



Submittal Transmittal

Project: Pike Addition Lift Station near Maple & 151st St.

City of Wichita Project Number: 468-2019-005340

Contractor Project Number: 20059


Submittal Number: 3-06

Subcontractor/Supplier: Shelley Electric

Description: SCADA System

Date Submitted: May 28, 2020

Stamp Area

 BAUGHMAN	315 ELLIS WICHITA, KS 67211 [P] 316-262-7271 [BaughmanCo.com]
<input checked="" type="checkbox"/> REVIEWED ONLY	BY: _____ TPV
<input type="checkbox"/> REVIEWED AS NOTED	
<input type="checkbox"/> REJECTED	DATE: _____ 6-5-2020



Shelley Electric, Inc. SUBMITTAL SHEET

3619 W 29th St South
PO Box 12124
Wichita, KS 67277
Ph 316-945-8311
Fax 316-945-2604

Job: 20158-
C.O.W. Pike Addition Lift Station

Spec Section Num: 260000
Submittal: 260000-004
Revision:
Package No:
Package Revision:
Date: 5/28/2020

Submittal Title: Lift Station SCADA System
Submittal Detail:

<input type="checkbox"/>	Record Drawing
<input checked="" type="checkbox"/>	For Approval
<input type="checkbox"/>	Resubmitted for Approval
For conformity with plans and specifications	
Shelley Electric, Inc.	
Date: <u>5/28/2020</u>	By: <u>Randy W.</u>

Notes & Clarifications:

Stamp Area

SUBMITTAL

**CITY OF WICHITA
PIKE ADDITION LIFT STATION
PROJECT# 468-2019-005340-59019**

**ENGINEERED BY:
BAUMAN COMPANY
315 Ellis St.
Wichita, KS 67211
(316)-262-7271**

**CONTRACTED BY:
SHELLEY ELECTRIC
619 West 29th St. South
Wichita, KS 67217
(316) 945-8311**

**SUBMITTED BY:
R. E. PEDROTTI COMPANY, INC.
5855 BEVERLY AVENUE
MISSION, KS 66202
(913) 677-3366**

May - 2020

City of Wichita
Pike Addition Lift Station Project

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<u>TAB</u>	<u>DESCRIPTION</u>	<u>MANUFACTURER</u>
1.0	SCADA Telemetry Control Panel Panel Drawings Panel Cutsheets	KASA / Pedrotti
2.0	Communications Tower Tower Cutsheets	Various

Submittal No: WIKSPALS
Engineer: Bauman Company
Contractor: Shelley Electric
Reference: City of Wichita Ks, Pike Addition Lift Station Project No. 468-2019-005340-59019

Date: May - 2020

Item	Qty	Model	Description
1.0	(1)	PLC Control Panel	SCADA Telemetry Control Panel

PLC / Base / Power Supply:

<u>Qty.</u>	<u>Part Number</u>	<u>Description</u>	<u>Manufacturer</u>
(1)	D3-350	CPU	Automation - Direct
(1)	D3-05B-1	5 Slot Base with Power Supply	Automation - Direct

I/O Modules:

<u>Qty.</u>	<u>Part Number</u>	<u>Description</u>	<u>Manufacturer</u>
(1)	D3-16NE3	Digital Input Module (16 Inputs) (2-Isolated)	Automation - Direct
(1)	F3-04ADS	Analog Input Module (4 Inputs)	Automation - Direct

Ethernet Switch

<u>Qty.</u>	<u>Part Number</u>	<u>Description</u>	<u>Manufacturer</u>
(1)	EDS-205	Un-managed Ethernet Switch (5 Port)	Ntron

Major Components:

<u>Qty.</u>	<u>Part Number</u>	<u>Description</u>	<u>Manufacturer</u>
(1)	2904600	Power Supply 24vdc, 5a	Phoenix Contact
(1)	APSQN928SSCHD2	Aprisa SC+ Radio 928 – 960 MHz	4RF
(1)	BE850M2	UPS 800va 120V	APC
(1)	IS-B50LN-C2	Coaxial Surge Arrestor	Polyphaser

R.E. PEDROTTI CO., INC.

CITY OF WICHITA
 PIKE ADDITION LS CONTROL PANEL
 WICHITA, KANSAS
 KASA JOB #8435

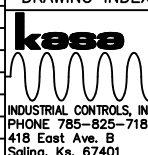
SHEET #	DRAWING #	DESCRIPTION
ID	8435-PIKE ADD-ID	DRAWING INDEX
1	8435-PIKE ADD-E01	120VAC POWER DISTRIBUTION
2	8435-PIKE ADD-E02	24VDC POWER DISTRIBUTION
3	8435-PIKE ADD-E03	I/O SCHEMATICS - RACK 1, SLOT 0, CPU
4	8435-PIKE ADD-E04	I/O SCHEMATICS - RACK 1, SLOT 1, DIGITAL INPUT
5	8435-PIKE ADD-E05	I/O SCHEMATICS - RACK 1, SLOT 2, ANALOG INPUT
6	8435-PIKE ADD-L01	EXTERIOR LAYOUT
7	8435-PIKE ADD-L02	INTERIOR LAYOUT
8	8435-PIKE ADD-L03	PLC RACK LAYOUT
9	8435-PIKE ADD-L04	COMMUNICATION LAYOUT
10	8435-PIKE ADD-BOM	BILL OF MATERIALS

May, 21 2020

REP

R.E. Pedrotti Co., Inc.
 5855 Beverly, SUITE A
 MISSION, KANSAS 66202
 (913) 677-3366 FAX (913) 677-3460

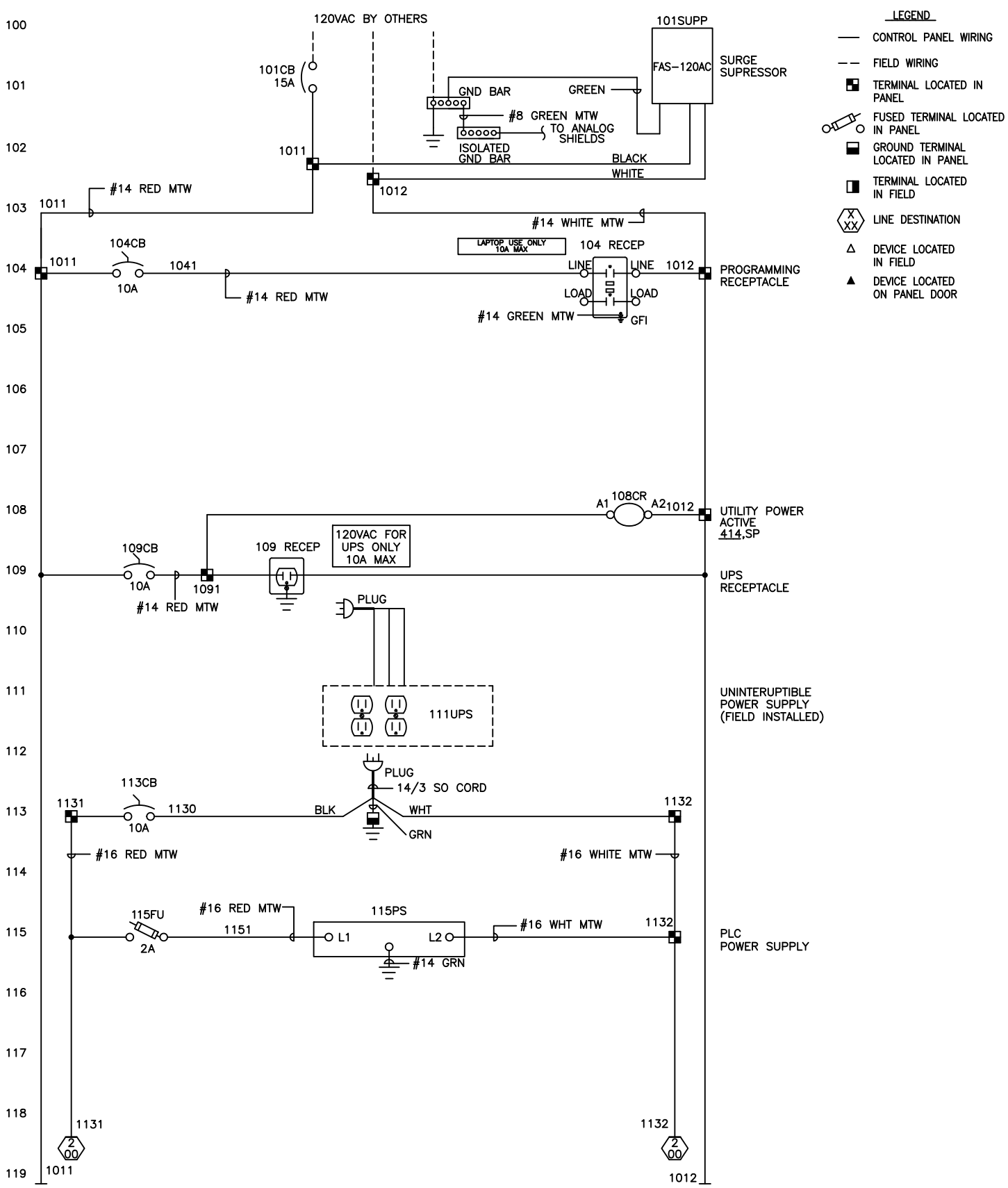
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-	-	-	-	DESIGNED MG	
-	-	-	-	DRAWN SO	
-	-	-	-	CHECKED -	
-	-	-	-	APPROVED -	
-	-	-	-	P.O. NO. 00058277-WKSPALS	



kase
 INDUSTRIAL CONTROLS, INC.
 PHONE 785-825-7181
 418 East Ave. B
 Salina, Ks. 67401

R.E. PEDROTTI CO., INC.
 CITY OF WICHITA
 PIKE ADD LS CONTROL PANEL
 WICHITA, KANSAS

SHEET OF	ID	JOB NO.	DWG. NO.
		8435	8435-PIKE ADD-ID



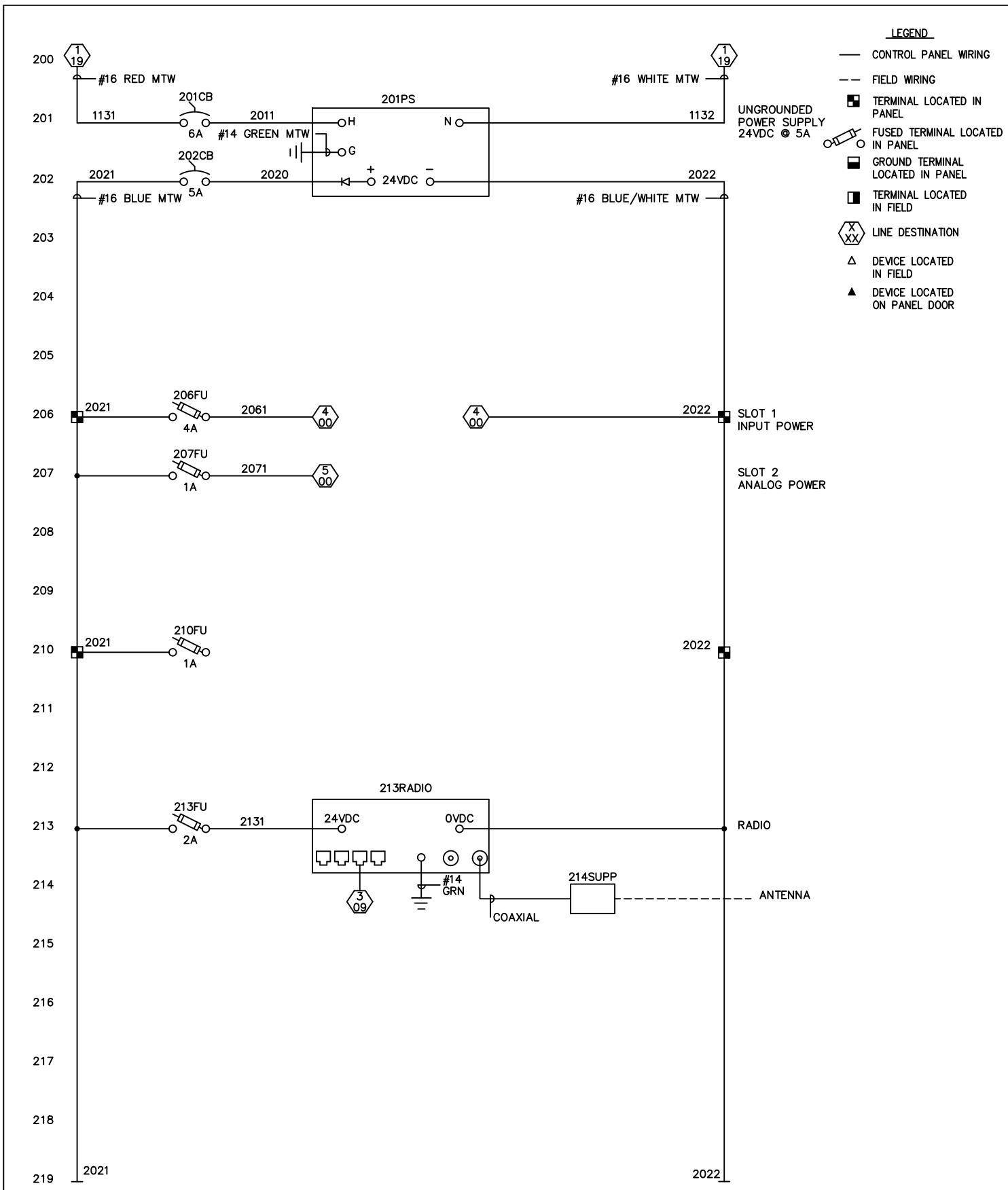
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NO	REVISIONS	DATE	BY	MISC.
1	SUBMITTAL	05/13/20	MG	DATE 05/11/20
-	-	-	-	SCALE -
-	-	-	-	DESIGNED MG
-	-	-	-	DRAWN SO
-	-	-	-	CHECKED -
-	-	-	-	APPROVED -
-	-	-	-	P.O. NO. 00058277-WKSPALS

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 418 East Ave. B
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120VAC POWER DISTRIBUTION		
R.E. PEDROTTI CO., INC. CITY OF WICHITA PIKE ADD LS CONTROL PANEL WICHITA, KANSAS		
SHEET 1 OF 10	JOB NO. 8435	DWG. NO. 8435-PIKE ADD-E01



May 21 2020

NO	REVISIONS	DATE	BY	MISC.	24VDC POWER DISTRIBUTION		
1	SUBMITTAL	05/13/20	MG	DATE 05/11/20	<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="font-weight: bold; font-size: 18px;">kasa</div> <div style="text-align: right; font-size: 10px;"> R.E. PEDROTTI CO., INC. CITY OF WICHITA PIKE ADD LS CONTROL PANEL WICHITA, KANSAS </div> </div>		
-	-	-	-	SCALE -			
-	-	-	-	DESIGNED MG			
-	-	-	-	DRAWN SO			
-	-	-	-	CHECKED -			
-	-	-	-	APPROVED -			
-	-	-	-	P.O. NO. 00058277-WKSPALS			

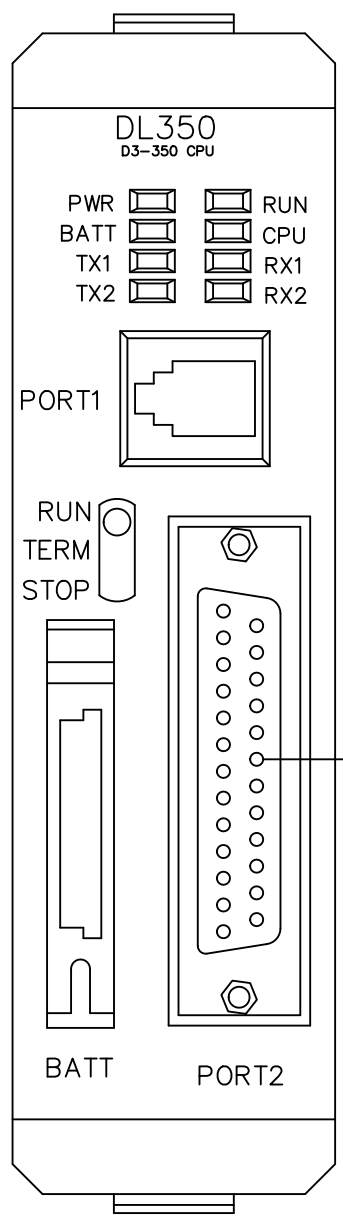
REP
 R.E. Pedrotti Co., Inc.
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 (913) 677-3366 FAX (913) 677-3480

INDUSTRIAL CONTROLS, INC.
 PHONE 785-825-7181
 418 East Ave. B
 Salina, Ks. 67401

SHEET	2	JOB NO.	8435	DWG. NO.	8435-PIKE ADD-E02
OF	10				

300
301
302
303
304
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307
308
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310
311
312
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314
315
316
317
318
319

RACK 1
SLOT 0



- LEGEND**
- CONTROL PANEL WIRING
 - - - FIELD WIRING
 - TERMINAL LOCATED IN PANEL
 - FUSED TERMINAL LOCATED IN PANEL
 - GROUND TERMINAL LOCATED IN PANEL
 - TERMINAL LOCATED IN FIELD
 - ⊗ LINE DESTINATION
 - △ DEVICE LOCATED IN FIELD
 - ▲ DEVICE LOCATED ON PANEL DOOR

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MISSION, KANSAS 66202
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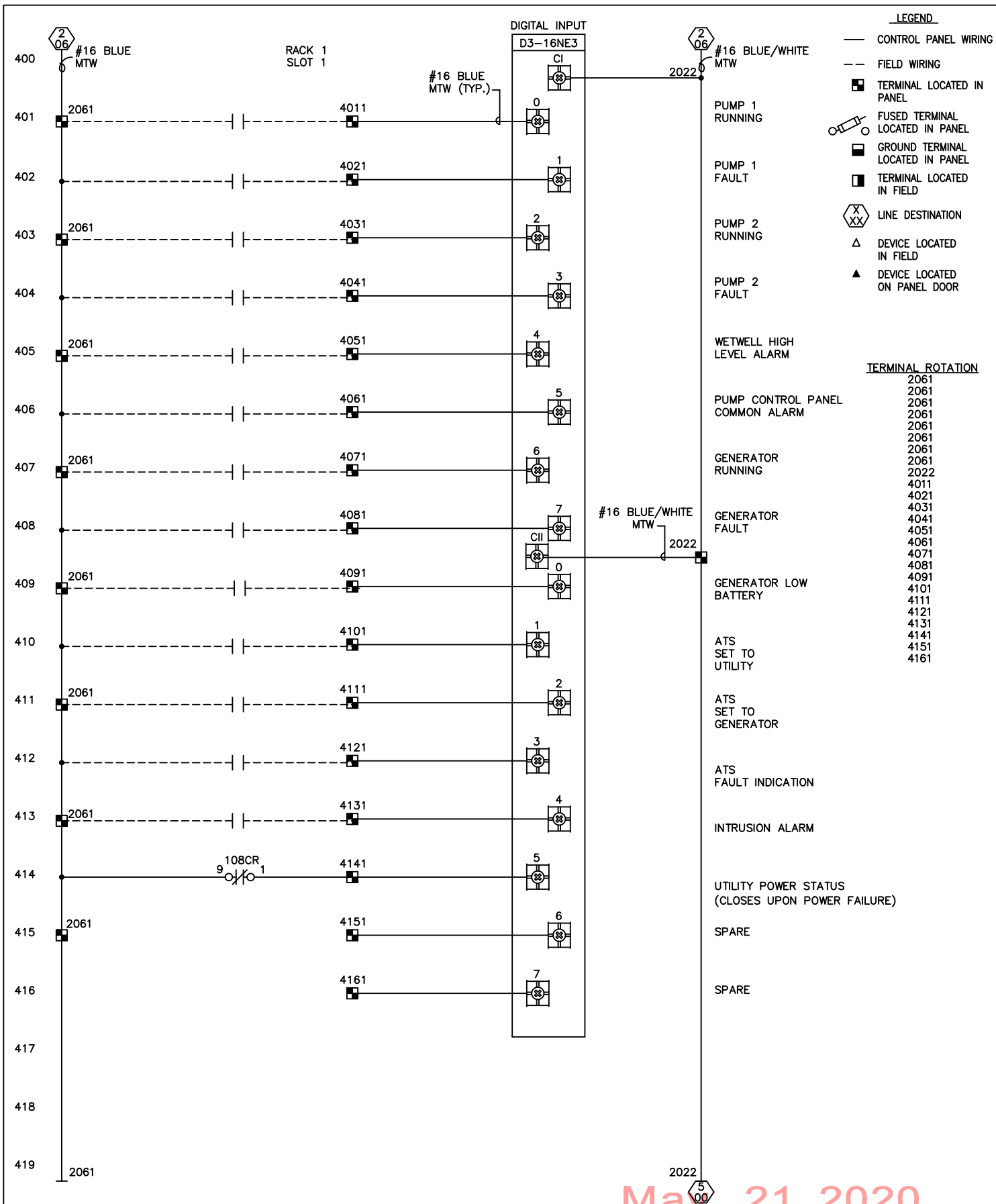
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-	-	-	-	DESIGNED MG
-	-	-	-	DRAWN SO
-	-	-	-	CHECKED -
-	-	-	-	APPROVED -
-	-	-	-	P.O. NO. 00058277-WKSPALS

I/O SCHEMATICS - RACK 1, SLOT 0, CPU

kasa
INDUSTRIAL CONTROLS, INC.
PHONE 785-825-7181
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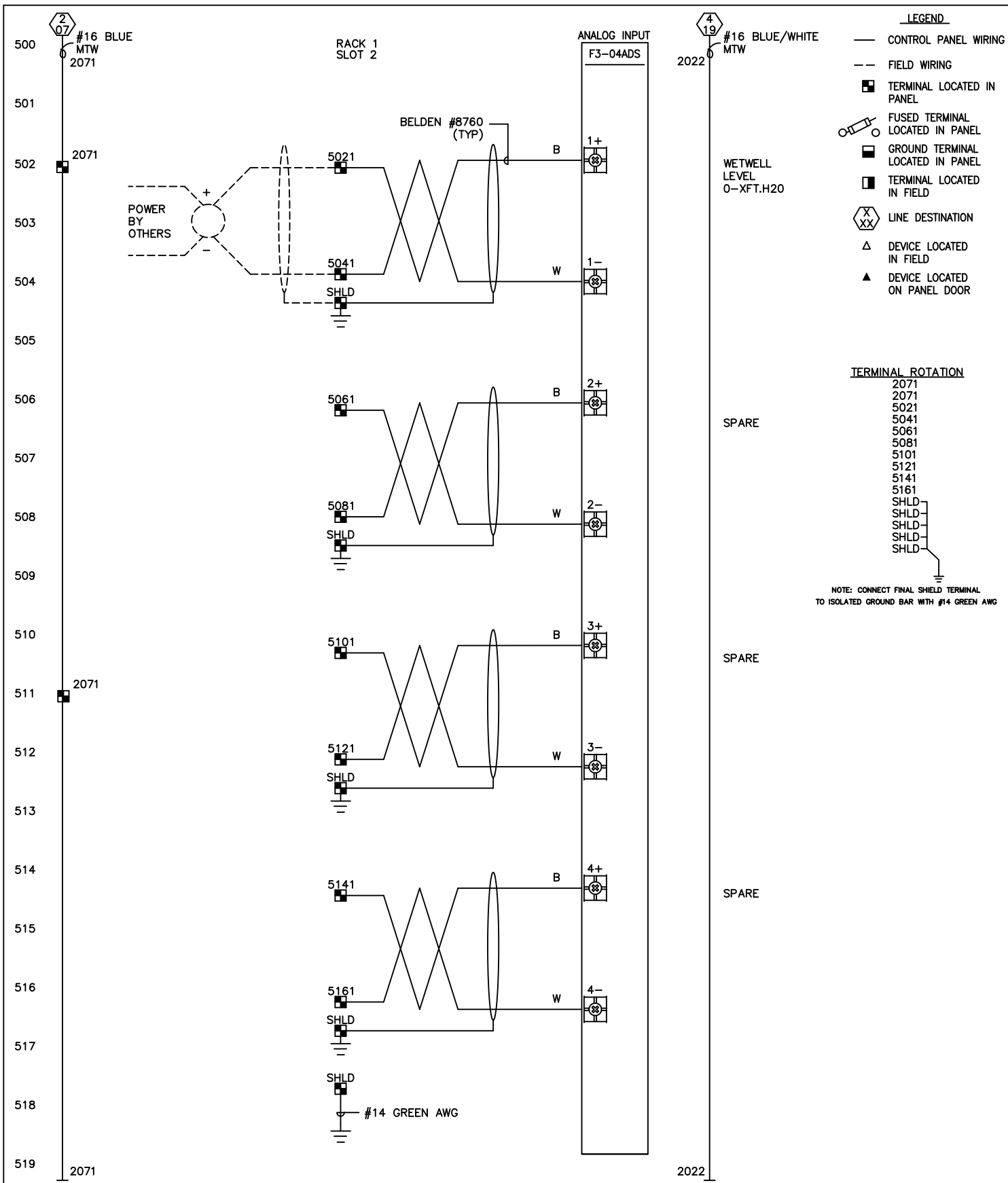
R.E. PEDROTTI CO., INC.
CITY OF WICHITA
PIKE ADD LS CONTROL PANEL
WICHITA, KANSAS

SHEET 3	JOB NO. 8435	DWG. NO. 8435-PIKE ADD-E03
OF 10		



May 21 2020

<p>REP R.E. Pedrotti Co., Inc. 5855 Beverly, SUITE A MISSION, KANSAS 66202 (913) 677-3366 FAX (913) 677-3460</p>	NO	REVISIONS	DATE	BY	MISC.	<p>I/O SCHEMATICS - RACK 1, SLOT 1, DIGITAL INPUT</p> <p style="text-align: center;">kasa</p> <p>INDUSTRIAL CONTROLS, INC. PHONE: 785-825-7181 418 East Ave. B Salina, Ks. 67401</p>	<p>R.E. PEDROTTI CO., INC. CITY OF WICHITA PIKE ADD LS CONTROL PANEL WICHITA, KANSAS</p>
	1	SUBMITTAL	05/13/20	MG	DATE 05/11/20		
	-	-	-	-	SCALE -		
	-	-	-	-	DESIGNED MG		
	-	-	-	-	DRAWN SO		
	-	-	-	-	CHECKED -		
	-	-	-	-	APPROVED -		
	-	-	-	-	P.O. NO. 00058277-WKSPALS		
				SHEET 4 OF 10	JOB NO. 8435	DWG. NO. 8435-PIKE ADD-E04	



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1	SUBMITTAL	05/13/20	MG	DATE 05/11/20
-	-	-	-	SCALE -
-	-	-	-	DESIGNED MG
-	-	-	-	DRAWN SO
-	-	-	-	CHECKED -
-	-	-	-	APPROVED -
-	-	-	-	P.O. NO. 00058277-WKSPALS

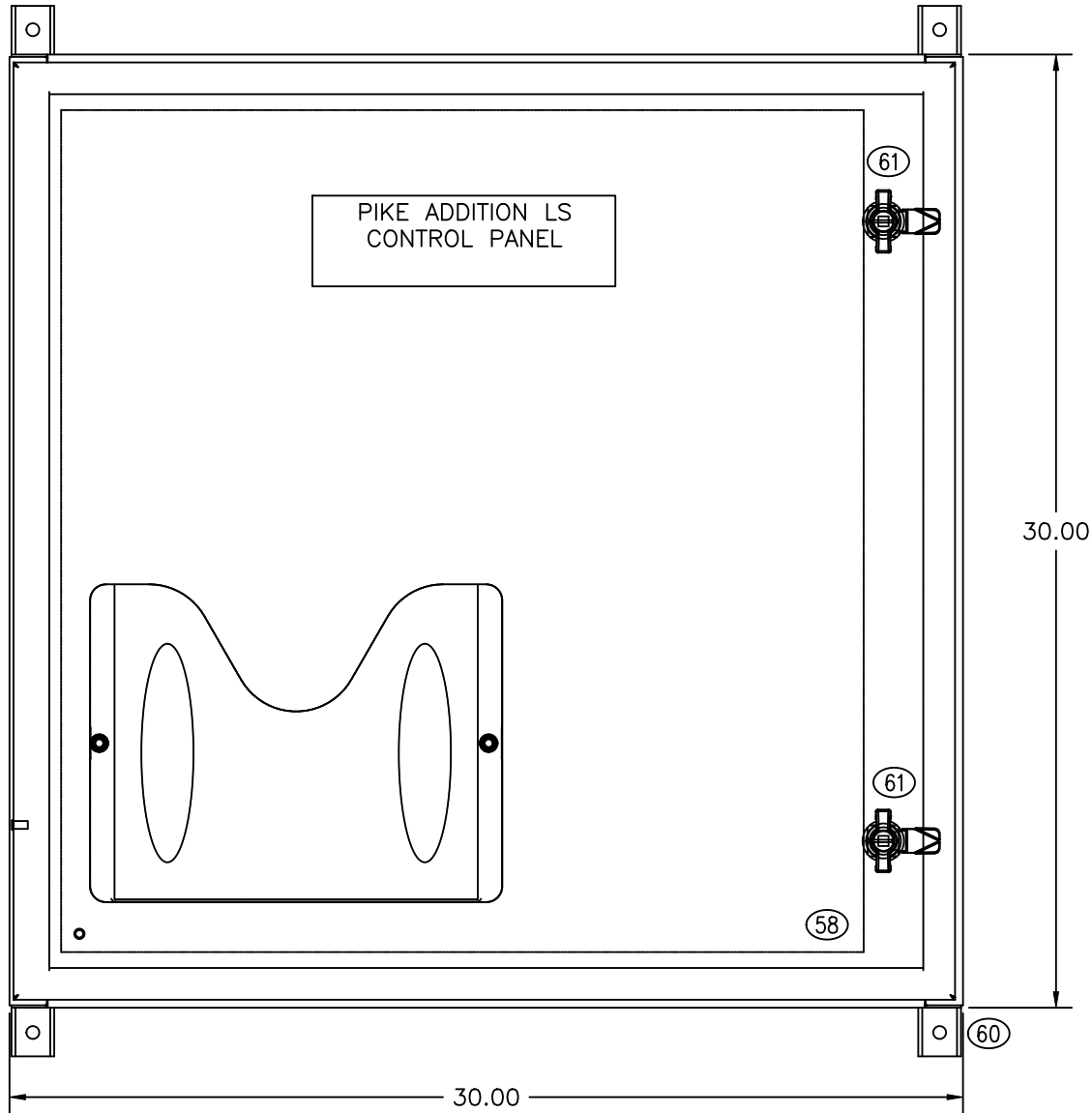
I/O SCHEMATICS - RACK 1, SLOT 2, ANALOG INPUT

kasa

INDUSTRIAL CONTROLS, INC.
 PHONE: 785-825-7181
 418 East Ave. B
 Salina, Ks. 67401

R.E. PEDROTTI CO., INC.
 CITY OF WICHITA
 PIKE ADD LS CONTROL PANEL
 WICHITA, KANSAS



SHEET 5	JOB NO. 8435	DWG. NO. 8435-PIKE ADD-E05
OF 10		

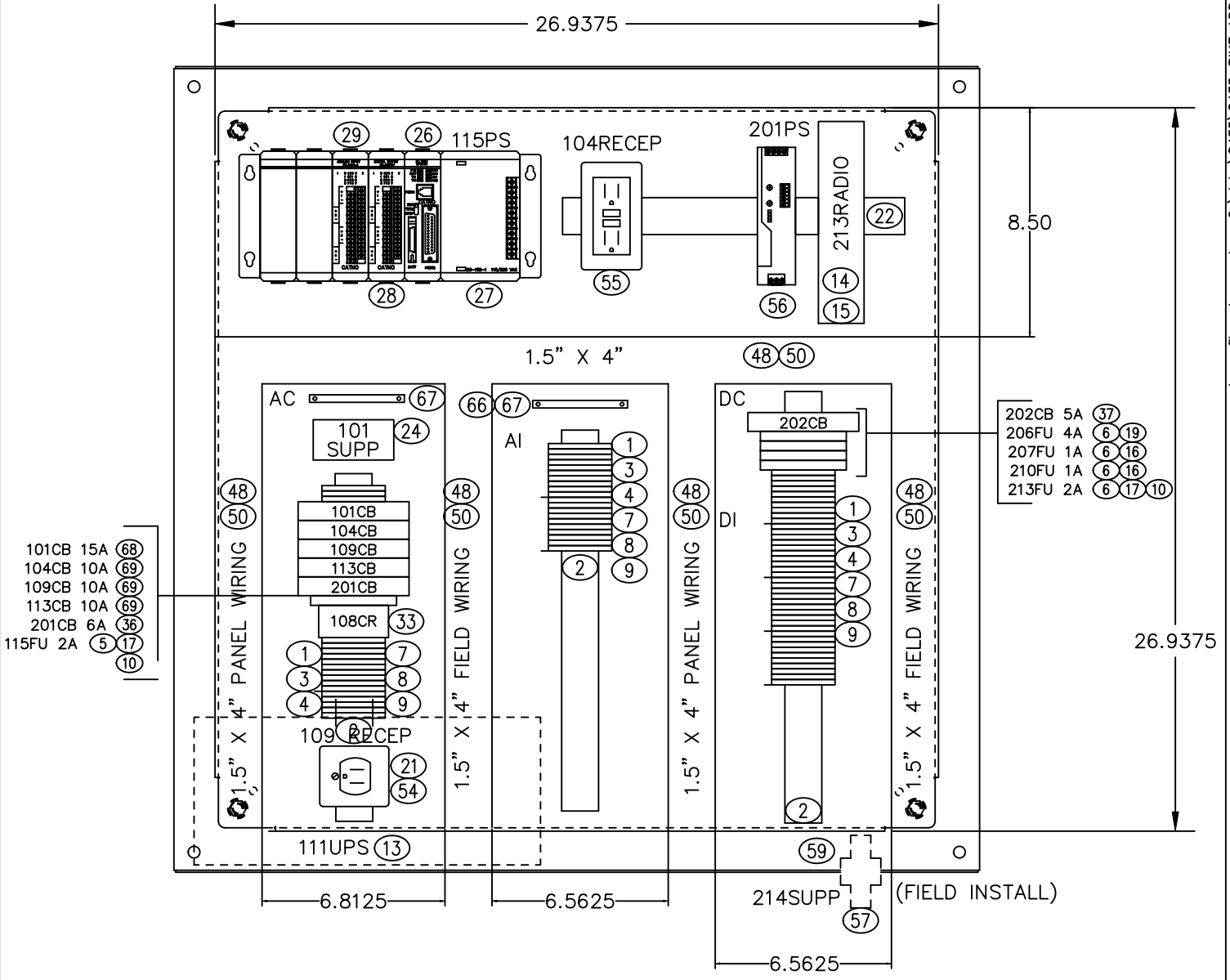


EXTERIOR LAYOUT
 SCALE : 3/8" = 1"
 30"x30"x12"
 TYPE 4X

- SHOP NOTES:**
1. Print five (5) extra wire labels for every terminal that receives field wiring, for use by the install electrical contractor, and ship the labels inside the control panel.
 2. Install 20% spare terminals at the end of each A/C and each D/C terminal strip group.
 3. Install all terminals and quantities as shown in the schematics. Include all hot and neutral terminals as shown. Follow terminal strip rotation sheet if applicable.
 4. Package all spare parts listed in the Bill of Material Spare Parts column in zip-lock bag(s) and place inside the enclosure for shipment.
 5. Save all customer supplied equipment (PLC and Computer component) boxes and ship these inside or with the enclosure. If the boxes will not fit in the panel crate, see the Project Manager for instructions.

May, 21 2020

 R.E. Pedrotti Co., Inc. 5855 Beverly, SUITE A MISSION, KANSAS 66202 (913) 677-3366 FAX (913) 677-3460	NO	REVISIONS	DATE	BY	MISC.	EXTERIOR LAYOUT	
	1	SUBMITTAL	05/13/20	MG	DATE 05/11/20		
	-	-	-	-	SCALE	-	
	-	-	-	-	DESIGNED	MG	
	-	-	-	-	DRAWN	SO	
	-	-	-	-	CHECKED	-	
	-	-	-	-	APPROVED	-	
	-	-	-	-	P.O. NO. 00058277-WKSPALS	-	
 INDUSTRIAL CONTROLS, INC. 418 East Ave. B Salina, Ks. 67401						R.E. PEDROTTI CO., INC. CITY OF WICHITA PIKE ADD LS CONTROL PANEL WICHITA, KANSAS	
SHEET 6 OF 10						JOB NO. 8435	DWG. NO. 8435-PIKE ADD-L01



- 101CB 15A (68)
- 104CB 10A (69)
- 109CB 10A (69)
- 113CB 10A (69)
- 201CB 6A (36)
- 115FU 2A (5, 17, 10)

- 202CB 5A (37)
- 206FU 4A (6, 19)
- 207FU 1A (6, 16)
- 210FU 1A (6, 16)
- 213FU 2A (6, 17, 10)

INTERIOR LAYOUT

SCALE : 3/8 = 1"

- SHOP NOTES:**
- Print five (5) extra wire labels for every terminal that receives field wiring, for use by the install electrical contractor, and ship the labels inside the control panel.
 - Install 20% spare terminals at the end of each A/C and each D/C terminal strip group.
 - Install all terminals and quantities as shown in the schematics. Include all hot and neutral terminals as shown. Follow terminal strip rotation sheet if applicable.
 - Package all spare parts listed in the Bill of Material Spare Parts column in zip-lock bag(s) and place inside the enclosure for shipment.
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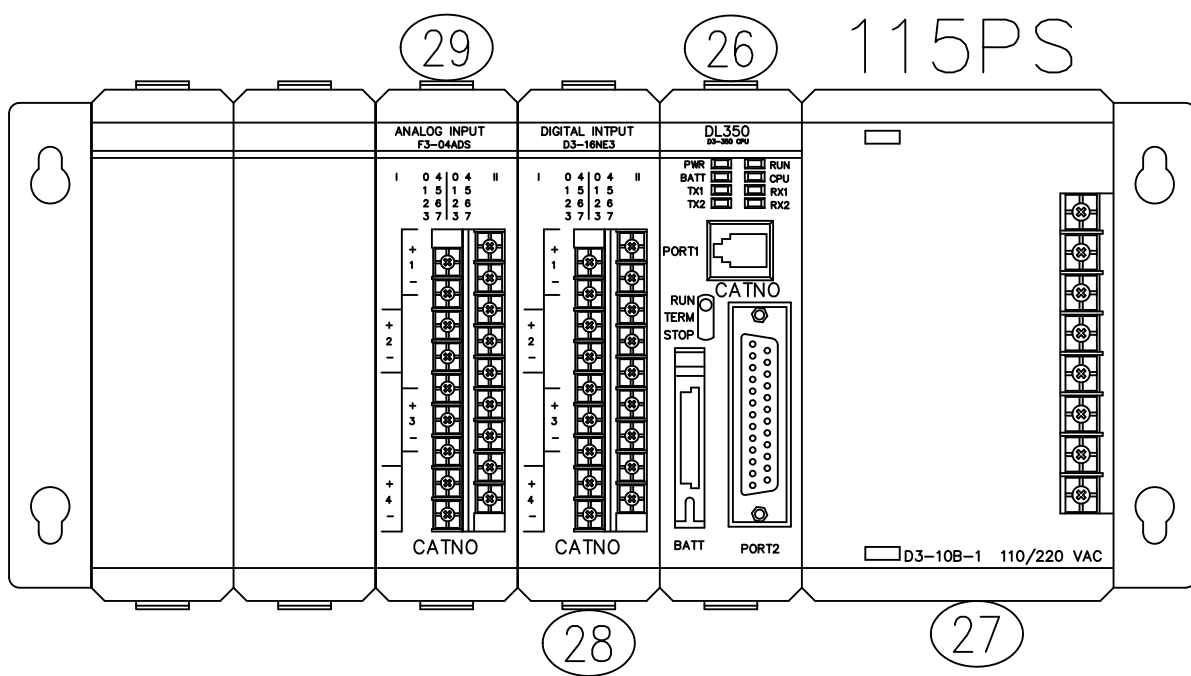
May, 21 2020

NO	REVISIONS	DATE	BY	MISC.	INTERIOR LAYOUT
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-	-	-	-	SCALE -	
-	-	-	-	DESIGNED MG	
-	-	-	-	DRAWN SO	
-	-	-	-	CHECKED -	
-	-	-	-	APPROVED -	
-	-	-	-	P.O. NO. 00058277-WKSPALS	
-	-	-	-	-	

REP
R.E. Pedrotti Co., Inc.
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 MISSION, KANSAS 66202
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R.E. PEDROTTI CO., INC.
 CITY OF WICHITA
 PIKE ADD LS CONTROL PANEL
 WICHITA, KANSAS

SHEET 7 OF 10 JOB NO. 8435 DWG. NO. 8435-PIKE ADD-L02



May, 21 2020

REP
 R.E. Pedrotti Co., Inc.
 5855 Beverly, SUITE A
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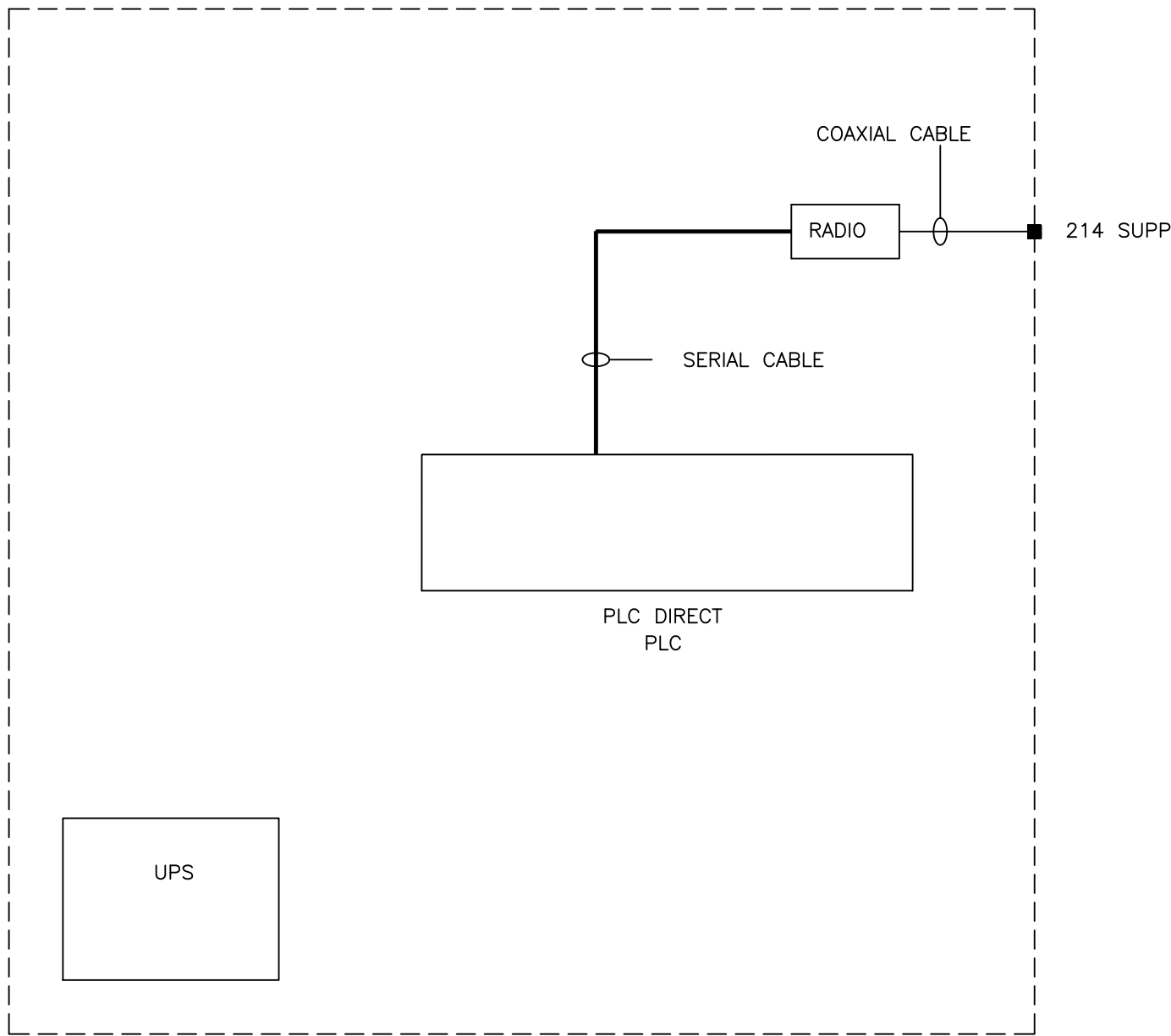
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-	-	-	-	DESIGNED MG
-	-	-	-	DRAWN SO
-	-	-	-	CHECKED -
-	-	-	-	APPROVED -
-	-	-	-	P.O. NO. 00058277-WKSPALS

PLC RACK LAYOUT

INDUSTRIAL CONTROLS, INC.
 PHONE 785-825-7181
 418 East Ave. B
 Salina, Ks. 67401

R.E. PEDROTTI CO., INC. CITY OF WICHITA PIKE ADD LS CONTROL PANEL WICHITA, KANSAS			
SHEET OF	8 OF 10	JOB NO. 8435	DWG. NO. 8435-PIKE ADD-L03

PIKE ADDITION LS CONTROL PANEL



May, 21 2020

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MISSION, KANSAS 66202
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-	-	-	-	APPROVED -
-	-	-	-	P.O. NO. 00058277-WIKSPALS

kase

INDUSTRIAL CONTROLS, INC.
PHONE 785-825-7181
418 East Ave. B
Salina, Ks. 67401

COMMUNICATION LAYOUT		
R.E. PEDROTTI CO., INC. CITY OF WICHITA PIKE ADD LS CONTROL PANEL WICHITA, KANSAS		
SHEET 9 OF 10	JOB NO. 8435	DWG. NO. 8435-PIKE ADD-L04

BILL OF MATERIALS

ITEM	QTY	SPARE	MANUFACTURER	PART NO.	DESCRIPTION
1	4	-	ALLEN BRADLEY	1492-CJ5-10	TERMINAL, IEC, JUMPER STRIP, CENTER, 10 POLE
2	A/R	-	ALLEN BRADLEY	1492-DR6	TERMINAL, DIN MOUNTING RAIL, HIGH RISE
3	6	-	ALLEN BRADLEY	1492-ERL35	TERMINAL, IEC, END ANCHOR
4	4	-	ALLEN BRADLEY	1492-EBJ3	TERMINAL, IEC, END BARRIER, J3 TERMINAL
5	1	-	ALLEN BRADLEY	1492-H4	TERMINAL, NEMA, FUSE HOLDER, 120VAC, 12A, 30-12AWG, 1/4" X 1 1/4", INDICATING
6	4	-	ALLEN BRADLEY	1492-H5	TERMINAL, NEMA, FUSE HOLDER, 24VDC, 12A, 30-12AWG, 1/4" X 1 1/4", INDICATING
7	80	-	ALLEN BRADLEY	1492-J3	TERMINAL, IEC, 600V, 30A, 22-10AWG, GREY
8	7	-	ALLEN BRADLEY	1492-JG3	GROUNDING TERMINAL, IEC, 600V, 30A, 22-10AWG, GREEN
9	2	-	ALLEN BRADLEY	1492-M5X12	TERMINAL, IEC, MARKER CARD, 144 LABELS
10	2	-	ALLEN BRADLEY	1492-N37	TERMINAL, NEMA, END BARRIER FOR FUSED TERMINAL
11	-	-	-	-	-
12	-	-	-	-	-
† * 13	1	-	APC	BE850-M2	UPS, 850VA
* 14	1	-	4RF	APSB-MBRK-DIN	RADIO DIN RAIL MOUNTING BRACKET
* 15	1	-	4RF	APSQ928SSCHD2	RADIO, 928-960 MHz W/JUMPER
16	2	-	BUSSMAN	MDL-1-R	FUSE, 250VAC, 1A, 1/4" X 1 1/4", TIME DELAY
17	2	-	BUSSMAN	MDL-2-R	FUSE, 250VAC, 2A, 1/4" X 1 1/4", TIME DELAY
18	-	-	BUSSMAN	MDL-5-R	FUSE, 250VAC, 5A, 1/4" X 1 1/4", TIME DELAY
† * 19	1	-	BUSSMAN	MDL-4-R	FUSE, 250VAC, 4A, 1/4" X 1 1/4", TIME DELAY
* 20	1	-	REP	DATA CABLE	DB25 TO RJ45 DATA CABLE
21	1	-	EAGLE	2867	3 PRONG PLUG
22	A/R	-	ERAIL	ER35P	DIN RAIL
23	-	-	-	-	-
24	1	-	ASCO	FAS-120AC	SURGE PROTECTION
25	-	-	-	-	-
* 26	1	-	AUTOMATION DIRECT	D3-350	CPU
* 27	1	-	AUTOMATION DIRECT	D3-05B-1	5 SLOT BASE W/POWER SUPPLY
* 28	1	-	AUTOMATION DIRECT	D3-16NE3	DIGITAL INPUT 24 VAC/VDC SINKING/SOURCING, 2 COMMONS (ISOLATED)
* 29	1	-	AUTOMATION DIRECT	F3-04ADS	ANALOG INPUT 4PT
30	-	-	-	-	-
31	-	-	-	-	-
32	-	-	-	-	-
33	1	-	FINDER	58.32.8.120.0060.SPA	RELAY, DPDT, 120VAC COIL
34	5	-	IDEC	BNL-5	END ANCHOR
35	-	-	-	-	-
36	1	-	EATON	FAZ-C6/1-NA-SP	CIRCUIT BREAKER, 1 POLE, 120/240V, 6A
37	1	-	EATON	FAZ-C5/1-NA-SP	CIRCUIT BREAKER, 1 POLE, 120/240V, 5A
38	-	-	-	-	-
39	-	-	-	-	-
40	-	-	-	-	-
41	-	-	-	-	-
42	-	-	-	-	-
43	-	-	-	-	-
44	-	-	-	-	-
45	-	-	-	-	-
46	-	-	-	-	-
47	A/R	-	PANDUIT	C1WH6	WIRE DUCT, COVER, 1", WHITE, 6 FT.
48	A/R	-	PANDUIT	C1.5WH6	WIRE DUCT, COVER, 1.5", WHITE, 6 FT.
49	A/R	-	PANDUIT	G1X4WH6-A	WIRE DUCT, 1" X 4", ADHESIVE BACK, SLOT TYPE, WHITE, 6 FT.
50	A/R	-	PANDUIT	G1.5X4WH6-A	WIRE DUCT, 1.5" X 4", ADHESIVE BACK, SLOT TYPE, WHITE, 6 FT.
51	-	-	-	-	-
52	-	-	-	-	-
53	-	-	-	-	-
54	1	-	PHOENIX CONTACT	0804155	RECEPTACLE, SIMPLEX, 15A, DIN-RAIL MOUNT
55	1	-	PHOENIX CONTACT	56 00 46 2	DUPLEX RECEPTACLE, 20A-115VAC
* 56	1	-	PHOENIX CONTACT	29 04 60 0	POWER SUPPLY 24VDC, 5A
* 57	1	-	POLYPHASER	IS-B50LN-C2	COAXIAL SURGE ARRESTOR
58	1	-	SAGINAW	SCE-30EL3012SSLP	ENCLOSURE, NEMA 4X, 30"H X30"W X 12"D STAINLESS STEEL
59	1	-	SAGINAW	SCE-30P30	ENCLOSURE BACKPLATE
60	1	-	SAGINAW	SCE-ELMFK4	MOUNTING FOOT KIT
61	2	-	SAGINAW	SCE-PLWKB	PADLOCKING WINGKNOB DOOR LATCH (BLACK)
62	-	-	-	-	-
63	-	-	-	-	-
64	-	-	-	-	-
65	-	-	-	-	-
66	1	-	SQUARE D	PKGTAB	LOAD CENTER GROUND BAR, ISOLATER KIT
67	2	-	SQUARE D	PK9GTA	GROUND BAR, 9 HOLE, 14-4AWG
68	1	-	EATON	FAZ-C15/1-NA-SP	CIRCUIT BREAKER, 1 POLE, 120/240V, 15A
69	3	-	EATON	FAZ-C10/1-NA-SP	CIRCUIT BREAKER, 1 POLE, 120/240V, 10A
70	-	-	-	-	-

* = SUPPLIED BY R.E. PEDROTTI
 † = FIELD INSTALLED; PART SHIPPED DIRECTLY TO JOB SITE

May, 21 2020

REP
 R.E. Pedrotti Co., Inc.
 5855 Beverly, SUITE A
 MISSION, KANSAS 66202
 (913) 677-3366 FAX (913) 677-3480

NO	REVISIONS	DATE	BY	MISC.
1	SUBMITTAL	05/13/20	MG	DATE 05/11/20
-	-	-	-	SCALE -
-	-	-	-	DESIGNED MG
-	-	-	-	DRAWN SO
-	-	-	-	CHECKED -
-	-	-	-	APPROVED -
-	-	-	-	P.O. NO. 00058277-WKSPALS

INDUSTRIAL CONTROLS, INC.
 PHONE: 785-825-7181
 418 East Ave. B
 Salina, Ks. 67401

R.E. PEDROTTI CO., INC.
 CITY OF WICHITA
 PIKE ADD LS CONTROL PANEL
 WICHITA, KANSAS

SHEET 10	JOB NO. 8435	DWG. NO. 8435-PIKE ADD-BOM
OF 10		

D3-350 CPU

D3-350 <--->

Our most powerful DL305 CPU

The D3-350 combines the power, speed and ease of the D2-250-1 CPU with existing DL305 I/O modules and bases.

