

SUBJECT: Storm Drain Control Valve-Control Panel Revised**DATE:** 08/01/16**PROJECT:** Monte Bello Estates**JOB NO:** 5751589**TO:** Northstar Engineering
620 12th Street
Modesto, Ca. 95354**FROM:** Jeff Herbert**ATTN:** Bill Penney**SPECIFICATION SECTION:**

Sht. C1.04

REV No.	DESCRIPTION	SENT	RETURNED	COMMENT/ STATUS	HELD
006	Storm Drain Control Valve -Control Panel Revised	05/20/16			

COMMENTS

**City of Manteca, CA
Monte Bello Estates**

**PLC Control Panel
Product Data Submittal**

Owner:	City of Manteca
Engineer:	North Start Engineering Group, Inc.
Contractor:	Falco Construction
Customer:	Falco Construction

MCC-CS Project No.:	2914
MCC-CS Submittal No.:	201
MCC-CS Revision No.:	1.3
Submittal Date:	07/29/2016
Prepared By:	Spencer Alderman, EIT

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	Original Notes to Reviewing Contractor
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	New Changes per Reviewing Engineer's Email
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3.	Radio & Accessories
4.	Power Equipment
5.	Circuit Breakers
6.	Relays
7.	Termination Equipment
8.	Fuses
9.	Receptacles
10.	New Material Submersible Level Transmitter
11.	New Valve Box Enclosure
12.	New Material Drawings & Bill of Materials

Notes To Reviewing Engineer

No.	Section	Description
1.		This submittal contains product data for MCCC's supplied PLC Control Panel. Note that an O&M Manual will follow under separate cover upon submittal approval.
2.	Tab3	There are currently other projects experiencing difficulty with the MDS radio. Product Selection is to be confirmed at a later date.



Notes To Reviewing Contractor

No.	Section	Description
1.		This submittal contains product data for MCCC'S supplied PLC Control Panel. Note that an O&M Manual will follow under separate cover upon submittal approval.
2.	Tab1	The color of the enclosure was selected as RAL 6029. Please verify selection on color chart under enclosure tab.

2914-201 REV. 1.1 SUBMITTAL REVIEW COMMENTS:

From: Mijango, Alfredo [<mailto:amijango@ci.manteca.ca.us>]

Sent: Tuesday, June 14, 2016 4:30 PM

To: Bill Penney

Cc: Emerick, Glen; Swain, Bret; Maneau, Lauren

Subject: Monte Bello Estate Storm Drain Control Valve-Control Panel submittal review

MCC-CS Response below in red by Spencer Alderman, EIT.

Dear Mr. Penney

The City of Manteca, Public Works Department, Engineering Division has reviewed the submittal for the Storm Drain Control Valve-Control Panel at Monte Bello Estates by Knife River, Job Number 5751589.

The submittal is not approved by the department based on the following items:

1. *Remove Modicon M340 Micro-PLC Standard BMX P34 1000*
Replace with Modicon M340 Micro-PLC Performance BMX P34 2020
MCC-CS Response: PLC CPU changed to BMXP342020. Covered under 2914-COQ-001.
2. *Remove Maple Systems OIT3185*
Replace OIT with a 6" touch screen by Automation Direct model EA7-T6CL or Schneider model HMISCU8A5, no equivalent.
MCC-CS Response: OIT changed to Schneider model HMISCU8A5. Covered under 2914-COQ-001.
3. Add Stilling Well inside control valve manhole, located upstream of control valve at STA 11+56.54, sheet C7.18. Level sensor by Keller America, P/N 0407.01607.021311.13, range 0-20 ft, output 4-20 mA, no equivalent.
MCC-CS Response: Level Transmitter added. Covered under 2914-COQ-001.
4. **Add Stilling Well inside storm drain manhole, located at STA 15+58.58, sheet C7.18. Level sensor by Keller America, P/N 0407.01607.021311.13, range 0-20 ft, output 4-20 mA, no equivalent.**
MCC-CS Response: Level Transmitter added. Covered under 2914-COQ-001.
5. Please provide all engineered calculations, control strategies and design details to demonstrate the proposed control algorithms and parameters to meet the City's basin discharge and storage standards. The information provided shall demonstrate that proposed facilities will not flood while both interconnected basins are under design storm conditions with the proposed control algorithms in operation. Reversal of flow between basins and flooding potential in either the upstream or downstream basins shall be considered in developing the algorithms. The existing storage and discharge capacities and free-board, as designed in all existing facilities, shall be maintained. The final submittal package shall be reviewed and approved by Northstar's engineer of record for this project for concurrence that the proposed control strategy will provide proper flood protection and storm drainage control to meet all applicable regulatory standards. Northstar's engineer shall demonstrate his concurrence that the control strategy, algorithms and parameters submitted meet the regulatory standards by signature and stamp on the submittal package.

MCC-CS Response: To be done by others.

MCC-CS Additional Note: The analog inputs from the Level Transducers will require the addition of an Analog Input Module and accessories. Covered under 2914-COQ-001.

Thank You

Alfredo Mijango

Assistant Engineer

209-456-8422

1001 W. Center Street

Manteca, CA 95337

Item 4 has been removed per Email Changes from Reviewing Engineer.



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From: Mijango, Alfredo [<mailto:amijango@ci.manteca.ca.us>]
Sent: Tuesday, July 12, 2016 5:45 PM
To: Todd Rammell
Cc: Vic Aquistapace - Falco Construction (falcov@aol.com); Spencer Alderman
Subject: RE: 2914 Manteca Monte Bello Questions CP layout details?
MCC-CS Response below in red by Spencer Alderman, EIT.

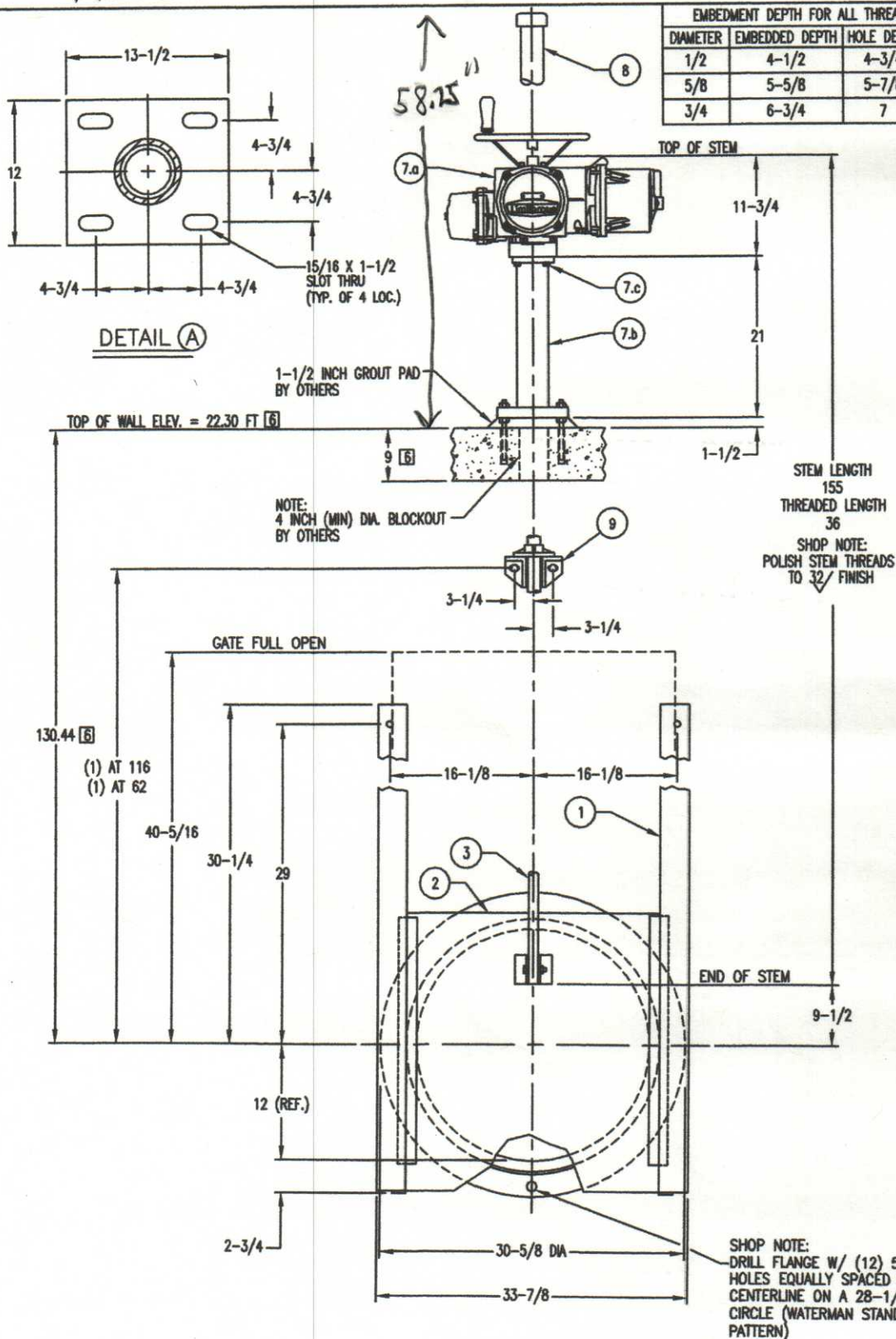
Hi Todd,

- 1- I would like a cabinet over the slide gate controller that is lockable and that it will let the slide gate fully open and close. I have gone to the Solera project site but the cabinet has not been installed yet. I'm fine with the proposed color (Tan) but I don't know if the dimensions of the slide gate in the cabinet, let me know if you have this information.
MCC-CS Response: Custom Gaylord Enclosure added to the bill of materials. See tab 11 for description.
- 2- Yes, only one stilling well (11+56.54) wired and controlled by the Monte Bello PLC/Radio. Todd, do you have the proposed control strategy for this setup?
MCC-CS Response: Level transmitter added per review 1.1 for location 15+58.58 has been removed.

