391	Bulk	1600	1.25	7.13	3.19	3.88	3.19	2.00	4.56	6.38
2-1/2	62-65	1010417	Bulk	1900	1.25	7.69	3.44	4.13	3.69	2.00	4.69	6.63
** 2-3/4	** 68-72	1010435	Bulk	2300	1.25	8.31	3.56	4.38	4.88	2.00	5.00	6.88
3	75-78	1010453	Bulk	3100	1.50	9.19	3.88	4.75	4.44	2.38	5.31	7.61
** 3-1/2	** 85-90	1010426	Bulk	4000	1.50	10.75	4.50	5.50	6.00	2.38	6.19	8.38
+ = 1		and Niuta ** 0.0	/4" 10.4/0			_						

^{*} Electro-plated U-Bolt and Nuts. ** 2-3/4" and 3-1/2" base is made of cast steel.



SS-450 Stainless Steel Wire Rope Clips

- Each base has a Product Identification Code (PIC) for material traceability, the name CROSBY or "CG", and a size forged
 into it
- Entire clip is made from 316 Stainless Steel to resist corrosive and rusting action.
- · All components are Electro-Polished.
- All Clips are individually bagged or tagged with proper application instructions and warning information.

SS-450 Stainless Steel Wire Rope Clips

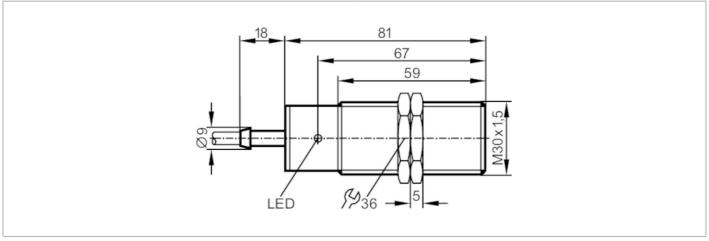
Rope	Size	SS-450	Std. Package	Weight Per 100	Dimensions (in.)							
(in.)	(mm)	Stock No.	Qty.	(lbs.)	Α	В	С	D	E	F	G	Н
1/8	3-4	1011250	Bulk	6	.22	.72	.44	.47	.41	.38	.81	.94
3/16	5	1011261	Bulk	10	.25	.97	.56	.59	.50	.44	.94	1.16
1/4	6-7	1011272	Bulk	20	.31	1.03	.50	.75	.66	.56	1.19	1.44
3/8	9-10	1011283	Bulk	47	.44	1.50	.75	1.00	.91	.75	1.63	1.94
1/2	12-13	1011305	Bulk	77	.50	1.88	1.00	1.19	1.13	.88	1.91	2.28
5/8	16	1011327	Bulk	106	.56	2.38	1.25	1.31	1.34	.94	2.06	2.50

115687

Inductive sensor

IIA2010-FRKG/10M/PH







Product characteristics			
Electrical design		PNP/NPN	
Output function		normally open / normally closed; (selectable)	
Sensing range	[mm]	10	
Housing		threaded type	
Dimensions	[mm]	M30 x 1.5 / L = 81	
Electrical data			
Operating voltage	[V]	1055 DC	
Protection class		II	
Reverse polarity protection		yes	
Outputs			
Electrical design		PNP/NPN	
Output function		normally open / normally closed; (selectable)	
Max. voltage drop switching output DC	[V]	4.6	
Minimum load current	[mA]	4	
Max. leakage current	[mA]	0.5	
Permanent current rating of switching output DC	[mA]	400	
Switching frequency DC	[Hz]	450	
Short-circuit protection		yes	
Type of short-circuit protection		pulsed	
Overload protection		yes	
Detection zone			
Sensing range	[mm]	10	
Real sensing range Sr	[mm]	10 ± 10 %	
Operating distance	[mm]	08.1	

115687

Inductive sensor





Accuracy / deviations				
Correction factor		steel: 1 / stainless steel: 0.7 / brass: 0.4 / aluminium: 0.3 / copper: 0.2		
Hysteresis	[% of Sr]	115		
Switch point drift	[% of Sr]	-10	10	
Operating conditions				
Ambient temperature	[°C]	-25	80	
Protection		IP	67	
Tests / approvals				
EMC		EN 60947-5-2		
		EN 55011	class B	
MTTF	[years]	16	599	
Mechanical data				
Weight	[g]	50	01.3	
Housing		thread	ed type	
Mounting			ountable	
Dimensions	[mm]	M30 x 1.	5 / L = 81	
Thread designation			x 1.5	
Materials		brass nickel-plated	l; sensing face: PBT	
Displays / operating el	ements			
Display		switching status 1 x LED, yellow		
Accessories				
Accessories (supplied)		lock nuts: 2		
Remarks				
Pack quantity		1 pcs.		

115687

Inductive sensor

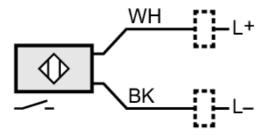
IIA2010-FRKG/10M/PH

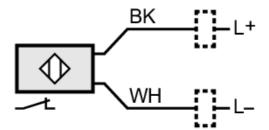


Electrical connection

Cable: 10 m, PUR / PVC; 2 x 0.5 mm²

Connection





Core colours:

BK = black WH = white

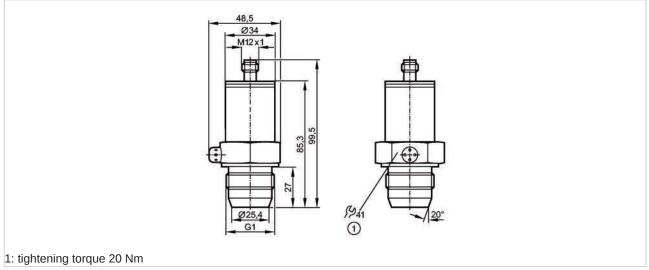


PL2657

PL-001BREA01-E-ZVG/US/ /P



Pressure sensors









LUSTED EC 1935/2004 EHEDG Certified



Product characteristics
lectronic pressure sensor
uick disconnect
o dead space
ero and span adjustable
rogrammable via EPS interface
ealing cone G 1 male
rocess connection: Sealing cone G 1 male
nalog output
leasuring range: -501000 mbar / -0.714.5 psi / -5.0100 kPa

Measuring range: -501000 mbar / -0.714.5 psi / -5.0100 kPa				
Application				
Application	Type of pressure: relative pressure Hygienic systems, viscous media and liquids with suspended particles Liquids and gases			
Pressure rating	10000 mbar	145 psi	1000 kPa	
Bursting pressure min.	30000 mbar	30000 mbar 450 psi 3000 kPa		
Medium temperature [°C		-2580		
Electrical data				
Electrical design		3-wire DC; 2-wire DC		
Operating voltage [V		1430 DC		
Insulation resistance [MΩ		> 100 (500 V DC)		
Protection class	III			
Reverse polarity protection		yes		
Outputs				
Output		Analog output		
Output function		420 mA analog		
Overload protection	yes			
Analog output	420 mA			
Max. load [Ω	max. (Ub - 13 V) / 20 mA; 550 at Ub = 24 V			
Measuring / setting range				
Measuring range	-501000 mbar -0.714.5 psi -5.0100 kPa			

efectorsoo

PL2657

PL-001BREA01-E-ZVG/US/ /P



Pressure sensors

ς	ρ	tt	in	n	ra	n	a	Δ
J	C	ιι	ш	ıy	ıα		ч	C

Analog start point, ASP	-50749 mbar	-0.710.9 psi	-5.074.9 kPa
Analog end point, AEP	200999 mbar	2.914.5 psi	2099.9 kPa
in steps of	1 mbar	0.1 psi	0.1 kPa
Factory setting	ASP = 0 mbar; AEP = 999 mbar		

Accuracy I	deviations

Accuracy / deviations

(in % of the span) Turn down 1:1

Characteristics deviation *)	< ± 0.6
Linearity	< ± 0.5
Hysteresis	< ± 0.1
Repeatability **)	< ± 0.1
Long-term stability ***)	< ± 0.1

Temperature coefficients (TEMPCO) in the temperature range 0...80° C (in % of the span per 10 K)

Greatest TEMPCO of the zero point	< ± 0.1
Greatest TEMPCO of the span	< ± 0.2

Dage	tion	11100	AG
Reac	шоп	41111	100

Response time analog output [ms]

Environment		
Ambient temperature	[°C]	-2580
Storage temperature	[°C]	-40100
Protection		IP 67

Tests / approvals			
EMC		EN 61000-4-2 ESD: EN 61000-4-3 HF radiated: EN 61000-4-4 Burst: EN 61000-4-6 HF conducted:	4 kV CD / 8 kV AD 10 V/m 2 kV 10 V
Shock resistance		DIN IEC 68-2-27:	50 g (11 ms)
Vibration resistance		DIN IEC 68-2-6:	20 g (102000 Hz)
MTTF	[Years]		248

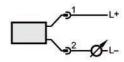
Mechanical data			
Process connection Sealing cone G		Sealing cone G 1 male	
Materials (wetted parts)		ceramics (99.9 % Al2 O3); PTFE; stainless steel 316L / 1.4435; surface characteristics: Ra $<$ 0.4 / Rz 4	
Housing materials		stainless steel 316L / 1.4404; PEI; FPM (Viton)	
Min. pressure cycles		100 million	
Weight	[kg]	0.386	

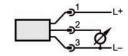
FIGCT	TC 2 I	CONF	nection
LICCU	IUal	CUIII	ICCHOIL

Connection M12 connector; gold-plated contacts











PL2657

PL-001BREA01-E-ZVG/US/ /P



Pressure sensors

Remarks		
Remarks		*) linearity, incl. hysteresis and repeatability; (limit value setting to DIN 16086) **) with temperature fluctuations < 10 K ***) in % of the span per year The 3-A qualification is only valid if adapters with 3-A qualification are used for installation.
Pack quantity	[piece]	1

ifm efector, inc. • 1100 Atwater Drive • Malvern • PA 19355 — We reserve the right to make technical alterations without prior notice. — US — PL2657 — 26.03.2009



SCREW PRESS JUNCTION BOX 1 CUTSHEETS



End clamp - E/NS 35 N - 0800886

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End clamp, width: 9.5 mm, color: gray

Product Features

✓ Large-surface labeling

Key Commercial Data

Packing unit	1 pc
Minimum order quantity	50 pc
GTIN	4 017918 129309
Weight per Piece (excluding packing)	14.8 g
Custom tariff number	39269097
Country of origin	Germany

Technical data

Dimensions

Height	32.8 mm
Length	48.6 mm
Width	9.5 mm

General

Material	PA
Color	gray
Tightening torque, min	0.4 Nm
Tightening torque max	0.5 Nm

Standards and Regulations

Flammability rating according to UL 94	V2



Feed-through terminal block - UT 2,5 - 3044076

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Feed-through terminal block, nom. voltage: 1000 V, nominal current: 24 A, connection method: Screw connection, number of connections: 2, cross section:0.14 mm² - 4 mm², AWG: 26 - 12, width: 5.2 mm, height: 46.9 mm, color: gray, mounting type: NS 35/7,5, NS 35/15

Why buy this product

- The large wiring space enables the connection of solid and stranded conductors without ferrules, even above the nominal cross section
- Mas well as saving space, the compact design enables user-friendly wiring in a small amount of space
- Optimum screwdriver guidance through closed screw shafts
- Tested for railway applications
- The cable entry funnel enables the use of conductors with ferrules and plastic collars within the nominal cross section



Key Commercial Data

Packing unit	1 STK
Minimum order quantity	50 STK
GTIN	4 017918 960377
GTIN	4017918960377
Weight per Piece (excluding packing)	8.000 g
Custom tariff number	85369010
Country of origin	Germany

Technical data

General

Number of levels	1
Number of connections	2
Potentials	1



Technical data

General

Nominal cross section	2.5 mm²	
Color	gray	
Insulating material	PA	
Flammability rating according to UL 94	V0	
Area of application	Railway industry	
	Machine building	
	Plant engineering	
	Process industry	
Rated surge voltage	8 kV	
Degree of pollution	3	
Overvoltage category	III	
Insulating material group	I	
Maximum power dissipation for nominal condition	0.77 W	
Maximum load current	32 A (with 4 mm² conductor cross section)	
Nominal current I _N	24 A	
Nominal voltage U _N	1000 V	
Open side panel	Yes	
Shock protection test specification	DIN EN 50274 (VDE 0660-514):2002-11	
Back of the hand protection	guaranteed	
Finger protection	guaranteed	
Result of surge voltage test	Test passed	
Surge voltage test setpoint	9.8 kV	
Result of power-frequency withstand voltage test	Test passed	
Power frequency withstand voltage setpoint	2.2 kV	
Result of the test for mechanical stability of terminal points (5 x conductor connection)	Test passed	
Result of bending test	Test passed	
Bending test rotation speed	10 rpm	
Bending test turns	135	
Bending test conductor cross section/weight	0.14 mm² / 0.2 kg	
	2.5 mm² / 0.7 kg	
	4 mm² / 0.9 kg	
Tensile test result	Test passed	
Conductor cross section tensile test	0.14 mm ²	
Tractive force setpoint	10 N	
Conductor cross section tensile test	2.5 mm²	
Tractive force setpoint	50 N	



Technical data

General

Conductor cross section tensile test	4 mm²	
Tractive force setpoint	60 N	
Result of tight fit on support	Test passed	
Tight fit on carrier	NS 35	
Setpoint	1 N	
Result of voltage-drop test	Test passed	
Requirements, voltage drop	≤ 3.2 mV	
Result of temperature-rise test	Test passed	
Short circuit stability result	Test passed	
Conductor cross section short circuit testing	2.5 mm²	
Short-time current	0.3 kA	
Conductor cross section short circuit testing	4 mm²	
Short-time current	0.48 kA	
Result of thermal test	Test passed	
Proof of thermal characteristics (needle flame) effective duration	30 s	
Oscillation, broadband noise test result	Test passed	
Test specification, oscillation, broadband noise	DIN EN 50155 (VDE 0115-200):2008-03	
Test spectrum	Service life test category 1, class B, body mounted	
Test frequency	$f_1 = 5 \text{ Hz to } f_2 = 150 \text{ Hz}$	
ASD level	1.857 (m/s²)²/Hz	
Acceleration	0,8 g	
Test duration per axis	5 h	
Test directions	X-, Y- and Z-axis	
Shock test result	Test passed	
Test specification, shock test	DIN EN 50155 (VDE 0115-200):2008-03	
Shock form	Half-sine	
Acceleration	5 g	
Shock duration	30 ms	
Number of shocks per direction	3	
Test directions	X-, Y- and Z-axis (pos. and neg.)	
Relative insulation material temperature index (Elec., UL 746 B)	130 °C	
Temperature index of insulation material (DIN EN 60216-1 (VDE 0304-21))	125 °C	
Static insulating material application in cold	-60 °C	
Behavior in fire for rail vehicles (DIN 5510-2)	Test passed	
Flame test method (DIN EN 60695-11-10)	V0	
Oxygen index (DIN EN ISO 4589-2)	>32 %	
NF F16-101, NF F10-102 Class I	2	



Technical data

General

NF F16-101, NF F10-102 Class F	2
Surface flammability NFPA 130 (ASTM E 162)	passed
Specific optical density of smoke NFPA 130 (ASTM E 662)	passed
Smoke gas toxicity NFPA 130 (SMP 800C)	passed
Calorimetric heat release NFPA 130 (ASTM E 1354)	27,5 MJ/kg
Fire protection for rail vehicles (DIN EN 45545-2) R22	HL 1 - HL 3
Fire protection for rail vehicles (DIN EN 45545-2) R23	HL 1 - HL 3
Fire protection for rail vehicles (DIN EN 45545-2) R24	HL 1 - HL 3
Fire protection for rail vehicles (DIN EN 45545-2) R26	HL 1 - HL 3

Dimensions

Width	5.2 mm
End cover width	2.2 mm
Length	47.7 mm
Height	46.9 mm
Height NS 35/7,5	47.5 mm
Height NS 35/15	55 mm