DirectSOFT Programming Software Release V2.3 or higher is required to program the D3-350. For existing license holders, an upgrade package is available. If you are using a handheld programmer (D2-HPP, release 1.8 or lower), a new release of handheld programmer firmware will also be required.

Four PID loops and auto-tuning

The D3-350 CPU can process up to four PID loops directly in the CPU. Select from various control modes, including automatic, manual and cascade control. There are a wide variety of alarms including Process Variable, Rate of Change and Deviation. The loop operation parameters (Process Variable, Setpoint, Setpoint Limits, etc.) are stored in V-memory, which allows easy access from operator interfaces or HMIs.

Setup is accomplished with easy-to-use setup menus and monitoring views in our **DirectSOFT** Programming Software.

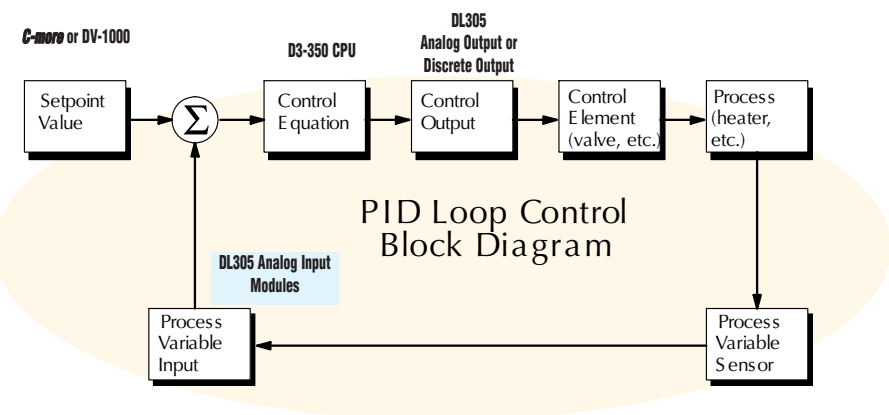
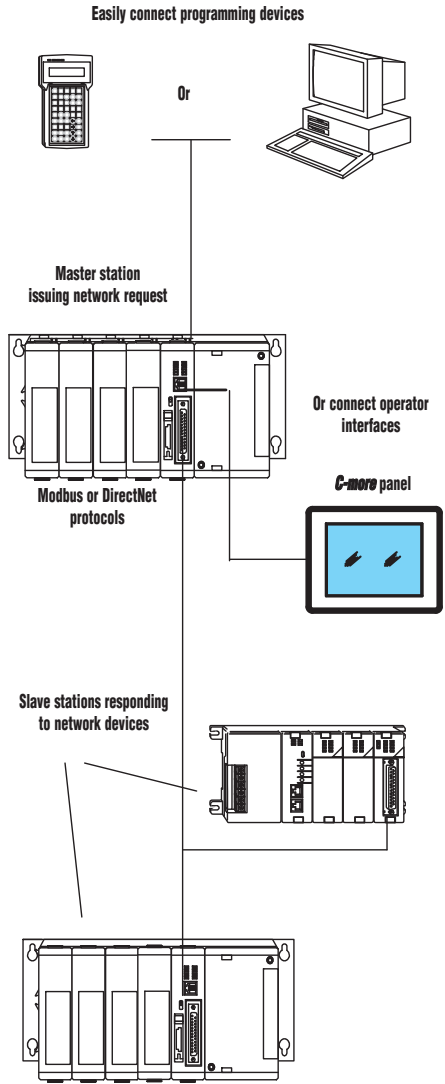
The auto-tuning feature is also easy to use and can reduce setup and maintenance time. The CPU uses the auto-tuning feature to automatically determine near optimum loop settings.

Note: D3-330 and D3-340 programs cannot be downloaded into the D3-350 CPU. The D3-350's instruction set is based on the DL205/DL405 instruction set. If an existing D3-330 or D3-340 system is upgraded to a D3-350 CPU, the RLL program must be re-written for the D3-350 CPU.



Powerful built-in CPU communications

The D3-350 offers two communication ports that provide a vast array of communication possibilities. The top RS232C port is for programming, a DV-1000 connection, a connection to our operator interface panels, or a K-sequence/**DirectNET** slave port. The 25-pin bottom port can use RS232C or RS422. This port offers several different protocol options, such as K-sequence protocol, **DirectNET** Master/Slave, Modbus Master/Slave, and even a direct connection to DL205 remote I/O. The ability to select these features is provided via software so you can choose the best combination for the application.



D3-350 Key Features

The D3-350 supports over 130 instructions. These include:

- Four types of drum sequencers
- Leading and trailing edge triggered one-shots
- Bit of word manipulation
- Floating point conversions
- Print instruction to send ASCII data through the bottom CPU port

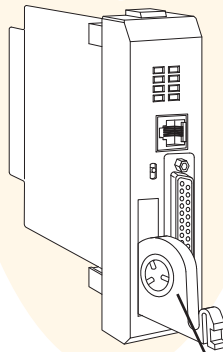
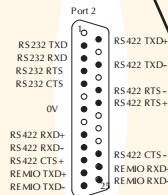
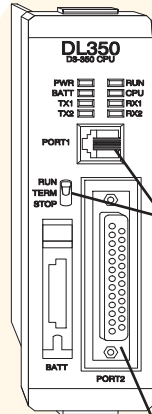
For a complete list of instructions supported by the D3-350 CPU, see the end of this section.

On-board flash memory

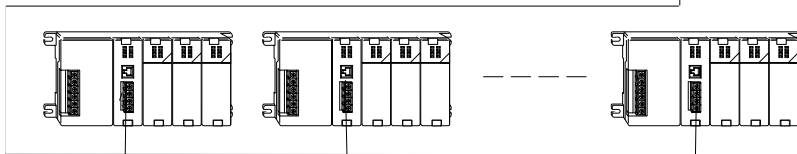
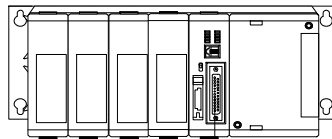
The D3-350 has 7.6 K of flash memory on board. With flash memory, you don't have to worry about losing the program due to a bad battery. If you have critical data stored in V-memory, like PID loops, simply purchase the optional lithium battery to maintain these parameters as well.

Built-in remote I/O connection

The bottom port on the D3-350 can also be used as a master for a remote I/O network. If you need extra I/O at some remote distance from the CPU, use this port to add up to seven DL205 remote slave stations. (See the DL205 section for D2-RSSS information.)



Built-in Remote I/O master



...allows you to connect up to seven DL205 remote slaves!

CPU Status Indicators		
RUN	ON	CPU is in RUN mode
	OFF	CPU is in Program mode
BATT	ON	Battery backup voltage is low
	OFF	Battery backup voltage is OK or disabled
CPU	ON	CPU internal diagnostics has detected an error
	OFF	CPU is OK
PWR	ON	CPU power good
	OFF	CPU power failure
Mode Switch		
RUN	Forces CPU into Run Mode	
TERM	Allows peripherals (HPP, <i>Direct</i> SOFT and operator interface panels) to write to the CPU.	
STOP	Forces CPU out of RUN mode	
Port 1		
Protocols	K-sequence slave <i>Direct</i> NET slave	
Devices	Can connect w/HPP, <i>Direct</i> SOFT, DV-1000, <i>C-more</i> Panels, or any <i>Direct</i> NET Master	
Specs.	6P6C phone jack connector RS232C 9600 baud Odd parity Fixed station address 1 8 data bits 1 start, 1 stop bit Asynchronous, half-duplex, DTE	
Port 2		
Protocols	K-sequence slave <i>Direct</i> NET Master/slave MODBUS RTU Master/slave Remote I/O Master	
Devices	Can connect w/many devices, such as PCs running <i>Direct</i> SOFT, <i>KEP direct</i> for PLCs Server, HMI packages, DV-1000, <i>C-more</i> panels, or any <i>Direct</i> NET or MODBUS RTU master or slave	
Specs.	25-pin D-shell connector RS232C/RS422 300/600/1200/2400/4800/9600 19.2K/38.4K Baud Odd, even or no parity Selectable address (1-90, HEX 1-5A) 8 data bits-1 start, 1 stop bit Asynchronous, half-duplex, DTE	
Batteries (optional)		
D2-BAT-1	D3-350 only, coin type 3.0V Lithium battery, 560mA battery # CR2354	

Note: Batteries are not needed for program backup. However, you should order a battery if you have parameters in V-memory that must be maintained in case of a power outage, such as PID loops.

D3-350 PID Loop Specifications

PID Loop Specifications and Key Features	
Number of Loops	Selectable, four maximum
CPU V-Memory Required	32 V-memory locations per loop selected (additional 32 V-memory locations per loop required if using Ramp/Soak)
PID Algorithm	Position or velocity form of the PID equation. direct or reverse acting, square root of the error and error squared control.
Auto Tuning	Open-loop step response method and closed-loop limit cycle method.
Sample Rate	Specify the time interval between PV samples, 0.05 to 99.99 seconds. Smallest sample rate is limited to either 0.05 seconds or (PLC scan time x number of loops).
Loop Operation Modes	Loops can be in automatic control, manual (operator) control, or cascade control. PV alarm monitoring continues when loops are in manual mode.
Ramp/Soak	Up to 16 steps (8 ramp, 8 soak) per loop, with indication of ramp/soak step.
Square Root PV	Specify a Square root of the PV for a flow control application.
Limit SP	Specify a maximum and minimum value for allowable setpoint changes.
Limit Output	Specify a maximum and minimum value for the output range.
Gain	Specify proportional gain of 0.01 to 99.99.
Reset	Specify integral time of 0.1 to 999.8 in units of seconds or minutes.
Rate	Specify the derivative time, 0.00 to 99.99 seconds.
Rate Limiting	Specify a derivative gain limiting coefficient to filter the PV used in calculating the derivative term (0 to 20).
Bumpless Transfer I	Bias and setpoint are initialized automatically when the module is switched from manual to automatic. This provides for a bumpless transfer, which reduces the chance of sharp changes in the output as a result of entering automatic mode.
Bumpless Transfer II	Bias is set equal to the output when the module is switched from manual to automatic. This allows switching in and out of automatic mode without having to re-enter the setpoint.
Error Deadband	Specify an incremental value above and below the setpoint in which no change in output is made.
Error Squared	Squaring the error minimizes the effect a small error has on the Loop output, however both Error Squared and Error Deadband control may be enabled.
Alarm Specifications	
Deadband	Specify 0.1% to 5% alarm deadband on all alarms except rate of change.
PV Alarm Points	Specify PV alarm settings for low-low, low, high, and high-high conditions. You can also specify a deadband to minimize the alarm cycles when the PV approaches alarm limits.
PV Deviation	Specify alarms to indicate two ranges of PV deviation from the setpoint value (yellow and red deviation).
Rate-of-Change	Specify a rate-of-change limit for the PV.

CPU Specifications

DL305 CPU Specifications			
System Capacity	D3-330	D3-340	D3-350
Total memory (K words)	3.91	3.98	14.8
Ladder memory (K words)	3.7	3.7	7.6
User data memory	116 bytes	172 bytes	7.1K words
CMOS RAM	Yes	Yes	No
UVPROM	Opt.	Opt.	No
EEPROM	No	Opt.	Flash
Total I/O points using:			
Local I/O	128	136	144
Local and Expansion I/O	176	184	368
Remote I/O ¹	N/A	N/A	512
I/O point density	8/16	8/16	8/16
Slots per base (CPU requires 1 slot)	5/8/10	5/8/10	5/8/10
Performance			
Contact execution (boolean)	6.6µs	.87µs	.61µs
Typical scan (1K boolean) ²	15ms	4-5ms	5-6ms
Programming & Diagnostics			
RLL ladder style	Yes	Yes	Yes
RLL ^{PLUS} (stage)	No	No	Yes
RunTime Editing	No	No	Yes
Supports Overrides	No	No	Yes
Variable/fixed scan	variable	variable	either
Handheld programmer port	Yes	Yes	Yes
Built-in RS232C ports	No ³	2	2
Real-time clock/calendar	No	No	Yes
Instructions	61	63	129
Control relays(CR)	140	196	1024
Shift register bits	128	128	use CRs
Stages (RLL ^{PLUS} only)	N/A	N/A	1024
Timers/counters	64	64	256/128
Immediate I/O	No	No	Yes
Subroutines	No	No	Yes
For/Next Loops	No	No	Yes
Timed interrupt	No	No	Yes
Integer math	Yes	Yes	Yes
Floating point math	No	No	Yes
PID	No	No	Yes
Drum sequence	No	No	Yes
Bit of word	No	No	Yes
ASCII print	No	No	Yes
Data registers	128	192	7168
Internal diagnostics	Yes	Yes	Yes
Password security	Yes	Yes	Multi-level
Battery backup	Yes	Yes	Yes
Communications			
Built-in ports ³	No	Yes	Yes
DirectNET master	No	Yes	Yes
DirectNET slave	w/DCU	Yes	Yes
MODBUS RTU master	No	No	Yes
MODBUS RTU slave	No	Yes	Yes
Data communications unit	Yes	Yes	N/A
Specialty modules			
Thermocouple	Yes	Yes	Yes
Analog Input (#channels max.)	112	128	368
Analog output (#channels max.)	28	32	48
High-speed counter (10KHz)	Yes	Yes	No



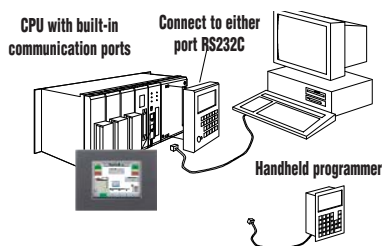
1. The D3-350 bottom port supports DL205 remote I/O.
2. 1K program includes contacts, coils, and scan overhead. If you compare to other products, make sure to include their scan overhead.
3. The D3-330 requires a Data Communications Unit (DCU) for programming with DirectSOFT software.

Communications

Determine your communications requirements

The choice of CPU can have a big impact on your communications capabilities in the DL305 family. If you are considering doing any communications, you should use the D3-340 or the D3-350 CPUs. You can communicate with the D3-330 CPU, but you have to add a DL305 Data Communications Unit to connect any device other than a handheld programmer. The Data Communications Unit has only one port.

D3-340 RS232C Communication Port Specifications	
Protocol	DirectNET
Connector	RJ11(handset connector)
Network address	01 to 90
Baud rate	38400, 19200, 9600, 4800, 2400, 1200, 600, 300
Parity-	None or odd
Transfer mode	HEX/ASCII Half-duplex Asynchronous
Data bits	8
Start bits	1
Stop bits	1
Turn around delay	0 to 1980 in 20ms intervals (preset with R777)



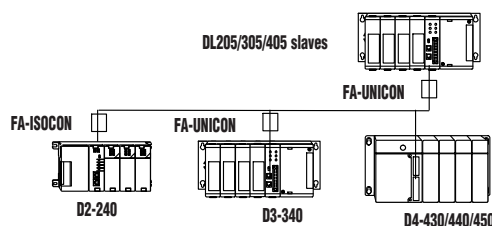
Network Addresses		
Port	Protocol	Range
1	Slave	1-90
2	Slave	1-90
	Master	0
	MODBUS/RTU	1-247

Standard communications

The D3-340 and D3-350 CPUs offer two built-in RS232C communication ports. Operator interfaces and **DirectSOFT** can be connected to either port. On the D3-340 CPU, the handheld programmer is attached directly or with a cable to the parallel port adjacent to the two serial communication ports. On the D3-350 CPU, the handheld programmer is attached to Port 1. The handheld programmer can be operated simultaneously with the communication ports. The D3-340 baud rate and network addresses are set by hardware dipswitches and rotary switches for Port 1. Port 2 uses internal registers that can be changed with a handheld programmer or **DirectSOFT**. Port 1 on the D3-350 is fixed. Port 2 can be configured using the handheld programmer or **DirectSOFT**.

DL305 as a slave on a network

Both ports on the D3-340 and the D3-350 CPUs can serve as slave ports for **DirectNET**. The bottom ports offer additional flexibility in that they can serve as a slave on a Modbus RTU network. The D3-350 even supports RS422, so no RS232-to-RS422 converter is needed. No programming is required in these CPUs for them to act as slave ports.



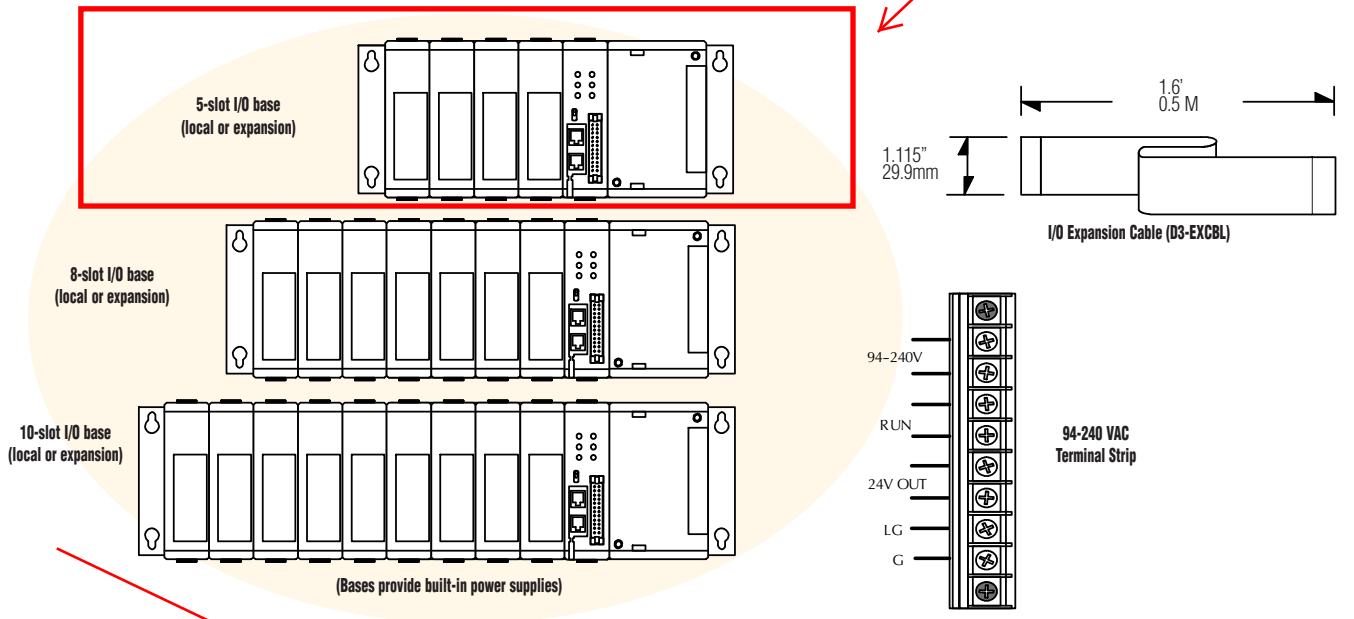
DL305 as a network master

The bottom built-in communication port of the D3-340 and D3-350 CPUs can serve as a Network Master for **DirectNET**. Up to 90 slave stations can be addressed. The D3-350 can also serve as a MODBUS RTU Master; up to 247 slave stations can be addressed. DL405, DL305 and DL205 controllers can be used as slave stations. (Please note there are certain restrictions pertaining to valid DL205 and DL405 memory types that the D3-340 master can read and write.)

Custom drivers

The DL305 product family supports the **DirectNET** protocol. However, in some applications you may have a need to connect to a device that does not support this protocol. If so, the ASCII/BASIC modules also allow you to write your own custom communication drivers (in BASIC) to connect to special devices. These high-speed modules offer communication rates up to 115.2K baud on RS232C, RS422, and RS485. With 128K of memory, there is ample program or data storage space. (These modules are not supported by the D3-350.)

DL305 Base Specifications



	D3-05B-1 <---->	D3-05BDC <---->	D3-08B-1 <---->	D3-10B-1 <---->	D3-10BDC <---->
Number of Slots	5	5	8	10	10
Local CPU Base	Yes	Yes	Yes	Yes	Yes
Expansion Base	Yes CPU base and two expansion bases. If CPU base is 5-slot, then the expansion bases must be 5-slot also.	Yes CPU base and two expansion bases. If CPU base is 5-slot, then the expansion bases must be 5-slot also.	Yes (D3-350 only) CPU base and two expansion bases. If CPU base is 8-slot, then the expansion bases must be 8-slot or 5-slot	Yes CPU base and one expansion bases. If CPU base is 10-slot, then the expansion bases must be 10-slot or 5-slot	Yes CPU base and one expansion bases. If CPU base is 10-slot, then the expansion bases must be 10-slot or 5-slot.
Input Voltage Range	85-264VAC 47-63Hz	20.5-30VDC <10% ripple	85-264VAC 47-63Hz	85-264VAC 47-63Hz	20.5-30VDC <10% ripple
Base Power Consumption	85 VA Max	48 Watts	85VA Max	85VA Max	65 Watts
Inrush Current Max.	30A 1ms	30A	30A 1ms	30A 1ms	30A
Dielectric Strength	1500VAC for one minute between terminals of AC P/S, run output, common, 24VDC	1500VAC for one minute between 24VDC input terminals and run output	1500VAC for one minute between terminals of AC P/S, run output, common, 24VDC	2000VAC for one minute between terminals of AC P/S, run output, common, 24VDC	1500VAC for one minute between 24VDC input terminals and run output
Insulation Resistance	>10Mohm at 500VDC	>10Mohm at 500VDC	>10Mohm at 500VDC	>10Mohm at 500VDC	>10Mohm at 500VDC
Power Supply Output (Voltage Ranges and Ripple)	(5VDC) 4.75-5.25V 5% ripple (9VDC) 8.5-10V 5% ripple (24VDC) 20-28V 5% ripple	(5VDC) 4.75-5.25V 5% ripple (9VDC) 8.5-10V 5% ripple (24VDC) 20-28V 5% ripple	(5VDC) 4.75-5.25V 5% ripple (9VDC) 8.5-10V 5% ripple (24VDC) 20-28V 5% ripple	(5VDC) 4.75-5.25V 5% ripple (9VDC) 8.5-10V 5% ripple (24VDC) 20-28V 5% ripple	(5VDC) 4.75-5.25V 5% ripple (9VDC) 8.5-10V 5% ripple (24VDC) 20-28V 5% ripple
5 VDC Current Supplied	.7A	1.4A	1.0A	1.0A	1.4A
9 VDC Current Supplied	2.0A	0.8A	2.0A	2.0A	1.7A
24 VDC Current Supplied	0.5A	0.5A	0.5A	0.5A	0.5A
Auxiliary 24 VDC Output	100mA max	None	100mA max	100mA max	None
Run Relay	250VAC 4A (resistive load)	250VAC 4A (resistive load)	250VAC 4A (resistive load)	250VAC 4A (resistive load)	250VAC, 4A (resistive load)
Fuses	2A (250V) Non-replaceable	4A (250V) User-replaceable D3-FUSE-3 <---->	2A (250V) Non-replaceable	2A (250V) Non-replaceable	4A (250V) User-replaceable D3-FUSE-3 <---->
Dimensions W/H/D	11.42x4.85x4.41 in. (290x123x112 mm)	11.42x4.85x4.41 in. (290x123x112 mm)	15.55x4.85x4.41 in. (395x123x112 mm)	18.3x4.85x4.41 in. (465x123x112 mm)	18.34x4.85x4.41 in. (465x123x112 mm)
Weight	37oz. (1050g)	34oz. (964g)	44oz. (1250g)	51.1oz. (1450g)	50.5oz. (1432g)

DL305 Power Requirements

This section shows the amount of power supplied by the base power supplies and the amount of power used by each DL305 device. Note the base power supplies provide three internal voltages (5V, 9V, 24V). The chart shows how much power from each of these power sources is required for each DL305 device. Use this information when calculating the power budget for your system.

In addition to the three internal power sources, the DL305 bases provide an external power connection. There is 24 VDC available from the 24 VDC output terminals on the bases (except D3-05BDC and D3-10BDC).

The 24 VDC can be used to power external devices or DL305 modules that require external 24 VDC. The power used from this external 24 VDC output reduces the internal system 24 VDC that is available to the modules by an equal amount. When using the 24 VDC output at the base terminal, it is recommended that 100 mA not be exceeded.

Power Consumed				
Device	5V(mA)	9V(mA)	24V(mA)	Ext req.
CPUs				
D3-330	300	50	0	0
D3-340	300	20	0	0
D3-350	500	0	0	0
DC Input Modules				
D3-08ND2	0	10	112	0
D3-16ND2-1	0	25	224	0
D3-16ND2F	0	25	224	0
F3-16ND3F	0	148	68	0
AC Input Modules				
D3-08NA-1	0	10	0	0
D3-08NA-2	0	10	0	0
D3-16NA	0	100	0	0
AC/DC Input Modules				
D3-08NE3	0	10	0	0
D3-16NE3	0	130	0	0
DC Output Modules				
D3-04TD1	0	12	5	0
D3-08TD1	0	20	24	0
D3-08TD2	0	30	0	0
D3-16TD1-1	0	40	96	0
D3-16TD2	0	180	0	0
AC Output Modules				
D3-04TAS	0	12	0	0
F3-08TAS-1	0	200	0	0
D3-08TA-1	0	160	0	0
D3-08TA-2	0	160	0	0
F3-16TA-2	0	250	0	0
D3-16TA-2	0	400	0	0

Power Supplied				
Device	5V(mA)	9V(mA)	24V(mA)	24 V (mA)
D3-05B-1	900	2000	500	100
D3-08B-1	900	2000	500	100
D3-10B-1	900	2000	500	100
D3-05BDC	900	2000	500	None
D3-10BDC	900	2000	500	None
D3-05B-NR	900	2000	500	100
D3-08B-NR	900	2000	500	100
D3-10B-NR	900	2000	500	100
D3-05BDC-NR	900	2000	500	None
D3-10BDC-NR	900	2000	500	None
Power Consumed				
Device	5V(mA)	9V(mA)	24V(mA)	External required
Relay Output Modules				
D3-08TR	0	360	0	0
F3-08TRS-1	0	296	0	0
F3-08TRS-2	0	296	0	0
D3-16TR	0	480	0	0
Analog Temperature and Thermocouple Modules				
F3-04ADS	0	183	50	0
F3-08AD-1	0	45	55	0
F3-08THM-n	0	50	34	0
F3-16AD	0	55	65	0
F3-04DA-1	0	144	108	0
F3-04DAS	0	154	145	0
Communications and Networking				
D3-232 DCU	500	0	0	Optional 5V@500mA
D3-422 DCU	500	0	0	Optional 5V@500mA
FA-UNICON	0	0	0	24V or 5V@ 100mA
D3- DCM	0	300	0	0
Specialty Modules				
D3-08SIM	0	10	112	0
D3-HSC	0	70	0	0
D3-TCSU	40	5	0	0
Programming				
D3-HP	50	50	0	0
D3-HPP	50	50	0	0
D2-HP	200	0	0	0
Specialty CPUs				
F3-OMUX-1	409	0	0	0
F3-OMUX-2	262	0	150	0
F3-PMUX	455	0	0	0
F3-RTU	416	0	0	0
Operator Interface				
DV-1000	150	0	0	0
<i>C-more</i> Micro-Graphic	210	0	0	0

Dimensions and Installation

It is important to understand the installation requirements for your DL305 system. This will help ensure that the DL305 products operate within their environmental and electrical limits.

Plan for safety

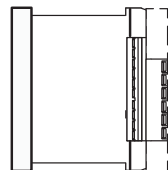
This catalog should never be used as a replacement for the user manual. The user manuals, D3-USER-M and D3-350-M (available for download from our web site), contain important safety information that must be followed. The system installation should comply with all appropriate electrical codes and standards.

Base dimensions and mounting orientation

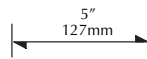
Use the diagrams to the right to make sure the DL305 system can be installed in your application. DL305 bases must be mounted horizontally to ensure proper airflow for cooling purposes. It is important to check these dimensions against the conditions required for your application. For example, it is recommended that you leave 1.5" depth for ease of access and cable clearance. However, your distance may be greater or less. Also, check the installation guidelines for the recommended cabinet clearances.

Specification	Rating
Storage Temperature	-4°F - 158°F (-20°C to 70°C)
Ambient Operating Temperature	32°F - 131°F (0° to 55°C)
Ambient Humidity	30% - 95% relative humidity (non-condensing)
Vibration Resistance	MIL STD 810C, Method 514.2
Shock Resistance	MIL STD810, Method 516.2
Noise Immunity	NEMA (ICS3-304)

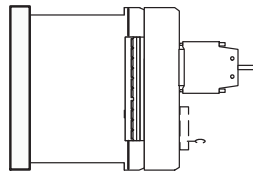
DL305 mounting depths



Base and CPU



With 8-pt., 16-pt. I/O, or handheld



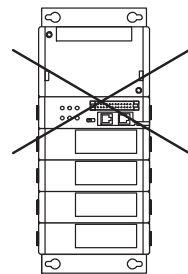
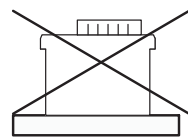
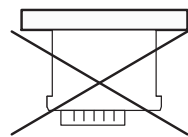
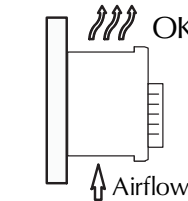
Base and CPU with DCU, or Thumbwheel interface



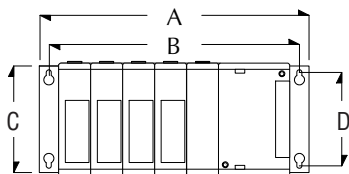
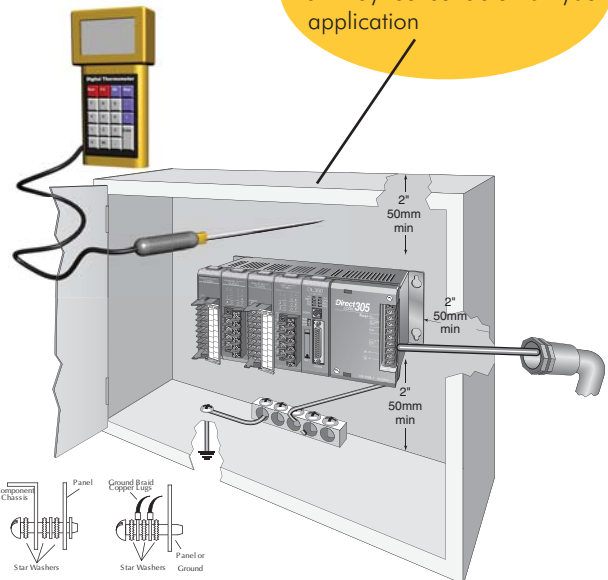
With PROM Writer Unit (-lines)



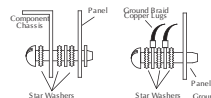
With DCU and D3-DSCBL-2 connected



See the Enclosures section in this catalog for an enclosure that may be suitable for your application

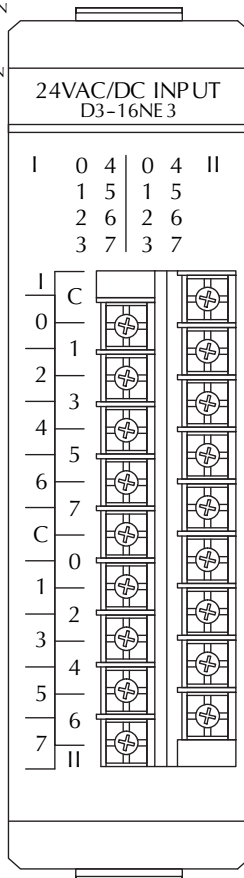
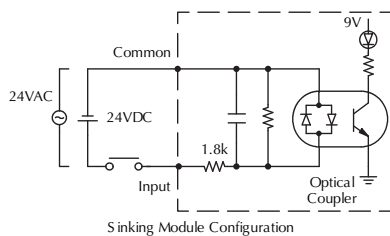
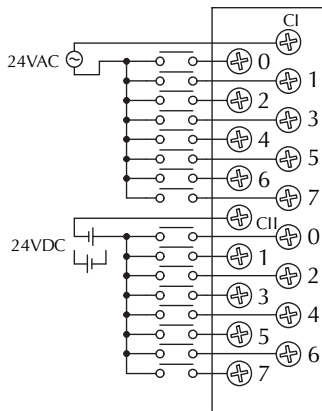
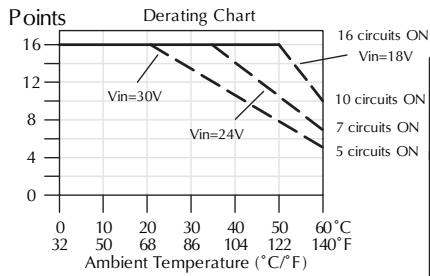


Base	Price	A	B	C	D				
D3-05B-1	<--->	11.41"	290mm	10.63"	270mm	4.84"	123mm	3.54"	90mm
D3-08B-1	<--->	15.55"	395mm	14.76"	375mm	4.84"	123mm	3.54"	90mm
D3-10B-1	<--->	18.30"	465mm	17.51"	445mm	4.84"	123mm	3.54"	90mm



AC/DC Input Modules

D3-16NE3 AC/DC Input <---->	
Inputs per Module	16 (sink/source)
Commons per Module	2 (isolated)
Input Voltage Range	14-30VAC/VDC
Input Voltage	External
Peak Voltage	30VAC/VDC
AC Frequency	47-63Hz
ON Voltage Level	>14V
OFF Voltage Level	<3V
Input Impedance	1.8Kohm
Input Current	16mA Max
Minimum ON Current	7mA
Maximum OFF Current	2mA
Base Power Required	9V 2.5mA+4.5mA/ON pt. (130mA max) 24V N/A
OFF to ON Response	AC 5-30ms DC 5-25 ms
ON to OFF Response	AC 5-30ms DC 5-25 ms
Terminal Type	Removable
Status Indicators	Logic side
Weight	6oz. (170g)



See page 5-29 for part numbers of ZIPLink cables and connection modules compatible with this I/O module.

Analog Input Modules

F3-04ADS 4-Channel Isolated Analog Input	
Number of Channels	4, (isolated)
Input Ranges	0-5 V, 0-10 V, 1-5 V, ±5V, ±10V, 0-20 mA, 4-20 mA
Channels Individually Configured	Yes
Resolution	12 bit (1 in 4096)
Input Type	Differential
Max. Common Mode Voltage	±750V peak continuous transformer isolation
Noise Rejection Ratio	Common mode: -100dB at 60Hz
Active Low-pass Filtering	-3dB at 10Hz, -12dB per octave
Input Impedance	250Ω ± 0.1%, 1/2W current input, 200kΩ voltage input
Absolute Maximum Ratings	±40mA, current input ± 100V, voltage input
Conversion Time	1 channel per scan, successive approximation, AD574
Linearity Error	±1 counts max. (0.03% of full scale) unipolar ±2 counts max. (0.05% of full scale) bipolar
Full Scale Calibration Error	±8 counts maximum

Offset Calibration Error	±8 counts maximum
Accuracy vs. Temperature	57ppm/ °C maximum full scale
Recommended Fuse	0.032 A, Series 217 fast-acting, current inputs
Power Budget Requirement	183mA @ 9VDC, 50mA @ 24VDC
External Power Supply	None required
Operating Temperature	32° to 140°F (-0° to 60°C)
Storage Temperature	-4° to 158° F (-20° to 70°C)
Relative Humidity	5 to 95% (non-condensing)
Environmental Air	No corrosive gases permitted
Vibration	MIL STD 810C 514.2
Shock	MIL STD 810C 516.2
Noise Immunity	NEMA ICS3-304

See page D3-28 for part numbers of ZIPLink cables and connection modules compatible with this I/O module.



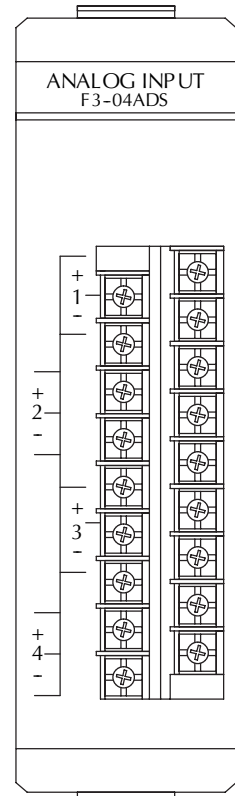
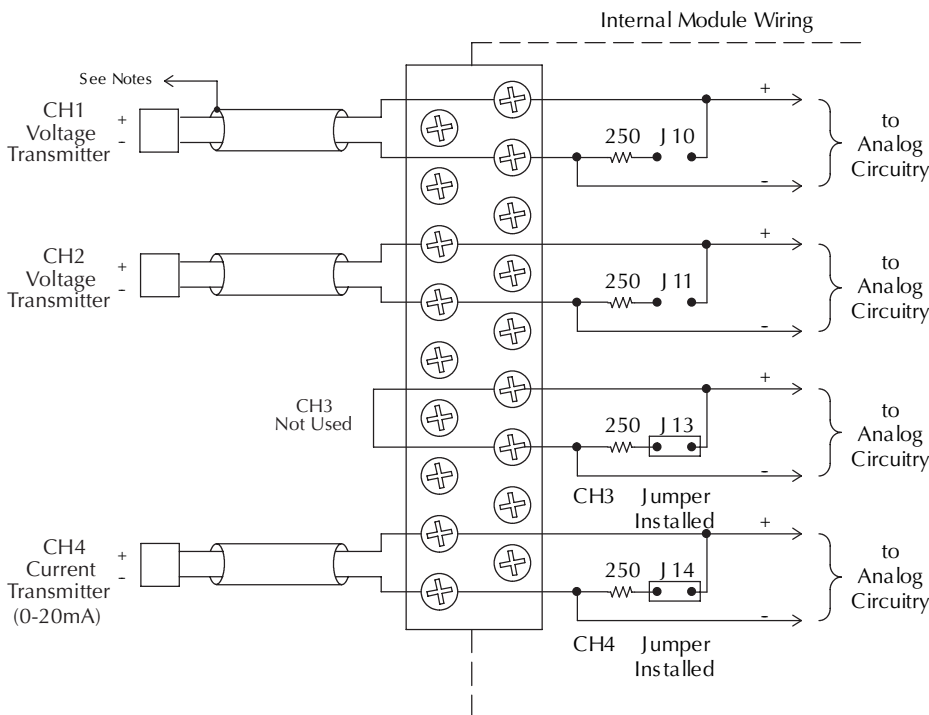
Note 1: Connect unused voltage or current inputs to 0VDC at terminal block or leave current jumper installed (see Channel 3).

Note 2: A Series 217, 0.032A, fast-acting fuse is recommended for 4-20 mA current loops.

Note 3: Transmitters may be 2, 3, or 4 wire type.

Note 4: Transmitters may be powered from separate power sources.

Note 5: Terminate all shields of the cable at their respective signal source.



EDS-205/208 Series

5 and 8-port entry-level unmanaged Ethernet switches



- > 10/100BaseT(X) (RJ45 connector), 100BaseFX (multi-mode, SC/ST connectors)
- > IEEE802.3/802.3u/802.3x support
- > Broadcast storm protection
- > DIN-rail mounting ability
- > -10 to 60°C operating temperature range



Introduction

The EDS-205/208 series of industrial Ethernet switches are entry-level industrial 5 and 8-port Ethernet switches that support IEEE 802.3/802.3u/802.3x with 10/100M, full/half-duplex, MDI/MDIX auto-sensing RJ45 ports. The EDS-205/208 switches are rated to operate at temperatures ranging from -10 to 60°C, and are rugged enough for

any harsh industrial environment. The switches can be easily installed on a DIN-rail as well as in distribution boxes. The DIN-rail mounting capability, wide operating temperature, and the IP30 housing with LED indicators make the plug-and-play EDS-205/208 switches easy to use and reliable.

Specifications

Technology

Standards:

IEEE 802.3 for 10BaseT
 IEEE 802.3u for 100BaseT(X) and 100BaseFX
 IEEE 802.3x for Flow Control

Processing Type: Store and Forward

Flow Control: IEEE 802.3x flow control, back pressure flow control

Switch Properties

MAC Table Size: 1 K

Packet Buffer Size: 512 kbit

Interface

Fiber Ports: 100BaseFX ports (SC/ST connector, multi-mode)

RJ45 Ports: 10/100BaseT(X) auto negotiation speed, Full/Half duplex mode, and auto MDI/MDI-X connection

LED Indicators: Power, 10/100M (TP port), 100M (fiber port)

Optical Fiber

	100BaseFX	
	Multi-mode	Single-mode
Wavelength	1300 nm	1310 nm
Max. TX	-10 dBm	0 dBm
Min. TX	-20 dBm	-5 dBm
RX Sensitivity	-32 dBm	-34 dBm
Link Budget	12 dB	29 dB
Typical Distance	5 km ^a 4 km ^b	40 km ^c
Saturation	-6 dBm	-3 dBm

a. 50/125 μm, 800 MHz*km fiber optic cable
 b. 62.5/125 μm, 500 MHz*km fiber optic cable
 c. 9/125 μm single-mode fiber optic cable

Power Requirements

Input Voltage:

EDS-205: 24 VDC (12 to 48 VDC), 18 to 30 VAC (47 to 63 Hz), single input

EDS-208 Series: 24 VDC (12 to 45 VDC), 18 to 30 VAC (47 to 63 Hz), single input

Input Current:

EDS-205: 0.12 A @ 24 V

EDS-208: 0.14 A @ 24 V

EDS-208-M: 0.23 A @ 24 V

Overload Current Protection: 1.1 A

Connection: 1 removable 3-contact terminal block

Reverse Polarity Protection: Present

Physical Characteristics

Housing: Plastic, IP30 protection

Dimensions:

EDS-205: 24.9 x 100 x 86.5 mm (0.98 x 3.94 x 3.41 in)

EDS-208 Series: 40 x 100 x 86.5 mm (1.57 x 3.94 x 3.41 in)

Weight:

EDS-205: 135 g

EDS-208 Series: 170 g

Installation: DIN-rail mounting

Environmental Limits

Operating Temperature: -10 to 60°C (14 to 140°F)

Storage Temperature: -40 to 85°C (-40 to 185°F)

Ambient Relative Humidity: 5 to 95% (non-condensing)

Standards and Certifications

Safety:

EDS-205: UL 508, EN 60950-1
 EDS-208 Series: UL 508

EMI: FCC Part 15 Subpart B Class A, EN 55022 Class A

EMS:

EN 61000-4-2 (ESD) Level 2, EN 61000-4-3 (RS) Level 3,
 EN 61000-4-4 (EFT) Level 3, EN 61000-4-5 (Surge) Level 3,
 EN 61000-4-6 (CS) Level 3,
 EN 61000-4-8, EN 61000-4-11

Shock: IEC 60068-2-27

Freefall: IEC 60068-2-32

Vibration: IEC 60068-2-6

Note: Please check Moxa's website for the most up-to-date certification status.

MTBF (mean time between failures)

Time:

EDS-205: 3,915,945 hrs

EDS-208 Series: 7,492,000 hrs

Database: Telcordia (Bellcore), GB

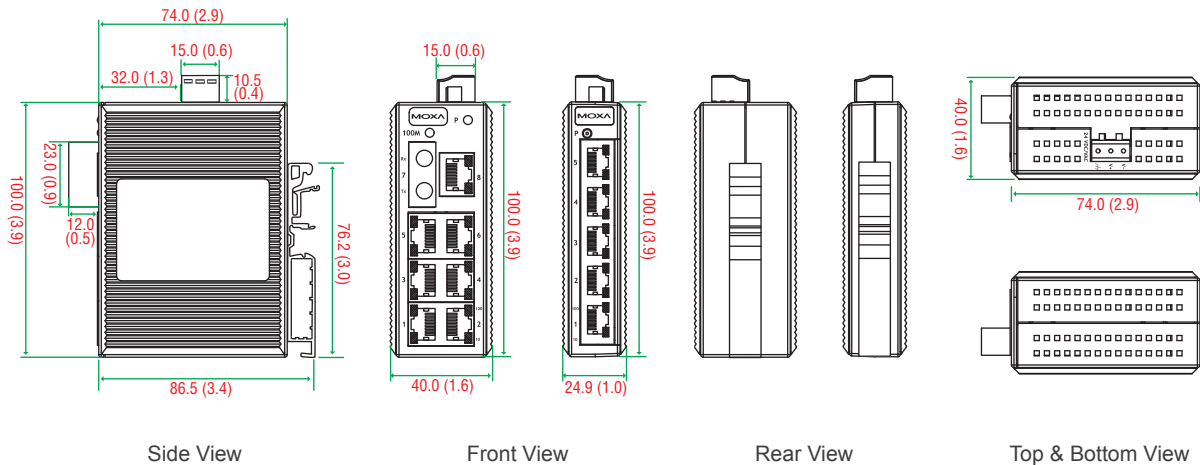
Warranty

Warranty Period: 5 years

Details: See www.moxa.com/warranty

Dimensions

Unit: mm (inch)



Ordering Information

Available Models	Port Interface			Housing Material	Power Range	
	Standard Temperature (-10 to 60°C)	10/100BaseT(X)	100BaseFX			
			Multi-mode, SC Connector			Multi-mode, ST Connector
EDS-205	5	–	–	Plastic	12 to 48 VDC	
EDS-208	8	–	–	Plastic	12 to 45 VDC	
EDS-208-M-SC	7	1	–	Plastic	12 to 45 VDC	
EDS-208-M-ST	7	–	1	Plastic	12 to 45 VDC	

Optional Accessories (can be purchased separately)

DR-4524/75-24/120-24: 45/75/120 W DIN-rail 24 VDC power supplies

MDR-40-24/60-24: 40/60 W DIN-rail 24 VDC power supplies, -20 to 70°C operating temperature

RK-4U: 4U-high 19" rack mounting kit

Package Checklist

- EDS-205 or EDS-208 switch
- Hardware installation guide (printed)
- Warranty card

Power supply unit - QUINT4-PS/1AC/24DC/5 - 2904600

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>)



Primary-switched QUINT POWER power supply with free choice of output characteristic curve, SFB (selective fuse breaking) technology, and NFC interface, input: 1-phase, output: 24 V DC/5 A

Product Description

The fourth generation of the high-performance QUINT POWER power supplies ensures superior system availability by means of new functions. Signaling thresholds and characteristic curves can be individually adjusted via the NFC interface. The unique SFB technology and preventive function monitoring of the QUINT POWER power supply increase the availability of your application.

