SUBMITTAL SHEET

Dondlinger Construction
120036- - COW -WWTP II -Final Clarifier Replacement

Project: 120036-
COW -WWTP II -Final Clarifier Replacement
2305 E. 57th Street South Tim Helten at 316-650-2029
Wichita, KS
67216

Spec Section Num: 112300
Submittal: 112300-02
Revision: 0
Package: Equipment
Date: 10/4/2021 UTC

Received From:

Submittal Title: Clarifier Control Panels
Submittal Detail: 4 - 160' C4D-CMD Clarifiers
Response Due By: 10/8/2021 UTC

Contractor:
Adam Doll
Dondlinger Construction

Contractor's Stamp

DONDLINGER AND SONS CONST. CO., INC.

[X] Reviewed Adam D. Doll
[ ] Reviewed as Noted
[ ] Revise and Resubmit
[X] Date 10/01/2020
[X] Submittal No. 112300-02

REVIEW OF ITEMS DOES NOT RELIEVE VENDOR FROM COMPLYING WITH REQUIREMENTS OF CONTRACT PLANS AND SPECIFICATIONS, CONTRACT AND CITY, STATE AND LOCAL CODES.

Architect:
Keith Scarberry
MKEC ENGINEERING, INC.

Architect's Stamp

Response:
Comment:

MKEC ENGINEERING CONSULTANTS, INC.
411 N. WEBB RD. WICHITA, KS 67206

☐ Reviewed ☐ Incomplete

☑ Reviewed as Noted ☐ Revise and Resubmit

☐ Not Reviewed ☐ Rejected

Reviewed for conformance with the design concept of the Project and compliance with the information given in the Contract documents. Contractor is responsible for: dimensions to be confirmed and correlated at the job site; for information that pertains solely to the fabrication process or to techniques of construction; and for coordination of work of all other trades.

BY DAS DATE 10-08-202

MKEC ENGINEERING SUCCESS

MKEC SUBMITTAL REVIEW

Project Name: COW FINAL CLARIFIER REPLACEMENT

Description:

OVIVO CONTROL PANEL SUBMITTAL

Comments:

CLARIFIER CONTROL PANEL REVIEWED WITH NO CHANGES.
CITY OF WICHITA WILL SELECT REMOTE SIGNALS TO ACTIVATE AND THOSE TO REMAIN INACTIVE.

Ovivo USA, LLC
4246 S. Riverboat Rd., Suite 300
Salt Lake City, Utah
84123
USA

Telephone: 801.931.3000
Facsimile: 801.931.3080

www.ovivowater.com

Your Purchase Order No: 120036-001

September 23, 2021

Dondlinger & Sons Construction
PO Box 398
2656 S Sheridan

ATTN: Adam Doll

Enclosed are documents pertaining to your order. A description of the documents and their submittal codes are shown on the attached "Submittal Information and Conditions" sheet.

Please note the "Required Return Date" highlighted.

After you review the documents submitted "For Approval" or "Revised for Approval," please make your approval comments, sign one copy of each document, and return them as specified below.

Electronic Copies:	**Todd.Gneiting@ovivowater.com**
Hard Copies:	**Ovivo USA, LLC** **4246 S. Riverboat Rd., Suite 300** **Salt Lake City, UT 84123** **ATTN: Todd Gneiting**

Documents being submitted as "Revised for Final," "Final Certified," or "For Information Only" need not be returned and are submitted for your records and distribution.

Sincerely,
Ovivo USA, LLC
Todd Gneiting

Project Manager

CC: Environmental Process Equipment (EPEC)

Ovivo USA, LLC
4246 S. Riverboat Rd., Suite 300
Salt Lake City, Utah
84123
USA

Telephone: 801.931.3000
Facsimile: 801.931.3080

www.ovivowater.com

OVIVO
Worldwide Experts in Water Treatment

September 23, 2021 | **Submittal Rev.: A**

SUBMITTAL INFORMATION PREPARED FOR:

Dondlinger & Sons Construction
PO Box 398
2656 S Sheridan

Project Name:
Wichita WWTP-II, KS

Project Location:
Wichita, KS

Equipment Type:
4 - 160' C4D-CMD Clarifiers

Specification Section:
0

Consulting Engineer:
NA

Customer Order No.: 120036-001

OVIVO Sales Order No.: CSW0001517-01

Ovivo USA, LLC
4246 S. Riverboat Rd., Suite 300
Salt Lake City, Utah
84123
USA

Telephone: 801.931.3000
Facsimile: 801.931.3080

www.ovivowater.com

OVIVO
Worldwide Experts in Water Treatment

SUBMITTAL INFORMATION AND CONDITIONS

Submittal Date:	23-Sep-2021	Rev.:	A	Indicates Revision

		# Copies
Submittal In Response To:	Customer Order	Print: -
Required Return Date:	1-Oct-2021	Email: N/A
Customer P.O. Number:	120036-001	CD's: N/A
OVIVO Sales Order Number:	CSW0001517-01	Other: N/A

SUBMITTAL CODE KEY

XXX	1. For Approval
	2. Revised for Approval
	3. Revised for Final Record
	4. Final Certified
XXX	5. For Information Only

ENTER

DOCUMENT NO.	DESCRIPTION	CURRENT REV. LEVEL	SUBMIT CODE
(2) Pages	PM Cover Letter		5
(52) Pages	Control Panel Cutsheets	A	1
CSW1517-121	Control Panel	A	1

Indicates revision from previous submittal	Engineering Change Order #:	ECO-S-017778

REMARKS AND EXPLANATION

Ovivo USA, LLC
4246 S. Riverboat Rd., Suite 300
Salt Lake City, Utah
84123
USA

Telephone: 801.931.3000
Facsimile: 801.931.3080

www.ovivowater.com

TABLE OF CONTENTS

TAB

Ovivo USA, LLC
4246 S. Riverboat Rd., Suite 300
Salt Lake City, Utah
84123
USA

Telephone: 801.931.3000
Facsimile: 801.931.3080

www.ovivowater.com

OVIVO
Worldwide Experts in Water Treatment

SUBMITTAL DATA SHEET

PROJECT NAME_____ Wichita WWTP-II, KS

LOCATION _____ Wichita, KS

CUSTOMER _____ Dondlinger & Sons Construction

CUSTOMER P.O. NUMBER _____ 120036-001

OVIVO S.O. NUMBER _____ CSW0001517-01

EQUIPMENT DESCRIPTION _____ 4 - 160' C4D-CMD Clarifiers

SPECIFICATION SECTION _____ 0

CONSULTING ENGINEER _____ NA

ITEM DESCRIPTION UNDER THIS COVER:

PM COVER LETTER..... (2) Pages

CSW0001517-01 ~ For Information Only ~ 9.23.2021

Ovivo USA, LLC
4246 S. Riverboat Rd., Suite 300
Salt Lake City, Utah
84123
USA

Telephone: 801.931.3000
Facsimile: 801.931.3080

www.ovivowater.com

September 23, 2021

Dondlinger & Sons Construction
PO Box 398
2656 S Sheridan

ATTN: Adam Doll

Project Name:	Wichita WWTP-II, KS
Customer Order No.:	120036-001
Ovivo Sales Order No.:	CSW0001517-01
Equipment Description:	4 - 160' C4D-CMD Clarifiers

Dear Adam,

I am the Ovivo USA project manager for the Clarifier portion of the above referenced project. I will be your first point of contact at Ovivo for submittal and technical questions, scheduling, and all project matters regarding this equipment. You may reach me directly at (801) 931-3024 or via email at Todd.Gneiting@ovivowater.com.

We thank you for your order and look forward to a mutually beneficial project. Enclosed with this cover letter is the initial submittal for review and subsequent approval of the clarifier equipment. The following schedule is anticipated for the project:

Subsequent to this cover letter is Ovivo's scope of supply for the above referenced equipment, followed by specification deviations and/or clarifications regarding the submittal package.

The submittal package provided herein is complete and accurate to the best of my knowledge. All products submitted meet requirements of the standards referenced. I hope to resolve any concerns or questions in a timely manner so as to expedite the approval process and move the equipment into detailing and fabricating. If Ovivo can do anything to help accelerate the approval process, please let me know.

If you have any questions or concerns regarding this correspondence please contact me at (801) 931-3024, or via email, Todd.Gneiting@ovivowater.com, at your convenience.

Sincerely,
Ovivo USA, LLC

Ovivo USA, LLC
4246 S. Riverboat Rd., Suite 300
Salt Lake City, Utah
84123
USA

Telephone: 801.931.3000
Facsimile: 801.931.3080

www.ovivowater.com

Todd Gneiting
Sedimentation Project Manager

Cc: M Rudy, Environmental Process Equipment (EPEC)
Cedric Sirantoine, Ovivo USA

Ovivo USA, LLC
4246 S. Riverboat Rd., Suite 300
Salt Lake City, Utah
84123
USA

Telephone: 801.931.3000
Facsimile: 801.931.3080

www.ovivowater.com

OVIVO
Worldwide Experts in Water Treatment

SUBMITTAL DATA SHEET

PROJECT NAME_____ Wichita WWTP-II, KS

LOCATION _____ Wichita, KS

CUSTOMER _____ Dondlinger & Sons Construction

CUSTOMER P.O. NUMBER _____ 120036-001

OVIVO S.O. NUMBER _____ CSW0001517-01

EQUIPMENT DESCRIPTION _____ 4 - 160' C4D-CMD Clarifiers

SPECIFICATION SECTION _____ 0

CONSULTING ENGINEER _____ NA

ITEM DESCRIPTION UNDER THIS COVER:

CONTROL PANEL CUTSHEETS..... (52) Pages

CSW0001517-01 ~ For Approval ~ 9.23.2021

CONTINUOUS HINGE WITH CLAMPS, TYPE 4X

APPLICATION

For use in indoor and outdoor corrosive environments that require a water-tight seal, this enclosure's seamless foam-in-place gasket and screw-down clamps provide a secure seal against contaminants.

SPECIFICATIONS

- 14 gauge Type 304 or Type 316L stainless steel bodies and doors
- Seams continuously welded and ground smooth
- Seamless foam-in-place gasket
- Rolled lip around three sides of door
- Stainless steel door clamp assembly
- Hasp and staple for padlocking
- Door removed 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

FINISH

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

ACCESSORIES

Fast-Operating Clamp Assembly
Panels for Type 3R, 4, 4X, 12 and 13 Enclosures
Junction Box and Wall-Mount Enclosure Swing-Out Panel Kit
Steel, Stainless Steel and Non-Metallic Window Kits
H2OMIT Vent Drains, Type 4X
H2OMIT Thermoelectric Dehumidifier
Steel, Stainless Steel and Non-Metallic Window Kits
PANELITE Enclosure Lights
Hol-Sealers Hole Seals
Themoelectric Temperature Controller

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 3, 3R, 4, 4X, 12, 13
CSA File No. 42186: Type 4, 4X, 12
IEC 60529, IP66
Meets NEMA Type 3RX requirements

MODIFICATION AND CUSTOMIZATION

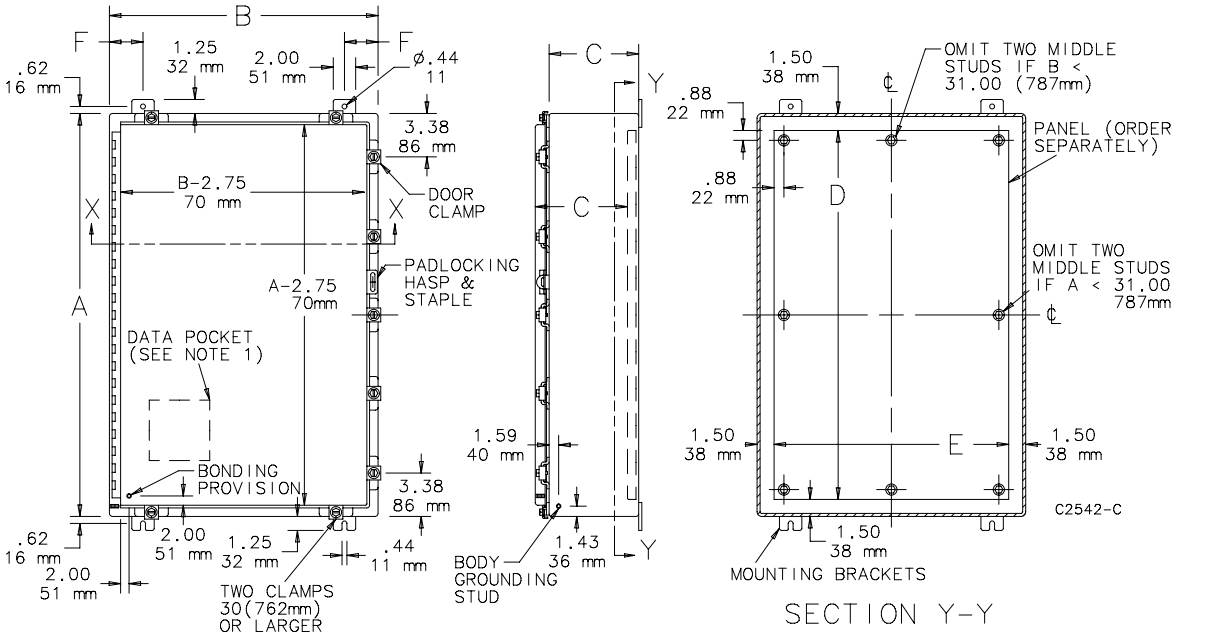
Hoffman excels at modifying and customizing products to your specifications. Contact your local Hoffman sales office or distributor for complete information.

BULLETIN: A4S

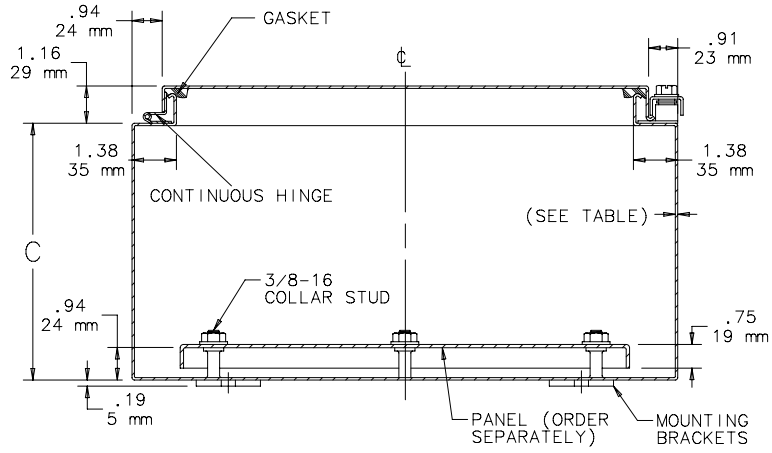
Standard Product

Catalog Number	AxBxC in./mm	Stainless Steel Type	Steel Panel	Conductive Steel Panel	Stainless Steel Panel	Panel Size D x E in./mm	F in./mm	Clamps Qty.	Data Pocket
A16H1206SSLP	16.00 x 12.00 x 6.00 406 x 305 x 152	304	A16P12	A16P12G	A16P12SS6	13.00 x 9.00 330 x 229	1.25 32	4	Small
A16H1206SS6LP	16.00 x 12.00 x 6.00 406 x 305 x 152	316L	A16P12	A16P12G	A16P12SS6	13.00 x 9.00 330 x 229	1.25 32	4	Small
A16H1606SSLP	16.00 x 16.00 x 6.00 406 x 406 x 152	304	A16P16	A16P16G	A16P16SS6	13.00 x 13.00 330 x 330	3.00 76	4	Small
A16H1606SS6LP	16.00 x 16.00 x 6.00 406 x 406 x 152	316L	A16P16	A16P16G	A16P16SS6	13.00 x 13.00 330 x 330	3.00 76	4	Small
A16H2006SSLP	16.00 x 20.00 x 6.00 406 x 508 x 152	304	A20P16	A20P16G	A20P16SS6	17.00 x 13.00 432 x 330	3.00 76	4	Small
A16H2006SS6LP	16.00 x 20.00 x 6.00 406 x 508 x 152	316L	A20P16	A20P16G	A20P16SS6	17.00 x 13.00 432 x 330	3.00 76	4	Small
A20H1606SSLP	20.00 x 16.00 x 6.00 508 x 406 x 152	304	A20P16	A20P16G	A20P16SS6	17.00 x 13.00 432 x 330	3.00 76	4	Small
A20H1606SS6LP	20.00 x 16.00 x 6.00 508 x 406 x 152	316L	A20P16	A20P16G	A20P16SS6	17.00 x 13.00 432 x 330	3.00 76	4	Small
A20H2006SSLP	20.00 x 20.00 x 6.00 508 x 508 x 152	304	A20P20	A20P20G	A20P20SS6	17.00 x 17.00 432 x 432	3.00 76	4	Small
A20H2006SS6LP	20.00 x 20.00 x 6.00 508 x 508 x 152	316L	A20P20	A20P20G	A20P20SS6	17.00 x 17.00 432 x 432	3.00 76	4	Small
A24H2006SSLP	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	3.00 76	5	Small
A24H2006SS6LP	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	3.00 76	5	Small
A24H2406SSLP	24.00 x 24.00 x 6.00 610 x 610 x 152	304	A24P24	A24P24G	A24P24SS6	21.00 x 21.00 533 x 533	3.00 76	5	Small
A24H2406SS6LP	24.00 x 24.00 x 6.00 610 x 610 x 152	316L	A24P24	A24P24G	A24P24SS6	21.00 x 21.00 533 x 533	3.00 76	5	Small

Catalog Number	AxBxC in./mm	Stainless Steel Type	Steel Panel	Conductive Steel Panel	Stainless Steel Panel	Panel Size D x E in./mm	F in./mm	Clamps Qty.	Data Pocket
A16H1208SSLP	16.00 x 12.00 x 8.00 406 x 305 x 203	304	A16P12	A16P12G	A16P12SS6	13.00 x 9.00 330 x 229	1.25 32	4	Small
A16H1208SS6LP	16.00 x 12.00 x 8.00 406 x 305 x 203	316L	A16P12	A16P12G	A16P12SS6	13.00 x 9.00 330 x 229	1.25 32	4	Small
A20H1608SSLP	20.00 x 16.00 x 8.00 508 x 406 x 203	304	A20P16	A20P16G	A20P16SS6	17.00 x 13.00 432 x 330	3.00 76	4	Small
A20H1608SS6LP	20.00 x 16.00 x 8.00 508 x 406 x 203	316L	A20P16	A20P16G	A20P16SS6	17.00 x 13.00 432 x 330	3.00 76	4	Small
A20H2008SSLP	20.00 x 20.00 x 8.00 508 x 508 x 203	304	A20P20	A20P20G	A20P20SS6	17.00 x 17.00 432 x 432	3.00 76	4	Small
A20H2008SS6LP	20.00 x 20.00 x 8.00 508 x 508 x 203	316L	A20P20	A20P20G	A20P20SS6	17.00 x 17.00 432 x 432	3.00 76	4	Small
A20H2408SSLP	20.00 x 24.00 x 8.00 508 x 610 x 203	304	A24P20	A24P20G	A24P20SS6	21.00 x 17.00 533 x 432	3.00 76	4	Small
A20H2408SS6LP	20.00 x 24.00 x 8.00 508 x 610 x 203	316L	A24P20	A24P20G	A24P20SS6	21.00 x 17.00 533 x 432	3.00 76	4	Small
A24H1608SSLP	24.00 x 16.00 x 8.00 610 x 406 x 203	304	A24P16	A24P16G	A24P16SS6	21.00 x 13.00 533 x 330	3.00 76	5	Small
A24H1608SS6LP	24.00 x 16.00 x 8.00 610 x 406 x 203	316L	A24P16	A24P16G	A24P16SS6	21.00 x 13.00 533 x 330	3.00 76	5	Small
A24H2008SSLP	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	3.00 76	5	Small
A24H2008SS6LP	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	3.00 76	5	Small
A24H2408SSLP	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	3.00 76	5	Small
A24H2408SS6LP	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	3.00 76	5	Small
A24H3008SSLP	24.00 x 30.00 x 8.00 610 x 762 x 203	304	A30P24	A30P24G	A30P24SS6	27.00 x 21.00 686 x 533	3.00 76	7	Small
A24H3008SS6LP	24.00 x 30.00 x 8.00 610 x 762 x 203	316L	A30P24	A30P24G	A30P24SS6	27.00 x 21.00 686 x 533	3.00 76	7	Small
A30H2008SSLP	30.00 x 20.00 x 8.00 762 x 508 x 203	304	A30P20	A30P20G	A30P20SS6	27.00 x 17.00 686 x 432	3.00 76	5	Small
A30H2008SS6LP	30.00 x 20.00 x 8.00 762 x 508 x 203	316L	A30P20	A30P20G	A30P20SS6	27.00 x 17.00 686 x 432	3.00 76	5	Small
A30H2408SSLP	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	3.00 76	5	Large
A30H2408SS6LP	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	3.00 76	5	Large
A30H3008SSLP	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	3.00 76	7	Large
A30H3008SS6LP	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	3.00 76	7	Large
A36H2408SSLP	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	3.00 76	5	Large
A36H2408SS6LP	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	3.00 76	5	Large
A36H3008SSLP	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	3.00 76	7	Large
A36H3008SS6LP	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	3.00 76	7	Large
A42H3608SSLP	42.00 x 36.00 x 8.00 1067 x 914 x 203	304	A42P36	A42P36G	A42P36SS6	39.00 x 33.00 991 x 838	3.00 76	8	Large
A42H3608SS6LP	42.00 x 36.00 x 8.00 1067 x 914 x 203	316L	A42P36	A42P36G	A42P36SS6	39.00 x 33.00 991 x 838	3.00 76	8	Large
A48H3608SSLP	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	3.00 76	8	Large
A48H3608SS6LP	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	3.00 76	8	Large
A20H1610SSLP	20.00 x 16.00 x 10.00 508 x 406 x 254	304	A20P16	A20P16G	A20P16SS6	17.00 x 13.00 432 x 330	3.00 76	4	Small
A20H1610SS6LP	20.00 x 16.00 x 10.00 508 x 406 x 254	316L	A20P16	A20P16G	A20P16SS6	17.00 x 13.00 432 x 330	3.00 76	4	Small
A24H2010SSLP	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	3.00 76	5	Small
A24H2010SS6LP	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	3.00 76	5	Small
A30H2410SSLP	30.00 x 24.00 x 10.00 762 x 610 x 254	304	A30P24	A30P24G	A30P24SS6	27.00 x 21.00 686 x 533	3.00 76	5	Large
A30H2410SS6LP	30.00 x 24.00 x 10.00 762 x 610 x 254	316L	A30P24	A30P24G	A30P24SS6	27.00 x 21.00 686 x 533	3.00 76	5	Large
A36H2410SSLP	36.00 x 24.00 x 10.00 914 x 610 x 254	304	A36P24	A36P24G	A36P24SS6	33.00 x 21.00 838 x 533	3.00 76	5	Large
A36H2410SS6LP	36.00 x 24.00 x 10.00 914 x 610 x 254	316L	A36P24	A36P24G	A36P24SS6	33.00 x 21.00 838 x 533	3.00 76	5	Large
A36H3010SSLP	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	3.00 76	7	Large



SECTION Y-Y



SECTION X-X

NOTE:
1. Removable data pocket included (see table for size). Large data pocket 12.00 x 12.00 (305mm x 305mm); small data pocket 6.00 x 6.00 (152mm x 152mm).
2. Maximum spacing between door clamps is 15.00 (382mm)

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 (50/60 Hz), IEC 60947-2 I_{cu} [kA]/I_{cs} %								Breaking Capacity (DC), IEC 60947-2				
			220V★		415V		440V★		690V		250V DC (2-pole in series)		500V DC (3-pole in series)		
240V	480V	600Y/347V	I_{cu} [kA]	I_{cs} [%I_{cu}]	I_{cu} [kA]	I_{cs} [%I_{cu}]	I_{cu} [kA]	I_{cs} [%I_{cu}]	I_{cu} [kA]	I_{cs} [%I_{cu}]	I_{cu} [kA]	I_{cs} [%I_{cu}]	I_{cu} [kA]	I_{cs} [%I_{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.