Let me know if you have any other questions.

Thanks
Alfredo Mijango
Assistant Engineer
209-456-8422
1001 W. Center Street
Manteca, CA 95337

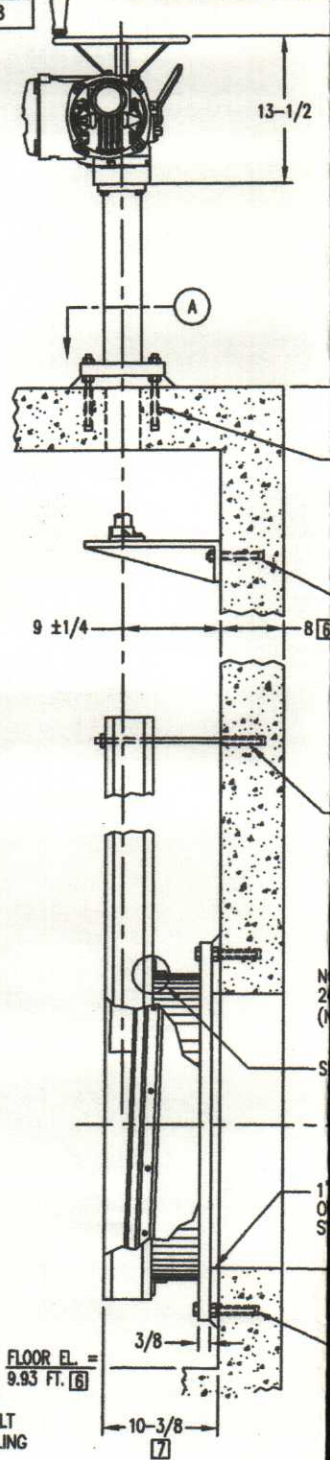
Monte Bello Control Box



DIAMETER	EMBEDDED DEPTH	HOLE DEPTH	HOLE DIA.
1/2	4-1/2	4-3/4	9/16
5/8	5-5/8	5-7/8	3/4
3/4	6-3/4	7	7/8

NOTE: HANDRAIL BY OTHERS (NO CONTRACTOR TO ENSURE CLEAR FOR HANDWHEEL OPERATION.

NOTE: ALUMINUM IN CONTACT WITH
TO BE FIELD PAINTED BY OTHERS



SHOP NOTE: DRILL FLANGE W/ (12) 5/8 DIA. HOLES EQUALLY SPACED FROM TOP CENTERLINE ON A 28-1/4 DIA. BOLT CIRCLE (WATERMAN STANDARD DRILLING PATTERN)

FLOOR EL. =
9.93 FT. [6]



24 DIA. WATERMAN MODEL
AC-31-F
CANAL GATE

FOR: FALCO CONS
3808 FARM
STOCKTON,

PO: 782386

REF: MONTE BELL
MANTECA, C.

P.O. BOX 458 • 25500 Road 204 • Exeter, California 93221 • Phone (559)562-4000 • FAX (559)562-2277 • www.watermanusa.com

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ENG:

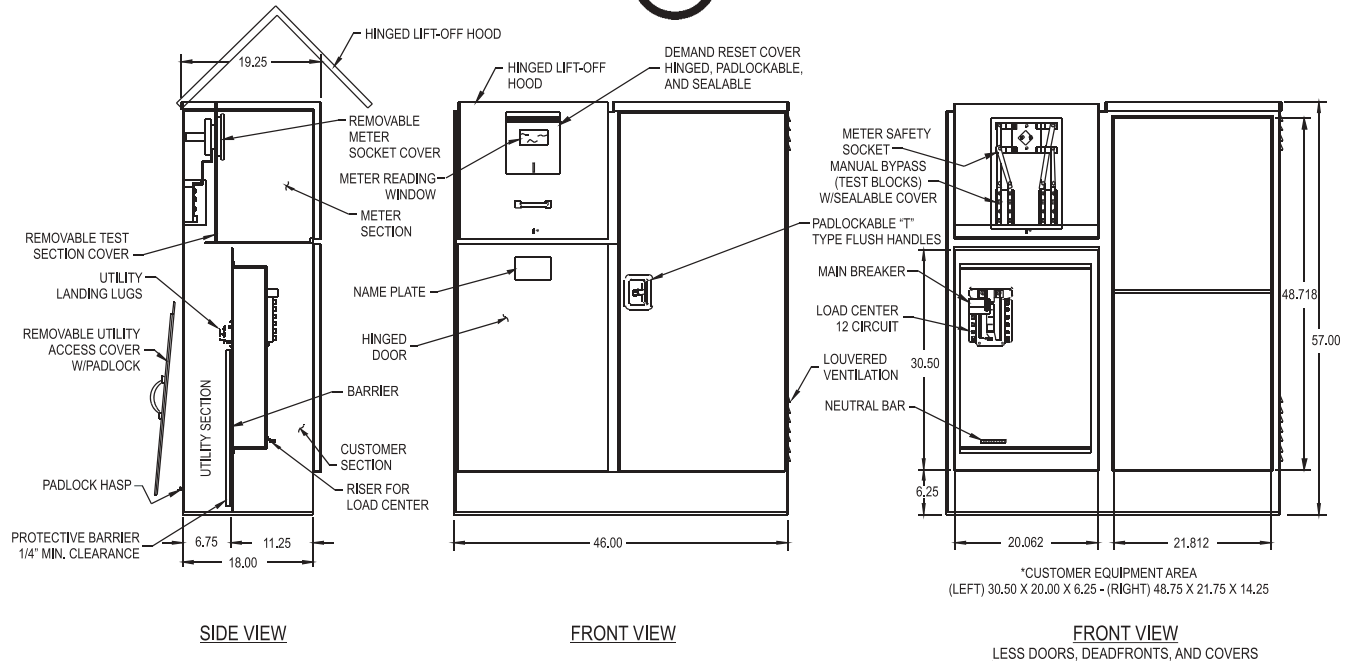
TAB 1





MEUG46 (formerly MEUGD)

Designed to supply metered power to remote locations
and enclose an irrigation controller.



STANDARD FEATURES

- Standard voltage 120/240V 1Ø 3W.
- Meter Socket: 4 jaw, 100 amps or 200 amps.
- Meter socket with test blocks.
- 12 circuit copper bussed interior.
- Main Breaker: 100 amps or 200 amps, 10K AIC.
- Utility Landing Lugs: 200 amps.
- Vandal-resistant hinged door and dead front.
- Light green powder coat finish in accordance with ASTM B-117. Custom colors available.
- 2-14 gauge adjustable mounting panels (right side).