Why buy this product

- SFB technology trips standard circuit breakers selectively, loads that are connected in parallel continue working
- Preventive function monitoring indicates critical operating states before errors occur
- Signaling thresholds and characteristic curves that can be adjusted via NFC maximize system availability
- Easy system extension thanks to static boost; starting of difficult loads thanks to dynamic boost
- High degree of immunity, thanks to integrated gas-filled surge arrester and mains failure bridging time of more than 20 milliseconds
- Robust design thanks to metal housing and wide temperature range from -40°C to +70°C
- Worldwide use thanks to the wide range input and international approval package



Key Commercial Data

Packing unit	1 STK
GTIN	 4 046356 985321
GTIN	4046356985321
Weight per Piece (excluding packing)	960.000 g
Custom tariff number	85044030
Country of origin	Thailand

Technical data

Dimensions

Power supply unit - QUINT4-PS/1AC/24DC/5 - 2904600

Technical data

Dimensions

Width	36 mm
Height	130 mm
Depth	125 mm
Width with alternative assembly	122 mm
Height with alternative assembly	130 mm
Depth with alternative assembly	39 mm

Ambient conditions

Degree of protection	IP20
Ambient temperature (operation)	-25 °C ... 70 °C (> 60 °C Derating: 2,5 %/K)
Ambient temperature (storage/transport)	-40 °C ... 85 °C
Max. permissible relative humidity (operation)	≤ 95 % (at 25 °C, non-condensing)
Noise immunity	Immunity according to EN 61000-6-1 (residential), EN 61000-6-2 (industrial), and EN 61000-6-5 (power station equipment zone 1, 2)
Installation height	≤ 5000 m (> 2000 m, observe derating)

Input data

Nominal input voltage range	100 V AC ... 240 V AC
	110 V DC ... 250 V DC
Input voltage range	100 V AC ... 240 V AC -15 % ... +10 %
	110 V DC ... 250 V DC -18 % ... +40 %
Dielectric strength maximum	300 V AC 60 s
AC frequency range	50 Hz ... 60 Hz -10 % ... +10 %
Discharge current to PE	< 3.5 mA
Current consumption	1.7 A (100 V AC)
	1.5 A (120 V AC)
	0.9 A (230 V AC)
	0.8 A (240 V AC)
Nominal power consumption	135 W
Inrush surge current	typ. 14 A (at 25 °C)
Power failure bypass	≥ 24 ms (120 V AC)
	≥ 32 ms (230 V AC)
Input fuse	6.3 A (slow-blow, internal)
Choice of suitable circuit breakers	6 A ... 16 A (Characteristic B, C, D, K or comparable)
Type of protection	Transient surge protection
Protective circuit/component	Varistor, gas-filled surge arrester

Output data

Nominal output voltage	24 V DC
------------------------	---------

Power supply unit - QUINT4-PS/1AC/24DC/5 - 2904600



Technical data

Output data

Setting range of the output voltage (U_{Set})	24 V DC ... 29.5 V DC (constant capacity)
Nominal output current (I_N)	5 A
Static Boost ($I_{Stat.Boost}$)	6.25 A
Dynamic Boost ($I_{Dyn.Boost}$)	10 A (5 s)
Selective Fuse Breaking (I_{SFB})	30 A (15 ms)
Derating	> 60 °C (2.5 %/K)
Connection in parallel	Yes, for redundancy and increased capacity
Connection in series	yes
Control deviation	< 0.5 % (Static load change 10 % ... 90 %)
	< 4 % (Dynamic load change 10 % ... 90 %, (10 Hz))
	< 0.25 % (change in input voltage ± 10 %)
Residual ripple	< 30 mV _{PP} (with nominal values)
Output power	120 W
Typical response time	300 ms (from SLEEP MODE)
Maximum power dissipation in no-load condition	< 3 W (120 V AC)
	< 3 W (230 V AC)

General

Net weight	0.7 kg
Efficiency	typ. 88.8 % (120 V AC)
	typ. 89.2 % (230 V AC)
Insulation voltage input/output	4 kV AC (type test)
	2 kV AC (routine test)
Protection class	I
MTBF (IEC 61709, SN 29500)	> 1440000 h (25 °C)
	> 895000 h (40°C)
	> 421000 h (60°C)
Mounting position	horizontal DIN rail NS 35, EN 60715
Assembly instructions	Alignable: 5 mm horizontally, 15 mm next to active components, 50 mm vertically

Connection data, input

Connection method	Screw connection
Conductor cross section solid min.	0.2 mm ²
Conductor cross section solid max.	2.5 mm ²
Conductor cross section flexible min.	0.2 mm ²
Conductor cross section flexible max.	2.5 mm ²
Conductor cross section AWG min.	30

Power supply unit - QUINT4-PS/1AC/24DC/5 - 2904600



Technical data

Connection data, input

Conductor cross section AWG max.	12
Stripping length	6.5 mm

Connection data, output

Connection method	Screw connection
Conductor cross section solid min.	0.2 mm ²
Conductor cross section solid max.	2.5 mm ²
Conductor cross section flexible min.	0.2 mm ²
Conductor cross section flexible max.	2.5 mm ²
Conductor cross section AWG min.	30
Conductor cross section AWG max.	12
Stripping length	6.5 mm

Connection data for signaling

Connection method	Push-in connection
Conductor cross section solid min.	0.2 mm ²
Conductor cross section solid max.	1.5 mm ²
Conductor cross section flexible min.	0.2 mm ²
Conductor cross section flexible max.	1.5 mm ²
Conductor cross section AWG min.	24
Conductor cross section AWG max.	16
Stripping length	8 mm

Standards and Regulations

Electromagnetic compatibility	Conformance with EMC Directive 2014/30/EU
Shock	18 ms, 30g, in each space direction (according to IEC 60068-2-27)
Noise emission	Additional basic standard EN 61000-6-5 (immunity in power station)
Noise immunity	Immunity according to EN 61000-6-1 (residential), EN 61000-6-2 (industrial), and EN 61000-6-5 (power station equipment zone 1, 2)
Standards/regulations	EN 61000-4-2
	EN 61000-4-3
	EN 61000-4-4
	EN 61000-4-5
	EN 61000-4-6
	EN 61000-4-8
	EN 61000-4-11
	EN 61000-4-9
	EN 61000-4-12
	EN 61000-4-16

Power supply unit - QUINT4-PS/1AC/24DC/5 - 2904600

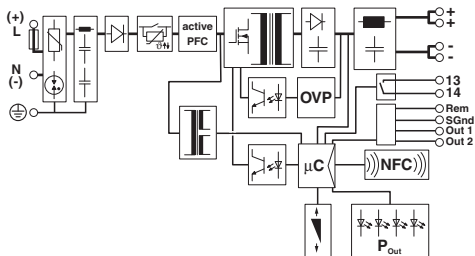
Technical data

Standards and Regulations

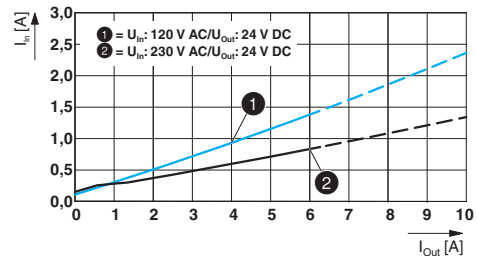
	EN 61000-4-18
Standard - Safety of transformers	EN 61558-2-16 (air clearances and creepage distances only)
Standard - Electrical safety	IEC 60950-1/VDE 0805 (SELV)
Standard - power supply devices for low voltage with DC output	EN 61204-3
Standard – Electronic equipment for use in electrical power installations and their assembly into electrical power installations	EN 50178/VDE 0160 (PELV)
Standard – Safety extra-low voltage	IEC 60950-1 (SELV)
	EN 60204-1 (PELV)
Standard - Safe isolation	DIN VDE 0100-410
Standard – Limitation of mains harmonic currents	EN 61000-3-2
Shipbuilding approval	DNV GL, PRS, BV, LR, ABS
UL approvals	UL Listed UL 508
	UL/C-UL Recognized UL 60950
	UL ANSI/ISA-12.12.01 Class I, Division 2, Groups A, B, C, D (Hazardous Location)
Vibration (operation)	5 Hz - 100 Hz resonance search 2.3g, 90 min., resonance frequency 2.3g, 90 min. (according to DNV GL Class C)
Low Voltage Directive	Conformance with Low Voltage Directive 2014/35/EC
Approval - requirement of the semiconductor industry with regard to mains voltage dips	SEMI F47-0706 Compliance Certificate; EN 61000-4-11
Rail applications	EN 50121-3-2
Overvoltage category (EN 60950-1)	II
Overvoltage category (EN 61010-1)	II
Overvoltage category (EN 62477-1)	III

Drawings

Block diagram



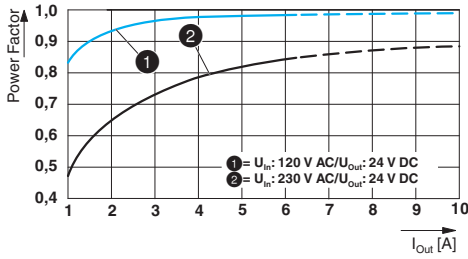
Diagram



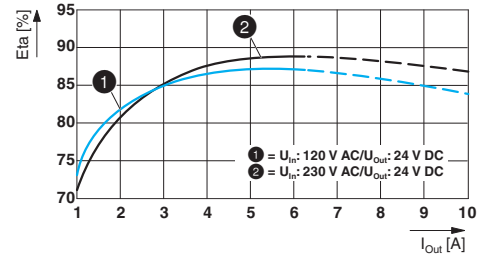
Power supply unit - QUINT4-PS/1AC/24DC/5 - 2904600



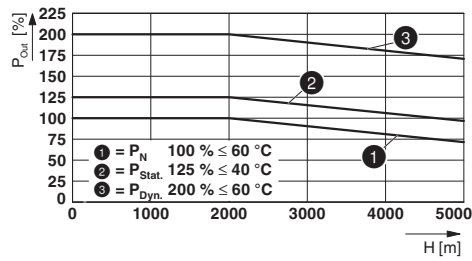
Diagram



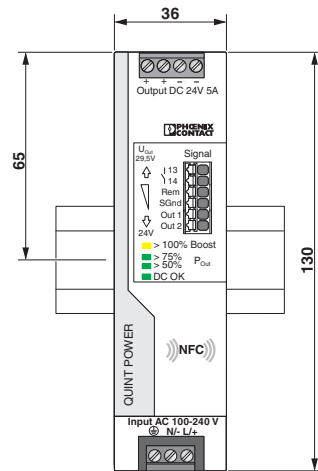
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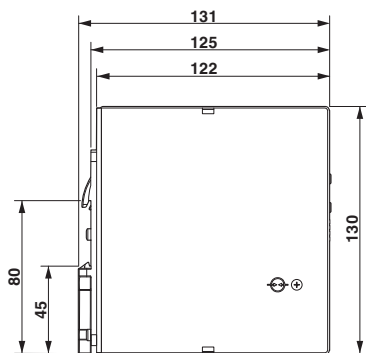
Diagram



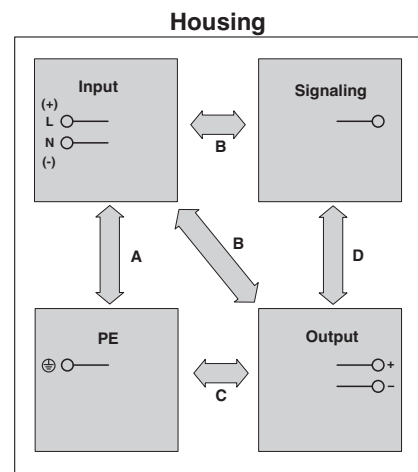
Dimensional drawing



Dimensional drawing



Schematic diagram



Power supply unit - QUINT4-PS/1AC/24DC/5 - 2904600



Classifications

eCl@ss

eCl@ss 5.1	27242213
eCl@ss 6.0	27049005
eCl@ss 8.0	27049002
eCl@ss 9.0	27040701

ETIM

ETIM 5.0	EC002540
ETIM 6.0	EC002540

UNSPSC

UNSPSC 13.2	39121004
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Approvals

Approvals

Approvals

UL Recognized / cUL Recognized / EAC / UL Listed / cUL Listed / DNV GL / PRS / CSA / Bauartgeprüft / cULus Recognized

Ex Approvals

UL Listed / cUL Listed / cULus Listed

Approval details

UL Recognized		http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/index.htm	FILE E 211944
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cUL Recognized		http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/index.htm	FILE E 211944
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EAC			RU C- DE.A*30.B.01082
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Power supply unit - QUINT4-PS/1AC/24DC/5 - 2904600



Approvals

UL Listed		http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/index.htm	FILE E 123528
cUL Listed		http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/index.htm	FILE E 123528
DNV GL		http://exchange.dnv.com/tari/	TAA00000BV
PRS		http://www.prs.pl/	TE/2104/880590/16
CSA		http://www.csagroup.org/services/testing-and-certification/certified-product-listing/	70076170
Bauartgeprüft			SI-SIQ BG 005/038
cULus Recognized		http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/index.htm	

Accessories

Accessories

Assembly adapter

Assembly adapters - UWA 182/52 - 2938235



Universal wall adapter for securely mounting the power supply in the event of strong vibrations. The power supply is screwed directly onto the mounting surface. The universal wall adapter is attached at the top/bottom.

Power supply unit - QUINT4-PS/1AC/24DC/5 - 2904600



Accessories

Assembly adapters - UWA 130 - 2901664



2-piece universal wall adapter for securely mounting the power supply in the event of strong vibrations. The profiles that are screwed onto the side of the power supply are screwed directly onto the mounting surface. The universal wall adapter is attached on the left/right.

Assembly adapters - QUINT-PS-ADAPTERS7/1 - 2938196



Assembly adapter for QUINT-PS... power supply on S7-300 rail

Device protection

Type 3 surge protection device - PLT-SEC-T3-230-FM - 2905229



Pluggable device protection, according to type 3/class III, for 1-phase power supply networks with separate N and PE (3-conductor system: L1, N, PE), with integrated surge-proof fuse and remote indication contact. Also suitable for DC applications.

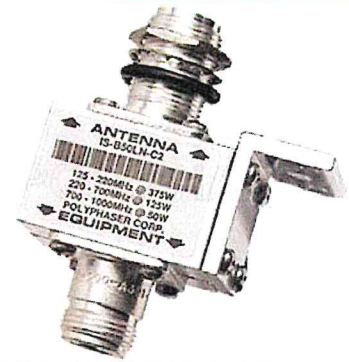
Programming adapter

Programming adapter - TWN4 MIFARE NFC USB ADAPTER - 2909681



Near Field Communication (NFC) programming adapter with USB interface for the wireless configuration of NFC-capable products from PHOENIX CONTACT with software. No separate USB driver is required.

Type N F/F Bulkhead Coaxial RF Surge Protector, 10MHz - 1GHz,
DC Block, 1.5kW, 3.5mJ, 20kA, Blocking Cap, Hole Mount



IS-B50LN-C2

Features

- Surge current of 20kA
- Max Power 1.5KW
- Frequency range from 10 MHz to 1000 MHz
- N Female to N Female connectors
- VSWR <1.1:1
- Multi-strike capability
- CE & RoHS compliant

Applications

- HF, UHF and VHF radios
- Ham radios
- Remote industrial monitoring

Description

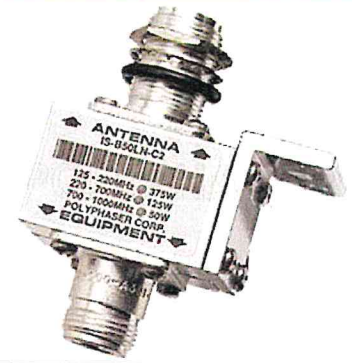
RF surge protector (also known as lightning arrester or surge arrester) IS-B50LN-C2 from PolyPhaser, integrating a RF blocking capacitor with a gas tube (GT or GDT). This RF surge protector component is manufactured in a coaxial in-line design with wide operating frequency range. All PolyPhaser RF surge protector products are available in stock with same day shipping.

Electrical Specifications

Description	Surge Protector Type DC Handling		Blocking Cap and Gas Tube DC Block	
	Minimum	Typical	Maximum	Units
Frequency Range	10		1,000	MHz
Impedance		50		Ohms
VSWR			1.1:1	
Insertion Loss			0.1	dB
Input Power, CW			1.5	kWatts
1.5kW @ 10 to 50MHz				
375W @ 50 to 220MHz				
125W @ 220 to 700MHz				
50W @ 700 to 1000MHz				
Surge Current			20	kA
IEC 61000-4-5 8/20µs WAVEFORM MULTIPLE				
Turn On Voltage		600 ±20%		Volts
Throughput Energy			3.5	mJ
@ 3kA 8/20µs WAVEFORM				

Click the following link (or enter part number in "SEARCH" on website) to obtain additional part information including price, inventory and certifications:
Type N F/F Bulkhead Coaxial RF Surge Protector, 10MHz - 1GHz, DC Block, 1.5kW, 3.5mJ, 20kA, Blocking Cap, Hole Mount IS-B50LN-C2

Type N F/F Bulkhead Coaxial RF Surge Protector, 10MHz - 1GHz,
DC Block, 1.5kW, 3.5mJ, 20kA, Blocking Cap, Hole Mount



IS-B50LN-C2

Mechanical Specifications

Size

Length	2.72 in [69.09 mm]
Width/Diameter	1 in [25.4 mm]
Height	2.25 in [57.15 mm]
Weight	0.35 lbs [158.76 g]

Configuration

Input Connector	N Female
Output Connector	N Female

Environmental Specifications

Temperature

Operating Range	-50 to +50 deg C
Storage Range	-55 to +85 deg C

Ingress Protection (IP) Rating	None
Vibration	1G up to 100Hz

Compliance Certifications

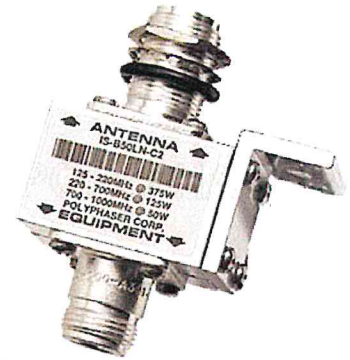
RoHS
CE

Plotted and Other Data

Notes:

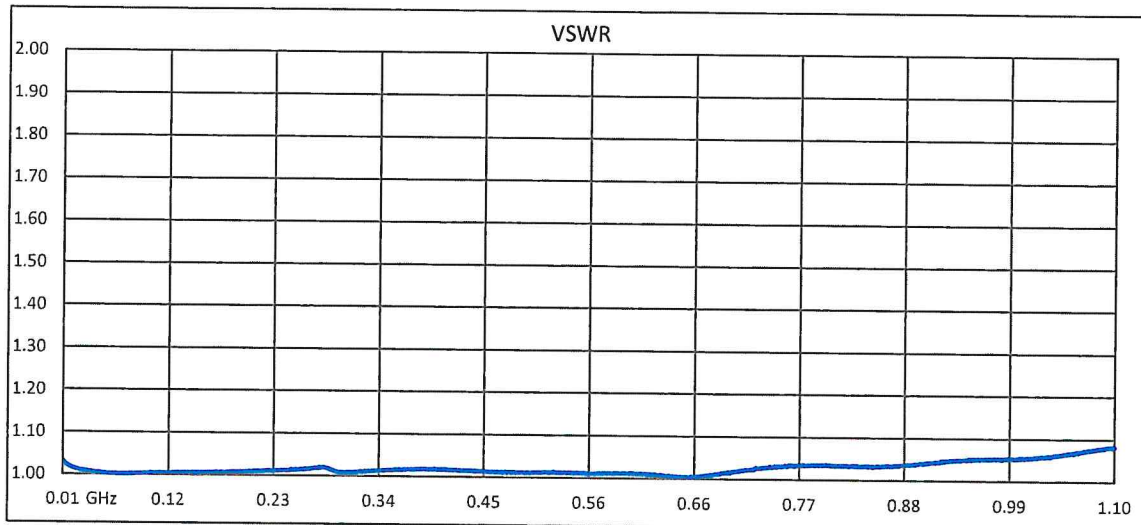
Click the following link (or enter part number in "SEARCH" on website) to obtain additional part information including price, inventory and certifications:
Type N F/F Bulkhead Coaxial RF Surge Protector, 10MHz - 1GHz, DC Block, 1.5kW, 3.5mJ, 20kA, Blocking Cap, Hole Mount IS-B50LN-C2

Type N F/F Bulkhead Coaxial RF Surge Protector, 10MHz - 1GHz,
DC Block, 1.5kW, 3.5mJ, 20kA, Blocking Cap, Hole Mount



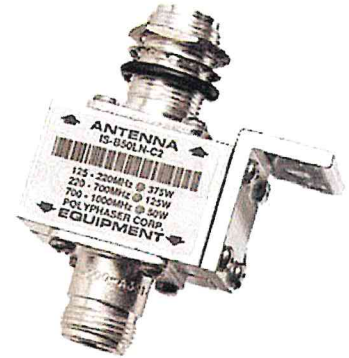
IS-B50LN-C2

Typical Performance Data

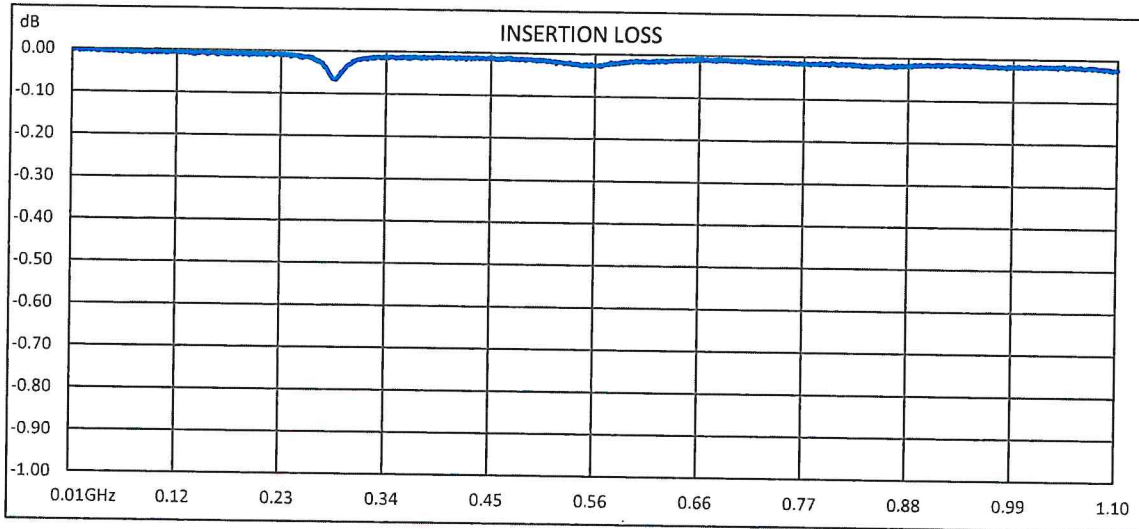


Click the following link (or enter part number in "SEARCH" on website) to obtain additional part information including price, inventory and certifications:
Type N F/F Bulkhead Coaxial RF Surge Protector, 10MHz - 1GHz, DC Block, 1.5kW, 3.5mJ, 20kA, Blocking Cap, Hole Mount IS-B50LN-C2

Type N F/F Bulkhead Coaxial RF Surge Protector, 10MHz - 1GHz,
DC Block, 1.5kW, 3.5mJ, 20kA, Blocking Cap, Hole Mount



IS-B50LN-C2



PolyPhaser protects and increases the reliability of global RF communications networks, including transportation, telecommunications, defense, security and industrial applications, with superior RF surge protection technologies including DC Block, DC Pass and Ultra Low PIM. Backed by responsive service and expert technical support PolyPhaser continually expands its product offering and services to serve engineers' urgent needs for RF components in mission critical communication networks.

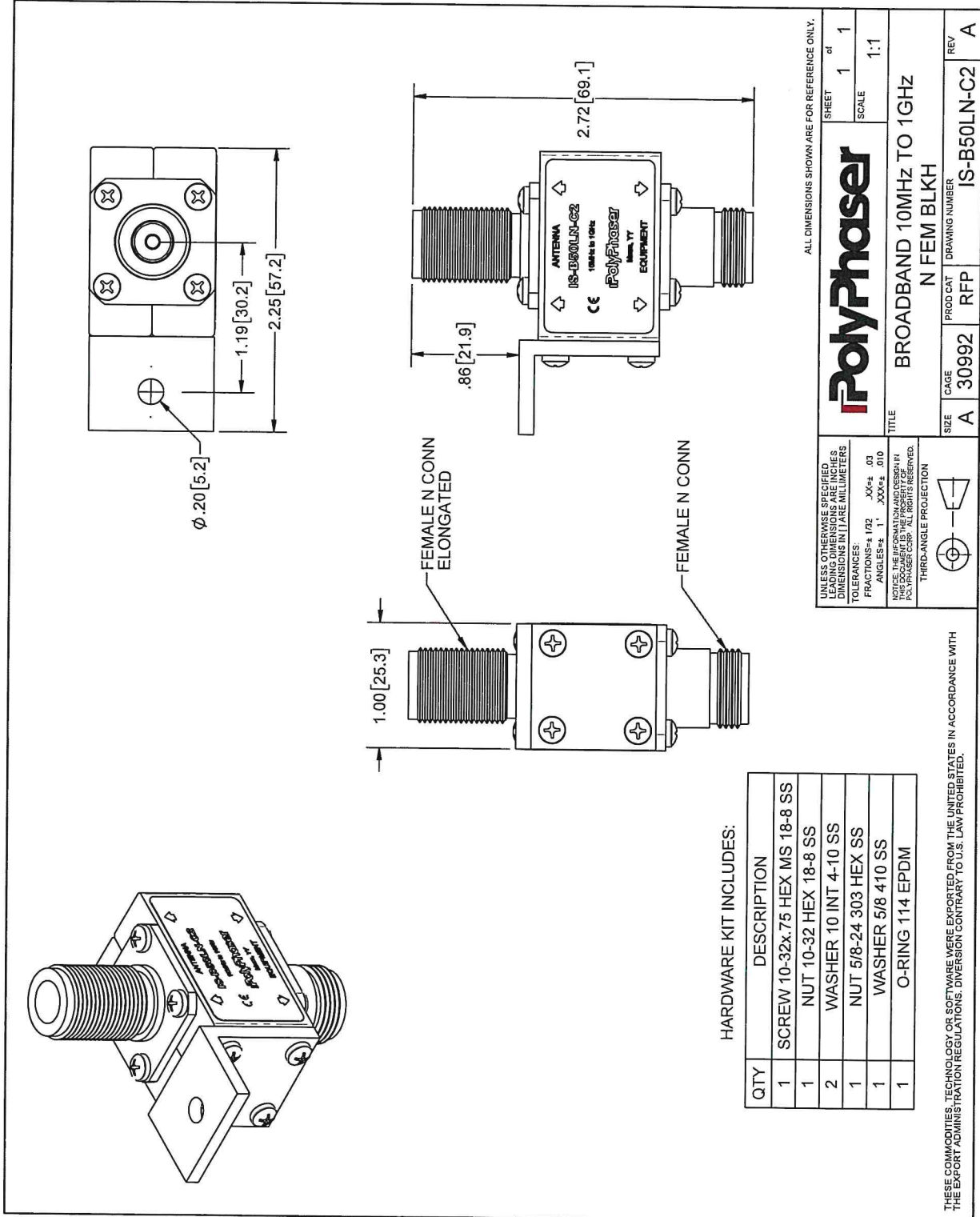
Click the following link (or enter part number in "SEARCH" on website) to obtain additional part information including price, inventory and certifications: [Type N F/F Bulkhead Coaxial RF Surge Protector, 10MHz - 1GHz, DC Block, 1.5kW, 3.5mJ, 20kA, Blocking Cap, Hole Mount IS-B50LN-C2](https://www.polyphaser.com/type-n-surge-protector-1ghz-blocking-cap-gas-tube-is-b50ln-c2-p.aspx)

URL: <https://www.polyphaser.com/type-n-surge-protector-1ghz-blocking-cap-gas-tube-is-b50ln-c2-p.aspx>

The information contained in this document is accurate to the best of our knowledge and representative of the part described herein. It may be necessary to make modifications to the part and/or the documentation of the part, in order to implement improvements. PolyPhaser reserves the right to make such changes as required. Unless otherwise stated, all specifications are nominal. PolyPhaser does not make any representation or warranty regarding the suitability of the part described herein for any particular purpose, and PolyPhaser does not assume any liability arising out of the use of any part or documentation.

Type N F/F Bulkhead Coaxial RF Surge Protector, 10MHz - 1GHz, DC Block, 1.5kW, 3.5mJ, 20kA, Blocking Cap, Hole Mount

IS-B50LN-C2 CAD Drawing





Private market spectrum
220, 700, and 900 MHz

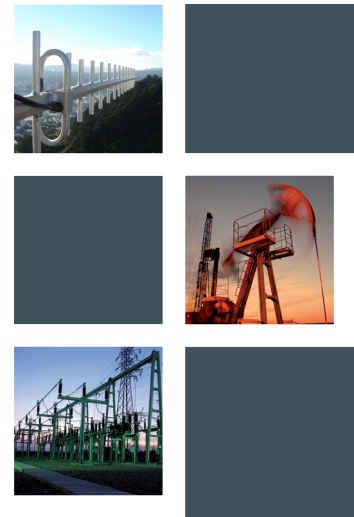
Aprisa SR+

SMART, SECURE POINT-TO-MULTIPOINT RADIO



Smart, secure, industry-leading speed licensed point-to-multipoint SCADA communications for industrial monitoring and control for the electricity, water, oil and gas industries

- **High capacity:** to meet the growing number of data-intensive applications in the SCADA environment, the Aprisa SR+ provides data rates of up to 400 kbit/s half duplex / 800 kbit/s full duplex in 100 kHz licensed channels.
- **Secure:** with its defense in depth approach, including AES encryption, authentication, address filtering and user access control including RADIUS, the Aprisa SR+ protects against vulnerabilities and malicious attacks.
- **Future-proof:** the Aprisa SR+ supports dual serial and dual Ethernet ports in a single, compact form factor, designed to cryptographically secure legacy serial, protect existing device investment, and enable new applications. Old and new application protocols can be run side by side.
- **Advanced L2 / L3 capabilities:** selectable L2 bridge, L3 router, or advanced gateway router combination L2/L3 modes with VLAN, QoS, NAT, and filtering attributes to maximize capacity in constrained bandwidth and prioritize mission critical traffic while meeting tough security and IP network policy imperatives.
- **Adaptable:** the Aprisa SR+ integrates into a range of network topologies, with each unit configurable as a master station, repeater or remote station; connect multiple RTUs / PLCs to a single radio.
- **Flexible interfaces:** the data interfaces can be configured for serial or Ethernet operation; a range of options are supported, including two serial and two Ethernet, one serial and three Ethernet, or four Ethernet ports. Support for NMEA GPS receiver option.
- **Link efficiency:** Adaptive Coding and Modulation (ACM) and forward error correction maintains the integrity of the wireless connection while an effective channel access scheme and IP routing ensures efficient transfer of data across the Aprisa SR+ network. Advanced payload and Ethernet / IP / TCP / UDP header compression.
- **Reliable and robust:** the Aprisa SR+ requires no manual component tuning and maintains its performance over a wide temperature range using full specification industrially rated components and shared Aprisa family heritage.
- **Easily managed:** an easy to use GUI supports local element management via HTTPS and remote element management over the air and SNMP support allows network-wide monitoring and control via a variety of supported third party network management systems.



The Aprisa SR+ in brief

- ~~133-173, 213-240, 400-520, 757-759 and 767-790, 836-862 and 928-960 MHz~~
- RS-232 and IEEE 802.3 with multiple port options
- Software selectable 12.5 kHz, 15 kHz, 25 kHz, 30 kHz, 50 kHz, and 100 kHz channel sizes (frequency band dependent)
- Full and half duplex operation, single or dual frequency
- Data rates of up to 400 kbit/s half duplex / 800 kbit/s full duplex
- 256, 192 or 128 bit AES encryption
- AES-CCM to NIST SP 800-38C
- Adaptive Coding and Modulation: QPSK to 64 QAM
- Advanced forward error correction
- Ethernet and IP / TCP / UDP header compression (ROHC) and payload compression
- Software selectable dual / single antenna port operation
- Transparent to all common SCADA protocols
- Dedicated alarm port and optional GPS for radio coordinates
- Protected station and remote station options
- Power optimized option
- Layer 2 bridge (VLAN aware), layer 3 router, and advanced gateway router combination L2/L3 modes
- VLAN tagging and Q-in-Q
- Flexible QoS priority enforcement – by port or traffic type, VLAN, PCP/DSCP, rule including SMAC/DMAC, IP address and IP protocol, and EtherType
- L2 / L3 / L4 filtering
- IEEE 1613 and IEC 61850-3 substation protection
- 30 kV ESD antenna protection
- Class 1, Division 2 for hazardous protection
- -40 to +70 °C operational temperature without fans
- 210 mm (W) x 130 mm (D) x 41.5 mm (H)
- FCC and IC standards compliant

Aprisa SR+ applications

- Electricity grid: distribution automation control and protection in MV / HV distribution / transmission
- Smart grid, DA, DFA, DER, cap bank control
- Oil & Gas: production metering, lift pump automation
- AMI / AMR: high density data concentrator backhaul
- Renewables: wind farm, tidal, hydro automation
- Water and wastewater: flow, level, pressure modulation automation and pump status

SYSTEM SPECIFICATION

GENERAL			
NETWORK TOPOLOGY	Point-to-multipoint (PMP), Master, Remote, Repeater		
NETWORK INTEGRATION	Serial and Ethernet (router or bridge mode)		
PROTOCOLS			
ETHERNET	IEEE 802.3, 802.1d/q/p		
SERIAL	Legacy RS-232 transport		
WIRELESS	Proprietary		
SCADA	Transparent to all common SCADA protocols such as Modbus, IEC 60870-5-101/104, DNP3 or similar		
RADIO			
FREQUENCY RANGE	FREQ BAND	TUNING RANGE	TUNE STEP
	135 MHz	135 – 175 MHz	0.625 kHz
	220 MHz	215 – 240 MHz	0.625 kHz
	400 MHz	400 – 470 MHz	6.25 kHz
	(Note 4) 450 MHz	450 – 520 MHz	6.25 kHz
	(Note 4) 700 MHz	757 – 758 & 787 – 788 MHz	6.25 kHz
	(Note 5) 896 MHz	896 – 902 MHz	6.25 kHz
	(Note 5) 928 MHz	928 – 960 MHz	6.25 kHz
CHANNEL SIZE	12.5 kHz, 15 kHz, 25 kHz, 30 kHz, 50 kHz and 100 kHz software selectable		
DUPLEX	Single frequency half-duplex Dual frequency half-duplex Dual frequency full-duplex		
FREQUENCY STABILITY	± 0.5 ppm		
FREQUENCY AGING	< 1 ppm / annum		
TRANSMITTER			
MAX PEAK ENVELOPE POWER (PEP)	10.0 W (+40 dBm)		
AVERAGE POWER OUTPUT	64 QAM 0.01 – 2.5 W (+10 to +34 dBm, in 1 dB steps) 16 QAM 0.01 – 3.2 W (+10 to +35 dBm, in 1 dB steps) QPSK 0.01 – 5.0 W (+10 to +37 dBm, in 1 dB steps) (Note 2) 4-CPFSK 0.01 – 10.0 W (+10 to +40 dBm, in 1 dB steps)		
ADJACENT CHANNEL POWER	< –60 dBc		
TRANSIENT ADJACENT CHANNEL POWER	< –60 dBc		
SPURIOUS EMISSIONS	< –37 dBm		
ATTACK TIME	< 1.5 ms		
RELEASE TIME	< 0.5 ms		
DATA TURNAROUND TIME	< 2 ms		
EMISSION DESIGNATOR SUFFIX	QPSK G1D, QAM D1D		
RECEIVER			
		12.5 kHz	25 kHz
		50 kHz	100 kHz
SENSITIVITY (BER < 10 ⁻⁵)	max coded	64 QAM	–103 dBm
		–99 dBm	–96 dBm
		–93 dBm	–93 dBm
	max coded	16 QAM	–110 dBm
		–107 dBm	–104 dBm
		–101 dBm	–101 dBm
	max coded	QPSK	–115 dBm
		–112 dBm	–109 dBm
		–106 dBm	–106 dBm
	min coded	4-CPFSK	–113 dBm
		–110 dBm	–107 dBm
		–104 dBm	–104 dBm
ADJACENT CHANNEL SELECTIVITY		> –47 dBm	> –37 dBm
		> –37 dBm	> –37 dBm
	(Note 1)	[> 48 dB]	[> 58 dB]
		[> 58 dB]	[> 58 dB]
CO-CHANNEL REJECTION max coded QPSK	> –10 dB		
CO-CHANNEL REJECTION max coded 64 QAM	> –20 dB		
INTERMODULATION RESPONSE REJECTION	> –35 dBm [> 60 dB Note 1]		
BLOCKING OR DESENSITISATION	> –17 dBm [> 78 dB Note 1]		
SPURIOUS RESPONSE REJECTION	> –32 dBm [> 63 dB Note 1]		
MODEM			
	12.5 kHz (Note 3)	15 kHz	25 kHz
		30 kHz	50 kHz
			100 kHz
GROSS DATA RATE			
BANDS	220, 400, 450, 700, 896, 928	135, 220	220, 400, 450, 700, 896, 928
		135	135, 220, 400, 700, 896, 928
			700, 896, 928
64 QAM	54 kbit/s	60 kbit/s	54 kbit/s
	60 kbit/s	60 kbit/s	96 kbit/s
		120 kbit/s	96 kbit/s
			216 kbit/s
			240 kbit/s
			400 kbit/s
16 QAM	36 kbit/s	40 kbit/s	36 kbit/s
	40 kbit/s	40 kbit/s	64 kbit/s
		80 kbit/s	64 kbit/s
			144 kbit/s
			160 kbit/s
			267 kbit/s
QPSK	18 kbit/s	20 kbit/s	18 kbit/s
	20 kbit/s	20 kbit/s	32 kbit/s
		40 kbit/s	32 kbit/s
			72 kbit/s
			80 kbit/s
			134 kbit/s
4-CPFSK	9.6 kbit/s	9.6 kbit/s	9.6 kbit/s
	9.6 kbit/s	9.6 kbit/s	19.2 kbit/s
		19.2 kbit/s	19.2 kbit/s
			38.4 kbit/s
			38.4 kbit/s
			76.8 kbit/s
OCC BW	10.7 kHz	12.0 kHz	10.7 kHz
	12.0 kHz	12.0 kHz	19.8 kHz
			24.5 kHz
			19.8 kHz
			43.0 kHz
			48.0 kHz
			85.0 kHz
FORWARD ERROR CORRECTION	Variable Reed Solomon plus convolutional code		
ADAPTIVE BURST SUPPORT	Adaptive Coding and Modulation		

SECURITY			
DATA ENCRYPTION	256, 192 or 128 bit AES		
DATA AUTHENTICATION	CCM		
INTERFACES			
ETHERNET	2, 3 or 4 port RJ45 10/100Base-T switch (specified at order)		
SERIAL	2, 1 or 0 port RJ45 RS-232 (specified at order) Additional RS-232 / RS-485 port via USB converter (option)		
MANAGEMENT	1 x USB micro type B (device port) 1 x USB standard type A (host port)		
ANTENNA	2 x TNC 50 ohm female Software selectable single or dual port operation		
ALARM I/O	1 x RJ45 Alarm I/O interface 2 x inputs + 2 x outputs		
LEDs	Status: OK, MODE, AUX, TX, RX Diagnostics: RSSI, traffic port status		
TEST BUTTON	Toggles LEDs between diagnostics / status		
PRODUCT OPTIONS			
DATA PORT CONFIGURATION	2 x Ethernet ports + 2 serial ports 3 x Ethernet ports + 1 serial port 4 x Ethernet ports		
POWER OPTIMIZED	Providing optimized power and sleep mode		
PROTECTED STATION	Providing hot-swappable / hot-standby redundant hardware switching (13.8 VDC or 48 VDC)		
GPS RECEIVER	Support for NMEA GPS receiver with radio coordinates		
POWER			
INPUT VOLTAGE	10 – 30 VDC (13.8 V nominal)		
RECEIVE	All bands		
	< 3 W (217 mA at 13.8 VDC) in active receive state < 2 W (145 mA at 13.8 VDC) in idle receive state < 0.5 W (36 mA at 13.8 VDC) in sleep mode		
TRANSMIT	135 and 220 MHz		
	< 26 W (1884 mA at 13.8 VDC)		
	400, 450, 700, 896, 928 MHz		
	< 28 W (2028 mA at 13.8 VDC)		
MECHANICAL			
DIMENSIONS	Radio		
	210 mm (W) x 130 mm (D) x 41.5 mm (H) 8.27" (W) x 5.12" (D) x 1.63" (H)		
	Protected Station		
	434 mm (W) x 372 mm (D) x 88.9 mm (H) 2 RU 17.1" (W) 14.6" (D) 3.5" (H)		
WEIGHT	1.25 kg (2.81 lbs)		
MOUNTING	Wall, Rack or DIN rail		
ENVIRONMENTAL			
OPERATING TEMPERATURE	–40 to +70 °C (–40 to +158 °F)		
HUMIDITY	Maximum 95 % non-condensing		
MANAGEMENT & DIAGNOSTICS			
LOCAL ELEMENT	SSH and HTTP/S web servers with full control / diagnostics Partial diagnostics via LEDs and test button Software upgrade from PC or USB flash drive		
REMOTE ELEMENT	SSH and HTTP/S over-the-air remote element management with control / diagnostics Network software upgrade over-the-air		
NETWORK	SNMPv2 and SNMPv3 security support for integration with external network management systems		
COMPLIANCE			
RF	FCC CFR47 Part 24 / 27 / 80 / 90 / 95 / 101 IC RSS 119 / RSS 134		
	BAND	FCC ID:	IC:
	135	UIPSQ135M150	6772A-SQ135M150
	220	UIPSQ215M141	6772A-SQ215M141
	400	UIPSQ400M1311	6772A-SQ400M1311
	450	UIPSQ450M140	N/A
	700	UIPSQ757M160	N/A
	896	UIPSQ896M141	6772A-SQ896M141
	928	UIPSQ928M141	6772A-SQ928M141
EMC	FCC CFR47 Part 15, EN 301 489-5, ICES-003		
SAFETY	UL / EN 60950, Class 1 division 2 for hazardous locations		
ENVIRONMENTAL	ETS 300 019 Class 3.4, IEEE 1613 Class 2 IEC 61850-3, Ingress Protection IP51		

Notes:

1. The receiver figures are shown in typical fixed interference dBm values and dB values [in brackets] relative to the sensitivity. Relative values are given for QPSK modulation and max coded FEC. Refer to the Aprisa SR+ User Manual for a complete list of modulation and coding levels.

2. Please consult 4RF for availability.

3. The gross data rate for the 12.5 kHz channel size varies with regulatory compliance.

4. The 450 MHz and 700 MHz bands are only available for FCC.

5. The receive tuning range is specified. The transmit tuning range is 896 - 960 MHz.

ABOUT 4RF

Operating in more than 140 countries, 4RF provides radio communications equipment for critical infrastructure applications. Customers include utilities, oil and gas companies, transport companies, telecommunications operators, international aid organisations, public safety, military and security organisations. 4RF point-to-point and point-to-multipoint products are optimized for performance in harsh climates and difficult terrain, supporting IP, legacy analogue, serial data applications.

Made in USA from local and imported parts.

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For more information please contact
EMAIL sales@4rf.com
URL www.4rf.com

Version 2.3.1

Product data sheet

Characteristics

BE850M2

APC Back-UPS BE850M2, 850VA, 2 USB charging ports, 120V



Overview

Model Name	APC Back-UPS BE850M2, 850VA, 2 USB charging ports, 120V
Includes	USB cable , User Manual
Standard Lead Time	Usually in Stock
Product Distribution	Anguilla , Aruba , Bahamas , Barbados , Belize , Bermuda , Canada , Cayman Islands , Colombia , Dominican Republic , Falkland Islands (Malvinas) , Guyana , Haiti , Jamaica , Netherlands Antilles , Puerto Rico , Trinidad And Tobago , United States , VIRGIN ISLANDS (UNITED STATES)

Output

Output Power Capacity	450 Watts / 850 VA
Max Configurable Power (Watts)	450 Watts / 850 VA
Nominal Output Voltage	120V
Output Frequency (sync to mains)	50/60Hz +/- 3 Hz
Output Frequency (sync to mains)	Standby
Waveform Type	Stepped approximation to a sinewave
Output Connections	(3) NEMA 5-15R (Surge Protection) , (6) NEMA 5-15R (Battery Backup)

Input

Nominal Input Voltage	120V
Input Frequency	50/60 Hz +/- 3 Hz (auto sensing)
Input Connections	NEMA 5-15P
Cord Length	1.52 meters
Input voltage range for main operations	92 - 139 V
Maximum Input Current	0 A
Input Breaker Capacity	0 A

Batteries & Runtime

Battery Type	Maintenance-free sealed Lead-Acid battery with suspended electrolyte : leakproof
Included Battery Modules	0
Battery Slots Empty	0
Typical recharge time	8 hour(s)

Replacement Battery	RBC17
RBC Quantity	0

Communications & Management

Interface Port(s)	USB
Available SmartSlot™ Interface Quantity	0
Control panel	LED status display with On Line : On Battery : Replace Battery and Building Wiring Fault
Audible Alarm	Alarm when on battery : distinctive low battery alarm : overload continuous tone alarm

Surge Protection and Filtering

Surge energy rating	354 Joules
---------------------	------------

Physical

Maximum Height	139.0 mm
Maximum Width	327.0 mm
Maximum Depth	105.0 mm
Rack Height	0 U
Net Weight	4.1 kg
Shipping Weight	4.41 kg
Shipping Height	196.0 mm
Shipping Width	416.0 mm
Shipping Depth	168.0 mm
Master Carton Units	2.0
Master Carton Weight	9.81 kg
Color	Black
SCC Codes	1073130432526 7
Units per Pallet	80.0
# of Layers per Pallet	5
# of Units per Layer per Pallet	16
Pallet Weight	414.0 kg

Environmental

Operating Environment	0 - 40 °C
Operating Relative Humidity	0 - 95% non-condensing %
Operating Elevation	0-3000 meters
Storage Temperature	-15 - 45 °C
Storage Relative Humidity	10 - 90 %
Storage Elevation	0-15000 meters
Audible noise at 1 meter from surface of unit	45.000 dB

Conformance

Approvals	California (CEC) Battery Charger , ENERGY STAR V1.0 (USA)
Standard warranty	3 years repair or replace
Equipment protection policy	Lifetime : \$75000

IEC Terminal Block Accessories

Screw Type Center Jumpers, Jumper Links, and Jumper Covers



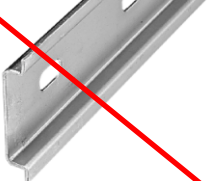
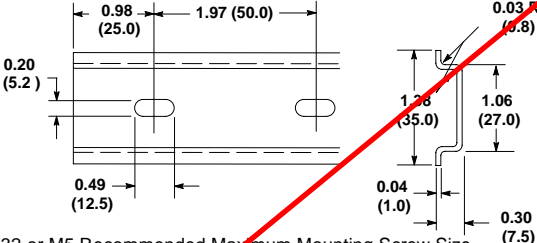
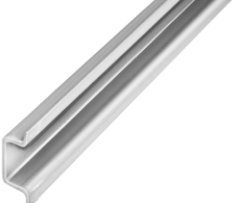
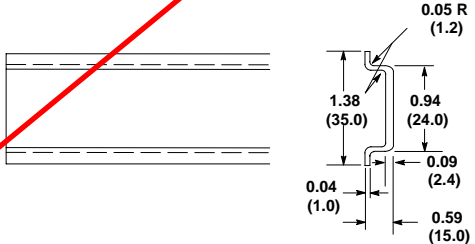

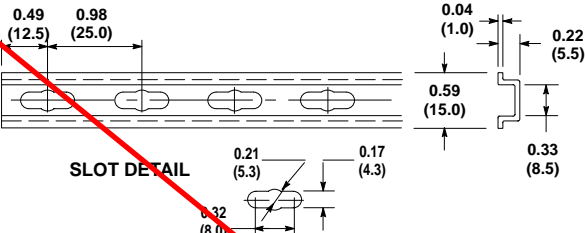
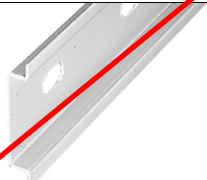
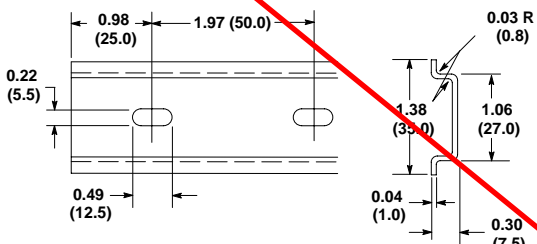
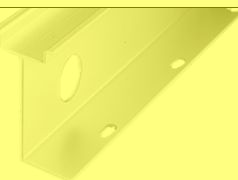
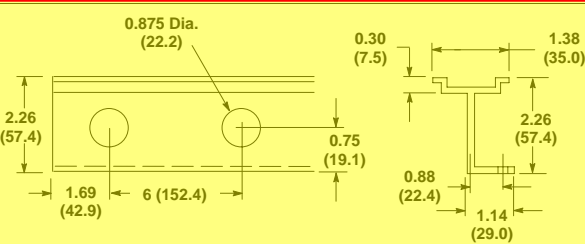
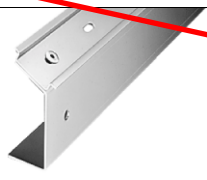
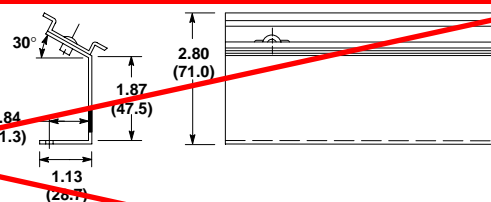
Used On	Cat. No.	Pcs/Pkg
1492-J3, JD3..., JDG3..., J2Q, J3TW, J3F, JD3F	1492-CJJ5-2	50
	1492-CJJ5-3	50
	1492-CJJ5-4	50
	1492-CJJ5-10	20
1492-J4, J4M	1492-CJJ6-2	50
	1492-CJJ6-3	50
	1492-CJJ6-4	50
	1492-CJJ6-10	20
1492-J6	1492-CJJ8-2	50
	1492-CJJ8-3	50
	1492-CJJ8-4	50
	1492-CJJ8-10	20
1492-J10	1492-CJJ10-2	50
	1492-CJJ10-3	50
	1492-CJJ10-4	50
	1492-CJJ10-10	20
1492-J16	1492-CJJ12-2	20
	1492-CJJ12-3	20
	1492-CJJ12-4	20
1492-J35	1492-CJJ12-10	10
	1492-CJJ16-2	20
	1492-CJJ16-3	20
	1492-CJJ16-4	20
1492-J50	1492-CJJ16-10	10
	1492-CJJ18-2	10
	1492-CJJ18-3	10
1492-J70	1492-CJJ18-4	10
	1492-CJJ20-2	5
	1492-CJJ20-3	5
	1492-CJJ20-4	5
1492-WM3	1492-CJM5-2	10
	1492-CJM5-3	10
	1492-CJM5-4	10
	1492-CJM5-5	10
	1492-CJM5-10	10
1492-W3, WM3, WR3, WTF3..., WTS3...	1492-CJL5 (Link)	10
1492-WR3	1492-CJD5-50	5
	1492-CJD5-2	10
	1492-CJD5-3	10
	1492-CJD5-4	10
	1492-CJD5-5	10
	1492-CJD5-10	10

Note: Notching out one or more jumper poles, with the notched jumpers going across different potentials, will require de-rating to 400V.