‡ See table below for Cat. No. selection

Thermal-Magnetic, Fixed Thermal-Fixed Magnetic

Rated Current I_n [A]	Thermal Trip [A] $I_r = I_n$ (Fixed)	Magnetic Trip [A] I_m	Interrupting Code G2 Cat. No.		Interrupting Code G3 Cat. No.		Interrupting Code G6 Cat. No.	
			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.

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

Molded Case Switch — UL489§

Rated Current I_n [A]	Magnetic Trip [A] I_m	Cat. No. 3 Poles	Cat. No. 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

significantly less expensive. With the introduction of this internal handle, customers can now comply with the NFPA 79 requirement and use the less-expensive, non-flanged enclosure with circuit breakers.

Applications Where NFPA 79 Compliance is Required as an Upgrade

From an installation perspective, the internal handle replaces the existing operating shaft. Externally, the same 140G handle is used. In the case of an existing 140G installation, installing the kit can be as simple as removing the existing operating shaft, measuring it, and then cutting the new internal operating handle shaft to the same length. It is then installed in place of the existing operating shaft.

Easy to Use, No-Tools-Required Internal Handle Operation

When the door is open, the kit provides an internal handle with a positive grip, allowing users to operate the breaker. If the enclosure were opened using the defeater on the external handle with the circuit breaker on, the user could then turn the breaker off using the internal handle, rather than using a tool to rotate the operating shaft.

Compliance with "Deliberate Action Required"

Finally, the handle complies with the NFPA 79 requirement to: "Prevent closing of the disconnecting means while the enclosure door is open, unless an interlock is operated by deliberate action." The internal handle must be pulled out before it can be turned, otherwise the handle itself will just ratchet on the shaft.

Rotary Variable Depth Operators

	Description	Frame Size	Handle Color	Shaft Length	Cat. No.
	• Supplied with external handle, operating shaft, and MCCB mounted operating mechanism. • See page 90 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.	G, I	Black	12 in. (305 mm)	140G-G-RVM12B
			Red/Yellow		140G-G-RVM12R
			Black	21 in. (533 mm)	140G-G-RVM21B
			Red/yellow		140G-G-RVM21R
		H, J	Black	12 in. (305 mm)	140G-H-RVM12B
			Red/yellow		140G-H-RVM12R
			Black	21 in. (533 mm)	140G-H-RVM21B
			Red/yellow		140G-H-RVM21R
		K	Black	12 in. (305 mm)	140G-K-RVM12B
			Red/yellow		140G-K-RVM12R
			Black	22 in. (559 mm)	140G-K-RVM21B
			Red/yellow		140G-K-RVM21R
		M	Black	12 in. (305 mm)	140G-M-RVM12B
			Red/yellow		140G-M-RVM12R
			Black	22 in. (559 mm)	140G-M-RVM21B
			Red/yellow		140G-M-RVM21R
		N	Black	12 in. (305 mm)	140G-N-RVM12B
			Red/yellow		140G-N-RVM12R
			Black	22 in. (559 mm)	140G-N-RVM21B
			Red/yellow		140G-N-RVM21R

IEC Contactor Specifications

Bulletin Numbers 100/104-K, 100/104-C, 100/104S-C, 100/104-E, 100S-E, 100Q-C

IEC Contactors

			
Bulletin No.	**100-K/104-K**	**100-C/104-C**	**100-E/104-E**
Screw Terminals	✓	✓	✓ (9...96 A), Thru-hole (116...2650 A)
Spring Terminals	✓(5...9 A)	✓ (9...16 A)	–
Max.Current I_e	12 A	97 A	2650 A
Current Rating	5...12 A	9...97 A	9...2650 A
Features	• Mini-contactors • Uniform panel mounting dimensions • Panel mounting or mounting on 35 mm DIN Rail • AC or DC coil control • Made of environmentally friendly materials	• Panel mounting or mounting on 35 mm DIN Rail • AC or DC coil control • Reversible coil terminals (line or load side) • Common accessories • Made of environmentally friendly materials	• Panel mounting or mounting on 35 mm DIN Rail • **E09...E370** AC/DC electronic coil; with optional PLC interface on E116...E370 **E400...E2650** AC/DC with PLC interface • Made of environmentally friendly materials
Contacts	• 3 power poles with internal N.O. or N.C. auxiliary contact, or 4 power poles. • Optional front-mounted 2- or 4-pole external auxiliary contact block.	• 3 power poles with internal N.O. or N.C. auxiliary contact or 4 power poles (9...23 A). • Optional front- or side-mounted 1-, 2- or 4-pole external auxiliary contact block.	• 3 main poles with 2 auxiliary contacts (1 N.O. and 1 N.C.) on E116...E2650 • Optional side- or front-mounted external auxiliary contact block.
Coil Voltages	AC = 24...600V, 50/60Hz DC = 12...250V	AC = 12...600V, 50/60Hz DC = 9...250V	20...500V 50/60 Hz/DC
Optional Overload Relays	Electronic or bimetallic	Electronic or bimetallic	Electronic
Optional Accessories	• Front-mount auxiliary contacts • Surge suppressors • Electronic timers • Mechanical interlocks	• Front or side-mount auxiliary contacts • Surge suppressors • Electronic or pneumatic timers • Mechanical interlocks • Mechanical latches	• Side- or front-mount auxiliary contacts • Mechanical interlocks • Terminal lugs • Terminal shields • Connecting bars
Standards/ Certifications	• UL • CSA • IEC • CE Marked • CCC	• UL • CSA • IEC • CE Marked • CCC	• EN/IEC • CE Marked • cULus • CCC • EAC • C-tick • KC

Product Selection—100-C/104-C Contactors

- Compact sizes from 4...55 kW/5...75 Hp (9...97 A)
- Common accessories for all contactor sizes
- Front and side mounting of auxiliary contacts
- Electronic and pneumatic timing modules
- Space-saving coil-mounted control modules
- Reversible coil terminations (line or load side)
- All devices can be attached to 35 mm DIN mounting Rail
- Environmentally friendly materials


100-C Contactor


104-C Reversing Contactor

The Bulletin 100-C/104-C IEC contactor family, along with a wide range of common accessories and Bulletin 193 solid-state overload relays, provides the most compact and flexible starter component system available.

3-Pole AC- and DC-operated Contactors

Rated Operational Current I_e [A]		Ratings for switching AC motors - AC-2, AC-3, AC-4										Auxiliary Contacts		Cat. No.(1)
		3-phase kW (50 Hz)				Hp (60 Hz)								
40 °C (104 °F)		230V	400/415V	500V	690V	1-Phase		3-Phase						
AC-3	AC-1					115V	230V	200V	230V	460V	575V	N.O.	N.C.	
9	32	3	4	4	4	1/2	1-1/12	2	2	5	7-1/12	1	0	100-C09⊗10
												0	1	100-C09⊗01
12	32	4	5.5	5.5	5.5	1/2	2	3	3	7-1/2	10	1	0	100-C12⊗10
												0	1	100-C12⊗01
16	32	5.5	7.5	7.5	7.5	1	3	5	5	10	15	1	0	100-C16⊗10
												0	1	100-C16⊗01
23	32	7.5	11	13	10	2	3	5	7-1/2	15	15	1	0	100-C23⊗10
												0	1	100-C23⊗01
30	65	10	15	15	15	2	5	7-1/2	10	20	25	0	0	100-C30⊗00
												1	0	100-C30⊗10
												0	1	100-C30⊗01
37	65	11	18.5/20	20	18.5	3	5	10	10	25	30	0	0	100-C37⊗00
												1	0	100-C37⊗10
												0	1	100-C37⊗01
43	85	13	22	25	22	3	7-1/2	10	15	30	30	0	0	100-C43⊗00
												1	0	100-C43⊗10
												0	1	100-C43⊗01
55	85	15	30	30	30	5	10	15	20	40	40	0	0	100-C55⊗00
												1	0	100-C55⊗10
												0	1	100-C55⊗01
60	100	18.5	32	37	32	5	10	15	20	40	50	0	0	100-C60⊗00
												1	0	100-C60⊗10
												0	1	100-C60⊗01
72	100	22	40	45	40	5	15	20	25	50	60	0	0	100-C72⊗00
												1	0	100-C72⊗10
												0	1	100-C72⊗01
85	100	25	45	55	45	7-1/2	15	25	30	60	60	0	0	100-C85⊗00
												1	0	100-C85⊗10
												0	1	100-C85⊗01
97	130	30	55	55	55	10	20	30	30	75	75	0	0	100-C97⊗00
												1	0	100-C97⊗10
												0	1	100-C97⊗01

(1) For screwless terminals on 100-C09...C16, add an "R" after the letter "C" in the catalog number. Example: Cat. No. 100-C09⊗10 becomes 100-CR09⊗10. The AC-1 rating for the 100-CR is limited to 25 A.

⊗ Coil voltage code and terminal position—see page 19

Coil Voltage Codes

The Cat. No. as listed is incomplete. Select a coil voltage code from the table below to complete the Cat. No. Example: 120V, 60 Hz: Cat. No. 100-C09⊗10 becomes Cat. No.100-C09D10.

AC Voltages [V]	12	24	32	36	42	48	100	100…110	110	120	127	200	200…220	208	208…240
50 Hz	R	K	V	W	X	Y	KP	—	D	P	S	KG	L	—	—
60 Hz	Q	J	—	V	—	X	—	KP	—	D	—	—	KG	H	L
50/60 Hz	—	KJ	—	—	—	KY	KP	—	KD	—	—	KG	KL(1)	—	—

(1) Not available on 100/104-C90 or -C97 contactors.

AC Voltages [V]	220…230	230	230…240	240	277	347	380	380…400	400	400…415	440	480	500	550	600
50 Hz	F	—	VA	T	—	—	—	N	—	G	B	—	M	C	—
60 Hz	—	—	—	A	T	I	E	—	—	—	N	B	—	—	C
50/60 Hz	KL(1)	KF	—	KA	—	—	—	—	KN	—	KB	—	—	—	—

(1) Not available on 100/104-C90 or -C97 contactors.

DC Voltages [V]		9	12	24	24	36	36…48	48	48…72	60	64
100-C09…C55	Electronic with Integrated Diode	—	EQ	EJ	QJ(1)	—	EW	—	EY	—	—
100-C60…C97	with Integrated Diode	DR	DQ	DJ	—	DW	—	DY	—	DZ	DB

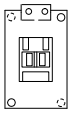
(1) "QJ" coil has faster dropout time (16…21 ms).

DC Voltages [V]		72	80	110	110…125	115	125	220	220…250	230	250
100-C09…C55	Electronic with Integrated Diode	—	—	—	ED	—	—	—	EA	—	—
100-C60…C97	with Integrated Diode	DG	DE	DD	—	DP	DS	DA	—	DF	DT

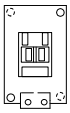
Coil Terminal Position

All contactors are delivered with the coil terminals located on the line side.

For load side coil terminations, insert a "U" prior to the coil voltage code. Ordering example: Cat. No. 100-C09UD10.

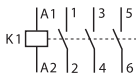
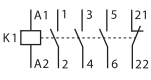
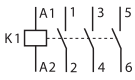
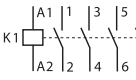
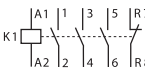
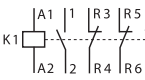
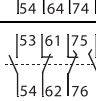


Cat. No.100-C09⊗10 Line Side



Cat. No.100-C09U⊗10 Load Side

Device Combinations in Accordance with IEC 60947-1 / -4-1

Auxiliary Contact Blocks		100-C Contactors (AC and DC Control)						
	Circuit Diagram	Control	100-C09_⊗10 100-C12_⊗10 100-C16_⊗10 100-C23_⊗10	100-C09_⊗01 100-C12_⊗01 100-C16_⊗01 100-C23_⊗01	100-C30_⊗00 100-C37_⊗00 100-C43_⊗00 100-C55_⊗00 100-C60_⊗00 100-C72_⊗00 100-C85_⊗00 100-C97_⊗00	100-C09_⊗400 100-C12_⊗400 100-C16_⊗400 100-C23_⊗400 100-C40_⊗400 100-C90_⊗400	100-C09_⊗300 100-C12_⊗300 100-C16_⊗300 100-C23_⊗300	100-C09_⊗200 100-C12_⊗200 100-C16_⊗200 100-C23_⊗200 100-C40_⊗200 100-C90_⊗200
								
Front Mounting (1)								
100-FA02, 100-FAB02		AC/DC	10 + 02 = 12	01 + 02 = 03	00 + 02 = 02	00 + 02 = 02	00 + 02 = 02	00 + 02 = 02
100-FA11, 100-FAB11		AC/DC	10 + 11 = 21	01 + 11 = 12	00 + 11 = 11	00 + 11 = 11	00 + 11 = 11	00 + 11 = 11
100-FB11, 100-FBB11		AC/DC	–	–	00 + 11 = 11	00 + 11 = 11	00 + 11 = 11	00 + 11 = 11
100-FC11, 100-FCB11		AC/DC	10 + 11 = 21	–	–	–	–	–
100-FA20, 100-FAB20		AC/DC	10 + 20 = 30	01 + 20 = 21	00 + 20 = 20	00 + 20 = 20	00 + 20 = 20	00 + 20 = 20
100-FBL11 (2)		AC/DC	–	–	00 + L11 = L11	00 + L11 = L11	00 + L11 = L11	00 + L11 = L11
100-FA22, 100-FAB22		AC/DC	10 + 22 = 32	01 + 22 = 23	00 + 22 = 22	00 + 22 = 22	00 + 22 = 22	00 + 22 = 22
100-FB22, 100-FBB22		AC/DC	–	–	00 + 22 = 22	00 + 22 = 22	00 + 22 = 22	00 + 22 = 22
100-FC22, 100-FCB22		AC/DC	10 + 22 = 32	–	–	–	–	–
100-FA31, 100-FAB31		AC/DC	10 + 31 = 41	01 + 31 = 32	00 + 31 = 31	00 + 31 = 31	00 + 31 = 31	00 + 31 = 31
100-FA40, 100-FAB40		AC/DC	10 + 40 = 50	01 + 40 = 41	00 + 40 = 40	00 + 40 = 40	00 + 40 = 40	00 + 40 = 40
100-FAL22 (2)		AC/DC	10 + L22 = L32	01 + L22 = L23	00 + L22 = L22	00 + L22 = L22	00 + L22 = L22	00 + L22 = L22
100-FA04, 100-FAB04		AC/DC	10 + 04 = 14	01 + 04 = 05	00 + 04 = 04	00 + 04 = 04	00 + 04 = 04	00 + 04 = 04
100-FA13, 100-FAB13		AC/DC	10 + 13 = 23	01 + 13 = 14	00 + 13 = 13	00 + 13 = 13	00 + 13 = 13	00 + 13 = 13
100-FB02, 100-FBB02		AC/DC	10 + 02 = 12	01 + 02 = 03	00 + 02 = 02	00 + 02 = 02	00 + 02 = 02	00 + 02 = 02
100-FB20, 100-FBB20		AC/DC	10 + 20 = 30	01 + 20 = 21	00 + 20 = 20	00 + 20 = 20	00 + 20 = 20	00 + 20 = 20
100-FC31, 100-FCB31		AC/DC	10 + 31 = 41	01 + 31 = 32	00 + 31 = 31	00 + 31 = 31	00 + 31 = 31	00 + 31 = 31

(1) Up to 8 auxiliary contacts possible: contactor + front mounted (AC max. 4 N.C. / DC max. 4 N.C.), side mounted (AC max. 2 N.O. / DC max. 2 N.O. and max. 2 N.C.).
(2) Early make and/or late break.

Bimetallic Overload Relay Specifications

Bulletin Number 193-K, 193-T1

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, http://www.ab.com	Provides declarations of conformity, certificates, and other certification details.