OPTIONAL FEATURES

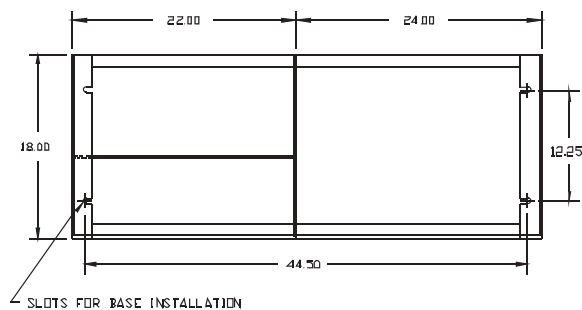
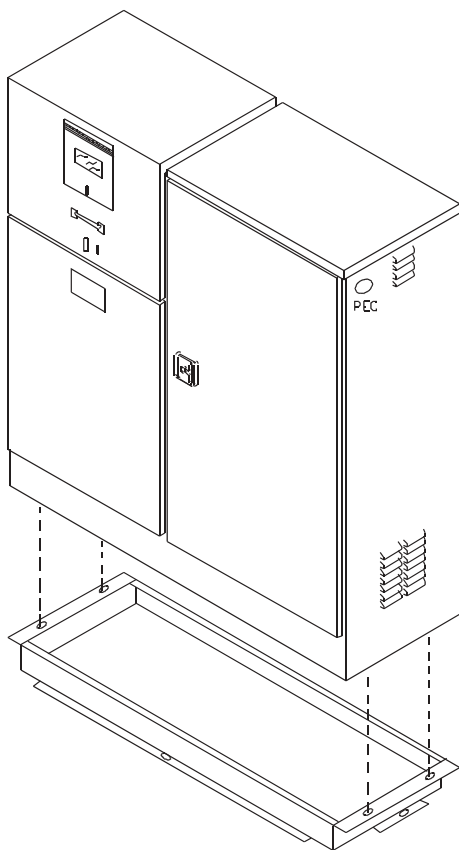
- Maximum voltage 480Y/277V 3Ø 4W (may effect optional equipment).
- 12 circuit interior may be increased to 30 circuit.
- Higher AIC available upon request.
- P.E. cell, test switch, lighting relay may be added to standard.
- Some equipment modifications available. Consult your factory representative.
- Meter Sockets: 5 jaw or 7 jaw, 100 amps or 200 amps.
- Meter sockets with or without test blocks.
- Pad Mounting Base available for concrete foundation. Order separately - MEUG46-BASE.
- Anchor bolts. Order separately - 714548 (quantity 4).
- Uni-body construction available in steel, stainless steel and aluminum.

SPECIFICATIONS

- 12 gauge corrosion resistant zinc coated steel construction. Hood and covers 14 gauge.
- Rainproof type 3R enclosure.
- Complies with Caltrans specification ES-2E.
- Meets EUSERC 308 requirements.
- All factory wiring is 600 volt rated copper.
- Acceptable circuit breakers are GE, ITE, Crouse-Hinds/Murray, Cutler-Hammer.
- Suitable for use without main when no more than six service disconnects are installed and used in accordance with article 384 of the NEC.
- Listed by Underwriters Laboratories, Inc.

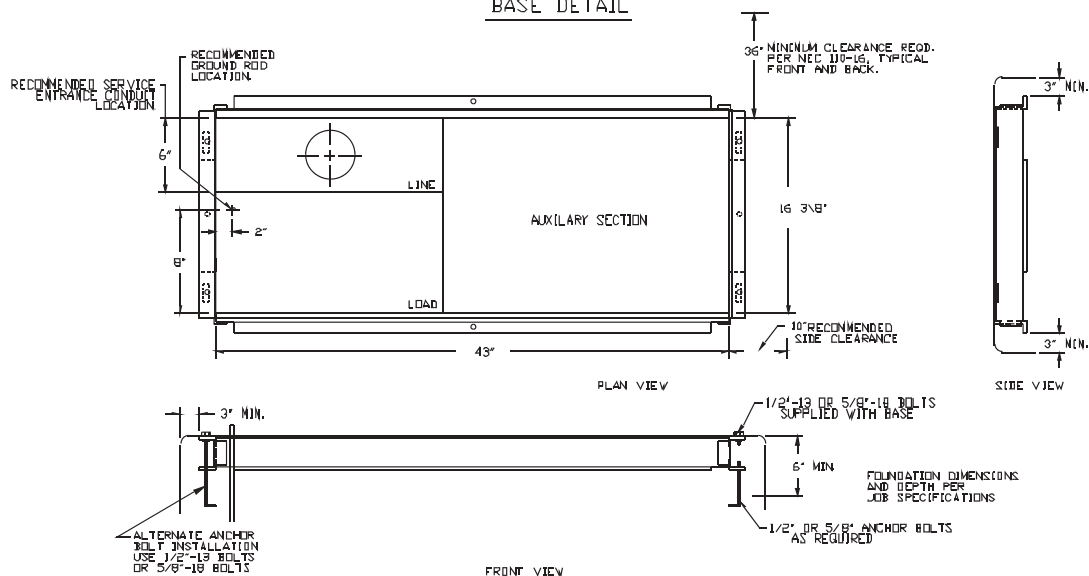
STANDARD MODELS
*Custom configurations also available.
 Consult your factory representative.*

Catalog No.	Amps	Voltage	Main	AIC Rating
MEUG46-M100	100	120/240	100	10,000
MEUG46-M200	200	120/240	200	10,000
For aluminum enclosure order MEUG46A- For stainless steel enclosure order MEUG46X-				



BOTTOM VIEW
MOUNTING SLOT DETAIL

BASE DETAIL



Tel: 866-MY-MYERS Fax: 951-520-1961
www.myerspowerproducts.com

ISO 9001
Certified Manufacturer

Specifications are subject to change without notice to reflect improvements and upgrades.

DIVIDER



TIGER Drylac®

ral colors

exterior powder coatings



TIGER Drylac®
Powder Coatings

series 49

Weather Resistant TGIC Polyester Powder Coatings for Exterior and Interior Applications

Features: Good weather resistance, good mechanical properties, very smooth flow, good storage stability, good coverage

Gloss Level: All colors featured in this chart are available as standard products in smooth glossy with a gloss level of 80-90+ (gloss level according to Garner 60 deg., ASTM D 523).

Typical Applications: Residential windows and doors, garden equipment, patio furniture, automotive accessories, bicycles, motorcycles, sporting goods.

Standard Packaging: 55 lb boxes or 5 lb mini packs

Datasheets: Periodically updated datasheets, showing cure parameters, test results, pre-treatment information and more are available for all products in this chart. Please contact your local TIGER Drylac office or visit www.tigerdrylac.com for the most current edition.



All Series 49 (custom and stock) products, made in the US or Canada are periodically re-certified and carry the UL (Underwriter Laboratories) Recognized Component mark. This UL mark is for all equipment and products intended for the US and Canadian market.

series 38

Highly Weather- and UV-Resistant Powder Coatings based on Super Durable TGIC Polyester for Exterior and Interior Applications

Features: Superior gloss and color retention, excellent weather resistance, good mechanical properties, superior chalk resistance, smooth flow, excellent edge coverage, good storage stability. AAMA 2604-05 conforming.

Gloss Level: All colors featured in this chart are available as standard products in smooth glossy with a gloss level of 80-90 (gloss level according to Gardner 60 deg., ASTM D 523).

Typical Applications: Agricultural and construction equipment, bus shelters, lighting fixtures, playground equipment, site furnishings, garage doors, stadium seating, fencing, automotive equipment, and marine applications.

Standard Packaging: 44 lb boxes and 5 lb mini packs

Datasheets: Periodically updated datasheets, showing cure parameters, test results, pre-treatment information and more are available for all products in this chart. Please contact your local TIGER Drylac office or visit www.tigerdrylac.com for the most current edition.

RAL colors not available: Due to pigmentation a small percentage of colors in the yellow, orange, red and purple range offer only limited UV stability and are therefore not available.

More standard Series 38 products: For additional architectural mattes, glossy and metallic products please see our Series 38 Super Durable Powder Coatings brochure.

Custom colors: Custom colors not shown in this brochure can be custom made in 7 to 10 days. Due to pigmentation some colors in the yellow, orange, red and purple range offer only limited UV stability. UV stability of custom colors in that color range must be verified by our production laboratories on a case by case basis.

TIGER Drylac continues to offer the largest product selection in the powder coating industry. For additional standard products and innovative powder coating solutions please see our numerous other brochures including:

TIGER Drylac Metallic

TIGER Drylac Special Effect

TIGER Drylac Essentials

TIGER Drylac Specialties

TIGER Drylac Series 38 Super Durable

TIGER Drylac Anti-Graffiti

TIGER Drylac Series 58 Super Durable
(for approved applicators only)

TIGER Drylac Series 75 Fluoropolymer
(for approved applicators only)

TIGER Drylac Wood

Specifying TIGER Drylac products

In order to eliminate possible errors in specifying our products, we recommend using the full product number rather than specifying the RAL number only. This product number not only describes the Series/Chemistry, but also the exact color, finish and sheen.

Please check with your local TIGER Drylac office or representative for assistance with specifications and suitability issues.

RAL

Having gained worldwide acceptance over the last few decades, the RAL is the most popular Central European Color Standard used today.

The RAL colors in this chart have been matched as closely as possible. Color chart production methods and influence from heat and light may account for slight color deviation from the actual RAL Standard. This chart therefore can not serve as a standard for RAL color production and is to be used as a guide for color planning and specification only.

To aid in final product selection please contact your regional Tiger Drylac location for a powder coated Q-Panel of the product of your choice.