Used On	Cat. No.	Pcs/Pkg
1492-WM4	1492-CJD6-50	5
	1492-CJD6-2	10
	1492-CJD6-3	10
	1492-CJD6-4	10
	1492-CJD6-5	10
	1492-CJD6-10	10
1492-WM4, W4TW	1492-CJLD6 (Link)	10
1492-W3	1492-CJ5-2	10
	1492-CJ5-3	10
	1492-CJ5-10	10
	1492-CJCW5 (CJ Cover)*	20
1492-WTF3..., WTS3...	1492-CJT5-50	5
	1492-CJT5-2	10
	1492-CJT5-3	10
	1492-CJT5-4	10
	1492-CJT5-5	10
	1492-CJT5-10	10
1492-W4, W4TW	1492-CJ6-50	5
	1492-CJ6-2	10
	1492-CJ6-3	10
	1492-CJ6-4	10
	1492-CJ6-5	10
	1492-CJ6-10	10
1492-W4	1492-CJL6 (Link)	10
1492-W4, W6, W10	1492-CJCW6 (CJ Cover)*	20
1492-W6	1492-CJ7-40	5
	1492-CJ7-2	10
	1492-CJ7-3	10
	1492-CJ7-4	10
	1492-CJ7-5	10
	1492-CJ7-10	10
1492-W6	1492-CJL7 (Link)	10
1492-W10	1492-CJ8-40	5
	1492-CJ8-2	10
	1492-CJ8-3	10
	1492-CJ8-4	10
	1492-CJ8-5	10
	1492-CJ8-10	10
1492-W10	1492-CJL8 (Link)	10
1492-W16S	1492-CJS11-2	10
	1492-CJS11-3	10
	1492-CJS11-4	10
	1492-CJS11-5	10
	1492-CJS11-10	10

* May only be used as a marking surface. May not be installed over center jumper.

DIN Mounting Rails

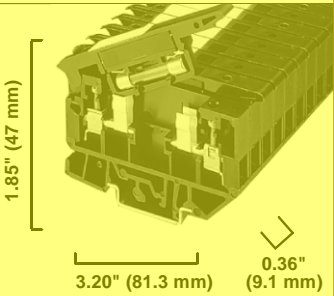
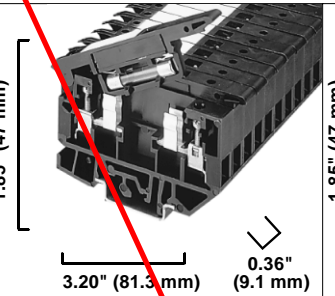
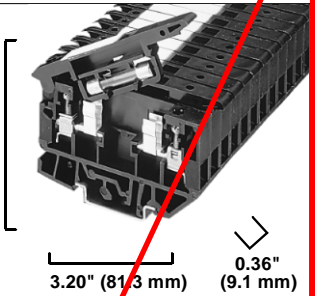



Item	Description	Pcs./Pkg.	Dimensions ①
<p>199-DR1</p> 	<p>Symmetrical Rail 35 mm x 7.5 mm 3.28' (1 m) long Zinc-Plated, Yellow Chromated Steel EN50022</p> <p>DIN #3</p>	<p>10</p>	 <p>#10-32 or M5 Recommended Maximum Mounting Screw Size</p>
<p>199-DR4</p> 	<p>Heavy Duty Symmetrical Rail 35 mm x 15 mm 3.28' (1 m) long Zinc-Plated, Yellow Chromated Steel EN50022</p> <p>DIN #3</p>	<p>5</p>	
<p>1492-DR3</p> 	<p>Mini 15 mm x 5.5 mm Rail 3.28' (1 m) long Zinc-Plated, Yellow Chromated Steel EN50045</p> <p>DIN #2</p>	<p>5</p>	 <p>SLOT DETAIL</p> <p>#8-32 or M4 Recommended Maximum Mounting Screw Size</p>
<p>1492-DR5</p> 	<p>Symmetrical Rail 35 mm x 7.5 mm 3.28' (1 m) long Copper-Free Aluminum EN50022</p> <p>For 1492 Terminal Blocks Only</p> <p>DIN #3</p>	<p>10</p>	 <p>#12-24 or M5 Recommended Maximum Mounting Screw Size</p>
<p>1492-DR6 ②</p> 	<p>Symmetrical Rail 35 mm x 7.5 mm 2.26" (57.4 mm) high 3.28' (1 m) long Copper-Free Aluminum</p> <p>For 1492 Terminal Blocks Only</p> <p>DIN #3</p>	<p>2</p>	 <p>Wire insulator plug for wire access through rail — use Heyco</p>
<p>1492-DR7 ②</p> 	<p>Symmetrical Rail 35 mm x 7.5 mm 2.80" (71.0 mm) high 3.28' (1 m) long Angled 30° Zinc-Plated, Chromated Steel</p> <p>DIN #3</p>	<p>2</p>	 <p>For mounting rail details, see Cat. No. 199-DR1</p>

① Dimensions shown in inches (millimeters). Dimensions are not intended to be used for manufacturing purposes.
 ② 0.218" (5.5 mm) x 0.50" (12.7 mm) slotted mounting holes every 3" (76.2 mm) starting 1.69" (42.9 mm) from end.

For Screw Type Products



Dimensions Width x Length x Height	Used With	Color	Cat. No.	Pcs/Pkg
0.06 x 1.31 x 2.36 in (1.5 x 33.35 x 60 mm)	1492-J3, J4, J6, J10, J2Q, J3TW, J4M, J3F, JG2Q, JG3, JG3TW, JKD3, JKD3TP, J3P, J3PTP, JTC3...	Gray	1492-EBJ3	50
		Blue	1492-EBJ3-B	50
		Yellow	1492-EBJ3-Y	50
0.06 x 1.93 x 2.36 in (1.5 x 49 x 60 mm)	1492-J16, J35	Gray	1492-EBJ16	20
		Blue	1492-EBJ16-B	20
		Yellow	1492-EBJ16-Y	20
0.06 x 2.15 x 2.72 in (1.5 x 54.5 x 69 mm)	1492-JD3, JD3C, JD3F, JD3DF, JD3DR, JD3RB..., JD3RC001, JD3SS	Gray	1492-EBJD3	20
		Blue	1492-EBJD3-B	20
		Yellow	1492-EBJD3-Y	20
0.06 x 1.31 x 2.36 in (1.5 x 33.35 x 60 mm)	1492-JPO	Gray	1492-EBJO	20
0.10 x 1.45 x 1.77 in (2.5 x 36.7 x 45 mm)	1492-JC3	Gray	1492-BKJC3	10 Start Barriers / 10 End Barriers
0.10 x 1.78 x 2.28 in (2.5 x 45.2 x 58 mm)	1492-JDC3	Gray	1492-BKJDC3	10 Start Barriers / 10 End Barriers
0.06 x 3.15 x 2.31 in (1.5 x 80.2 x 58.8 mm)	1492-JD3P, JD3PTP, JD3PSS, JD3PSSTP, JDG3P, JDG3PTP, JDG3PSS, JDG3PSSTP	Gray	1492-EBJD3P	20
0.06 x 1.10 x 0.97 in (1.5 x 28 x 24.6 mm)	1492-WM3	Gray	1492-EBM3	50
0.06 x 1.22 x 1.09 in (1.5 x 31 x 27.7 mm)	1492-WM4	Gray	1492-EBM4	50
0.06 x 1.65 x 1.32 in (1.5 x 42 x 33.5 mm)	1492-WMD1	Gray	1492-EBMD1	50
0.06 x 1.46 x 1.38 in (1.5 x 37 x 35 mm)	1492-W3, W4, WG4	Gray	1492-EB3	50
		Yellow	1492-EB3-Y	50
0.06 x 1.77 x 1.61 in (1.5 x 45 x 41 mm)	1492-W6, W10, W16S, WG6, WG10S, WG16S	Gray	1492-EB10	50
		Yellow	1492-EB10-Y	50
0.06 x 1.65 x 2.19 in (1.5 x 42 x 55.5 mm)	1492-WR3	Gray	1492-EBR3	50
0.06 x 1.79 x 1.64 in (1.5 x 45.4 x 41.6 mm)	1492-W4TW	Gray	1492-EB3TW	50
0.06 x 3.51 x 1.74 in (1.5 x 89.1 x 44.1 mm)	1492-WTF3...	Gray	1492-EBTF3	50
0.06 x 2.61 x 1.74 in (1.5 x 66.2 x 44.1 mm)	1492-WTS3...	Gray	1492-EBTS3	50
0.11 x 2.81 x 1.96 in (2.8 x 71.4 x 49.8 mm)	1492-H4, H5, H6, H7	Black	1492-N37	50

	1492-H4			1492-H5			1492-H6		
Dimensions are not intended to be used for manufacturing purposes. Note: Height dimension is measured from top of rail to top of terminal block.	 1.85" (47 mm) 3.20" (81.3 mm) 0.36" (9.1 mm)			 1.85" (47 mm) 3.20" (81.3 mm) 0.36" (9.1 mm)			 1.85" (47 mm) 3.20" (81.3 mm) 0.36" (9.1 mm)		
Specifications	Single-circuit fusible terminal block with neon blown fuse indicator.			Single-circuit fusible terminal block with LED blown fuse indicator.			Single-circuit fusible terminal block without a blown fuse indicator.		
Approvals		CSA	IEC		CSA	IEC		CSA	IEC
Voltage Rating	300V AC/DC	300V AC/DC	500V AC/DC	300V AC/DC	300V AC/DC	500V AC/DC	300V AC/DC	300V AC/DC	500V AC/DC
Maximum Current	12 A	12 A	12 A	12 A	12 A	12 A	12 A	12 A	12 A
Wire Range (Rated Cross Section)	#30... #12 AWG	#30... #12 AWG	0.05... 4 mm ²	#30... #12 AWG	#30... #12 AWG	0.05... 4 mm ²	#30... #12 AWG	#30... #12 AWG	0.05... 4 mm ²
Indicator Type	Neon			LED			Non-Indicating		
Leakage Current	2 mA @ 300V			2 mA @ 24V			—		
Working Voltage	100...300V AC			10...57V AC/DC			Per Fuse Rating		
Fuse Size (Not Supplied)	1/4" x 1-1/4"			1/4" x 1-1/4"			1/4" x 1-1/4"		
Wire Strip Length	0.38" (9.7 mm)			0.38" (9.7 mm)			0.38" (9.7 mm)		
Recommended Tightening Torque	3...7 lb-in. (0.3...0.8 Nm)			3...7 lb-in. (0.3...0.8 Nm)			3...7 lb-in. (0.3...0.8 Nm)		
Density	33 pcs./ft (109/m)			33 pcs./ft (109/m)			33 pcs./ft (109/m)		
Insulation Temperature Range	-40...+221°F (-40...+105°C)			-40...+221°F (-40...+105°C)			-40...+221°F (-40...+105°C)		
Terminal Blocks	Cat. No.	Pcs./Pkg.		Cat. No.	Pcs./Pkg.		Cat. No.	Pcs./Pkg.	
Terminal Block	1492-H4	25		1492-H5	25		1492-H6	25	
Accessories (page 12-172)	Cat. No.	Pcs./Pkg.		Cat. No.	Pcs./Pkg.		Cat. No.	Pcs./Pkg.	
Mounting Rails:									
1 m Symmetrical DIN (Steel)	199-DR1	10		199-DR1	10		199-DR1	10	
1 m Symmetrical DIN (Aluminum)	1492-DR5	10		1492-DR5	10		1492-DR5	10	
1 m Hi-Rise Sym. DIN (Aluminum)	1492-DR6	2		1492-DR6	2		1492-DR6	2	
1 m Angled Hi-Rise Sym. DIN (Steel)	1492-DR7	2		1492-DR7	2		1492-DR7	2	
End Barrier	1492-N37	50		1492-N37	50		1492-N37	50	
End Anchors:									
DIN Rail — Normal Duty	1492-EA35	50		1492-EA35	50		1492-EA35	50	
DIN Rail — Heavy Duty	1492-EAH35	10		1492-EAH35	10		1492-EAH35	10	
Jumpers:									
Side Jumper — 10-pole Uninsulated	1492-N49	10		1492-N49	10		1492-N49	10	
Side Jumper — Insulating Sleeve	1492-SJS	10		1492-SJS	10		1492-SJS	10	
Other Accessories:									
Group Marking Carrier	1492-GM35	10		1492-GM35	10		1492-GM35	10	
Marking Systems:									
Snap-in Marker Card	1492-SM8X12	5		1492-SM8X12	5		1492-SM8X12	5	

	1492-H4			1492-H5			1492-H6		
Dimensions are not intended to be used for manufacturing purposes. Note: Height dimension is measured from top of rail to top of terminal block.									
Specifications	Single-circuit fusible terminal block with neon blown fuse indicator.			Single-circuit fusible terminal block with LED blown fuse indicator.			Single-circuit fusible terminal block without a blown fuse indicator.		
Approvals		CSA	IEC		CSA	IEC		CSA	IEC
Voltage Rating	300V AC/DC	300V AC/DC	500V AC/DC	300V AC/DC	300V AC/DC	500V AC/DC	300V AC/DC	300V AC/DC	500V AC/DC
Maximum Current	12 A	12 A	12 A	12 A	12 A	12 A	12 A	12 A	12 A
Wire Range (Rated Cross Section)	#30... #12 AWG	#30... #12 AWG	0.05... 4 mm ²	#30... #12 AWG	#30... #12 AWG	0.05... 4 mm ²	#30... #12 AWG	#30... #12 AWG	0.05... 4 mm ²
Indicator Type	Neon			LED			Non-Indicating		
Leakage Current	2 mA @ 300V			2 mA @ 24V			—		
Working Voltage	100...300V AC			10...57V AC/DC			Per Fuse Rating		
Fuse Size (Not Supplied)	1/4" x 1-1/4"			1/4" x 1-1/4"			1/4" x 1-1/4"		
Wire Strip Length	0.38" (9.7 mm)			0.38" (9.7 mm)			0.38" (9.7 mm)		
Recommended Tightening Torque	3...7 lb-in. (0.3...0.8 Nm)			3...7 lb-in. (0.3...0.8 Nm)			3...7 lb-in. (0.3...0.8 Nm)		
Density	33 pcs./ft (109/m)			33 pcs./ft (109/m)			33 pcs./ft (109/m)		
Insulation Temperature Range	-40...+221°F (-40...+105°C)			-40...+221°F (-40...+105°C)			-40...+221°F (-40...+105°C)		
Terminal Blocks	Cat. No.	Pcs./Pkg.		Cat. No.	Pcs./Pkg.		Cat. No.	Pcs./Pkg.	
Terminal Block	1492-H4	25		1492-H5	25		1492-H6	25	
Accessories (page 12-172)	Cat. No.	Pcs./Pkg.		Cat. No.	Pcs./Pkg.		Cat. No.	Pcs./Pkg.	
Mounting Rails:									
1 m Symmetrical DIN (Steel)	199-DR1	10		199-DR1	10		199-DR1	10	
1 m Symmetrical DIN (Aluminum)	1492-DR5	10		1492-DR5	10		1492-DR5	10	
1 m Hi-Rise Sym. DIN (Aluminum)	1492-DR6	2		1492-DR6	2		1492-DR6	2	
1 m Angled Hi-Rise Sym. DIN (Steel)	1492-DR7	2		1492-DR7	2		1492-DR7	2	
End Barrier	1492-N37	50		1492-N37	50		1492-N37	50	
End Anchors:									
DIN Rail — Normal Duty	1492-EA35	50		1492-EA35	50		1492-EA35	50	
DIN Rail — Heavy Duty	1492-EAH35	10		1492-EAH35	10		1492-EAH35	10	
Jumpers:									
Side Jumper — 10-pole Uninsulated	1492-N49	10		1492-N49	10		1492-N49	10	
Side Jumper — Insulating Sleeve	1492-SJS	10		1492-SJS	10		1492-SJS	10	
Other Accessories:									
Group Marking Carrier	1492-GM35	10		1492-GM35	10		1492-GM35	10	
Marking Systems:									
Snap-in Marker Card	1492-SM8X12	5		1492-SM8X12	5		1492-SM8X12	5	

Screw Connection Terminal Blocks

Standard Feed-Through Blocks

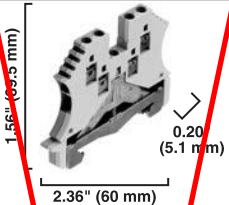
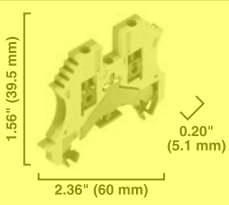
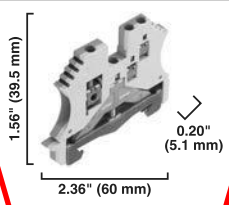
		1492-J3				1492-J4				1492-J6			
Dimensions are not intended to be used for manufacturing purposes. Note: Height dimension is measured from top of rail to top of terminal block.													
Specifications		Feed-through terminal block				Feed-through terminal block				Feed-through terminal block			
Certifications													
Voltage Rating		600V AC/DC		800V AC/DC	550V AC/DC	600V AC/DC		800V AC/DC	690V AC/DC	600V AC/DC	800V AC/DC	55V AC/DC	
Maximum Current		25 A	20 A	24 A	21 A	35 A	25 A	32 A	28 A	50 A	41 A	36 A	
Wire Range (Rated Cross Section)		#28...12 AWG	#26...12 AWG	2.5 mm2	2.5 mm2 (#20...14 AWG)	#22...10 AWG	#22...10 AWG	4 mm2	4 mm2 (#20...12 AWG)	#22...8 AWG	6 mm2	6 mm2 (#20...10 AWG)	
Wire Strip Length		0.39 in. (10 mm)				0.39 in. (10 mm)				0.47 in. (12 mm)			
Recommended Tightening Torque		4.5...7.1 lb•in (0.5...0.8 N•m)				9.0 lb•in (1.0 N•m)				14.2 lb•in (1.6 N•m)			
Density		59 pcs/ft (196 pcs/m)				49 pcs/ft (163 pcs/m)				37 pcs/ft (123 pcs/m)			
Housing Temperature Range		-58...+248 °F (-50...+120 °C)				-58...+248 °F (-50...+120 °C)				-58...+248 °F (-50...+120 °C)			
Short-Circuit Current Rating		See Short-Circuit Current Ratings											
Terminal Blocks		Cat. No.		Pkg Qty.		Cat. No.		Pkg Qty.		Cat. No.		Pkg Qty.	
Color:	Grey	→ 1492-J3		100		1492-J4		100		1492-J6		100	
	Red	1492-J3-RE		100		1492-J4-RE		100		1492-J6-RE		100	
	Blue	1492-J3-B		100		1492-J4-B		100		1492-J6-B		100	
	Black	1492-J3-BL		100		1492-J4-BL		100		1492-J6-BL		100	
	Green	1492-J3-G		100		1492-J4-G		100		1492-J6-G		100	
	Yellow	1492-J3-Y		100		1492-J4-Y		100		1492-J6-Y		100	
	Orange	1492-J3-OR		100		1492-J4-OR		100		1492-J6-OR		100	
	Brown	1492-J3-BR		100		1492-J4-BR		100		1492-J6-BR		100	
	White	1492-J3-W		100		1492-J4-W		100		1492-J6-W		100	
	Violet	1492-J3-V		100		1492-J4-V		100		-		-	
Mounting Rails:		199-DR1		10		199-DR1		10		199-DR1		10	
	1 m Symmetrical DIN (Steel)	1492-DR1		10		1492-DR1		10		1492-DR1		10	
	1 m Symmetrical DIN (Aluminum)	1492-DR5		10		1492-DR5		10		1492-DR5		10	
	1 m Hi-Rise Sym. DIN (Aluminum)	→ 1492-DR6		2		1492-DR6		2		1492-DR6		2	
	1 m Angled Hi-Rise Sym. DIN (Steel)	1492-DR7		2		1492-DR7		2		1492-DR7		2	
End Barriers	Grey	→ 1492-EBJ3		50		1492-EBJ3		50		1492-EBJ3		50	
	Blue	1492-EBJ3-B		50		1492-EBJ3-B		50		1492-EBJ3-B		50	
	Yellow	1492-EBJ3-Y		50		1492-EBJ3-Y		50		1492-EBJ3-Y		50	
End Anchors and Retainers:		→ 1492-EAJ35		100		1492-EAJ35		100		1492-EAJ35		100	
	DIN Rail – Normal Duty	1492-EAJ35		100		1492-EAJ35		100		1492-EAJ35		100	
	DIN Rail – Heavy Duty	1492-EAHJ35		50		1492-EAHJ35		50		1492-EAHJ35		50	
	Screwless End Retainer	→ 1492-ERL35		20		1492-ERL35		20		1492-ERL35		20	
Jumpers:*		→ 1492-CJJ5-10		20		1492-CJJ6-10		20		1492-CJJ8-10		20	
	Screw Center Jumper – 10-pole	1492-CJJ5-10		20		1492-CJJ6-10		20		1492-CJJ8-10		20	
	Screw Center Jumper – 4-pole	1492-CJJ5-4		50		1492-CJJ6-4		50		1492-CJJ8-4		50	
	Screw Center Jumper – 3-pole	1492-CJJ5-3		50		1492-CJJ6-3		50		1492-CJJ8-3		50	
	Screw Center Jumper – 2-pole	1492-CJJ5-2		50		1492-CJJ6-2		50		1492-CJJ8-2		50	
	Plug-in Center Jumper – 50-Pole	1492-CJLJ5-50		10		1492-CJLJ6-41 (41-pole)		10		-		-	
	Plug-in Center Jumper – 10-Pole	1492-CJLJ5-10		20		1492-CJLJ6-10		20		-		-	
	Plug-in Center Jumper – 9-Pole	1492-CJLJ5-9		20		-		-		-		-	
	Plug-in Center Jumper – 8-Pole	1492-CJLJ5-8		20		-		-		-		-	
	Plug-in Center Jumper – 7-Pole	1492-CJLJ5-7		20		-		-		-		-	
	Plug-in Center Jumper – 6-Pole	1492-CJLJ5-6		20		-		-		-		-	
	Plug-in Center Jumper – 5-Pole	1492-CJLJ5-5		20		-		-		-		-	
	Plug-in Center Jumper – 4-Pole	1492-CJLJ5-4		60		1492-CJLJ6-4		60		-		-	

Plug-in Center Jumper – 3-Pole	1492-CJLJ5-3	60	1492-CJLJ6-3	60	–	–
Plug-in Center Jumper – 2-Pole	1492-CJLJ5-2	60	1492-CJLJ6-2	60	–	–
Insulated Side Jumper – 24-Pole	1492-SJ5B-24	50	–	–	–	–
Insulated Side Jumper – 10-Pole	1492-SJ5B-10	50	–	–	–	–
Screw Type Jumper Notching Tool	1492-T1	1	1492-T1	1	1492-T1	1
Other Accessories: Partition Plate	1492-EBJ16	20	1492-EBJ16	20	1492-EBJ16	20
Test Plug Socket	1492-TPS23	20	1492-TPS23L	50	1492-TPS23L	50
Test Plug	1492-TP23	20	1492-TP23	20	1492-TP23	20
Test Plug (Stackable)	1492-TPJ5	25	1492-TPJ6	25	–	–
Electrical Warning Plate	1492-EWPJ5	25	1492-EWPJ5	25	1492-EWPJ8	50
Marking Systems: Snap-in Marker Cards	→ 1492-M5X12 (144/card)	5	1492-M6X12 (120/card)	5	1492-M8X12 (84/card)	5
	1492-M5X5 (200/card)	5	1492-M6X5 (200/card)	5	1492-M8X5 (160/card)	5

* Use of center jumpers may affect spacings, requiring derating of terminal blocks. See Jumpers use the terminal block wire openings. Multi-pole jumpers can be cut into a smaller number of poles. Jumpers carry 100% of rated terminal block current. The back of IEC style jumpers are insulated with plastic. An adjacent partition plate provides the necessary electrical spacings between adjacent jumpers or between exposed ends of cut jumpers. for details.

Screw Connection Terminal Blocks




Grounding Blocks

	1492-JG2Q	1492-JG3	1492-JG3TW			
Dimensions are not intended to be used for manufacturing purposes. Note: Height dimension is measured from top of rail to top of terminal block.						
Specifications	Feed-through grounding terminal block with 2 connection points on each side		Feed-through grounding terminal block with 3 connection points, 2 on one side			
Certifications	CSA IEC	CSA IEC ATEX	CSA IEC ATEX			
Voltage Rating	—	—	—			
Maximum Current	Grounding					
Wire Range (Rated Cross Section)	#22...14 AWG 1.5 mm ²	#22...12 AWG 2.5 mm ²	Single Side: #22...12 AWG 2.5 mm ² 2.5 mm ² (#20...14 AWG) Twin Side: #26...12 AWG 1.5 mm ² 1.5 mm ² (#20...16 AWG)			
Wire Strip Length	0.28 in. (7 mm)	0.39 in. (10 mm)	Single Side: 0.49 in. (10 mm) Twin Side: 0.28 in. (7 mm)			
Recommended Tightening Torque	5.0 lb•in (0.6 N•m)	7.1 lb•in (0.8 N•m)	Single Side: 7.1 lb•in (0.8 N•m) Twin Side: 4.5 lb•in (0.5 N•m)			
Mounting Torque — Center Screw	3.5...5.3 lb•in (0.4...0.6 N•m)	3.5...6.2 lb•in (0.4...0.6 N•m)	Single Side: 7.1 lb•in (0.8 N•m) Twin Side: 4.5 lb•in (0.5 N•m)			
Density	59 pcs/ft (196 pcs/m)	59 pcs/ft (196 pcs/m)	59 pcs/ft (196 pcs/m)			
Housing Temperature Range	-58...+248 °F (-50...+120 °C)	-58...+248 °F (-50...+120 °C)	-58...+248 °F (-50...+120 °C)			
Short-Circuit Current Rating	See page 12-42					
Terminal Blocks	Cat. No.	Pkg Qty.	Cat. No.	Pkg Qty.	Cat. No.	Pkg Qty.
Color: Green/Yellow	1492-JG2Q	100	1492-JG3	100	1492-JG3TW	100
Accessories	Cat. No.	Pkg Qty.	Cat. No.	Pkg Qty.	Cat. No.	Pkg Qty.
Mounting Rails:						
1 m Symmetrical DIN (Steel)	199-DR1	10	199-DR1	10	199-DR1	10
1 m Symmetrical DIN (Aluminum)	1492-DR5	10	1492-DR5	10	1492-DR5	10
1 m Hi-Rise Sym. DIN (Aluminum)	1492-DR6	2	1492-DR6	2	1492-DR6	2
1 m Angled Hi-Rise Sym. DIN (Steel)	1492-DR7	2	1492-DR7	2	1492-DR7	2
End Barrier Yellow	1492-EBJ3-Y	50	1492-EBJ3-Y	50	1492-EBJ3-Y	50
End Anchors and End Retainers:						
Screwless End Retainer	1492-ERL35	20	1492-ERL35	20	1492-ERL35	20
DIN Rail — Normal Duty	1492-EAJ35	100	1492-EAJ35	100	1492-EAJ35	100
DIN Rail — Heavy Duty	1492-EAHJ35	50	1492-EAHJ35	50	1492-EAHJ35	50
Marking Systems:						
Snap-in marker cards	1492-M5X12 (144/card)	5	1492-M5X12 (144/card)	5	1492-M5X12 (144/card)	5
Snap-in marker cards	1492-M5X5 (200/card)	5	1492-M5X5 (200/card)	5	1492-M5X5 (200/card)	5


IEC Terminal Block Accessories

Marking Systems and Electrical Warning Plate Markers

Terminal Block Snap-In Markers

Photo	Used With	Markers per Card	Color	Cat. No.	Pcs/Pkg
	1492-L	100	White	1492-M3X5	5
	1492-L	120	White	1492-M3X12	5
	1492-J, L	200	White	1492-M5X5	5
	1492-J, L	144	White	1492-M5X8	5
	1492-J, L	144	White	1492-M5X10	5
	1492-J, L	144	White	1492-M5X12	5
	1492-J, L	96	White	1492-M5X15	5
	1492-J, L	200	White	1492-M6X5	5
	1492-J, L	120	White	1492-M6X10	5
	1492-J, L	120	White	1492-M6X12	5
	1492-J, L	108	White	1492-M7X12	5
	1492-J, L	160	White	1492-M8X5	5
	1492-K	144	White	1492-SM5X10	5
	1492-K	120	White	1492-SM6X10	5
	1492-L	96	White	1492-MH5X10	5
	1492-L	96	White	1492-MH5X15	5
	1492-L	80	White	1492-MH6X12	5
	NEMA Terminal Blocks, Circuit Breakers	120	White	1492-MN81	5
	NEMA Terminal Blocks, Circuit Breakers	60	White	1492-MN83	5
	1492-WM3, WMD1	80	White	1492-MS5X5	5
	1492-W, 700-HA Relays	80	White	1492-MS5X9	5
	1492-W, 700-HA Relays	80	White	1492-MS5X12	5
	1492-W,R, 700-HA Relays	80	White	1492-MS6X9	5
	1492-W, 700-HA Relays	80	White	1492-MS6X12	5
	1492-W,R, 700-HA Relays	56	White	1492-MS8X9	5
	1492-W, 700-HA Relays	56	White	1492-MS8X12	5
	1492-W, Bulletin 1667 PanelConnect™	40	White	1492-MS9X20	5
	Bulletins 100 and 140 Products	40	White	1492-MS10X17	5

Competitive Terminal Block Markers

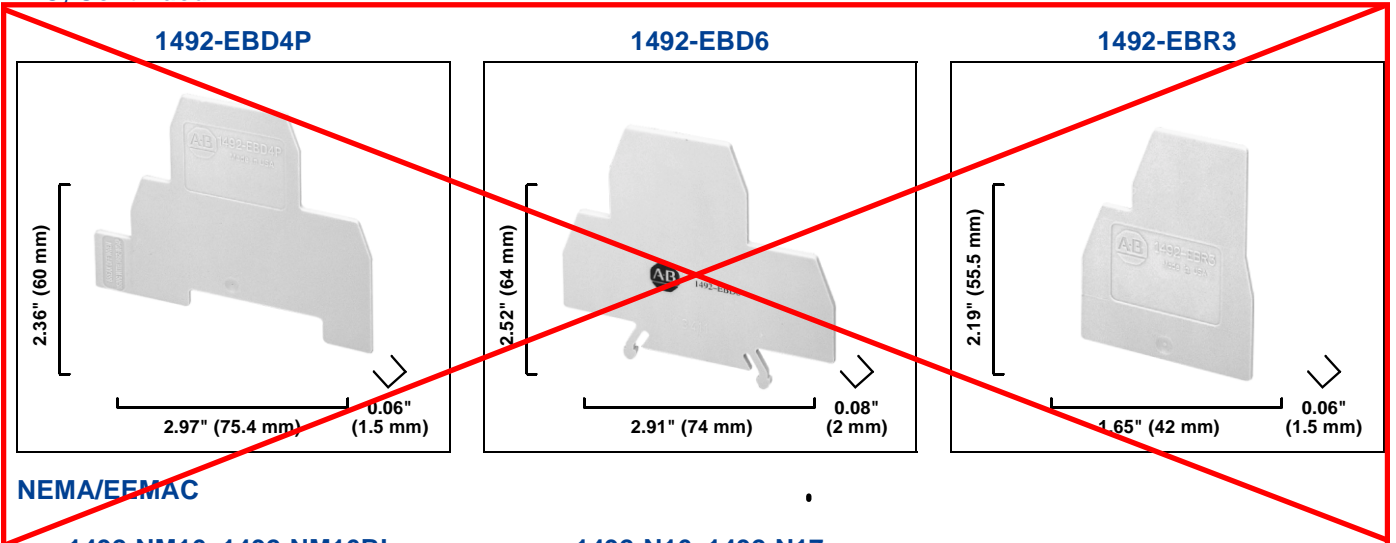
Photo	Used With	Markers per Card	Color	Cat. No.	Pcs/Pkg
	Phoenix, Entrelec, Telemecanique, Legrand Products*	120	White	1492-MC5X5	5
	Phoenix, Wago, Wieland, Entrelec, Telemecanique, and Legrand Products†	120	White	1492-MC5X10	5
	Wago, Wieland, and Telemecanique Products‡	120	White	1492-MC5X12	5
	700-HL Relays, Phoenix, Wago, Wieland, Entrelec, Telemecanique, and Legrand Products§	120	White	1492-MC6X10	5

* May have some mounting limitations with Telemecanique Earthing Terminals.
 † May have some mounting limitations with Telemecanique Initiator/Actuator Terminals.
 ‡ May have some mounting limitations with Legrand Standard Terminals.
 § May have some mounting limitations with Telemecanique Initiator/Actuator Terminals, and Legrand Standard Terminals.

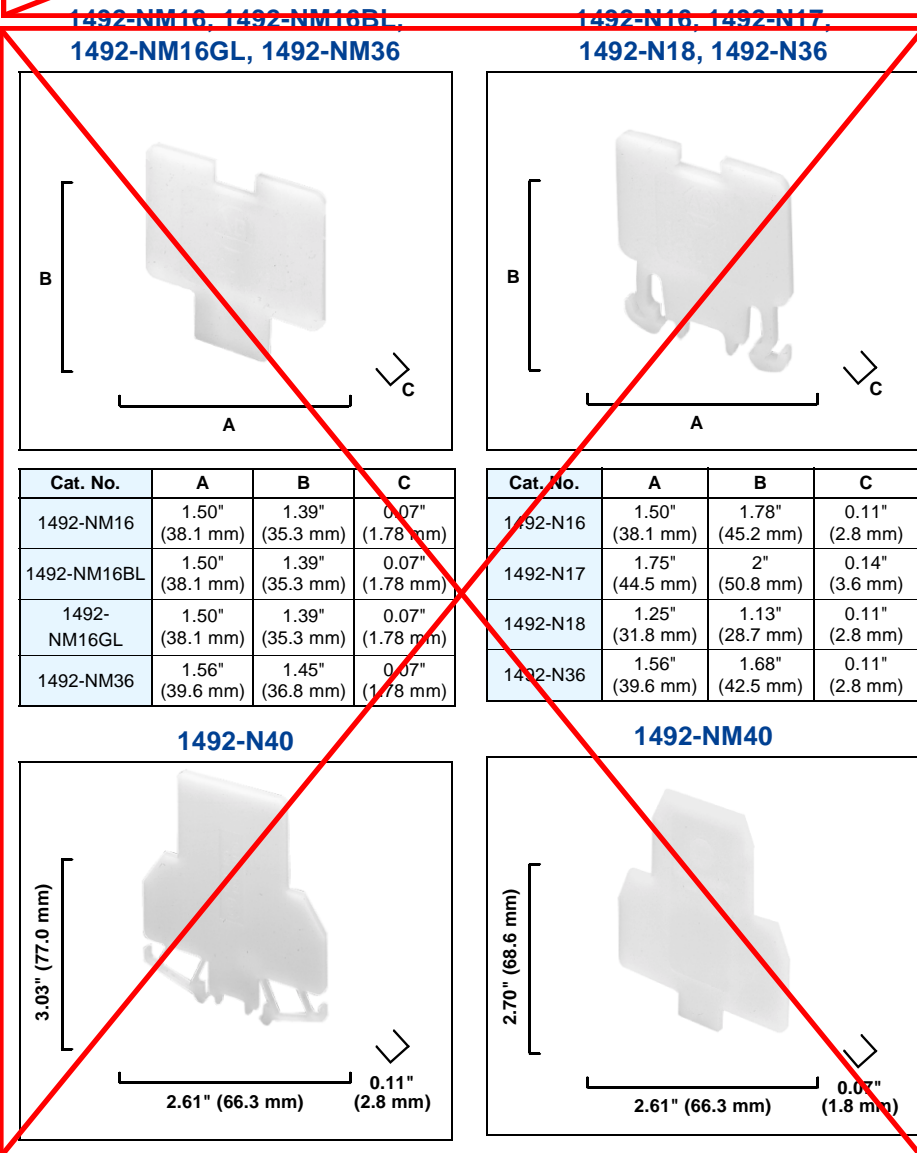
Wire Markers

Wire Size	Insulation Dia.	Markers per Card	Color	Cat. No.	Pcs/Pkg
#20... #18 AWG (0.5... 1.0 mm ²)	0.059... 0.098 in (1.5... 2.5 mm ²)	40	White	1492-MWC1-12	5
#18... #14 AWG (0.75... 2.5 mm ²)	0.078... 0.138 in (2.0... 3.5 mm ²)	40	White	1492-MWC3-12	5
#12 AWG (2.5... 4.0 mm ²)	0.098... 0.197" in (2.5... 5.0 mm ²)	24	White	1492-MWC4-12	5

IEC, Continued



NEMA/EFMAC

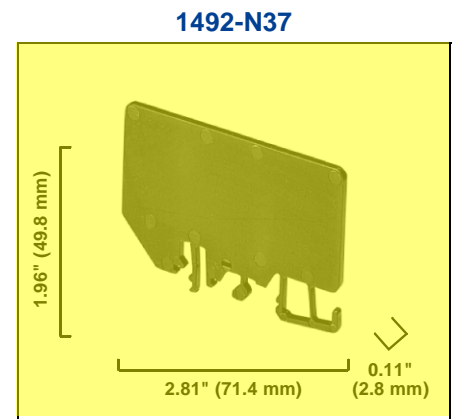


~~1492-NM16, 1492-NM16BL,
 1492-NM16GL, 1492-NM36~~

~~1492-N16, 1492-N17,
 1492-N18, 1492-N36~~

Cat. No.	A	B	C
1492-NM16	1.50" (38.1 mm)	1.39" (35.3 mm)	0.07" (1.78 mm)
1492-NM16BL	1.50" (38.1 mm)	1.39" (35.3 mm)	0.07" (1.78 mm)
1492-NM16GL	1.50" (38.1 mm)	1.39" (35.3 mm)	0.07" (1.78 mm)
1492-NM36	1.56" (39.6 mm)	1.45" (36.8 mm)	0.07" (1.78 mm)

Cat. No.	A	B	C
1492-N16	1.50" (38.1 mm)	1.78" (45.2 mm)	0.11" (2.8 mm)
1492-N17	1.75" (44.5 mm)	2" (50.8 mm)	0.14" (3.6 mm)
1492-N18	1.25" (31.8 mm)	1.13" (28.7 mm)	0.11" (2.8 mm)
1492-N36	1.56" (39.6 mm)	1.68" (42.5 mm)	0.11" (2.8 mm)



1492-N37





Configuration Results

Product: 1492-ERL35
Description: , , 1492 Terminal Block Accessories, End Anchor, Screwless End Retainer for 35 mm DIN Rail



Representative Photo Only (actual product may vary based on configuration selections)

Selected Components

Drawings

Selected Components

Catalog Number	Qty	Product Description	Supplementary Documents
1492-ERL35	1	, , 1492 Terminal Block Accessories, End Anchor, Screwless End Retainer for 35 mm DIN Rail	<ul style="list-style-type: none"> Product Details and Certifications Terminal Block Photo 3D STEP (STP) Model

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Eagle Armored Plug & Connector

ELECTRICAL SUPPLIES

- Steel clamps and armor are heavy plated for corrosion resistance
- Armor is knurled for easy gripping
- Solid brass plug blades are firmly embedded into body
- Terminal screws are large head type for easy wiring, separated by barriers to prevent flashover or short circuits
- Strain relief clamps are superior designs, providing a secure mechanical grip
- Vinyl Dead-Front Construction
- 2-Pole, 3-Wire Grounding with cord clamp
- Cord diameter .250" - .625"
- UL & CSA listed, NEMA 5-15
- 15 AMP, 125 Volts
- Made in the U.S.A.



Armored Plug Male



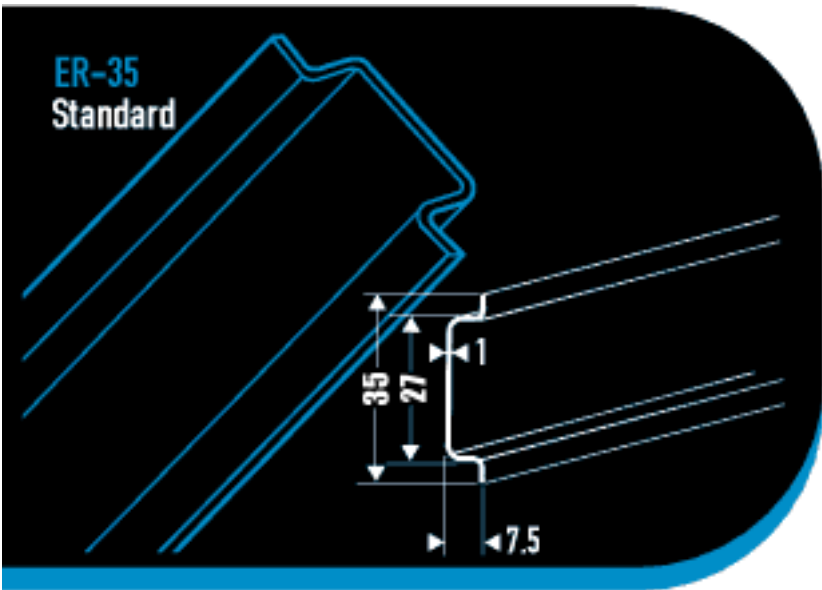
Armored Connector Female

15 AMP TYPE (125V):

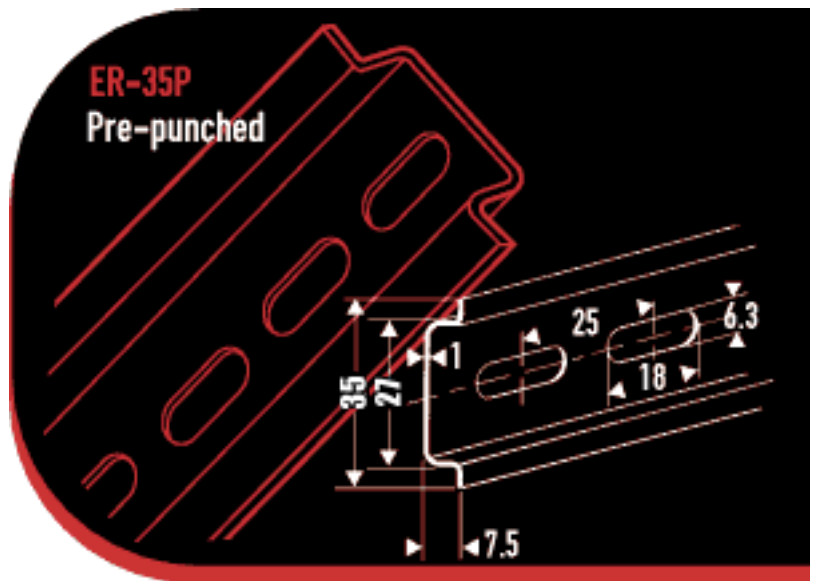
Part Number		Dia.	Eagle Length	P/N	Each
91-1168-00 Buy	Armored Plug Male	1-½"	2"	2867	View Price
91-1169-00 Buy	Armored Connector Female	1-½"	2-19/32"	2887	View Price

E-Rails

As one of the world's leading manufacturers of DIN rail, E-Rail provides over forty years of experience producing high-quality products. Our factory's quality assurance program (ISO 9002 Certification since 1994) is based on international standards and is designed to provide you with the highest quality products and insure complete customer satisfaction.



~~#111.011 Zinc-bichromate Cold rolled electrolytically plated steel per DIN EN 50022. 2 meters in length~~



→ #111.013 Zinc-bichromate Cold rolled electrolytically plated steel per DIN EN 50022. 2 meters in length.

~~#111.103 Zinc bichromate Cold rolled steel per DIN EN 50022. 1 meter in length.~~

~~#111.037 Stainless Steel~~

Part numbers 111.013 and ER-35P are equivalent per Daniel Baker with E-RAIL LLC.

PowerSure™ FAS-120AC

120 VAC Medium Duty (Parallel) AC-Hardware

■ Surge Protection
For Business-Critical Continuity™

The PowerSure FAS-120AC surge suppressor is designed to protect AC distribution panel circuits or 120V power supplies feeding sensitive electronic equipment. Electrically, the unit incorporates MOV and thermal fusing technology. The PowerSure FAS-120AC is designed to be installed in parallel on standard single phase 120 VAC (L,N,G) circuits.



General Technical Specifications

Operating Voltage	120 VAC
Total Peak Surge Current	15.5 kA (8 x 20 μs)
Short Circuit Current Rating	5kAIC
Location Type	Type 2
I-Nominal	3kA
UL 1449 VPR Rating	700V (L-N, L-G), 900V (N-G)
Operating Current	NA, Parallel
Operating Frequency	47-63 Hz
EMI Attenuation (100 kHz to 100 MHz)	>25 dB
SPD Technology	Metal Oxide Varistors (MOVs)
Modes of Protection	Line-to-Neutral, Line-to-Ground, Neutral-to-Ground
Status Indication	Power On & MOV Functional
Connection Type	#14 Wire Leads, 12" Long
Operating Temperature	-40°C to +85°C
Dimensions (Inches)	2.5H x 1.5W x 3.0L
Weight	4.2 oz
Certifications	ANSI/UL1449 Third Edition

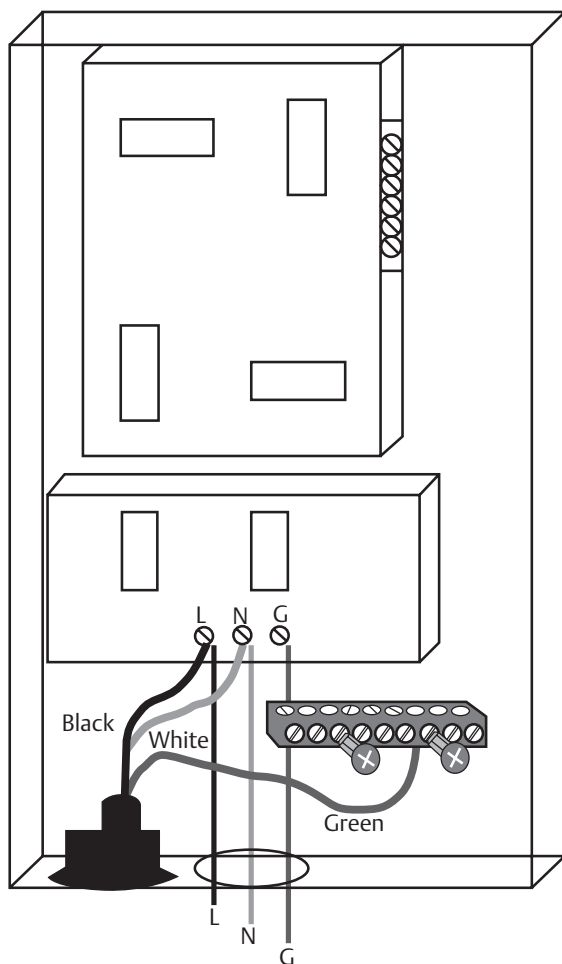
Features

- LED indicator
- Fast response time
- Thermal fuse
- L-G, L-N & N-G protection
- Compact size
- Liquid tight conduit fitting
- ANSI/UL 1449 Third Edition
- 5 year warranty



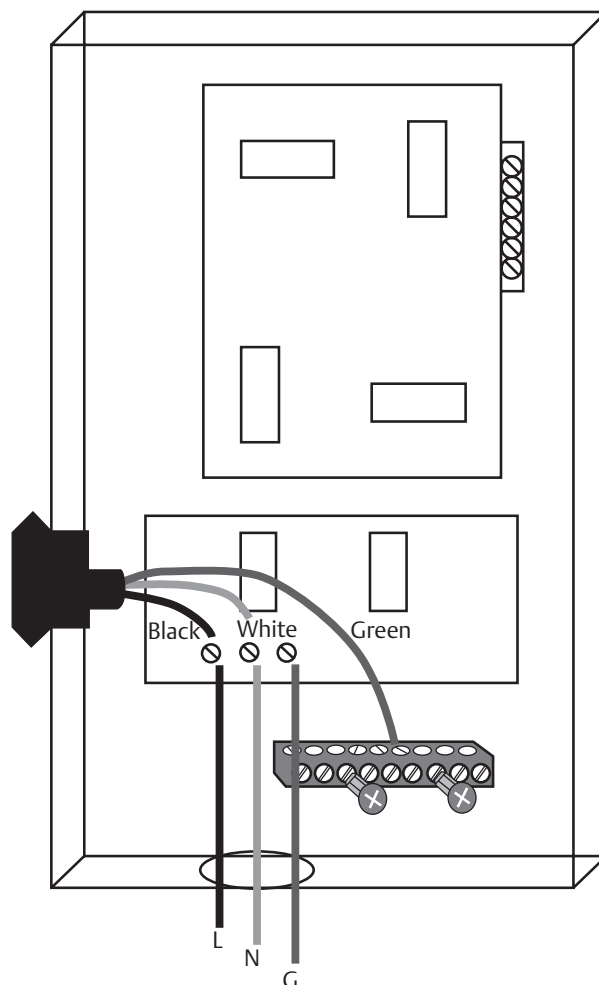
Installation

Mounting Inside Fire/Security Panel



A ground bus can be installed in cabinet to provide a single point ground.

Mounting Outside (closed nipple 3/4") Fire/Security Panel



Installation can be close-nipple up to a distribution panel/circuit or hardwired in parallel up to power supply input terminal screws. Be sure to dress leads as short as possible.

Emerson Network Power.
The global leader in enabling
Business-Critical Continuity™.