Connection data

Connection method	Screw connection	
Connection in acc. with standard	IEC 60947-7-1	
Note	Note: Product releases, connection cross sections and notes on connecting aluminum cables can be found in the download area.	
Conductor cross section solid min.	0.14 mm²	
Conductor cross section solid max.	4 mm²	
Conductor cross section AWG min.	26	
Conductor cross section AWG max.	12	
Conductor cross section flexible min.	0.14 mm²	
Conductor cross section flexible max.	4 mm²	
Min. AWG conductor cross section, flexible	26	
Max. AWG conductor cross section, flexible	12	
Conductor cross section flexible, with ferrule without plastic sleeve min.	0.14 mm²	
Conductor cross section flexible, with ferrule without plastic sleeve max.	2.5 mm²	
Conductor cross section flexible, with ferrule with plastic sleeve min.	0.14 mm²	
Conductor cross section flexible, with ferrule with plastic sleeve max.	2.5 mm²	
2 conductors with same cross section, solid min.	0.14 mm²	
2 conductors with same cross section, solid max.	1.5 mm ²	
2 conductors with same cross section, stranded min.	0.14 mm²	
2 conductors with same cross section, stranded max.	1.5 mm ²	

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Technical data

Connection data

2 conductors with same cross section, stranded, TWIN ferrules with plastic sleeve, min.	0.5 mm²
2 conductors with same cross section, stranded, TWIN ferrules with plastic sleeve, max.	1.5 mm²
2 conductors with same cross section, stranded, ferrules without plastic sleeve, min.	0.14 mm²
2 conductors with same cross section, stranded, ferrules without plastic sleeve, max.	1.5 mm ²
Connection in acc. with standard	IEC/EN 60079-7
Conductor cross section solid min.	0.14 mm²
Conductor cross section solid max.	4 mm²
Conductor cross section AWG min.	26
Conductor cross section AWG max.	12
Conductor cross section flexible min.	0.14 mm²
Conductor cross section flexible max.	2.5 mm²
Stripping length	9 mm
Internal cylindrical gage	A3
Screw thread	M3
Tightening torque, min	0.5 Nm
Tightening torque max	0.6 Nm

Standards and Regulations

Connection in acc. with standard	CSA	
	IEC 60947-7-1	
Flammability rating according to UL 94	V0	
Fire protection for rail vehicles (DIN EN 45545-2) R22	HL 1 - HL 3 HL 1 - HL 3 HL 1 - HL 3 HL 1 - HL 3	
Fire protection for rail vehicles (DIN EN 45545-2) R23	HL 1 - HL 3 HL 1 - HL 3 HL 1 - HL 3 HL 1 - HL 3	
Fire protection for rail vehicles (DIN EN 45545-2) R24	HL 1 - HL 3 HL 1 - HL 3 HL 1 - HL 3 HL 1 - HL 3	
Fire protection for rail vehicles (DIN EN 45545-2) R26	HL 1 - HL 3 HL 1 - HL 3 HL 1 - HL 3 HL 1 - HL 3	

Environmental Product Compliance

China RoHS	Environmentally Friendly Use Period = 50	
	For details about hazardous substances go to tab "Downloads", Category "Manufacturer's declaration"	

Drawings

Circuit diagram





Classifications

eCl@ss

eCl@ss 4.0	27141120
eCl@ss 4.1	27141120
eCl@ss 5.0	27141120
eCl@ss 5.1	27141120
eCl@ss 6.0	27141120
eCl@ss 7.0	27141120
eCl@ss 8.0	27141120
eCl@ss 9.0	27141120

ETIM

ETIM 2.0	EC000897
ETIM 3.0	EC000897
ETIM 4.0	EC000897
ETIM 5.0	EC000897
ETIM 6.0	EC000897

UNSPSC

UNSPSC 6.01	30211811
UNSPSC 7.0901	39121410
UNSPSC 11	39121410
UNSPSC 12.01	39121410
UNSPSC 13.2	39121410

Approvals

Approvals

Approvals

CSA / UL Recognized / VDE Gutachten mit Fertigungsüberwachung / cUL Recognized / LR / IECEE CB Scheme / EAC / DNV GL / PRS / cULus Recognized

Ex Approvals

IECEx / ATEX / UL Recognized / cUL Recognized / EAC Ex

Approval details



Approvals

CSA (P)	http://www.csagroup.org/services-industries/product-listing/ 13631	
	В	С
mm²/AWG/kcmil	26-12	26-12
Nominal current IN	20 A	20 A
Nominal voltage UN	600 V	600 V

UL Recognized	http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/index.htm FILE E 60425					
	В	С				
mm²/AWG/kcmil	26-12	26-12				
Nominal current IN	20 A	20 A				
Nominal voltage UN	600 V	600 V				

VDE Gutachten mit Fertigungsüberwachung	VDE	rw2.vde.com/de/Institut/Online-Service/ uefteProdukte/Seiten/Online-Suche.aspx	40013658
mm²/AWG/kcmil		0.2-2.5	
Nominal current IN		24 A	
Nominal voltage UN		800 V	

cUL Recognized	http://database.ul.com/cgi-bin/XYV/template/L	.ISEXT/1FRAME/index.htm FILE E 60425
	В	С
mm²/AWG/kcmil	26-12	26-12
Nominal current IN	20 A	20 A
Nominal voltage UN	600 V	600 V

LR	L loyds Register	http://www.lr.org/en	05/20042
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Approvals

IECEE CB Scheme	CB scheme	http://www.iecee.org/	DE1-60117
mm²/AWG/kcmil		0.2-2.5	
Nominal voltage UN		800 V	

	EAC	ERC	EAC-Zulassung
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DNV GL	http://exchange.dnv.com/tari/	TAE00001S9



cULus Recognized

http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/index.htm

Accessories

Accessories

Component plug terminal block

Component connector - P-CO 2-5 R47K - 3032447



Component connector, with 47 kOhm resistor for open circuit monitoring, pitch: 5.2 mm, length: 8.9 mm, width: 4.1 mm, height: 34.8 mm, number of positions: 2, color: black

DIN rail



Accessories

DIN rail perforated - NS 35/7,5 PERF 2000MM - 0801733



DIN rail perforated, Standard profile, width: 35 mm, height: 7.5 mm, acc. to EN 60715, material: Steel, galvanized, passivated with a thick layer, length: 2000 mm, color: silver

DIN rail, unperforated - NS 35/7,5 UNPERF 2000MM - 0801681



DIN rail, unperforated, Standard profile, width: 35 mm, height: 7.5 mm, acc. to EN 60715, material: Steel, galvanized, passivated with a thick layer, length: 2000 mm, color: silver

DIN rail perforated - NS 35/7,5 WH PERF 2000MM - 1204119



DIN rail perforated, Standard profile, width: 35 mm, height: 7.5 mm, acc. to EN 60715, material: Steel, Galvanized, white passivated, length: 2000 mm, color: white

DIN rail, unperforated - NS 35/7,5 WH UNPERF 2000MM - 1204122



DIN rail, unperforated, Standard profile, width: 35 mm, height: 7.5 mm, acc. to EN 60715, material: Steel, Galvanized, white passivated, length: 2000 mm, color: white

DIN rail, unperforated - NS 35/7,5 AL UNPERF 2000MM - 0801704

DIN rail, unperforated, Standard profile, width: 35 mm, height: 7.5 mm, acc. to EN 60715, material: Aluminum, uncoated, length: 2000 mm, color: silver



Accessories

DIN rail perforated - NS 35/7,5 ZN PERF 2000MM - 1206421



DIN rail perforated, Standard profile, width: 35 mm, height: 7.5 mm, acc. to EN 60715, material: Steel, galvanized, length: 2000 mm, color: silver

DIN rail, unperforated - NS 35/7,5 ZN UNPERF 2000MM - 1206434



DIN rail, unperforated, Standard profile, width: 35 mm, height: 7.5 mm, acc. to EN 60715, material: Steel, galvanized, length: 2000 mm, color: silver

DIN rail, unperforated - NS 35/7,5 CU UNPERF 2000MM - 0801762



DIN rail, unperforated, Standard profile, width: 35 mm, height: 7.5 mm, acc. to EN 60715, material: Copper, uncoated, length: 2000 mm, color: copper-colored

End cap - NS 35/7,5 CAP - 1206560



DIN rail end piece, for DIN rail NS 35/7.5

DIN rail perforated - NS 35/15 PERF 2000MM - 1201730



DIN rail perforated, Standard profile, width: 35 mm, height: 15 mm, similar to EN 60715, material: Steel, galvanized, passivated with a thick layer, length: 2000 mm, color: silver



Accessories

DIN rail, unperforated - NS 35/15 UNPERF 2000MM - 1201714



DIN rail, unperforated, Standard profile, width: 35 mm, height: 15 mm, similar to EN 60715, material: Steel, galvanized, passivated with a thick layer, length: 2000 mm, color: silver

DIN rail perforated - NS 35/15 WH PERF 2000MM - 0806602



DIN rail perforated, Standard profile, width: 35 mm, height: 15 mm, similar to EN 60715, material: Steel, Galvanized, white passivated, length: 2000 mm, color: white

DIN rail, unperforated - NS 35/15 WH UNPERF 2000MM - 1204135



DIN rail, unperforated, Standard profile, width: 35 mm, height: 15 mm, similar to EN 60715, material: Steel, Galvanized, white passivated, length: 2000 mm, color: white

DIN rail, unperforated - NS 35/15 AL UNPERF 2000MM - 1201756



DIN rail, unperforated, Standard profile, width: 35 mm, height: 15 mm, similar to EN 60715, material: Aluminum, uncoated, length: 2000 mm, color: silver

DIN rail perforated - NS 35/15 ZN PERF 2000MM - 1206599



DIN rail perforated, Standard profile, width: 35 mm, height: 15 mm, similar to EN 60715, material: Steel, galvanized, length: 2000 mm, color: silver



Accessories

DIN rail, unperforated - NS 35/15 ZN UNPERF 2000MM - 1206586



DIN rail, unperforated, Standard profile, width: 35 mm, height: 15 mm, similar to EN 60715, material: Steel, galvanized, length: 2000 mm, color: silver

DIN rail, unperforated - NS 35/15 CU UNPERF 2000MM - 1201895



DIN rail, unperforated, Standard profile, width: 35 mm, height: 15 mm, similar to EN 60715, material: Copper, uncoated, length: 2000 mm, color: copper-colored

End cap - NS 35/15 CAP - 1206573



DIN rail end piece, for DIN rail NS 35/15

DIN rail, unperforated - NS 35/15-2,3 UNPERF 2000MM - 1201798



DIN rail, unperforated, Standard profile 2.3 mm, width: 35 mm, height: 15 mm, acc. to EN 60715, material: Steel, galvanized, passivated with a thick layer, length: 2000 mm, color: silver

End block

End clamp - CLIPFIX 35 - 3022218



Quick mounting end clamp for NS 35/7,5 DIN rail or NS 35/15 DIN rail, with marking option, width: 9.5 mm, color: gray



Accessories

End clamp - CLIPFIX 35-5 - 3022276



Quick mounting end clamp for NS 35/7,5 DIN rail or NS 35/15 DIN rail, with marking option, with parking option for FBS...5, FBS...6, KSS 5, KSS 6, width: 5.15 mm, color: gray

End clamp - E/NS 35 N - 0800886



End clamp, width: 9.5 mm, color: gray

End cover

End cover - D-UT 2,5/10 - 3047028



End cover, length: 47 mm, width: 2.2 mm, height: 39.8 mm, color: gray

Front adapter

Front adapters - VIP-PA-PWR/20XOE/ 1,0M/S7 - 2904724



VIP power cabling, universal front adapter for connection to all popular 20-pos. SIMATIC S7-300 I/O modules, via 20 individual wires in rope structure, not assembled (field connection, e.g., via 20 modular terminal blocks), cable length: 1 m

Front adapters - VIP-PA-PWR/20XOE/ 2,0M/S7 - 2904725



VIP power cabling, universal front adapter for connection to all popular 20-pos. SIMATIC S7-300 I/O modules, via 20 individual wires in rope structure, not assembled (field connection, e.g., via 20 modular terminal blocks), cable length: 2 m



Accessories

Front adapters - VIP-PA-PWR/20XOE/ 3,0M/S7 - 2904726



VIP power cabling, universal front adapter for connection to all popular 20-pos. SIMATIC S7-300 I/O modules, via 20 individual wires in rope structure, not assembled (field connection, e.g., via 20 modular terminal blocks), cable length: 3 m

Front adapters - VIP-PA-PWR/20XOE/10,0M/S7 - 2904730



VIP power cabling, universal front adapter for connection to all popular 20-pos. SIMATIC S7-300 I/O modules, via 20 individual wires in rope structure, not assembled (field connection, e.g., via 20 modular terminal blocks), cable length: 10 m

Front adapters - VIP-PA-PWR/40XOE/ 1,0M/S7 - 2904731



VIP power cabling, universal front adapter for connection to all popular 40-pos. SIMATIC S7-300 I/O modules, via 40 individual wires in rope structure, not assembled (field connection, e.g., via 40 modular terminal blocks), cable length: 1 m

Front adapters - VIP-PA-PWR/40XOE/ 2,0M/S7 - 2904732



VIP power cabling, universal front adapter for connection to all popular 40-pos. SIMATIC S7-300 I/O modules, via 40 individual wires in rope structure, not assembled (field connection, e.g., via 40 modular terminal blocks), cable length: 2

Front adapters - VIP-PA-PWR/40XOE/ 3,0M/S7 - 2904733



VIP power cabling, universal front adapter for connection to all popular 40-pos. SIMATIC S7-300 I/O modules, via 40 individual wires in rope structure, not assembled (field connection, e.g., via 40 modular terminal blocks), cable length: 3 m



Accessories

Front adapters - VIP-PA-PWR/40XOE/10,0M/S7 - 2904737



VIP power cabling, universal front adapter for connection to all popular 40-pos. SIMATIC S7-300 I/O modules, via 40 individual wires in rope structure, not assembled (field connection, e.g., via 40 modular terminal blocks), cable length: 10 m

Insulating sleeve

Insulating sleeve - MPS-IH WH - 0201663



Insulating sleeve, color: white

Insulating sleeve - MPS-IH RD - 0201676



Insulating sleeve, color: red

Insulating sleeve - MPS-IH BU - 0201689



Insulating sleeve, color: blue

Insulating sleeve - MPS-IH YE - 0201692



Insulating sleeve, color: yellow



Accessories

Insulating sleeve - MPS-IH GN - 0201702



Insulating sleeve, color: green

Insulating sleeve - MPS-IH GY - 0201728



Insulating sleeve, color: gray

Insulating sleeve - MPS-IH BK - 0201731



Insulating sleeve, color: black

Jumper

Plug-in bridge - FBS 2-5 - 3030161



Plug-in bridge, pitch: 5.2 mm, length: 22.7 mm, width: 9 mm, number of positions: 2, color: red

Plug-in bridge - FBS 3-5 - 3030174



Plug-in bridge, pitch: 5.2 mm, length: 22.7 mm, width: 14.2 mm, number of positions: 3, color: red



Accessories

Plug-in bridge - FBS 4-5 - 3030187



Plug-in bridge, pitch: 5.2 mm, length: 22.7 mm, width: 19.4 mm, number of positions: 4, color: red

Plug-in bridge - FBS 5-5 - 3030190



Plug-in bridge, pitch: 5.2 mm, length: 22.7 mm, width: 24.6 mm, number of positions: 5, color: red

Plug-in bridge - FBS 10-5 - 3030213



Plug-in bridge, pitch: 5.2 mm, length: 22.7 mm, width: 50.6 mm, number of positions: 10, color: red