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

		
Bulletin	**193-K**	**193-T1**
Type	Bimetallic Overload Relay	
Rated Current (Range)	0.1…12.5 A	0.1…90 A
Operating Voltage, Nominal	600V	
Overload Type	Bimetallic	
Trip Class (Fixed)	10	10
Ambient Temperature Compensated	✓	✓
Reset Type	Automatic and Manual	Automatic and Manual
Adjustment Range	1.5:1	1.5:1
Phase Loss	Normal Sensing	Normal Sensing
N.C. Trip Contact	✓	✓
N.O. Alarm Contact	✓	✓
Variable Frequency Drive (VFD) Compatible	✓	✓

Standards Compliance—193-K

IEC/EN 60947-1,-4-1,-5-1
UL 508
CSA 22.2. No. 14

Certifications—193-K

CE Marked
cULus Listed (File No. E33916, Guide NKCR, NKCR7)

Standards Compliance—193-T1

IEC/EN 60947-1, -4-1, -5-1
UL508
CSA C22.2 No.14

Certifications—193-T1

cULus (File No. E33916, Guide NKCR, NKCR7),
CE marked

Thermal Overload Relays

Main Circuits

Cat. No.				193-T1…
Rated isolation voltage U_i				690V AC
Rated impulse withstand voltage U_{imp} (between main poles and between main poles and auxiliary circuits)				6kV AC
Rated impulse withstand voltage U_{imp} (between auxiliary circuits)				4kV AC
Rated operating voltage U_e		IEC		690V AC
				440V DC
		UL, CSA		600V AC
Rated frequencies		[Hz]		50/60
Operational frequencies				DC…400 Hz
Power dissipation	193-T1A, 193-T1B	up to 0.4 A		7 W
		0.5…36 A		6 W
		38 A		12 W
	193-T1C	25…47 A		12 W
	193-T1D	47…90 A		18 W

Control Circuits

Cat. No.				193-T1…
Rated operating current I_e				
AC-15	24V	[A]		4
	240V	[A]		2
	400V	[A]		1.6
	690V	[A]		0.15
DC-13	24V	[A]		2
	110V	[A]		0.4
	220V	[A]		0.25
	440V	[A]		0.08
Thermal Current I_{th}				5
Short-circuit withstand, Fuse	IEC, gL/gG	[A]		6
Short-circuit withstand, circuit breaker ≤ 1 kA prospective short-circuit-current		[A]		4
Min. contact load for reliable operation				15V, 2 mA
UL Rating				A600/Q300

Terminations

Cat. Nos.			Main Circuits						Control Circuits	Remote Reset
			193-T1A…	193-T1BC20… T1BC25	193-T1BC30… T1BC38	193-T1C…	193-T1D…	193-T1APM	193-T1… all	193-T1R…
Wiring cross section Terminal type										
Terminal screws			M4	M4	M4	M5	M6	M4	M3.5	M3.5
	Fine stranded with ferrule	1 conductor [mm²] 2 conductors [mm²]	1.5…4 1.5…4	1.5…4 1.5…4	2.5…10 -	2.5…16 -	10…35 -	1.5…10 -	1…4 1…4	1…2.5 -
	Solid or coarse stranded	1 conductor [mm²] 2 conductors [mm²]	1.5…6 1.5…6	1.5…6 1.5…6	2.5…16 -	2.5…25 -	10…35 -	1.5…16 -	1…4 1…4	1…2.5 -
		1 conductor [AWG] 2 conductors [AWG]	No. 16…10 No. 16…10	No. 14…10 No. 14…10	No. 10…6 -	No. 10…6 -	No. 8…1 -	No. 16…6 -	No. 18…12 No. 18…12	No. 16…12 -
Recommended torque		[N•m]	1.5 … 2.2	1.5 … 2.2	2.5 … 3.5	2.5 … 3.5	4.5 … 6	1.8…2.8	1.2	1.2
		[lb•in]	13 … 20	13 … 20	22 … 31	22 … 31	40 … 53	16…25	10.6	10.6
Pozidrive screwdriver No.		Size	2	2	2	2	-	2	2	2
Slotted screwdriver		[mm]	0.8 x 5.5	0.8 x 5.5	0.8 x 5.5	0.8 x 5.5	-	0.8 x 5.5	0.8 x 5.5	0.8 x 5.5
Hexagon socket screw		Size	-	-	-	-	4	-	-	-

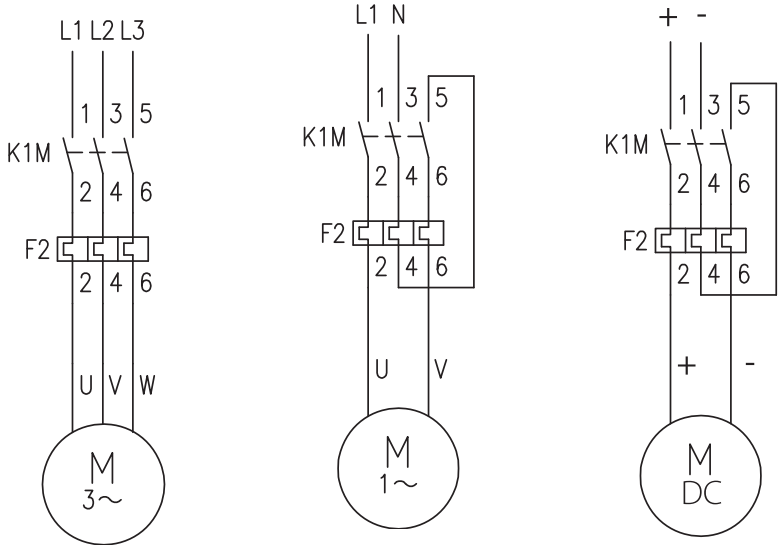
193-T1R Remote Reset

Operating Limits		
Maximum Command Impulse		5s
AC 50/60 Hz	Pick-up [x U_s]	0.8….1.1
	Drop-out [x U_s]	
DC	Pick-up [x U_s]	0.7….1.25
	Drop-out [x U_s]	
Coil Consumtion		
AC 50/60 Hz	Pick-up [VA/W]	
	Hold-in [VA/W]	
DC	Pick-up [W]	17 (24, 110, 125V) 25 (48V)
	Hold-in [W]	17 (24, 110, 125V) 25 (48V)

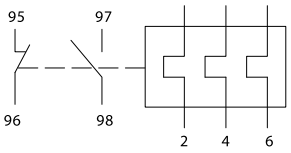
General

Cat. No.			193-T1…	
Type of Overload Relay			Bimetallic, Ambient Compensated, Phase Loss Sensitive	
Trip Rating (ultimate tripping current)			120% FLA	
Phase loss sensitivity: Trip rating at phase loss			115% FLA	
Trip Class			193-T1A/-T1B	193-T1C/-T1D
		IEC/EN 60947-4-1	10A	10
		UL	10	
Reset Mode			Automatic or Manual	
Test release			Manual release of auxiliary contacts	
Trip indication			By means of a flag visible through an opening in the relay front	
Compensation temperature range			-20…+60 °C (-4…+140 °F)	
Climatic Conditions	Release Tolerance at -20 °C		1.05…1.4 x I_n	
	Storage Temperature Range		-55…+80 °C (-67…+176 °F)	
	Operating Temperature Range		-20…+60 °C (-4…+140 °F)	
	Air moisture (Storage/Operating)		5…95% rel.humidity, non-condensing	
Vibration	(per IEC/EN 60068-2-6), service		3g	
	IEC/EN 61373 (vibration railways)		category 1, class B	
	IEC/EN 60092-504 (vibration ships), service		0.7 g, all axes, 2…200 Hz	
Shock	(per IEC/EN 68000-2-27), transport		30 g	
	IEC/EN 60068-2-27 (Shock half-sinus), service		11 ms > 5 g all axes	
	IEC/EN 61373 (shock railways)		category 1, class B, 5g 30 ms	
Max. Altitude			2000 m	
Pollution Degree			3	
Degree of Protection, with wires connected			IP2X	
Approximate Weight (unpackaged)	193-T1A, 193-T1B	0.16…25 A	0.115 kg	
	193-T1B	30…38 A	0.155 kg	
	193-T1C	25…47 A	0.330 kg	
	193-T1D	47…90 A	0.360 kg	
	193-T1….P	47…90 A	0.415 kg	
Standards			IEC/EN 60497-1, -4-1, -5-1, UL508, CSA C22.2 No.14	
Certifications			CE, cULus	

Circuit Diagrams



Wiring Schematic



Typical IEC Wiring Schematic

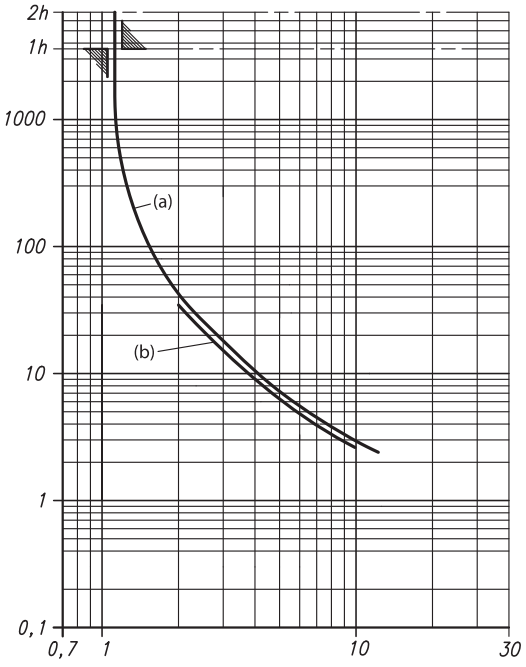
Trip Characteristics

These trip characteristics refer to IEC/EN 60947-4-1 and are average values from cold start at an ambient temperature of 20 °C. Trip time is pictured as a function of operating current. With the device at max. operating temperature, the trip time decreases to approximately 25% of the shown value.

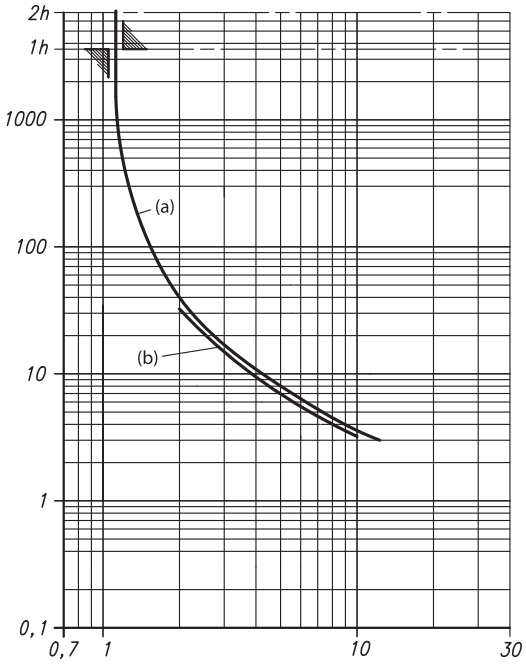
(a) Tripping characteristics 3-poles from the cold state

(b) Tripping characteristics 2-poles from the cold state

Cat. Nos. 193-T1AA16...AA40 Overload Relays

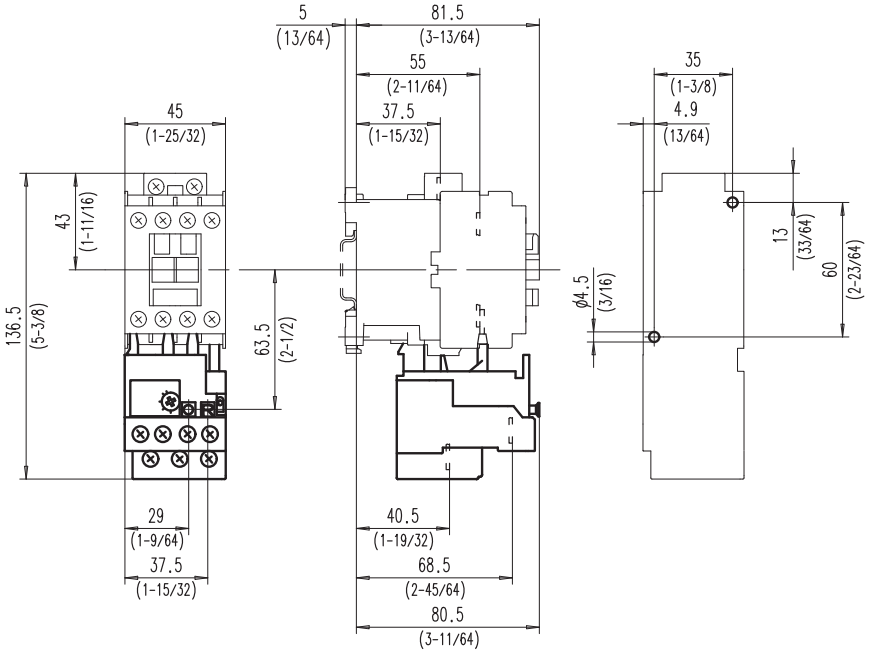


Cat. Nos. 193-T1AA50...AB40 Overload Relays

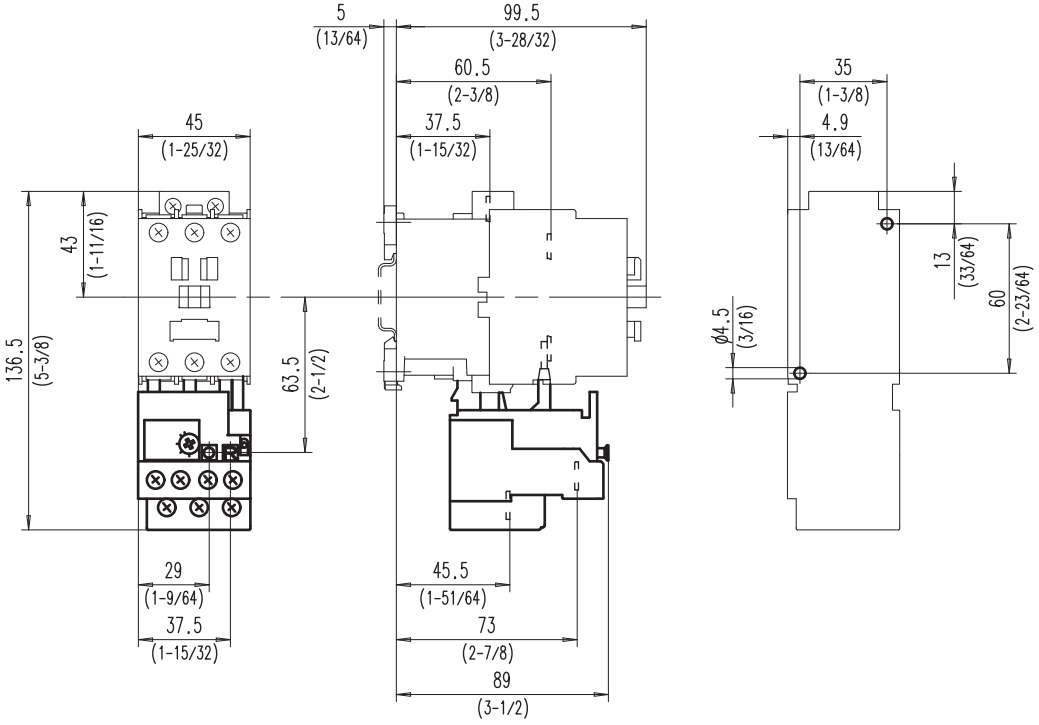


Dimensions are shown in millimeters (inches). Dimensions are not intended for manufacturing purposes.

Cat. Nos. 193-T1AA16…AC25 Overload Relays



Cat. Nos. 193-T1BC20…25 Overload Relays



Low-Peak™ LP-CC Class CC 600 Vac/300 Vdc, 1/2-30 A time-delay fuses

RoHS

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.
1/2-30	10

Catalog symbol:

- LP-CC-(amp)

Description:

Bussmann™ series Ultimate protection Low-Peak Class CC current-limiting, time-delay fuses. Time-delay – 12 seconds (minimum) at 200% of rated current.

Specifications:

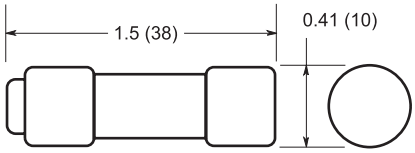
Ratings

- Volts
  - 600 Vac
  - 300 Vdc (1/2 to 2-8/10 A, 20-30 A)
  - 150 Vdc (3-15 A)
- Amps 1/2-30 A
- IR
  - 200 kA Vac RMS Sym.
  - 20 kA Vdc

Agency information

- UL® Listed Class CC, Std. 248-4, Guide JDDZ, File E4273
- CSA® Certified; Class 1422-02, File 53787
- CE
- RoHS compliant

Dimensions - in (mm)



Features:

- 200 kA 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 amp rating 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 fault conditions provides a high degree of current limitation.
- Current-limitation protects downstream components against damaging thermal and magnetic effects of fault currents.
- A superior, all-purpose, space-saving branch circuit fuse that meets most protection requirements up to 30 A.
- Very compact physical size that's only 13/32" x 1-1/2" (10 x 38 mm) 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.

Powering Business Worldwide

Recommended fuse blocks and holders:

Fuse amps	1-pole	2-pole	3-pole
Modular open blocks			
up to 30	BCM603-1_	BCM603-2_	BCM603-3_
DIN-Rail holders			
Up to 30	CHCC1D_	CHCC2D_	CHCC3D_
	—	—	OPM-NG-_
	—	—	OPM-1038_
	—	—	OPM-1038_SW
Panel mount holders			
Up to 30	HPS-RR	—	—
	HPF-RR	—	—
In-line holders			
Up to 30	—	HEY	—
	HEZ	—	—

For additional information on Class CC fuse blocks and holders, see data sheets:

- Modular open blocks No. 10241 (BCM)
- DIN-Rail holders No. 10430 (CHCC), No. 1109 (OPM-NG), 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)

CH Modular, IP20 finger-safe DIN-Rail holders for Class CC, supplemental and PV fuses

RoHS 2011/65/EU

Catalog symbol:

- CHCC_ (Class CC)
- CHM_ (UL® supplemental/IEC 10x38)
- CHPV_ (13/32 x 1-1/2 and 10x38 photovoltaic)

Description:

Eaton's Bussmann™ series CH DIN-Rail fuse holders are for UL Class CC and supplemental fuses, and IEC 10x38 fuses. They are available with and without indication in 1-, 2- and 3-pole IP20 finger-safe versions. A variety of accessories extends their application flexibility and they may be ganged together to meet specific application requirements.

For other Bussmann series CH fuse holders, please see the following data sheets.

Fuse class	Fuse size	Data sheet No.
Class J	30 and 60 A	2144
IEC	8 x 32 mm	720147
	14 x 51 mm	10080
	22 x 58 mm	10015

Powering Business Worldwide

Specifications:

Ratings

- Volts
  - 600 V (or less) UL
  - 690 V (or less) IEC
  - 1000 Vdc (or less) photovoltaic (PV)
- Amps
  - 30 A UL
  - 32 A IEC
- Short-Circuit Current Rating (SCCR)
  - 33 kA photovoltaic
  - 200 kA RMS Sym. (CHCC, CHM*)

* CHM SCCR is fuse interrupting rating dependent.

Agency information

- Class CC version: UL Listed File E14853, Guide IZLT, Recognized IZLT2
- PV version: UL Listed to E348242 and Guide IZMR (CHPV)
- CSA® File 47235, CHPV and CHM - Class 6225-30, CHCC - Class 6225-01
- IEC 60269-2 (CHM, CHPV)
- CCC
- RoHS compliant

Mounting

- 35 mm DIN-Rail

Wire range (see conductor table on page 3 for details)

- 75°C and 90°C Cu
- #18 to #4 (0.8 mm^2 to 21.1 mm^2)
  - Solid
  - Stranded
  - Fine stranded

Terminals

- Single or dual conductors
- Comb busbar
- Terminal screws
  - Standard phil-slot
  - Optional hex head (order by adding "-H" suffix to the catalog number, e.g., CHM1DU-H)

Flammability

- UL 94V0, self-extinguishing

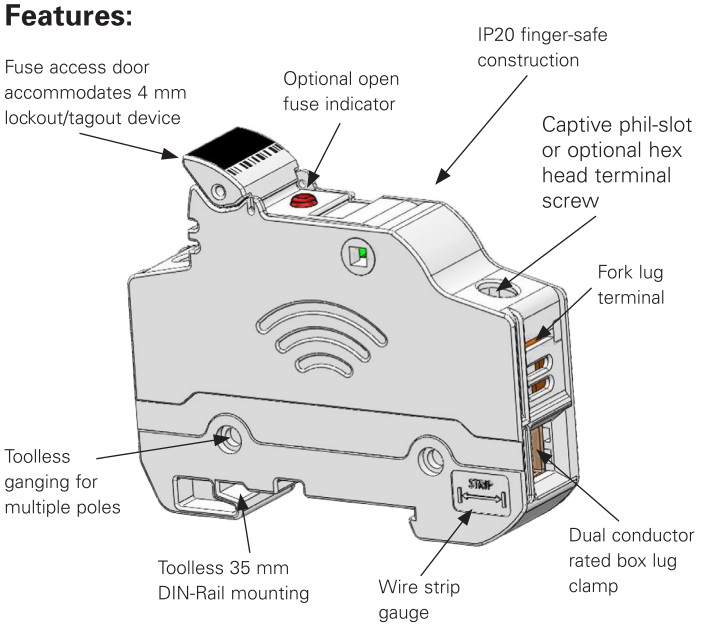
Storage and operating temperature

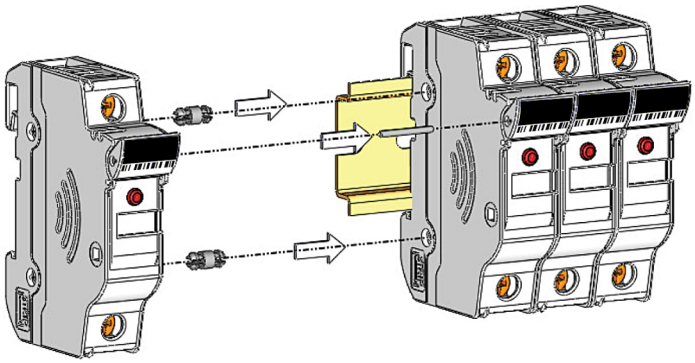
- -4°F (-20°C) to 194°F (90°C) indicating
- -4°F (-20°C) to 248°F (120°C) non-indicating

Features and benefits:

- High SCCR rated, UL Listed Class CC holder with optional open fuse indication for 600 Vac/dc and 48 V dc (see catalog number table for details)
- Enhanced safety with IP20 finger-safe construction
- UL Recognized midget and IEC 10x38 holders with factory assembled neutral pole option
- Agency ratings up to 1000 Vdc for use with PV fuses
- Available remote PLC fuse indication module
- Wiring flexibility with terminals rated for use with 75°C or 90°C solid, stranded and fine stranded wire, and spade terminals and comb busbars. (Use any higher temperature insulations at the 90°C ampacity.)
- Complete range of UL Listed and high SCCR rated one- and three-phase finger-safe comb busbars and power feed lugs
- Optional hex head terminal screw makes it easier to achieve necessary torque values

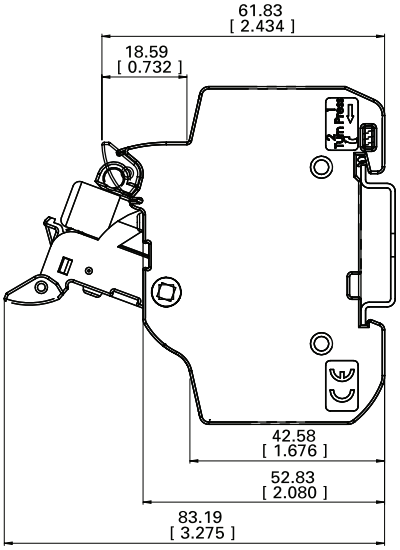
Features:

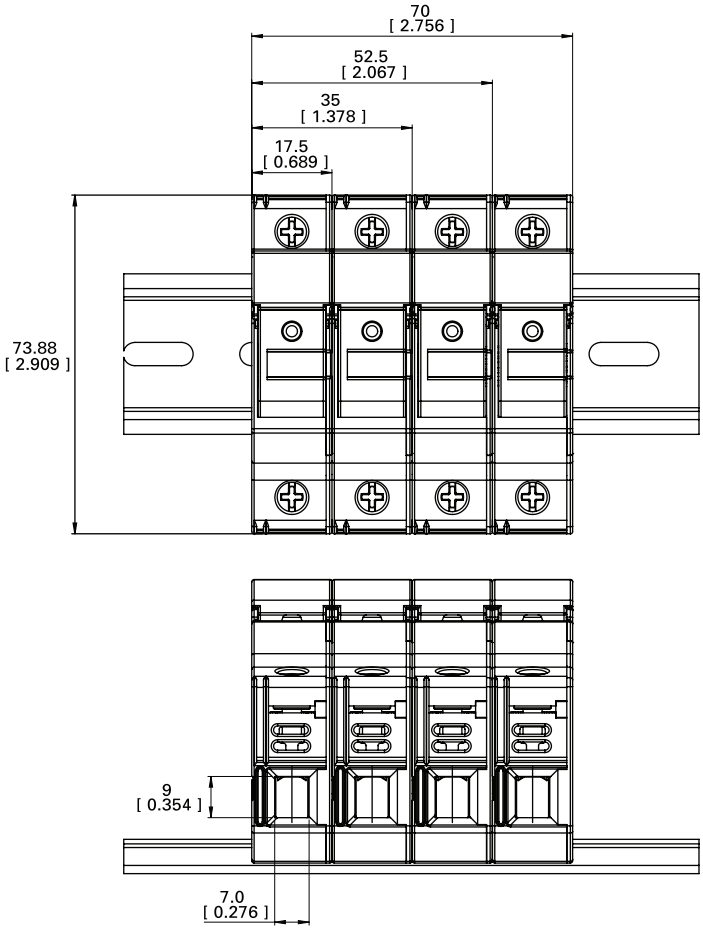




Gang multiple poles to meet application requirements using kit catalog number JV-L (gangs up to four poles).