■ AC Power
■ Connectivity
■ DC Power

■ Embedded Computing
■ Embedded Power
■ Monitoring

■ Outside Plant
■ Power Switching & Control
■ Precision Cooling

■ Racks and Integrated Cabinets
■ Services
■ Surge Protection

Emerson Network Power Contact information

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T: (800) 288-6169
F: (607) 722-8713
E: contactsurge@emerson.com

www.emersonnetworkpower.com





Miniature circuit breaker (MCB), 10A, 1p, C-Char, AC

Part no. FAZ-C10/1-NA
Catalog No. 102087
Eaton Catalog No. FAZ-C10/1-NA
EL-Nummer (Norway) 0001691576

Similar to illustration

Delivery program

Basic function			Miniature circuit-breakers
Number of poles			1 pole
Tripping characteristic			C
Application			Switchgear for export to North America (UL-listed)
Rated current	I_n	A	10
Rated switching capacity acc. to IEC/EN 60947-2	I_{cu}	kA	15
Product range			FAZ-NA

Technical data

Electrical

Standards			UL 489, CSA C22.2 No. 5 IEC 60947-2
Rated operational voltage	U_e	V	
		V AC	277/480 Y
		V DC	60
Rated voltage according to IEC/EN 60947-2	U_n	V AC	254
Rated voltage according to UL	U_n	V AC	277
Rated switching capacity acc. to IEC/EN 60947-2	I_{cu}	kA	15
Breaking capacity according to UL		kA	10 (UL489)
Characteristic			B, C, D
Selectivity Class			3
lifespan			
Lifespan	Operations		> 20000
Direction of incoming supply			as required

Mechanical

Standard front dimension		mm	45
Enclosure height		mm	105
Mounting width per pole		mm	17.7
Mounting			IEC/EN 60715 top-hat rail
Degree of Protection			IP20, IP40 (when fitted)
Terminals top and bottom			Twin-purpose terminals
Terminal protection			Finger and back-of-hand proof to BGV A2
Tightening torque of fixing screws		N/m	max. 2.4 UL: #18-12 AWG: 2.4 Nm (21 lb-in) #10-8 AWG: 2.8 Nm (25 lb-in) #6 AWG: 4 Nm (36 lb-in)
Mounting position			As required

Design verification as per IEC/EN 61439

Technical data for design verification			
Rated operational current for specified heat dissipation	I_n	A	10

Heat dissipation per pole, current-dependent	P _{vid}	W	0
Equipment heat dissipation, current-dependent	P _{vid}	W	1.8
Static heat dissipation, non-current-dependent	P _{vs}	W	0
Heat dissipation capacity	P _{diss}	W	0
Operating ambient temperature min.		°C	-25
Operating ambient temperature max.		°C	75
			linear, per +1 °C, results in a 0.5% reduction of current carrying capacity
IEC/EN 61439 design verification			
10.2 Strength of materials and parts			
10.2.2 Corrosion resistance			
			Meets the product standard's requirements.
10.2.3.1 Verification of thermal stability of enclosures			
			Meets the product standard's requirements.
10.2.3.2 Verification of resistance of insulating materials to normal heat			
			Meets the product standard's requirements.
10.2.3.3 Verification of resistance of insulating materials to abnormal heat and fire due to internal electric effects			
			Meets the product standard's requirements.
10.2.4 Resistance to ultra-violet (UV) radiation			
			Meets the product standard's requirements.
10.2.5 Lifting			
			Does not apply, since the entire switchgear needs to be evaluated.
10.2.6 Mechanical impact			
			Does not apply, since the entire switchgear needs to be evaluated.
10.2.7 Inscriptions			
			Meets the product standard's requirements.
10.3 Degree of protection of ASSEMBLIES			
			Does not apply, since the entire switchgear needs to be evaluated.
10.4 Clearances and creepage distances			
			Meets the product standard's requirements.
10.5 Protection against electric shock			
			Does not apply, since the entire switchgear needs to be evaluated.
10.6 Incorporation of switching devices and components			
			Does not apply, since the entire switchgear needs to be evaluated.
10.7 Internal electrical circuits and connections			
			Is the panel builder's responsibility.
10.8 Connections for external conductors			
			Is the panel builder's responsibility.
10.9 Insulation properties			
10.9.2 Power-frequency electric strength			
			Is the panel builder's responsibility.
10.9.3 Impulse withstand voltage			
			Is the panel builder's responsibility.
10.9.4 Testing of enclosures made of insulating material			
			Is the panel builder's responsibility.
10.10 Temperature rise			
			The panel builder is responsible for the temperature rise calculation. Eaton will provide heat dissipation data for the devices.
10.11 Short-circuit rating			
			Is the panel builder's responsibility. The specifications for the switchgear must be observed.
10.12 Electromagnetic compatibility			
			Is the panel builder's responsibility. The specifications for the switchgear must be observed.
10.13 Mechanical function			
			The device meets the requirements, provided the information in the instruction leaflet (IL) is observed.

Technical data ETIM 7.0

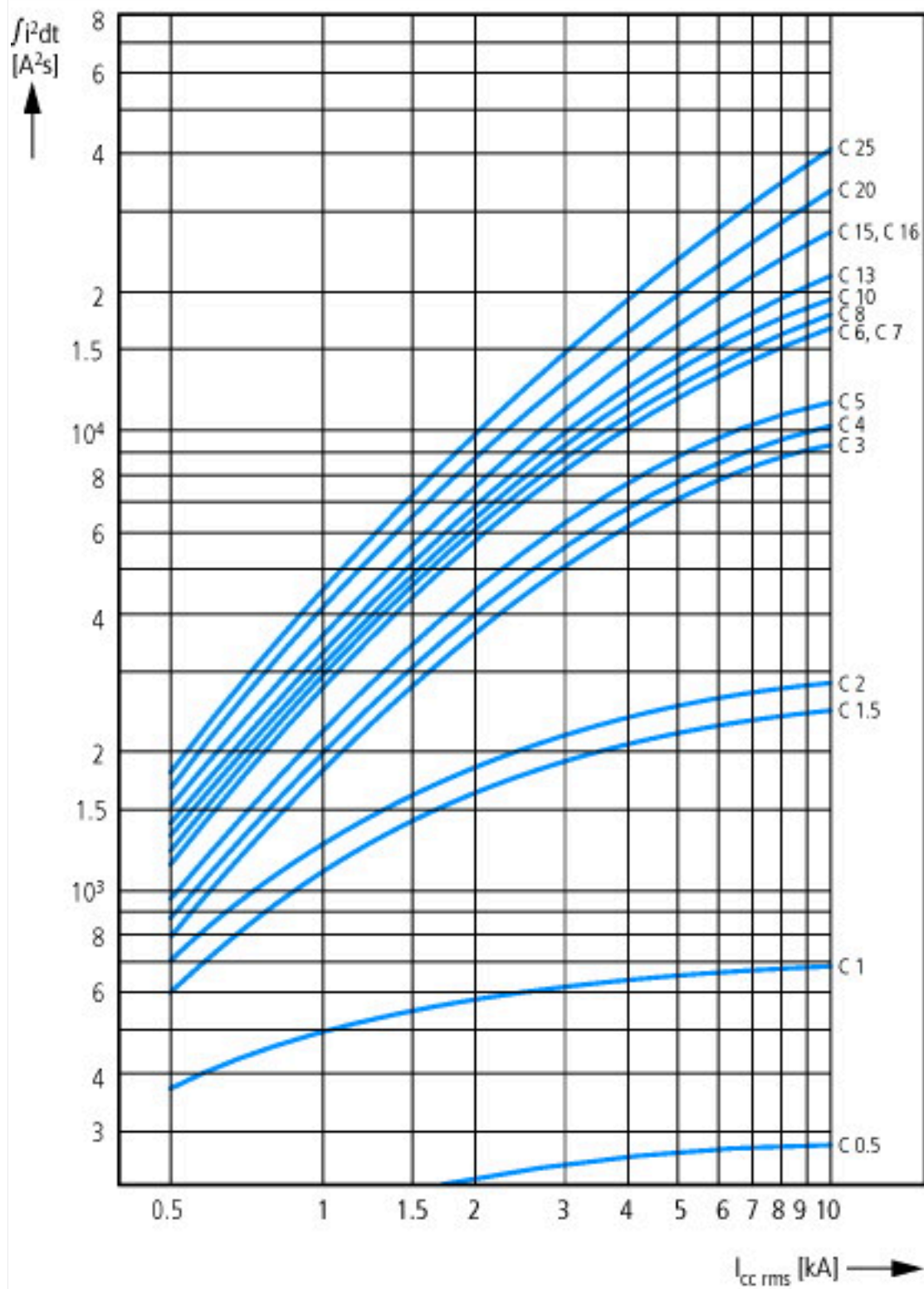
Circuit breakers and fuses (EG000020) / Miniature circuit breaker (MCB) (EC000042)			
Electric engineering, automation, process control engineering / Electrical installation, device / Miniature circuit breaker system (MCB) / Miniature circuit breaker (MCB) (ec1@ss10.0.1-27-14-19-01 [AAB905014])			
Release characteristic			C
Number of poles (total)			1
Number of protected poles			1
Rated current	A		10
Rated voltage	V		240
Rated insulation voltage U _i	V		440
Rated impulse withstand voltage U _{imp}	kV		4
Rated short-circuit breaking capacity I _{cn} EN 60898 at 230 V	kA		0
Rated short-circuit breaking capacity I _{cn} EN 60898 at 400 V	kA		0
Rated short-circuit breaking capacity I _{cu} IEC 60947-2 at 230 V	kA		15
Rated short-circuit breaking capacity I _{cu} IEC 60947-2 at 400 V	kA		15
Voltage type			AC
Frequency	Hz		50 - 60
Current limiting class			3
Suitable for flush-mounted installation			No
Concurrently switching N-neutral			No

Over voltage category			3
Pollution degree			2
Additional equipment possible			Yes
Width in number of modular spacings			1
Built-in depth		mm	70.5
Degree of protection (IP)			IP20
Ambient temperature during operating		°C	-25 - 75
Connectable conductor cross section multi-wired		mm ²	1 - 25
Connectable conductor cross section solid-core		mm ²	1 - 25

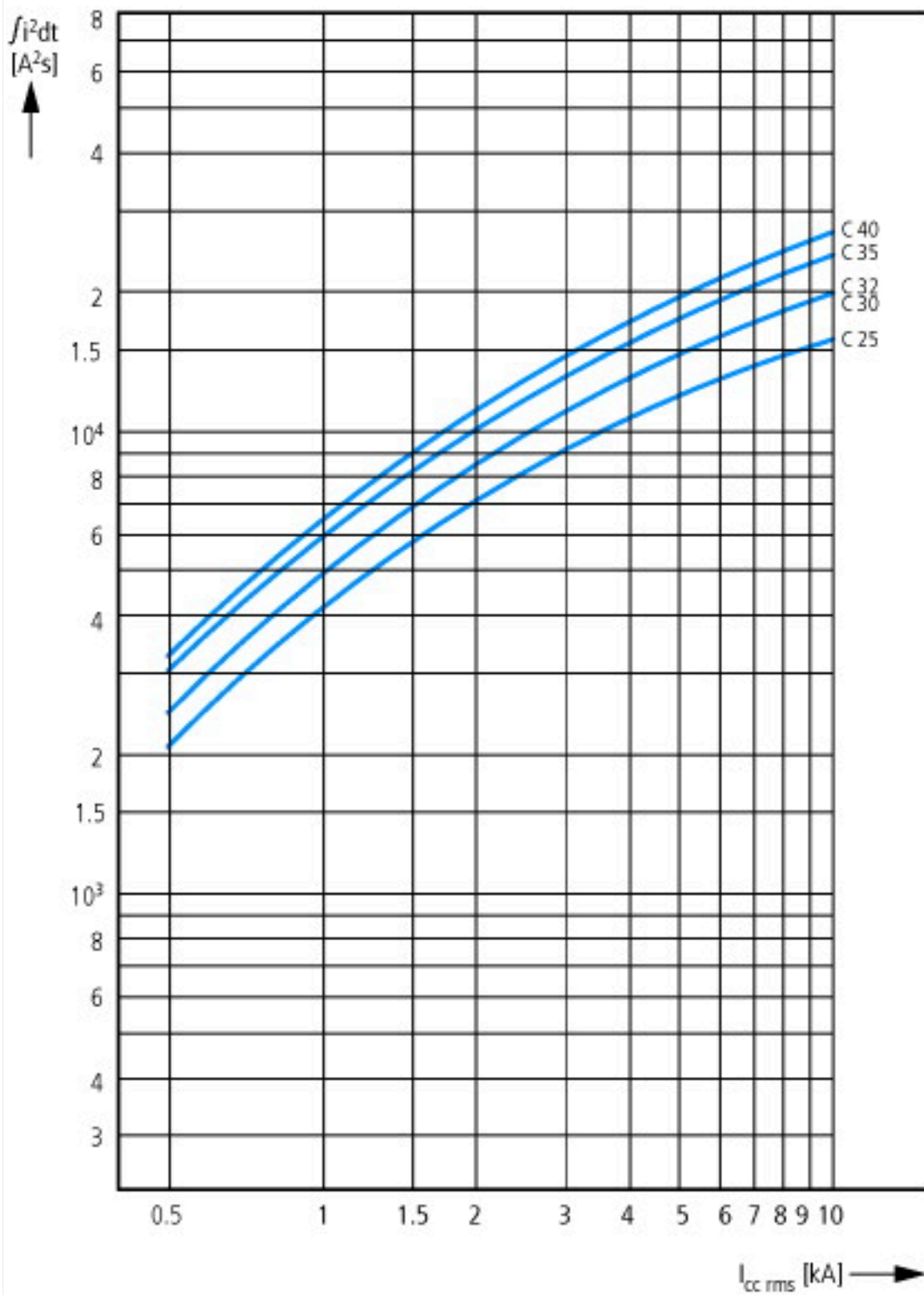
Approvals

Product Standards			IEC/EN 60947-2; UL 489; CSA-C22.2 No. 5-09; CE marking
UL File No.			E235139
UL Category Control No.			DIVQ
CSA File No.			204453
CSA Class No.			1432-01
North America Certification			UL listed, CSA certified
Specially designed for North America			Yes, suitable as BCPD
Suitable for			Feeder circuits, branch circuits
Current Limiting Circuit-Breaker			Yes
Max. Voltage Rating			≤ 32 A
Degree of Protection			IEC: IP20, UL/CSA Type: -

Characteristics



Let-through energy I^2t
 Characteristic C (0.5 - 20 A), 277 V



Characteristic C (25 - 40 A), 240 V

Assets (links)

Manuals

[hkr-system/Bedienungs- und Montageanleitungen/150501363 \(German\)](#)



Miniature circuit breaker (MCB), 15A, 1p, C-Char, AC

Part no. FAZ-C15/1-NA
Catalog No. 102089
Alternate Catalog No. FAZ-C15/1-NA
EL-Nummer (Norway) 0001691578

Similar to illustration

Delivery program

Basic function			Miniature circuit-breakers
Number of poles			1 pole
Tripping characteristic			C
Application			Switchgear for export to North America (UL-listed)
Rated current	I_n	A	15
Rated switching capacity acc. to IEC/EN 60947-2	I_{cu}	kA	15
Product range			FAZ-NA

Technical data

Electrical

Standards			UL 489, CSA C22.2 No. 5 IEC 60947-2
Rated operational voltage	U_e	V	
		V AC	277/480 Y
		V DC	60
Rated voltage according to IEC/EN 60947-2	U_n	V AC	254
Rated voltage according to UL	U_n	V AC	277
Rated switching capacity acc. to IEC/EN 60947-2	I_{cu}	kA	15
Breaking capacity according to UL		kA	14 (UL489)
Characteristic			B, C, D
Selectivity Class			3
lifespan			
Lifespan	Operations		> 20000
Direction of incoming supply			as required

Mechanical

Standard front dimension		mm	45
Enclosure height		mm	105
Mounting width per pole		mm	17.7
Mounting			IEC/EN 60715 top-hat rail
Degree of Protection			IP20, IP40 (when fitted)
Terminals top and bottom			Twin-purpose terminals
Terminal protection			Finger and back-of-hand proof to BGV A2
Tightening torque of fixing screws		N/m	max. 2.4 UL: #18-12 AWG: 2.4 Nm (21 lb-in) #10-8 AWG: 2.8 Nm (25 lb-in) #6 AWG: 4 Nm (36 lb-in)
Mounting position			As required

Design verification as per IEC/EN 61439

Technical data for design verification			
Rated operational current for specified heat dissipation	I_n	A	15

Heat dissipation per pole, current-dependent	P _{vid}	W	0
Equipment heat dissipation, current-dependent	P _{vid}	W	1.9
Static heat dissipation, non-current-dependent	P _{vs}	W	0
Heat dissipation capacity	P _{diss}	W	0
Operating ambient temperature min.		°C	-25
Operating ambient temperature max.		°C	75
			linear, per +1 °C, results in a 0.5% reduction of current carrying capacity
IEC/EN 61439 design verification			
10.2 Strength of materials and parts			
10.2.2 Corrosion resistance			
			Meets the product standard's requirements.
10.2.3.1 Verification of thermal stability of enclosures			
			Meets the product standard's requirements.
10.2.3.2 Verification of resistance of insulating materials to normal heat			
			Meets the product standard's requirements.
10.2.3.3 Verification of resistance of insulating materials to abnormal heat and fire due to internal electric effects			
			Meets the product standard's requirements.
10.2.4 Resistance to ultra-violet (UV) radiation			
			Meets the product standard's requirements.
10.2.5 Lifting			
			Does not apply, since the entire switchgear needs to be evaluated.
10.2.6 Mechanical impact			
			Does not apply, since the entire switchgear needs to be evaluated.
10.2.7 Inscriptions			
			Meets the product standard's requirements.
10.3 Degree of protection of ASSEMBLIES			
			Does not apply, since the entire switchgear needs to be evaluated.
10.4 Clearances and creepage distances			
			Meets the product standard's requirements.
10.5 Protection against electric shock			
			Does not apply, since the entire switchgear needs to be evaluated.
10.6 Incorporation of switching devices and components			
			Does not apply, since the entire switchgear needs to be evaluated.
10.7 Internal electrical circuits and connections			
			Is the panel builder's responsibility.
10.8 Connections for external conductors			
			Is the panel builder's responsibility.
10.9 Insulation properties			
10.9.2 Power-frequency electric strength			
			Is the panel builder's responsibility.
10.9.3 Impulse withstand voltage			
			Is the panel builder's responsibility.
10.9.4 Testing of enclosures made of insulating material			
			Is the panel builder's responsibility.
10.10 Temperature rise			
			The panel builder is responsible for the temperature rise calculation. Eaton will provide heat dissipation data for the devices.
10.11 Short-circuit rating			
			Is the panel builder's responsibility. The specifications for the switchgear must be observed.
10.12 Electromagnetic compatibility			
			Is the panel builder's responsibility. The specifications for the switchgear must be observed.
10.13 Mechanical function			
			The device meets the requirements, provided the information in the instruction leaflet (IL) is observed.

Technical data ETIM 7.0

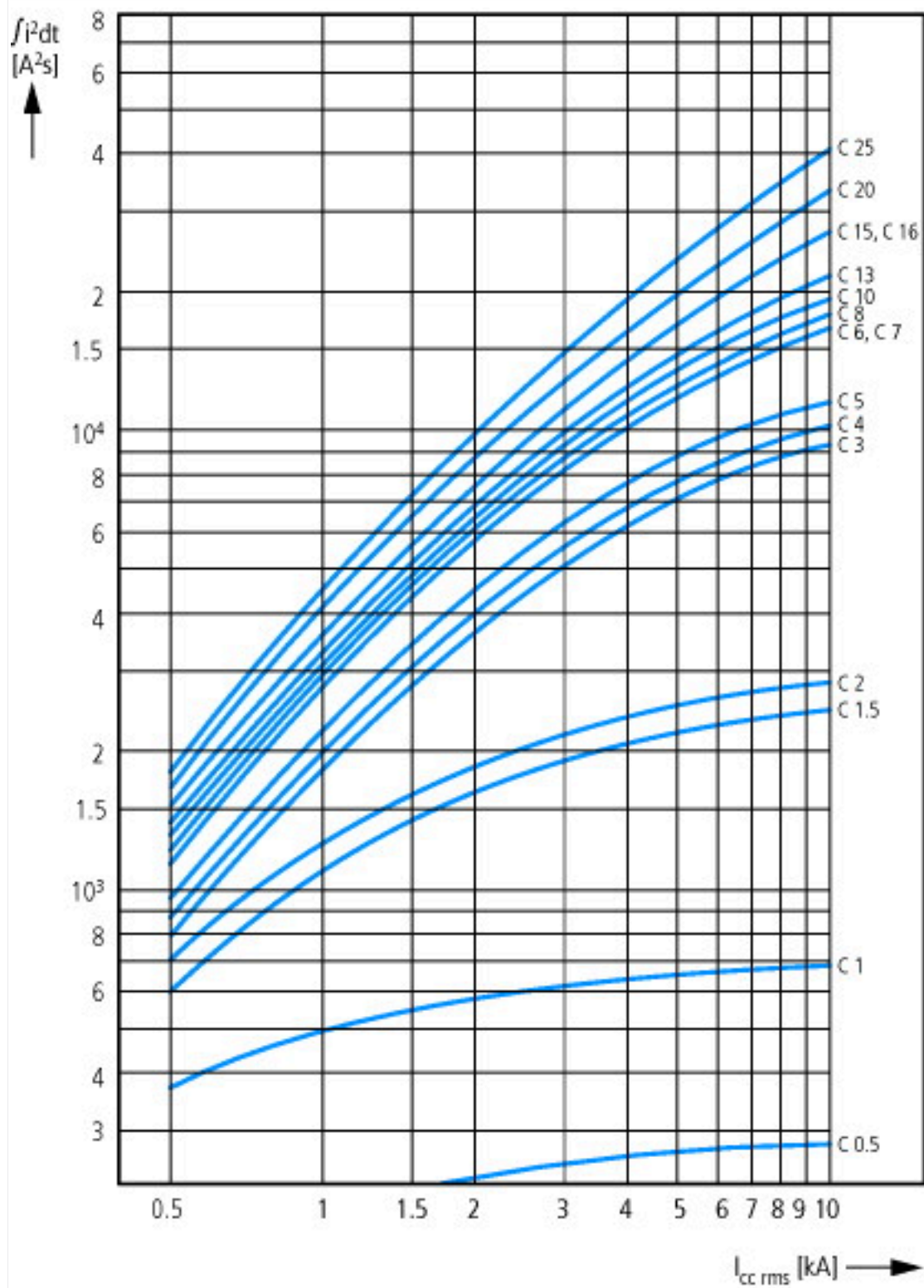
Circuit breakers and fuses (EG000020) / Miniature circuit breaker (MCB) (EC000042)			
Electric engineering, automation, process control engineering / Electrical installation, device / Miniature circuit breaker system (MCB) / Miniature circuit breaker (MCB) (ec1@ss10.0.1-27-14-19-01 [AAB905014])			
Release characteristic			C
Number of poles (total)			1
Number of protected poles			1
Rated current	A		15
Rated voltage	V		240
Rated insulation voltage U _i	V		440
Rated impulse withstand voltage U _{imp}	kV		4
Rated short-circuit breaking capacity I _{cn} EN 60898 at 230 V	kA		0
Rated short-circuit breaking capacity I _{cn} EN 60898 at 400 V	kA		0
Rated short-circuit breaking capacity I _{cu} IEC 60947-2 at 230 V	kA		15
Rated short-circuit breaking capacity I _{cu} IEC 60947-2 at 400 V	kA		15
Voltage type			AC
Frequency	Hz		50 - 60
Current limiting class			3
Suitable for flush-mounted installation			No
Concurrently switching N-neutral			No

Over voltage category			3
Pollution degree			2
Additional equipment possible			Yes
Width in number of modular spacings			1
Built-in depth		mm	70.5
Degree of protection (IP)			IP20
Ambient temperature during operating		°C	-25 - 75
Connectable conductor cross section multi-wired		mm ²	1 - 25
Connectable conductor cross section solid-core		mm ²	1 - 25

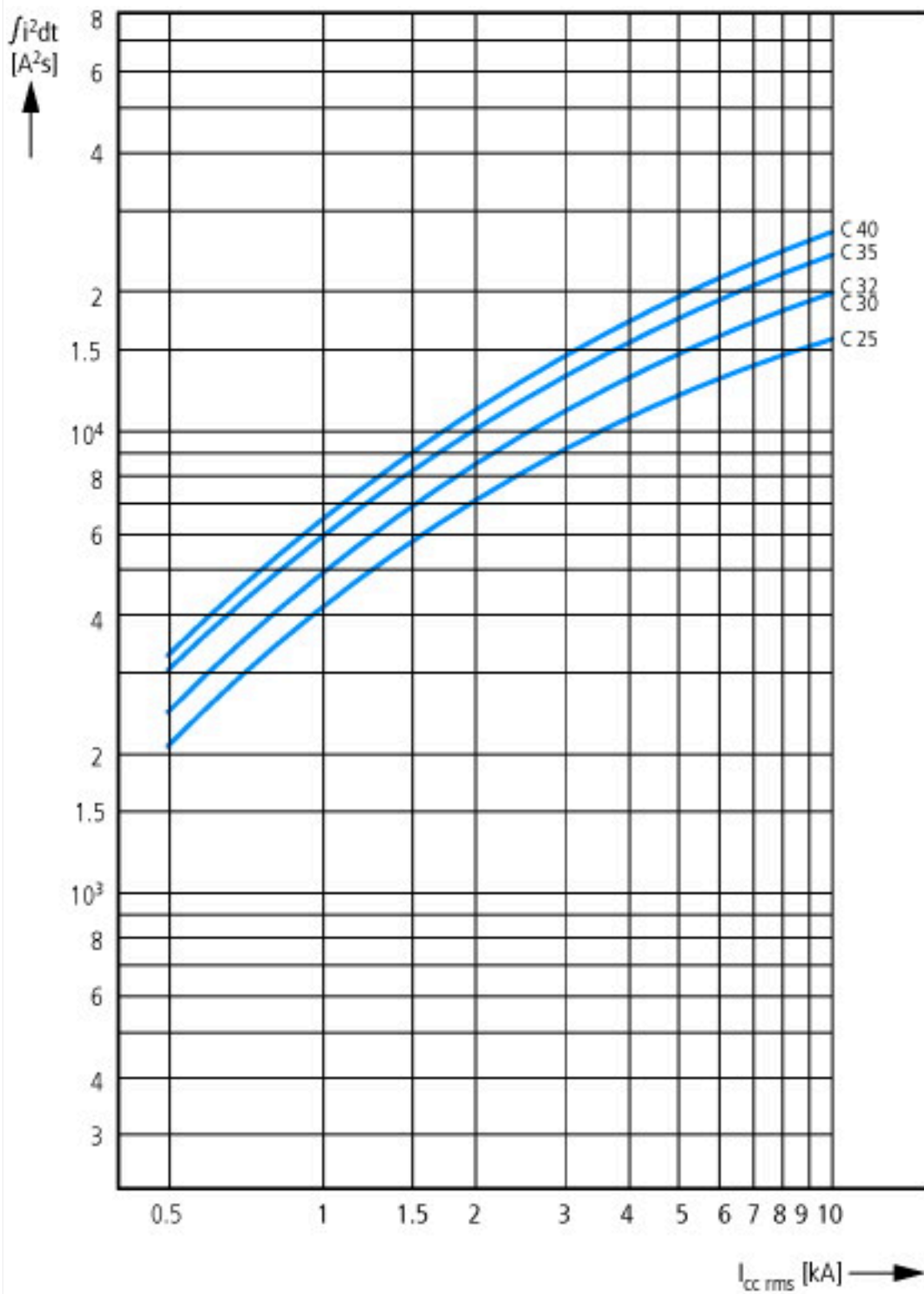
Approvals

Product Standards			IEC/EN 60947-2; UL 489; CSA-C22.2 No. 5-09; CE marking
UL File No.			E235139
UL Category Control No.			DIVQ
CSA File No.			204453
CSA Class No.			1432-01
North America Certification			UL listed, CSA certified
Specially designed for North America			Yes, suitable as BCPD
Suitable for			Feeder circuits, branch circuits
Current Limiting Circuit-Breaker			Yes
Max. Voltage Rating			≤ 32 A
Degree of Protection			IEC: IP20, UL/CSA Type: -

Characteristics



Let-through energy I^2t
 Characteristic C (0.5 - 20 A), 277 V



Characteristic C (25 - 40 A), 240 V



Miniature circuit breaker (MCB), 5A, 1p, C-Char, AC

Part no. FAZ-C5/1-NA
Catalog No. 102083
Eaton Catalog No. FAZ-C5/1-NA
EL-Nummer (Norway) 1691572

Similar to illustration

Delivery program

Basic function			Miniature circuit-breakers
Number of poles			1 pole
Tripping characteristic			C
Application			Switchgear for export to North America (UL-listed)
Rated current	I_n	A	5
Rated switching capacity acc. to IEC/EN 60947-2	I_{cu}	kA	15
Product range			FAZ-NA

Technical data

Electrical

Standards			UL 489, CSA C22.2 No. 5 IEC 60947-2
Rated operational voltage	U_e	V	
		V AC	277/480 Y
		V DC	60
Rated voltage according to IEC/EN 60947-2	U_n	V AC	254
Rated voltage according to UL	U_n	V AC	277
Rated switching capacity acc. to IEC/EN 60947-2	I_{cu}	kA	15
Breaking capacity according to UL		kA	10 (UL489)
Characteristic			B, C, D
Selectivity Class			3
lifespan			
Lifespan	Operations		> 20000
Direction of incoming supply			as required

Mechanical

Standard front dimension		mm	45
Enclosure height		mm	105
Mounting width per pole		mm	17.7
Mounting			IEC/EN 60715 top-hat rail
Degree of Protection			IP20, IP40 (when fitted)
Terminals top and bottom			Twin-purpose terminals
Terminal protection			Finger and back-of-hand proof to BGV A2
Tightening torque of fixing screws		N/m	max. 2.4 UL: #18-12 AWG: 2.4 Nm (21 lb-in) #10-8 AWG: 2.8 Nm (25 lb-in) #6 AWG: 4 Nm (36 lb-in)
Mounting position			As required

Design verification as per IEC/EN 61439

Technical data for design verification			
Rated operational current for specified heat dissipation	I_n	A	5

Heat dissipation per pole, current-dependent	P _{vid}	W	0
Equipment heat dissipation, current-dependent	P _{vid}	W	1.9
Static heat dissipation, non-current-dependent	P _{vs}	W	0
Heat dissipation capacity	P _{diss}	W	0
Operating ambient temperature min.		°C	-25
Operating ambient temperature max.		°C	75
			linear, per +1 °C, results in a 0.5% reduction of current carrying capacity
IEC/EN 61439 design verification			
10.2 Strength of materials and parts			
10.2.2 Corrosion resistance			
			Meets the product standard's requirements.
10.2.3.1 Verification of thermal stability of enclosures			
			Meets the product standard's requirements.
10.2.3.2 Verification of resistance of insulating materials to normal heat			
			Meets the product standard's requirements.
10.2.3.3 Verification of resistance of insulating materials to abnormal heat and fire due to internal electric effects			
			Meets the product standard's requirements.
10.2.4 Resistance to ultra-violet (UV) radiation			
			Meets the product standard's requirements.
10.2.5 Lifting			
			Does not apply, since the entire switchgear needs to be evaluated.
10.2.6 Mechanical impact			
			Does not apply, since the entire switchgear needs to be evaluated.
10.2.7 Inscriptions			
			Meets the product standard's requirements.
10.3 Degree of protection of ASSEMBLIES			
			Does not apply, since the entire switchgear needs to be evaluated.
10.4 Clearances and creepage distances			
			Meets the product standard's requirements.
10.5 Protection against electric shock			
			Does not apply, since the entire switchgear needs to be evaluated.
10.6 Incorporation of switching devices and components			
			Does not apply, since the entire switchgear needs to be evaluated.
10.7 Internal electrical circuits and connections			
			Is the panel builder's responsibility.
10.8 Connections for external conductors			
			Is the panel builder's responsibility.
10.9 Insulation properties			
10.9.2 Power-frequency electric strength			
			Is the panel builder's responsibility.
10.9.3 Impulse withstand voltage			
			Is the panel builder's responsibility.
10.9.4 Testing of enclosures made of insulating material			
			Is the panel builder's responsibility.
10.10 Temperature rise			
			The panel builder is responsible for the temperature rise calculation. Eaton will provide heat dissipation data for the devices.
10.11 Short-circuit rating			
			Is the panel builder's responsibility. The specifications for the switchgear must be observed.
10.12 Electromagnetic compatibility			
			Is the panel builder's responsibility. The specifications for the switchgear must be observed.
10.13 Mechanical function			
			The device meets the requirements, provided the information in the instruction leaflet (IL) is observed.

Technical data ETIM 7.0

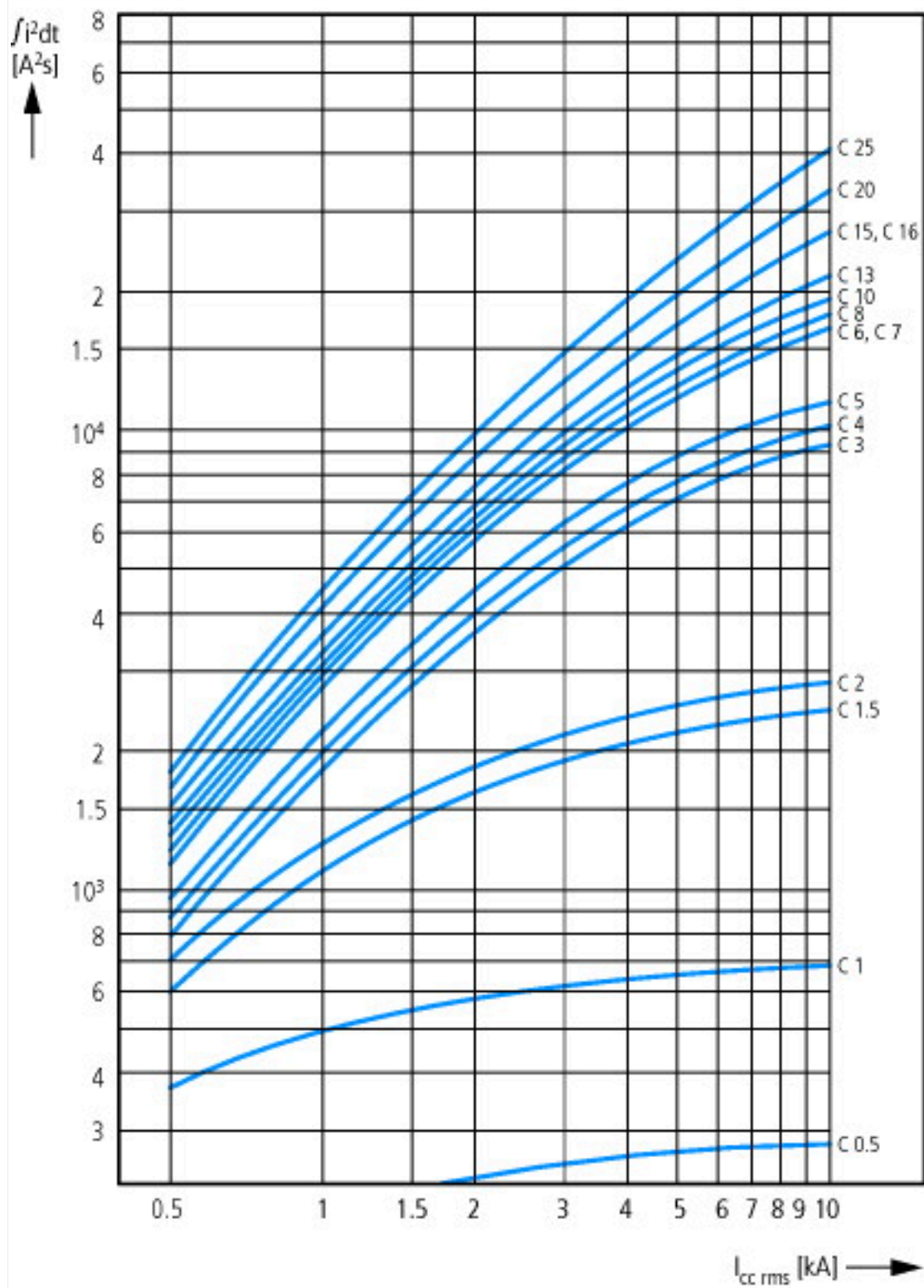
Circuit breakers and fuses (EG000020) / Miniature circuit breaker (MCB) (EC000042)			
Electric engineering, automation, process control engineering / Electrical installation, device / Miniature circuit breaker system (MCB) / Miniature circuit breaker (MCB) (ec1@ss10.0.1-27-14-19-01 [AAB905014])			
Release characteristic			C
Number of poles (total)			1
Number of protected poles			1
Rated current	A		5
Rated voltage	V		240
Rated insulation voltage U _i	V		440
Rated impulse withstand voltage U _{imp}	kV		4
Rated short-circuit breaking capacity I _{cn} EN 60898 at 230 V	kA		0
Rated short-circuit breaking capacity I _{cn} EN 60898 at 400 V	kA		0
Rated short-circuit breaking capacity I _{cu} IEC 60947-2 at 230 V	kA		15
Rated short-circuit breaking capacity I _{cu} IEC 60947-2 at 400 V	kA		15
Voltage type			AC
Frequency	Hz		50 - 60
Current limiting class			3
Suitable for flush-mounted installation			No
Concurrently switching N-neutral			No

Over voltage category			3
Pollution degree			2
Additional equipment possible			Yes
Width in number of modular spacings			1
Built-in depth		mm	70.5
Degree of protection (IP)			IP20
Ambient temperature during operating		°C	-25 - 75
Connectable conductor cross section multi-wired		mm ²	1 - 25
Connectable conductor cross section solid-core		mm ²	1 - 25

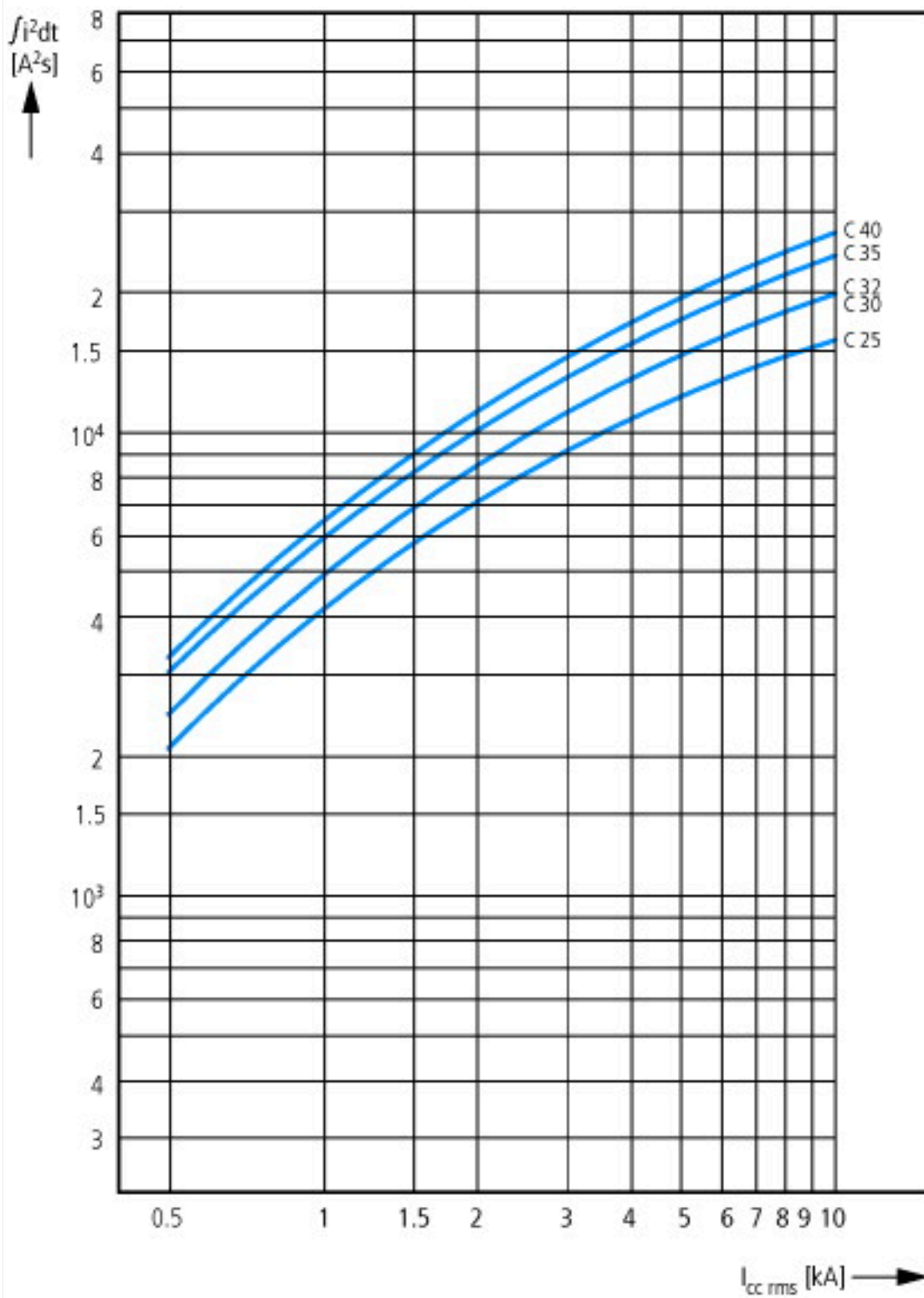
Approvals

Product Standards			IEC/EN 60947-2; UL 489; CSA-C22.2 No. 5-09; CE marking
UL File No.			E235139
UL Category Control No.			DIVQ
CSA File No.			204453
CSA Class No.			1432-01
North America Certification			UL listed, CSA certified
Specially designed for North America			Yes, suitable as BCPD
Suitable for			Feeder circuits, branch circuits
Current Limiting Circuit-Breaker			Yes
Max. Voltage Rating			≤ 32 A
Degree of Protection			IEC: IP20, UL/CSA Type: -

Characteristics



Let-through energy I^2t
 Characteristic C (0.5 - 20 A), 277 V



Characteristic C (25 - 40 A), 240 V

Assets (links)

Manuals

[hkr-system/Bedienungs- und Montageanleitungen/150501363 \(German\)](#)



Miniature circuit breaker (MCB), 6A, 1p, C-Char, AC

Part no. FAZ-C6/1-NA
Catalog No. 102084
Eaton Catalog No. FAZ-C6/1-NA
EL-Nummer (Norway) 0001691573

Similar to illustration

Delivery program

Basic function			Miniature circuit-breakers
Number of poles			1 pole
Tripping characteristic			C
Application			Switchgear for export to North America (UL-listed)
Rated current	I_n	A	6
Rated switching capacity acc. to IEC/EN 60947-2	I_{cu}	kA	15
Product range			FAZ-NA

Technical data

Electrical

Standards			UL 489, CSA C22.2 No. 5 IEC 60947-2
Rated operational voltage	U_e	V	
		V AC	277/480 Y
		V DC	60
Rated voltage according to IEC/EN 60947-2	U_n	V AC	254
Rated voltage according to UL	U_n	V AC	277
Rated switching capacity acc. to IEC/EN 60947-2	I_{cu}	kA	15
Breaking capacity according to UL		kA	10 (UL489)
Characteristic			B, C, D
Selectivity Class			3
lifespan			
Lifespan	Operations		> 20000
Direction of incoming supply			as required

Mechanical

Standard front dimension		mm	45
Enclosure height		mm	105
Mounting width per pole		mm	17.7
Mounting			IEC/EN 60715 top-hat rail
Degree of Protection			IP20, IP40 (when fitted)
Terminals top and bottom			Twin-purpose terminals
Terminal protection			Finger and back-of-hand proof to BGV A2
Tightening torque of fixing screws		N/m	max. 2.4 UL: #18-12 AWG: 2.4 Nm (21 lb-in) #10-8 AWG: 2.8 Nm (25 lb-in) #6 AWG: 4 Nm (36 lb-in)
Mounting position			As required

Design verification as per IEC/EN 61439

Technical data for design verification			
Rated operational current for specified heat dissipation	I_n	A	6

Heat dissipation per pole, current-dependent	P _{vid}	W	0
Equipment heat dissipation, current-dependent	P _{vid}	W	1.2
Static heat dissipation, non-current-dependent	P _{vs}	W	0
Heat dissipation capacity	P _{diss}	W	0
Operating ambient temperature min.		°C	-25
Operating ambient temperature max.		°C	75
			linear, per +1 °C, results in a 0.5% reduction of current carrying capacity
IEC/EN 61439 design verification			
10.2 Strength of materials and parts			
10.2.2 Corrosion resistance			
			Meets the product standard's requirements.
10.2.3.1 Verification of thermal stability of enclosures			
			Meets the product standard's requirements.
10.2.3.2 Verification of resistance of insulating materials to normal heat			
			Meets the product standard's requirements.
10.2.3.3 Verification of resistance of insulating materials to abnormal heat and fire due to internal electric effects			
			Meets the product standard's requirements.
10.2.4 Resistance to ultra-violet (UV) radiation			
			Meets the product standard's requirements.
10.2.5 Lifting			
			Does not apply, since the entire switchgear needs to be evaluated.
10.2.6 Mechanical impact			
			Does not apply, since the entire switchgear needs to be evaluated.
10.2.7 Inscriptions			
			Meets the product standard's requirements.
10.3 Degree of protection of ASSEMBLIES			
			Does not apply, since the entire switchgear needs to be evaluated.
10.4 Clearances and creepage distances			
			Meets the product standard's requirements.
10.5 Protection against electric shock			
			Does not apply, since the entire switchgear needs to be evaluated.
10.6 Incorporation of switching devices and components			
			Does not apply, since the entire switchgear needs to be evaluated.
10.7 Internal electrical circuits and connections			
			Is the panel builder's responsibility.
10.8 Connections for external conductors			
			Is the panel builder's responsibility.
10.9 Insulation properties			
10.9.2 Power-frequency electric strength			
			Is the panel builder's responsibility.
10.9.3 Impulse withstand voltage			
			Is the panel builder's responsibility.
10.9.4 Testing of enclosures made of insulating material			
			Is the panel builder's responsibility.
10.10 Temperature rise			
			The panel builder is responsible for the temperature rise calculation. Eaton will provide heat dissipation data for the devices.
10.11 Short-circuit rating			
			Is the panel builder's responsibility. The specifications for the switchgear must be observed.
10.12 Electromagnetic compatibility			
			Is the panel builder's responsibility. The specifications for the switchgear must be observed.
10.13 Mechanical function			
			The device meets the requirements, provided the information in the instruction leaflet (IL) is observed.