Plug-in bridge - FBS 20-5 - 3030226



Plug-in bridge, pitch: 5.2 mm, number of positions: 20, color: red

Plug-in bridge - FBS 50-5 - 3038930



Plug-in bridge, pitch: 5.2 mm, number of positions: 50, color: red



Accessories

Plug-in bridge - FBSR 2-5 - 3033702



Plug-in bridge, pitch: 5.2 mm, number of positions: 2, color: red

Plug-in bridge - FBSR 3-5 - 3001591



Plug-in bridge, pitch: 5.2 mm, number of positions: 3, color: red

Plug-in bridge - FBSR 4-5 - 3001592



Plug-in bridge, pitch: 5.2 mm, number of positions: 4, color: red

Plug-in bridge - FBSR 5-5 - 3001593



Plug-in bridge, pitch: 5.2 mm, number of positions: 5, color: red

Plug-in bridge - FBSR 10-5 - 3033710



Plug-in bridge, pitch: 5.2 mm, number of positions: 10, color: red



Accessories

Plug-in bridge - FBS 2-5 BU - 3036877



Plug-in bridge, pitch: 5.2 mm, number of positions: 2, color: blue

Plug-in bridge - FBS 3-5 BU - 3036880



Plug-in bridge, pitch: 5.2 mm, number of positions: 3, color: blue

Plug-in bridge - FBS 4-5 BU - 3036893



Plug-in bridge, pitch: 5.2 mm, number of positions: 4, color: blue

Plug-in bridge - FBS 5-5 BU - 3036903



Plug-in bridge, pitch: 5.2 mm, number of positions: 5, color: blue

Plug-in bridge - FBS 10-5 BU - 3036916



Plug-in bridge, pitch: 5.2 mm, number of positions: 10, color: blue



Accessories

Plug-in bridge - FBS 20-5 BU - 3036929



Plug-in bridge, pitch: 5.2 mm, number of positions: 20, color: blue

Plug-in bridge - FBS 50-5 BU - 3032114



Plug-in bridge, pitch: 5.2 mm, number of positions: 50, color: blue

Labeled terminal marker

Zack marker strip - ZB 5 CUS - 0824962



Zack marker strip, can be ordered: Strip, white, labeled according to customer specifications, mounting type: snap into tall marker groove, for terminal block width: 5.2 mm, lettering field size: 5.15 x 10.5 mm

Zack marker strip - ZB 5,LGS:FORTL.ZAHLEN - 1050017



Zack marker strip, Strip, white, labeled, printed horizontally: consecutive numbers 1 - 10, 11 - 20, etc. up to 491 - 500, mounting type: snap into tall marker groove, for terminal block width: 5.2 mm, lettering field size: 5.15 x 10.5 mm

Zack marker strip - ZB 5,QR:FORTL.ZAHLEN - 1050020





Accessories

Zack marker strip - ZB 5,LGS:GLEICHE ZAHLEN - 1050033



Zack marker strip, Strip, white, labeled, can be labeled with: CMS-P1-PLOTTER, printed horizontally: Identical numbers 1 or 2, etc. up to 100, mounting type: snap into tall marker groove, for terminal block width: 5.2 mm, lettering field size: 5.15 x 10.5 mm

Marker for terminal blocks - ZB 5,LGS:L1-N,PE - 1050415



Marker for terminal blocks, Strip, white, labeled, Horizontal: L1, L2, L3, N, PE, L1, L2, L3, N, PE, mounting type: snap into tall marker groove, for terminal block width: 5.2 mm, lettering field size: 5.15 x 10.5 mm

Marker for terminal blocks - UC-TM 5 CUS - 0824581



Marker for terminal blocks, can be ordered: by sheet, white, labeled according to customer specifications, mounting type: snap into tall marker groove, for terminal block width: 5.2 mm, lettering field size: 10.5 x 4.6 mm

Marker for terminal blocks - UCT-TM 5 CUS - 0829595



Marker for terminal blocks, can be ordered: by sheet, white, labeled according to customer specifications, mounting type: snap into tall marker groove, for terminal block width: 5.2 mm, lettering field size: 4.6 x 10.5 mm

Marker pen

Marker pen - X-PEN 0,35 - 0811228



Marker pen without ink cartridge, for manual labeling of markers, labeling extremely wipe-proof, line thickness 0.35 mm



Accessories

Partition plate

Partition plate - ATP-UT - 3047167



Partition plate, length: 50 mm, width: 2.2 mm, height: 48 mm, color: gray

Spacer plate - DP PS-5 - 3036725



Spacer plate, length: 22.4 mm, width: 5.2 mm, height: 29 mm, number of positions: 1, color: red

Planning and marking software

Software - CLIP-PROJECT ADVANCED - 5146040



Multilingual software for convenient configuration of Phoenix Contact products on standard DIN rails.

Software - CLIP-PROJECT PROFESSIONAL - 5146053



Multilingual software for terminal strip configuration. A marking module enables the professional marking of markers and labels for identifying terminal blocks, conductors and cables, and devices.

Screwdriver tools



Accessories

Screwdriver - SZS 0,6X3,5 - 1205053



Actuation tool, for ST terminal blocks, insulated, also suitable for use as a bladed screwdriver, size: 0.6 x 3.5 x 100 mm, 2-component grip, with non-slip grip

Terminal marking

Zack marker strip - ZB 5 :UNBEDRUCKT - 1050004



Zack marker strip, Strip, white, unlabeled, can be labeled with: CMS-P1-PLOTTER, PLOTMARK, mounting type: snap into tall marker groove, for terminal block width: 5.2 mm, lettering field size: 5.1 x 10.5 mm

Marker for terminal blocks - UC-TM 5 - 0818108



Marker for terminal blocks, Sheet, white, unlabeled, can be labeled with: BLUEMARK ID, BLUEMARK ID COLOR, BLUEMARK CLED, BLUEMARK LED, CMS-P1-PLOTTER, PLOTMARK, mounting type: snap into tall marker groove, for terminal block width: 5.2 mm, lettering field size: 10.5 x 4.6 mm

Marker for terminal blocks - UCT-TM 5 - 0828734



Marker for terminal blocks, Sheet, white, unlabeled, can be labeled with: THERMOMARK PRIME, THERMOMARK CARD, BLUEMARK ID, BLUEMARK ID COLOR, BLUEMARK CLED, BLUEMARK LED, TOPMARK NEO, mounting type: snap into tall marker groove, for terminal block width: 5.2 mm, lettering field size: 4.6 x 10.5 mm

Test plug terminal block

Test plugs - MPS-MT - 0201744



Test plugs, with solder connection up to 1 mm² conductor cross section, color: silver



Accessories

Test plugs - PS-5 - 3030983



Test plugs, color: red

Test plugs - PS-5/2,3MM RD - 3038723



Test plugs, color: red

Test socket

Test adapter - PAI-4-FIX-5/6 BU - 3035975



4 mm test adapter, for terminal blocks with 5.2 mm and 6.2 mm pitch

Test adapter - PAI-4-FIX-5/6 OG - 3035974



4 mm test adapter, for terminal blocks with 5.2 mm and 6.2 mm pitch

Test adapter - PAI-4-FIX-5/6 YE - 3035977



4 mm test adapter, for terminal blocks with 5.2 mm and 6.2 mm pitch



Accessories

Test adapter - PAI-4-FIX-5/6 RD - 3035976



4 mm test adapter, for terminal blocks with 5.2 mm and 6.2 mm pitch

Test adapter - PAI-4-FIX-5/6 GN - 3035978



4 mm test adapter, for terminal blocks with 5.2 mm and 6.2 mm pitch

Test adapter - PAI-4-FIX-5/6 BK - 3035980



4 mm test adapter, for terminal blocks with 5.2 mm and 6.2 mm pitch

Test adapter - PAI-4-FIX-5/6 GY - 3035982



4 mm test adapter, for terminal blocks with 5.2 mm and 6.2 mm pitch

Test adapter - PAI-4-FIX-5/6 VT - 3035979



4 mm test adapter, for terminal blocks with 5.2 mm and 6.2 mm pitch



Accessories

Test adapter - PAI-4-FIX-5/6 BN - 3035981



4 mm test adapter, for terminal blocks with 5.2 mm and 6.2 mm pitch

Test adapter - PAI-4-FIX-5/6 WH - 3035983



4 mm test adapter, for terminal blocks with 5.2 mm and 6.2 mm pitch

Test adapter - PAI-4-N GY - 3032871



4 mm test adapter, for terminal blocks with 5.2 mm, 6.2 mm and 8.2 mm pitch

Warning label printed

Warning label - WS UT 2,5 - 3047923



Warning sign for UT terminal blocks

Warning label - WS UT 2,5 - 3047923



Warning sign for UT terminal blocks



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Feed-through terminal block, nom. voltage: 1000 V, nominal current: 24 A, connection method: Screw connection, number of connections: 2, cross section:0.14 mm² - 4 mm², AWG: 26 - 12, width: 5.2 mm, color: green, mounting type: NS 35/7,5, NS 35/15



Key Commercial Data

Packing unit	1 STK
Minimum order quantity	50 STK
GTIN	4 017918 975432
GTIN	4017918975432
Weight per Piece (excluding packing)	8.180 g
Custom tariff number	85369010
Country of origin	Germany

Technical data

General

Number of levels	1
Number of connections	2
Potentials	1
Nominal cross section	2.5 mm²
Color	green
Insulating material	PA
Flammability rating according to UL 94	V0
Area of application	Railway industry
	Machine building



Technical data

General

	Plant engineering
	Process industry
Rated surge voltage	8 kV
Degree of pollution	3
Overvoltage category	III
Insulating material group	1
Maximum power dissipation for nominal condition	0.77 W
Maximum load current	32 A (with 4 mm² conductor cross section)
Nominal current I _N	24 A
Nominal voltage U _N	1000 V
Open side panel	Yes
Shock protection test specification	DIN EN 50274 (VDE 0660-514):2002-11
Back of the hand protection	guaranteed
Finger protection	guaranteed
Result of surge voltage test	Test passed
Surge voltage test setpoint	9.8 kV
Result of power-frequency withstand voltage test	Test passed
Power frequency withstand voltage setpoint	2.2 kV
Result of the test for mechanical stability of terminal points (5 x conductor connection)	Test passed
Result of bending test	Test passed
Bending test rotation speed	10 rpm
Bending test turns	135
Bending test conductor cross section/weight	0.14 mm² / 0.2 kg
	2.5 mm² / 0.7 kg
	4 mm² / 0.9 kg
Tensile test result	Test passed
Conductor cross section tensile test	0.14 mm²
Tractive force setpoint	10 N
Conductor cross section tensile test	2.5 mm ²
Tractive force setpoint	50 N
Conductor cross section tensile test	4 mm²
Tractive force setpoint	60 N
Result of tight fit on support	Test passed
Tight fit on carrier	NS 35
Setpoint	1 N
Result of voltage-drop test	Test passed



CONTINUOUS-HINGE WITH CLAMPS, TYPE 4X



INDUSTRY STANDARDS

UL 50, 50E Listed; Type 3R, 4, 4X, 12; File No. E27567 cUL Listed per CSA C22.2 No 94; Type 3R, 4, 4X, 12; File No. E27567

UL 508A Listed; Type 3R, 4, 4X, 12; File No. E61997 cUL Listed per CSA C22.2 No 94; Type 3R, 4, 4X, 12; File No. E61997

NEMA/EEMAC Type 3R, 4, 4X, 12, 13 CSA File No. 42184: Type 4, 4X, 12 IEC 60529, IP66 Meets NEMA Type 3RX requirements

APPLICATION

Used in either indoor or outdoor applications, these enclosures combine a rugged continuous hinge, seamless foam-in-place gasket and stainless steel screw-down clamps for a reliable seal that protects components from corrosive environments.

SPECIFICATIONS

- 16 and 14 gauge Type 304 or 316L stainless steel
- Seams continuously welded and ground smooth
- Seamless foam-in-place gasket
- Stainless steel screws and clamps
- Pull stainless steel continuous hinge pin to remove door
- Weldnuts provided for mounting optional panels and terminal block kits
- · Bonding provision on door and body

FINISH

Cover and sides of body have smooth #4 brushed finish.

ACCESSORIES

Fast-Operating Clamp-Cover Junction Box Clamp Lock Kit for Clamp Cover Junction Boxes Panels for Junction Boxes Terminal Block Kit Assembly for Junction Boxes

MODIFICATION AND CUSTOMIZATION

Hoffman excels at modifying and customizing products to your specifications. Contact your local Hoffman sales office or distributor for complete information.

BULLETIN: A51S

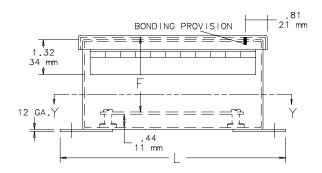
Standard Product

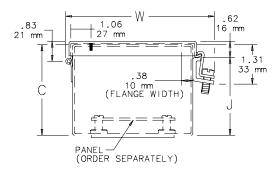
								Panel Size	Mounting	Overall						
		Stainless		Body	Cover	Steel	Conductive	DxE	GxH	LxW	F	J	N	T	٧	Υ
Catalog Number	AxBxC in./mm	Steel Type	UL Listed	Gauge	Gauge	Panel	Panel	in./mm	in./mm	in./mm	in./mm	in./mm	in./mm	in./mm	in./mm	in./mm
A6044CHNFSS	6.00 x 4.00 x 4.00	304	508A	16	16	A6P4	A6P4G	4.88 x 2.88	6.75 x 2.00	7.50 x 4.94	3.50	3.62	2.38	3.00	0.31	0.56
	152 x 102 x 102							124 x 73	171 x 51	191 x 125	89	92	60	76	8	14
A606CHNFSS	6.00 x 6.00 x 4.00	304	50, 50E	16	16	A6P6	A6P6G	4.88 x 4.88	6.75 x 4.00	7.50 x 6.94	3.50	3.62	2.38	5.00	0.31	0.56
	152 x 152 x 102							124 x 124	171 x 102	191 x 176	89	92	60	127	8	14
A8064CHNFSS	8.00 x 6.00 x 4.00	304	50, 50E	14	16	A8P6	A8P6G	6.75 x 4.88	8.75 x 4.00	9.50 x 6.94	3.50	3.62	1.38	5.00	0.25	0.62
	203 x 152 x 102							171 x 124	222 x 102	241 x 176	89	92	35	127	6	16
A1008CHNFSS	10.00 x 8.00 x 4.00	304	50, 50E	14	16	A10P8	A10P8G	8.75 x 6.88	10.75 x 6.00	11.50 x 8.94	3.50	3.62	1.38	7.00	0.25	0.62
	254 x 203 x 102							222 x 175	273 x 152	292 x 227	89	92	35	178	6	16
A12106CHNFSS	12.00 x 10.00 x 6.00	304	50, 50E	14	16	A12P10	A12P10G	10.75 x 8.88	12.75 x 8.00	13.50 x 10.94	5.50	5.62	2.38	9.00	0.25	0.62
	305 x 254 x 152							273 x 225	324 x 203	343 x 278	140	143	60	229	6	16
A1212CHNFSS	12.00 x 12.00 x 6.00	304	50, 50E	14	16	A12P12	A12P12G	10.75 x 10.88	12.75 x 10.00	13.50 x 12.94	5.50	5.62	2.38	11.00	0.25	0.62
	305 x 305 x 152							273 x 276	324 x 254	343 x 329	140	143	60	279	6	16
A1412CHNFSS	14.00 x 12.00 x 6.00	304	50, 50E	14	16	A14P12	A14P12G	12.75 x 10.88	14.75 x 10.00	15.50 x 12.94	5.50	5.62	2.38	11.00	0.25	0.62
	356 x 305 x 152							324 x 276	375 x 254	394 x 329	140	143	60	279	6	16
A1614CHNFSS	16.00 x 14.00 x 6.00	304	508A	14	16	A16P14	A16P14G	14.75 x 12.88	16.75 x 12.00	17.50 x 14.94	5.50	5.62	2.38	13.00	0.25	0.62
	406 x 356 x 152							375 x 327	425 x 305	445 x 379	140	143	60	330	6	16
A6044CHNFSS6	6.00 x 4.00 x 4.00	316L	50, 50E	16	16	A6P4	A6P4G	4.88 x 2.88	6.75 x 2.00	7.50 x 4.94	3.50	3.62	2.38	3.00	0.31	0.56
	152 x 102 x 102							124 x 73	171 x 51	191 x 125	89	92	60	76	8	14
A606CHNFSS6	6.00 x 6.00 x 4.00	316L	50, 50E	16	16	A6P6	A6P6G	4.88 x 4.88	6.75 x 4.00	7.50 x 6.94	3.50	3.62	2.38	5.00	0.31	0.56
	152 x 152 x 102							124 x 124	171 x 102	191 x 176	89	92	60	127	8	14
A8064CHNFSS6	8.00 x 6.00 x 4.00	316L	50, 50E	14	16	A8P6	A8P6G	6.75 x 4.88	8.75 x 4.00	9.50 x 6.94	3.50	3.62	1.38	5.00	0.25	0.62
	203 x 152 x 102							171 x 124	222 x 102	241 x 176	89	92	35	127	6	16
A1008CHNFSS6	10.00 x 8.00 x 4.00	316L	50, 50E	14	16	A10P8	A10P8G	8.75 x 6.88	10.75 x 6.00	11.50 x 8.94	3.50	3.62	1.38	7.00	0.25	0.62
	254 x 203 x 102							222 x 175	273 x 152	292 x 227	89	92	35	178	6	16
A12106CHNFSS6	12.00 x 10.00 x 6.00	316L	50, 50E	14	16	A12P10	A12P10G	10.75 x 8.88	12.75 x 8.00	13.50 x 10.94	5.50	5.62	2.38	9.00	0.25	0.62
	305 x 254 x 152							273 x 225	324 x 203	343 x 278	140	143	60	229	6	16
A1212CHNFSS6	12.00 x 12.00 x 6.00	316L	50, 50E	14	16	A12P12	A12P12G	10.75 x 10.88	12.75 x 10.00	13.50 x 12.94	5.50	5.62	2.38	11.00	0.25	0.62
	305 x 305 x 152							273 x 276	324 x 254	343 x 329	140	143	60	279	6	16
A1412CHNFSS6	14.00 x 12.00 x 6.00	316L	50, 50E	14	16	A14P12	A14P12G	12.75 x 10.88	14.75 x 10.00	15.50 x 12.94	5.50	5.62	2.38	11.00	0.25	0.62
	356 x 305 x 152							324 x 276	375 x 254	394 x 329	140	143	60	279	6	16
A1614CHNFSS6	16.00 x 14.00 x 6.00	316L	50, 50E	14	16	A16P14	A16P14G	14.75 x 12.88	16.75 x 12.00	17.50 x 14.94	5.50	5.62	2.38	13.00	0.25	0.62
	406 x 356 x 152							375 x 327	425 x 305	445 x 379	140	143	60	330	6	16

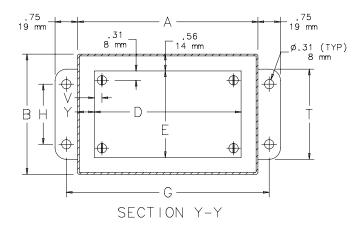
A6044CHNFSS and A6044CHNFSS6 UL 508A Listed. The remaining catalog numbers are UL 50 Listed.