Product Code Matrix

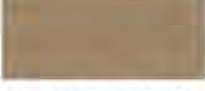
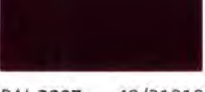
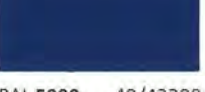
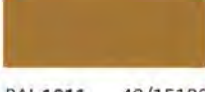
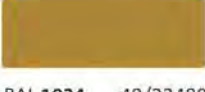
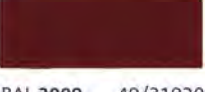
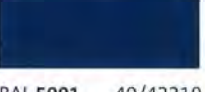
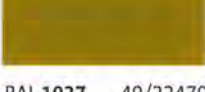
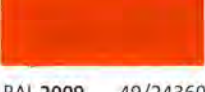
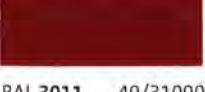
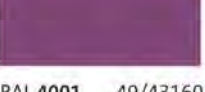
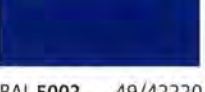
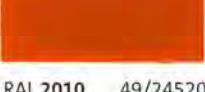
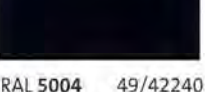
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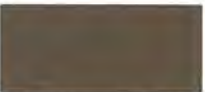
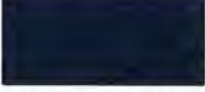
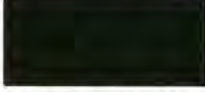
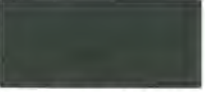
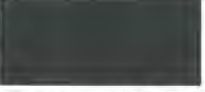
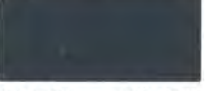
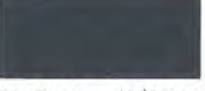
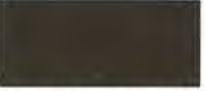
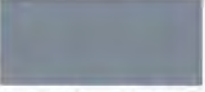
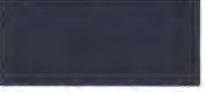
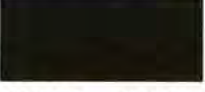
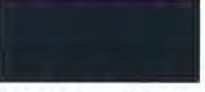
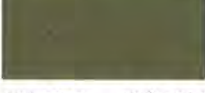
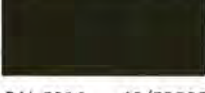
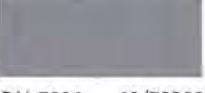
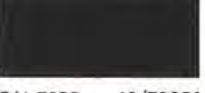
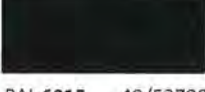
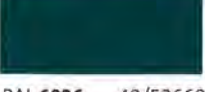
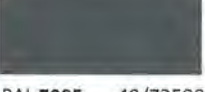
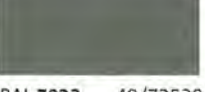
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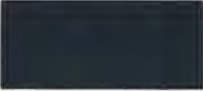
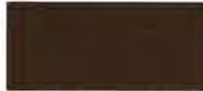
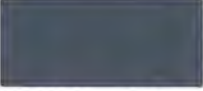
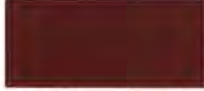
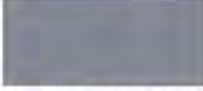
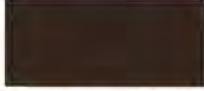
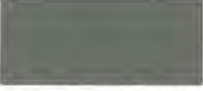
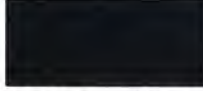
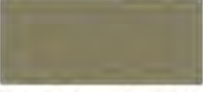
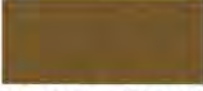
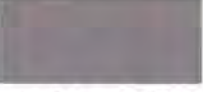
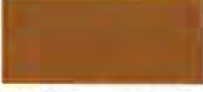
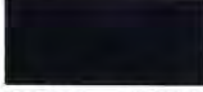
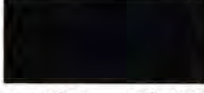
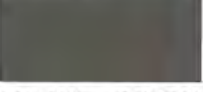
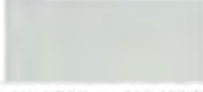
09 Polyester/Epoxy Hybrid
16 Acrylic Hybrid
28 Super Durable Polyester
TGIC (for approved
applicators only)
39 Polyester TGIC
44 Polyurethane
49 Polyester TGIC
59 Polyester TGIC-Free
69 Epoxy
75 Fluoropolymer
(for approved
applicators only)
89 Polyester/Epoxy Hybrid,
Low/Fast Cure

Color Group (starting with)

1 White
2 Yellow / Orange
3 Red
4 Blue
5 Green
6 Brown
7 Grey
8 Black
9 Metallic

					
RAL 1000 49/15200 38/15000	RAL 1015 49/15320 38/15015	RAL 1033 49/22240	RAL 2012 49/24690	RAL 3014 49/31080	RAL 4004 49/31020 38/30024
					
RAL 1001 49/15190 38/15001	RAL 1016 49/22520 38/20016	RAL 1034 49/23910	RAL 3000 49/33120 38/30000	RAL 3015 49/33670	RAL 4005 49/42780
					
RAL 1002 49/22590 38/20002	RAL 1017 49/22510 38/20017	RAL 1037 49/20096	RAL 3001 49/31120 38/30001	RAL 3016 49/31980 38/30016	RAL 4006 49/32090
					
RAL 1003 49/22580	RAL 1018 49/21830 38/20018	RAL 2000 49/24570	RAL 3002 49/31110 38/30002	RAL 3017 49/31060	RAL 4007 49/32540 38/30025
					
RAL 1004 49/22570 38/20004	RAL 1019 49/13660 38/15019	RAL 2001 49/24560 38/23170	RAL 3003 49/31100 38/30003	RAL 3018 49/31050	RAL 4008 49/32280
					
RAL 1005 49/22560 38/20005	RAL 1020 49/22500 38/20020	RAL 2002 49/24550 38/25002	RAL 3004 49/33900 38/30004	RAL 3020 49/31040 38/30021	RAL 4009 49/34740
					
RAL 1006 49/22550 38/20006	RAL 1021 49/22280 38/20021	RAL 2003 49/24540	RAL 3005 49/31900 38/30005	RAL 3022 49/33700	RAL 4010 49/40490
					
RAL 1007 49/22540	RAL 1023 49/22490 38/20023	RAL 2004 49/24530	RAL 3007 49/31910 38/30007	RAL 3027 49/33660	RAL 5000 49/42200 38/40000
					
RAL 1011 49/15180 38/15011	RAL 1024 49/22480 38/20024	RAL 2008 49/24340	RAL 3009 49/31920 38/30009	RAL 3031 49/34730 38/30031	RAL 5001 49/42210 38/40001
					
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RAL 1013 49/11280 38/10013	RAL 1028 49/22460	RAL 2010 49/24520 38/25001	RAL 3012 49/31940 38/30012	RAL 4002 49/31030 38/30008	RAL 5003 49/42230 38/40003
					
RAL 1014 49/15170 38/15014	RAL 1032 49/22450 38/20032	RAL 2011 49/24580	RAL 3013 49/31950 38/30013	RAL 4003 49/32270	RAL 5004 49/42240 38/40004

					
RAL 5005 49/43190 38/40010	RAL 5019 49/42360 38/40019	RAL 6006 49/52870 38/50006	RAL 6016 49/51020 38/50016	RAL 6027 49/50990 38/50027	RAL 7006 49/72580 38/70006
					
RAL 5007 49/42250 38/40007	RAL 5020 49/44270 38/40018	RAL 6007 49/52860 38/50007	RAL 6017 49/52780 38/50017	RAL 6028 49/52650 38/50028	RAL 7008 49/72570 38/70008
					
RAL 5008 49/42260 38/40008	RAL 5021 49/41190 38/40021	RAL 6008 49/53240 38/50008	RAL 6018 49/52720 38/50018	RAL 6029 49/52640 38/50029	RAL 7009 49/72770 38/70009
					
RAL 5009 49/42270 38/40009	RAL 5022 49/42390 38/40022	RAL 6009 49/52840 38/50009	RAL 6019 49/51000 38/50019	RAL 6032 49/52630 38/50032	RAL 7010 49/72560 38/70014
					
RAL 5010 49/42280 38/40016	RAL 5023 49/44650 38/40023			RAL 6033 49/55010 38/50033	RAL 7011 49/72790 38/70011
					
RAL 5011 49/43180 38/40011	RAL 5024 49/44660 38/40024				
RAL 5012 49/43170 38/40012	RAL 6000 49/53160 38/50000	RAL 6010 49/52830 38/50031	RAL 6020 49/52710 38/50020	RAL 7000 49/72700 38/70000	RAL 7013 49/72550 38/70013
					