Dimensions - mm (in):





UL midget and IEC 10x38 CHM holder catalog numbers

Catalog number†		Volts and amps		Agency marks	Poles	SCCR	Recommended Bussmann series fuses
With indication*	Without indication	UL	IEC				
CHM1DIU	CHM1DU	600 V/30 A	690 V/32 A	UR, CSA, IEC 60269-2, CCC	1	200 kA** RMS Sym.††	BAF, BAN, FNM, FNQ, FWA, FWC, KLM, KTK, AGU, C10G_, C10M_
CHM2DIU	CHM2DU				2		
CHM3DIU	CHM3DU				3		
CHM4DIU	CHM4DU				4		
CHM1DNIU	CHM1DNU			IEC 60269-2	1 + neutral		
CHM3DNIU	CHM3DNU				3 + neutral		
CHM1DI-48U	—	48 Vdc/30 A	48 Vdc/32 A	UR, CSA, IEC 60269-2, CCC	1		
—	CHM1DNXU	—	690V/32 A	IEC 60269-2		N/A	N/A
CHM1DCIU	CHM1DCU	600 Vac, 1000 Vdc, 30 A	690 V, 32 A	UR, CSA, IEC 60269-2	1	200 kA** RMS Sym., 33 kA DC††	600/690V BAF, BAN, FNM, FNQ, FWA, FWC, KLM, KTK, AGU, C10G_, C10M_, 1000Vdc PV-(amp)A10F, PV10M-(amp)
CHM2DCIU	CHM2DCU				2		
CHM3DCIU	CHM3DCU				3		
CHM4DCIU	CHM4DCU				4		

† Available with optional hex head terminal screws. To order, add "-H" suffix to the desired catalog number.
†† SCCR is limited to the interrupting rating of the installed fuse or 200 kA, which ever is less.
* All models require 90 V minimum for illumination, except CHM1DI-48U that requires 15 V minimum.
** SCCR is limited to the interrupting rating of the installed fuse or 200 kA, which ever is less.

UL Class CC CHCC holder catalog numbers

Catalog number†		Volts / amps	Agency marks	Poles	SCCR	Recommended Bussmann series fuses
With indication*	Without indication					
CHCC1DIU	CHCC1DU	600 V/30 A	UL, CSA, CCC	1	200 kA RMS Sym.	LP-CC, FNQ-R, KTK-R
CHCC2DIU	CHCC2DU			2		
CHCC3DIU	CHCC3DU			3		
CHCC1DI-48U	—	48 Vdc/30 A		1	33 kA DC	

† Available with optional hex head terminal screws. To order, add "-H" suffix to the desired catalog number.
* All models require 90 V minimum for illumination, except CHCC1DI-48U that requires 15 V minimum.

UL and IEC photovoltaic CHPV holder catalog numbers

Catalog number†		Volts / amps	Agency marks	Poles	SCCR	Recommended Bussmann series fuses
With indication	Without indication					
CHPV1IU	CHPV1U	1000 Vdc/30 A	UL, CSA, , UL 4248-18, IEC 60269-1, CCC	1	33 kA DC	PV-(amp)A10F, PV10M-(amp)
CHPV2IU	CHPV2U			2		

† Available with optional hex head terminal screws. To order, add "-H" suffix to the desired catalog number.
* All models require 90 V minimum for illumination.

Conductor information

AWG wire range	Wire type	Wire rating	Terminal torque N•m (lb-in)*
4-12	Solid/Stranded/compact/Class K	75°C or 90°C Cu	3.4 (30)
14-18	Solid/Stranded/Class K		2.3 (20)
(2) 10-12	Stranded		3.4 (30)
(2) 14	Solid/Stranded		
(2) 16-18			2.8 (25)
Fork terminals	N/A		3.4 (30)
Comb busbar			

* Use a phil-slot bit designed for high torque, or specify hex head terminal screw option.

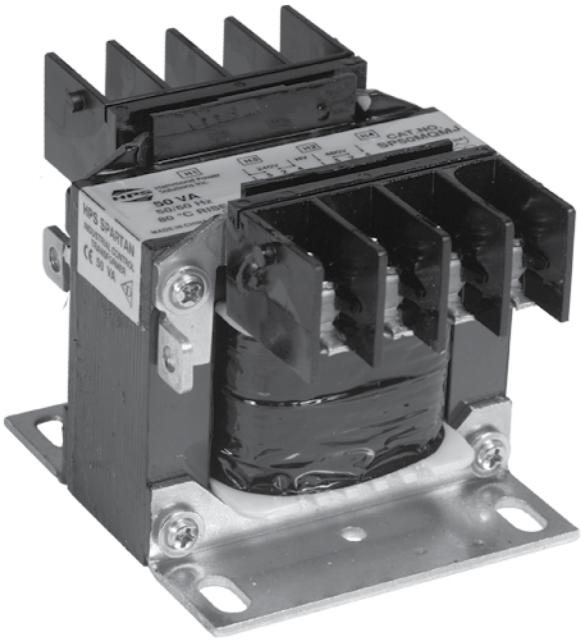
HPS Spartan® Industrial Open-Style Control Transformer

The Economical Solution

The HPS Spartan® line of industrial control transformers are ideally suited for general purpose, industrial and light duty loads. Designed for applications where high inrush or machine tool duty are not necessary, the HPS Spartan industrial open-style control transformer offers an efficient and economical solution. These units are well suited for HVAC applications, signal and alarm systems, motor control circuits, lighting and circuit isolation.

The HPS Spartan control transformer is an open style unit with molded terminal blocks up to 3000 VA or 30 amps. Optional Finger guards and a fuse block adapter kit are available upon request.

For an economical approach to control transformers, the HPS Spartan is the transformer of choice.



STANDARDS

The HPS Spartan Control Transformers meet or exceed the standards established by UL, CSA, IEC and NEMA.

Standard	File #	VA Size
UL (ANSI/UL506)	E50394	All
CSA	LR3902	All
IEC 61558		All
NEMA (ST-1)		All

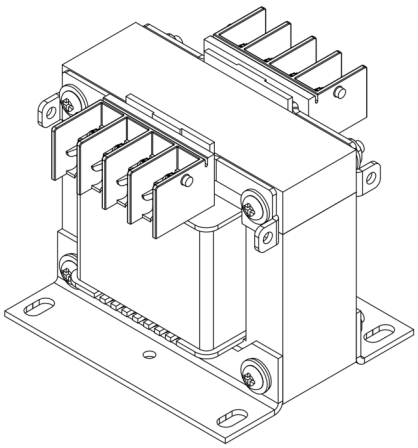
© Hammond Power Solutions Inc.

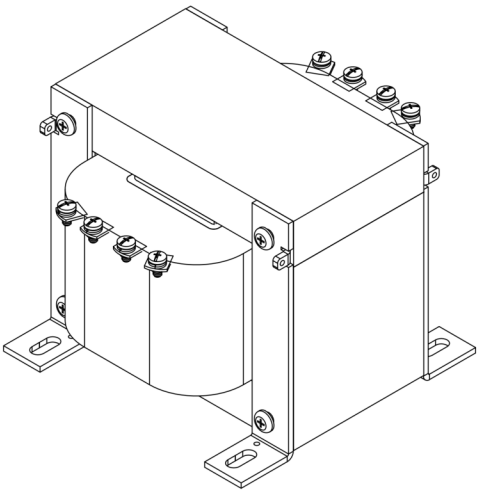
Data subject to change without notice.

Features and Benefits

- Molded terminal blocks for primary and secondary connections[1]
- Coil face termination over 3000VA or 30 amps
- Vacuum Impregnated with Polyester Resin and oven cured
- Bolted core construction
- Bolt-on mounting brackets
- All terminal blocks utilize a combination slot/Phillips #6 screw with a SEMS washer (suitable for 18 AWG to 14 AWG for solid wire and 18 AWG to 12 AWG for stranded wire). Coil face terminations utilize a ¼ - 20 UNC X 0.50" combination slot/Phillips screw and a spring lock washer
- All units supplied with primary and secondary voltage links/jumpers
- 50/60 Hz (60 Hz on SP***ACP and SP***AR)
- Copper wound coils with high dielectric strength insulation
- Seismically certified in accordance with IBC 2009; Section 1613 Earthquake Loads, for S_{DS} <= 2.00g , z/h = 1.0, and I_p = 1.5
- CSA Certified, UL Listed, CE Marked and RoHS compliant
- Meets NEMA standards
- Superior insulating materials. The HPS Spartan series transformers offer the following insulation systems:
  Up to 1500 VA: 80°C rise, 130°C temperature class (B)
  2000 VA to 5000 VA: 115°C rise, 180°C temperature class (F)
- "Premium Packaging"[1] which feature:
  - Premium fluted cartons
  - Custom molded foam inserts
  - Easy removal and repacking
  - Industry's best box label
- Supplied with trilingual installation and wiring instruction sheets
- 15 year warranty
- Optional finger guards available[1]
- Optional fuse block adapter kit available[1]

[1] up to and including 3000VA or 30 amps





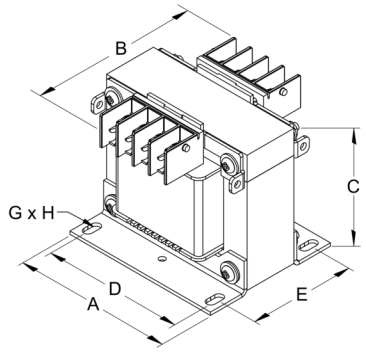


FIGURE A

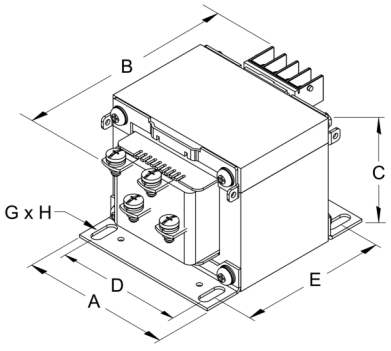


FIGURE B

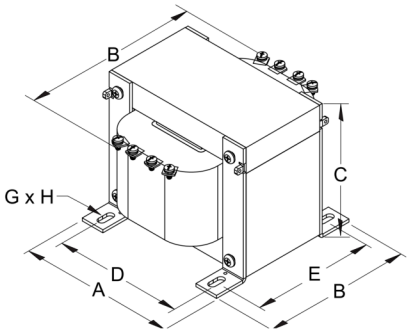


FIGURE C

Group A

Primary Voltage: **600/480** | 575/460 | 550/440
Secondary Voltage: **120 X 240** | 115 X 230 | 110 X 220

60 Hertz

VA Rating	CE VA Rating	Catalog Number	Mtg. Fig.	Output Amps	Overall Dimensions			Mounting Centers		Mounting Slot	Height with Finger Guard	Height with Fuse Block Adapter	Approx. Ship Weight Lbs.
					A	B	C	D	E	G X H			
50	50	**SP50ACP**	A	0.42/0.21	2.60	3.82	2.60	2.13	2.64	0.22 x 0.44	2.98	2.79	2.2
100	100	**SP100ACP**	A	0.83/0.42	2.99	3.74	2.85	2.52	2.60	0.22 x 0.44	3.23	3.04	3.3
150	150	**SP150ACP**	A	1.25/0.63	2.99	4.29	2.85	2.52	3.15	0.22 x 0.44	3.23	3.04	4.4
250	160	**SP250ACP**	A	2.08/1.04	3.78	4.09	3.40	3.31	2.99	0.22 x 0.44	3.78	3.59	6.4
350	250	**SP350ACP**	A	2.92/1.46	3.78	4.49	3.40	3.31	3.39	0.22 x 0.44	3.78	3.59	7.5
500	300	**SP500ACP**	A	4.17/2.08	4.49	4.69	3.78	3.78	3.66	0.31 x 0.81	4.16	3.97	11
750	500	**SP750ACP**	A	6.25/3.13	5.25	5.08[1]	4.37	4.50	4.06	0.31 x 0.81	4.75	4.56	18
1000	650	**SP1000ACP**	A	8.33/4.17	5.25	5.47[1]	4.37	4.50	4.45	0.31 x 0.81	4.75	4.56	21
1500	1000	**SP1500ACP**	A	12.5/6.25	5.25	6.85[1]	4.37	4.50	5.83	0.31 x 0.81	4.56	4.37	28
2000	1300	**SP2000ACP**	A	16.7/8.33	6.38	5.87[1]	5.31	5.75	4.84	0.31 x 0.81	5.69	5.50	34
3000	2000	**SP3000ACP**	A	25.0/12.5	7.50	7.50	6.50	6.30	6.85	0.44 x 1.00	6.50	6.50	60
5000	3000	**SP5000ACP**	C	41.7/20.8	8.98	9.88	7.76	7.40	7.13	0.44 x 1.00	N/A	N/A	93

Primary and Secondary voltage links/jumpers supplied standard with all transformers.
Refer to page 73 for wiring schematic drawing. Custom voltages and VA sizes available upon request.
All dimensions in inches
[1] Note: For 750 through 2000 VA units actual overall depth is 0.24" plus the value in column B.

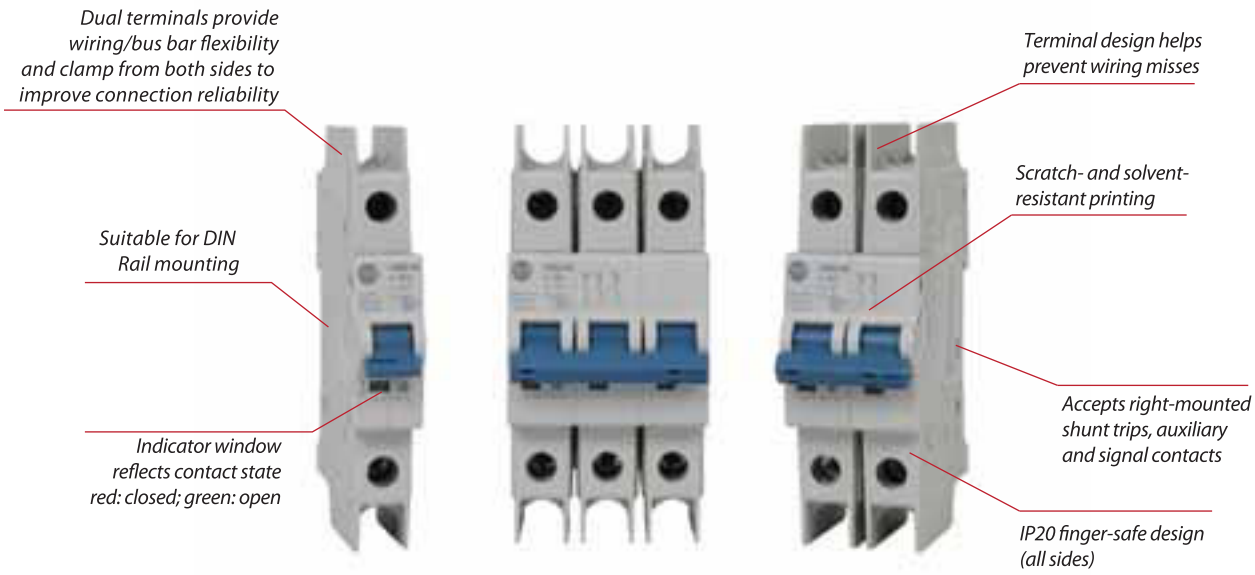
Group B

Primary Voltage: **600** | 575 | 550
Secondary Voltage: **12 X 24** | 11.5 X 23 | 11 X 22

60 Hertz

VA Rating	CE VA Rating	Catalog Number	Mtg. Fig.	Output Amps	Overall Dimensions			Mounting Centers		Mounting Slot	Height with Finger Guard	Height with Fuse Block Adapter	Approx. Ship Weight Lbs.
					A	B	C	D	E	G X H			
50	50	**SP50AR**	A	4.17/2.08	2.60	3.23	2.60	2.13	2.05	0.22 x 0.44	2.98	2.79	1.5
100	100	**SP100AR**	A	8.33/4.17	2.99	3.74	2.85	2.52	2.60	0.22 x 0.44	3.23	3.04	3.3
150	150	**SP150AR**	A	12.5/6.25	2.99	4.09	2.85	2.52	2.95	0.22 x 0.44	3.23	3.04	3.9
250	160	**SP250AR**	A	20.8/10.4	3.78	3.70	3.40	3.31	2.60	0.22 x 0.44	3.78	3.59	5.2
350	250	**SP350AR**	A	29.2/14.6	3.78	4.29	3.40	3.31	3.19	0.22 x 0.44	3.78	3.59	7.1
500	300	**SP500AR**	B	41.7/20.8	4.49	5.08	3.78	3.78	3.27	0.31 x 0.81	4.16	3.97	9.9

Primary and Secondary voltage links/jumpers supplied standard with all transformers.
Refer to page 73 for wiring schematic drawing. Custom voltages and VA sizes available upon request.
All dimensions in inches



Bulletin 1489-M thermal-magnetic Circuit Breakers are approved for branch circuit protection in the United States and Canada, and are certified as Miniature Circuit Breakers for IEC applications.

These branch protectors are compatible with many accessories to meet diverse application needs, including UL 508 Listed bus bars for convenience in panel assembly, auxiliary contacts, signal contacts and shunt trips for versatility, and lockout attachments for safety during maintenance.

1489-M Circuit Breakers	
Rated Voltage	UL/CSA: Max. 480Y/277V AC IEC: U_e 230/400V AC
Interrupting Capacity	UL/CSA: 10 kA IEC: 15 kA
Current Ratings	0.5...63 A
Poles	1, 2, 3
Trip Curves	C, D
Standards Compliance	UL 489 CSA C22.2 No. 5.1 EN 60947-2 GB 14048.2
Certifications	UL Listed, File No. E197878 CSA Certified, File No. 259391 CE Marked VDE Certified CCC Certified RoHS Compliant

Features

- Current limiting
- Fast breaking time
- High rated voltage
- 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 help 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

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 5...10 I_n Cat. No.	Trip Curve D Highly Inductive 10...20 I_n Cat. No.
	277V AC, 48V DC	230V AC	0.5	1489-M1C005	1489-M1D005
			1	1489-M1C010	1489-M1D010
			1.6	1489-M1C016	1489-M1D016
			2	1489-M1C020	1489-M1D020
			3	1489-M1C030	1489-M1D030
			4	1489-M1C040	1489-M1D040
			5	1489-M1C050	1489-M1D050
			6	1489-M1C060	1489-M1D060
			7	1489-M1C070	1489-M1D070
			8	1489-M1C080	1489-M1D080
			10	1489-M1C100	1489-M1D100
			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
			35	1489-M1C350	1489-M1D350
 1-pole	C Curve: 277V AC, 48V DC D Curve: 240V AC, 48V DC		40	1489-M1C400	1489-M1D400
	240V AC, 48V DC		50	1489-M1C500	1489-M1D500
			60	1489-M1C600	1489-M1D600
			63	1489-M1C630	1489-M1D630

Specifications

Electrical Ratings					
Poles					1, 2, 3
Tripping characteristics					C, D
Rated current (I_n)					0.5...63 A
Rated frequency [f]					50/60 Hz
Rated insulation voltage U_i per IEC/EN 60664-1					250V AC (phase to ground) 440V AC (phase to phase)
Overvoltage category					III
Pollution degree					3
Data per UL/CSA					
Rated voltage	AC	1-pole	C Curve	0.5...40 A	277V AC
				50...63 A	240V AC
			D Curve	0.5...35 A	277V AC
				40...63 A	240V AC
		2-, 3-pole	C Curve	0.5...40 A	480Y/277V AC
				50...63 A	240V AC
			D Curve	0.5...35 A	480Y/277V AC
				40...63 A	240V AC
	DC	1-pole			48V DC
		2-pole			96V DC (2-pole in series)
Rated interrupting capacity per UL 489					10 kA
Reference temperature for tripping characteristics					40 °C
Electrical endurance					6,000 operations (AC and DC); 1 cycle (1s - ON, 9s - OFF)
Data per IEC/EN 60947-2					
Rated operational voltage (U_e)	1-pole				230V AC
	2-, 3-pole				400 V AC
Highest supply or utilization voltage (U_{max})	AC	1-pole			253/440V AC
		2-, 3-pole			440V AC
	DC ★	1-pole			48V DC
		2-pole			96V DC
Min. operating voltage					12V AC, 12V DC
Rated ultimate short-circuit breaking capacity (I_{cu})					15 kA
Rated service short-circuit breaking capacity (I_{cs})					≤40 A: 11.25 kA >40 A: 7.5 kA
Rated impulse withstand voltage Uimp. (1.2/50μs)					4 kV (test voltage 6.2kV at sea level, 5kV at 2,000m)
Dielectric test voltage					2 kV (50/60Hz, 1 min.)
Reference temperature for tripping characteristics					30 °C
Electrical endurance 1 cycle (2s - ON, 13s - OFF, $I_n \leq 32A$), 1 cycle (2s - ON, 28s - OFF, $I_n > 32A$)					$I_n < 30A$:20,000 ops.(AC) $I_n \geq 30A$:10,000 ops. (AC) 1,000 ops. (DC)

★ Self-declared IEC DC ratings.