Purchase panels separately. Optional stainless steel, composite and aluminum panels are available for most sizes.

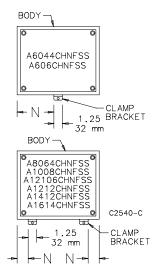








CLAMP BRACKET LOCATIONS



- NOTE: 1. Optional panels are 14 gauge steel, conductive steel or stainless steel 2. Panel screws are #10-32 pan head

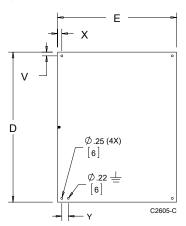


PANELS FOR JUNCTION BOXES



Steel panels are 14 gauge, finished with white polyester powder paint or with a conductive, corrosion-resistant coating. Stainless steel panels are 14 gauge Type 304 and have a commercial #3 finish which is protected on one side with a plastic film. Aluminum panels are 5052-H32 aluminum alloy 0.080-in. (2-mm) thick and protected on one side with a plastic film. Panel mounting hardware is furnished with all enclosures which accept these panels.

BULLETIN: PNLJ, PNLWM



Catalog Number	Material	Panel Size D x E (in.)	Panel Size D x E (mm)	V (in.)	V (mm)	X (in.)	X (mm)	Y (in.)	Y (mm)
A4P4G	Conductive	2.88 x 2.88	73 x 73	.31	8	.31	8	1.25	32
A6P4	Painted steel	4.88 x 2.88	124 x 73	.31	8	.31	8	1.25	32
A6P4G	Conductive steel	4.88 x 2.88	124 x 73	.31	8	.31	8	1.25	32
A6P4SS	Stainless Steel	4.88 x 2.88	124 x 73	.31	8	.31	8	1.25	32
A6P4AL	Aluminum	4.88 x 2.88	124 x 73	.31	8	.31	8	1.25	32
A6P6	Painted steel	4.88 x 4.88	124 x 124	.31	8	.31	8	1.25	32
A6P6G	Conductive steel	4.88 x 4.88	124 x 124	.31	8	.31	8	1.25	32
A6P6SS	Stainless Steel	4.88 x 4.88	124 x 124	.31	8	.31	8	1.25	32
A6P6AL	Aluminum	4.88 x 4.88	124 x 124	.31	8	.31	8	1.25	32
A7P7G	Conductive	5.88 x 5.88	149 x 149	.31	8	.31	8	1.25	32
A8P6	Painted steel	6.75 x 4.88	171 x 124	.25	6	.31	8	1.25	32
A8P6G	Conductive steel	6.75 x 4.88	171 x 124	.25	6	.31	8	1.25	32
A8P6SS	Stainless Steel	6.75 x 4.88	171 x 124	.25	6	.31	8	1.25	32
A8P6AL	Aluminum	6.75 x 4.88	171 x 124	.25	6	.31	8	1.25	32
A8P8	Painted steel	6.75 x 6.88	171 x 175	.25	6	.31	8	1.25	32
A8P8G	Conductive Steel	6.75 x 6.88	171 x 175	.25	6	.31	8	1.25	32
A8P8AL	Aluminum	6.75 x 6.88	171 x 175	.25	6	.31	8	1.25	32
A9P6G	Conductive	7.38 x 4.63	187 x 118	.31	8	.31	8	1.25	32
A10P8	Painted steel	8.75 x 6.88	222 x 175	.25	6	.31	8	1.25	32
A10P8G	Conductive steel	8.75 x 6.88	222 x 175	.25	6	.31	8	1.25	32
A10P8SS	Stainless Steel	8.75 x 6.88	222 x 175	.25	6	.31	8	1.25	32
A10P8AL	Aluminum	8.75 x 6.88	222 x 175	.25	6	.31	8	1.25	32
A10P10	Painted steel	8.75 x 8.88	222 x 226	.25	6	.31	8	1.25	32
A10P10G	Conductive steel	8.75 x 8.88	222 x 226	.25	6	.31	8	1.25	32
A10P10AL	Aluminum	8.75 x 8.88	222 x 226	.25	6	.31	8	1.25	32
A12P6	Painted steel	10.75 x 4.88	273 x 124	.25	6	.31	8	1.25	32
A12P6G	Conductive steel	10.75 x 4.88	273 x 124	.25	6	.31	8	1.25	32
A12P10	Painted steel	10.75 x 8.88	273 x 226	.25	6	.31	8	1.25	32
A12P10G	Conductive steel	10.75 x 8.88	273 x 226	.25	6	.31	8	1.25	32
A12P10SS	Stainless Steel	10.75 x 8.88	273 x 226	.25	6	.31	8	1.25	32
A12P10AL	Aluminum	10.75 x 8.88	273 x 226	.25	6	.31	8	1.25	32
A12P12	Painted steel	10.75 x 10.88	273 x 276	.25	6	.31	8	1.25	32
A12P12G	Conductive steel	10.75 x 10.88	273 x 276	.25	6	.31	8	1.25	32
A12P12SS	Stainless Steel	10.75 x 10.88	273 x 276	.25	6	.31	8	1.25	32
A14P8	Painted steel	12.75 x 6.88	324 x 175	.25	6	.31	8	1.25	32
A14P8G	Conductive steel	12.75 x 6.88	324 x 175	.25	6	.31	8	1.25	32
A14P12	Painted steel	12.75 x 10.88	324 x 276	.25	6	.31	8	1.25	32
A14P12G	Conductive steel	12.75 x 10.88	324 x 276	.25	6	.31	8	1.25	32
A14P12S	Stainless Steel	12.75 x 10.88	324 x 276	.25	6	.31	8	1.25	32
A14P12AL		12.75 x 10.88	324 x 276	.25	6	.31	8	1.25	32
	Aluminum					.31	8		32 32
A16P10	Painted steel	14.75 x 8.88	375 x 226	.25	6		-	1.25	
A16P10G	Conductive steel	14.75 x 8.88	375 x 226	.25	6	.31	8	1.25	32
A16P14	Painted steel	14.75 x 12.88	375 x 327	.25	6	.31	8	1.25	32
A16P14G	Conductive steel	14.75 x 12.88	375 x 327	.25	6	.31	8	1.25	32
A16P14SS	Stainless Steel	14.75 x 12.88	375 x 327	.25	6	.31	8	1.25	32
A16P14AL	Aluminum	14.75 x 12.88	375 x 327	.25	6	.31	8	1.25	32
A18P16	Painted steel	16.75 x 14.88	425 x 378	.25	6	.31	8	1.25	32
A18P16G	Conductive steel	16.75 x 14.88	425 x 378	.25	6	.31	8	1.25	32
A18P16SS	Stainless Steel	16.75 x 14.88	425 x 378	.25	6	.31	8	1.25	32
A18P16AL	Aluminum	16.75 x 14.88	425 x 378	.25	6	.31	8	1.25	32
A20P16J	Painted	18.75 x 14.88	476 x 378	.47	12	.54	14	.81	21
A20P16JAL	Aluminum	18.75 x 14.88	476 x 378	.47	12	.54	14	.81	21



10.0 Motor Information

FOR APPROVAL
) Approved
) Approved with comments
) Not approved

DATA SHEET

Three Phase Induction Motor - Squirrel Cage



Customer : ROSSI DO BRASIL COMERCIO E SERVICOS LTDA.

MOBIL POLYREX EM

Product line : W22 - IE3 / Nema Premium Efficiency Tru Metric

Frame : 90L Locked rotor time : 14 s (hot) 25 s (cold) Output : 2 HP (1.5 kW) Temperature rise : 80 K Poles Duty cycle : S1 : 4 : -20 °C to +40 °C Frequency : 60 Hz Ambient temperature Rated voltage : 3280 ft : 480 V Altitude Rated current : 2.71 A Protection degree : IP66 L. R. Amperes : 22.5 A Cooling method : IC411 - TEFC **LRC** : 8.3 Code L Mounting : B5R(D) No load current Rotation¹ : 1.61 A : Both Rated speed Noise level² : 49.0 dB(A) : 1755 rpm Slip : 2.50 % Vibration class : A Rated torque : 8.00 Nm Starting method : Direct On Line Coupling Locked rotor torque : 310 % : Direct Pull up torque : 260 % Approx. weight3 : 50.7 lb Breakdown torque : 390 % Painting plan : 203A Insulation class : F : RAL 5015 Color : 1.25 Service factor Design : N Moment of inertia (J) : 0.1566 sq.ft.lb Output 50% 75% 100% Load type Efficiency (%) 82.5 85.5 86.5 Load torque : -Power Factor 0.55 0.77 Load inertia (J=GD²/4) 0.68 ٠_ Drive end Non drive end Foundation loads Bearing type : 779.1 N 6205-ZZ 6204-ZZ Max. traction : 1004.8 N Lubrication interval Max. compression

Notes

See notes on page 2.

Lubricant amount Lubricant type

This revision replaces and cancel the previous one, which must be eliminated.

- (1) Looking the motor from the shaft end.
- (2) Measured at 1m and with tolerance of +3dB(A).
- (3) Approximate weight, subject to be changed after manufacturing process.

(4) At 100% of full load.

These are average values based on tests with sinusoidal power supply, subject to the tolerances stipulated in IEC 60034-1.

Rev.		Changes Summary	Rev.	Checked	Date
Performed by	natashas			1066706406	
Checked by	natashas			Page	Rev.
Date	27/01/2020			1/2	1

DATA SHEET

Three Phase Induction Motor - Squirrel Cage



Approved with comments Not approved

FOR APPROVAL

Customer : ROSSI DO BRASIL COMERCIO E SERVICOS LTDA.

Product line : W22 - IE3 / Nema Premium Efficiency Tru Metric

Space heater information Voltage: 200-240 V Output: 9.1-13 W

Notes

Specification : MG1 - Part 10 Vibration
Test : MG1 - Part 12 Tolerance
Noise : MG1 - Part 9

This revision replaces and cancel the previous one, which must be eliminated.

(1) Looking the motor from the shaft end.

- (2) Measured at 1m and with tolerance of +3dB(A).
- (3) Approximate weight, subject to be changed after manufacturing process.

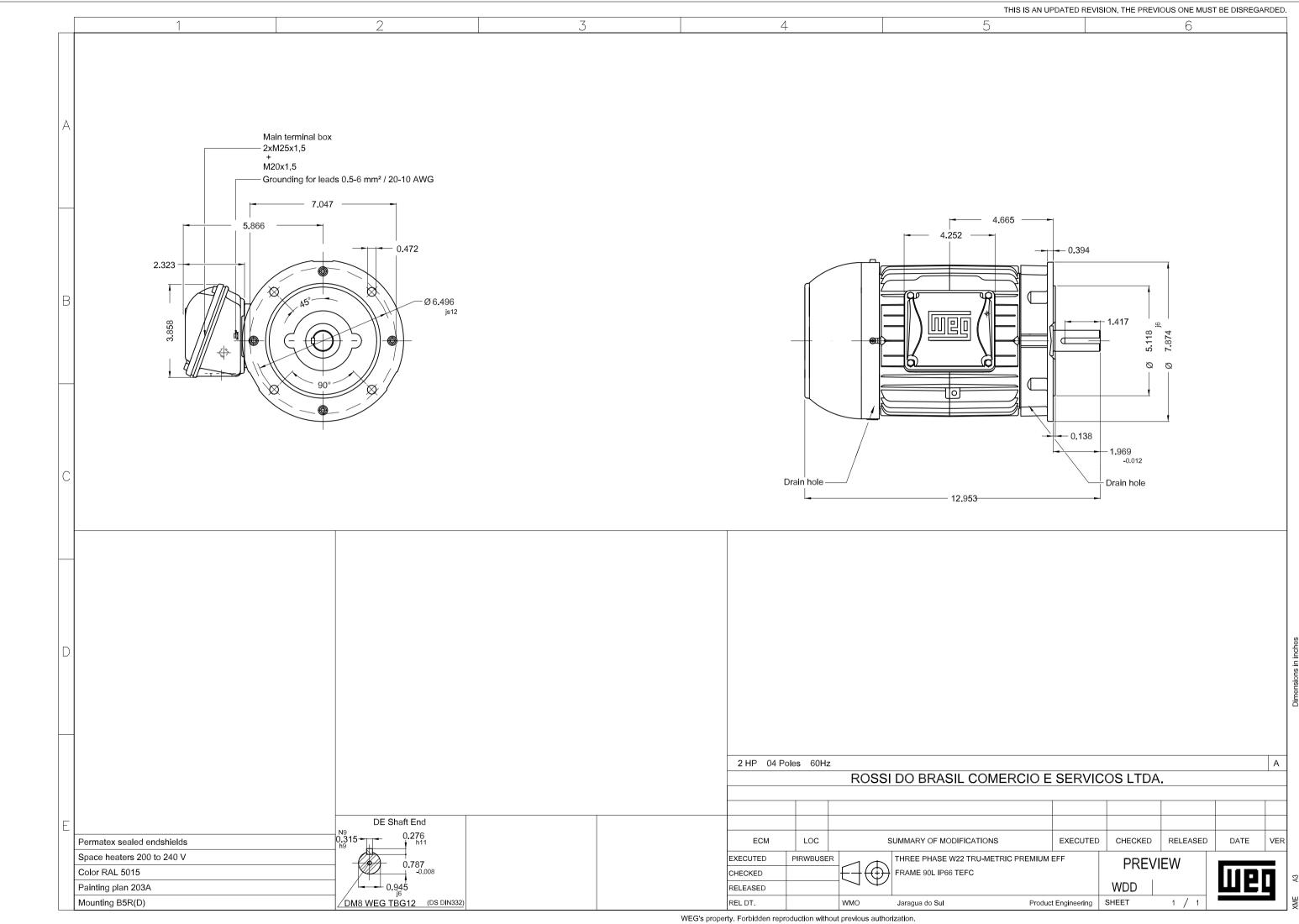
(4) At 100% of full load.

These are average values based on tests with sinusoidal power supply, subject to the tolerances stipulated in IEC 60034-1.