RAL 5013 49/42310 38/40013	RAL 6001 49/52900 38/50005	RAL 6011 49/52820 38/50011	RAL 6021 49/52700 38/50021	RAL 7001 49/72710 38/70003	RAL 7015 49/72820 38/70015
					
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RAL 5017 49/40760 38/40017	RAL 6004 49/50980 38/50004	RAL 6014 49/52800 38/50014	RAL 6025 49/52670 38/50025	RAL 7004 49/73300 38/70004	RAL 7022 49/72850 38/70022
					
RAL 5018 49/41140 38/40020	RAL 6005 49/50670 38/50002	RAL 6015 49/52790 38/50015	RAL 6026 49/52660 38/50026	RAL 7005 49/72590 38/70005	RAL 7023 49/72530 38/70023

			
RAL 7024 49/72870 38/70024	RAL 7040 49/75470 38/70046	RAL 8007 49/66120 38/60007	RAL 8025 49/66050 38/60025
			
RAL 7026 49/72880 38/70026	RAL 7042 49/73250 38/70042	RAL 8008 49/66110 38/60008	RAL 8028 49/66500 38/60028
			
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RAL 7031 49/72520 38/70031	RAL 7044 49/75480 38/70044	RAL 8012 49/66090 38/60012	RAL 9002 49/70520 38/10002
			
RAL 7032 49/72910 38/70001	RAL 7045 49/77890 38/70045	RAL 8014 49/65230 38/60010	RAL 9003 49/11400 38/10003
			
RAL 7033 49/72510 38/70033	RAL 7046 49/72010 38/70002	RAL 8015 49/63040 38/60015	RAL 9004 49/81950 38/80004
			
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RAL 7035 49/73510 38/70035	RAL 8000 49/66170 38/60000	RAL 8017 49/65220 38/60017	RAL 9010 49/11500 38/10004
			
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RAL 7037 49/72480 38/70037	RAL 8002 49/66150 38/60002	RAL 8022 49/63080 38/60022	RAL 9016 49/11340 38/10010
			
RAL 7038 49/72470 38/70038	RAL 8003 49/66140 38/60003	RAL 8023 49/66070 38/60023	RAL 9017 49/80550 38/80017
			
RAL 7039 49/71020 38/70039	RAL 8004 49/66130 38/60004	RAL 8024 49/66060 38/60024	RAL 9018 49/72490 38/10018

exterior



DIVIDER



COMPACT AXIAL FANS



Fan to be included by Meyers Power Pedestal, when providing pedestal. Will be similar to this cut sheet, however may not be identical.

INDUSTRY STANDARDS

UL Component Recognized

CSA certified

APPLICATION

Compact Cooling Fans are ideal for applications where enclosure space is limited and quiet, reliable cooling is required. Engineered for 50,000 hours of continuous operation without lubrication or service.

Installation

Can be installed on any surface of an enclosure. With the addition of accessory fan brackets, Compact Cooling Fans can also be installed in any position inside the enclosure for spot cooling or air circulation.

FEATURES

- Maximum operating temperature is 158 F (70 C)
- 4-in. fan is thermally protected and uses permanently lubricated ball bearings
- 6- and 10-in. fans have ball-bearing construction and split-capacitor motors

- Split-capacitor motors are thermally protected to avoid premature failure
- Dynamically balanced impellers molded from polycarbonate material
- One finger guard is furnished (additional finger guards are available)
- All mounting hardware is provided
- 240 and 560 CFM fans have ball bearing construction and split capacitor motors
- Fans have leadwires with ends stripped 1/2-in. (12-mm) or 6-ft. (1.8-m) cord with polarized plug for power connections

Fan bracket and additional finger guards must be purchased separately

FINISH

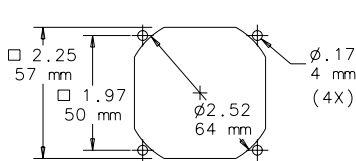
- Fan housing is black.

ACCESSORIES

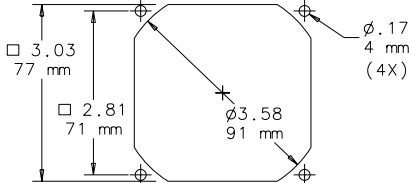
Fan Power Cords
Fan Brackets
Finger Guards
Temperature Control Switch

Design Data Compact Axial Fans

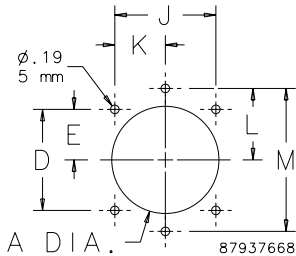
CATALOG NUMBERS	Nominal Size	Voltage	A in./mm	D in./mm	E in./mm	J in./mm	K in./mm	L in./mm	M in./mm
A2AXFN24	2	24 VDC	—	1.97/50	.98/25	1.97/50	.98/25	—	—
3-in. Fans									
A3AXFN	3	115 VAC	—	2.81/71	1.40/36	2.81/71	1.40/36	—	—
A3AXFN24	3	24 VDC	—	2.81/71	1.40/36	2.81/71	1.40/36	—	—
4-in. Fans									
A4AXFNGQ	4	115 VAC	4.62/117	4.12/105	2.06/52	4.12/105	2.06/52	—	—
A4AXFNPG	4	115 VAC	4.62/117	4.12/105	2.06/52	4.12/105	2.06/52	—	—
A4AXFN	4	115 VAC	4.62/117	4.12/105	2.06/52	4.12/105	2.06/52	—	—
A4AXFN2	4	230 VAC	4.62/117	4.12/105	2.06/52	4.12/105	2.06/52	—	—
A4AXFN24	4	24 VDC	4.62/117	4.12/105	2.06/52	4.12/105	2.06/52	—	—
6-in. Fans									
A6AXFNGQ	6	115 VAC	5.88/149	—	—	—	—	3.19/81	6.38/162
A6AXFNPG	6	115 VAC	5.88/149	—	—	—	—	3.19/81	6.38/162
A6AXFN	6	115 VAC	5.88/149	—	—	—	—	3.19/81	6.38/162
A6AXFN2	6	230 VAC	5.88/149	—	—	—	—	3.19/81	6.38/162
A6AXFN24	6	24 VDC	5.88/149	—	—	—	—	3.19/81	6.38/162
10-in. Fans									
A10AXFNPG	10	115 VAC	9.00/229	6.88/175	3.44/87	6.88/175	3.44/87	—	—
A10AXFN	10	115 VAC	9.00/229	6.88/175	3.44/87	6.88/175	3.44/87	—	—
A10AXFN2	10	230 VAC	9.00/229	6.88/175	3.44/87	6.88/175	3.44/87	—	—



MOUNTING CUTOUT
DIMENSIONS 2 INCH



MOUNTING CUTOUT
DIMENSIONS 3 INCH



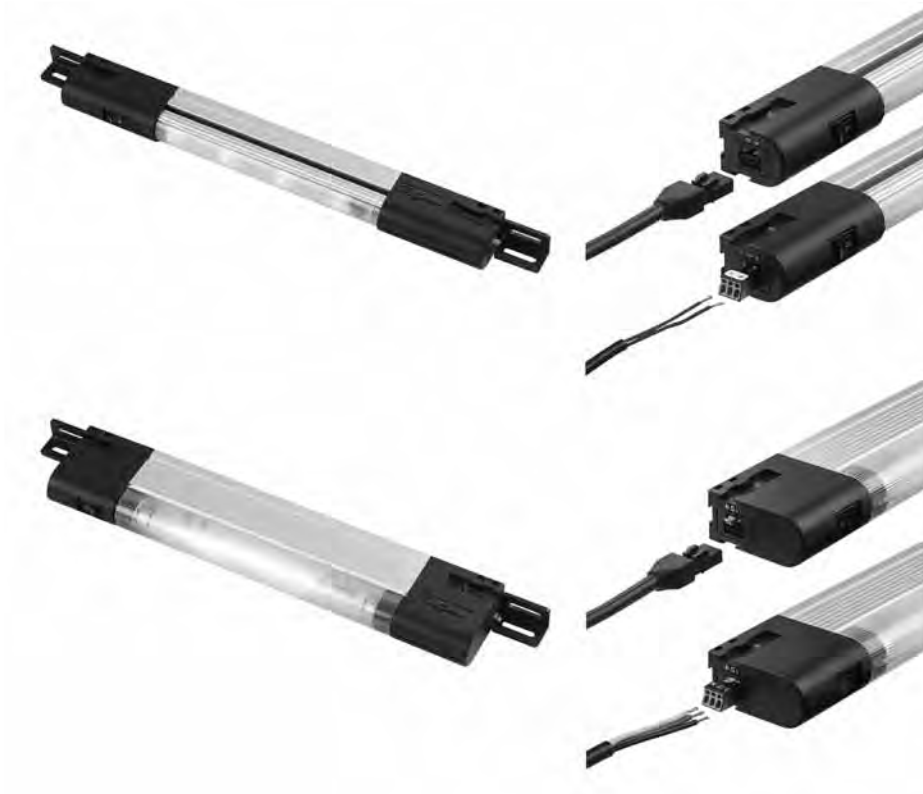
MOUNTING CUTOUT
DIMENSIONS 4, 6, 10 INCH

DIVIDER



Lighting Packages

PANELITE™ Enclosure Lights Overview



Industry Standards

UL 508A Component Recognized; File No. E61997
cUL Component Recognized per CSA C22.2 No 14; File No. E61997

CSA File No. 42186

Maintains UL/CSA Type 4, 4X and 12 enclosure rating when properly installed in a Hoffman enclosure.