Technical data ETIM 7.0

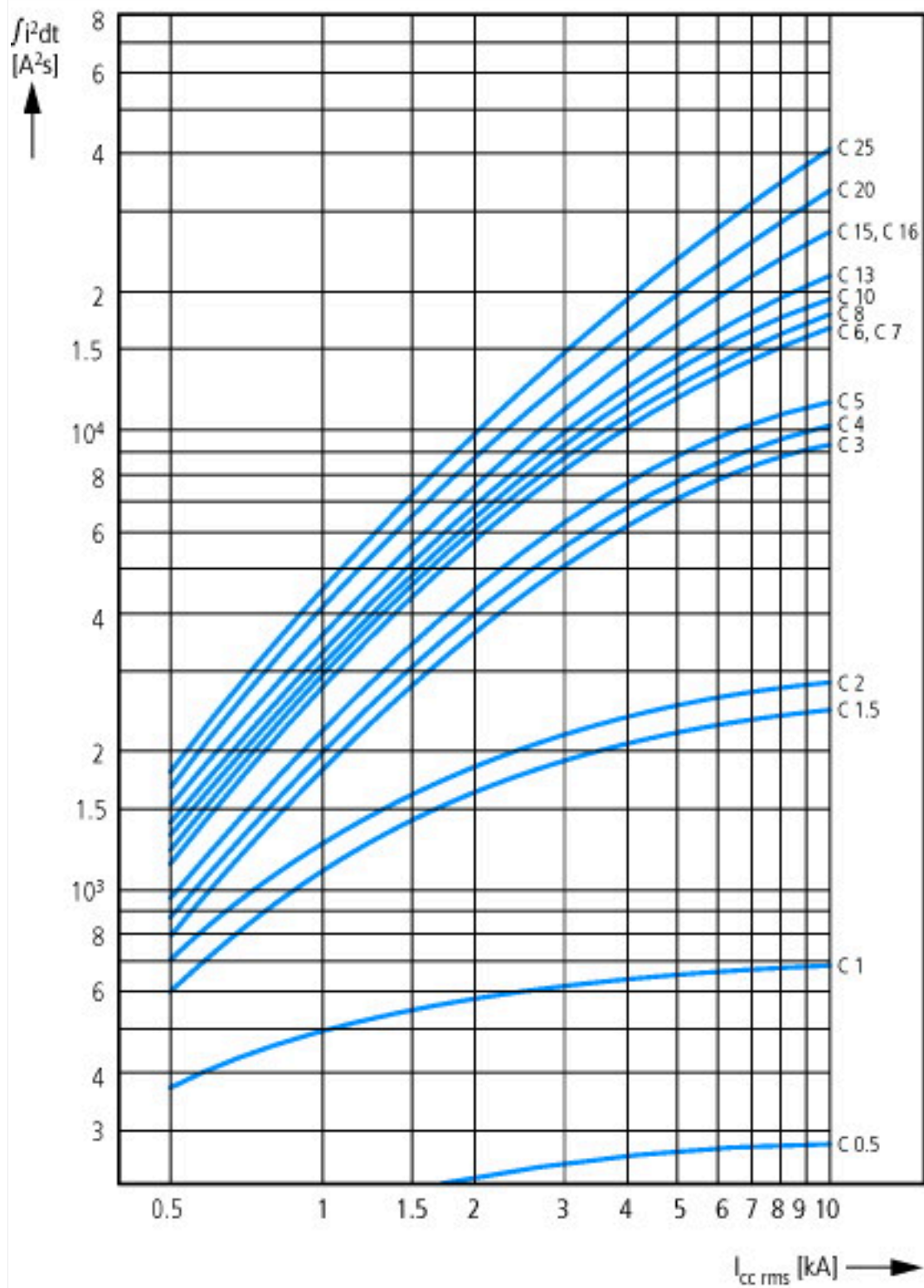
Circuit breakers and fuses (EG000020) / Miniature circuit breaker (MCB) (EC000042)			
Electric engineering, automation, process control engineering / Electrical installation, device / Miniature circuit breaker system (MCB) / Miniature circuit breaker (MCB) (ec1@ss10.0.1-27-14-19-01 [AAB905014])			
Release characteristic			C
Number of poles (total)			1
Number of protected poles			1
Rated current	A		6
Rated voltage	V		240
Rated insulation voltage U _i	V		440
Rated impulse withstand voltage U _{imp}	kV		4
Rated short-circuit breaking capacity I _{cn} EN 60898 at 230 V	kA		0
Rated short-circuit breaking capacity I _{cn} EN 60898 at 400 V	kA		0
Rated short-circuit breaking capacity I _{cu} IEC 60947-2 at 230 V	kA		15
Rated short-circuit breaking capacity I _{cu} IEC 60947-2 at 400 V	kA		15
Voltage type			AC
Frequency	Hz		50 - 60
Current limiting class			3
Suitable for flush-mounted installation			No
Concurrently switching N-neutral			No

Over voltage category			3
Pollution degree			2
Additional equipment possible			Yes
Width in number of modular spacings			1
Built-in depth		mm	70.5
Degree of protection (IP)			IP20
Ambient temperature during operating		°C	-25 - 75
Connectable conductor cross section multi-wired		mm ²	1 - 25
Connectable conductor cross section solid-core		mm ²	1 - 25

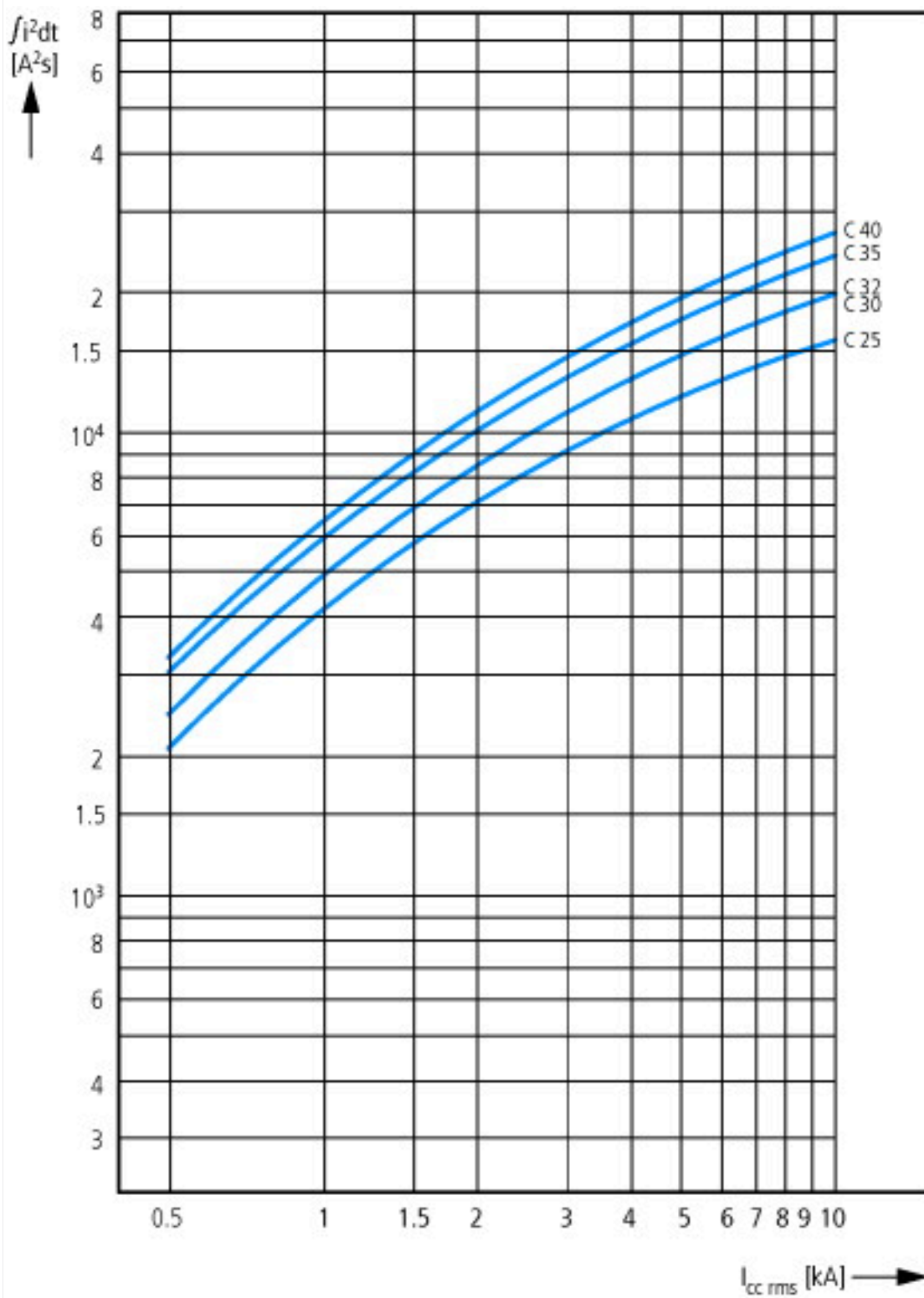
Approvals

Product Standards			IEC/EN 60947-2; UL 489; CSA-C22.2 No. 5-09; CE marking
UL File No.			E235139
UL Category Control No.			DIVQ
CSA File No.			204453
CSA Class No.			1432-01
North America Certification			UL listed, CSA certified
Specially designed for North America			Yes, suitable as BCPD
Suitable for			Feeder circuits, branch circuits
Current Limiting Circuit-Breaker			Yes
Max. Voltage Rating			≤ 32 A
Degree of Protection			IEC: IP20, UL/CSA Type: -

Characteristics



Let-through energy I^2t
 Characteristic C (0.5 - 20 A), 277 V



Characteristic C (25 - 40 A), 240 V

Assets (links)

Manuals

[hkr-system/Bedienungs- und Montageanleitungen/150501363 \(German\)](#)

**2, 3 & 4 CO relay interface modules,
27 mm wide with Screw terminals**
Ideal interface for PLC and electronic systems

Type 58.32

- 2 CO 10 A
- Screw terminals

Type 58.33

- 3 CO 10 A
- Screw terminals

Type 58.34

- 4 CO 7 A
- Screw terminals

- AC coils or DC coils
- Supply status indication and EMC coil suppression module as standard
- Identification label
- Cadmium Free contacts
- UL Listing (certain relay/socket combinations)
- 35 mm rail (EN 60715) mounting

58.32 / 58.33 / 58.34
Screw terminals



For outline drawing see page 7

Contact specification

Contact configuration

2 CO (DPDT)

Rated current/Maximum peak current

A 10/20

Rated voltage/
Maximum switching voltage

V AC 250/400

Rated load AC1

VA 2500

Rated load AC15 (230 V AC)

VA 500

Single phase motor rating (230 V AC)

kW 0.37

Breaking capacity DC1: 30/110/220 V

A 10/0.25/0.12

Minimum switching load

mW (V/mA) 300 (5/5)

Standard contact material

AgNi

Coil specification

Nominal voltage (U_N)

V AC (50/60 Hz) 12 - 24 - 48 - 110 - 120 - 230

V DC 12 - 24 - 48 - 125

Rated power AC/DC

VA (50 Hz)/W 1.5/1

Operating range

AC (0.8...1.1) U_N

DC (0.8...1.1) U_N

Holding voltage

AC/DC 0.8 U_N / 0.5 U_N

Must drop-out voltage

AC/DC 0.2 U_N / 0.1 U_N

Technical data

Mechanical life AC/DC

cycles 20 · 10⁶ / 50 · 10⁶

Electrical life at rated load AC1

cycles 200 · 10³

Operate/release time

ms 10/5 (AC) - 10/15 (DC)

Insulation between coil
and contacts (1.2/50 μ s)

kV 3.6

Dielectric strength
between open contacts

V AC 1000

Ambient temperature range

°C -40...+70

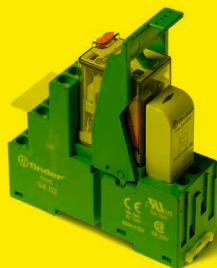
Protection category

IP 20

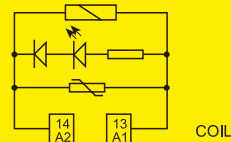
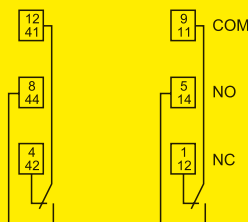
Approvals relay (according to type)



58.32



- 2 CO 10 A
- Screw terminals

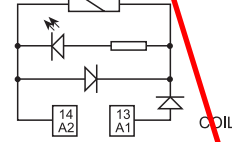
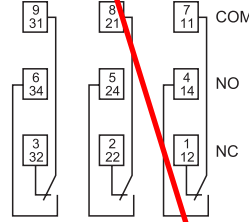


Example: AC

58.33



- 3 CO 10 A
- Screw terminals

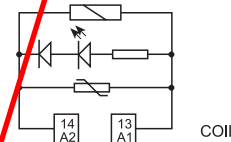
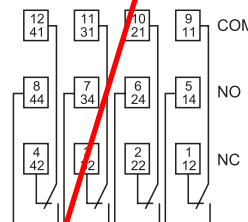


Example: DC

58.34



- 4 CO 7 A
- Screw terminals



Example: AC

Ordering information

Example: 58 series, 35 mm rail (EN 60715) mounting, Push-in terminals interface module, 4 CO, 24 V DC coil, green LED + diode.

B Series: 58.P

Type: 4.9.024.0050

A: Contact material
0 = AgNi Standard
5 = AgNi + Au

B: Contact circuit
0 = CO (nPDT)

C: Options
5 = Standard DC: green LED + diode (polarity +A+)
6 = Standard AC: green LED + Varistor

D: Special versions
0 = Standard

No. of poles
2 = 2 pole, 10 A
~~3 = 3 pole, 10 A~~
~~4 = 4 pole, 7 A~~

Coil version
8 = AC (50/60 Hz)
9 = DC

Coil voltage
See coil specifications
120 = 120v

Selecting features and options: only combinations in the same row are possible.
Preferred selections for best availability are shown in **bold**.

Type	Coil version	A	B	C	D
58.P3/P4/32/33/34	AC	0-5	0	6	0
58.P3/P4/32/33/34	DC	0-5	0	5	0

Ordering information ATEX versions

Example: 58 series, 35 mm rail (EN 60715), screw terminal interface module, 4 CO, 120 V AC, green LED, mechanical indicator, ATEX version

~~Series: 58.3~~

~~Type: 4.8.120.0049~~

~~**A: Contact material**
0 = AgNi Standard
2 = AgCdO
5 = AgNi + Au~~

~~**B: Contact circuit**
0 = CO (nPDT)~~

~~**D: Special versions**
8 = ATEX compliant (Ex nA nC) without mechanical indicator
9 = ATEX compliant (Ex nA nC) with mechanical indicator~~

~~**C: Options**
4 = Module 99 LED (AC/DC)
5 = Module 99 LED + Diode (DC)~~

~~**No. of poles**
2 = 2 pole, 10 A
4 = 4 pole, 6 A~~

~~**Coil version**
8 = AC (50/60 Hz)
9 = DC~~

~~**Coil voltage**
See coil specifications~~

Technical data

Insulation					
Insulation according to EN 61810-1	insulation rated voltage	V	400 (2-3 pole)	250 (4 pole)	
	rated impulse withstand voltage	kV	3.6 (2-3 pole)	2.5 (4 pole)	
	pollution degree		2	2	
	overvoltage category		III	II	
Insulation between coil and contacts (1.2/50 µs)		kV	3.6		
Dielectric strength between open contacts		V AC	1000		
Dielectric strength between adjacent contacts		V AC	2000 (58.32,58.33, 58.P3)	1550 (58.34, 58.P4)	
Conducted disturbance immunity					
Burst (5...50)ns, 5 kHz, on A1 - A2 according to EN 61000-4-4			level 4 (4 kV)		
Surge (1.2/50 µs) on A1 - A2 (differential mode) according to EN 61000-4-5			level 4 (4 kV)		
Other data					
Bounce time: NO/NC		ms	1/3		
Vibration resistance (10...55)Hz: NO/NC		g	6/6		
Power lost to the environment	without contact current	W	1		
	with rated current	W	3 (58.32, 58.34, 58.P4)	4 (58.P3, 58.33)	
			58.32/33/34 (screw terminals)	58.P3/P4 (Push-in terminals)	
Wire strip length		mm	8	8	
Screw torque		Nm	0.5	—	
Min. wire size		solid cable	stranded cable	solid cable	stranded cable
		mm ²	0.5	0.5	0.5
	AWG	21	21	21	21
	Max. wire size		solid cable	stranded cable	solid cable
mm ²			1 x 6 / 2 x 2.5	1 x 4 / 2 x 2.5	2 x 1.5 / 1 x 2.5
AWG	1 x 10 / 2 x 14	1 x 12 / 2 x 14	2 x 16 / 1 x 14	2 x 16 / 1 x 14	

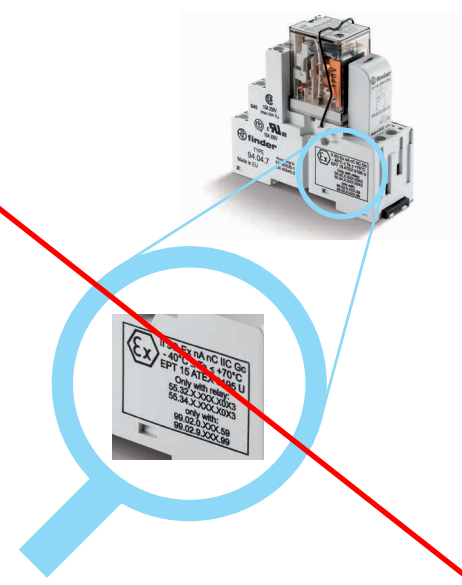
B

Other data ATEX versions

Max current @ 70 °C		Single piece mount	> 1 piece mount
Type 58.32	A	10	7
Type 58.34	A	6	5
Terminal			
Wire strip length		mm	8
Screw torque		Nm	0.5
Wire size		solid cable	stranded cable
		mm ²	1 x 2.5
	AWG	1 x 12	2 x 16

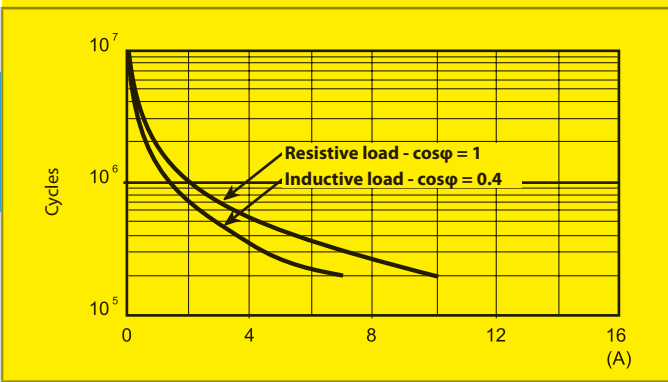
Markings - ATEX versions - ATEX, II 3G Ex nA nC IIC Gc

MARKING	
	Specific marking of explosion protection
II	Component for surface plant (different from mines)
3	Category 3: normal level of protection
GAS	G Explosive atmosphere due to presence of combustible gas vapour or mist
	Ex nA Non-sparking equipment
	Ex nC Sealed device (type of protection for category 3G)
	IIC Gas group
	Gc Equipment Protection Level
-40 °C ≤ Ta ≤ +70 °C Ambient temperature	
EPT 15 ATEX 0195 U EPT: laboratory which issues the CE type certificate 15: year of issue of certificate 0195: number of CE type certificate U: ATEX component	

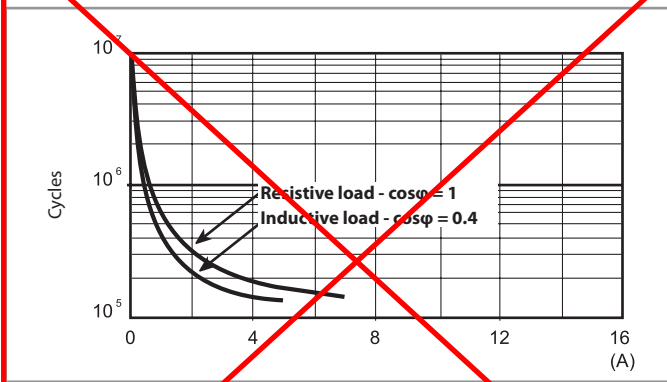


Contact specification

F 58 - Electrical life (AC) v contact current
2 & 3 pole relays

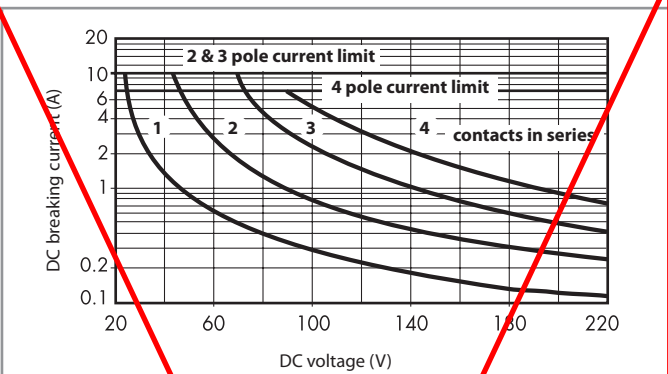


F 58 - Electrical life (AC) v contact current
4 pole relay



- When switching a resistive load (DC1) having voltage and current values under the curve, an electrical life of $\geq 100 \cdot 10^3$ can be expected.
- In the case of DC13 loads, the connection of a diode in parallel with the load will permit a similar electrical life as for a DC1 load.
Note: the release time for the load will be increased.

H 58 - Maximum DC1 breaking capacity

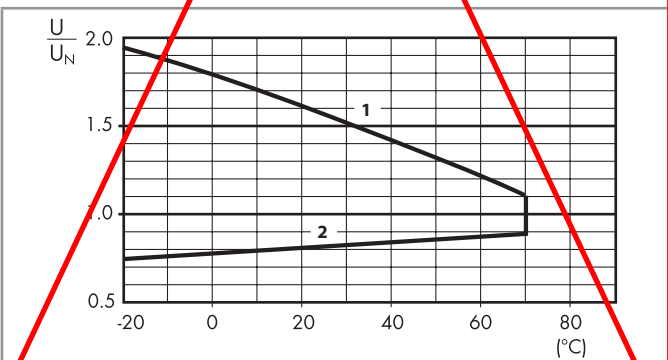


Coil specifications

DC coil data

Nominal voltage U_N V	Coil code	Operating range		Resistance R Ω	Rated coil absorption I at U_N mA
		U_{min} V	U_{max} V		
12	9.012	9.6	13.2	140	86
24	9.024	19.2	26.4	600	40
48	9.048	38.4	52.8	2400	20
125	9.125	100	138	17300	7.2

R 58 - DC coil operating range v ambient temperature

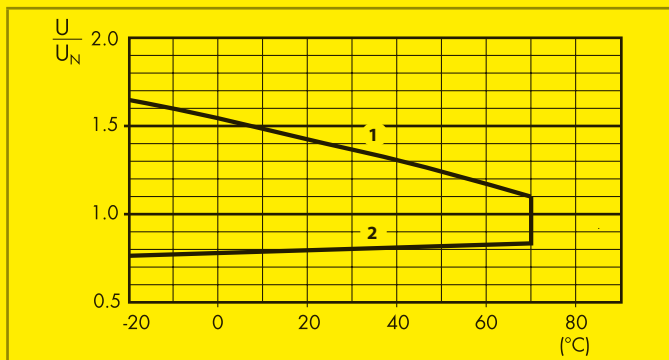


- 1 - Max. permitted coil voltage.
2 - Min. pick-up voltage with coil at ambient temperature.

AC coil data

Nominal voltage U_N V	Coil code	Operating range		Resistance R Ω	Rated coil absorption I at U_N (50 Hz) mA
		U_{min} V	U_{max} V		
12	8.012	9.6	13.2	50	97
24	8.024	19.2	26.4	190	53
48	8.048	38.4	52.8	770	25
110	8.110	88	121	4000	12.5
120	8.120	96	132	4700	12
230	8.230	184	253	17000	6

R 58 - AC coil operating range v ambient temperature



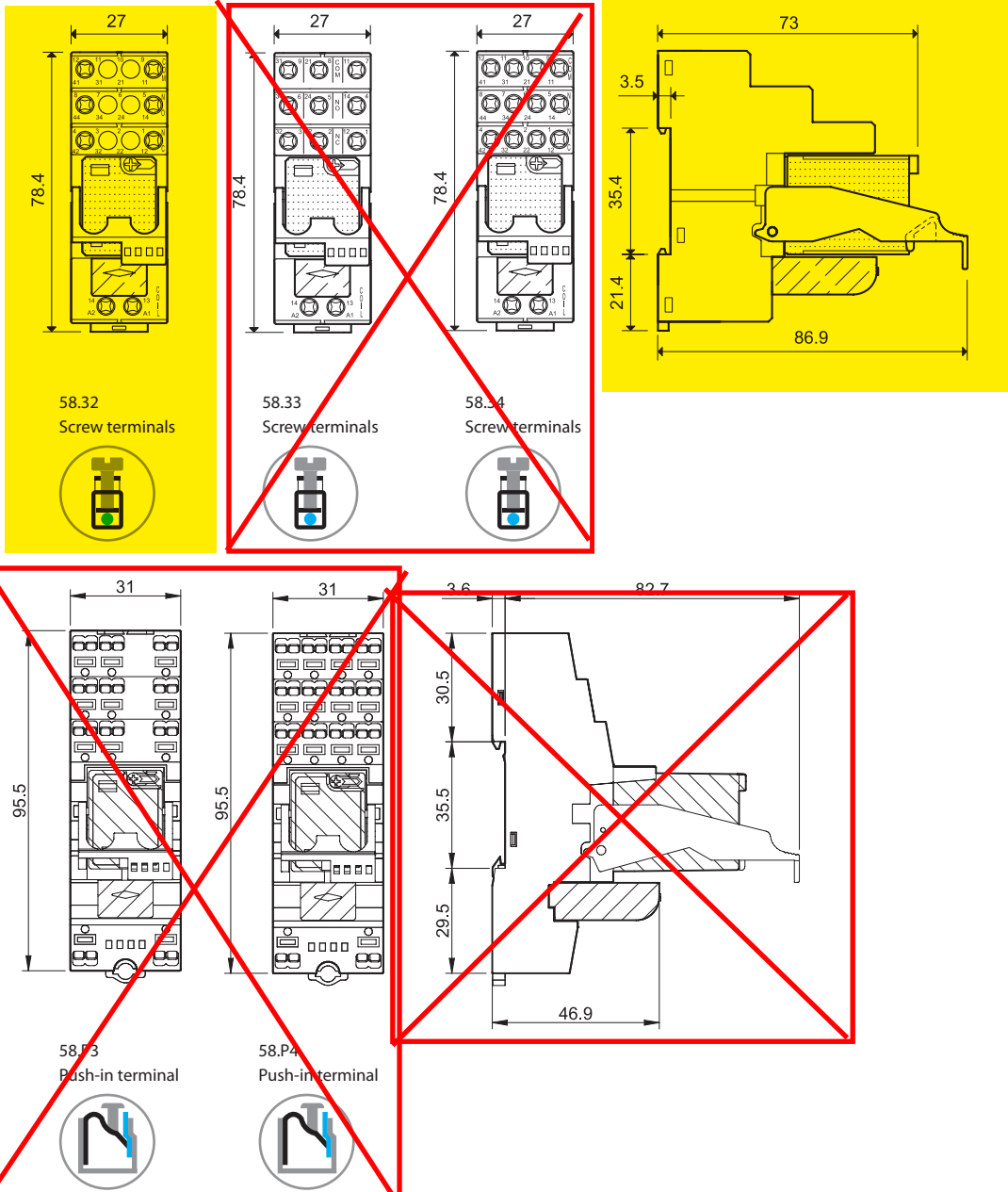
- 1 - Max. permitted coil voltage.
2 - Min. pick-up voltage with coil at ambient temperature.

Combinations

Certain relay/socket combinations

Code	Type of socket	Type of relay	Module	Retaining clip
58.P3	94.P3	55.33	99.02	094.91.3
58.P4	94.P4	55.34	99.02	094.91.3
58.32	94.02	55.32	99.02	094.91.3
58.33	94.03	55.33	99.02	094.91.3
58.34	94.04	55.34	99.02	094.91.3

Outline drawing



B

Accessories

094.52.1 **2-way jumper link** for type 58.P3 and 58.P4
Rated values: 10 A - 250 V

097.52 **2-way jumper link** for type 58.P3 and 58.P4
Rated values: 10 A - 250 V

097.00 **Marker tag holder** for type 58.P3, 58.P4, 58.32, 58.33 and 58.34
Rated values: 10 A - 250 V

094.06 **6-way jumper link** for type 58.32, 58.33, 58.34
Rated values: 10 A - 250 V

094.56 **6-way jumper link** for type 58.P3 and 58.P4
Rated values: 10 A - 250 V

060.48 **Sheet of marker tags, plastic, 48 tags, 6 x 12 mm**
Rated values: 10 A - 250 V

Packaging codes

How to code and identify retaining clip and packaging options for sockets.

Example:

5 8 . P 4 . 9 . 0 2 4 . 0 0 5 0 S P A

- A** Standard packaging
- B** Blister packaging
- SP** Plastic retaining clip
- SM** Metallic retaining clip (58.32/33/34 - x0xx only)

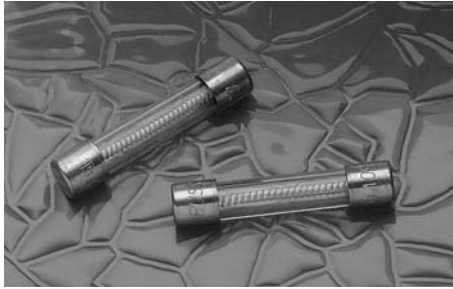
Dimensions: Accessories, continued

Dimensions: DIN Rail Stops and Stand-Offs

Part No.	Dimensions
<p>→ BNL-5</p>	<p>0.374" (9.5mm) Width</p> <p>1.77" (45mm) Length</p>
<p>BNL-8</p>	<p>1.794" (46mm)</p> <p>0.52" (14.1mm)</p>
<p>BNL-8</p>	<p>1.794" (46mm)</p> <p>0.52" (14.1mm)</p>
<p>BNDL2</p>	<p>1.17" (30mm)</p> <p>1.014" (26mm)</p> <p>0.51" (13mm)</p> <p>1.482" (38mm)</p>
<p>BNS3</p>	<p>1.17" (30mm)</p> <p>2 - Ø 0.21" (5.2mm)</p> <p>0.101" (2.6mm)</p> <p>0.59" (15mm)</p> <p>1.443" (37mm)</p>
<p>BNS4</p>	<p>1.17" (30mm)</p> <p>2.11" (54mm)</p> <p>0.49" (12.5mm)</p> <p>2 - Ø 0.20" (5mm)</p> <p>1.014" (26mm)</p> <p>0.59" (15mm)</p> <p>1.09" (28mm)</p> <p>0.59" (15mm)</p> <p>25°</p> <p>3.003" (77mm)</p>

MDL

1/4" x 1 1/4" Time-delay glass tube fuses



Product features

- Time-delay
- Optional axial leads available
- 1/4 x 1 1/4 (6.4 x 31.7mm) physical size
- Glass tube, nickel-plated brass endcap construction
- UL Listed product meets standard 248-14

Environmental data

- Shock: 1A thru 30A – MIL-STD-202, Method 207, (HI Shock)
- Vibration: 1/4A thru 30A – MIL-STD-202, Method 204, Test Condition C (Except 5g, 500HZ)

Agency information

- UL Listed Card: MDL 1/16 - 8A (Guide JDYX, File E19180)
- UL Recognized Card: MDL 9 - 30A (Guide JDYX2, File E19180)
- CSA Certification Card: MDL 1/16 - 8A (Class No. 1422-01)
- CSA Component Acceptance: MDL 9-30A (Class No. 1422-30)
- CE

Ordering

- Specify packaging code
- Insert packaging code prefix before part number. E.g., BK (or BK1)-MDL-5-R
- Specify option codes if desired
- For axial leads, insert "V" between catalog series and amp rating. E.g., BK-MDL-V-5-R
- For board washable, insert "B" between catalog series and amp rating. E.g., BK-MDL-B-5-R
- For axial leads and board washable, insert "B" then "V" between catalog series and amp rating. E.g., BK-MDL-BV-5-R

Part Number	Voltage Rating Vac	Specifications			Typical DC Cold Resistance** (Ω)	Typical Melting I ² t† AC	Typical Voltage Drop‡
		AC Interrupting Rating* (amps)@					
		250Vac	125Vac	32Vac			
MDL-1/16-R	250	35	10000	-	45.6	0.0046	2.79
MDL-1/10-R	250	35	10000	-	15.68	0.0420	1.95
MDL-1/8-R	250	35	10000	-	12.238	0.0422	1.52
MDL-3/16-R	250	35	10000	-	4.81	0.116	1.05
MDL-2/10-R	250	35	10000	-	5.234	0.314	0.972
MDL-1/4-R	250	35	10000	-	3.200	0.447	0.965
MDL-3/10-R	250	35	10000	-	2.046	0.412	0.808
MDL-3/8-R	250	35	10000	-	1.567	0.982	1.46
MDL-1/2-R	250	35	10000	-	0.943	1.656	1.27
MDL-3/4-R	250	35	10000	-	0.397	4.343	1.01
MDL-1-R	250	35	10000	-	0.273	11.498	0.995
MDL-1-1/4-R	250	100	10000	-	0.205	86.2	0.722
MDL-1-1/2-R	250	100	10000	-	0.156	22.7	0.721
MDL-2-R	250	100	10000	-	0.116	62.3	0.644
MDL-2-1/4-R	250	100	10000	-	0.096	49.6	0.535
MDL-2-1/2-R	250	100	10000	-	0.081	63.1	0.410
MDL-3-R	250	100	10000	-	0.057	67.5	0.345
MDL-4-R	250	200	10000	-	0.038	19.3	0.187
MDL-5-R	250	200	10000	-	0.025	32.0	0.160
MDL-6-R	250	200	10000	-	0.022	37.4	0.155
MDL-6-1/4-R	250	200	10000	-	0.02	38.7	0.152
MDL-7-R	250	200	10000	-	0.018	42.7	0.140
MDL-8-R	250	200	10000	-	0.015	47.8	0.119
MDL-9-R	32	-	-	1000	0.012	51.5	0.124
MDL-10-R	32	-	-	1000	0.01	64.4	0.114
MDL-15-R	32	-	-	1000	0.005	354.0	0.130
MDL-20-R	32	-	-	1000	0.004	2914.0	0.530
MDL-25††	32	-	-	1000	0.01225	15221.0	0.30
MDL-30††	32	-	-	1000	0.0011	15581.0	0.40

* Interrupting Ratings (Interrupting ratings were measured at 70% - 80% power factor on AC)

** DC Cold Resistance (Measured at ≤10% of rated current)

† Typical Melting I²t (A²Sec) (I²t was measured at listed interrupting rating and rated voltage.)

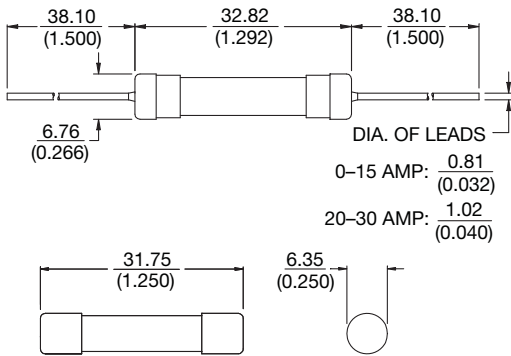
‡ Typical Voltage Drop (Voltage drop was measured at 25°C±3°C ambient temperature at rated current)

†† MDL-25 & MDL-30 not available in RoHS compliant construction.

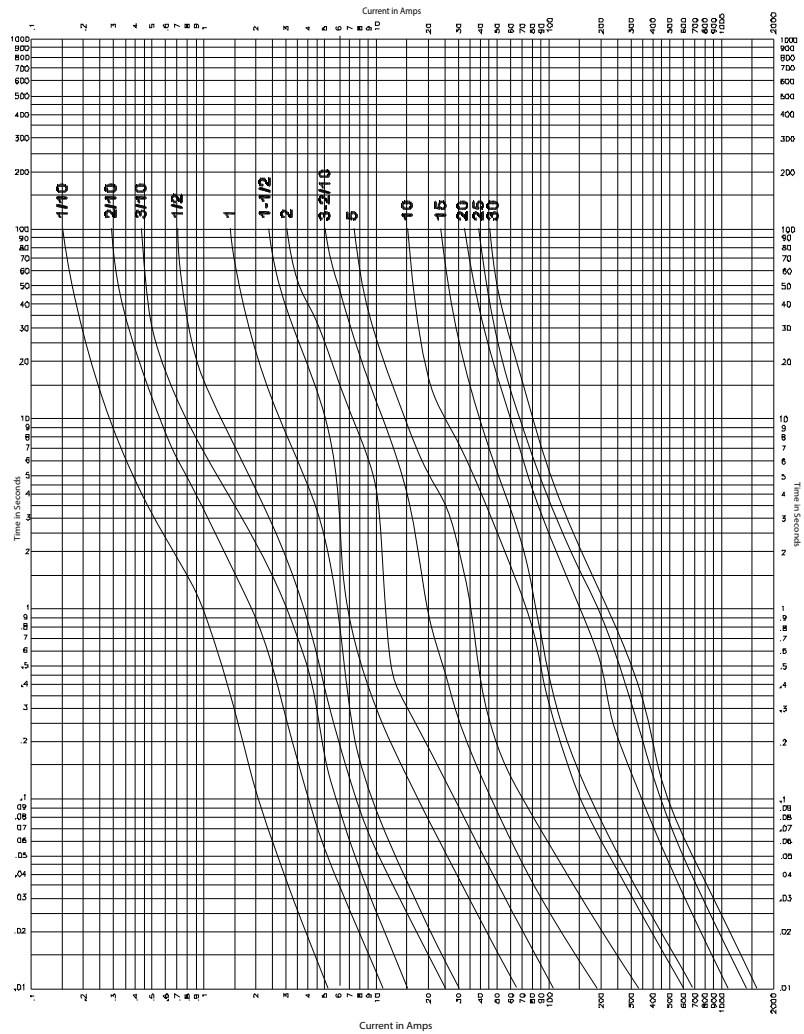


Powering Business Worldwide

Dimensions - mm (in)
Drawing Not to Scale



Time-Current Curve



Packaging Code	
Packaging Code	Description
BK	100 fuses packed into a cardboard carton
BK1	1,000 fuses packed into a cardboard carton
BK8	8,000 fuses packed into a cardboard carton

Option Code	
Option Code	Description
B	Sealed to withstand aqueous cleaning (Board Washable)
V	Axial leads - copper tinned wire with nickel plated brass overcaps

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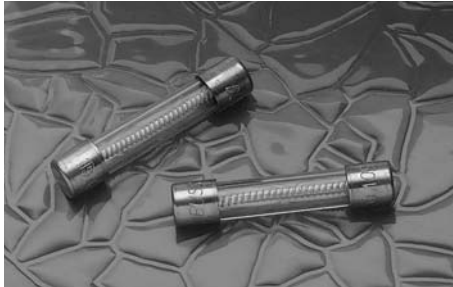
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Publication No. 2004 SB-BU08675
June 2017

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MDL

1/4" x 1 1/4" Time-delay glass tube fuses



Product features

- Time-delay
- Optional axial leads available
- 1/4 x 1 1/4 (6.4 x 31.7mm) physical size
- Glass tube, nickel-plated brass endcap construction
- UL Listed product meets standard 248-14

Environmental data

- Shock: 1A thru 30A – MIL-STD-202, Method 207, (HI Shock)
- Vibration: 1/4A thru 30A – MIL-STD-202, Method 204, Test Condition C (Except 5g, 500HZ)

Agency information

- UL Listed Card: MDL 1/16 - 8A (Guide JDYX, File E19180)
- UL Recognized Card: MDL 9 - 30A (Guide JDYX2, File E19180)
- CSA Certification Card: MDL 1/16 - 8A (Class No. 1422-01)
- CSA Component Acceptance: MDL 9-30A (Class No. 1422-30)
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Part Number	Voltage Rating Vac	Specifications			Typical DC Cold Resistance** (Ω)	Typical Melting I ^{††} AC	Typical Voltage Drop‡
		AC Interrupting Rating* (amps)@					
		250Vac	125Vac	32Vac			
MDL 1/16-R	250	35	10000	-	45.6	0.0046	2.79
MDL 1/10-R	250	35	10000	-	15.68	0.0420	1.95
MDL 1/8-R	250	35	10000	-	12.238	0.0422	1.52
MDL 3/16-R	250	35	10000	-	4.81	0.116	1.05
MDL 2/10-R	250	35	10000	-	5.234	0.314	0.972
MDL 1/4-R	250	35	10000	-	3.208	0.447	0.965
MDL 3/10-R	250	35	10000	-	2.046	0.412	0.808
MDL 3/8-R	250	35	10000	-	1.567	0.982	1.46
MDL 1/2-R	250	35	10000	-	0.943	1.656	1.27
MDL 3/4-R	250	35	10000	-	0.397	4.343	1.01
MDL 1-R	250	35	10000	-	0.273	11.498	0.995
MDL 1-1/4-R	250	100	10000	-	0.205	86.2	0.722
MDL 1-1/2-R	250	100	10000	-	0.156	22.7	0.721
MDL 2-R	250	100	10000	-	0.116	62.3	0.644
MDL 2-1/4-R	250	100	10000	-	0.096	49.6	0.535
MDL 2-1/2-R	250	100	10000	-	0.081	63.1	0.410
MDL 3-R	250	100	10000	-	0.057	67.5	0.345
MDL 4-R	250	200	10000	-	0.038	19.3	0.187
MDL 5-R	250	200	10000	-	0.025	32.0	0.160
MDL 6-R	250	200	10000	-	0.022	37.4	0.155
MDL 6-1/4-R	250	200	10000	-	0.02	38.7	0.152
MDL 7-R	250	200	10000	-	0.018	42.7	0.140
MDL 8-R	250	200	10000	-	0.015	47.8	0.119
MDL 9-R	32	-	-	1000	0.012	51.5	0.124
MDL 10-R	32	-	-	1000	0.01	64.4	0.114
MDL 15-R	32	-	-	1000	0.005	354.0	0.130
MDL 20-R	32	-	-	1000	0.004	2914.0	0.530
MDL 25††	32	-	-	1000	0.01225	15221.0	0.30
MDL 30††	32	-	-	1000	0.0011	15581.0	0.40

* Interrupting Ratings (Interrupting ratings were measured at 70% - 80% power factor on AC)

** DC Cold Resistance (Measured at ≤10% of rated current)

† Typical Melting I^{††} (I^{††}t was measured at listed interrupting rating and rated voltage.)

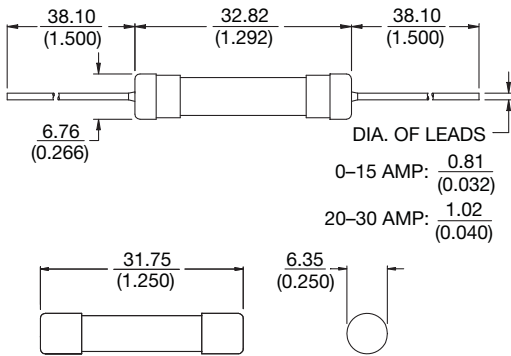
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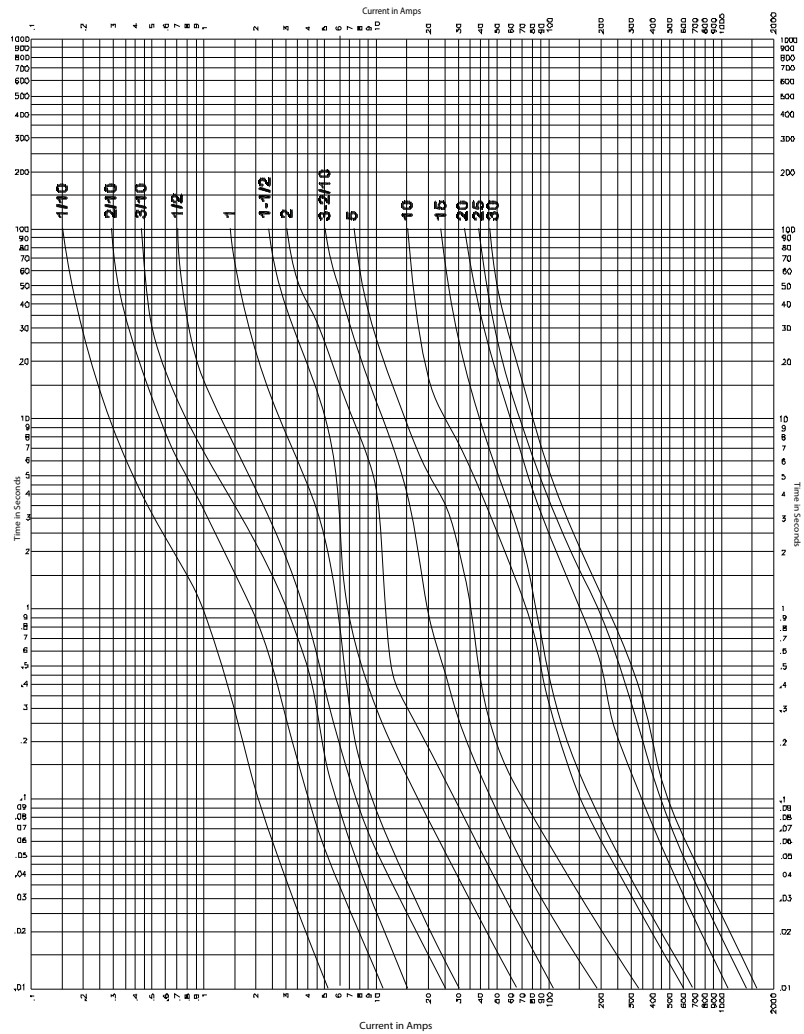


Powering Business Worldwide

Dimensions - mm (in)
Drawing Not to Scale



Time-Current Curve



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Option Code	Description
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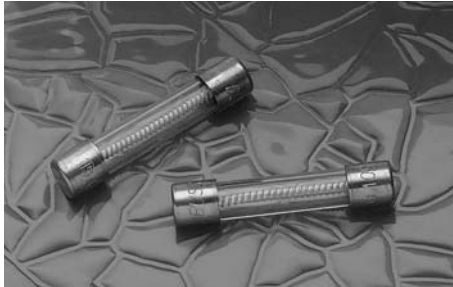
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MDL

1/4" x 1 1/4" Time-delay glass tube fuses



Product features

- Time-delay
- Optional axial leads available
- 1/4 x 1 1/4 (6.4 x 31.7mm) physical size
- Glass tube, nickel-plated brass endcap construction
- UL Listed product meets standard 248-14

Environmental data

- Shock: 1A thru 30A – MIL-STD-202, Method 207, (HI Shock)
- Vibration: 1/4A thru 30A – MIL-STD-202, Method 204, Test Condition C (Except 5g, 500HZ)

Agency information

- UL Listed Card: MDL 1/16 - 8A (Guide JDYX, File E19180)
- UL Recognized Card: MDL 9 - 30A (Guide JDYX2, File E19180)
- CSA Certification Card: MDL 1/16 - 8A (Class No. 1422-01)
- CSA Component Acceptance: MDL 9-30A (Class No. 1422-30)
- CE

Ordering

- Specify packaging code
- Insert packaging code prefix before part number. E.g., BK (or BK1)-MDL-5-R
- Specify option codes if desired
- For axial leads, insert "V" between catalog series and amp rating. E.g., BK-MDL-V-5-R
- For board washable, insert "B" between catalog series and amp rating. E.g., BK-MDL-B-5-R
- For axial leads and board washable, insert "B" then "V" between catalog series and amp rating. E.g., BK-MDL-BV-5-R

Part Number	Voltage Rating Vac	Specifications			Typical DC Cold Resistance** (Ω)	Typical Melting I ² t† AC	Typical Voltage Drop‡
		AC Interrupting Rating* (amps)@					
		250Vac	125Vac	32Vac			
MDL-1/16-R	250	35	10000	-	45.6	0.0046	2.79
MDL-1/10-R	250	35	10000	-	15.68	0.0420	1.95
MDL-1/8-R	250	35	10000	-	12.238	0.0422	1.52
MDL-3/16-R	250	35	10000	-	4.81	0.116	1.05
MDL-2/10-R	250	35	10000	-	5.234	0.314	0.972
MDL-1/4-R	250	35	10000	-	3.208	0.447	0.965
MDL-3/10-R	250	35	10000	-	2.046	0.412	0.808
MDL-3/8-R	250	35	10000	-	1.567	0.982	1.46
MDL-1/2-R	250	35	10000	-	0.943	1.656	1.27
MDL-3/4-R	250	35	10000	-	0.397	4.343	1.01
MDL-1-R	250	35	10000	-	0.273	11.498	0.995
MDL-1-1/4-R	250	100	10000	-	0.205	86.2	0.722
MDL-1-1/2-R	250	100	10000	-	0.156	22.7	0.721
MDL-2-R	250	100	10000	-	0.116	62.3	0.644
MDL-2-1/4-R	250	100	10000	-	0.096	49.6	0.535
MDL-2-1/2-R	250	100	10000	-	0.081	63.1	0.410
MDL-3-R	250	100	10000	-	0.057	67.5	0.345
MDL-4-R	250	200	10000	-	0.038	19.3	0.187
MDL-5-R	250	200	10000	-	0.025	32.0	0.160
MDL-6-R	250	200	10000	-	0.022	37.4	0.155
MDL-6-1/4-R	250	200	10000	-	0.02	38.7	0.152
MDL-7-R	250	200	10000	-	0.018	42.7	0.140
MDL-8-R	250	200	10000	-	0.015	47.8	0.119
MDL-9-R	32	-	-	1000	0.012	51.5	0.124
MDL-10-R	32	-	-	1000	0.01	64.4	0.114
MDL-15-R	32	-	-	1000	0.005	354.0	0.130
MDL-20-R	32	-	-	1000	0.004	2914.0	0.530
MDL-25††	32	-	-	1000	0.01225	15221.0	0.30
MDL-30††	32	-	-	1000	0.0011	15581.0	0.40

* Interrupting Ratings (Interrupting ratings were measured at 70% - 80% power factor on AC)

** DC Cold Resistance (Measured at ≤10% of rated current)

† Typical Melting I²t (A²Sec) (I²t was measured at listed interrupting rating and rated voltage.)

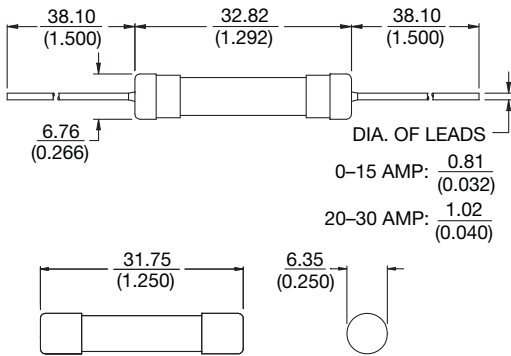
‡ Typical Voltage Drop (Voltage drop was measured at 25°C±3°C ambient temperature at rated current)

†† MDL-25 & MDL-30 not available in RoHS compliant construction.

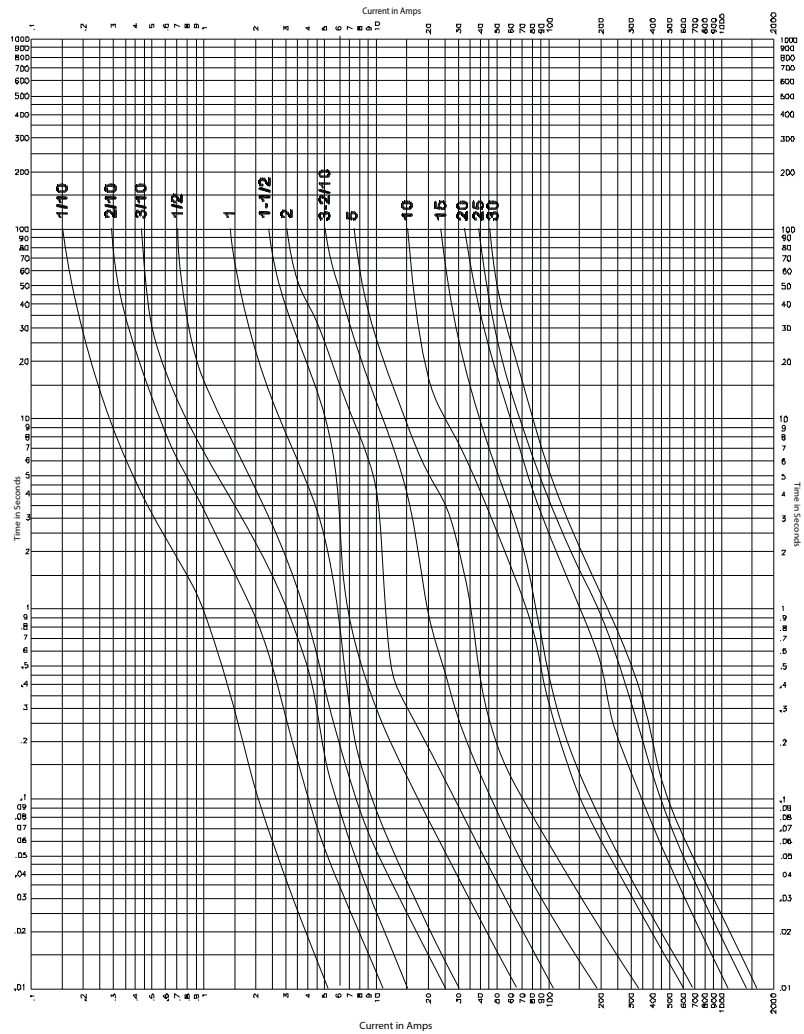


Powering Business Worldwide

Dimensions - mm (in)
Drawing Not to Scale



Time-Current Curve



Packaging Code	
Packaging Code	Description
BK	100 fuses packed into a cardboard carton
BK1	1,000 fuses packed into a cardboard carton
BK8	8,000 fuses packed into a cardboard carton

Option Code	
Option Code	Description
B	Sealed to withstand aqueous cleaning (Board Washable)
V	Axial leads - copper tinned wire with nickel plated brass overcaps

Life Support Policy: Eaton does not authorize the use of any of its products for use in life support devices or systems without the express written approval of an officer of the Company. Life support systems are devices which support or sustain life, and whose failure to perform, when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in significant injury to the user.

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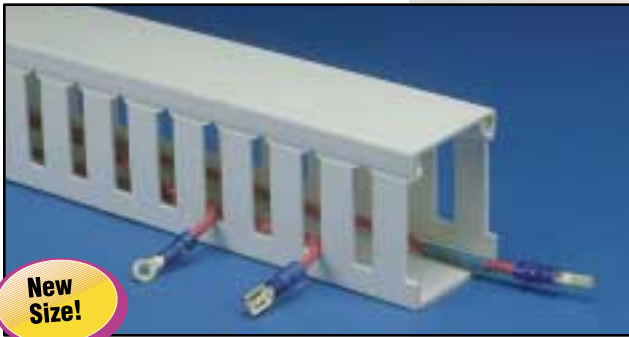
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PANDUCT® Type G — Slotted Wall Wiring Duct



Type G Slotted Wall Wiring Duct

- Made of rigid PVC (See pg. 41 for material specifications)
- Rated for continuous use temperatures up to 50°C (122°F)
- U.L. Flammability Rating: V-0
- Available in a variety of colors as a standard part
- Provided with standard mounting holes (See page 35 for dimensions)
- Available with adhesive backing* (See page 25 for details)

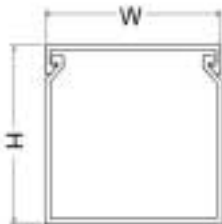


Type G— Wiring Duct Standard Colors:

LG	DG	WH
Light Gray	Dark Gray	White

BL	IB
Black	Intrinsic Blue

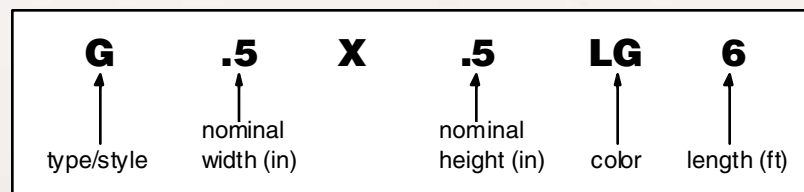
Colors shown are approximate.