: MG1 - Part 7

: MG1 - Part 12

` '						
Rev.	Changes Summary		Rev.	Checked	Date	
Performed by	natashas			1066706406		
Checked by	natashas			Page	Rev.	
Date	27/01/2020			2/2	1	





11.0 Compressor Information

2 HP Reciprocating



5 cfm @ 125 psi

Compressor Features

- Cast iron industrial grade pump
- Industrial Grade Electric Motor
- Auto start/stop
- Fully enclosed beltguard
- All UL control components
- ASME/CRN certified tank



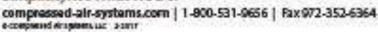
Model	Phase	Voltage	Tirek	Length	Width	Height	Amp Draw 224 Welt	Amp Draw 480 Velt
B23H1060	3	230/460	10 Gallon Horizontal	31"	16.5"	28"	6.8 amps	3.4 amps
Add Eatland of par	Numberio	make Dite		0.5.6	3000	33 - 3	X107 (7)	

No Start Up Kit Required

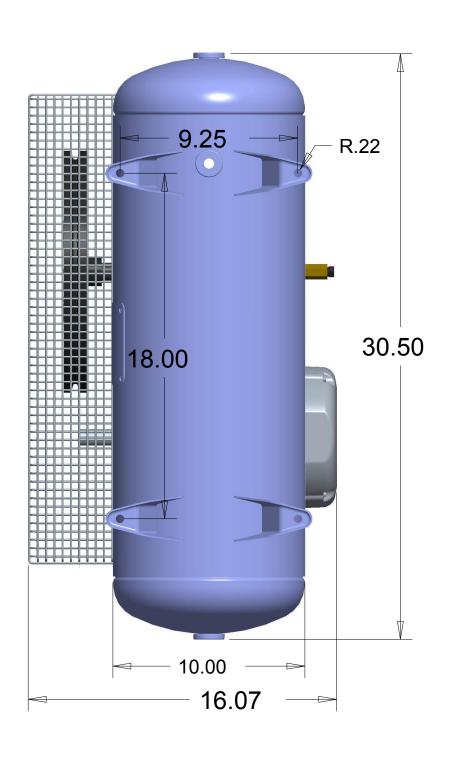
See catalog for additional options

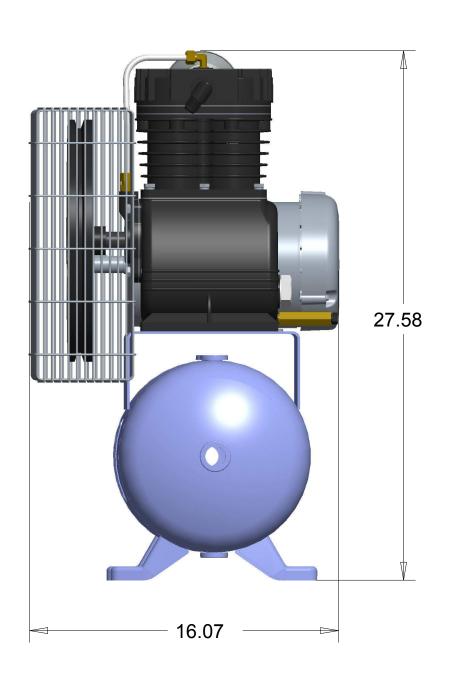
Compressed Air Systems

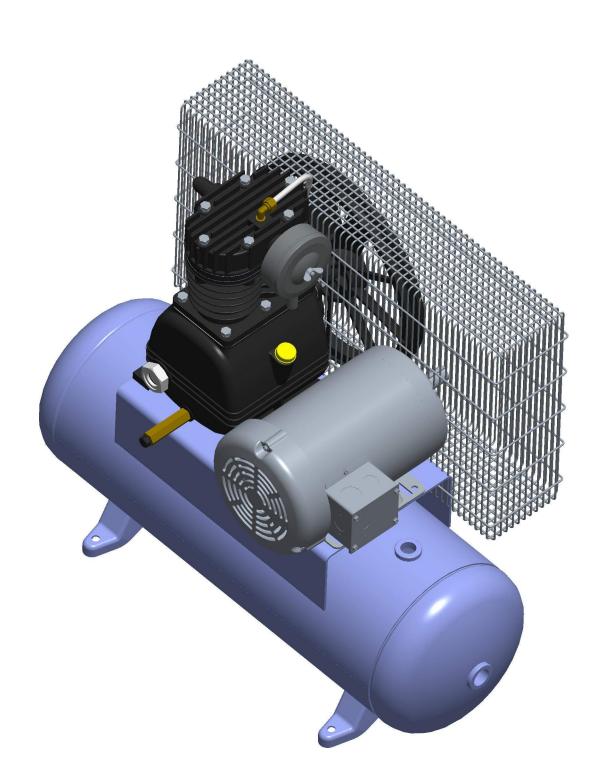


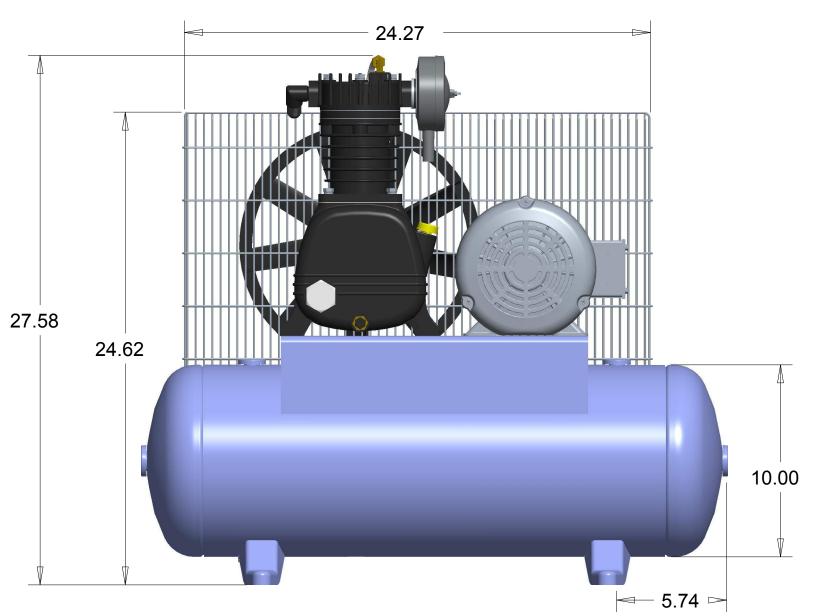














CAS P/N	H-BM40RS			
Revision	1			
Drawn By	Scott Satterfield			
Date	6/26/18			
Owner	Compressed Air Systems			
Unless specified, dimensions are in inches				

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COMBO

Electronic timer drain with integrated strainer

PRODUCT FEATURES

The COMBO timer controlled condensate drain combines an easy to program timer controlled drain, a ball valve and a mesh strainer into one compact easy to install package.

The COMBO is perfect for a wide range of compressed air applications, especially those with solid particulate contaminants.

With a test button, LED ON/OFF indication and a fully serviceable direct acting valve, the COMBO offers ease to use, affordable and reliable condensate management without the need to install additional valves and strainers. Use it on compressors, receivers, filters or refrigerated air dryers.

The 115VAC version of this drain is supplied with a 6 ft. power cord with plug and the 230VAC version is supplied with a 7 ft. power cord.





COMMERCIAL BENEFITS

- Installation time saver thanks to the integrated shut off valve and mesh strainer
- Dual thread inlet (1/2" & 1/4"), offering installation flexibility
- Any type of compressed air system and up to 230 psi (16 bar)
- Serviceable valve construction, offering you routine maintenance revenues
- Consult JORC for private labelling options

TECHNICAL ADVANTAGES

- Integrated mesh strainer, offering valve and orifice protection from larger particles found in condensate
- Integrated shut off valve, offering easy shut off of the valve for routine maintenance
- Does not air-lock during operation
- TEST (micro-switch) feature



COMBO

Electronic timer drain with integrated strainer

DIMENSIONS





Compact design!

TECHNICAL SPECIFICATIONS

Max. compressor capacity Any size

Pressure range 0 - 230 psi (0 - 16 bar), for higher pressures see OPTIMUM-HP-S

Supply voltage options 12 - 380 VAC/DC 50/60Hz. (please indicate)

Medium temperature 34 - 122 °F (1 - 50 °C) Ambient temperature 34 - 122 °F (1 - 50 °C)

Timer cycle range (ON/OFF) 0.5 - 10 seconds/0.5 - 45 minutes

Timer PCB SMD technology, ensuring consistency

in production

Timer cycle indication Bright LED illumination

TEST feature Yes

Valve type 2/2 way, direct acting

Valve orifice 4 mm Valve seals FPM

Inlet/outlet connections 1/4" & 1/2" / 1/2" NPT or BSP

Inlet connection height 0.4" (10 mm)

Serviceable valve Yes

Valve housing material Brass (Stainless steel available, see OPTIMUM)

Power connection DIN 43650-A Environmental protection NEMA4 (IP65)



Dual inlet feature

1/2" & 1/4"

Integrated mesh strainer

JORC is NEN - EN - ISO 9001:2015 certified

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JORC Industrial LLC

1146 River Road

New Castle, DE 19720

USA

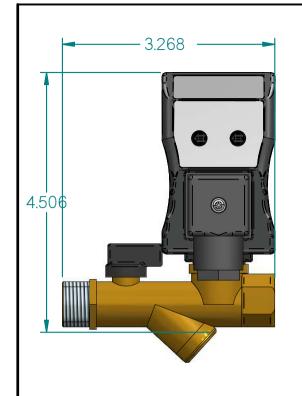
Tel +1 302-395-0310

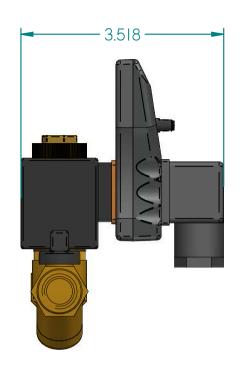
Fax +1 302-395-0312

E-mail info@jorc.com

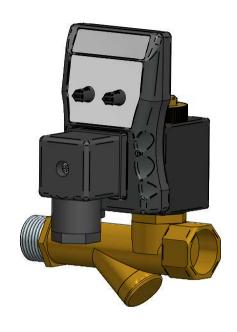
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	NAME	DATE				IORC	7	
DRAWN	FK FK	21–10–2016	COMBO ARTIKEL NUMBER				<u></u>	
CHECKED							R:	
JORC Industrial LLC 1146 River Road New Castle, DE 19720		SIZE A4		Material:		RE		
USA		All dimensions are in inches unless otherwise stated			erwise stated			
National Tel: 302 395 0310 Fax: 302 395 0312 International Tel: +1 302 395 0310 Fax: +1 302 395 0312						SHEET: 1/1		

E. KENAI WWTF RECORD DRAWINGS

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KENAI WWTF RECORD DRAWINGS

Electronic copies of record drawings for the Kenai WWTF are available upon request to those on current plan holder's list. Contact the Public Works Department at publicworks@kenai.city. Location of existing features, equipment, pipes, etc. in the record drawings are approximate. Contractor shall be responsible for obtaining field verification of all dimensions and layout.

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F. ASBESTOS SAMPLING SUMMARY REPORT

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SUMMARY REPORT – SLUDGE PRESS REPLACEMENT PROJECT ROOFING ASBESTOS SAMPLING



CITY OF KENAI WASTEWATER TREATMENT PLANT

KENAI, ALASKA

Surveyed May 5, 20221

Report Date May 31, 2022

EHS-ALASKA, INC.
ENGINEERING, HEALTH & SAFETY CONSULTANTS
11901 BUSINESS BLVD., SUITE 208
EAGLE RIVER, ALASKA 99577-7701

ASBESTOS SAMPLING SUMMARY REPORT SLUDGE PRESS REPLACEMENT PROJECT

KENAI, ALASKA

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ASBESTOS SAMPLING SUMMARY REPORT SLUDGE PRESS REPLACEMENT PROJECT

KENAI, ALASKA

OVERVIEW

Roofing Materials likely to be disturbed during the installation of a new Sludge Press at the Waste Water Treatment Plant (WWTP), located in Kenai, Alaska, was surveyed for the presence of asbestos-containing materials (ACM) as a part of the Sludge Press Replacement Project for the City of Kenai. No other hazardous materials were included in this focused survey. Mr. Martin K. Schwan, Project Manager, of EHS-Alaska, Inc. (EHS-Alaska) conducted the inspections in May 2022. It will be the contractor's responsibility to take this baseline data, and to conduct hazardous materials removal in compliance with all regulatory requirements.

A. GENERALIZED REQUIREMENTS FOR HAZARDOUS MATERIALS

Potentially hazardous materials have been identified at the WWTP that will be affected by the proposed renovations. Those materials include asbestos, lead, polychlorinated bi-phenyls (PCBs), mercury, and radioactive materials. Not all materials were tested for potentially hazardous components, other potentially hazardous materials, including those exterior to the building, such as contamination from underground fuel tanks may be present, but are not part of this report.

Buildings or portions of buildings that were constructed prior to 1978 which are residences, or contain day care facilities, kindergarten classes or other activities frequently visited by children under 6 years of age are classified as *child occupied facilities*. All work which is NOT classified as "minor repair and maintenance activities" (as defined by the regulations), that takes place in the "*child occupied*" portions of facilities must comply with the requirements of 40 CFR 745. This building is not classified as a *child occupied facility* and therefore the requirements of 40 CFR 745 are not applicable.

Only the materials that will be directly affected by this project are required to be removed. It is the Contractor's responsibility to take this baseline data to coordinate and fully develop a hazardous materials removal design that will identify the presence, locations, and quantities of asbestos and/or other hazardous materials that will be affected by this project. The removal and disposal of potentially hazardous materials are highly regulated, and it is anticipated that removal and disposal of asbestos, lead and chemical hazards will be conducted by a subcontractor to the general contractor who is qualified for such removal. It is anticipated that the general contractor and other trades will be able to conduct their work using engineering controls and work practices to control worker exposure and to keep airborne contaminants out of occupied areas of the building.

Settled and concealed dusts in areas not subject to routine cleaning are present throughout the building, including the roof, and inside and on top of architectural, mechanical, electrical, and structural elements, and those dusts are assumed to contain regulated air contaminants. This should not be read to imply that there is an existing hazard to building occupants (normal occupants of the building as opposed to construction workers working in the affected areas). However, depending on the specific work items involved and on the means and methods employed when working in the affected areas, construction workers could be exposed to regulated air contaminants from those dusts in excess of the OSHA Permissible Exposure Limits (PELs).

The settled and concealed dusts were examined by an EPA Certified Building Inspector but were not sampled. The inspector determined that the dusts are not "asbestos debris" from an asbestos-containing building material (ACBM). Based on similar sampling from similar buildings, the inspector also determined that the dusts are unlikely to contain more than one percent (1%) asbestos by weight, and therefore are not an asbestos-containing material (ACM). Reference 40 CFR 763.83.

"Awareness training" (typically 2 hours) and possibly respiratory protection will be required for all Contractor Personnel who will be disturbing the dusts. The extent of the training and protective measures will depend upon the airborne concentrations measured during air monitoring of the contractors work force, which depends on the means and methods employed to control the dusts. The air monitoring may be discontinued following a "negative exposure assessment" showing that worker exposures are below the OSHA permissible exposure limits for the type of work and means and methods employed. Previous air monitoring from similar jobs with similar conditions may be used as historical data to establish a "negative exposure assessment."

B. BUILDING DESCRIPTION

The Kenai Waste Water Treatment Plant was reportedly constructed in 1971 of steel post and beams and metal siding. The roof is a built-up asphaltic roof over 2" rigid insulation on 11/2" steel deck. Giving the age of the building there is a potential that a previous re-roof occurred but the two roof cores taken during this survey were consistent with the 1971 drawings provided by the City of Kenai. The exposed underside was the 1/1/2" metal deck.

The west portion of the building has some areas with a spray-applied cellulose insulation on the underside of the roof deck and walls and two samples were collected which the lab reported as "none detected" for asbestos.

C. SAMPLING AND ANALYSIS

1. Asbestos-Containing Materials

The survey was limited to the areas of the roof where penetrations in support of the new sludge press were shown on the drawing provided by the City of Kenai and not all areas were included in this limited survey.

The samples were analyzed for the presence of asbestos using polarized light microscopy (PLM), analysis, as recommended by EPA, to determine the composition of suspected ACMs (EPA method 600/M4-82-020). Only materials containing more than 1% total asbestos were classified as "asbestos-containing" based on EPA and OSHA criteria. Samples analyzed to have less than 10% asbestos were "point-counted" by the laboratory for more accuracy. Samples listed as having a "Trace by Point Count" had asbestos fibers found in the material, but the fibers were not present at the counting grids. Table 1 in Part D below contains a summary list of the asbestos bulk samples and the applicable results.