Mechanical Data		
Housing		Insulation group II, RAL 7035
Indicator window		red ON/green OFF
Protection degree per EN 60529		IP20, IP40 in enclosure with cover
Mechanical endurance		20,000 operations
Shock resistance per IEC/EN 60068-2-27		25 g - 2 shocks - 13 ms
Vibration resistance per IEC/EN 60068-2-6		5g - 20 cycles at 5…150…5 Hz with load 0.8 In
Environmental		
Environmental conditions (damp heat) per IEC/EN 60068-2-30		28 cycles with 55°C/90-96% and 25°C/95-100%
Ambient temperature Δ		-25…+55 °C
Storage temperature		-40…+70 °C
Installation		
Terminal		Dual terminal
Cross-section of wire ◆ – solid, stranded (front/back terminal slot)		35/35 mm^2
		18…4/18…10 AWG
Cross-section of wire – flexible (front/back terminal slot)		25/10 mm^2
Multi-wire rating per UL, CSA		1 wire, 18…4 AWG
		2-4 wires‡, 18…10 AWG
Cross-section of bus bars (back terminal slot)		10 mm^2
Tightening torque	IEC	2.8 N•m
	UL/CSA	AWG 18...16: 13.3 in•lb, AWG 14...10: 17.7 in•lb, AWG 8...4: 39.8 in•lb
Screwdriver		No. 2 Pozidrive
Mounting		DIN Rail (EN 60715, 35 mm) with fast clip
Mounting position		Any
Supply		Optional
Approximate Dimensions and Weight		
Pole dimensions (H x D x W)		111 x 69 x 17.5 mm (4.37 x 2.72 x .69")
Pole weight		125 g (4.4 oz.)
Combination with Auxiliary Elements		
Auxiliary contact		Yes
Signal contact		Yes
Shunt trip		Yes

◆ 35 mm self-declared, not included in IEC/EN approval.

Δ Refer to the ambient temperature derating tables.

‡ Wires must be of like size and stranding. Up to two wires per terminal slot.

RH Series Compact Power Relays

Key features

- SPDT through 4PDT, 10A contacts
- Compact power type relays
- Miniature power relays with a large capacity
- 10A contact capacity
- Compact size saves space

Part Number Selection

Contact	Model	Part Number: Blade Terminal	Part Number: PCB Terminal	Coil Voltage Code (Standard Stock in bold)
SPDT 	Standard	RH1B-U ☐	RH1V2-U ☐	AC6V, AC12V, **AC24V**, AC110V, **AC120V**, AC220V, **AC240V** DC6V, **DC12V**, **DC24V**, DC48V, DC110V
	With Indicator	RH1B-UL ☐	—	
	With Check Button	RH1B-UC ☐	—	
	With Indicator and Check Button	RH1B-ULC ☐	—	
	Top Bracket Mounting	RH1B-UT ☐	—	
	With Diode (DC coil only)	RH1B-UD ☐	RH1V2-UD ☐	DC6V, **DC12V**, **DC24V**, DC48V, DC110V
	With Indicator and Diode (DC coil only)	RH1B-ULD ☐	—	**DC12V**, **DC24V**, DC48V, DC110V
DPDT 	Standard	RH2B-U ☐	RH2V2-U ☐	AC6V, AC12V, **AC24V**, **AC110-120V**, **AC220-240V** DC6V, **DC12V**, **DC24V**, DC48V, DC100-110V
	With Indicator	RH2B-UL ☐	RH2V2-UL ☐	
	With Check Button	RH2B-UC ☐	—	
	With Indicator and Check Button	RH2B-ULC ☐	—	
	Top Bracket Mounting	RH2B-UT ☐	—	
	With Diode (DC coil only)	RH2B-UD ☐	RH2V2-UD ☐	DC6V, **DC12V**, **DC24V**, DC48V, DC100-110V
	With Indicator and Diode (DC coil only)	RH2B-ULD ☐	RH2V2-ULD ☐	
3PDT 	Standard	RH3B-U ☐	RH3V2-U ☐	AC6V, AC12V, **AC24V**, AC110V, **AC120V**, AC220V, **AC240V** DC6V, **DC12V**, **DC24V**, DC48V, DC110V
	With Indicator	RH3B-UL ☐	RH3V2-UL ☐	
	With Check Button	RH3B-UC ☐	—	
	With Indicator and Check Button	RH3B-ULC ☐	—	
	Top Bracket Mounting	RH3B-UT ☐	—	
	With Diode (DC coil only)	RH3B-UD ☐	—	DC6V, DC12V, DC24V, DC48V, DC110V
	With Indicator and Diode (DC coil only)	RH3B-ULD ☐	—	
4PDT 	Standard	RH4B-U ☐	RH4V2-U ☐	AC6V, AC12V, **AC24V**, AC110V, **AC120V**, AC220V, **AC240V** DC6V, **DC12V**, **DC24V**, DC48V, DC110V
	With Indicator	RH4B-UL ☐	RH4V2-UL ☐	
	With Check Button	RH4B-UC ☐	—	
	With Indicator and Check Button	RH4B-ULC ☐	—	
	Top Bracket Mounting	RH4B-UT ☐	—	
	With Diode (DC coil only)	RH4B-UD ☐	RH4V2-UD ☐	DC6V, DC12V, DC24V, DC48V, DC110V
	With Indicator and Diode (DC coil only)	RH4B-ULD ☐	—	

PCB terminal relays are designed to mount directly to a circuit board without any socket.

Ordering Information
When ordering, specify the Part No. and coil voltage code:
(example) **RH3B-U** (Part No.) **AC120V** (Coil Voltage Code)

Sockets (for Blade Terminal Models)

Relays	Standard DIN Rail Mount [1]	Finger-safe DIN Rail Mount [1]	Through Panel Mount	PCB Mount
RH1B	SH1B-05	SH1B-05C	SH1B-51	SH1B-62
RH2B	SH2B-05	SH2B-05C	SH2B-51	SH2B-62
RH3B	SH3B-05	SH3B-05C	SH3B-51	SH3B-62
RH4B	SH4B-05	SH4B-05C	SH4B-51	SH4B-62
				

1. DIN Rail mount socket comes with two horseshoe clips. Do not use unless you plan to insert pullover wire spring. Replacement horseshoe clip part number is Y778-011.

Hold Down Springs & Clips

Appearance	Item	Relay	For DIN Mount Socket	For Through Panel & PCB Mount Socket
	Pullover Wire Spring	RH1B	SY2S-02F1 [2]	SY4S-51F1
		RH2B	SY4S-02F1 [2]	
		RH3B	SH3B-05F1 [2]	
		RH4B	SH4B-02F1 [2]	
	Leaf Spring (side latch)	RH1B, RH2B, RH3B, RH4B	SFA-202 [3]	SFA-302 [3]
	Leaf Spring (top latch)	RH1B, RH2B, RH3B, RH4B	SFA-101 [3]	SFA-301 [3]

2. Must use horseshoe clip when mounting in DIN mount socket. Replacement horseshoe clip part number is Y778-011.
3. Two required per relay.

AC Coil Ratings

Voltage (V)	Rated Current (mA) ±15% at 20°C								Coil Resistance (Ω) ±10% at 20°C				Operation Characteristics (against rated values at 20°C)		
	AC 50Hz				AC 60Hz										
	SPDT	DPDT	3PDT	4PDT	SPDT	DPDT	3PDT	4PDT	SPDT	DPDT	3PDT	4PDT	Max. Continuous Applied Voltage	Pickup Voltage	Dropout Voltage
6	170	240	330	387	150	200	280	330	330	9.4	6.4	5.4	110%	80% maximum	30% minimum
12	86	121	165	196	75	100	140	165	165	39.3	25.3	21.2			
24	42	60.5	81	98	37	50	70	83	83	153	103	84.5			
110	9.6	—	18.1	21.6	8.4	—	15.5	18.2	18.2	—	2,200	1,800			
110-120	—	9.4-10.8	—	—	—	8.0-9.2	—	—	—	—	—	—			
120	8.6	—	16.4	19.5	7.5	—	14.2	16.5	16.5	—	10,800	7,360			
220	4.7	—	8.8	10.7	4.1	—	7.7	9.1	9.1	—	10,800	7,360			
220-240	—	4.7-5.4	—	—	—	4.0-4.6	—		—	18,820	—	—			
240	4.9	—	8.2	9.8	4.3	—	7.1	8.3	8.3	—	12,100	9,120			

DC Coil Ratings

Voltage (V)	Rated Current (mA) ±15% at 20°C				Coil Resistance (Ω) ±10% at 20°C				Operation Characteristics (against rated values at 20°C)		
	SPDT	DPDT	3PDT	4PDT	SPDT	DPDT	3PDT	4PDT	Max. Continuous Applied Voltage	Pickup Voltage	Dropout Voltage
6	128	150	240	250	47	40	25	24	110%	80% maximum	10% minimum
12	64	75	120	125	188	160	100	96			
24	32	36.9	60	62	750	650	400	388			
48	18	18.5	30	31	2,660	2,600	1,600	1,550			
100-110	—	8.2-9.0	—	—	—	12,250	—	—			
110	8	—	12.8	15	13,800	—	8,600	7,340			

Standard coil voltages are in **BOLD**.

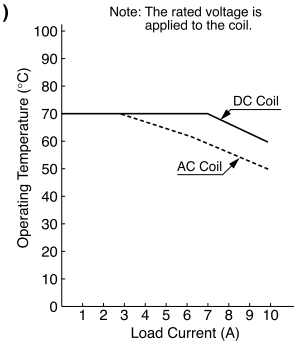
Specifications

Contact Material		Silver cadmium oxide
Contact Resistance [1]		50mΩ maximum
Minimum Applicable Load		24V DC, 30 mA; 5V DC, 100 mA (reference value)
Operating Time [2]	SPDT DPDT	20ms maximum
	3PDT 4PDT	25ms maximum
Release Time [2]	SPDT DPDT	20ms maximum
	3PDT 4PDT	25ms maximum
Power Consumption (approx.)	SPDT	AC: 1.1VA (50Hz), 1VA (60Hz) DC: 0.8W
	DPDT	AC: 1.4VA (50Hz), 1.2VA (60Hz) DC: 0.9W
	3PDT	AC: 2VA (50Hz), 1.7VA (60Hz) DC: 1.5W
	4PDT	AC: 2.5VA (50Hz), 2VA (60Hz) DC: 1.5W
Insulation Resistance		100MΩ minimum (500V DC megger)
Dielectric Strength [3]	SPDT	Between live and dead parts: 2,000V AC, 1 minute Between contact and coil: 2,000V AC, 1 minute Between contacts of the same pole: 1,000V AC, 1 minute
	DPDT 3PDT 4PDT	Between live and dead parts: 2,000V AC, 1 minute Between contact and coil: 2,000V AC, 1 minute Between contacts of different poles: 2,000V AC, 1 minute Between contacts of the same pole: 1,000V AC, 1 minute
Operating Frequency		Electrical: 1,800 operations/hour maximum Mechanical: 18,000 operations/hour maximum
Vibration Resistance		Damage limits: 10 to 55Hz, amplitude 0.5 mm Operating extremes: 10 to 55Hz, amplitude 0.5 mm
Shock Resistance		Damage limits: 1,000m/s² (100G) Operating extremes: 200m/s² (20G - SPDT, DPDT) 100m/s² (10G - 3PDT, 4PDT)
Mechanical Life		50,000,000 operations minimum
Electrical Life	DPDT	500,000 operations minimum (120V AC, 10A)
	SPDT 3PDT 4PDT	200,000 operations minimum (120V AC, 10A)
Operating Temperature [4]	SPDT DPDT 3PDT 4PDT	–25 to +70°C (no freezing)
Operating Humidity		45 to 85% RH (no condensation)
Weight (approx.)		SPDT: 24g, DPDT: 37g, 3PDT: 50g, 4PDT: 74g

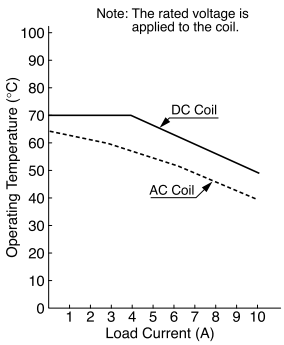
Note: Above values are initial values.
1. Measured using 5V DC, 1A voltage drop method
2. Measured at the rated voltage (at 20°C), excluding contact bouncing
   Release time of relays with diode: 40 ms maximum
3. Relays with indicator or diode: 1000V AC, 1 minute
4. For use under different temperature conditions, refer to Continuous Load Current vs. Operating Temperature Curve. The operating temperature range of relays with indicator or diode is –25 to +40°C.

Continuous Load Current vs. Operating Temperature Curve (Basic Type, With Check Button, and Top Bracket Mounting Type)

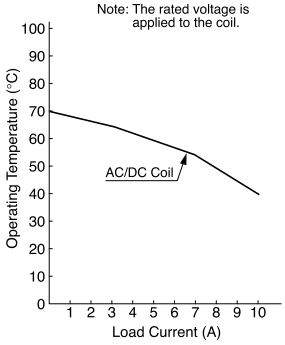
(RH1)



(RH2)

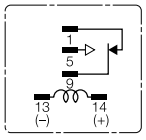
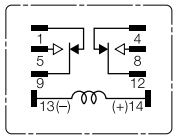
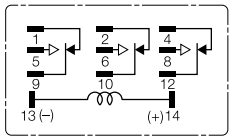
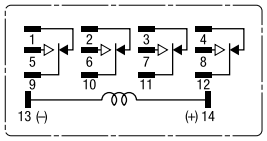
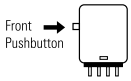


(RH3/RH4)

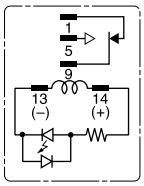
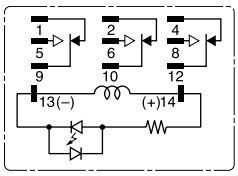
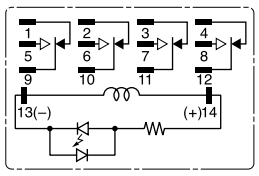
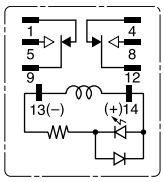
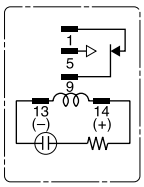
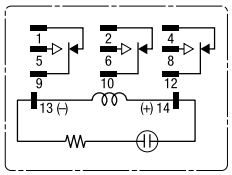
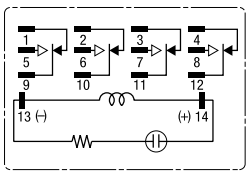
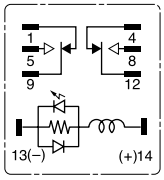


Internal Connection (View from Bottom)

Basic Type

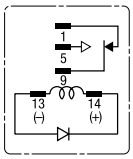
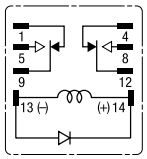
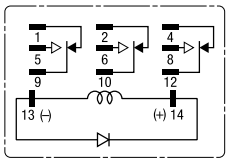
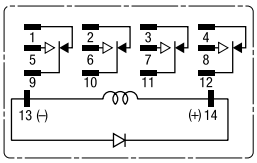
SPDT	DPDT	3PDT	4PDT	With Check Button
				 Contacts can be operated by pressing the check button.

With Indicator (-L type)

	SPDT	3PDT	4PDT	DPDT	
Below 100V AC/DC				Below 24V AC/DC	
100V AC/DC and over				24V AC/DC and over	

When the relay is energized, the indicator goes on.
- Relay coils less than 100V DC do not contain a protection diode (except DPDT).
- Relay coils below 100V use LED indicator, coils above 100V use neon lamp indicator.
- LED color of DPDT model is green

With Diode (-D type)

SPDT	DPDT	3PDT	4PDT	
				Contains a diode to absorb the back emf generated when the coil is de-energized. The release time is slightly longer. Available for DC coil only. • Diode Characteristics Reverse withstand voltage: 1,000V Forward current: 1A

New TWND Series — Full Size NEMA Pushbuttons

New! TWND Series: Heavy duty switches built to last

Key features:

- Variety of button sizes up to 2 9/16" (65mm)
- Rugged construction includes chrome plated zinc locking ring die cast zinc mounting thread
- LED illumination
- Transformer or full voltage
- Slow make, double break wiping contacts
- Modular construction for maximum flexibility
- Available assembled or as sub-components
- UL Type 4X, 13 and IP65 watertight/oiltight panel

The rugged series of TWND switches offers both variety and durability in an attractive design.

With button sizes up to 2 9/16" (65mm), chrome plated zinc locking rings, die cast zinc mounting threads, steel anti-rotation rings, and self cleaning contacts, the TWNDs are here to stay.

The TWND series also offers LED illumination in full voltage and transformer models.

Regardless of your switching needs, the NEW TWND series provides the kind of long lasting, industrial strength quality you've come to expect from IDEC.

UL Listed
File No. E68961

File No. LR21451

TÜV Rheinland
R 50363567

Certificate No.
2016010305902410

Specifications

Conforming to Standards	EN60947-5-1, UL508, CSA C22-2 No.14
Approvals	**CSA:** pushbuttons and selector switches: A600 pilot lights and illuminated pushbuttons, direct supply pilot lights and illuminated pushbuttons with integral transformer (100/110, 115, 120, 200/220, 230, 240, 380, 400/440, 480V) **UL:** pushbuttons and selector switches: A600 pilot lights and illuminated pushbuttons, direct supply pilot lights and illuminated pushbuttons with integral transformer (100/110, 115, 120, 200/220, 230, 240, 380, 400/440, 480V) **TÜV:** pushbuttons and selector switches: A600 pilot lights and illuminated pushbuttons, direct supply pilot lights and illuminated pushbuttons with integral transformer (100/110, 115, 120, 200/220, 230, 240, 380, 400/440, 480V)
Operating Temperature	Operation: –25 to +50°C (illuminated versions) -25 ~ +70C non-illuminated Storage: –40 to +80°C (without freezing) C-> °C
Vibration Resistance	5 to 55Hz, 98m/sec^2 (10g) conforming to IEC60068-2-6
Shock Resistance	980m/sec^2 (100g) conforming to IEC60068-2-27
Electric Shock Protection	Class 2 conforming to IEC60664-1
Degree of Protection	IP65 (from front of the panel) (conforming to IEC60529) UL Type 1, 2, 3, 3R, 3S, 4, 4X, 5, 12, 13 (conforming to NEMA ICS6-110)
Mechanical Life	Momentary pushbuttons: 5,000,000 (1800 operations per hour) All other switches: 500,000
Pollution Degree (conforming to IEC60947-1)	3

Mechanical-Electrical Specifications

Rated Operational Characteristics	AC-15: A600					
Rated Insulation Voltage	600V					
Rated Impulse Withstanding Voltage øDielectric Strength	Between live and dead metal parts 2.5kV AC, 1 minute					
Rated Thermal Current	10 Amp					
Minimum Switching Capacity	5 mA at 3V AC/DC (applicable range may vary with operating conditions and load types)					
Contact Operation	Slow break NC or NO					
Operating Force	Flush and extended pushbuttons—with 1NO or 1NC contact: 6.2±2N (momentary), 9.0±1.5N Additional contacts—1NO or 1NC: +3.0N					
Recommended Terminal Torque	Unit	Wire		Number of Wires	Recommended Tightening Torque (Nm)	Terminal Screw
	HW-U Contact Block	Crimping Terminal		2	1.0 to 1.3	M3.5
		Solid Wire	ø0.5 to 1.6 mm (AWG14 to 22)	2	1.0 to 1.3	
			ø1.7 to 2.0 mm (AWG12)	1	1.2 to 1.3	
		Stranded Wire	0.3 to 2.0 mm^2 (AWG14 to 22)	2	1.0 to 1.3	
			2.1 to 3.5 mm^2 (AWG12)	1	1.2 to 1.3	
	Illuminated Unit (*1)	Crimping Terminal		2	1.0 to 1.3	M3.5
		Solid Wire	ø0.5 to 1.6 mm (AWG14 to 22)			
		Stranded Wire	0.3 to 2.0 mm (AWG14 to 22)			
Applicable Wire Size	Pilot Light	Crimping Terminal		2	0.6 to 1.0 (M3.0) 1.0 to 1.3 (M3.5)	
		Solid Wire	ø0.5 to 1.6 mm (AWG14 to 22)			
		Stranded Wire	ø0.3 to 2.0 mm (AWG14 to 22)			
	1. * refers to the lamp terminals of the illuminated push buttons and selector switches.					
Contact Resistance	Initial contact resistance of 50mΩ or less					
Contact Gap	4mm (NO and NC) 2mm (NO-EM and NC-LB)					
LED Ratings	LEDs: 6V: 8mA, 12V: 11mA, 24V: 11mA, 120V: 8.8mA, 240V: 8.6mA					
Contact Material	Silver					

Contact Ratings

Contact Ratings by Utilization Category IEC 60947-5-1	AC-15 (A600)
	DC-13 (P600)

Contact Ratings by Utilization Category								
Operational Voltage			24V	48V	50V	110V	220V	440V
Operation Current	AC 50/60 Hz	AC-12 Control of resistive loads & solid state loads	10A	—	10A	10A	6A	2A
		AC-15 Control of electromagnetic loads (> 72VA)	10A	—	7A	5A	3A	1A
	DC	DC-12 Control of resistive loads & solid state loads	10A	5A	—	2.2A	1.1A	—
		DC-13 Control of electromagnets	5A	2A	—	1.1A	0.6A	—

Non-Illuminated Pushbuttons (Assembled)

Assembled Pushbuttons

A B ( ) D 1 10 NU R

Function

B: Momentary
O: Maintained
V: Pushlock Turn Reset
Y: Push-Pull

Bezel Shape

Blank: Octagonal
F: Full Shroud
G: Mushroom Shroud
P: Neoprene Boot

Series Designation

D: TWND Series

Button Color

B: Black G: Green W: White
R: Red S: Blue Y: Yellow

Contact Arrangement

10: 1NO 01: 1NC
20: 2NO 02: 2NC
11: 1NO-1NC 22: 2NO-2NC

Button Shape

1: Flush
2: Extended
3: Mushroom ø 40mm
4: Jumbo Mushroom ø 65mm

1. Use only when interpreting part numbers. Do not use for developing part numbers.
2. Custom contact configurations available, contact IDEC for details.