Application

Versatile, slim-profile LED and fluorescent lights provide mounting flexibility and are easy to install in any enclosure. Terminal blocks on both ends of the light allow for easy wiring. Accessories include ganging cables, power cords and door switches, all provided with plug-and-play connectors for easy connection to the terminal blocks with an innovative terminal connection system. LED version provides superior lighting performance with minimal power consumption.

Features

- Slim profile allows light to be tucked up out of the way for easy panel installation
- Versatile mounting tabs allow the light to be positioned horizontally or vertically; two-way mounting tabs can be installed on front or back of light for ideal orientation
- Mounting tabs provide easy access point for attachment hardware; light does not need to be disassembled for installation
- Includes mounting hardware for the following enclosure installations: PROLINE Frame, Enclosure Top, Panel Mount and Unistrut

- On/off switch incorporated in light; optional remote door switch accessory available to activate light when enclosure door is opened
- Up to five lights can be daisy-chained together
- Plug-and-play terminal connection system:
 - Pre-wired connection sockets on both ends of light allow use of Hoffman cable accessories
 - Optional terminal blocks snap into the connection sockets allowing customers to use own wiring methods; two terminal blocks provided with each light kit
 - Power supply can be wired manually with Hoffman PANELITE Power Cable with Leads or with Hoffman optional PANELITE Power Cord
 - Ganging cables are available in 2-, 4- and 6-ft. lengths to easily join up to five lights together using one power supply
 - Remote door switch for easy door activation eliminates need to mount light in the exact location required to activate the light

Specifications

- Extruded aluminum center support
- Black composite end caps
- Black composite mounting tabs
- Each light fixture includes two mounting tabs, two pre-wired connection sockets, two optional terminal blocks that snap into the connection sockets and enclosure attachment hardware (bulb not included with fluorescent light)

Lighting Packages

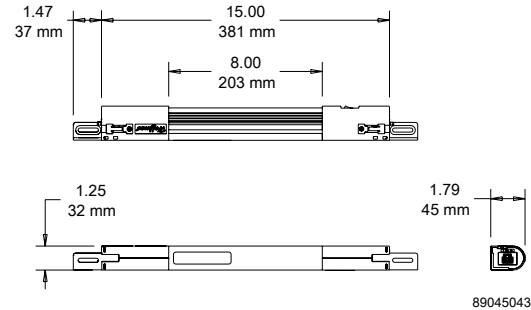
PANELITE™ LED Enclosure Light



- 24 VDC operation for superior lighting performance with minimal power consumption
- 140-degree cone angle casts a broad covering of neutral light
- Center section rotates 120 degrees to re-direct light where needed
- Long life; 70 percent of initial luminance at 50,000 hours (at 25 C)
- High power LED emitters produce 470 Lumens for superior lighting performance; provides up to 50 percent more usable light than comparable length fluorescent lights
- Can be wired using optional PANELITE Cable Accessories or can be hard-wired with terminal blocks included in hardware kit
- Up to five lights can be daisy-chained together using hard-wired connection to power supply or catalog number LPC72 power cable with leads

Bulletin: A80LT

Catalog Number	Description	VDC	Amps	W in./mm	X in./mm
LED24V15	LED Light, 15 in.	24	.5	15.00 381	8.00 203



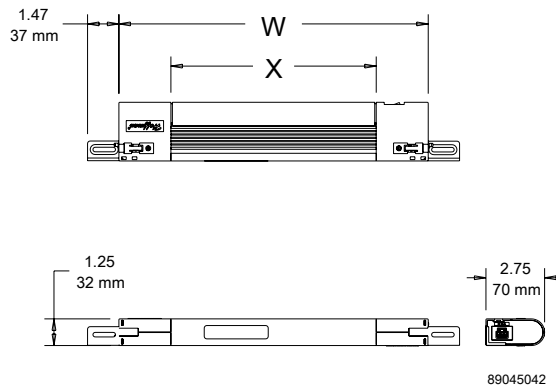
PANELITE™ Fluorescent Enclosure Light



- 120 VAC, 50/60 Hz operation
- Can be wired using optional PANELITE™ Cable Accessories or can be hard-wired with terminal blocks included in hardware kit
- Available in 15-, 18- and 28-in. lengths with ability to daisy chain up to five lights together using one power supply
- Fluorescent bulb not included

Bulletin: A80LT

Catalog Number	Description	VAC	Hz	Amps	W in./mm	X in./mm	Bulb (purchase separately)
LF120V15	Fluorescent Light, 15 in.	120	50/60	.13	14.50 368	9.63 245	F6T5
LF120V18	Fluorescent Light, 18 in.	120	50/60	.13	17.50 445	12.63 321	F8T5
LF120V28	Fluorescent Light, 28 in.	120	50/60	.26	27.75 705	22.88 581	F14T5



Lighting Packages

PANELITE™ Remote Door Switches



- Remote door switch activates the light when the enclosure door is opened
- Mounts on enclosure frame and includes mounting hardware
- Mounting plate is 14 gauge steel with a plated finish
- Can be hard-wired to the PANELITE™LED or Fluorescent light or connected via the PANELITE Door Switch Cable

Bulletin: A80LT, P20

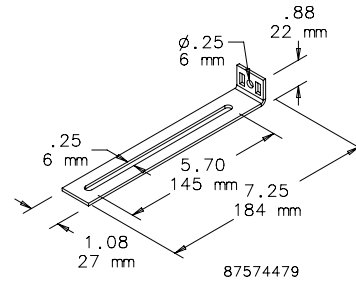
Catalog Number	Description
ALFSWD	Door switch assembly (order connection cable separately)
PLFSWD	Door switch assembly for PROLINE® (order connection cable separately)

Mounting Bracket Kit for Light Package

Kit simplifies mounting light package in Hoffman PROLINE® disconnect enclosures. Includes brackets, all mounting hardware and complete instructions.

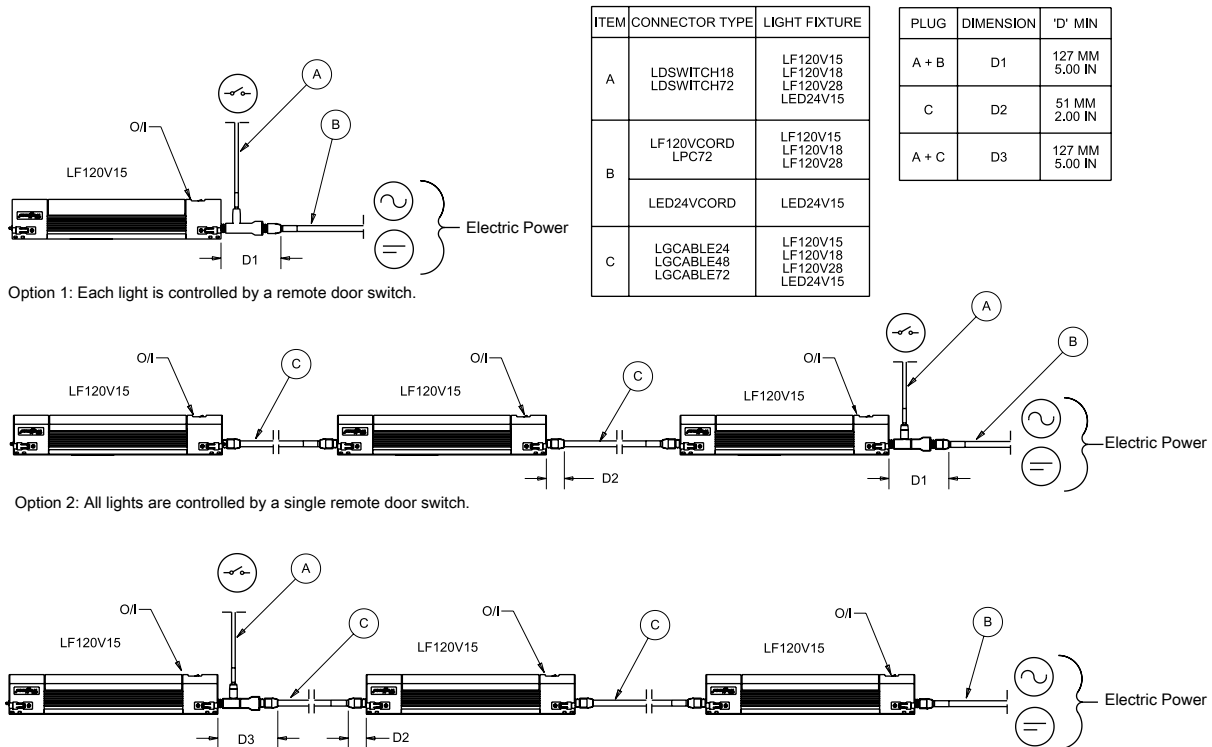
Bulletin: A80LT

Catalog Number	Description
PDLFBRKT	Mounting Bracket Kit



PANELITE™ Wiring Options

See the table on the drawing for cable clearance dimensions.