The Bulk Asbestos samples were analyzed for asbestos content by International Asbestos Testing Laboratories (IATL), Mt. Laurel, New Jersey a National Voluntary Laboratory Accreditation Program (NVLAP) accredited laboratory.

EPA regulations under 40 CFR 763 require the use of PLM to determine whether or not a material contains asbestos. While PLM analysis does a good job for most materials, it does have some limitations. Fibers may be undetectable if their small size prevents visibility under a standard optical microscope, or if they are bound in an organic matrix to the point that the fibers are obscured. At the discretion of the building inspector and the client, some types of samples may be analyzed or re-analyzed by what is called Transmission Electron Microscopy for Non-Friable Organically Bound (TEM NOB) materials. TEM NOB analysis was not done for this project.

Field survey data sheets and laboratory reports of the bulk samples are included in Appendix A. Drawings showing sample locations are included as Appendix E.

2. Lead-Containing Materials

Nearly all surfaces in the building were coated with paint and most surfaces had been repainted but no testing of paints or sealants for lead was authorized for this project, and no sampling occurred.

no lead survey was included in the survey.

3. Testing of Paints and Sealants for PCB's

No testing of paints or sealants for PCB's was authorized for this project, and no sampling occurred.

D. SURVEY RESULTS

1. Asbestos-Containing Materials

The following Table 1A lists the samples taken in May 2022 in the WWTP, and the results of the laboratory analysis. Asbestos field survey data sheets and laboratory reports are included as Appendix A. Refer to Appendix B for sample locations sketch.

TABLE 1A

SAMPLE NUMBER	MATERIAL	LOCATION	ASBESTOS CONTENT
WTP0522-A01	Built-up roofing: L1 – Asphaltic rolled roofing, L2 underlayment, L3 underlayment. Not included L4 4" rigid foam, L5 fibrous thin layer of underlayment.	Roof Core: one 21/2" core from the center of the roof – Top layer L1 and L2 and L3. Photo 249	All 3 layers - None Detected
WTP0522-A02	L5 fibrous thin layer of underlayment, tar.	Roof Core: one 21/2" core from the center of the roof – Bottom layer L5.Photo 250	None Detected
WTP0522-A03	Pliable black tar	Roof: South side AHU, SW corner on built-up curb facing roof edge on base of AHU. Photo 259	None Detected
WTP0522-A04	Black tar, fiber board. Lab also reported black shingle.	Roof: South side AHU, just west of the SE corner on built-up curb facing roof edge on base of AHU. Photo 262	All 3 layers - None Detected
WTP0522-A05	Black tar	Roof: South side AHU, SE corner on east face of AHU above the built-up curb. Photo 263	None Detected
WTP0522-A06	Pliable black sealant	Roof: smaller (RA) housing east of the AHU, SW corner of metal housing above the built-up curb. Photo 264	None Detected
WTP0522-A07	Black glass tar. Lab also reported black shingle.	Roof: smaller (RA) housing east of the AHU, SW corner of metal housing on the built-up curb. Photo 264	Both layers - None Detected
WTP0522-A08	Soft Black Sealant	Roof: on duct between the AHU and the RA housing, top on seam. Photo 269	None Detected
WTP0522-A09	Black tar, asphaltic roofing. Lab also reported silver/black tar.	Roof: smaller (RA) housing east of the AHU, NW corner of metal housing on the built-up curb. Photo 274	All 3 layers - None Detected
WTP0522-A10	Built-up roofing: L1 – Asphaltic rolled roofing, L2 black tar, L3 underlayment. Not included L4 4" rigid foam, L5 fibrous thin layer of underlayment.	Roof Core: one 21/2" core from the area adjacent to AHU on the west side, north end – Top layer L1 and L2 and L3. Photo 277	All 4 layers - None Detected

SAMPLE NUMBER	MATERIAL	LOCATION	ASBESTOS CONTENT
WTP0522-A11	L5 fibrous thin layer of underlayment, tar.	Roof Core: one 21/2" core from the center of the roof – Bottom layer L5.Photo 277	Both layers - None Detected
WTP0522-A12	White seal sealant, putty-like	Roof: on seam of the outside air intake housing on the west side of the AHU. Photo 292	1.9% Chrysotile
WTP0522-A13	White spray-on fire proofing, fluffy – "cotton-like"	WWTP Office: East wall, left of the door above the electrical panel, above the GWB, at former wall penetrations. Photo 310	None Detected
WTP0522-A14	White spray-on fire proofing, fluffy – "cotton-like"	WWTP Office: East wall, left of the door above the electrical panel, above the GWB on steel post. Photo 311	None Detected

The testing method used (polarized light microscopy [PLM]) is not consistently reliable in detecting asbestos in floor coverings and similar non-friable organically bound materials. Before this material can be considered or treated as non-asbestos containing, confirmation should be made by quantitative transmission electron microscopy (TEM).

The following materials have been found to contain asbestos in this survey or were assumed to contain asbestos.

- 1. Roofing outside of the scope of this sampling (assumed asbestos).
- 2. Penetration Sealants (assumed asbestos).
- 3. White Putty-like seam sealant on AHU (confirmed asbestos).
- 4. Metal siding seam sealant (assumed asbestos).

The effects of the above asbestos-containing materials on the proposed renovation are discussed below.

Roofing

Roofing over this portion of the building is an asphaltic built-up roofing and all samples in the areas where penetrations will be made for the Sludge Press replacement were none detected for asbestos. However, there may be asbestos-containing roofing materials in areas which were not included in this limited survey. The roofing materials will be partially removed by this project.

Penetration Sealants

Doors, windows, and other penetrations of the exterior walls are assumed to contain an asbestos-containing sealant compound. An asbestos-containing sealant is assumed to be present around exterior door frames. The sealants are unlikely to be disturbed by this project.

AHU Seam Sealant

A white putty-like sealant on the AHU that will be affected by this project is asbestos-containing. These materials were in good condition but may become friable during removal or disassembly. The sealant will be partially removed by this project.

Metal Siding Sealants

There is a factory installed sealant located on the metal siding joints according to the building details provided by the City of Kenai. Previous testing of similar metal buildings in the same era have shown the sealant contains asbestos. The sealants are unlikely to be disturbed by this project.

2. Asbestos in Dusts

The settled and concealed dusts were examined by an EPA Certified Building Inspector but no samples for asbestos in dusts were authorized for this project. Based on their visual inspection and experience from

similar buildings, the inspector determined that the typical settled and concealed dusts are not "asbestos debris" from an asbestos-containing building material (ACBM). Based on similar sampling from similar buildings, the inspector also determined that the dusts are unlikely to contain more than one percent (1%) asbestos by weight, and therefore are not an asbestos-containing material (ACM).

3. Lead-Containing Materials

Lead-Testing

No lead paint testing was performed.

4. PCB-Containing Materials

Bulk Products

Some older paints, sealants and other building materials may contain measurable amounts of PCB's. PCB use in paints and sealants was supposed to have been discontinued in 1979. The EPA does not require the sampling of bulk products, and no sampling of "Bulk Products" were authorized for this project.

5. Mercury-Containing Materials

Fluorescent Lamps

Fluorescent lamps use mercury to excite the phosphor crystals that coat the inside of the lamp. These lamps contain from 15 to 48 milligrams of mercury depending on their age and manufacturer. No fluorescent light fixtures are scheduled to be replaced by this project.

All mercury-containing items being removed by this project are required to be disposed of as hazardous waste or recycled.

6. Other Hazardous Materials

This survey was limited in scope and therefore other hazardous materials may be present that were not part of this survey.

Soil Contamination

The scope of work for EHS-Alaska, Inc. did not include investigation of soils for petroleum or other contaminations.

E. REGULATORY CONSTRAINTS

1. Asbestos-Containing Materials

The Federal Occupational Safety and Health Administration (29 CFR 1926.1101) and the State of Alaska Department of Labor (8 AAC 61) have promulgated regulations requiring testing for airborne asbestos fibers; setting allowable exposure limits for workers potentially exposed to airborne asbestos fibers; establishing contamination controls, work practices, and medical surveillance; and setting worker certification and protection requirements. These regulations apply to all workplace activities involving asbestos-containing materials.

The EPA regulations, issued as Title 40 of the Code of Federal Regulations, Part 61 (40 CFR 61), Subpart M under the National Emission Standards for Hazardous Air Pollutants (NESHAP), established procedures for handling ACM during asbestos removal and waste disposal.

The EPA regulations require an owner (or the owner's contractor) to notify the EPA of asbestos removal operations and to establish responsibility for the removal, transportation, and disposal of asbestos-containing materials.

The disposal of asbestos waste is regulated by the EPA, the Alaska Department of Environmental Conservation, and the disposal site operator. Wastes being transported to the disposal site must be sealed in leak tight containers prior to disposal and must be accompanied by disposal permits and waste manifests.

2. Dusts with Asbestos

Settled and concealed dusts above ceilings, and at other areas that are not routinely cleaned (such as inside ducts and at roofs, etc.) are assumed to have measurable concentrations of asbestos. Based on sampling of similar settled and concealed dusts at similar buildings, those dusts are assumed to contain less than 1 percent asbestos. Normal settled and concealed dusts are distinct and treated differently from debris resulting from damaged asbestos-containing materials.

Background levels of asbestos in dusts for a particular location will depend on many factors, including whether or not asbestos occurs naturally in soils in the area.

Likely sources of asbestos in dusts include natural occurrences of asbestos

The types of asbestos found in settled and concealed dusts often contain actinolite, anthophyllite and tremolite forms of asbestos which are not commonly found in bulk samples taken of materials from buildings. Those forms of asbestos may come from natural occurrences of asbestos in an outside source, such as rock or ore deposits, which appear to be common in Alaska.

Because the type of disturbance, concentration of asbestos in the dusts, cohesiveness of the dusts and room sizes will change, the airborne asbestos levels expected during the project will depend on the contractor's means and methods of conducting the work. The mere presence of asbestos in the dusts does not necessarily imply that a "hazard" exists which would require the use of specially trained workers to "abate" the "hazard." All dusts will likely be required to be removed from the areas where asbestos-containing materials are being removed (abatement areas) in order to achieve clearances. The dusts in the other areas are to be controlled so as to limit worker exposures and prevent contamination of occupied areas of the building.

There is no established correlation between settled or adhered dusts with measurable concentrations of asbestos and airborne concentrations. The definition in the OSHA regulations of asbestos-containing materials as those materials that contain 1 percent or more asbestos by weight, apply to cohesive materials and not to dusts. The OSHA regulations are essentially "performance based," if workers are exposed above the permissible exposure limits, then all of the requirements in the regulations become effective.

3. Lead-Containing Materials

The EPA Standard 40 CFR 745, Lead-Based Paint Poisoning Prevention in Certain Residential Structures, defines lead-based paint hazards and regulates lead based paint activities in target housing and child-occupied facilities. The requirements of this regulation include training certification, pre-work notifications, work practice standards and record keeping. Areas typically classified as child occupied facilities may include but are not limited to day care facilities, preschools, kindergarten classrooms, restrooms, multipurpose rooms, cafeterias, gyms, libraries, and other areas routinely used by children under 6 years of age. Training requirements for Firms (Contractors) and Renovators (Workers) became effective on April 22, 2010. The building is not classified as a child occupied facility therefore the requirements of 40 CFR 745 do not apply.

The requirements apply to renovation, repair or painting activities that are NOT classified as "minor repair and maintenance activities" (as defined by the regulations), which take place in the "child occupied" portions of facilities. It is anticipated that only small amounts of lead based paint (if present) will be required to be disturbed for the Sludge Press replacement work, and the work would be classified as minor repair and maintenance activities, therefore most requirements of 40 CFR 745 do not apply.

4. PCB-Containing Materials

The EPA has promulgated regulations (40 CFR Part 761) that cover the proper handling and disposal of PCB-containing materials. If any PCB-containing equipment is discovered and if they will be removed, those materials are required to be disposed of at fully permitted hazardous waste facilities. The EPA regulates liquid PCBs differently from non-liquid materials. Workers who remove or handle PCB-containing or PCB-contaminated materials or who transport or dispose of PCB wastes must be trained and certified in hazardous waste operations and emergency response (HAZWOPER) as required by 29 CFR 1910.120 and the State of Alaska Department of Labor (8 AAC 61). The Department of Transportation under 49 CFR Parts 100-199 regulates the marking, packaging, handling, and transportation of hazardous materials. All federal, state, and local standards regulating PCBs and PCB waste must be followed during this project.

5. Mercury-Containing Materials

Thermostats and mercury-containing lamps are classified by the EPA as Universal Wastes. The EPA encourages that all Universal Wastes be recycled in accordance with 40 CFR 273. Mercury and mercury-containing products are considered hazardous waste if TCLP testing of the waste for mercury confirms the mercury content to be greater than the EPA criteria of 0.2 mg/l.

6. Other Hazardous Materials

Other hazardous materials to include refrigerants, chemicals, waste heat transfer fluids, radioactive materials were not part of this survey. If other hazardous materials are disturbed or removed during the Sludge Press installation, they shall be removed and disposed according to all regulations.

F. RECOMMENDATIONS

1. Asbestos-Containing Materials

The asbestos-containing materials identified in the building are typically in intact condition and are classified as non-friable ACM. All asbestos-containing materials that will be disturbed by the planned renovation work are required to be removed by trained asbestos workers. If any asbestos-containing materials are found that will be disturbed by the Sludge Press installation, they are required to be removed by trained asbestos workers.

2. Dusts with Asbestos

Dusts with measurable concentrations of asbestos are assumed to be present, but are not classified as asbestos-containing materials, or as debris from asbestos-containing materials. Workers disturbing dusts are required to have hazard communication training in accordance with OSHA regulations but are not required to receive 40 hours of training, which is required for asbestos workers. The contractor will need to choose means and methods to control worker exposures to airborne contaminants. At least an initial exposure assessment or data from previous air monitoring is needed to show that worker exposures are maintained below the OSHA permissible exposure limits (PELs).

3. Lead-Containing Materials

Federal OSHA (29 CFR 1926.62) and the State of Alaska (8 AAC Chapter 61) have promulgated regulations that apply to all construction work where employees may be exposed to lead, including disturbance of paints with low concentrations of lead.

4. PCB-Containing Materials

If any PCB-containing ballasts are discovered, and they are removed or replaced, they will need to be removed, handled, packaged, and disposed of in accordance with all regulations.

5. Mercury-Containing Materials

If any mercury-containing materials are removed or replaced, they will need to be removed, handled, packaged, and disposed of in accordance with all regulations. If mercury-containing lamps and thermostats are handled and disposed of in accordance with the Universal Waste Regulations, no TCLP test is required. If the Contractor chooses to perform a TCLP test of fluorescent lamps, the test shall be conducted in accordance with the requirements of ANSI/NEMA Standard Procedure for Fluorescent Lamp Sample Preparation and Toxicity Characteristic Leaching Procedure, C78.LL 1256-2003 or latest version.

6. Other Hazardous Materials

Although other hazardous materials were not included as part of this limited survey, if other hazardous materials are identified that will be disturbed as part of the Sludge Press replacement project, they will need to be removed, handled, packaged, and disposed of in accordance with all regulations.

G. LIMITATIONS

The conclusions and recommendations contained in this report are based upon professional opinions with regard to the subject matter. These opinions have been arrived at in accordance with currently accepted environmental consulting and engineering standards and practices and are subject to the following inherent limitations:

1. Accuracy of Information

The laboratory reports utilized in this assessment were provided by the accredited laboratories cited in this report. Although the conclusions, opinions, and recommendations are based in part, on such information, our services did not include the verification of accuracy or authenticity of such reports. Should such information provided be found to be inaccurate or unreliable, EHS-Alaska, Inc. reserves the right to amend or revise its conclusions, opinions, and/or recommendations.

2. Site Conditions

This limited survey did not include investigation of the entire site and may not be valid outside the area identified as the area where penetrations were proposed in support of the Sludge Press replacement project and was limited to testing for asbestos only. This survey is not intended to be utilized as the sole design document for abatement. The scope of work for this survey did not include identification of all potentially hazardous materials that may be present at this site such as lead, PCB's, mercury, and was limited to the scope of work agreed upon with our client. Although a concerted effort was made to identify those common hazardous materials likely to be affected by this project, some hazardous materials may not have been identified. Other asbestos-containing or potentially hazardous materials may be present in the facilities that were concealed by structural members, walls, ceilings, or floor coverings, or in materials where testing was not conducted.