Duct Part Number	Duct External Dimensions		Cover Part Number	Duct Std. Ctn. Qty.	Cover Std. Ctn. Qty.	Std. Lgth.
	WxH In.	WxH (mm)				
G.5X.5LGG	0.69 x .56	(17.5) x (14.2)	C.5LG6	120 ft.	120 ft.	6 ft.
G.5X1LG6	0.69 x 1.09	(17.5) x (27.1)		120 ft.	120 ft.	
G.5X4LG6	0.69 x 4.10	(17.5) x (104.0)		120 ft.	120 ft.	
G.75X.75LG6	0.94 x 0.83	(23.9) x (21.0)	C.75LG6	120 ft.	120 ft.	6 ft.
G.75X1LG6	0.94 x 1.09	(23.9) x (27.1)		120 ft.	120 ft.	
G.75X1.5LG6	0.94 x 1.58	(23.9) x (40.0)		120 ft.	120 ft.	
G.75X2LG6	0.94 x 2.09	(23.9) x (53.0)		120 ft.	120 ft.	
G.1X1LGG	1.25 x 1.00	(31.8) x (25.4)	C.1LGG	120 ft.	120 ft.	6 ft.
G.1X1.5LGG	1.25 x 1.50	(31.8) x (38.0)		120 ft.	120 ft.	
G.1X2LGG	1.25 x 2.00	(31.8) x (50.0)		120 ft.	120 ft.	
G.1X3LGG	1.25 x 3.10	(31.8) x (78.6)		120 ft.	120 ft.	
G.1X4LGG	1.25 x 4.10	(31.8) x (104.0)		60 ft.	120 ft.	
G.1.5X1LGG	1.75 x 1.00	(44.5) x (25.4)	C.1.5LG6	120 ft.	120 ft.	6 ft.
G.1.5X1.5LGG	1.75 x 1.50	(44.5) x (38.0)		120 ft.	120 ft.	
G.1.5X2LGG	1.75 x 2.00	(44.5) x (50.0)		120 ft.	120 ft.	
G.1.5X3LGG	1.75 x 3.10	(44.5) x (78.6)		120 ft.	120 ft.	
G.1.5X4LGG	1.75 x 4.10	(44.5) x (104.0)		60 ft.	120 ft.	
G.2X1LGG	2.25 x 1.00	(57.2) x (25.4)	C.2WH6	120 ft.	120 ft.	6 ft.
G.2X1.5LGG	2.25 x 1.50	(57.2) x (38.0)		120 ft.	120 ft.	
G.2X2LGG	2.25 x 2.00	(57.2) x (50.0)		120 ft.	120 ft.	
G.2X3LGG	2.25 x 3.10	(57.2) x (78.6)		60 ft.	120 ft.	
G.2X4LGG	2.25 x 4.10	(57.2) x (104.0)		60 ft.	120 ft.	
G.2.5X3LGG	2.75 x 3.10	(70.0) x (78.6)	C.2.5LGG	60 ft.	120 ft.	6 ft.
G.3X1LGG	3.25 x 1.00	(82.6) x (25.4)	C.3WH6	120 ft.	120 ft.	6 ft.
G.3X2LGG	3.25 x 1.50	(82.6) x (38.0)		120 ft.	120 ft.	
G.3X3LGG	3.25 x 2.00	(82.6) x (50.0)		60 ft.	120 ft.	
G.3X4LGG	3.25 x 3.10	(82.6) x (78.6)		60 ft.	120 ft.	
G.3X5LGG	3.25 x 4.10	(82.6) x (104.0)		60 ft.	120 ft.	
G.4X1.5LGG	4.25 x 1.50	(108.0) x (38.0)	C.4WH6	60 ft.	120 ft.	6 ft.
G.4X2LGG	4.25 x 2.00	(108.0) x (50.0)		60 ft.	120 ft.	
G.4X3LGG	4.25 x 3.10	(108.0) x (78.6)		60 ft.	120 ft.	
G.4X4LGG	4.25 x 4.10	(108.0) x (104.0)		60 ft.	120 ft.	
G.4X5LGG	4.25 x 5.10	(108.0) x (129.7)		60 ft.	120 ft.	
G.5X1LGG	5.25 x 1.10	(133.0) x (27.9)	C.5LGG	60 ft.	120 ft.	6 ft.

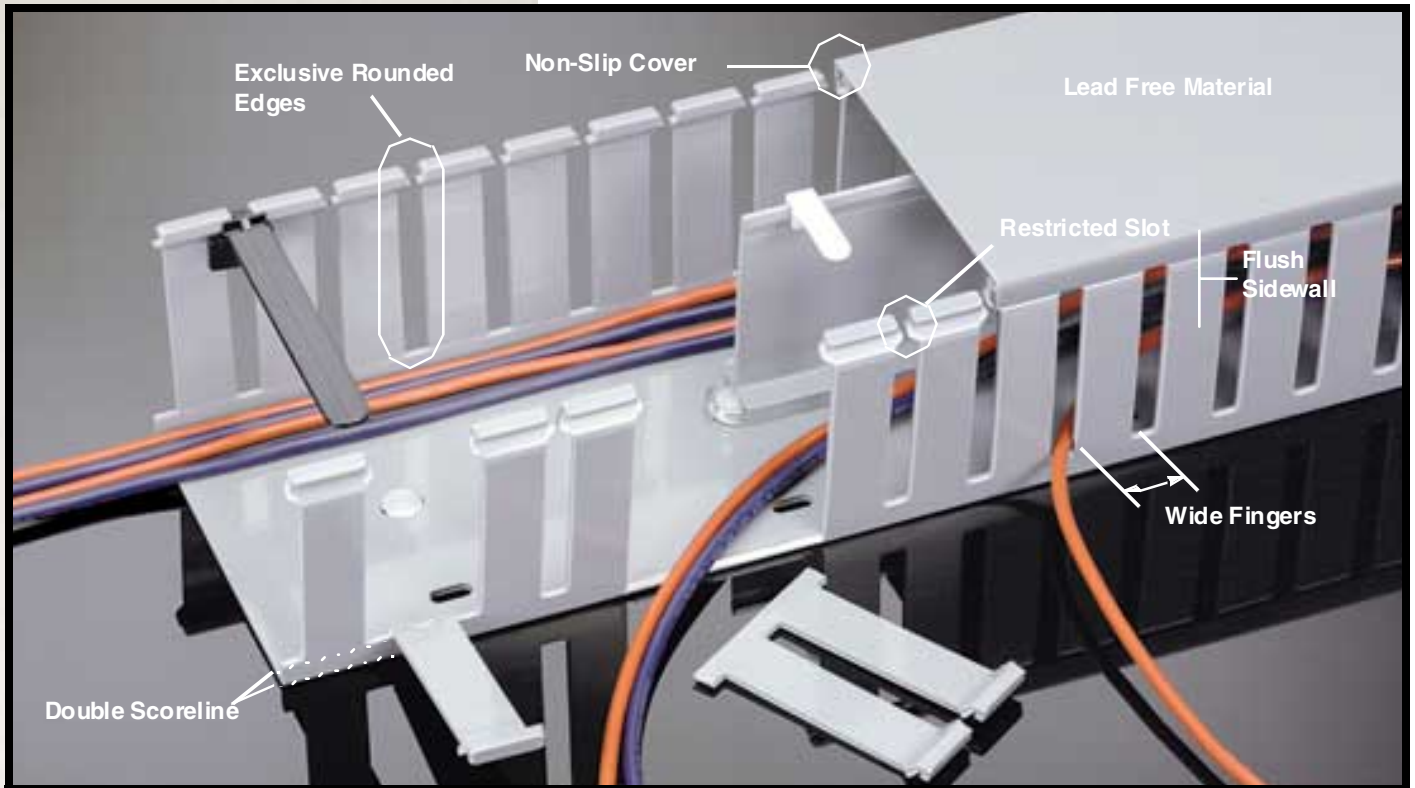
*Adhesive tape is not CSA Certified.
See page 35 for complete listing of dimensions. ✓=New Size

Part Number Nomenclature —



Ordering Information:

- Order number of feet required in multiples of 6 ft or Std. Carton quantities.
- To order with pressure-sensitive adhesive mounting tape applied, add -A to Part Number.
- Part Number shown for Light Gray LG. For other color availability see chart, page 43.



Type G Slotted Wall Wiring Duct

Choose from **35** sizes of *PANDUIT*® Type G Wiring Duct; from **0.5" x 0.5" up to 6" x 4"**. Used for general purpose control panel wiring and to route and protect wiring in communication closets. The non-slip cover conceals all wiring and is easy to install. The duct and cover form a flush sidewall providing increased capacity and improved aesthetics.

Accessories

Duct Cutting Tool	26
Duct Finger Cutting Tool	26
Duct Notching Tool	27
Nylon Rivet Installation Tool	27
Divider Walls	28
Wire Retainers	29-30
Mounting Bracket	33
Labeling	34

Features & Benefits

Wide Fingers

- Provide added support
- Same slot and finger width as Type E Duct

Cover Flush with Base

- Provides greater wire capacity
- Improves aesthetics

Restricted Slot Design

- Retains wire in slot
- Speeds installation
 - Simply deflect finger for fast, easy wire installation or removal

Optional Divider Walls

- Can create multiple channels within duct to separate wiring

Exclusive Rounded Edges Along Entire Slot

- Protect wires and hands from abrasion

Non-Slip Cover Design

- Incorporates integral high friction lining to inhibit cover movement

Easy Cover Removal

- Changes to wiring can be made quickly & easily

Double Scorelines

- Upper Scoreline:
 - Fingers break off leaving a smooth edge, without the use of a tool
- Lower Scoreline:
 - Fingers and sidewall break off flush with base for junctions. (Use DNT-100 Tool to cut side wall)

Bar Coded Part Number Label with QC Number

- Allows for automated inventory control systems
- Quick identification of loose piece wiring duct
- Complete quality traceability

Optional Pressure-Sensitive Adhesive Mounting Tape is Available

PANDUIT® Adhesive Backed Wiring Duct



Adhesive Backing For Wiring Duct

For Most Wiring Duct Types and Sizes

Adhesive backing is available option for most types and sizes of PANDUIT® Wiring Duct and Raceway. The adhesive backing is factory applied and ready for use. Simply peel off the tape's protective liner and mount the duct to a clean, dry, grease-free surface.

Features & Benefits

As a PERMANENT MOUNTING METHOD

Eliminates the drilling and tapping of holes, labor and time required to install separate mounting devices.

As a TEMPORARY MOUNTING METHOD

Holds duct in place to free installer's hands to further secure duct with screws, rivets, etc.

- Recommended installation temperature is 70°F (21°C)
- UL Recognized service temperature is 32°F (0°C) to 140°F (60°C)
- Optimum recommended dwell time for acrylic adhesive is 8 hours
- Recommended tape load is 1/2 lb. per square inch of tape area

Ordering Information:

For Factory Applied Tape:

- Add -A to the Duct or Raceway Part Number (Not available for Type D)

To Order Tape Separately:

- Order number of rolls required from the table at right

Factory Applied Tape —

To order any PANDUIT Wiring Duct or Raceway with pressure-sensitive adhesive mounting tape factory applied add -A to the Duct/Raceway part number.

G	2	X	1	LG	6	-A
↑	↑	↑	↑	↑	↑	↑
type/style	nominal width (in)	nominal height (in)	color	length (ft)	factory applied adhesive tape	

Specifications for Factory Applied Tape:

Duct Size WxH	Rows of Tape	Tape			
		Width		Thickness	
		In.	(mm)	In.	(mm)
.5X.5 thru 1.5X4	1	.50	(12.7)	.0313	(.8)
2X1 thru 3X3	2	.50	(12.7)	.0313	(.8)
3X4 thru 3X5	2	.75	(19.1)	.0313	(.8)
4X1.5 thru 4X3	2	.50	(12.7)	.0313	(.8)
4X4 thru 6X4	2	.75	(19.1)	.0313	(.8)

To Order Tape Separately:

Duct Size WxH	Tape Part Number	Roll Length		Std. Package Qty.	Std. Carton Qty.
		Yds.	(m)		
.5X.5 thru 1.5X4	P32W2A2-50-7	7.0	(6.4)	1 Roll	100 Rolls
	P32W2A2-50-72	72.0	(65.5)	1 Roll	9 Rolls
2X1 thru 3X3	P32W2A2-50-7	7.0	(6.4)	1 Roll	100 Rolls
	P32W2A2-50-72	72.0	(65.5)	1 Roll	9 Rolls
3X4 thru 3X5	P32W2A2-75-7	7.0	(6.4)	1 Roll	60 Rolls
	P32W2A2-75-72	72.0	(65.5)	1 Roll	7 Rolls
4X1.5 thru 4X3	P32W2A2-50-7	7.0	(6.4)	1 Roll	100 Rolls
	P32W2A2-50-72	72.0	(65.5)	1 Roll	9 Rolls
4X4 thru 6X4	P32W2A2-75-7	7.0	(6.4)	1 Roll	60 Rolls
	P32W2A2-75-72	72.0	(65.5)	1 Roll	7 Rolls

Socket - EO-AB/UT/LED/15 - 0804155

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Socket, Pin connector pattern type AB 15A, Screw connection, for USA and other countries, with LED display, gray, for mounting on a DIN rail in the service interface or direct mounting, 125 V AC, 15 A, -20 °C, 60 °C, UL 508



Key Commercial Data

Packing unit	1 pc
Minimum order quantity	5 pc
GTIN	 4 055626 226781
GTIN	4055626226781
Weight per Piece (excluding packing)	84.000 g
Custom tariff number	85366990
Country of origin	Poland

Technical data

Dimensions

Width	45 mm
Height	75 mm
Depth	57.5 mm

Ambient conditions

Ambient temperature (operation)	-20 °C ... 60 °C
---------------------------------	------------------

General

Nominal voltage U_N	125 V AC (60 Hz)
Nominal current I_N	15 A
Status display	Yes

Socket - EO-AB/UT/LED/15 - 0804155

Technical data

General

Contact material	CuZn37
Color	gray
Insulating material	PA
Flammability rating according to UL 94	V0
Standards/regulations	UL 508
Country ID	USA

Connection data

Conductor cross section solid min.	0.2 mm ²
Conductor cross section solid max.	4 mm ²
Conductor cross section flexible min.	0.2 mm ²
Conductor cross section flexible max.	2.5 mm ²
Conductor cross section AWG min.	24
Conductor cross section AWG max.	12
Connection method	Screw connection

Standards and Regulations

Standards/regulations	UL 508
Flammability rating according to UL 94	V0

Environmental Product Compliance

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

Classifications

eCl@ss

eCl@ss 4.0	27142300
eCl@ss 4.1	27142300
eCl@ss 5.0	27142300
eCl@ss 5.1	27142300
eCl@ss 6.0	27142300
eCl@ss 7.0	27142305
eCl@ss 8.0	27142305
eCl@ss 9.0	27142305

Socket - EO-AB/UT/LED/15 - 0804155

Classifications

ETIM

ETIM 5.0	EC001663
ETIM 6.0	EC001663
ETIM 7.0	EC001663

Approvals

Approvals

Approvals

UL Listed / cUL Listed / cULus Listed

Ex Approvals

Approval details

UL Listed		http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/index.htm	E238705
Nominal voltage UN		125 V	
Nominal current IN		15 A	

cUL Listed		http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/index.htm
------------	--	---

cULus Listed	
--------------	--

Accessories

Accessories

Terminal marking

Socket - EO-AB/UT/LED/15 - 0804155

Accessories

Marker for terminal blocks - UC-TMF 8 - 0818137



Marker for terminal blocks. Sheet, white, unlabeled, can be labeled with: BLUEMARK ID COLOR, BLUEMARK ID, BLUEMARK CLED, PLOTMARK, CMS-P1-PLOTTER, mounting type: snap into flat marker groove, for terminal block width: 8.2 mm, lettering field size: 7.6 x 5.1 mm, Number of individual labels: 56

Marker for terminal blocks - UC-TMF 16 - 0819262



Marker for terminal blocks. Sheet, white, unlabeled, can be labeled with: BLUEMARK ID COLOR, BLUEMARK ID, BLUEMARK CLED, PLOTMARK, CMS-P1-PLOTTER, mounting type: snap into flat marker groove, for terminal block width: 16 mm, lettering field size: 15.45 x 5.1 mm, Number of individual labels: 32

Zack Marker strip, flat - ZBF 8:UNBEDRUCKT - 0808781



Zack Marker strip, flat, Strip, white, unlabeled, can be labeled with: PLOTMARK, CMS-P1-PLOTTER, mounting type: snap into flat marker groove, for terminal block width: 8 mm, lettering field size: 5.15 x 8.15 mm, Number of individual labels: 10

Zack Marker strip, flat - ZBF 16:UNPRINTED - 0827464



Zack Marker strip, flat, Strip, white, unlabeled, can be labeled with: PLOTMARK, CMS-P1-PLOTTER, mounting type: snap into flat marker groove, for terminal block width: 16 mm, lettering field size: 16.25 x 10.5 mm, Number of individual labels: 50

GFI-Dual Utility Outlet EM-DUO/120/15/GFI

Data Sheet 1090A

September 1999

Features

- DIN-rail mount dual utility outlet
- Vertical or horizontal mounting
- Fits on 35 mm wide DIN-rail
- Ground fault protection circuit

Description

The EMG-DUO 120/15/GFI is a fully enclosed, dual utility outlet rated for 120 V ac/15 A. The outlet is equipped with Ground Fault Circuit Interruption (GFCI) for protection against shock hazards associated with ground shorts. For enhanced safety, the grounding pins of the receptacles are located at the top when vertically mounted. This prevents any metallic parts from inadvertently shorting the “hot” and neutral blade connections. This feature is particularly important in a control cabinet where ongoing maintenance and upgrades occur.

The dual outlet is packaged in a touch safe enclosure to eliminate the possibility of shock caused by accidental contact with live terminals. The universal mounting foot allows the outlet box to be DIN-rail mounted either vertically or horizontally. VDFK 4 self-locking screw terminal blocks provide reliable input power connections.

This utility outlet can be used for connecting test equipment, diagnostic equipment, power tools, soldering irons, displays, lighting, fans or anything that needs a 120 V power source.

This part is manufactured in the United States and is a stock item in Harrisburg as well as at our stocking distributor locations.

The device is UL listed under file #E123528.



Figure 7. EM-DUO/120/15/GFI

Table 3. EM-DUO/120/15/GFI Specifications

General Specifications	
Technical Data	
Rated voltage	120 V ac
Rated current	15 amps
Maximum wire size	#10 AWG
GFI response time	25 ms @ 4-6 mA
Housing Data	
Color	Ivory
Material	PVC 94 V-0
Minimum temperature	-35°C
Maximum temperature	66°C
Dimensions	
Length	5.33 in. (135 mm)
Width	3.25 in. (82 mm)
Depth	2.45 in. (62 mm)

1090A003

EM-DUO/120/15/GFI

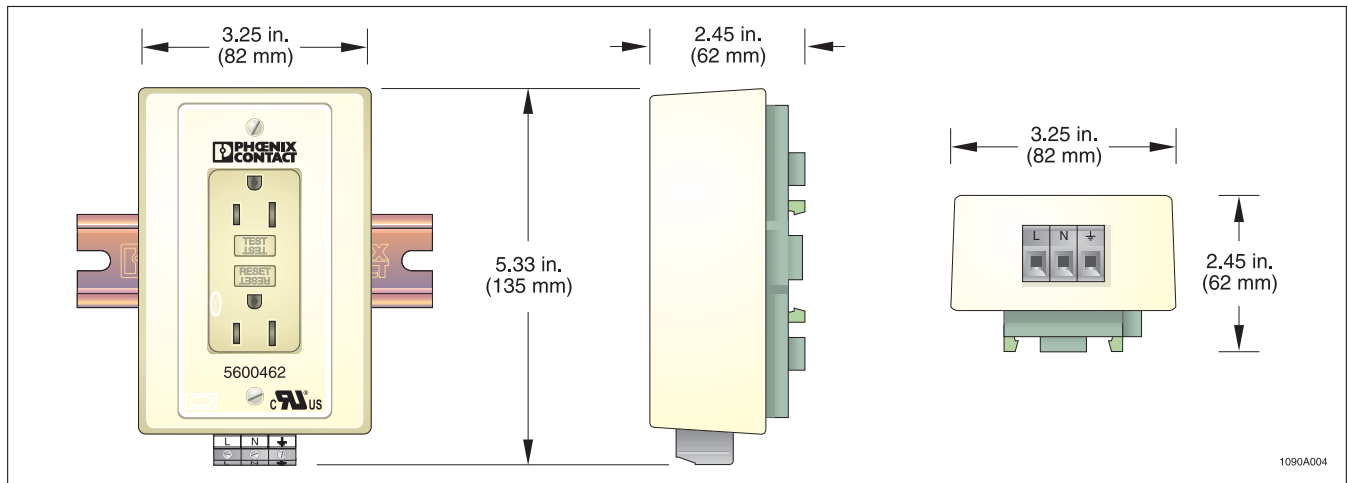


Figure 8. EM-DUO/120/15/GFI Dimensions

Ordering Information

Description	Part Number	Pieces/Package
EM-DUO-120/15/GFI	5600462	1

Dual Utility Outlet.

A fully enclosed receptacle offering two 120 V outlets for mounting on DIN-rail with GFCI protection.

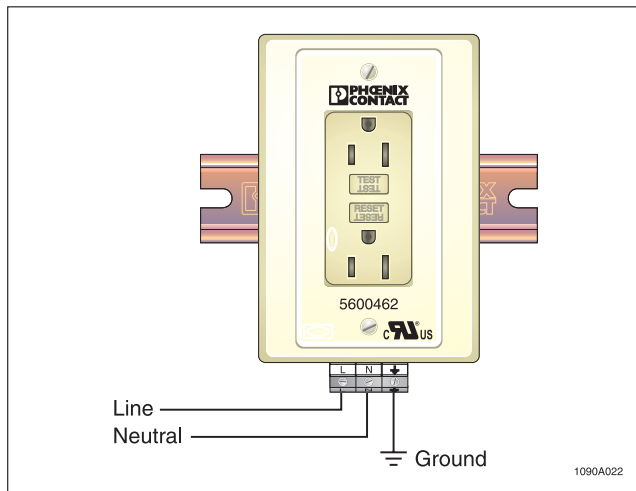


Figure 9. EM-DUO/120/15/GFI Wiring Diagram

**Visit us at our website
www.em-duo.com**

Headquarters, U.S.

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Mississauga, Ontario L4Z 1P3
Phone: (905) 890-2820
Fax: (905) 890-0180

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PK9GTA

LOAD CENTER EQUIPMENT GROUND BAR ASSY

Product availability : Stock - Normally stocked in distribution facility



Price** : 13.40 USD



Main

Product line	QO
Product type	Load Center Grounding Bar Assembly

Complementary

Number of connectors	9
Wire size	AWG 14...AWG 10 copper AWG 12...AWG 10 aluminium AWG 8 aluminium/copper AWG 6...AWG 4 aluminium/copper AWG 14...AWG 12
Provided equipment	2 screw
Bar length	3.78 in (96 mm)
Maximum length of segment	3.15 in (80 mm)
Device mounting	Direct mounting back of enclosure
Tightening torque	2.26 N.m (20 lbf.in) AWG 14...AWG 10) 2.26 N.m (20 lbf.in) AWG 12...AWG 10) 3.95 N.m (35 lbf.in) AWG 6...AWG 4)

Ordering and shipping details

Category	00102 - QO LC ACCESSORIES
Discount Schedule	DE3A
GTIN	00785901026396
Package weight(Lbs)	0.02 kg (0.05 lb(US))
Returnability	Yes
Country of origin	US

Offer Sustainability

REACH Regulation	REACH Declaration
EU RoHS Directive	Pro-active compliance (Product out of EU RoHS legal scope) EU RoHS Declaration
Mercury free	Yes
RoHS exemption information	Yes
China RoHS Regulation	China RoHS declaration Product out of China RoHS scope. Substance declaration for your information.
Circularity Profile	No need of specific recycling operations

Contractual warranty

Warranty	18 months
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Product availability : Stock - Normally stocked in distribution facility



Price* : 43.80 USD



Main

Range of product	QO
Product or component type	Load Center Insulator Kit

Ordering and shipping details

Category	00102 - QO LC ACCESSORIES
Discount Schedule	DE3A
GTIN	00785901539490
Nbr. of units in pkg.	10
Package weight(Lbs)	0.11
Returnability	Y
Country of origin	US

Offer Sustainability

RoHS (date code: YYWW)	Compliant - since 1337 - Schneider Electric declaration of conformity Schneider Electric declaration of conformity
REACH	Reference not containing SVHC above the threshold Reference not containing SVHC above the threshold
Product end of life instructions	Need no specific recycling operations

Contractual warranty

Warranty period	18 months
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Your Enclosure Source®

Saginaw Control and Engineering
95 Midland Road Saginaw, MI 48638-5770
(800) 234-6871 - Fax: (989) 799-4524
SCE@SaginawControl.com

SCE-30EL3012SSLP

Product Specifications:



Part Number: SCE-30EL3012SSLP
Description: S.S. EL Enclosure
Height: 30.00"
Width: 30.00"
Depth: 12.00"
Price Code: S5
List Price: \$1,506.67
Catalog Page: 274
Est. Ship Weight: 89.00 lbs

Construction

- * 0.075 In. stainless steel Type 304.
- * Seams continuously welded and ground smooth.
- * Flange trough collar around all sides of door opening.
- * Pour in place oil & water resistant gasket
- * Collar studs provided for mounting optional panels.
- * Stainless steel concealed hinges.
- * Removable and interchangeable doors.
- * Black quarter turn latches.
- * Latches are opened or closed with a screwdriver (optional tamper-resistant inserts are available).
- * Mounting holes in back of enclosure.
- * Mounting hardware, sealing washer and hole plug included.
- * Removable print pocket furnished if height and width of enclosure is greater than 12 inches.
- * Ground studs on door and body.

Application

Designed to house electrical and electronic controls, instruments and components in areas which may be regularly hosed down or are in very wet conditions. Provides protection from dust, dirt, oil, and water. For outdoor applications a drip shield is recommended.

Options

Optional mounting feet available. Door hardware available.

Finish

#4 brushed finish on all exterior surfaces. Optional sub-panels are powder coated white.

Industry Standards - (IS6)

- * NEMA Type 3R, 4, 4X, 12 and Type 13
- * UL Listed Type 3R, 4, 4X and 12
- * CSA Type 4, 4X and 12
- * IEC 60529
- * IP 66

Notes

Provision for Lifting Lugs on enclosures when Height >48" and Depth >16". The Lifting Lug assembly will be included with the enclosure bolt pack.

Special Instructions apply for IS3, IS4 and IS6 to maintain the environmental rating of Type 3R for these parts. Instructions are located on the enclosure door. Drip shield is required on IS3, drip shield is recommended on IS4 and IS6. Drain holes are required on all.

Optional Accessories

SCE-30P30 Subpanel, Bent
SCE-30P30GALV Subpanel, Bent Galvanized
SCE-BVK Breather Vent
SCE-DF30EL30LP Panel, Dead Front (Wall Mount)
SCE-DS30SS Shield, S.S. Drip
SCE-ELFM30HSS S.S. EL Flush Mount Frame
SCE-ELFM30WSS S.S. EL Flush Mount Frame
SCE-ELMFK4 Foot Kit, EL Mounting (4pc.)
SCE-ELSP3 KIT, Swing-Out Panel (20 High & Up)

Similar Part Numbers

SCE-20EL2006SSLP.S. EL Enclosure
SCE-20EL2008SSLP.S. EL Enclosure
SCE-20EL2010SSLP.S. EL Enclosure
SCE-20EL2012SSLP.S. EL Enclosure
SCE-20EL2408SSLP.S. EL Enclosure
SCE-24EL2006SSLP.S. EL Enclosure
SCE-24EL2008SSLP.S. EL Enclosure
SCE-24EL2010SSLP.S. EL Enclosure
SCE-24EL2012SSLP.S. EL Enclosure
SCE-24EL2408SSLP.S. EL Enclosure

Installation Information

- * Mounting Foot Kit for Enviroline Enclosures
- * EL Flush Mount Frame
- * Drip Shield Kit Assembly
- * Sealing Washer Specifications
- * Dead Front Wall Mount Installation Instructions
- * Swing Panel Assembly for Enviroline Enclosures
- * Dead Front Wall Mount < 20 In Height Installation Instructions
- * Swing Panel ELSP for Encl. Height > 16
- * Swing Panel ELSP for Encl. Height <= 16
- * Service Parts Wall Mount Enclosures

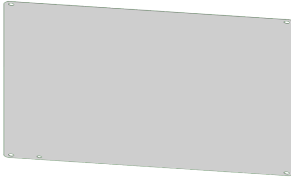


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 95 Midland Road Saginaw, MI 48638-5770
 (800) 234-6871 - Fax: (989) 799-4524
 SCE@SaginawControl.com

SCE-30P30

Product Specifications:



Part Number: SCE-30P30
Description: Subpanel, Bent
Height: 27.00"
Width: 27.00"
Depth: 0.88"
Price Code: P3
List Price: \$83.55
Catalog Page: 418
Est. Ship Weight: 28.00 lbs
Edge Flanges: Four
Configuration: C

Finish

Powder Coated White.

Industry Standards - (IS17)

- * NEMA Not Applicable
- * UL Not Applicable
- * CSA N/A

Similar Part Numbers

SCE-20P18HMISubpanel, Flat
 SCE-20P20Subpanel, Flat
 SCE-20P20CSubpanel, Flat
 SCE-20P24CSubpanel, Flat
 SCE-20P30CSubpanel, Flat
 SCE-24P20Subpanel, Bent
 SCE-24P24Subpanel, Bent
 SCE-24P24PCSubpanel, Flat
 SCE-30P20Subpanel, Bent
 SCE-30P24Subpanel, Bent

Installation Information

- * Sub-Plate Layout & Grounding for 3/8-16



SCE-ELMFK4

Product Specifications:



Part Number: SCE-ELMFK4
Description: Foot Kit, EL Mounting (4pc.)
Height: 5.00"
Width: 3.00"
Depth: 1.25"
Price Code: P2
List Price: \$17.69
Catalog Page: 413
Est. Ship Weight: 2.00 lbs
Feet Per Kit: 4
Kits Per Package: 1

Application

Made for use with all SCE Enviroline enclosures and two-door wall-mount enclosures. Chemical and Corrosion resistant Polyamide material rated for type 3, 3R, 4, 4X and 12. Available in kits of four or six, and with plated steel fastener or stainless steel fasteners to maintain type 3, 3R, 4, 4X and 12 rating of your enclosure.

Industry Standards - (IS17)

- * NEMA Not Applicable
- * UL Not Applicable
- * CSA N/A

Similar Part Numbers

SCE-ELMFK4-25Foot Kit, EL Mounting (4pc.) - Bulk
 SCE-ELMFK6Foot Kit, EL Mounting (6pc.)

Installation Information

- * Mounting Foot Kit for Enviroline Enclosures
- * Mounting Foot Kit for WFLP Enclosures



SCE-PLWKB

Product Specifications:



Part Number: SCE-PLWKB
Description: Padlocking Wingknob Door Latch (Black)
Height: 1.33"
Width: 1.10"
Depth: 1.10"
Price Code: P2
List Price: \$19.87
Catalog Page: 382
Est. Ship Weight: 1.00 lbs
Quantity Per Kit: 1
Finish: Black

Application

Designed to replace black quarter turn latches when additional security is required.

Industry Standards - (IS17)

- * NEMA Not Applicable
- * UL Not Applicable
- * CSA N/A

Similar Part Numbers

SCE-PLWKSSLatch, Padlocking Wing Knob Door (316 Stainless)

Installation Information

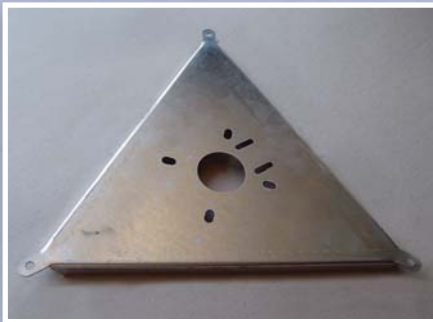
Submittal No: WIKSHIP
Engineer: Bauman Company
Contractor: Shelley Electric
Reference: City of Wichita Ks, Pike Addition Lift Station Project No. 468-2019-005340-59019

Date: May - 2020

Item	Qty	Model	Description
2.0	(1)	TBX32	32 Ft. Self-Supporting Communications Tower

Communications Tower Equipment

<u>Qty.</u>	<u>Part Number</u>	<u>Description</u>	<u>Manufacturer</u>
(1)	TBX32	33 ft. Self-Supporting Communications Tower	Thomas Shelby
(1)	TBX1A	Tower Section #1 (8 ft.)	Thomas Shelby
(1)	TBX2	Tower Section #2 (8 ft.)	Thomas Shelby
(1)	TBX3	Tower Section #3 (8 ft.)	Thomas Shelby
(1)	TBX4	Tower Top Section	Thomas Shelby
(1)	HWP	Tower Leg Hardware	Thomas Shelby
(1)	P8114	Mast 1.25 x 8 ft.	Thomas Shelby
(1)	RP1	Rotor Plate	Thomas Shelby
(1)	TP1	Top Plate	Thomas Shelby
(1)	ACP3-4	Anti Climb Panel 32 ft. (Set of 3)	Thomas Shelby
(1)	LRCL	Lightning Rod c/cad 5/8 in. x 5	Thomas Shelby
(1)	BGK5G	Grounding Kit	Thomas Shelby
(1)	BS-4	Base Stubs	Thomas Shelby
(1)	RY900B	YAGI Antenna 10DB	Katherin
(1)	SCAMKPS-1	Mounting Kit for RY900-1 Yagi Antenna	Katherin
(75 Ft.)	LMR600	LMR 600 Coaxial Cable	Times Microwave
(2)	EZ600NMC-2-D	Coaxial Connectors for LMR 600 Cable	Times Microwave



TBX Tower Series

- X Brace design for strength
- Braces riveted in center as well as ends
- All riveted construction
- Greater width and weight at bottom
- Beaded channel leg for added strength
- All steel
- Pregalvanized for added life
- Rotors easily installed
- Three steps included on one face of top section

Thomas Shelby & Company, Inc.

309 South Park Drive
St. Marys, Ohio 45885

419 . 394 . 3377 Phone
419 . 394 . 4815 Fax

sales@thomasshelby.com
www.tbxtower.com

Manufactured in the U.S.A.

Part #	8' TBX Sections	wt.
TBX1A	Offset top section w/TP1, RP1, MK2	26#
TBX2	Standard offset section	24#
TBX2A	Offset top section w/TP2, RP2, TC	31#
TBX3	Standard offset section	29#
TBX3A	Offset top section w/TP3, RP3, TC	39#
TBX4	Standard offset section	42#
TBX5	Standard offset section	60#
TBX6	Standard offset section	65#
TBX7	Standard offset section	75#
TBX8	Standard offset section	83#
TBX8ST	Standard offset straight section	85#

Nuts and bolts are included in section prices.

For TBX8ST, the top sets of braces are bolted to tower for ease of installation.

Part #	TBX Accessories	wt.
MK2	Mast hardware kit w/rotor post for top and rotor plate	2#
TC	Heavy duty mast clamp	3#
TB3	Heavy duty thrust bearing, recommended for 2" OD tubing (for use w/section 3 with field drilled hole)	2 ½#
TB4	Heavy duty thrust bearing, recommended for 3" OD tubing (for use w/section 3 with field drilled hole)	3#
SM	Side mount (28" - 40") w/4', 1 ¼" OD mast (fits sections 1 thru 4)	12#
SK1	Extra step kit for section 1 (3 steps on one face)	1#
SK2	Extra step kit for section 2 (3 steps on one face)	1#
SK3	Extra step kit for section 3 (3 steps on one face)	1#
ACP	Anti climb panels	

Part #	Top and Rotor Plates	wt.
TP1A	Top plate for section 1 w/hardware nuts, bolts, and TACWS	2#
TP2A	Top plate for section 2 w/hardware nuts, bolts, and TACWS	2#
TP3A	Top plate for section 3 w/hardware nuts, bolts, and TACWS	2½#
RP1A	Rotor plate for section 1 w/hardware nuts, bolts, and TACWS	1½#
RP2A	Rotor plate for section 2 w/hardware nuts, bolts, and TACWS	2#
RP3A	Rotor plate for section 3 w/hardware nuts, bolts, and TACWS	2½#

Part #	Masts	wt.
P8114	8' mast (1 ¼")	6 ½#

TBX Anti-Climb Panels

- Flat surface for extra security
- Made of durable 20ga steel
- Available for TBX, THBX and THDBX series



ASSEMBLY INSTRUCTIONS

BREAKING DOWN THE BUNDLE

1. Mast, accessories, and hardware packages need to be removed prior to de-bundling of the tower sections.
2. Bundle is to be laid on its side on a flat smooth surface.
3. Remove innermost section (*smallest*) by sliding from the bottom (*widest opening*). Proceed with each additional section. Protective gloves are suggested and the use of pry tools are not recommended.
4. Inspect each section for any transport, or shipping damage. It is acceptable to replace any broken, or lose rivets with a snug fitting machine bolt, nut, and lock washer. If replacing a rivet make sure the bolts are securely tightened.

TOWER

After you have chosen the desired type of base for your tower (*concrete base with concrete base stubs, or hinged concrete base*) and it is properly installed per base instructions, bolt the base section (*the largest section*) to the base. Proceed with the erection as follows:

1. The legs on each higher section slide inside the previous one and should be positioned on the stop rivet in the previous leg. (*This stop rivet is to prevent the tower section being installed from slipping through the previous section and is not for the purpose of aligning the assembly holes.*) (*Special Note: the TBX8 section does not have a stop rivet in it, so extreme caution should be used when installing the TBX7 section into the TBX8 section.*) Proceed by bolting together each section with the proper size bolts.
2. To erect the tower, section by section vertically, insert the next proceeding section into the previous allowing the stop rivet to catch the section, and then install the appropriate section hardware. By using HB36 or HB78 base, the tower can be assembled on the ground and hinged up using extreme caution. When hinging up, watch for power lines, trees, etc.
3. Loose, missing or faulty rivets should be replaced with a similar size nut and bolt which can be obtained at any local hardware.

Note

3/8" bolts are used on TBX1, TBX2 and the top of the TBX3 sections. 9/16" bolts are used on the bottom of the TBX3 and all sections from TBX4 through TBX8 (*TBX8 is the largest section*).

One set of cross braces on one face of the top section is purposely left off to allow easy access to the rotor plate for installing the mast and rotor.

Only one person should be on the tower at one time.

ROTOR INSTALLATION

Most all makes of rotors can be installed on the rotor plate inside the top tower section of the TBX standard, THBX, heavy duty, and THDBX extra heavy duty towers. There is a short piece of tubing furnished with each tower that can be used as a thrust bearing (for 1-1/4" mast) with the mast clamp installed on the top plate as is described under the heading Mast Assembly. Do not install rotors on the THDBX top plate.

For the THBX – Heavy Duty and THDBX - Extra Heavy Duty Towers, when a rotor is used a 4" piece of tubing or pipe with an I.D. larger than the O.D. of the mast can be installed in the pipe flange clamp and used as a bearing for the mast to turn in.

FOR ASSEMBLING THE ROTOR ITSELF, FOLLOW THE PROCEDURES OUTLINED BELOW:

Some inline model rotors mount directly to the rotor plate. (The lower housing of the rotor is not used when this is done.) The necessary holes for mounting most rotors are pre-punched in the plate itself and the bolts furnished to bolt the lower housing to the upper housing (4-1/4" x 1" bolts) are to be inserted from the bottom of the plate upward and into the rotor. It is desirable to place 3/8" nuts to act as spacers between the rotor plate and the rotor.

These nuts will prevent the terminals of the rotor and the rotor wire from shorting on the rotor plate. An 8" piece of tubing is furnished with each tower. It can be installed into the clamp ("V" clamp and "L" shaped brackets furnished for offset rotor installation only) for the offset type rotors. It is necessary to reverse the clamp assembly (to face outside of the tower), opposite that of installing a standard mast to the rotor plate. Some rotors can be mounted directly to the "L" shaped bracket or to the 8' mast as previously described.

Also, some rotors mount beneath the rotor plate. It will be necessary to increase the 1/4" holes in the rotor plate to 3/8" holes to use the 3/8" bolts furnished with these rotors.

MAST ASSEMBLY

1. Two U-bolt assemblies with "L" brackets are supplied for installing the mast. These "L" brackets are bolted through the slotted holes on the rotor and top plate with the short legs of the "L" bracket toward the outside of the tower.
2. Run the U-bolt through the open side of the formed "V" clamp and into the "L" bracket placing the 5/16" nuts and washers on the U-bolt loosely.
3. To install the mast, place one end of it through the upper U-bolt assembly end plate and slide it down into the lower U-bolt assembly to hold the mast.
4. Adjustments to make the mast vertical may be made by moving the "L" brackets in the slotted holes. The THBX – Heavy Duty and THDBX – Extra Heavy Duty Towers are furnished with a mast clamp installed on the top plate made from a pipe floor flange, which is provided with three bolts to be used as set screws to secure the mast. The box of hardware consists of one U-bolt assembly as described above and it can be installed on the lower plate as is instructed above, if required.

In all cases be careful during installation.

Notes

- Do not install towers near power lines. All towers should be installed out of falling distance of power lines since every electrical and telephone wire should be considered dangerous.
- It is recommend that anti-climb sections should be installed on all towers to prevent unauthorized persons from climbing towers. Only one person should be on the tower at a time.
- All antenna installations must be grounded per local or national codes.
- All towers should be installed and dismantled by experienced and trained personnel.
- All types of antenna installations should be thoroughly inspected by qualified personnel at least twice a year and re-marked with hazard and warning labels to ensure safety and proper performance. A safety package (part number TACWS) is available which includes one anti-climb warning sign and two Danger – Watch for Wires labels along with other printed safety information.

Section #	LEG JOINT BOLTS			"X" (Top)	"Y" (Bottom)
	Location	Qty	Size		
2	Top	2	$\frac{3}{8} \times \frac{3}{4}$	10 $\frac{7}{16}$ "	12 $\frac{1}{16}$ "
	Bottom	2	$\frac{3}{8} \times \frac{3}{4}$		
3	Top	2	$\frac{3}{8} \times \frac{3}{4}$	12 $\frac{13}{16}$ "	15 $\frac{1}{16}$ "
	Bottom	2	$\frac{9}{16} \times 1$		
4	Top	2	$\frac{9}{16} \times 1$	15 $\frac{3}{16}$ "	17 $\frac{7}{16}$ "
	Bottom	2	$\frac{9}{16} \times 1$		
5	Top	2	$\frac{9}{16} \times 1$	17 $\frac{5}{8}$ "	20 $\frac{1}{8}$ "
	Bottom	2	$\frac{9}{16} \times 1$		
6	Top	2	$\frac{9}{16} \times 1$	20 $\frac{5}{16}$ "	22 $\frac{13}{16}$ "
	Bottom	2	$\frac{9}{16} \times 1$		
7	Top	2	$\frac{9}{16} \times 1$	23"	25 $\frac{1}{2}$ "
	Bottom	3	$\frac{9}{16} \times 1$		
8	Top	3	$\frac{9}{16} \times 1$	25 $\frac{1}{16}$ "	28 $\frac{7}{16}$ "
	Bottom	3	$\frac{9}{16} \times 1$		

Section 1

Section 2

Section 3

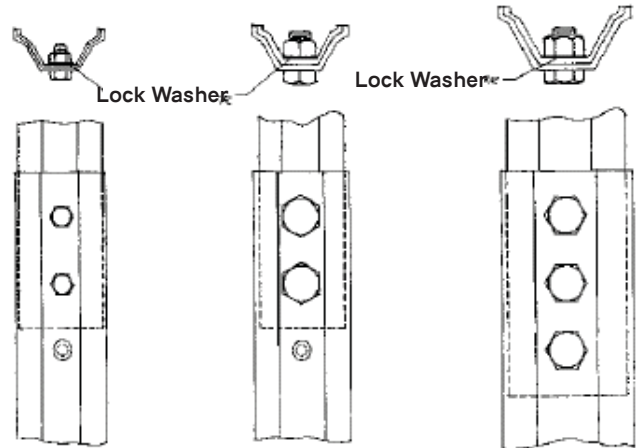
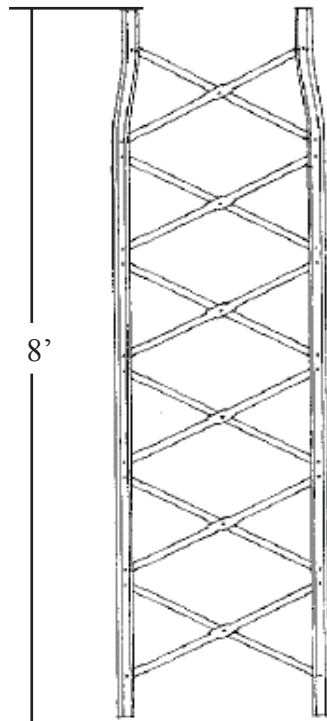
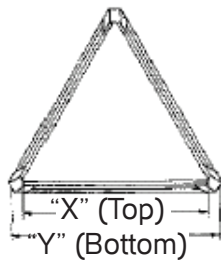
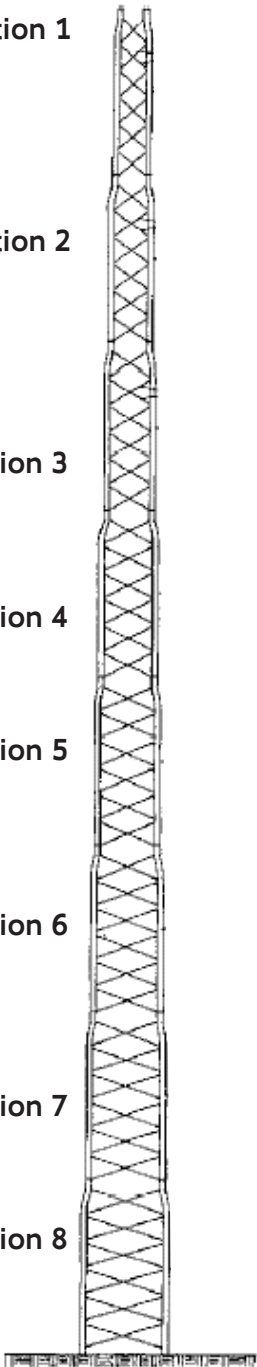
Section 4

Section 5

Section 6

Section 7

Section 8



Typical Leg Joint between Sections 1-2 Sections 2-3

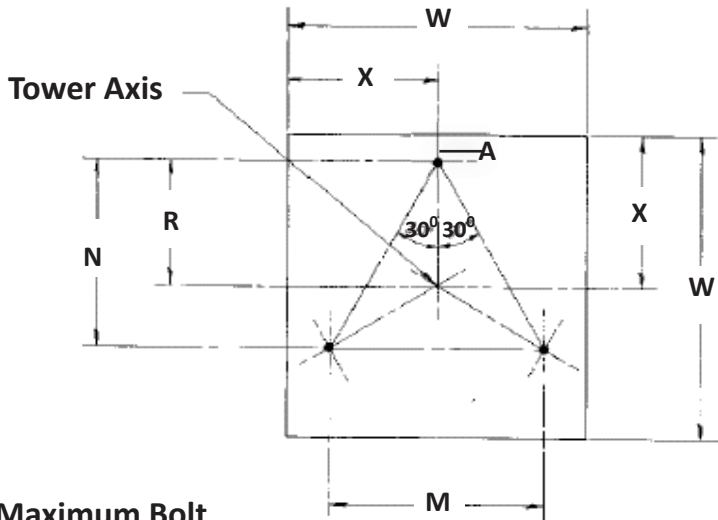
Typical Leg Joint between Sections 3-4 Sections 4-5 Sections 5-6 Sections 6-7

Typical Leg Joint between Sections 7-8

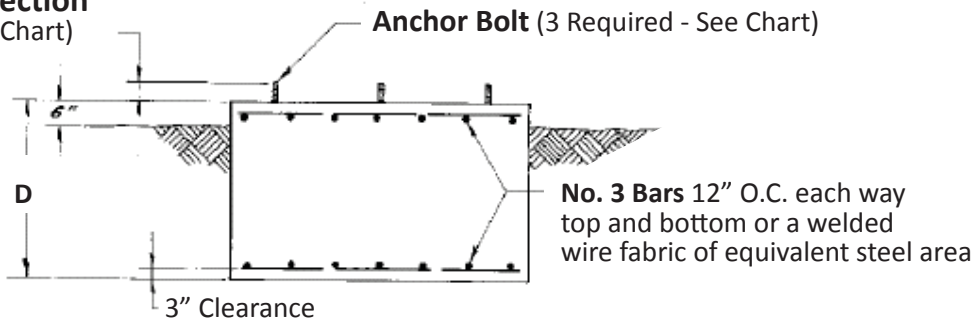
HINGED BASE FOUNDATION

Foundation Notes

1. Concrete, 3000 P.S.I. minimum ultimate strength.
2. ASTM A-615 Grade 40 deformed re-bars.
3. All forms must be removed from concrete before placing compacted backfill.
4. Foundations designed for 2000 PSF soil.
5. It is recommended that a wood template be constructed by the user for holding anchor bolts at the proper dimensions while concrete is being poured.
6. Reinforcing is recommended for temperature and shrinkage control.
7. Welding is prohibited on reinforcing steel and embedments.