Option 3: The last light is controlled by a remote door switch. The first two lights are manually operated.

89046495

T8 Linear Fluorescent Lamps



**Starcoat® Single Pin
(Fa8) Base**

**Starcoat® Medium
Bipin (G13) Base**

**Starcoat®, High Output,
Recessed Double
Contact (R17d) Base**

Lamp Length (in.)	Watts	Avg. Life (hrs.)	Lamp Designation†	3000K WARM Initial Lumens	Item No.	3500K NEUTRAL Initial Lumens	Item No.	4100K COOL Initial Lumens	Item No.	5000K VERY COOL Initial Lumens	Item No.	6500K DAYLIGHT Initial Lumens	Item No.	\$ Each	Case Qty.	\$ Each Case Qty.
Preheat, Medium BiPin (G13) Base																
12	13	7.5K	F13T8*	—	—	—	—	565	5V477	—	—	—	—	14.31	24	12.59
15	14	7.5K	F14T8*	—	—	—	—	685	5V479	—	—	—	—	11.82	24	10.40
18	15	7.5K	F15T8/KB/CVG	910	1MM58	—	—	—	—	—	—	—	—	24.44	6	21.51
18	15	7.5K	F15T8*	845	4V522	940	5V474	—	—	—	—	700	5V489	6.98	24	6.14
18	15	7.5K	F15T8/SPX*	1000	5V878	—	—	—	—	—	—	—	—	22.73	24	20.00
18	15	7.5K	F14T8/KB	940	3JK51	—	—	—	—	—	—	—	—	14.33	6	12.61
18	15	7.5K	F15T8*	—	—	—	—	825	1V173	—	—	—	—	6.98	6	6.14
18	15	7.5K	F15T8/SP*	—	—	—	—	940	1E012	—	—	—	—	13.29	24	11.70
18	15	7.5K	F15T8/SUN 6PK	—	—	—	—	—	—	620	3GXP1	—	—	13.29	24	11.70
22	18	7.5K	F22T8/D/4	—	—	—	—	—	—	—	—	925	1F408	17.17	24	15.11
24	18	7.5K	F24T8*/4	—	—	—	—	1225	1F406	—	—	—	—	12.57	6	11.06
26	19	7.5K	F26T8*/4	—	—	—	—	1275	1F340	—	—	—	—	19.22	6	16.91
28	19	7.5K	F28T8*/4	—	—	—	—	1350	1F338	—	—	—	—	18.87	6	16.61
30	19	7.5K	F30T8*/4	—	—	—	—	1375	5V495	—	—	—	—	18.26	24	16.07
36	30	7.5K	F30T8/KB	2125	3JK60	—	—	—	—	—	—	—	—	14.89	6	13.10
36	30	7.5K	F30T8*	2150	5V506	—	—	—	—	—	—	—	—	12.81	24	11.27
36	30	7.5K	F30T8*	—	—	—	—	2175	4V439	—	—	—	—	13.07	6	11.50
36	30	7.5K	F30T8*	—	—	—	—	—	—	—	—	1850	5V508	13.07	24	11.50
Starcoat®, High Output, Recessed Double Contact (R17d) Base																
96	86	18K	F96T8/SP*/HO	8000	2F960	8000	2F962	8000	2F964	—	—	—	—	25.15	24	22.13
96	86	18K	F96T8/SPX*/HO	—	—	8200	2F954	8200	2F956	8200	2F958	—	—	32.45	24	28.56
96	86	18K	F96T8/SP3*/HO/CVG	—	—	7760	4WW78	—	—	—	—	—	—	50.55	24	44.48
96	86	18K	F96T8/SP*/HO/CVG	—	—	—	—	7760	4WW79	—	—	—	—	50.55	24	44.48
Starcoat®, Medium BiPin (G13) Base																
18	15	7.5K	F15T8/SPX*/CVG	—	—	970	4HCL1	—	—	—	—	—	—	21.97	24	19.33
18	15	7.5K	F15T8/KB/RVL	825	5PDN1	—	—	—	—	—	—	—	—	15.15	6	12.88
24	15	29K	F17T8XLSPX*/WM/EC	1200	3GXP6	1200	3GXP7	1200	3GXP8	1175	3GXP9	—	—	7.84	24	6.90
24	17	24K	F17T8/SPX*/ECO/CVG	—	—	1310	5XN83	—	—	—	—	—	—	18.72	24	16.47
24	17	24K	F17T8/SP*/ECO/CVG	—	—	1350	4WW97	1350	4WW98	—	—	—	—	12.80	24	11.26
24	17	24K	F17T8/SPX*/ECO	1350	6XT96	1350	6XT98	1350	6XV01	—	—	—	—	8.21	24	7.22
24	17	24K	F17T8/XLSPX*/ECO	—	—	—	—	1350	4ZY29	—	—	—	—	9.83	24	8.65
24	17	24K	F17T8/SP*/ECO	1350	6XT95	1325	6XT97	1325	6XT99	—	—	—	—	5.71	24	5.02
24	17	29K	F17T8/XLSPX*/ECO	1350	4ZY27	1350	4ZY28	—	—	1300	4ZY36	1250	3DY14	9.83	24	8.65
36	22	29K	F25T8XLSPX*/WM/EC	1925	3GXR1	1925	3GXR2	1925	3GXR3	1900	3GXR4	—	—	7.84	24	6.90
36	25	24K	F25T8/SP*/ECO/CVG	—	—	2080	4WW64	2080	4WW65	—	—	—	—	12.30	24	10.82
36	25	24K	F25T8/SP*/ECO	2080	6XV02	2080	6XV04	2080	6XV06	—	—	—	—	5.71	24	5.02
36	25	24K	F25T8/SPX*/ECO	2150	6XV03	2150	6XV05	2150	6XV07	—	—	—	—	8.02	24	7.06
36	25	24K	F25T8/SPX*/ECO/CVG	2080	1TGY7	2080	5XN89	—	—	—	—	—	—	15.28	24	13.45
36	25	24K	F25T8/SP*/ECO/CVG	2020	1TGY6	—	—	—	—	—	—	—	—	12.30	36	10.82
36	25	29K	F25T8/XL*/ECO	2080	2EAE4	—	—	—	—	—	—	—	—	7.36	24	6.48
36	25	29K	F25T8/XLSPX*/ECO	2150	4ZY30	2150	4ZY31	2150	4ZY32	2050	4ZY26	1950	3DY15	9.82	24	8.64
48	25	46K	F32T8/25W/SPX*/ECO	2500	2ETR6	2500	2ETR7	2500	2ETR8	2500	2ETR9	—	—	7.26	36	6.39
48	28	42K	F28T8/XLSPX*/ECO	2750	2ETU1	2750	2ETU2	2725	2ETU3	2750	2ETU4	—	—	6.19	36	5.45
48	28	42K	F28T8/XLSPX*/CVG	—	—	2725	3DXN8	2725	3DXN9	2625	3DXP1	—	—	31.00	36	27.28
48	30	36K	F32T8/SP*/IS/WM/ECO	2850	6YG54	2850	6XZ27	2850	6YG55	2750	4ZY37	—	—	7.33	36	6.45
48	30	36K	F32T8/SP*/IS/WM/ECO/CVG	2765	3CA58	2765	3CA61	2765	3CA60	—	—	—	—	19.01	36	16.73
48	30	42K	F32T8/XLSPX*/WM/ECO/CVG	2715	3CA65	2715	3CA59	2715	3CA63	2690	3DXL2	—	—	21.55	36	18.96
48	30	42K	F32T8/XLSPX*/WM/ECO	2800	1NZ18	2800	1NZ19	2800	1NZ20	2700	4ZY38	—	—	9.20	36	8.10
48	32	20K	F40T8/SP*/CVG	—	—	—	—	—	—	2775	5TB68	—	—	20.32	36	17.88
48	32	20K	F32T8KB/RVL	2450	5PDL9	—	—	—	—	—	—	—	—	20.20	24	17.17
48	32	29K	F32T8/XLSPX*/ECO	2950	4WW58	2950	4WW59	2950	4WW60	2800	2F966	—	—	6.34	36	5.58
48	32	29K	F32T8/XLSPX*/ECO/CVG	2860	2PE89	2950	1MM81	2860	3DXK9	2860	3DXL1	—	—	18.74	36	16.49
48	32	30K	F32T8/SP*/ECO	—	—	—	—	—	—	—	—	2700	3JJ79	2.61	36	2.30
48	32	36K	F32T8/SPX*/ECO/CVG	2860	5XN96	2860	5XN97	2860	5XN98	2715	4ZY43	—	—	11.45	36	10.08
48	32	36K	F32T8/SP*/ECO	2800	4PL14	2800	4PL15	2800	4PL16	2750	3VK11	—	—	2.61	36	2.30
48	32	36K	F32T8/SP*/ECO/CVG	2715	4WW99	2715	4WX01	2715	4WX07	2665	4ZY41	2620	4ZY42	15.81	36	13.91
48	32	36K	F32T8/XLSPX*/ECO	—	—	—	—	—	—	—	—	2750	3DY16	6.34	36	5.58
48	32	36K	F32T8/SPX*/ECO	2950	3VK28	2950	3VK29	2950	3VK30	2800	6XT75	—	—	4.48	36	3.94
48	32	42K	F32T8/XLSPX*/HL/ECO	3100	3CA60	3100	3CA62	3100	3CA64	3000	4ZY40	—	—	7.46	36	6.56
48	32	42K	F32T8/XLSPX*/ECO	2800	4WW55	2800	4WW56	2800	4WW57	—	—	—	—	3.59	36	3.16
48	32	42K	F32T8/XLSPX*/H/CVG	—	—	3100	1PDE6	3100	1PDD3	2910	2EAE7	—	—	20.73	36	18.24
48	32	46K	F32T8/SXLSPX*/ECO	2850	2ETV6	2850	2ETV7	2850	2ETV8	2750	2ETV9	—	—	4.26	36	3.75
60	40	20K	F40T8/SP*/CVG	—	—	3490	5XN99	3600	3DXN3	—	—	—	—	20.32	24	17.88
60	40	20K	F40T8/SPX*	3725	6VR92	3725	6VR97	3725	6VR93	—	—	—	—	16.31	24	14.35
60	40	20K	F40T8/SPX*/CVG	—	—	3610	5XP01	3610	3DXN1	—	—	—	—	29.65	24	26.09
60	58	18K	F58WT8*/CVG	—	—	—	—	5800	1MM78	—	—	—	—	41.55	25	36.56
60	58	20K	F58T8*/CT	—	—	5800	2EAE9	5800	2PE88	—	—	—	—	46.40	24	40.83
70	70	20K	F70T8*/PLYXLR	—	—	—	—	6300	1DHE6	—	—	—	—	20.92	25	18.41
72	70	20K	F70T8*/CT	—	—	5800	2EAK1	6300	2PE87	—	—	—	—	47.95	18	42.20
Starcoat®, Single Pin (Fa8) Base																
72	35	7.5K	F72T8*	—	—	—	—	3000	1F318	—	—	—	—	28.65	24	25.21
72	35	7.5K	F72T8*	3100	1F316	—	—	—	—	—	—	—	—	28.65	6	25.21
96	49	24K	F96T8/49W/SPX*	5000	5PDN2	5000	5PDN3	5000	5PDN4	—	—	—	—	22.24	24	18.90
96	54	30K	F96T8/XLSP*/WM/MP	—	—	5800	5TB66	—	—	—	—	—	—	28.45	24	25.04
96	57	30K	F96T8/XLSP*/WM	5800	1NZ21	5800	1NZ22	5500	1NZ23	—	—	—	—	23.82	24	20.96
96	59	7.5K	F96T8*	—	—	—	—	4050	1F308	—	—	—	—	24.28	24	21.37
96	59	20K	F96T8/SPX*	5950	2D050	5950	2D051	5950	2D052	5750	1G936	—	—	19.42	24	17.09
96	59	20K	F96T8/SP*	5800	2D048	5800	2D049	5800	2D002	—	—	—	—	13.43	24	11.82
96	59	20K	F96T8/SP*/CVG	—	—	5620	4WW73	5620	4WW74	—	—	—	—	30.65	24	26.97
96	59	20K	F96T8SP*/ECO	5800	4ZY33	5800	4ZY34	5800	4ZY35	—	—	—	—	15.57	24	13.70