3. Changing Regulatory Constraints

The regulations concerning hazardous materials are constantly changing, including the interpretations of the regulations by the local and national regulating agencies. Should the regulations or their interpretation be changed from our current understanding, EHS-Alaska, Inc. reserves the right to amend or revise its conclusions, opinions, and/or recommendations.

APPENDIX A

Asbestos Bulk Sample Field Survey Data Sheets and Laboratory Reports

RECEIVED



EHS-Alaska, Inc.

11901 Business Blvd., Suite 208, Eagle River, AK 99577 (907) 694-1383 • (907) 694-1382 fax

e-mail • ehsak@ehs-alaska.com

PROJECT NO:	PROJECT	NAME:		FACILITY:			COLI	LECTION E:
7933-01	COK V	WWTP - Kenai Roof Sampli	ng	Kenai WWTP Roof			05/0	05/2022
CHAIN OF CUSTODY RECORD								
ANALYSIS	ANALYSIS PLM BULK PLM DUST TEM BULK TYPE: TURNAROUND: DISPOSAL: QUANTITY							QUANTITY
			EAD PP		5 DAYS	NORM	AL	14
1 A Da			SPEC	CIAL INSTRUCTIONS / CO	MMENTS:		1	
COLLECTED BY (signature) Martin Schwan PRINTED NAME 20110842		SELECTED LABORATORY SAMPLES ACCEPTED BY	LAB: RETURN A SIGNED COPY OF THIS FORM WITH THE FINAL REPORT TO EHS-ALASKA, INC.			/ITH		
TA8-1219-13450 CERT# / AHERA#		DATECTIME 1 0 3000	 See sample location drawing for more detailed explanation locations. 		ation	of exact		
Fed Ex		ANALYST'S SIGNATURE	1 U	Jalon				
SHIPPING METHOD		Krillel	1,16	negra 5/17/22				
7768 5644 07 COURIER (signature)	7/9	DATE	epopolice.	0				
DATE/TIME 5/7/22	0945	+						

FIELD SURVEY DATA						
EHS SAMPLE NO. LAB ID NO	SAMPLE DESCRIPTION, (COLOR, MATERIAL TYPE, LAYERS, FRIABILITY)	LOCATION/COMMENTS (INCLUDING PHOTO/XREF)	RESULTS FOR EHS-ALASKA USE ONLY			
WTP0522-A01	Built-up roofing: L1 – Asphaltic rolled roofing, L2 underlayment, L3 underlayment. Not included L4 4" rigid foam, L5 fibrous thin layer of underlayment.	Roof Core: one 21/2" core from the center of the roof – Top layer L1 and L2 and L3. Photo 249	Black phuse Black the Black Underlaym - All NONE Selected			
WTP0522-A02 7424697	L5 fibrous thin layer of underlayment, tar.	Roof Core: one 21/2" core from the center of the roof – Bottom layer L5.Photo 250	None detected			
wtp0522-A03 7424698	Pliable black tar	Roof: South side AHU, SW corner on built-up curb facing roof edge on base of AHU. Photo 259	Nove			
WTP0522-A04 7424698	Black tar, fiber board. Lab also reported Bleests Shereze	Roof: South side AHU, just west of the SE corner on built-up curb facing roof edge on base of AHU. Photo 262	All 3 laye - None Delected			
WTP0522-A05	Black tar	Roof: South side AHU, SE corner on east face of AHU above the built-up curb. Photo 263	None Selecte			
WTP0522-A06 7424701	Pliable black sealant	up curb. Photo 264	None Acticles			
WTP0522-A07	Black glass tar, Lab also reported black Alinge	Roof: smaller (RA) housing east of the AHU, SW corner of metal housing on the built-up curb. Photo 264	Both layer Ware Seterke			
WTP0522-A08 3	Soft Black Sealant	Roof: on duct between the AHU and the RA housing, top on seam. Photo 269	Horse Detected			
WTP0522-A09	Black tar, asphaltic roofing. lab also	Roof: smaller (RA) housing east of the AHU, NW corner of metal housing on the built-up curb. Photo 274	All 3 laye. - Nory Detected			



EHS-Alaska, Inc.
11901 Business Blvd., Suite 208, Eagle River, AK 99577
(907) 694-1383 • (907) 694-1382 fax
e-mail • ehsak@ehs-alaska.com

PROJECT NO: 7933-01	PROJECT NAME: COK WWTP - Kenai Roof Sampling	FACILITY: Kenai WWTP Roof	COLLECTION DATE: 05/05/2022
1700 01	FIELD SURV		03/03/2022
EHS SAMPLE NO. LAB ID NO	SAMPLE DESCRIPTION, (COLOR, MATERIAL TYPE, LAYERS, FRIABILITY)	LOCATION/COMMENTS (INCLUDING PHOTO/XREF)	RESULTS FOR EHS-ALASKA USE ONLY
WTP0522-A10 7 4 2 4 7 0 5	Built-up roofing: L1 – Asphaltic rolled roofing, L2 underfayment, L3 underlayment. Not included L4 4" rigid foam, L5 fibrous thin layer of underlayment.	Roof Core: one 21/2" core from the area adjacent to AHU on the west side, north end – Top layer L1 and L2 and L3. Photo 277	All 4 large none Siterted
WTP0522-A11 7424706	L5 fibrous thin layer of underlayment, tar.	Roof Core: one 21/2" core from the center of the roof – Bottom layer L5.Photo 277	Both lies
WTP0522-412-7	White seal sealant, putty-like	Roof: on seam of the outside air intake housing on the west side of the AHU. Photo 292	109% Chrispolite
WTP0522-A13 7 () 8	White spray-on fire proofing, fluffy – "cotton-like"	WWTP Office: East wall, left of the door above the electrical panel, above the GWB, at former wall penetrations. Photo 310	Nont Delected None Setected
WTP0522-A14 7424709	White spray-on fire proofing, fluffy – "cotton-like"	WWTP Office: East wall, left of the door above the electrical panel, above the GWB on steel post. Photo 311	Dire
END	END	END	E
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9000 Commerce Parkway Suite B Mt. Laurel, New Jersey 08054 Telephone: 856-231-9449

Email: customerservice@iatl.com

CERTIFICATE OF ANALYSIS

Client: EHS Alaska Incorporated Report Date: 5/17/2022

11901 Business Blvd., Ste 208 Report No.: 660676 - PLM

Eagle River AK 99577 Project: COK WWTP - Kenai Rood Sampling

> Project No.: 7933-01

PLM BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 7424696 Analyst Observation: Black Shingle

Client Description: Built-Up Roofing: L1-Asphaltic Rolled Client No.: WTP0522-A01

Roofing, L2 Underlayment, L3 Underlayment. Not Included

Percent Asbestos: Percent Non-Asbestos Fibrous Material:

20 Fibrous Glass None Detected

Lab No.: 7424696(L2) **Analyst Observation:** Black Tar

Client No.: WTP0522-A01 Client Description: Built-Up Roofing: L1-Asphaltic Rolled

Roofing, L2 Underlayment, L3 Underlayment. Not Included

Percent Asbestos: Percent Non-Asbestos Fibrous Material:

None Detected None Detected

Lab No.: 7424696(L3) Analyst Observation: Black Underlayment

Client No.: WTP0522-A01 Client Description: Built-Up Roofing: L1-Asphaltic Rolled

Roofing, L2 Underlayment, L3 Underlayment. Not Included

L4 4"

Percent Asbestos: Percent Non-Asbestos Fibrous Material:

35 Fibrous Glass None Detected 20 Cellulose

Lab No.: 7424696(L4)

Analyst Observation: Black Underlayment

Client No.: WTP0522-A01 Client Description: Built-Up Roofing: L1-Asphaltic Rolled

Roofing, L2 Underlayment, L3 Underlayment. Not Included

L4 4"

Percent Asbestos: Percent Non-Asbestos Fibrous Material:

35 Cellulose None Detected

15 Fibrous Glass

Location: Roof Core: One 21/2" Core From The Center Of The Roof-Top Layer L1, L2,

L3. Photo 249

Facility:

Percent Non-Fibrous Material:

80

Location: Roof Core: One 21/2" Core From The Center Of The Roof-Top Layer L1, L2,

L3. Photo 249 **Facility:**

Percent Non-Fibrous Material:

100

Location: Roof Core: One 21/2" Core From

The Center Of The Roof-Top Layer L1, L2,

L3. Photo 249 **Facility:**

Percent Non-Fibrous Material:

Location: Roof Core: One 21/2" Core From The Center Of The Roof-Top Layer L1, L2,

L3. Photo 249 **Facility:**

Percent Non-Fibrous Material:

50

Please refer to the Appendix of this report for further information regarding your analysis.

Date Received:

5/10/2022

Date Analyzed:

05/17/2022

Signature: Analyst:

Daviel David Hayes

Approved By:

Frank E. Ehrenfeld, III Laboratory Director

Dated: 5/17/2022 4:45:16 Page 1 of 9

Dayen



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Email: customerservice@iatl.com

CERTIFICATE OF ANALYSIS

Client: EHS Alaska Incorporated Report Date: 5/17/2022

11901 Business Blvd., Ste 208 Report No.: 660676 - PLM

Eagle River AK 99577 Project: COK WWTP - Kenai Rood Sampling

> Project No.: 7933-01

PLM BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 7424697 **Analyst Observation:** Black Underlayment

Client No.: WTP0522-A02 **Client Description:** L5 Fibrous Thin Layer Of Underlayment, The Center Of The Roof-Bottom Layer L5.

Location: Roof Core: One 21/2" Core From

Photo 250 **Facility:**

Percent Non-Fibrous Material:

Percent Asbestos: Percent Non-Asbestos Fibrous Material:

40 Cellulose None Detected

15 Fibrous Glass

Analyst Observation: Black Tar **Location:** Roof South Side AHU. SW **Lab No.:** 7424698

Client No.: WTP0522-A03 **Client Description:** Pliable Black Tar Corner On Built-Up Curb Facing Roof Edge

On Base Of AHU. Photo 259

Facility:

45

Percent Asbestos: Percent Non-Asbestos Fibrous Material: Percent Non-Fibrous Material:

None Detected None Detected

Lab No.: 7424699 **Analyst Observation:** Black Tar

Client No.: WTP0522-A04 Client Description: Black Tar, Fiberboard

Location: Roof: South Side AHU, Just West Of The SE Corner On Built-Up Curb Facing

Roof Edge On Base Of AHU. P

Facility:

100

Percent Non-Asbestos Fibrous Material: Percent Non-Fibrous Material: Percent Asbestos:

None Detected None Detected

Lab No.: 7424699(L2) Analyst Observation: Black Shingle

Client Description: Black Tar, Fiberboard Client No.: WTP0522-A04

Of The SE Corner On Built-Up Curb Facing

Location: Roof: South Side AHU, Just West

Roof Edge On Base Of AHU. P

Facility:

Percent Asbestos: Percent Non-Asbestos Fibrous Material: Percent Non-Fibrous Material: 80

20 Fibrous Glass None Detected

Analyst Observation: Tan Fibrous **Lab No.:** 7424699(L3) Client No.: WTP0522-A04

Client Description: Black Tar, Fiberboard

Location: Roof: South Side AHU, Just West Of The SE Corner On Built-Up Curb Facing

Roof Edge On Base Of AHU. P

Facility:

Percent Asbestos: Percent Non-Asbestos Fibrous Material: Percent Non-Fibrous Material:

90 Cellulose None Detected

Please refer to the Appendix of this report for further information regarding your analysis.

5/10/2022 Date Received:

05/17/2022 Date Analyzed:

Deagen Signature:

David Hayes Analyst:

Approved By:

Frank E. Ehrenfeld, III Laboratory Director

Dated: 5/17/2022 4:45:17 Page 2 of 9



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Email: customerservice@iatl.com

CERTIFICATE OF ANALYSIS

Client: EHS Alaska Incorporated Report Date: 5/17/2022

11901 Business Blvd., Ste 208 Report No.: 660676 - PLM

Eagle River AK 99577 Project: COK WWTP - Kenai Rood Sampling

> Project No.: 7933-01

PLM BULK SAMPLE ANALYSIS SUMMARY

Analyst Observation: Black Tar Location: Roof: South Side AHU, SE **Lab No.:** 7424700

Client Description: Black Tar Client No.: WTP0522-A05 Corner On East Face Of AHU Above The

Built-Up Curb. Photo 263

Facility:

Percent Asbestos: Percent Non-Asbestos Fibrous Material: Percent Non-Fibrous Material:

None Detected 3 Cellulose

Analyst Observation: Black Sealant Location: Roof: Smaller (RA) Housing East **Lab No.:** 7424701

Client No.: WTP0522-A06 Client Description: Pliable Black Sealant Of The AHU, SW Corner Of Metal Housing

Above The Built-Up Curb. Phot

Facility:

Percent Asbestos: Percent Non-Asbestos Fibrous Material: Percent Non-Fibrous Material:

5 Cellulose None Detected

Lab No.: 7424702 **Analyst Observation:** Black Tar **Location:** Roof: Smaller (RA) Housing East

Client No.: WTP0522-A07 **Client Description:** Black Glass Tar Of The AHU, SW Corner Of Metal Housing

On The Built-Up Curb. Photo 2

Facility:

Percent Non-Fibrous Material: Percent Asbestos: Percent Non-Asbestos Fibrous Material:

3 Cellulose None Detected

Lab No.: 7424702(L2) **Analyst Observation:** Black Shingle Location: Roof: Smaller (RA) Housing East

Client No.: WTP0522-A07 Client Description: Black Glass Tar Of The AHU, SW Corner Of Metal Housing

On The Built-Up Curb. Photo 2

Facility:

Percent Non-Asbestos Fibrous Material: Percent Non-Fibrous Material: Percent Asbestos:

25 Fibrous Glass None Detected

Lab No.: 7424703 **Analyst Observation:** Black Sealant Location: Roof: On Duct Between The Client No.: WTP0522-A08

Page 3 of 9

Client Description: Soft Black Sealant AHU And The RA Housing, Top On Seam.

> Photo 269 **Facility:**

Percent Non-Asbestos Fibrous Material: Percent Non-Fibrous Material: Percent Asbestos:

None Detected 100 None Detected

Please refer to the Appendix of this report for further information regarding your analysis.

5/10/2022 Date Received:

05/17/2022 Date Analyzed:

Analyst:

Deceyen David Signature: David Hayes

Dated: 5/17/2022 4:45:17

Approved By:

Frank E. Ehrenfeld, III

Laboratory Director



9000 Commerce Parkway Suite B Mt. Laurel, New Jersey 08054 Telephone: 856-231-9449

Email: customerservice@iatl.com

CERTIFICATE OF ANALYSIS

Client: EHS Alaska Incorporated Report Date: 5/17/2022

11901 Business Blvd., Ste 208 Report No.: 660676 - PLM

Eagle River AK 99577 Project: COK WWTP - Kenai Rood Sampling

> Project No.: 7933-01

PLM BULK SAMPLE ANALYSIS SUMMARY

Analyst Observation: Black Tar Location: Roof: Smaller (RA) Housing East **Lab No.:** 7424704

Of The AHU, NW Corner Of Metal Housing Client No.: WTP0522-A09 **Client Description:** Black Tar, Asphaltic Roofing

On The Built-Up Curb. Photo 2

Facility:

Percent Asbestos: Percent Non-Asbestos Fibrous Material: Percent Non-Fibrous Material:

95 None Detected 5 Cellulose

Lab No.: 7424704(L2) Analyst Observation: Black Shingle Location: Roof: Smaller (RA) Housing East

Client No.: WTP0522-A09 Client Description: Black Tar, Asphaltic Roofing Of The AHU, NW Corner Of Metal Housing

On The Built-Up Curb. Photo 2

Facility:

Percent Asbestos: Percent Non-Asbestos Fibrous Material: Percent Non-Fibrous Material:

25 Fibrous Glass None Detected

Analyst Observation: Silver/Black Tar **Lab No.:** 7424704(L3) **Location:** Roof: Smaller (RA) Housing East Client No.: WTP0522-A09 Client Description: Black Tar, Asphaltic Roofing Of The AHU, NW Corner Of Metal Housing

On The Built-Up Curb. Photo 2

Facility:

Facility:

80

Percent Non-Asbestos Fibrous Material: Percent Asbestos: Percent Non-Fibrous Material:

3 Cellulose None Detected

Lab No.: 7424705 **Analyst Observation:** Black Shingle

Client No.: WTP0522-A10 Client Description: Built-Up Roofing: L1-Asphaltic Rolled The Area Adj To AHU On The West Side,

Roofing, L2 Underlayment, L3 Underlayment. Not Included

Percent Non-Asbestos Fibrous Material: Percent Asbestos:

20 Fibrous Glass None Detected

Lab No.: 7424705(L2) **Analyst Observation:** Black Tar

Client No.: WTP0522-A10 Client Description: Built-Up Roofing: L1-Asphaltic Rolled

Roofing, L2 Underlayment, L3 Underlayment. Not Included

L4 4"

Percent Non-Asbestos Fibrous Material: Percent Asbestos:

None Detected None Detected

Location: Roof Core: One 21/2" Core From The Area Adj To AHU On The West Side,

Location: Roof Core: One 21/2" Core From

North End-Top Layer L1, L2, L3.