Non-Illuminated Pushbuttons (Assembled)

Non-Illuminated Pushbuttons

Style		Contacts	Momentary	Maintained
Flush		1NO	ABD110NU①	AOD110NU①
		1NC	ABD101NU①	AOD101NU①
		1NO-1NC	ABD111NU①	AOD111NU①
		2NO	ABD120NU①	AOD120NU①
		2NC	ABD102NU①	AOD102NU①
Extended		1NO	ABD210NU①	AOD210NU①
		1NC	ABD201NU①	AOD201NU①
		1NO-1NC	ABD211NU①	AOD211NU①
		2NO	ABD220NU①	AOD220NU①
		2NC	ABD202NU①	AOD202NU①
Extended with Neoprene Boot[1]		1NO	ABPD210NU①	AOPD210NU①
		1NC	ABPD201NU①	AOPD201NU①
		1NO-1NC	ABPD211NU①	AOPD211NU①
		2NO	ABPD220NU①	AOPD220NU①
		2NC	ABPD202NU①	AOPD202NU①
Recessed		1NO	ABFD110NU①	AOFD110NU①
		1NC	ABFD101NU①	AOFD101NU①
		1NO-1NC	ABFD111NU①	AOFD111NU①
		2NO	ABFD120NU①	AOFD120NU①
		2NC	ABFD102NU①	AOFD102NU①
Extended with Full Shroud		1NO	ABFD210NU①	AOFD210NU①
		1NC	ABFD201NU①	AOFD201NU①
		1NO-1NC	ABFD211NU①	AOFD211NU①
		2NO	ABFD220NU①	AOFD220NU①
		2NC	ABFD202NU①	AOFD202NU①
ø 40mm Mushroom Head		1NO	ABD310NU①	AOD310NU①
		1NC	ABD301NU①	AOD301NU①
		1NO-1NC	ABD311NU①	AOD311NU①
		2NO	ABD320NU①	AOD320NU①
		2NC	ABD302NU①	AOD302NU①
ø 40mm Mushroom Head with Full Shroud		1NO	ABGD310NU①	AOGD310NU①
		1NC	ABGD301NU①	AOGD301NU①
		1NO-1NC	ABGD311NU①	AOGD311NU①
		2NO	ABGD320NU①	AOGD320NU①
		2NC	ABGD302NU①	AOGD302NU①
ø 65mm Jumbo Mushroom Head		1NO	ABD410NU①	AOD410NU①
		1NC	ABD401NU①	AOD401NU①
		1NO-1NC	ABD411NU①	AOD411NU①
		2NO	ABD420NU①	AOD420NU①
		2NC	ABD402NU①	AOD402NU①
ø 65mm Jumbo Mushroom Head with Shallow Shroud		1NO	ABGD410NU①	AOGD410NU①
		1NC	ABGD401NU①	AOGD401NU①
		1NO-1NC	ABGD411NU①	AOGD411NU①
		2NO	ABGD420NU①	AOGD420NU①
		2NC	ABGD402NU①	AOGD402NU①
ø 65mm Jumbo Mushroom Head With Deep Shroud		1NO	ABFD410NU①	AOFD410NU①
		1NC	ABFD401NU①	AOFD401NU①
		1NO-1NC	ABFD411NU①	AOFD411NU①
		2NO	ABFD420NU①	AOFD420NU①
		2NC	ABFD402NU①	AOFD402NU①

1. In place of ①, specify the Button Color Code.
2. For sub-assembly part numbers, see next page.
4. [1]Neoprene boot available only in Black (B), Green (G), Red (R) and Yellow (Y).

① Button Color Codes

Color	Code
Black	B
Green	G
Red	R
Blue	S
Yellow	Y
White	W

1. 65mm Jumbo mushroom not available in white.
2. Neoprene boot is not available in blue or white.

Pilot Lights (Assembled)

Assembled Pilot Lights

A P D 1 126 D NU R

Function
P: Pilot Light

Series Designation
D: TWND Series

Lens Shape
1: Dome

Rated Operational Voltage (Primary)

Transformer Type	Full Voltage Type
126: 120V AC	66: 6VAC/DC
246: 240V AC	11: 12VAC/DC
486: 480V AC	22: 24VAC/DC
	QH2: 120VAC
	QM4: 240VAC

Lens Color Code
A: Amber
G: Green
R: Red
S: Blue
W: White
Y: Yellow

D: LED

Use only when interpreting part numbers. Do not use for developing part numbers.

LED Pilot Lights

Style	Operating Voltage	Part Number LED
Transformer Dome 	120V AC 240V AC 480V AC	APD1126DNU② APD1246DNU② APD1486DNU②
Full Voltage Dome 	—	APD1③DN②

1. In place of ②, specify the Lens/LED Color Code.
2. In place of ③, specify the Full Voltage Code (LED voltage).
3. Yellow pilot light comes with white LED.

② Lens Color Codes

Color	Code
Amber	A
Green	G
Red	R
Blue	S
White	W
Yellow	Y

③ Full Voltage Codes

Voltage	Code
6V AC/DC	66
12V AC/DC	11
24V AC/DC	22
120V AC	QH2
240V AC	QM4

Non-Illuminated Selector Switches (Assembled)

Assembled Selector Switches

A S D 2 ( ) ( ) 11 NU – ( )

Function

S: Selector Switch

Series Designation

D: TWND Series

Number of Positions

2: 2-Position
3: 3-Position

Spring Return Action

Blank: Maintained
1: Spring return from Right
2: Spring return from Left
3: 2-Way spring return from Left and Right

Circuit Number

(See Circuit # column of Selector Switch Contact Arrangement Chart on beginning on page 739.)

Contact Arrangement Code

10: 1NO	01: 1NC
20: 2NO	02: 2NC
40: 4NO	04: 4NC
11: 1NO-1NC	22: 2NO-2NC

Operator Style Code

Blank: Knob Operator
L: Lever Operator
K: Key Operator

1. Use only when interpreting part numbers. Do not use for developing part numbers.
2. Custom key removal codes available. Please contact IDEC for details.

Non-Illuminated Selector Switches (Assembled)

Non-Illuminated 2-Position Selector Switches

Style					Part Number		
Contact	Mounting	Operator Position L	Operator Position R		Maintained	Spring Return from Right	Spring Return from Left
1NO	1 2	0 0	X 0	Knob Lever Key	ASD210NU ASD2L10NU ASD2K10NU	ASD2110NU ASD21L10NU ASD21K10NU	ASD2210NU ASD22L10NU ASD22K10NU
1NC	1 2	X 0	0 0	Knob Lever Key	ASD201NU ASD2L01NU ASD2K01NU	ASD2101NU ASD21L01NU ASD21K01NU	ASD2201NU ASD22L01NU ASD22K01NU
1NO 1NC	1 2	0 X	X 0	Knob Lever Key	ASD211NU ASD2L11NU ASD2K11NU	ASD2111NU ASD21L11NU ASD21K11NU	ASD2211NU ASD22L11NU ASD22K11NU
2NO	1 2	0 0	X X	Knob Lever Key	ASD220NU ASD2L20NU ASD2K20NU	ASD2120NU ASD21L20NU ASD21K20NU	ASD2220NU ASD22L20NU ASD22K20NU
2NC	1 2	X X	0 0	Knob Lever Key	ASD202NU ASD2L02NU ASD2K02NU	ASD2102NU ASD21L02NU ASD21K02NU	ASD2202NU ASD22L02NU ASD22K02NU
2NO 2NC	1 2 3 4	0 X 0 X	X 0 X 0	Knob Lever Key	ASD222NU ASD2L22NU ASD2K22NU	ASD2122NU ASD21L22NU ASD21K22NU	ASD2222NU ASD22L22NU ASD22K22NU
2NO 2NC	1 2 3 4	0 0 X X	X X 0 0	Knob Lever Key	ASD222NU-111 ASD2L22NU-111 ASD2K22NU-111	ASD2122NU-111 ASD21L22NU-111 ASD21K22NU-111	ASD2222NU-111 ASD22L22NU-111 ASD22K22NU-111

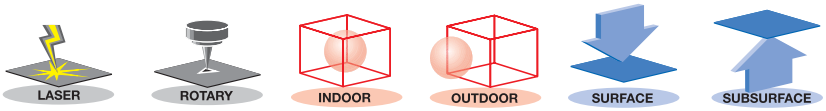
1. The truth table indicates the operating position of contact block when the operator is switched to that position.
   X = On (closed contacts) 0 = Off (open contacts)
   X—X = Overlapping Contacts: Remain on (closed contacts) when switch is moved between these two positions.
2. All knob and lever selector switches come in black. Other colors are available by ordering the knob or lever separately.
3. Custom contact arrangements available, see page 739.

Non-Illuminated 3-Position Selector Switches

Style						Part Number			
Contact	Mounting	Operator Position L	Operator Position C	Operator Position R		Maintained	Spring Return from Right	Spring Return from Left	Spring Return Two-Way
2NO	1 2	X 0	0 0	0 X	Knob Lever Key	ASD320NU ASD3L20NU ASD3K20NU	ASD3120NU ASD31L20NU ASD31K20NU	ASD3220NU ASD32L20NU ASD32K20NU	ASD3320NU ASD33L20NU ASD33K20NU
2NC	1 2	0 X—X	X—X	X 0	Knob Lever Key	ASD302NU ASD3L02NU ASD3K02NU	ASD3102NU ASD31L02NU ASD31K02NU	ASD3202NU ASD32L02NU ASD32K02NU	ASD3302NU ASD33L02NU ASD33K02NU
2NO 2NC	1 2 3 4	X 0 0 X—X	0 0 X—X	0 X X 0	Knob Lever Key	ASD322NU ASD3L22NU ASD3K22NU	ASD3122NU ASD31L22NU ASD31K22NU	ASD3222NU ASD32L22NU ASD32K22NU	ASD3322NU ASD33L22NU ASD33K22NU
2NO 2NC	1 2 3 4	X X—X 0 0	0 X X 0	X 0 0 X	Knob Lever Key	ASD322NU-309 ASD3L22NU-309 ASD3K22NU-309	ASD3122NU-309 ASD31L22NU-309 ASD31K22NU-309	ASD3222NU-309 ASD32L22NU-309 ASD32K22NU-309	ASD3322NU-309 ASD33L22NU-309 ASD33K22NU-309
2NO 2NC	1 2 3 4	0 0 0 0	X 0 X 0	0 X 0 X	Knob Lever Key	ASD322NU-310 ASD3L22NU-310 ASD3K22NU-310	ASD3122NU-310 ASD31L22NU-310 ASD31K22NU-310	ASD3222NU-310 ASD32L22NU-310 ASD32K22NU-310	ASD3322NU-310 ASD33L22NU-310 ASD33K22NU-310
4NO	1 2 3 4	X 0 X 0	0 0 0 0	0 X 0 X	Knob Lever Key	ASD340NU ASD3L40NU ASD3K40NU	ASD3140NU ASD31L40NU ASD31K40NU	ASD3240NU ASD32L40NU ASD32K40NU	ASD3340NU ASD33L40NU ASD33K40NU
4NC	1 2 3 4	0 X—X 0 X—X	X—X X—X	X 0 X—X 0	Knob Lever Key	ASD304NU ASD3L04NU ASD3K04NU	ASD3104NU ASD31L04NU ASD31K04NU	ASD3204NU ASD32L04NU ASD32K04NU	ASD3304NU ASD33L04NU ASD33K04NU

GRAVOPLY™ ULTRA

- **Badges**
- **Awards plaques**
- **Indoor and outdoor signage**



- Satin or matt finish
- Unique 0.5 mm (.002") cap layer for detailed engraving
- UV stable
- Excellent for photo lasering
- Reduce inventory with one material for rotary, laser, indoor and outdoor needs

Specifications

Surface	Satin or Matt
Composition	DR Acrylic
Rotary engraving depth	0.1 mm (.004")
Full sheet	1220 mm x 610 mm (24" x 48")
Half sheet	610 mm x 610 mm (24" x 24")
Quarter sheet	610 mm x 305 mm (12" x 24")

Capabilities

Interior	■	■	Exterior
Shear	■	■	Saw
Silk screen	■	■	Hot stamp
Scratch resistant	■	■	Flexible
Break resistant		■	UV resistant
		80ºC	Max. temp.

			Matt 2-ply		Satin 2-ply	
			0.5 mm	1.6 mm	1.6 mm	2.4 mm
	Surface colour	Core colour	.020"	1/16"	1/16"	3/32"
○	clear*	white	18965	19009		
●	clear*	black	18962	19006		
●	white	red		18997		
●	white	blue		18996		
●	white	black	18946	18984	29507	
●	yellow	black	18955	18993	29511	
●	orange	white		19000		
●	orange	black		29499		
●	red	white	18949	18987	29512	
●	red	black		29498		
●	red	gold		29503		
●	burgundy	white		18980		
●	burgundy	gold	18958	18999		
●	green apple	white	18970	19012	29513	
●	forest green	white		19001		
●	forest green	gold		18998		
●	pine green	white		29491		
●	blue	white	18952	18990	29510	
●	navy blue	white		29494		
●	royal blue	white		19015		
●	royal blue	gold	18942	18979		
●	brown	white		29495		
●	black	white	18943	18981	29508	29687
●	black	silver grey		19005		
●	glossy black	gold	18973			
●	matt black	gold	18976	19004		

* Suitable for subsurface engraving.

Gravoply™ Ultraglow Photoluminescent

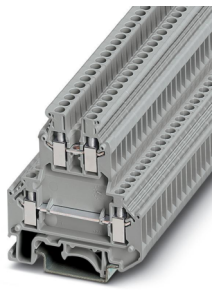
NEW

			Matt 2-ply
	Surface colour	Core colour	0.8 mm (1/32")
○	glow	white	49884

Please note:
This product allows for white engraving on the photoluminescent surface. 0.8 mm (1/32") thickness may be used to cut profile letters for DDA tactile signage applications.
The glow times for this product meet the following norms: ISO:10012-1 & MIL-STD-45662A

Double-level terminal block - UKK 3 - 2770011

Please be informed that the data shown in this PDF Document is generated from our Online Catalog. Please find the complete data in the user's documentation. Our General Terms of Use for Downloads are valid (http://phoenixcontact.com/download)



Double-level terminal block, connection method: Screw connection, cross section: 0.2 mm² - 4 mm², AWG: 24 - 12, width: 5.2 mm, color: gray, mounting type: NS 35/7,5, NS 35/15, NS 32

Your advantages

- Large-surface labeling option

RoHS

Key Commercial Data

Packing unit	1 pc
Minimum order quantity	50 pc
GTIN	4 017918 067755
GTIN	4017918067755
Weight per Piece (excluding packing)	12.800 g
Custom tariff number	85369010
Country of origin	China

Technical data

General

Number of levels	2
Number of connections	4
Nominal cross section	2.5 mm²
Color	gray
Insulating material	PA
Flammability rating according to UL 94	V0
Rated surge voltage	6 kV

Double-level terminal block - UKK 3 - 2770011

Technical data

General

Degree of pollution	3
Overvoltage category	III
Insulating material group	I
Connection in acc. with standard	IEC 60947-7-1
Nominal current I_N	24 A
Maximum load current	32 A (with 4 mm² conductor cross section)
Nominal voltage U_N	500 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	7.3 kV
Result of power-frequency withstand voltage test	Test passed
Power frequency withstand voltage setpoint	1.89 kV
Checking the mechanical stability of terminal points (5 x conductor connection)	Test passed
Result of flexion and pull-out test	Test passed
Bending test rotation speed	10 rpm
Bending test turns	135
Bending test conductor cross section/weight	0.2 mm² / 0.2 kg
	2.5 mm² / 0.7 kg
	4 mm² / 0.9 kg
Tensile test result	Test passed
Result of tight fit on support	Test passed
Tight fit on carrier	NS 32/NS 35
Setpoint	1 N
Result of voltage-drop test	Test passed
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
Relative insulation material temperature index (Elec.; UL 746 B)	130 °C

Double-level terminal block - UKK 3 - 2770011

Technical data

General

Temperature index of insulation material (DIN EN 60216-1 (VDE 0304-21))	130 °C
Static insulating material application in cold	-60 °C
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)	28 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	2.5 mm
Length	56 mm
Height NS 35/7,5	62 mm
Height NS 35/15	69.5 mm
Height NS 32	67 mm

Connection data

Connection method	Screw connection
Conductor cross section solid min.	0.2 mm²
Conductor cross section solid max.	4 mm²
Conductor cross section flexible min.	0.2 mm²
Conductor cross section flexible max.	2.5 mm²
Conductor cross section AWG min.	24
Conductor cross section AWG max.	12
Conductor cross section flexible, with ferrule without plastic sleeve min.	0.25 mm²
Conductor cross section flexible, with ferrule without plastic sleeve max.	2.5 mm²
Conductor cross section flexible, with ferrule with plastic sleeve min.	0.25 mm²
Conductor cross section flexible, with ferrule with plastic sleeve max.	1.5 mm²
Cross section with insertion bridge, solid max.	2.5 mm²
Cross section with insertion bridge, stranded max.	2.5 mm²
2 conductors with same cross section, solid min.	0.2 mm²
2 conductors with same cross section, solid max.	1 mm²
2 conductors with same cross section, stranded min.	0.2 mm²
2 conductors with same cross section, stranded max.	1.5 mm²
Two conductors with the same cross section stranded, with ferrule and without plastic sleeve, minimum	0.25 mm²

Double-level terminal block - UKK 3 - 2770011

Technical data

Connection data

Two conductors with the same cross section stranded, with ferrule and without plastic sleeve, maximum	1.5 mm²
Two conductors with the same cross section, flexible, with TWIN ferrules, with plastic sleeve, minimum	0.5 mm²
Two conductors with the same cross section, flexible, with TWIN ferrules, with plastic sleeve, maximum	1 mm²
Cross section with insertion bridge, solid max.	2.5 mm²
Cross section with insertion bridge, stranded max.	2.5 mm²
Stripping length	8 mm
Screw thread	M3
Tightening torque, min	0.5 Nm
Tightening torque max	0.6 Nm

Ambient conditions

Operating temperature	-60 °C ... 105 °C (max. short-term operating temperature 130°C)
Ambient temperature (storage/transport)	-25 °C ... 60 °C (for a short time, not exceeding 24 h, -60 °C to +70 °C)
Permissible humidity (storage/transport)	30 % ... 70 %
Ambient temperature (assembly)	-5 °C ... 70 °C
Ambient temperature (actuation)	-5 °C ... 70 °C

Standards and Regulations

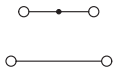
Connection in acc. with standard	CSA
	IEC 60947-7-1
Flammability rating according to UL 94	V0