Maximum Bolt Projection (See Chart)

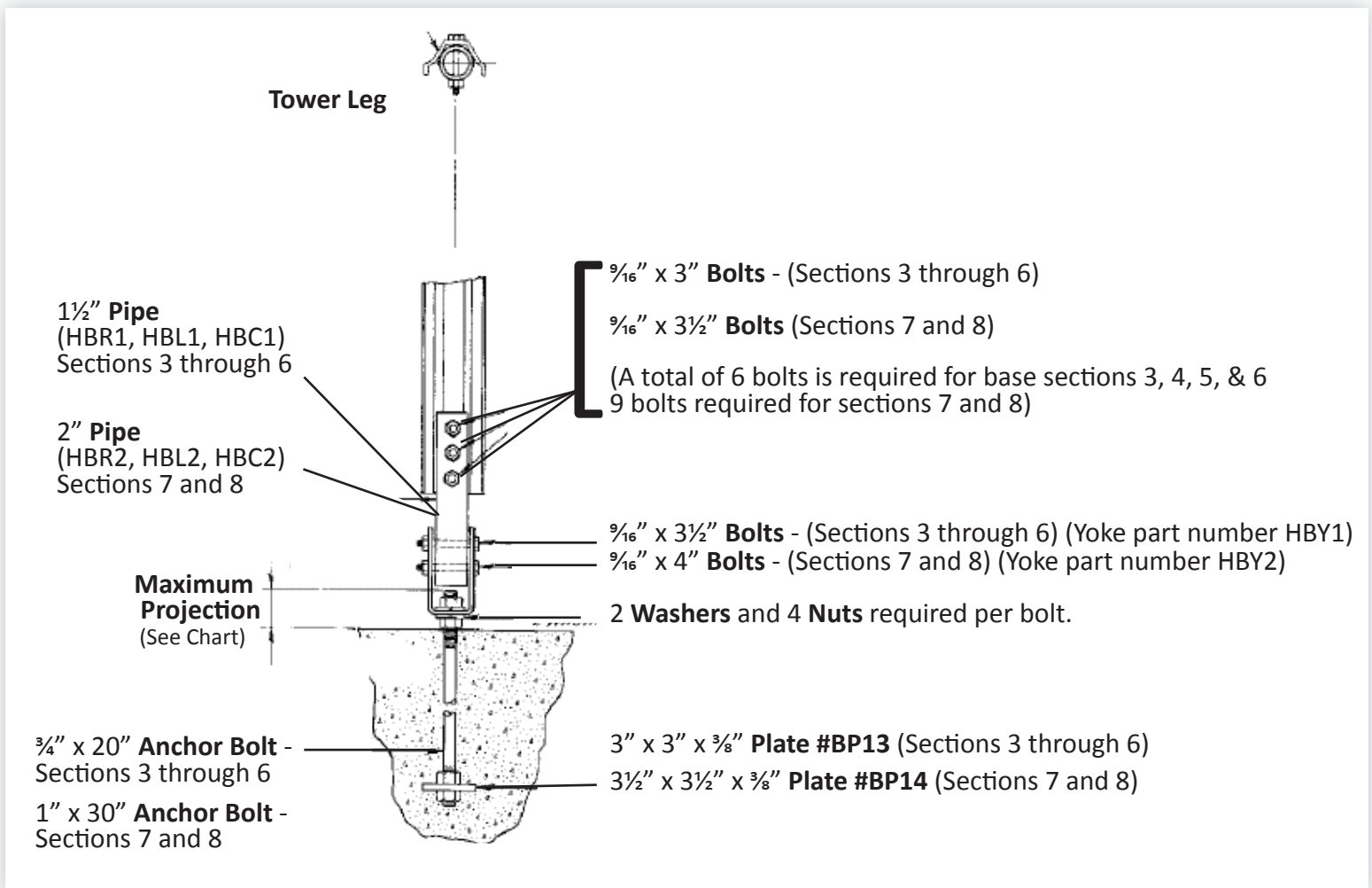


HINGED BASE

Sec No.	M	N	R	Max. Proj.	Anchor Bolt	Bearing	D	W	X	CU. YDS. CONC.
3	13 ⁵ / ₁₆ "	11 ¹ / ₂ "	7 ¹ / ₁₆ "	2 ⁵ / ₈ "	(3) - ³ / ₄ " x 20"	BP13	4' -0"	3'-6"	1'-9"	1.8
4	15 ¹ / ₁₆ "	13 ⁹ / ₁₆ "	9 ¹ / ₁₆ "	2 ⁵ / ₈ "	(3) - ³ / ₄ " x 20"	BP13	4' -0"	4'-0"	2'-0"	2.4
5	18 ⁵ / ₁₆ "	15 ⁷ / ₈ "	10 ⁹ / ₁₆ "	2 ⁵ / ₈ "	(3) - ³ / ₄ " x 20"	BP13	4' -0"	4'-6"	2'-3"	3.0
6	21"	18 ³ / ₁₆ "	12 ¹ / ₈ "	2 ⁵ / ₈ "	(3) - ³ / ₄ " x 20"	BP13	4' -0"	4'-9"	2'-4 ¹ / ₂ "	3.4
7	23 ¹ / ₄ "	20 ¹ / ₈ "	13 ⁷ / ₁₆ "	3 ¹ / ₄ "	(3) - 1" x 30"	BP14	4' -0"	5'-3"	2'-7 ¹ / ₂ "	4.1
8	26 ³ / ₁₆ "	22 ¹ / ₁₆ "	15 ¹ / ₈ "	3 ¹ / ₄ "	(3) - 1" x 30"	BP14	4' -0"	5'-9"	2'-10 ¹ / ₂ "	4.9

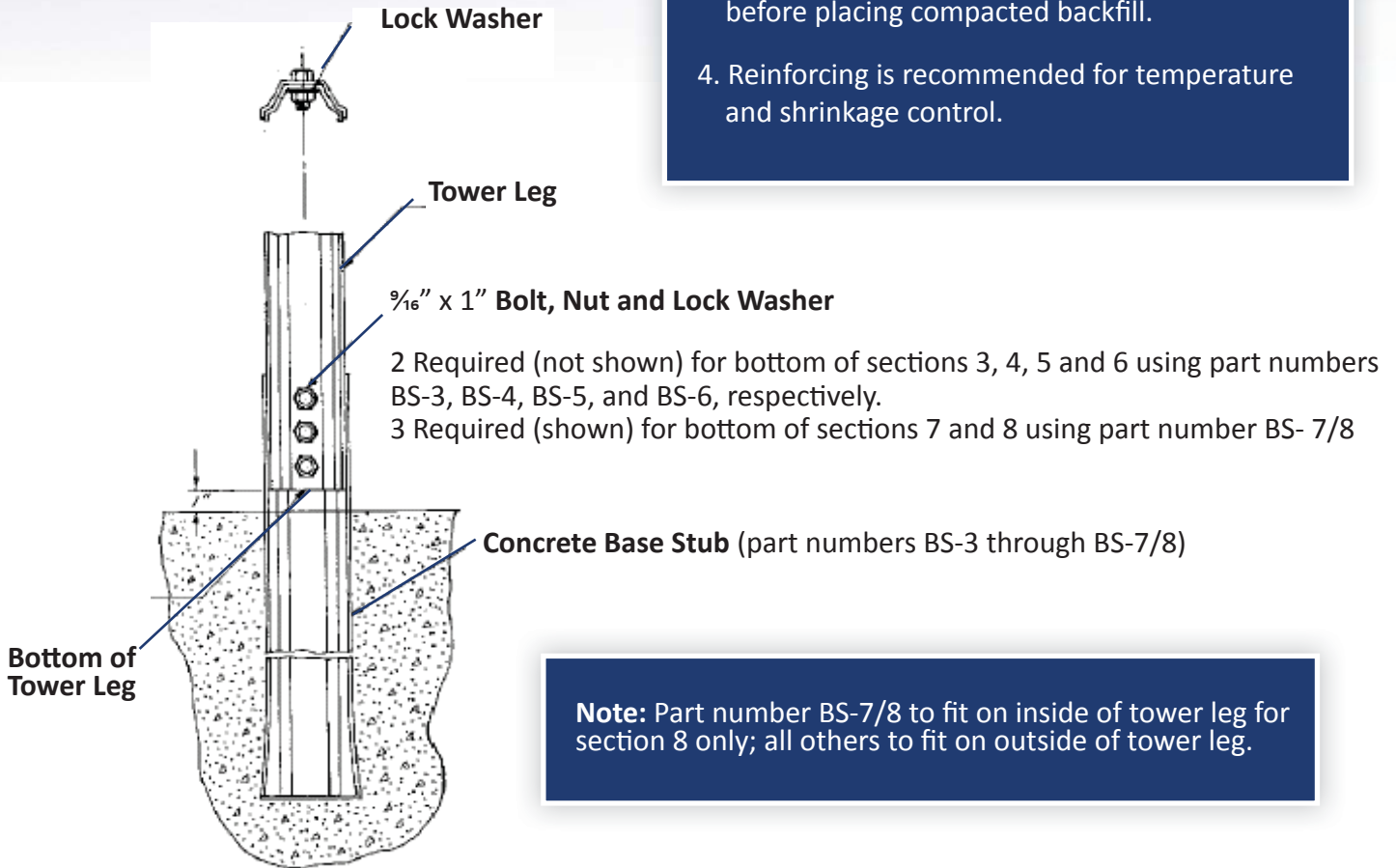
HINGED BASE 36 (HB36)		
QTY	PART #	DESCRIPTION
1	HBC1	STUB PIPE 1 1/2" STD
1	HBL1	STUB PIPE 1 1/2" STD
1	HBR1	STUB PIPE 1 1/2" STD
3	HYB1	YOKE
3	AB20	ANCHOR BOLT 3/4" X 20"
6	W34	3/4" SPLIT WASHER
6	B9163	9/16" X 3" BOLT
12	N34	3/4" HVY HEX NUT
12	N916	9/16" HEX NUT
3	BP13	3/8" X 3" X 3" BEARING PLATE
6	B91612	9/16" X 3 1/2" BOLT

HINGED BASE 78 (HB78)		
QTY	PART #	DESCRIPTION
1	HBC2	STUB PIPE 2" STD
1	HBL2	STUB PIPE 2" STD
1	HBR2	STUB PIPE 2" STD
3	HYB2	YOKE
3	AB30	ANCHOR BOLT 1" X 30"
6	W1	1" SPLIT WASHER
9	B91612	9/16" X 3 1/2" BOLT
12	N1	1" HVY HEX NUT
15	N916	9/16" HEX NUT
3	BP14	3/8" X 3 1/2" X 3 1/2" BEARING PLATE
6	B9164	9/16" X 4" BOLT



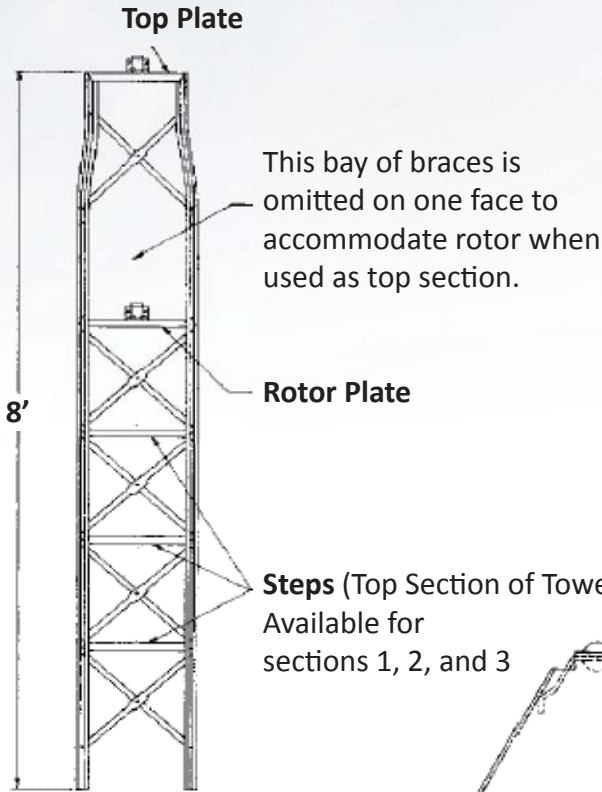
Foundation Notes

1. Concrete, 3000 PSI minimum ultimate strength.
2. ASTM A-615 Grade 40 deformed re-bars.
3. All forms must be removed from concrete before placing compacted backfill.
4. Reinforcing is recommended for temperature and shrinkage control.



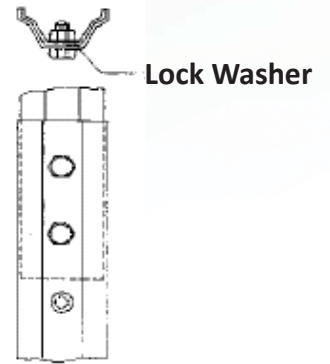
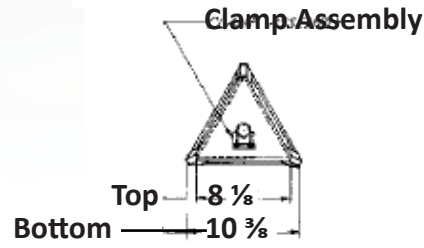
Note: Part number BS-7/8 to fit on inside of tower leg for section 8 only; all others to fit on outside of tower leg.

BASE STUB						
Part #	Sect. No.	W	X	D	Cu. Yds. Concr.	A
BS-3	3	3'-6"	1'-9"	4'-0"	1.8	1'-0 1/4"
BS-4	4	4'-0"	2'-0"	4'-0"	2.4	1'-2"
BS-5	5	4'-6"	2'-3"	4'-0"	3.0	1'-3 1/2"
BS-6	6	4'-9"	2'-4 1/2"	4'-0"	3.4	1'-3 1/2"
BS-7/8	7	5'-3"	2'-7 1/2"	4'-0"	4.1	1'-4 3/4"
BS-7/8	8	5'-9"	2'-10 1/2"	4'-0"	4.9	1'-6"



Top Section (1, 2, or 3)

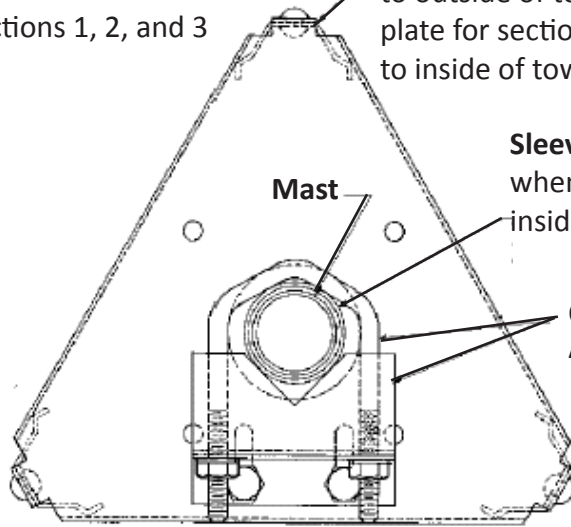
For straight section eliminate 1/8" dimension.



Typical Leg Joint between Sections 1-2

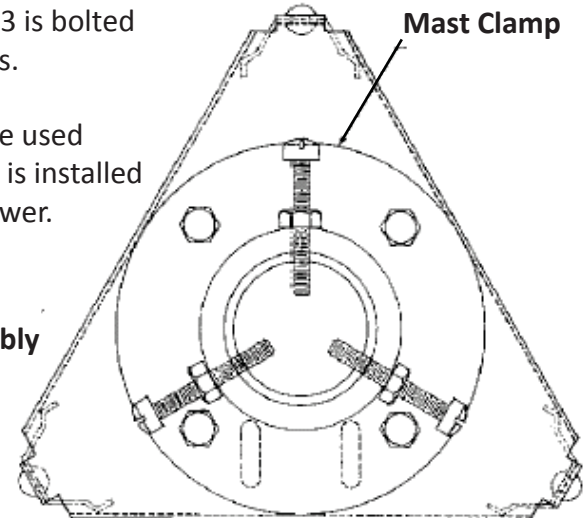
Steps (Top Section of Tower)
Available for sections 1, 2, and 3

Top Plate for section 1 is riveted to outside of tower legs. Top plate for section 2 or 3 is bolted to inside of tower legs.



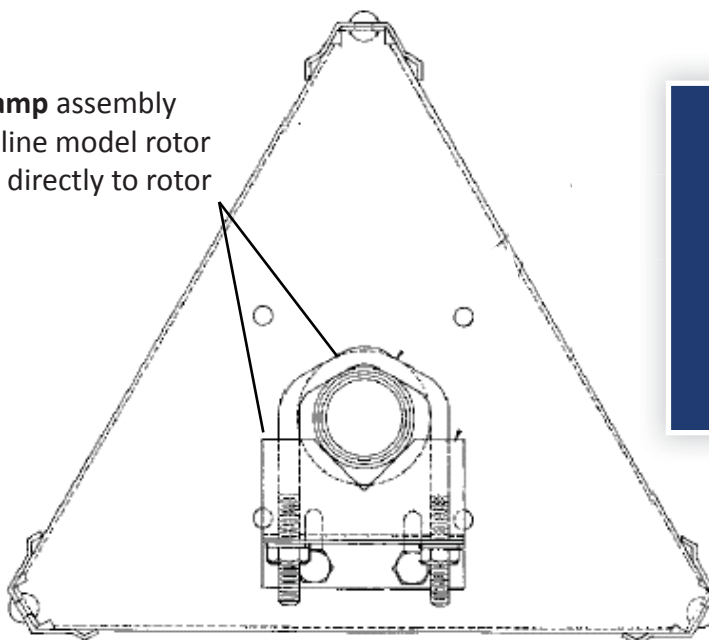
Top Plate with Clamp Assembly

TC Heavy Duty Mast Clamp



Top Plate with TC Heavy Duty Mast Clamp.

Lower Mast Clamp assembly not used for in-line model rotor when mounted directly to rotor plate.



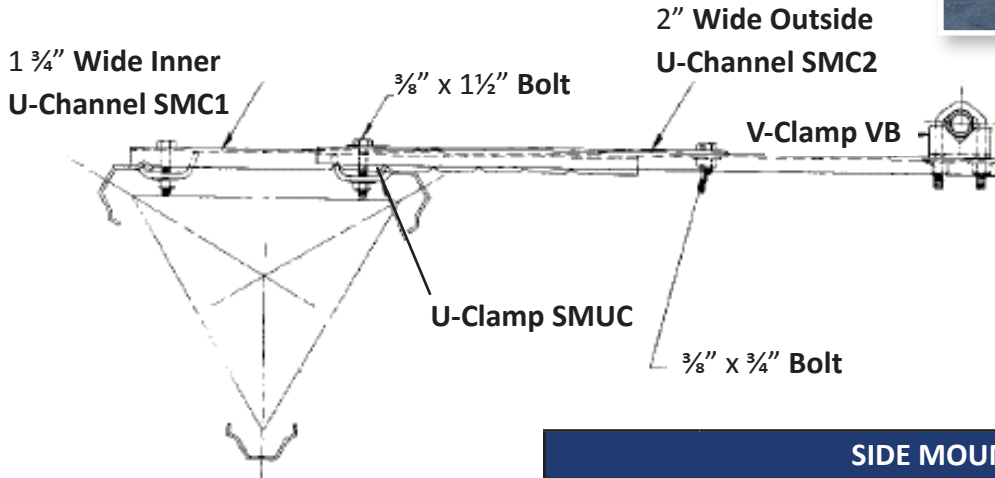
Rotor Plate with Clamp

Note: The clamp assembly is normally used with section 1 as a top section. The TC heavy duty mast clamp is normally used with section 2 or 3 as a top section. Holes are placed on all top plates and rotor plates, however, to accommodate either one.

SIDE MOUNT

Note: For mounting on sections 1 thru 4

Tower Leg
 Mast
 (1 1/4" O.D. x 3'4" Long Tube)
 5/16" U-Bolt
 1" x 31" Strap SMS



SIDE MOUNT (SM)		
QTY	PART #	DESCRIPTION
2	SMC2	2" WIDE OUTSIDE CHANNEL
2	SMC1	1 3/4" WIDE INNER CHANNEL
4	SMUC	U-CLAMP
1	SMS	1" X 31" STRAP
1	P11434	1 1/4" O.D. x 16 GA TUBE 3' 4" LONG
4	B38112	3/8" X 1 1/2" BOLT
5	N38	3/8" NUT
1	B38	3/8" X 3/4" BOLT
5	W38	3/8" WASHER
2	VB516	5/16" U-BOLT
4	N516	5/16" NUT
4	W516	5/16" WASHER
2	VB	V-BRACKET

TOWER MODELS		
Nominal Height, FT.	Catalog No.	Combination of Tower Sections
24	TBX24	TBX-1A-2-3
	THBX24	TBX-2A-3-4
	THDBX24	TBX-3A-4-5
32	TBX32	TBX-1A-2-3-4
	THBX32	TBX-2A-3-4-5
	THDBX32	TBX-3A-4-5-6
40	TBX40	TBX-1A-2-3-4-5
	THBX40	TBX-2A-3-4-5-6
	THDBX40	TBX-3A-4-5-6-7
48	TBX48	TBX-1A-2-3-4-5-6
	THBX48	TBX-2A-3-4-5-6-7
	THDBX48	TBX-3A-4-5-6-7-8
56	TBX56	TBX-1A-2-3-4-5-6-7
	THBX56	TBX-2A-3-4-5-6-7-8
64	TBX64	TBX-1A-2-3-4-5-6-7-8

TOWER OPTIONS (can be ordered separately)												
Tower Model	Concrete Base Stubs	Hinged Base	Side Arm Mt	Hardware Mast Kit	Rotor Plate	Top Plate	Extra Step Kit	Hardware Pack	Anti-Climb Panels	TBX5ST 8' Straight Section	TBX8ST 8' Straight Section	
TBX	24	BS-3	HB36	SM	MK2	RP1	TP1	SK1,2,3	HWP-TBX24	ACP3-3		
	32	BS-4	HB36	SM	MK2	RP1	TP1	SK1,2,3	HWP-TBX32	ACP3-4		
	40	BS-5	HB36	SM	MK2	RP1	TP1	SK1,2,3	HWP-TBX40	ACP3-5	TBX5ST	
	48	BS-6	HB36	SM	MK2	RP1	TP1	SK1,2,3	HWP-TBX48	ACP3-6		
	56	BS-7/8	HB78	SM	MK2	RP1	TP1	SK1,2,3	HWP-TBX56	ACP3-7		
	64	BS-7/8	HB78	SM	MK2	RP1	TP1	SK1,2,3	HWP-TBX64	ACP3-8		TBX8ST
THBX	24	BS-4	HB36	SM	MK2	RP2	TP2	SK2 & 3	HWP-THBX24	ACP3-4		
	32	BS-5	HB36	SM	MK2	RP2	TP2	SK2 & 3	HWP-THBX32	ACP3-5	TBX5ST	
	40	BS-6	HB36	SM	MK2	RP2	TP2	SK2 & 3	HWP-THBX40	ACP3-6		
	48	BS-7/8	HB78	SM	MK2	RP2	TP2	SK2 & 3	HWP-THBX48	ACP3-7		
	56	BS-7/8	HB78	SM	MK2	RP2	TP2	SK2 & 3	HWP-THBX56	ACP3-8		TBX8ST
THDBX	24	BS-5	HB36	SM	MK2	RP3	TP3	SK3	HWP-THDBX24	ACP3-5	TBX5ST	
	32	BS-6	HB36	SM	MK2	RP3	TP3	SK3	HWP-THDBX32	ACP3-6		
	40	BS-7/8	HB78	SM	MK2	RP3	TP3	SK3	HWP-THDBX40	ACP3-7		
	48	BS-7/8	HB78	SM	MK2	RP3	TP3	SK3	HWP-THDBX48	ACP3-8		TBX8ST

When purchasing a tower kit the rotor plate, top plate, hardware pack and one face of steps on top section are included. Leg Hardware is included with each section purchased.

Thomas Shelby & Company, Inc.

309 South Park Drive
St. Marys, Ohio 45885

419 . 394 . 3377 Phone
419 . 394 . 4815 Fax

sales@thomasshelby.com
www.tbxtower.com

Manufactured in the U.S.A.

LMR®-600 Flexible Low Loss Communications Coax

Ideal for...

- Jumper Assemblies in Wireless Communications Systems
- Short Antenna Feeder runs
- Any application (e.g. WLL, GPS, LMR, WLAN, WISP, WiMax, SCADA, Mobile Antennas) requiring an easily routed, low loss RF cable



• **LMR®** standard is a UV Resistant Polyethylene jacketed cable designed for 20-year service outdoor use. The bending and handling characteristics are significantly better than air-dielectric and corrugated hard-line cables.

• **LMR®-DB** is identical to standard LMR plus has the advantage of being watertight. The addition of waterproofing compound in and around the foil/braid insures continuous reliable service should the jacket be inadvertently damaged during installation or in the future.

• **LMR®-FR** is a non-halogen (non-toxic), low smoke, fire retardant cable designed for in-building runs that can be routed anywhere except air handling plenums. LMR-FR is UL/NEC & CSA rated 'CMR' and 'FT4' respectively, meets FAA FAR25 requirements and is MSHA-P for mining applications.

• **LMR®-FR-PVC** is a general-purpose indoor cable and has a UL/NEC & CSA rating of 'CMR' and 'FT4' respectively. It is less expensive than LMR-FR, however it emits toxic fumes (HCL) and greater smoke density when burned.

• **LMR®-PVC** is designed for low loss general-purpose applications and is somewhat more flexible than the standard polyethylene jacketed LMR.

• **LMR®-PVC-W** is a white-jacketed version of LMR-PVC for marine and other applications where color compatibility is desired.

• **Flexibility** and bendability are hallmarks of the LMR-600 cable design. The flexible outer conductor enables the tightest bend radius available for any cable of similar size and performance.

• **Low Loss** is another hallmark feature of LMR-600.

Size for size LMR has the lowest loss of any flexible cable and comparable loss to semirigid hard-line cables.

• **RF Shielding** is 50 dB greater than typical single shielded coax (40 dB). The multi-ply bonded foil outer conductor is rated conservatively at > 90 dB (i.e. >180 dB between two adjacent cables).

• **Weatherability:** LMR-600 cables designed for outdoor exposure incorporate the best materials for UV resistance and have life expectancy in excess of 20 years.

• **Connectors:** A wide variety of connectors are available for LMR-600 cable, including all common interface types, reverse polarity, and a choice of solder or non-solder center pins. Most LMR connectors employ crimp outer attachment using standard hex crimp sizes.

• **Cable Assemblies:** All LMR-600 cable types are available as pre-terminated cable assemblies. Refer to the section on FlexTech for further details.

Part Description				Stock	
Part Number	Application	Jacket Color	Code		
LMR-600	Outdoor	PE	Black	54003	
LMR-600-DB	Outdoor/Watertight	PE	Black	54093	
LMR-600-FR	Indoor/Outdoor Riser	CMR	FRPE	Black	54032
LMR-600-FR-PVC	Indoor/Outdoor Riser	CMR	FRPVC	Black	54074
LMR-600-PVC	General Purpose	PVC	Black	54219	
LMR-600-PVC-W	General Purpose	PVC	White	54206	

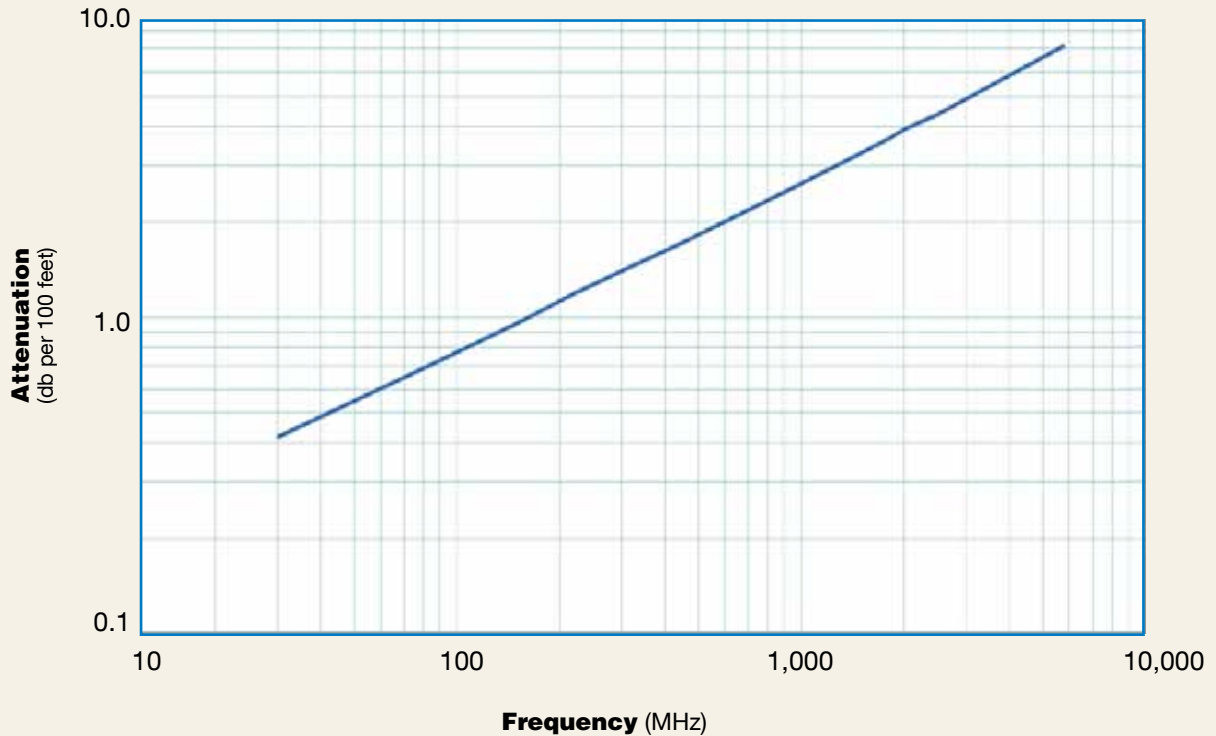
Construction Specifications			
Description	Material	In.	(mm)
Inner Conductor	Solid BCCAI	0.176	(4.47)
Dielectric	Foam PE	0.455	(11.56)
Outer Conductor	Aluminum Tape	0.461	(11.71)
Overall Braid	Tinned Copper	0.490	(12.45)
Jacket	(see table above)	0.590	(14.99)

Mechanical Specifications			
Performance Property	Units	US	(metric)
Bend Radius: installation	in. (mm)	1.50	(38.1)
Bend Radius: repeated	in. (mm)	6.0	(152.4)
Bending Moment	ft-lb (N-m)	2.75	(3.73)
Weight	lb/ft (kg/m)	0.131	(0.20)
Tensile Strength	lb (kg)	350	(158.9)
Flat Plate Crush	lb/in. (kg/mm)	60	(1.07)

Environmental Specifications		
Performance Property	°F	°C
Installation Temperature Range	-40/+185	-40/+85
Storage Temperature Range	-94/+185	-70/+85
Operating Temperature Range	-40/+185	-40/+85

Electrical Specifications			
Performance Property	Units	US	(metric)
Velocity of Propagation	%	87	
Dielectric Constant	NA	1.32	
Time Delay	nS/ft (nS/m)	1.17	(3.83)
Impedance	ohms	50	
Capacitance	pF/ft (pF/m)	23.4	(76.6)
Inductance	uH/ft (uH/m)	0.058	(0.19)
Shielding Effectiveness	dB	>90	
DC Resistance			
Inner Conductor	ohms/1000ft (/km)	0.53	(1.7)
Outer Conductor	ohms/1000ft (/km)	1.2	(3.9)
Voltage Withstand	Volts DC	4000	
Jacket Spark	Volts RMS	8000	
Peak Power	kW	40	

Attenuation vs. Frequency (typical)



Frequency (MHz)	30	50	150	220	450	900	1500	1800	2000	2500	5800
Attenuation dB/100 ft	0.4	0.5	1.0	1.2	1.7	2.5	3.3	3.7	3.9	4.4	7.3
Attenuation dB/100 m	1.4	1.8	3.2	3.9	5.6	8.2	10.9	12.1	12.8	14.5	23.8
Avg. Power kW	5.51	4.24	2.41	1.97	1.35	0.93	0.70	0.63	0.59	0.52	0.32

Calculate Attenuation =
 $(0.075550) \cdot \sqrt{\text{FMHz}} + (0.000260) \cdot \text{FMHz}$ (interactive calculator available at http://www.timesmicrowave.com/cable_calculators)

Attenuation:
 VSWR=1.0; Ambient = +25°C (77°F)

Power:
 VSWR=1.0; Ambient = +40°C; Inner Conductor = 100°C (212°F); Sea Level; dry air; atmospheric pressure; no solar loading

LMR®-600 Flexible Low Loss Communications Coax

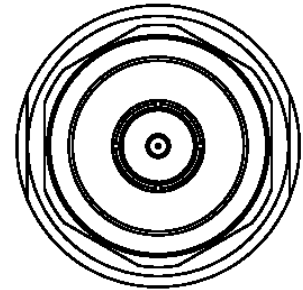
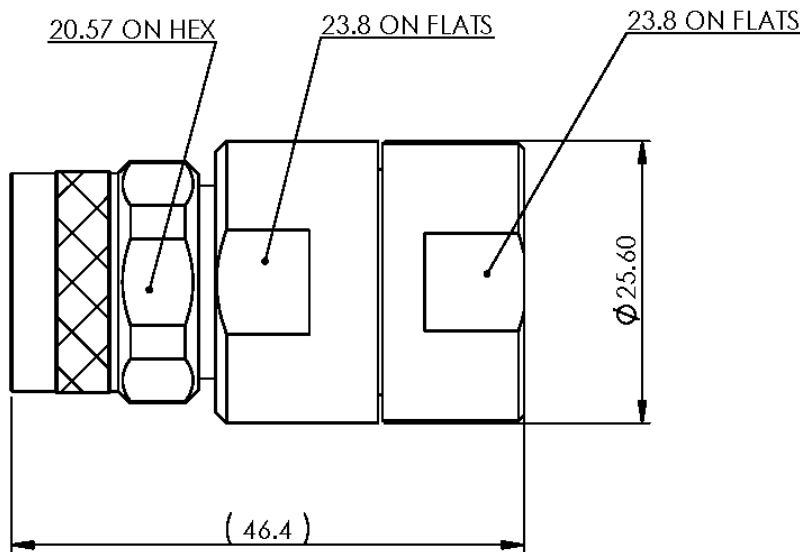
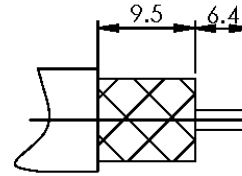


Connectors

Interface	Description	Part Number	Stock Code	VSWR**	Freq. (GHz)	Inner Coupling Nut	Outer Contact Attach	Finish* Attach	Body /Pin	Length		Width		Weight	
										in	(mm)	in	(mm)	lb	(g)
7/8 EIA	Flange	EZ-600-78EIA	3190-1373	<1.25:1	(2.5)	NA	Spring Finger Clamp	S/S	S/S	2.3	(58)	2.60	(66.0)	0.873	(396.0)
7-16 DIN Female	Straight Jack	TC-600-716FC	3190-375	<1.25:1	(2.5)	NA	Solder Clamp	S/S	S/S	1.1	(28)	1.00	(25.4)	0.249	(112.9)
7-16 DIN Male	Straight Plug	EZ-600-716MH	3190-503	<1.25:1	(2.5)	Hex	Spring Finger Crimp	S/S	S/S	2.0	(51)	1.30	(33.0)	0.254	(115.2)
	Straight Plug	TC-600-716MC	3190-502	<1.25:1	(2.5)	Hex	Solder Clamp	S/S	S/S	2.0	(51)	1.30	(33.0)	0.347	(157.4)
	Right Angle	TC-600-716M-RA	3190-395	<1.35:1	(2.5)	Hex	Solder Crimp	S/S	S/S	1.4	(36)	1.40	(35.6)	0.354	(160.8)
7/16 Male	Right Angle	EZ-600-716M-RA-X	3190-2546	<1.35:1	(6)	Hex	Spring Finger Crimp	A/G	A/G	1.6	(40)	1.38	(35.0)	0.462	(210.0)
	Straight Jack	EZ-600-716F	3190-2447	<1.25:1	(6)	Hex	Spring Finger Crimp	A/G	A/G	1.8	(45)	1.32	(33.6)	0.158	(71.7)
HN Male	Straight Plug	TC-600-HNM	3190-1429	<1.25:1	(<1)	Knurl	Solder Clamp	S/g	S/g	2.3	(59.2)	0.88	(22.4)	0.25	(113)
LC Male	Straight Plug	TC-600-LCM	3190-1406	<1.25:1	(<1)	Hex	Solder Clamp	N/S	N/S	3.1	(78.0)	1.62	(41.1)	1.20	(544)
N Female	Straight Jack	EZ-600-NF	3190-955	<1.25:1	(2.5)	NA	Spring Finger Crimp	S/G	S/G	2.3	(59)	0.87	(22.1)	0.150	(68.0)
	Bulkhead Jack	EZ-600-NF-BH	3190-616	<1.25:1	(2.5)	NA	Spring Finger Crimp	S/G	S/G	2.4	(61)	0.88	(22.4)	0.195	(88.5)
	Bulkhead Jack	TC-600-NF-BH	3190-589	<1.25:1	(2.5)	NA	Solder Crimp	S/G	S/G	2.4	(61)	0.88	(22.4)	0.195	(88.5)
	Bulkhead Jack	TC-600-NFC-BH	3190-466	<1.25:1	(2.5)	NA	Solder Clamp	S/G	S/G	2.2	(56)	0.94	(23.9)	0.214	(97.1)
N Male	Straight Plug	EZ-600-NMK	3190-669	<1.25:1	(2.5)	Knurl	Spring Finger Crimp	S/G	S/G	2.1	(53)	0.92	(23.4)	0.164	(74.4)
	Straight Plug	EZ-600-NMC-2-D	3190-2641	<1.25:1	(6)	Hex/Knurl	Spring Finger Clamp	A/G	A/G	2.1	(53)	0.92	(23.4)	0.202	(91.6)
	Straight Plug	TC-600-NMC	3190-357	<1.25:1	(2.5)	Hex	Solder Clamp	S/G	S/G	2.1	(53)	0.92	(23.4)	0.208	(93.4)
	Right Angle	TC-600-NMC-RA	3190-233	<1.35:1	(2)	Hex	Solder Clamp	S?G	S?G	2.2	(56.6)	1.29	(32.8)	0.270	(122.6)
	Straight Plug	EZ-600-NMH-X	3190-2627	<1.25:1	(8)	Hex/Knurl	Spring Finger Crimp	A/G	A/G	2.1	(53)	0.92	(23.4)	0.164	(74.4)
	Straight Plug	TC-600-NMH-X	3190-2628	<1.25:1	(8)	Hex/Knurl	Spring Finger Crimp	A/G	A/G	2.1	(53)	0.92	(23.4)	0.166	(75.3)
	Right Angle	EZ-600-NMH-RA-X	3190-2639	<1.35:1	(6)	Hex	Spring Finger Crimp	A/G	A/G	2.0	(50)	1.42	(36.0)	0.224	(101.7)
	Right Angle	TC-600-NMH-RA-D	3190-2427	<1.35:1	(6)	Hex	Solder Crimp	A/G	A/G	1.8	(46.5)	1.62	(41.2)	0.185	(84.3)
	Straight Plug	TC-600-NMH-75-50	3190-1610	<1.35:1	(6)	Hex	Solder Crimp	N/G	N/G	2.1	(52.8)	0.91	(23.1)	0.130	(59.0)
QDS Male	Straight Plug	TC-600-QDSM	3190-825	<1.25:1	(<1)	Knurl	Solder Clamp	A/G	A/G	2.2	(55.6)	1.00	(25.4)	0.25	(113)
	Right Angle	TC-600-QDSM-RA	3190-847	<1.25:1	(<1)	Knurl	Solder Clamp	A/G	A/G	2.4	(61.5)	1.88	(47.8)	0.35	(159)
TNC Male	Straight Plug	TC-600-TM-X	3190-2530	<1.25:1	(6)	Hex/Knurl	Solder Crimp	A/G	A/G	2.3	(57.6)	0.75	(19.0)	0.100	(45.6)
	Straight Plug	EZ-600-TM-X	3190-2531	<1.25:1	(6)	Hex/Knurl	Spring Finger Crimp	A/G	A/G	2.3	(57.6)	0.75	(19.0)	0.100	(45.6)
	Reverse Polarity	EZ-600-TM-RP	3190-796	<1.25:1	(2.5)	Knurl	Spring Finger Crimp	A/G	A/G	2.2	(56)	0.87	(22.0)	0.112	(50.8)
TNC Female	Reverse Polarity	EZ-600-TF-RP	3190-797	<1.25:1	(2.5)	NA	Spring Finger Crimp	A/G	A/G	2.3	(58)	0.87	(22.0)	0.100	(45.4)
UHF Male	Straight Plug	EZ-600-UM	3190-615	<1.25:1	(2.5)	Knurl	Spring Finger Crimp	S/G	S/G	1.7	(43)	0.88	(22.4)	0.164	(74.4)
	STRAIGHT PLUG	TC-600-UMC	3190-213	<1.25:1	(2.5)	KNURL	SOLDER CLAMP	S/G	S/G	1.7	(43)	0.88	(22.4)	0.198	(89.8)

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SYM	REVISION DESCRIPTION	DFTM	DATE	APPD	DATE
A	RELEASED FOR PRODUCTION	K.A.M.	5/20/11	J.D.B.	6/9/11



Reference standard IEC60169-16

I. Electric Performance

Nominal Impedance(Ω): 50
 Frequency Range: DC-6GHz
 VSWR: ≤ 1.35
 Insert Loss: ≤ 0.10 (0-3G)
 Insulation resistance ($M\Omega$): > 5000
 Proof voltage (V): 2500
 Conductor resistance ($m\Omega$):
 outer conductor < 0.4
 inner conductor < 0.8

II. Mechanical Performance

Whorl pull: 500N
 Nut torque: 5N.m
 Tensile force(cable-connect): 300N
 Torsion(cable-connect): 3N.m

II. Material and plating :

Component	Material	Plating
inner conductor	Beryllium copper	Au $>1.27\mu m$
outer conductor	Brass	Copper-tin-zinc $>2\mu m$
insulator	PTFE	
nut	Brass	Copper-tin-zinc $>2\mu m$

III. Environment

Temp.range	-55°C~+155°C
Thermal shock	US MIL-STD 202,Meth.107,Cond.B
Vibration	US MIL-STD 202,Meth.204,Cond.B
Shock	US MIL-STD 202,Meth.213,Cond.I
Weather standard	IEC 68 55 /155/ 56
ROHS compliant	

V. Assemble: inner and outer conductor installed

MATL:	UNLESS OTHERWISE SPECIFIED		DFTM: K. A. M.	TIMES MICROWAVE SYSTEMS
	ALL DIMENSIONS ARE IN mm		DATE: 5/20/11	
USED ON:			CHKD: J. D. B.	CONNECTOR, NM FOR LMR-600 (EZ-600-NMC-2-D)
			DATE: 6/9/11	
SCALE: ~	DWG. SIZE: A	DO NOT SCALE DRAWING	APPD: J. D. B.	SHEET: 1 of 1
			DATE: 6/9/11	
		CODE IDENT: 68999		REV: A

RY-900B Radome Protected Yagi Antenna

KATHREIN

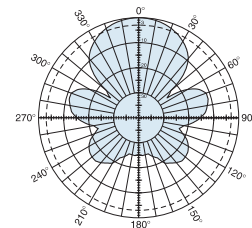
The KUSA RY series are rugged broadband yagi antennas housed in rugged fiberglass radomes, fabricated of 6061/T6 aluminum rod and 6063-T6 extruded pipe, anodized for maximum reliability and corrosion resistance. The radome protects the antenna against snow, ice and other adverse environmental conditions which can degrade performance and cause damage. The hardware and fastenings are stainless steel. The internal balun, coax feed and connector are sealed in a foam potting system to prevent moisture penetration and assure long service life in severe environmental conditions. The heavy aluminum mounting casting allows installation for V or H polarization.

- The RY-900B is specifically designed for professional fixed-station applications in the 890–960 MHz band.

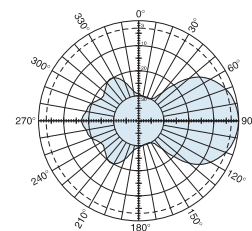


(Shown vertically polarized)

Specifications	
Frequency range	890–960 MHz
Gain	12 dBi
Impedance	50 ohms
VSWR	<1.5:1 maximum (1.35:1 typical)
Polarization	Horizontal or vertical
Front-to-back ratio	>20 dB
Maximum input power	100 watts (at 50°C)
H-plane beamwidth	48 degrees (half-power)
E-plane beamwidth	40 degrees (half-power)
Connector	N female
Weight	16.0 lb (7.3 kg)
Dimensions	29 x 17 x 12 inches (737 x 432 x 305 mm)
Wind load at 93 mph (150 kph)	at 100 mph (160 kph)
Side / Top / Rear	63 lbf / 16 lbf / 37 lbf (279 N) / (69 N) / (164 N)
Wind survival rating*	120 mph (193 kph)
Shipping dimensions	31 x 20 x 14.5 inches (787 x 508 x 368 mm)
Shipping weight	28.0 lb (12.7 kg)
Mounting	Mounting kits available for masts of 2.375 to 4.5 inch (60 to 114 mm) OD.



H-plane
Horizontal pattern — V-polarization
Vertical pattern — H-polarization



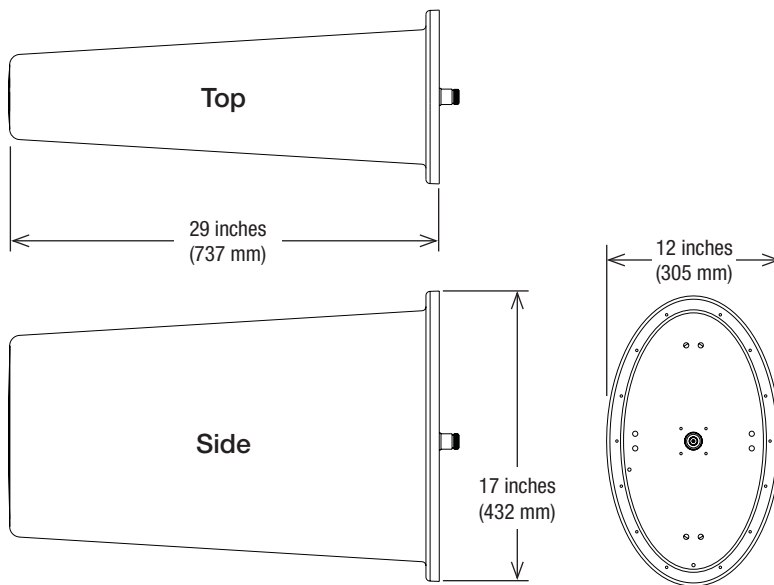
E-plane
Horizontal pattern — H-polarization
Vertical pattern — V-polarization

* Mechanical design is based on environmental conditions as stipulated in TIA-222-G-2 (December 2009) and/or ETS 300 019-1-4 which include the static mechanical load imposed on an antenna by wind at maximum velocity. See the Engineering Section of the catalog for further details.

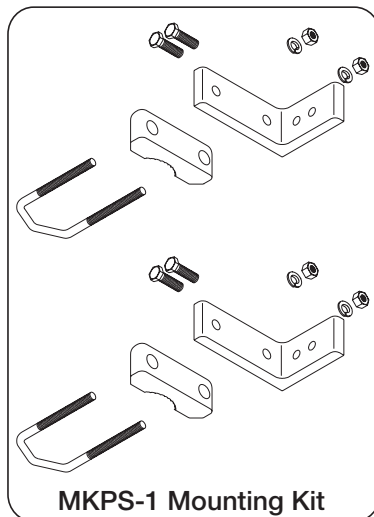
100641 subject to alteration



All specifications are subject to change without notice.
The latest specifications are available at www.kathreinusa.com



RY-900B Dimensions



MKPS-1 Mounting Kit

Mounting options

Model	Description
MKPS-1 (shown)	Mounting kit for 2.375 inch (60 mm) OD mast
MKPS-2	Mounting kit for 2.875 inch (73 mm) OD mast
MKPS-3	Mounting kit for 3.5 inch (89 mm) OD mast
MKPS-4	Mounting kit for 4 inch (102 mm) OD mast
MKPS-5	Mounting kit for 4.5 inch (114 mm) OD mast

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MOUNT KITS — TILT MOUNT KITS

ANTENNA MODELS	MKPP-23	MKPS-1	MKPS-2	MKPS-3	MKPS-4	MKPS-5	MKPS-12	MKPX-2	MKPX-3	MKPX-4	MKPX-5	MKPX-6	MKPX-9	MKPX-10	MKPX-11	MKPX-12	MKTB-1	MKTB-3
CL-900B	•	•	•	•	•													
MF-900B							•	•	•	•	•							
MF-940B							•	•	•	•	•							
MF-950B							•	•	•	•	•							
PR-850*							•*					•	•	•	•	•	•	•
PR-900*							•*					•	•	•	•	•	•	•
PR-950*							•*					•	•	•	•	•	•	•
RY-840B		•	•	•	•													
RY-860B		•	•	•	•													
RY-900B		•	•	•	•													
SL11-915/DT2	•						•											
SL11-940/DT2	•						•											
TY-840																		•
TY-860																		•
TY-900																		•

* Requires 2 each MKPX-2



11027-B

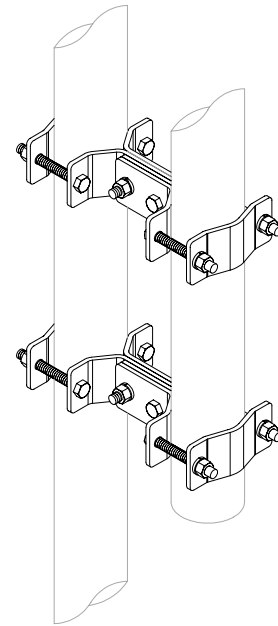
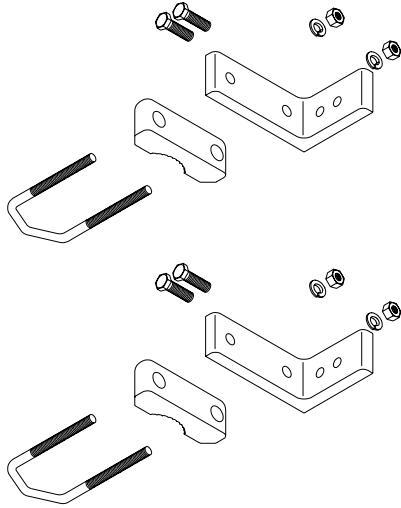


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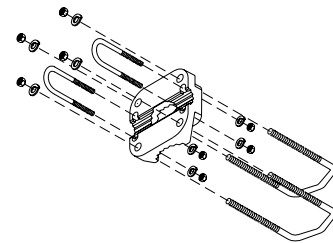
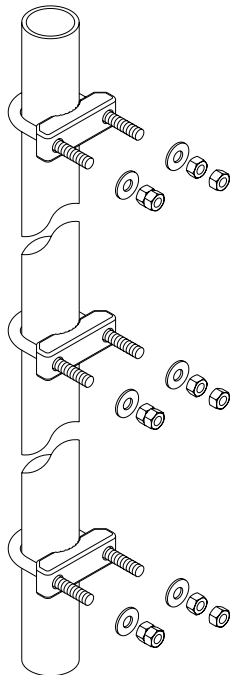
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**MKPS-1, MKPS-2, MKPS-3,
MKPS-4, MKPS-5**

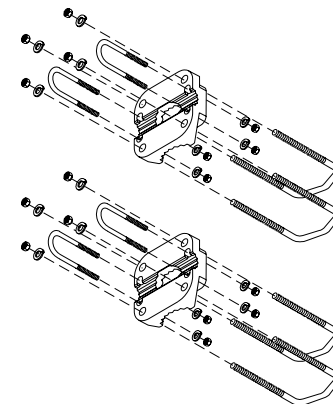


**MKPX-2, MKPX-3, MKPX-4,
MKPX-5, MKPX-6**

MKPS-13



**MKPX-9, MKPX-10
MKPX-11, MKPX-12**



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