North End-Top Layer L1, L2, L3.

Percent Non-Fibrous Material:

Facility:

Percent Non-Fibrous Material:

100

Please refer to the Appendix of this report for further information regarding your analysis.

5/10/2022 Date Received:

05/17/2022 Date Analyzed:

David Heagen Signature: David Hayes

Analyst:

Approved By:

Frank E. Ehrenfeld, III Laboratory Director

Dated: 5/17/2022 4:45:17 Page 4 of 9



Percent Asbestos:

9000 Commerce Parkway Suite B Mt. Laurel, New Jersey 08054 Telephone: 856-231-9449

Email: customerservice@iatl.com

CERTIFICATE OF ANALYSIS

Client: EHS Alaska Incorporated Report Date: 5/17/2022

11901 Business Blvd., Ste 208 Report No.: 660676 - PLM

Eagle River AK 99577 Project: COK WWTP - Kenai Rood Sampling

> Project No.: 7933-01

PLM BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 7424705(L3) Analyst Observation: Black Underlayment

Client Description: Built-Up Roofing: L1-Asphaltic Rolled Client No.: WTP0522-A10

Roofing, L2 Underlayment, L3 Underlayment. Not Included

Percent Non-Asbestos Fibrous Material:

30 Fibrous Glass None Detected

15 Cellulose

Lab No.: 7424705(L4) Analyst Observation: Black Underlayment

Client Description: Built-Up Roofing: L1-Asphaltic Rolled Client No.: WTP0522-A10

Roofing, L2 Underlayment, L3 Underlayment. Not Included

L4 4"

Percent Asbestos: Percent Non-Asbestos Fibrous Material:

45 Cellulose None Detected 15 Fibrous Glass

Analyst Observation: Black Underlayment **Lab No.:** 7424706

Client No.: WTP0522-A11 **Client Description:** L5 Fibrous This Layer Of Underlayment,

Tar

The Center Of The Roof-Bottom Layer L5.

Photo 277 **Facility:**

Facility:

40

Facility:

55

Percent Asbestos: Percent Non-Asbestos Fibrous Material: 45 Cellulose

None Detected 15 Fibrous Glass

Lab No.: 7424706(L2) Analyst Observation: Black Tar

Client No.: WTP0522-A11 Client Description: L5 Fibrous This Layer Of Underlayment,

Location: Roof Core: One 21/2" Core From

Location: Roof Core: One 21/2" Core From

Location: Roof Core: One 21/2" Core From

Location: Roof Core: One 21/2" Core From

The Area Adj To AHU On The West Side,

The Area Adj To AHU On The West Side,

North End-Top Layer L1, L2, L3.

North End-Top Layer L1, L2, L3.

Percent Non-Fibrous Material:

Percent Non-Fibrous Material:

Percent Non-Fibrous Material:

The Center Of The Roof-Bottom Layer L5.

Photo 277 **Facility:**

Percent Non-Asbestos Fibrous Material: Percent Asbestos: Percent Non-Fibrous Material:

5 Cellulose None Detected

Please refer to the Appendix of this report for further information regarding your analysis.

5/10/2022 Date Received:

05/17/2022 Date Analyzed:

Decyen Daverel Signature:

David Hayes Analyst:

Dated: 5/17/2022 4:45:17

Approved By:

Frank E. Ehrenfeld, III Laboratory Director

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None Detected

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CERTIFICATE OF ANALYSIS

Client: EHS Alaska Incorporated Report Date: 5/17/2022

11901 Business Blvd., Ste 208 Report No.: 660676 - PLM

Eagle River AK 99577 Project: COK WWTP - Kenai Rood Sampling

> Project No.: 7933-01

PLM BULK SAMPLE ANALYSIS SUMMARY

Analyst Observation: White/Black Sealant Location: Roof: On Seam Of The Outside **Lab No.:** 7424707

Client Description: White Seal Sealant, Putty-Like Air Intake Housing On The West Side Of Client No.: WTP0522-A12

The AHU. Photo 292

Location: WWTP Office: East Wall, Left Of

Frank E. Ehrenfeld, III

Facility: Percent Asbestos: Percent Non-Asbestos Fibrous Material: Percent Non-Fibrous Material:

PC 1.9 Chrysotile None Detected 98.1

Lab No.: 7424708 Analyst Observation: White Spray-On Fireproofing Location: WWTP Office: East Wall, Left Of

Client No.: WTP0522-A13 Client Description: White Spray-On Fireproofing, Fluffy-The Door Above The Electrical Panel,

Cotton Like Above The GWB, At Former Wall P

Facility: Percent Non-Asbestos Fibrous Material:

Percent Asbestos: Percent Non-Fibrous Material: 80 Cellulose None Detected

10 Fibrous Glass

Analyst Observation: White Spray-On Fireproofing Lab No.: 7424709

Client Description: White Spray-On Fireproofing, Fluffy-Client No.: WTP0522-A14 The Door Above The Electrical Panel,

> Cotton Like Above The GWB On Steel Post. Ph

Facility:

Percent Non-Asbestos Fibrous Material: Percent Non-Fibrous Material: Percent Asbestos:

80 Cellulose 10 Fibrous Glass

Please refer to the Appendix of this report for further information regarding your analysis.

5/10/2022 Date Received:

05/17/2022 Date Analyzed:

Dated: 5/17/2022 4:45:17

Signature: David Hayes Analyst:

Decyen Davice Laboratory Director

Approved By:

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Email: customerservice@iatl.com

CERTIFICATE OF ANALYSIS

Client: EHS Alaska Incorporated Report Date: 5/17/2022

11901 Business Blvd., Ste 208 Report No.: 660676 - PLM

Eagle River AK 99577 Project: COK WWTP - Kenai Rood Sampling

Project No.: 7933-01

Client: EHS511

Appendix to Analytical Report

Customer Contact: Cali Swatlowski

Method: 40 CFR Appendix E to Subpart E of Part 763, interim method for the Determination of Asbestos in Bulk Insulation Samples, USEPA 600, R93-116 and NYSDOH ELAP 198.1 as needed.

This appendix seeks to promote greater understanding of any observations, exceptions, special instructions, or circumstances that the laboratory needs to communicate to the client concerning the above samples. The information below is used to help promote your ability to make the most informed decisions for you and your customers. Please note the following points of contact for any questions you may have.

iATL Customer Service: customerservice@iatl.com iATL Office Manager:wchampion@iatl.com iATL Account Representative: Semih Kocahasan Sample Login Notes: See Batch Sheet Attached Sample Matrix: Bulk Building Materials Exceptions Noted: See Following Pages

General Terms, Warrants, Limits, Qualifiers:

General information about iATL capabilities and client/laboratory relationships and responsibilities are spelled out in iATL policies that are listed at www.iATL.com and ir our Quality Assurance Manual per ISO 17025 standard requirements. The information therein is a representation of iATL definitions and policies for turnaround times, sample submittal, collection media, blank definitions, quantification issues and limit of detection, analytical methods and procedures, sub-contracting policies, results reporting options, fees, terms, and discounts, confidentiality, sample archival and disposal, and data interpretation.

iATL warrants the test results to be of a precision normal for the type and methodology employed for each sample submitted. iATL disclaims any other warrants, expressed or implied, including warranty of fitness for a particular purpose and warranty of merchantability. iATL accepts no legal responsibility for the purpose for which the client uses test results. Any analytical work performed must be governed by our Standard Terms and Conditions. Prices, methods and detection limits may be changed without notification. Please contact your Customer Service Representative for the most current information.

This confidential report relates only to those item(s) tested and does not represent an endorsement by NIST-NVLAP, AIHA LAP LLC, or any agency of local, state or province governments nor of any agency of the U.S. government.

This report shall not be reproduced except in full, without written approval of the laboratory.

Information Pertinent to this Report:

Analysis by US EPA 600 93-116: Determination of Asbestos in Bulk Building Materials by Polarized Light Microscopy (PLM).

Certifications:

- NIST-NVLAP No. 101165-0
- NYSDOH-ELAP No. 11021
- AIHA-LAP, LLC No. 100188

Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. PC Trace represents a <0.25% amount. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

Analytical Methodology Alternatives: Your initial request for analysis may not have accounted for recent advances in regulatory requirements or advances in technology that are routinely used in similar situations for other qualified projects. You may have the option to explore additional analysis for further information. Below are a few options, listed as the matrix followed by the appropriate methodology. Also included are links to more information on our website.

Bulk Building Materials that are Non-Friable Organically Bound (NOB) by Gravimetric Reduction techniques employing PLM and TEM: ELAP 198.6 (PLM-NOB), ELAP 198.4 (TEM-NOB) See additional information at the end of this appendix.

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CERTIFICATE OF ANALYSIS

Client: EHS Alaska Incorporated Report Date: 5/17/2022

11901 Business Blvd., Ste 208 Report No.: 660676 - PLM

Eagle River AK 99577 Project: COK WWTP - Kenai Rood Sampling

Project No.: 7933-01

Client: EHS511

Loose Fill Vermiculite Insulation, Attic Insulation, Zonolite (copyright), etc.: US EPA 600 R-4/004 (multi-tiered analytical process) Sprayed On Insulation/Fireproofing with Vermiculite (SOF-V): ELAP 198.8 (PLM-SOF-V)

Soil, sludge, sediment, aggregate, and like materials analyzed for asbestos or other elongated mineral particles (ex. erionite, etc.): ASTM D7521, CARB 435, and other options available

Asbestos in Surface Dust according to one of ASTM's Methods (very dependent on sampling collection technique - by TEM): ASTM D 5755, D5756, or D6480

Various other asbestos matrices (air, water, etc.) and analytical methods are available.

Disclaimers / Qualifiers:

There may be some samples in this project that have a "NOTE:" associated with a sample result. We use added disclaimers or qualifiers to inform the client about something that requires further explanation. Here is a list with highlighted disclaimers that may be pertinent to this project. For a full explanation of these and other disclaimers, please inquire at **customerservice@iatl.com**.

- 1) Note: No mastic provided for analysis.
- 2) Note: Insufficient mastic provided for analysis.
- 3) Note: Insufficient material provided for analysis.
- 4) Note: Insufficient sample provided for QC reanalysis.
- 5) Note: Different material than indicated on Sample Log / Description.
- 6) Note: Sample not submitted.
- 7) Note: Attached to asbestos containing material.
- 8) Note: Received wet.
- 9) Note: Possible surface contamination.
- 10) Note: Not building material. 1% threshold may not apply.
- 11) Note: Recommend TEM-NOB analysis as per EPA recommendations.
- 12) Note: Asbestos detected but not quantifiable.
- 13) Note: Multiple identical samples submitted, only one analyzed.
- 14) Note: Analyzed by EPA 600/R-93/116. Point Counting detection limit at 0.080%.
- 15) Note: Analyzed by EPA 600/R-93/116. Point Counting detection limit at 0.125%.
- 16) Note: This sample contains >10% vermiculite mineral. See Appendix for Recommendations for Vermiculite Analysis.

Recommendations for Vermiculite Analysis:

Several analytical protocols exist for the analysis of asbestos in vermiculite. These analytical approaches vary depending upon the nature of the vermiculite mineral being tested (e.g. un-processed gange, homogeneous exfoliated books of mica, or mixed mineral composites). Please contact your client representative for pricing and turnaround time options available.

iATL recommends initial testing using the EPA 600/R-93/116 method. This method is specifically designed for the analysis of asbestos in bulk building materials. It provides an acceptable starting point for primary screening of vermiculite for possible asbestos.

Results from this testing may be inconclusive. EPA suggests proceeding to a multi-tiered analysis involving wet separation techniques in conjunction with PLM and TEM gravimetric analysis (EPA 600/R-04/004).

For New York State customers, NYSDOH requires disclaimers and qualifiers for various vermiculite containing samples that direct analysis via ELAP198.6 and ELAP198.8 for samples that contain >10% vermiculite mineral where ELAP198.6 may be used to evaluate the asbestos content of the material. However, any test result using ELAP198.6 will be reported with the following disclaimer: "ELAP198.6 method does not remove vermiculite and may underestimate the level of asbestos present in a sample containing >10% vermiculite."

Further information on this method and other vermiculite and asbestos issues can be found at the following: Agency for Toxic Substances and Disease Registry (ATSDR) www.atsdr.cdc.gov, United States Geological Survey (USGS) www.minerals.usgs.gov/minerals/, US EPA www.epa.gov/asbestos. The USEPA also has an informative brochure "Current Best Practices for Vermiculite Attic Insulation" EPA 747F03001 May 2003, that may assist the health and remediation professional. NYS customers please follow current NYSDOH ELAP requirements per policy on subject of surfacing and vermiculite, May 6, 2016, Testing Requirements for Surfacing Material Containing Vermiculite (https://www.wadsworth.org/sites/default/files/WebDoc/1198_8_02_2.pdf)

The following is a summary of the analytical process outlines in the EPA 600/R-04/004 Method:

1) Analytical Step/Method: Initial Screening by PLM, EPA 600R-93/116

Requirements/Comments: Minimum of 0.1 g of sample. \sim 0.25% for most samples.

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CERTIFICATE OF ANALYSIS

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11901 Business Blvd., Ste 208 Report No.: 660676 - PLM

Eagle River AK 99577 Project: COK WWTP - Kenai Rood Sampling

Project No.: 7933-01

2)Analytical Step/Method: Wet Separation by PLM Gravimetric Technique, EPA R-04/004 Requirements/Comments: Minimum 50g** of dry sample. Analysis of "Sinks" only.

3) **Analytical Step/Method:** Wet Separation by PLM Gravimetric Technique, EPA R-04/004 **Requirements/Comments:** Minimum 50g** of dry sample. Analysis of "Floats" only.

4) **Analytical Step/Method:** Wet Separation by TEM Gravimetric Technique, EPA R-04/004 **Requirements/Comments:** Minimum 50g** of dry sample. Analysis of "Sinks" only.

5)Analytical Step/Method: Wet Separation by TEM Gravimetric Technique, EPA R-04/004 Requirements/Comments: Minimum 50g** of dry sample. Analysis of "Suspension" only.

*With advance notice and confirmation by the laboratory.

New York State Department of Health requires that samples originating from NYS that they categorize as Non-friable Organically Bound materials can only be confirmed as None Detected for asbestos by method 198.4. See the table below for a list of those materials. (ENVIRONMENTAL LABORATORY APPROVAL PROGRAM CERTIFICATION MANUAL - ITEM No. 198.1, Revision Date 5/6/16)

*Asphalt Shingles, Caulking, Ceiling Tiles with Cellulose, Duct Wrap, Glazing, Mastic, Paint Chips, Resilient Floor Tiles, Rubberized Asbestos Gaskets, Siding Shingles, Vinyl Asbestos Tile, NOB materials (other that SM-V) with <10% vermiculite, Any material (Friable or NOB other than SM-V) with >10% vermiculite.

Statistically derived uncertainty with any measure should be taken into consideration when reviewing and interpreting all reported data and results. A more comprehensive listing of accuracy, precision, and uncertainty as it impacts this method is available upon request.

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^{**}Approximately 1 Liter of sample in double-bagged container (~9x6 inch bag of sample).

APPENDIX B

Sketch of Sample Locations