Environmental Product Compliance

REACh SVHC	Lead 7439-92-1
China RoHS	Environmentally Friendly Use Period = 50 years
	For details about hazardous substances go to tab “Downloads”, Category “Manufacturer's declaration”

Drawings

Circuit diagram



Classifications

eCl@ss

eCl@ss 10.0.1	27141120

Double-level terminal block - UKK 3 - 2770011

Classifications

eCl@ss

eCl@ss 11.0	27141120
eCl@ss 4.0	27141100
eCl@ss 4.1	27141100
eCl@ss 5.0	27141100
eCl@ss 5.1	27141100
eCl@ss 6.0	27141100
eCl@ss 7.0	27141120
eCl@ss 9.0	27141120

ETIM

ETIM 2.0	EC000897
ETIM 3.0	EC000897
ETIM 4.0	EC000897
ETIM 6.0	EC000897
ETIM 7.0	EC000897

UNSPSC

UNSPSC 6.01	30211811
UNSPSC 7.0901	39121410
UNSPSC 11	39121410
UNSPSC 12.01	39121410
UNSPSC 13.2	39121410
UNSPSC 18.0	39121410
UNSPSC 19.0	39121410
UNSPSC 20.0	39121410
UNSPSC 21.0	39121410

Approvals

Approvals

Approvals

DNV GL / CSA / UL Recognized / KEMA-KEUR / cUL Recognized / IECEE CB Scheme / EAC / RS / LR / cULus Recognized

Ex Approvals

Approval details

Double-level terminal block - UKK 3 - 2770011

Accessories

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

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 clamp - E/UK - 1201442

End clamp, width: 9.5 mm, height: 35.3 mm, material: PA, length: 50.5 mm, Mounting on a DIN rail NS 32 or NS 35, color: gray

End clamp - E/UK 1 - 1201413

End clamps, for supporting the ends of double-level and three-level terminal blocks, width: 10 mm, color: gray

End cover

Double-level terminal block - UKK 3 - 2770011

Accessories

Spacer plate - DG-UKK 3/5 - 2770817

Spacer plate, to compensate for level offsets, length: 56 mm, width: 2.5 mm, height: 52 mm, color: gray

End cover - D-UKK 3/5 - 2770024

End cover, length: 56 mm, width: 2.5 mm, height: 52 mm, color: gray

Insertion bridge

Insertion bridge - EBL 3- 5 - 2303158

Insertion bridge, pitch: 5.2 mm, number of positions: 3, color: gray

Insertion bridge - EBL 2- 5 - 2303145

Insertion bridge, pitch: 5.2 mm, number of positions: 2, color: gray

Insertion bridge - EBL 10- 5 - 2303132

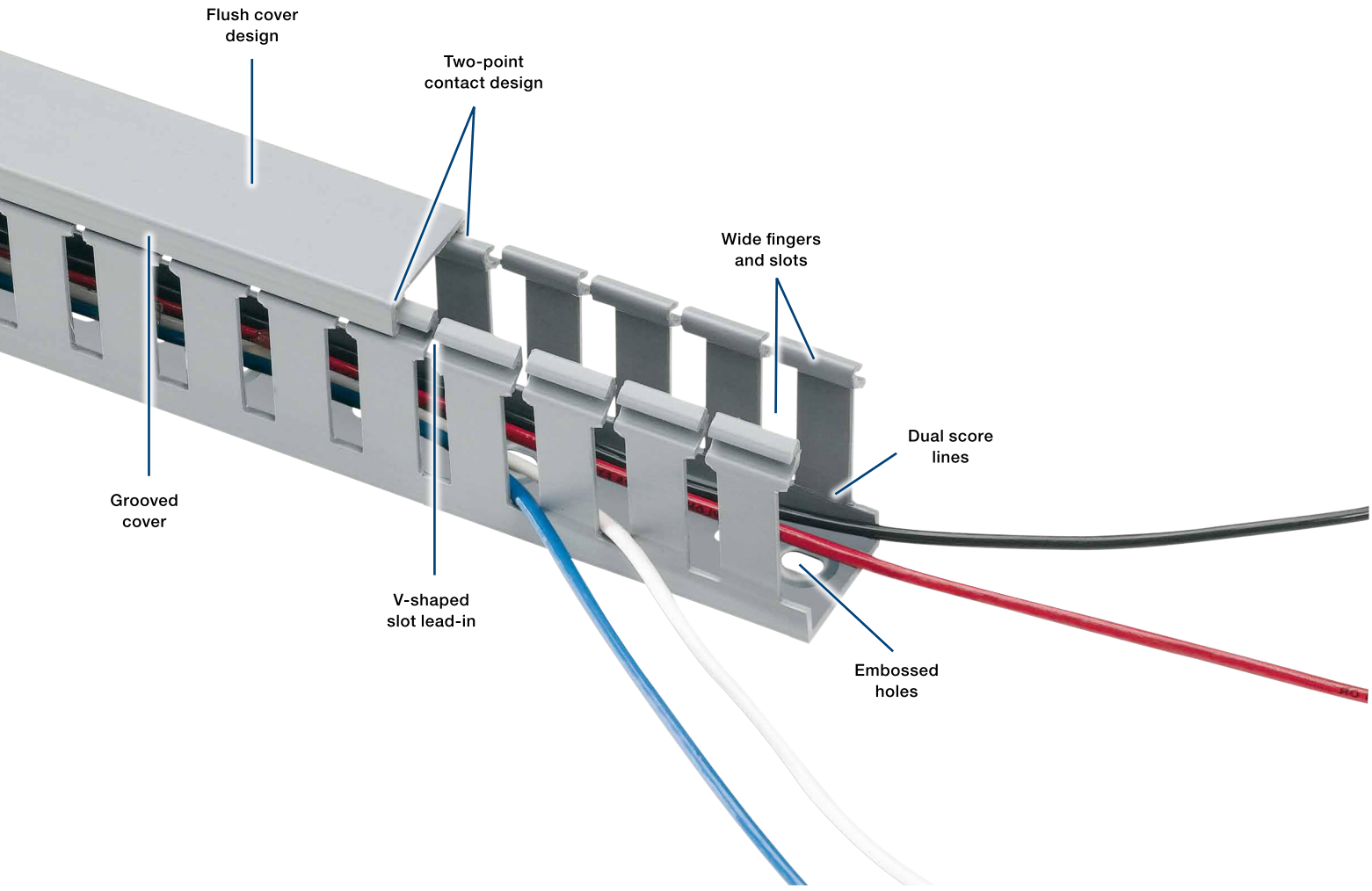
Insertion bridge, pitch: 5.2 mm, number of positions: 10, color: gray

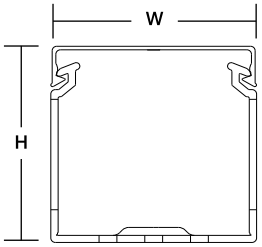
A

Greater sidewall rigidity with increased versatility.

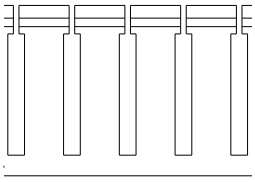
Wide slot wiring duct — PVC

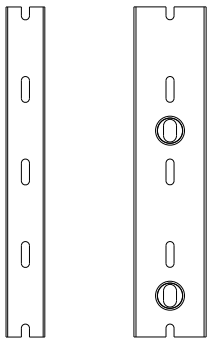
- Wide fingers and slots increase rigidity and enable easier insertion of wiring bundles
- Non-slip cover does not slide easily and resists vibration
- Rounded edges keep hands and wires free of abrasion
- V-shaped slot lead-in enables easier and faster wire installation
- Dual score lines are designed to yield clean breakoffs at the base of the slot and the duct
- Restricted slot design ensures that wires are held with or without the cover inserted
- Cover attaches flush with sidewall for finished look
- Improved flush sidewall and cover style for greater wire capacity
- Versatile North American and DIN standard mounting holes enable use of the same duct for multiple applications
- Constructed of flame-retardant PVC
- Integrated mounting holes — larger sizes include staggered holes for mounting flexibility (see page B-5 for illustration)
- Lead-free construction



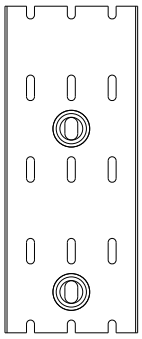


Front view with cover


Side view


Pattern for 3/4" & 1"

Pattern for 1-1/2"


Pattern for 2", 2-1/2", 3", 4" & 6"

For a complete listing of wide slot dimensional details, see page B-5.

Cat. no.	Description	Size (W x H) In.	Size (W x H) mm	Cover cat. no.	Duct std. ctn. qty.	Cover std. ctn. qty.	Length (ft.)
TYD75X1WP[_]6	0.75 x 1 Wide slot duct	0.94 x 1.14	23.9 x 27.7	TYD75CP[_]6	120	120	6
TYD75X15WP[_]6	0.75 x 1.5 Wide slot duct	0.94 x 1.60	23.9 x 39.6				
TYD75X2WP[_]6	0.75 x 2 Wide slot duct	0.94 x 2.10	23.9 x 52.6				
TYD1X1WP[_]6	1 x 1 Wide slot duct	1.25 x 1.14	31.8 x 27.7	TYD1CP[_]6	120	120	6
TYD1X15WP[_]6	1 x 1.5 Wide slot duct	1.25 x 1.60	31.8 x 39.9				
TYD1X2WP[_]6	1 x 2 Wide slot duct	1.25 x 2.10	31.8 x 52.8				
TYD1X3WP[_]6	1 x 3 Wide slot duct	1.25 x 3.05	31.8 x 77.7				
TYD1X4WP[_]6	1 x 4 Wide slot duct	1.25 x 4.37	31.8 x 111.3		60		
TYD15X1WP[_]6	1.5 x 1 Wide slot duct	1.75 x 1.14	44.5 x 27.7	TYD15CP[_]6	120	120	6
TYD15X15WP[_]6	1.5 x 1.5 Wide slot duct	1.75 x 1.60	44.5 x 39.9				
TYD15X2WP[_]6	1.5 x 2 Wide slot duct	1.75 x 2.10	44.5 x 52.8				
TYD15X3WP[_]6	1.5 x 3 Wide slot duct	1.75 x 3.05	44.5 x 77.7				
TYD15X4WP[_]6	1.5 x 4 Wide slot duct	1.75 x 4.37	44.5 x 111.3		60		
TYD2X1WP[_]6	2 x 1 Wide slot duct	2.25 x 1.24	57.2 x 28.4	TYD2CP[_]6	120	120	6
TYD2X15WP[_]6	2 x 1.5 Wide slot duct	2.25 x 1.70	57.2 x 40.4				
TYD2X2WP[_]6	2 x 2 Wide slot duct	2.25 x 2.19	57.2 x 53.3				
TYD2X3WP[_]6	2 x 3 Wide slot duct	2.25 x 3.14	57.2 x 78.2		60		
TYD2X4WP[_]6	2 x 4 Wide slot duct	2.25 x 4.46	57.2 x 111.8				
TYD2X5WP[_]6	2 x 5 Wide slot duct	2.25 x 5.15	57.2 x 129.3				
TYD25X2WP[_]6	2.5 x 2 Wide slot duct	2.75 x 2.19	69.9 x 53.6	TYD25CP[_]6	120	120	6
TYD25X3WP[_]6	2.5 x 3 Wide slot duct	2.75 x 3.14	69.9 x 78.2		60		
TYD25X4WP[_]6	2.5 x 4 Wide slot duct	2.75 x 4.46	69.9 x 111.8				
TYD3X1WP[_]6	3 x 1 Wide slot duct	3.25 x 1.24	82.6 x 29.0	TYD3CP[_]6	120	120	6
TYD3X2WP[_]6	3 x 2 Wide slot duct	3.25 x 2.19	82.6 x 54.9		60		
TYD3X3WP[_]6	3 x 3 Wide slot duct	3.25 x 3.14	82.6 x 79.8				
TYD3X4WP[_]6	3 x 4 Wide slot duct	3.25 x 4.46	82.6 x 113.5				
TYD3X5WP[_]6	3 x 5 Wide slot duct	3.25 x 5.15	82.6 x 130.6				
TYD4X15WP[_]6	4 x 1.5 Wide slot duct	4.25 x 1.70	108.0 x 42.4	TYD4CP[_]6	60	120	6
TYD4X2WP[_]6	4 x 2 Wide slot duct	4.25 x 2.19	108.0 x 55.1				
TYD4X3WP[_]6	4 x 3 Wide slot duct	4.25 x 3.14	108.0 x 80.0				
TYD4X4WP[_]6	4 x 4 Wide slot duct	4.25 x 4.46	108.0 x 113.8		30		
TYD4X5WP[_]6	4 x 5 Wide slot duct	4.25 x 5.15	108.0 x 130.8				
TYD6X4WP[_]6	6 x 4 Wide slot duct	6.25 x 4.46	158.8 x 114.0	TYD6CP[_]6	30	60	6

[_] = space for color identifier:

G = Gray

W = White

B = Black

I = Intrinsic blue

- Standard lengths are 6 feet.

+ Catalog number must be completed by adding suffix G for gray, W for white, I for intrinsic blue, B for black.
Example: TYD75X1WPG6 is a 0.75" x 1" wide slot gray duct.
To order duct without mounting holes, add suffix NM to catalog number.
Example: TYD75X1WPGNM6 is a 0.75" x 1" wide slot gray duct with no mounting holes.
To order adhesive-backed duct, add suffix A to Catalog Number.
Example: TYD75X1WPGA6 is a 0.75" x 1" wide slot gray duct with adhesive backing. Shelf life for adhesive is 1 year.
PVC vinyl duct is UL® Recognized, CSA certified and CE compliant.

DIN rail perforated - NS 35/ 7.5 PERF 1000MM - 0807012

Please be informed that the data shown in this PDF Document is generated from our Online Catalog. Please find the complete data in the user's documentation. Our General Terms of Use for Downloads are valid (http://phoenixcontact.com/download)

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: 1000 mm, color: silver

RoHS

Key Commercial Data

Packing unit	10 STK
GTIN	4 017918 254889
GTIN	4017918254889
Weight per Piece (excluding packing)	320.000 g
Custom tariff number	72166190
Country of origin	Germany

Technical data

Dimensions

Height	7.5 mm
Length	1000 mm
Width	35 mm
Hole width	15.00 mm
Hole height	6.20 mm
Drill hole spacing	25.00 mm

General

Material	Steel
Coating	galvanized, passivated with a thick layer
Color	silver

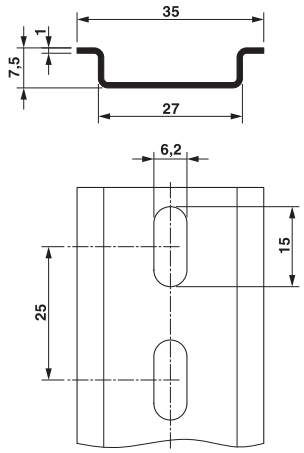
Standards and Regulations

Test standard	acc. to EN 60715

Drawings

DIN rail perforated - NS 35/ 7.5 PERF 1000MM - 0807012

Dimensional drawing



Phoenix Contact 2018 © - all rights reserved
http://www.phoenixcontact.com

KA26U

by Burndy
Catalog ID: KA26U

Prop 65 Notice

Aluminum Universal Terminal, 1 Hole, 6-2/0 AWG (Str), 1/4" Stud, 1 Screw, Al/Cu Rated, Tin Plated.

Features: These Dual-Rated One-Conductor Lugs Are Constructed From High Strength Aluminum Alloy And Electro Tin-Plated To Provide Low Contact Resistance, Stud/bolt Hole Size: 1/4 IN, Set Screw Type: Allen Key, Length: 1.47 IN, Installation Torque: 120 IN-LB, Width: 0.63 IN, Height: 0.8 IN, Dimension D: 0.81 IN, Dimension N: 0.47 IN, Dimension T: 0.19 IN

Product Details

General

Application	For Aluminum And Copper Conductors
Connector Type	Terminal
Installation Torque Recommended in-lb	120 LBS/in
Material	Aluminum
Material - Hardware	Aluminum
Physical Attribute - Number of Holes	1
Physical Attribute - Number of Screws	1
Physical Attribute - Screw Type	Allen
Plated	Y
Plating Type	Tin
Sub Brand	UNIVERSAL TERM
Temperature Rating	194
Type	Bolted Lugs & Terminals
UPC	781810370100

Dimensions

Dimension - Bolt Hole Size inch	0.25 in
Dimension - D inch	0.81 in
Dimension - Height fraction	4/5 in
Dimension - Height inch	0.80 in
Dimension - Hole Size inch	0.27 in
Dimension - Hole Size mm	7 mm
Dimension - L Length Overall mm	37 mm
Dimension - Length Overall inch	1.47 in
Dimension - N inch	0.45 in
Dimension - Pad Width inch	0.64 in
Dimension - Stud Size inch	1/4
Dimension - Width fraction	63/100 in
Dimension - Width inch	0.63 in

Dimension - Width mm	16 mm

Conductor Related

Conductor - AL Str Size	14;4;3;2;1;1/0;2/0
Conductor - AL Str Size Range	14-2/0
Conductor - Copper Str Size	14;5;4;3;2;1;1/0;2/0
Conductor - Copper Str Size Range	14-2/0
Conductor - Nominal Diameter	0.184, 0.184, 0.206, 0.232, 0.232, 0.260, 0.260, 0.292, 0.320, 0.328, 0.360, 0.368, 0.390, 0.414, 0.438
Conductor Type	• CU C Str-Size • AL C Str-Size
Number Of Conductors	1

Certifications and Compliance

Certification - CSA Approved	Yes
Certification - UL Listed Direct Burial	No
Industry Standard(s)	UL 486A-486B
Standards - Industry Standards Met	UL 486A-486B
Standards - RoHS Compliance Status	EX
UL Listed	Yes

Logistics

Carton Quantity	900 EA
Minimum Pack Quantity	50

For further technical assistance, please contact us

BURNDY Headquarters
47 East Industrial Park Drive
Manchester, New Hampshire 03109

Customer Service Hours:
8 AM - 8 PM Eastern Monday-Friday
Emergency Service 24-hours/365 Days
Phone: 1-800-346-4175
1-603-647-5299 (International)

Ovivo USA, LLC
4246 S. Riverboat Rd., Suite 300
Salt Lake City, Utah
84123
USA

Telephone: 801.931.3000
Facsimile: 801.931.3080

www.ovivowater.com

OVIVO
Worldwide Experts in Water Treatment

SUBMITTAL DATA SHEET

PROJECT NAME_____ Wichita WWTP-II, KS

LOCATION _____ Wichita, KS

CUSTOMER _____ Dondlinger & Sons Construction

CUSTOMER P.O. NUMBER _____ 120036-001

OVIVO S.O. NUMBER _____ CSW0001517-01

EQUIPMENT DESCRIPTION _____ 4 - 160' C4D-CMD Clarifiers

SPECIFICATION SECTION _____ 0

CONSULTING ENGINEER _____ NA

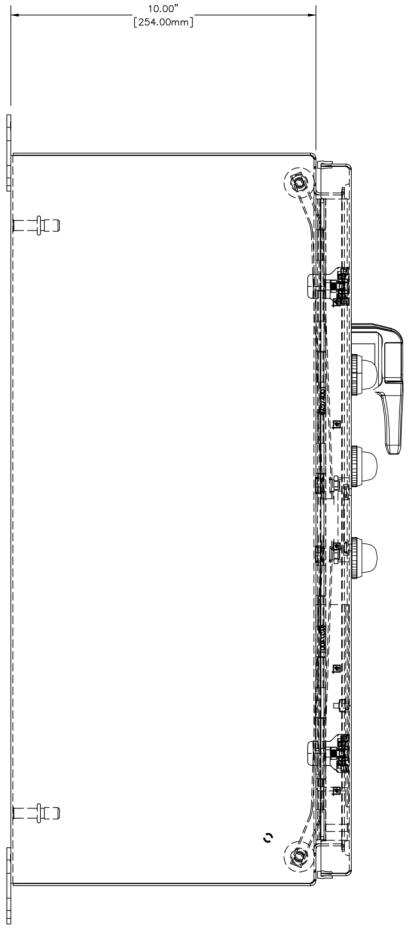
ITEM DESCRIPTION UNDER THIS COVER:

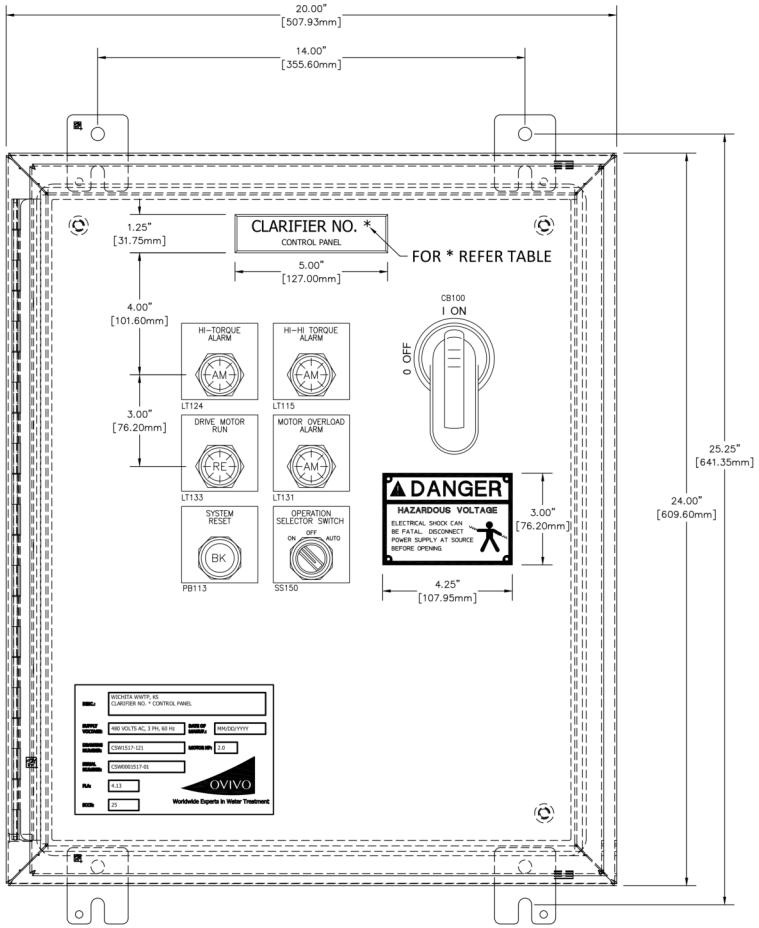
DRAWINGS..... (1) Drawing(s)

CSW0001517-01 ~ 9.23.2021

ELECTRICAL DRAWING INDEX

DWG #	SHEET DESRIPTION
CSW1517-121 SHT1	TITLE SHEET AND CONSTRUCTION NOTES
CSW1517-121 SHT2	SUB-PANEL LAYOUT AND BILL OF MATERIALS
CSW1517-121 SHT3	POWER AND CONTROL SCHEMATICS





ENCLOSURE LAYOUT

NEMA 4X ENCLOSURE

CONTROL PANEL SPECIFICATIONS

1. **COMPONENTS SPECIFIC**

1.1 ENCLOSURE TO BE NEMA 4X CONSTRUCTION.

1.2 CONTROL PANEL SHALL BE LABELED WITH SERIALIZED UL LABEL

1.3 PANEL WILL BE LABELED WITH IDENTIFICATION PLATE AS NOTED ON ENCLOSURE DRAWING.

1.4 ALL RELAY CONTACTS ARE RATED AT 10 AMPS UNLESS OTHERWISE NOTED.

1.5 COMPONENT IMAGES MAY NOT ACCURATELY REPRESENT THE ACTUAL DEVICE IN SOME INSTANCES. DIMENSIONS OF DEVICES, HOWEVER, WILL BE ACCURATE FOR PURPOSES OF LAYOUT AND SPACING.

1.6 SUBSTITUTIONS FOR COMPONENTS MAY BE PERMITTED UPON APPROVAL BY OVIVO ENGINEERS.

2. **WIRE SIZING & TYPE**

WIRE SIZING SHALL BE NO LESS THAN AS FOLLOWS (UNLESS OTHERWISE NOTED):
480 3 PHASE - 14 AWG TYPE: MTW
120 1 PHASE - 16 AWG TYPE: MTW

3. **WIRE COLOR**

WIRE COLOR SHALL BE AS FOLLOWS:
POWER (480 VOLTS)
GREEN - GROUND
BLACK - ALL PHASES

CONTROL (120 VAC)
RED - LOAD WIRES FOR ALL LOCAL CONTROL CIRCUITS
WHITE - NEUTRAL FOR ALL LOCAL CONTROL CIRCUITS
YELLOW - FOREIGN POWER IN PANEL

4. **CONNECTIONS**

4.1 ALL CONNECTIONS SHALL BE POINT TO POINT WITHOUT SPLICES. EXCEPTIONS APPLY TO SOLENOIDS AND MOTORS AND FACTORY WIRED COMPONENTS.

4.2 ALL CONDUCTORS MUST BE MARKED WITH MACHINE PRINTED TAGS AT EACH TERMINATION. MARKERS SHALL BE OF HEAT SHRINK TYPE.

5. **DOCUMENTATION**

5.1 FABRICATOR SHALL PROVIDE ONE COPY OF ALL DOCUMENTS SUPPLIED WITH THE COMPONENTS SUPPLIED BY THE FABRICATOR. THIS INFORMATION INCLUDES BUT IS NOT LIMITED TO MANUFACTURERS SPECIFICATIONS, INSTALLATION MANUALS AND OPERATION MANUALS.

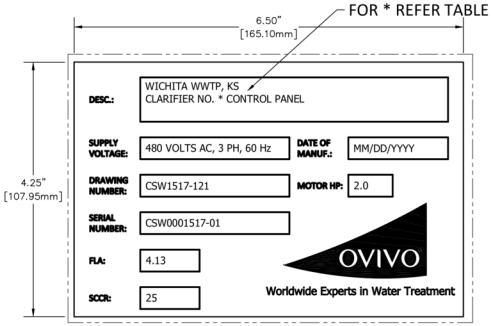
5.2 ANY OVIVO APPROVED CHANGES OR MARK-UPS TO THE SCHEMATICS, PANEL LAYOUTS AND ANY OTHER PERTAINING DOCUMENTS SHALL BE MAINTAINED AND DELIVERED TO OVIVO AT ACCEPTANCE OF THE PANEL.

6. **TESTING**

6.1 OVIVO ENGINEERS OR OVIVO APPROVED FABRICATOR, WILL PERFORM A POINT TO POINT CONTINUITY TEST ON THE PANEL.

6.2 WHEN APPLICABLE, THE FABRICATOR WILL ALSO PROVIDE POWER TO THE 120VAC CIRCUITS FOR VERIFICATION AND TESTING. FABRICATOR SHALL ALLOW A MINIMUM OF 2 HOUR OF ACCESS TO THE CONTROL PANEL BY AN OVIVO ENGINEER FOR THIS AND PREVIOUSLY STATED TEST. 3 PHASE POWER CIRCUITS WILL NOT BE POWERED ON FOR TESTING.

TABLE	
NUMBER	**EQUIPMENT**
1	CLARIFIER NO. 1
2	CLARIFIER NO. 2
3	CLARIFIER NO. 3
4	CLARIFIER NO. 4



OVIVO NAMEPLATE

ENGRAVE AS SHOWN

INITIAL RELEASE	018201	KD	CL	09/23/21	A
REVISION	EN/ECO	BY	CHECK'D	DATE	

D — SIZE SHEET (DO NOT SCALE PRINTS) — THIRD ANGLE PROJECTION

DRAWN BY: KD
CHECKED BY: CL
DATE (Controlled Copy): 09/23/21
PROJECT: CSW0001517-01
REF: CSW1514-121

WICHITA WWTP, KS
CLARIFIER CONTROL PANEL
(TYPICAL OF 4)

OVIVO

THIS DRAWING CONTAINS CONFIDENTIAL PROPRIETARY INFORMATION OF OVIVO AND ITS AFFILIATES AND IS NOT TO BE DISCLOSED NOR TO BE USED EXCEPT FOR EVALUATING PROPOSALS OF OVIVO OR INSTALLING, OPERATING OR MAINTAINING OVIVO EQUIPMENT UNLESS OTHERWISE AUTHORIZED IN WRITING BY OVIVO. UNCONTROLLED COPY IF PRINTED.

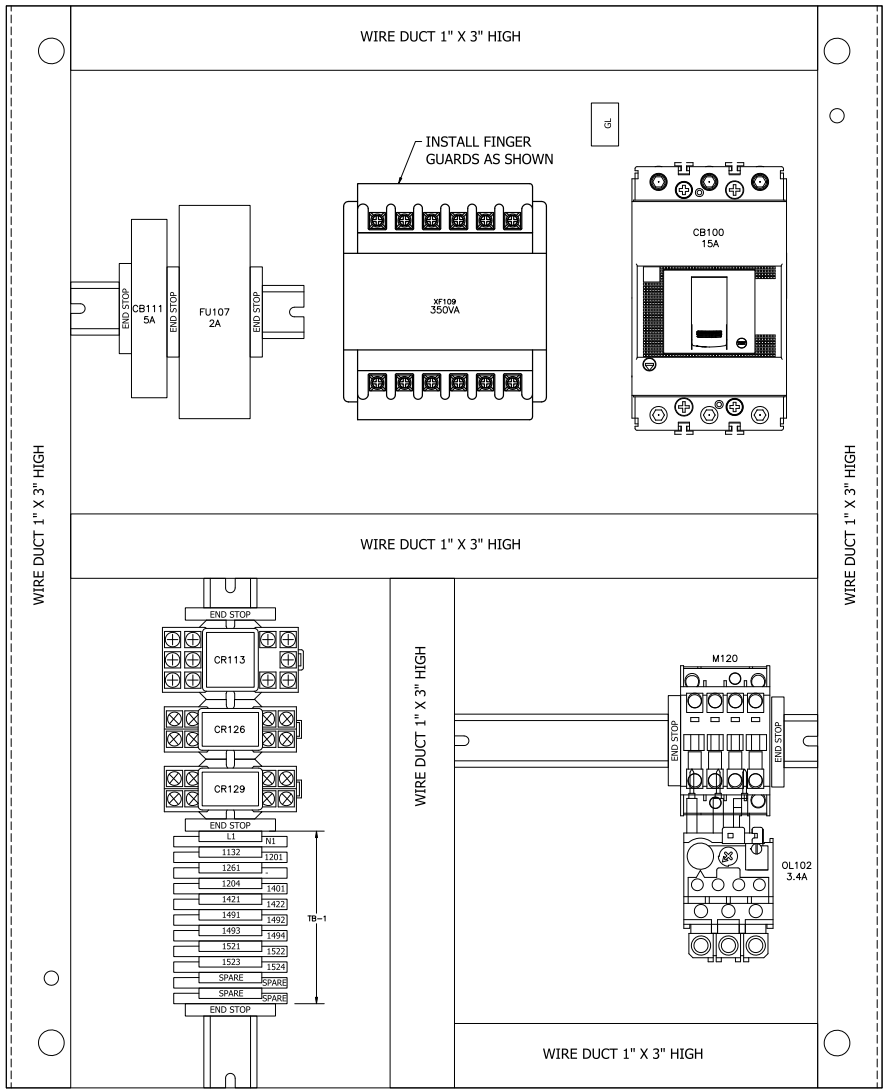
© 2021 OVIVO. ALL RIGHTS RESERVED.

WORKMANSHIP STANDARD ES9001 APPLIES

DWG NO.: CSW1517-121

SHEET 1 OF 3

A REVISION



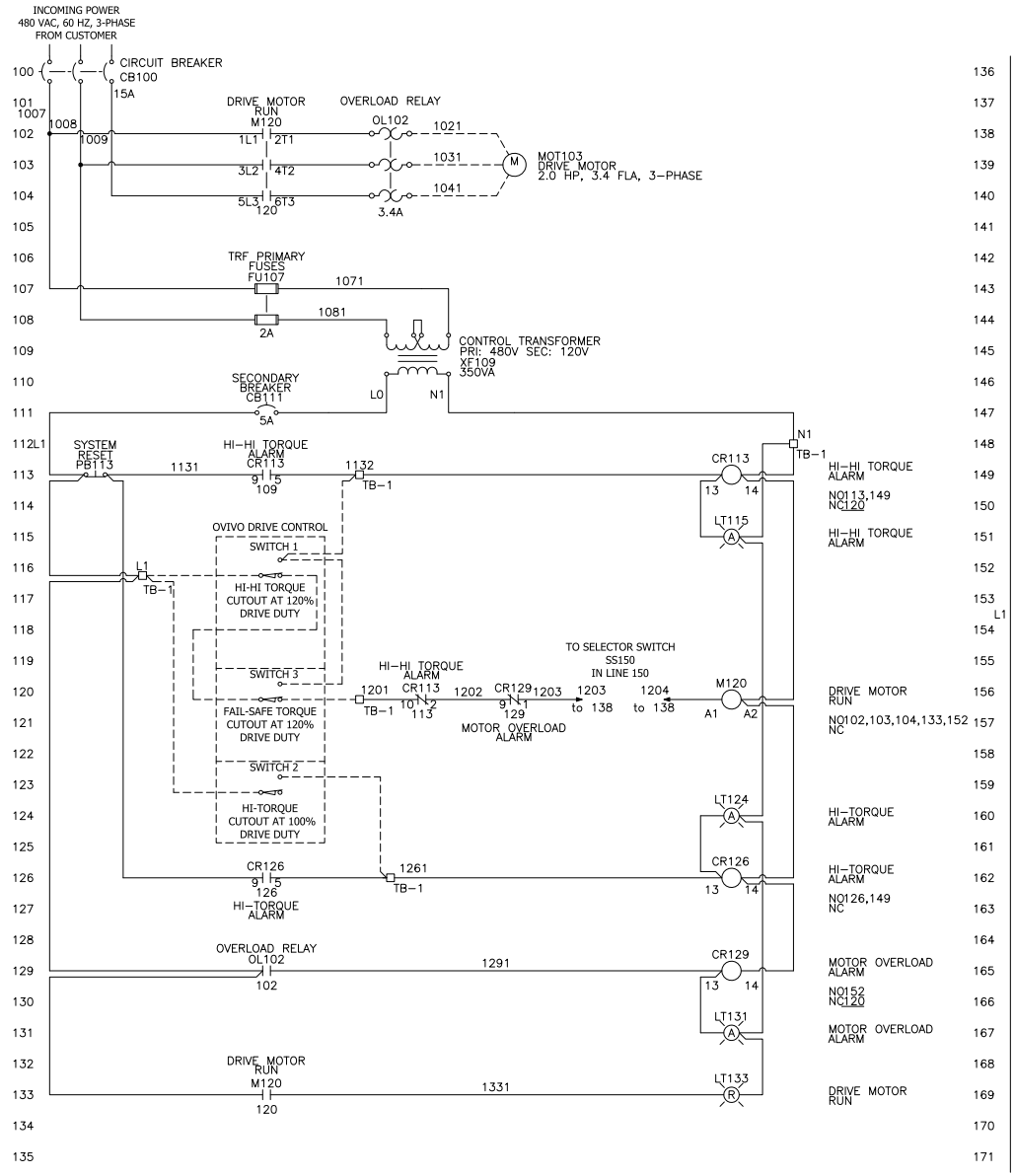
SUB-PANEL LAYOUT

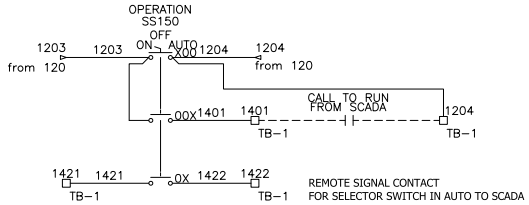
BILL OF MATERIALS

ITEM	QTY	CATALOG	DESC	MFG	TAGS
1	1	A24H2010SSLP	WALL-MOUNT ENCLOSURE, CONTINUOUS HINGE WITH CLAMPS, 24" X 20" X 10", 304 SS, NEMA 4X	HOFFMAN	ENC
2	1	A24P20	ENCLOSURE, BACK PANEL, 24" X 20"	HOFFMAN	ENC
3	1	140G-G2C3-C15	CIRCUIT BREAKER, THREE POLE, THERMAL MAGNETIC FIXED, 15 AMP, 480 VAC RATED, 25kA SCCR	ALLEN BRADLEY	CB100
4	1	140G-G-RVM12B	CIRCUIT BREAKER MECHANISM WITH SHAFT 12 INCHES EXTERNAL HANDLE, NEMA 4/4X, BLACK, PADLOCKABLE	ALLEN BRADLEY	CB100
5	1	100-C09D10	3-POLE CONTACTOR, OPEN, 120V 60HZ, 1 N.O. AUXILIARY CONTACT, RATED UP TO 5HP, 9 AMP MOTORS	ALLEN BRADLEY	M120
6	1	100-FA22	AUXILIARY CONTACT BLOCK, FRONT MOUNT, 2 N.O. + 2 N.C. CONTACTS	ALLEN BRADLEY	M120
7	1	193-T1AB40	BIMETALLIC THERMAL OVERLOAD RELAY, 2.9 TO 4.0 AMPS	ALLEN BRADLEY	OL102
8	2	LP-CC-2	TIME DELAY FUSES, 2 AMP, 200kA RMS SCCR	BUSSMAN	FU107
9	1	CHCC2DIU	FUSE HOLDER, WITH BLOWN FUSE FUSE INDICATION	BUSSMAN	FU107
10	1	SP350ACP	CONTROL TRANSFORMER 480V TO 120VAC, 350 VA	HAMMOND	XF109
11	1	1489-M1C050	MINIATURE CIRCUIT BREAKER, 5 AMP, 1-POLE	ALLEN BRADLEY	CB111
12	2	RH2B-ULC-110-120AC	RELAY, DPDT, WITH INDICATOR AND CHECK BUTTON, 120 VAC	IDEC	CR126, CR144
13	2	SH2B-05	SOCKET, RELAY	IDEC	CR126, CR144
14	2	RH3B-ULC-120AC	RELAY, 3PDT, WITH INDICATOR AND CHECK BUTTON, 120 VAC	IDEC	CR113, CR129
15	2	SH3B-05	SOCKET, RELAY	IDEC	CR113, CR129
16	3	APD1126DNUA	AMBER PILOT LIGHT, 120 VAC TRANSFORMER LED, NEMA 4/4X	IDEC	LT115, LT124, LT131
17	1	APD1126DNUR	RED PILOT LIGHT, 120 VAC TRANSFORMER LED, NEMA 4/4X	IDEC	LT133
18	1	ABD111NUB	PUSH BUTTON - MOMENTARY, NEMA 4/4X, BLACK, WITH 1 N.O. + 1 N.C. CONTACTS	IDEC	PB113
19	1	ASD340NU	3-POSITION SELECTOR SWITCH, MAINTAINED, NEMA 4/4X, BLACK, WITH 4 N.O. CONTACTS	IDEC	SS150
20	6	GRAVOPLY ULTRA	GENERIC OPERATOR TAG - ENGRAVE AS SHOWN	GRAVOGRAPH	LT115, LT124, LT131, LT133, PB113, SS150
21	11	2770011	FEED-THROUGH TERMINAL BLOCK, 2-LEVEL, SCREW CONNECTION, AWG 24-12, GRAY, 24 AMP, 500 VOLTS	PHOENIX CONTACT	TB-1
22	1	2770024	END COVER, GREY COLOR	PHOENIX CONTACT	TB-1
23	8	0800886	END STOP	PHOENIX CONTACT	AS SHOWN
24	A/R	TYD1X3WPW6 WITH TYD1CPW6 COVER	WIRE DUCT 1" X 3" HIGH, WHITE WITH COVER, WHITE	THOMAS & BETTS	AS SHOWN
25	1	49046A	NAME PLATE - "DANGER"	OVIVO	AS SHOWN
26	1	679002	NAME PLATE (ETCH AS SHOWN)	OVIVO	AS SHOWN
27	2	592273	ENCLOSURE EQUIPMENT TAG ID, AND "ELAPSED TIME METER"	OVIVO	AS SHOWN
28	A/R	0807012	DIN-RAIL	PHOENIX CONTACT	AS SHOWN
29	1	KA26U	GROUND LUG	BURNDY	GL

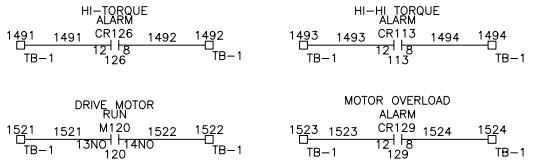
© 2020 OVIVO. ALL RIGHTS RESERVED.
THIS DRAWING CONTAINS CONFIDENTIAL PROPRIETARY INFORMATION OF OVIVO AND ITS AFFILIATES AND IS NOT TO BE DISCLOSED NOR TO BE USED EXCEPT FOR EVALUATING PROPOSALS OF OVIVO OR INSTALLING, OPERATING OR MAINTAINING OVIVO EQUIPMENT UNLESS OTHERWISE AUTHORIZED IN WRITING BY OVIVO. UNCONTROLLED COPY IF PRINTED.

D | OVIVO | DWG NO. CSW1517-121 | SHEET 3 OF 3 | A REVISION





REMOTE SIGNAL CONTACTS



WIRING LEGEND:
- - - - - - FIELD WIRING (NOT BY OVIVO)
——— INTERNAL WIRING (BY OVIVO)

© 2020 OVIVO. ALL RIGHTS RESERVED.
THIS DRAWING CONTAINS CONFIDENTIAL PROPRIETARY INFORMATION OF OVIVO AND ITS AFFILIATES AND IS NOT TO BE DISCLOSED NOR TO BE USED EXCEPT FOR EVALUATING PROPOSALS OF OVIVO OR INSTALLING, OPERATING OR MAINTAINING OVIVO EQUIPMENT UNLESS OTHERWISE AUTHORIZED IN WRITING BY OVIVO. UNCONTROLLED COPY IF PRINTED.

D | SIZE SHEET DO NOT SCALE PRINTS | THIRD ANGLE PROJECTION | OVIVO | DWG NO. CSW1517-121 | SHEET 3 OF 3 | A REVISION

Comments

Keith Scarberry (MKEC ENGINEERING, INC.)

December 2, 2021 at 8:41 PM UTC

APPROVED: This submittal should be listed as "Reviewed as Noted", but that is not a selectable option. This submittal was transmitted to Adam on 10/08/2021 by Keith Ayotte via email. This entry in Viewpoint Teams is to close the task item.