DIVIDER



Heaters

Electric Heater



CAUTION

These electric heaters are not designed for use in dusty, dirty, corrosive, or hazardous locations. Portions of the heater can get hot. Adequate protection must be taken to protect people from potential burns, and to protect other components from this heat. Hoffman recommends this heater only be installed in a totally-enclosed metal enclosure.

DO NOT INSTALL HEATERS ON WOOD PANELS.

Heat sensitive components should not be placed near the heater discharge area since this air can be quite warm. The clearance range defines the space that must be kept free of these components for proper and safe operation of the heater.

Industry Standards

UL 508A Component Recognized; File No. E61997

CSA Certified, CSA File No. LR42186
CE

Application

Protect mechanical, electrical and electronic equipment from low temperatures, condensation and corrosion with this thermostatically controlled, fan-driven heater that maintains a stable enclosure temperature.

Fan draws cool air from the bottom of the enclosure and passes this air across the thermostat and heating elements before being released into enclosure cavity. Heated air is discharged through the top of the heater unit.

Specifications

- Aluminum housing
- Thermostat range adjustable from 0 F to 100 F (-18 C to 38 C)
- Four 10-32 x self-tapping screws are included with each heater
- Ball bearing fan
- Terminal strip with clamp connector that accepts both solid and stranded wire

Finish

Brushed aluminum

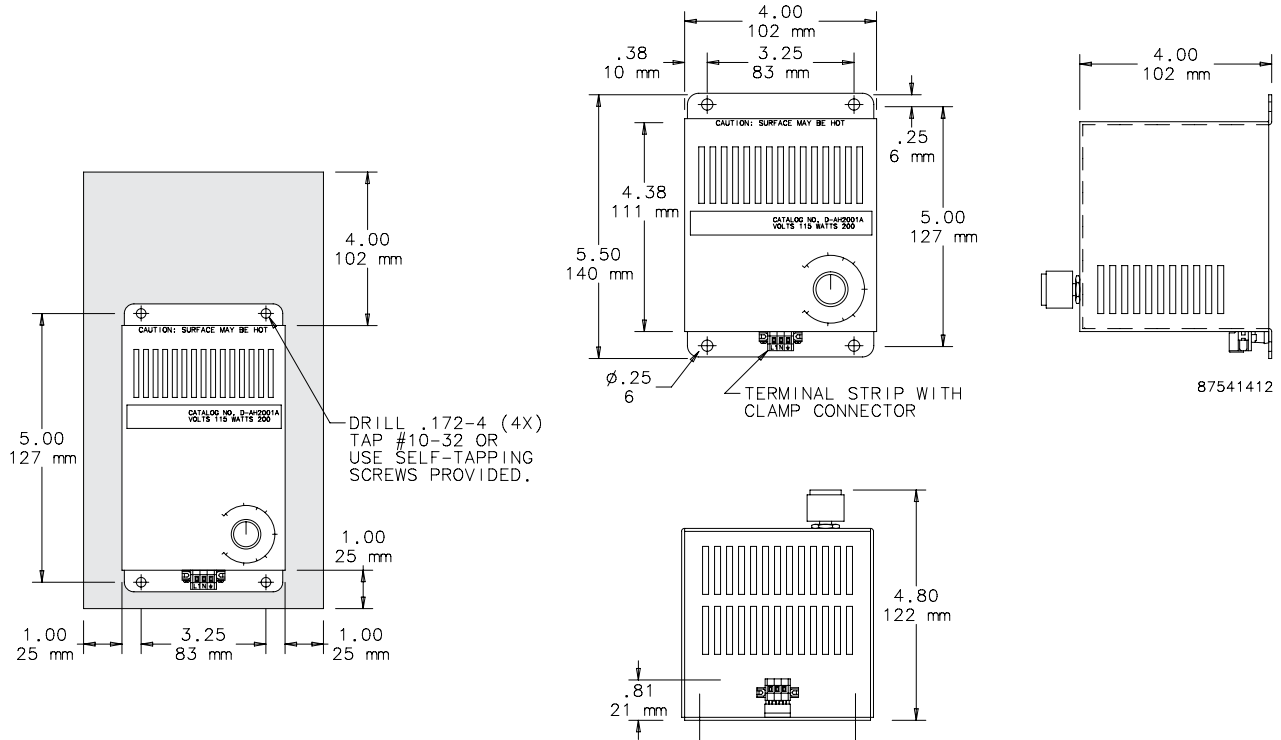
Bulletin: D85

Standard Product

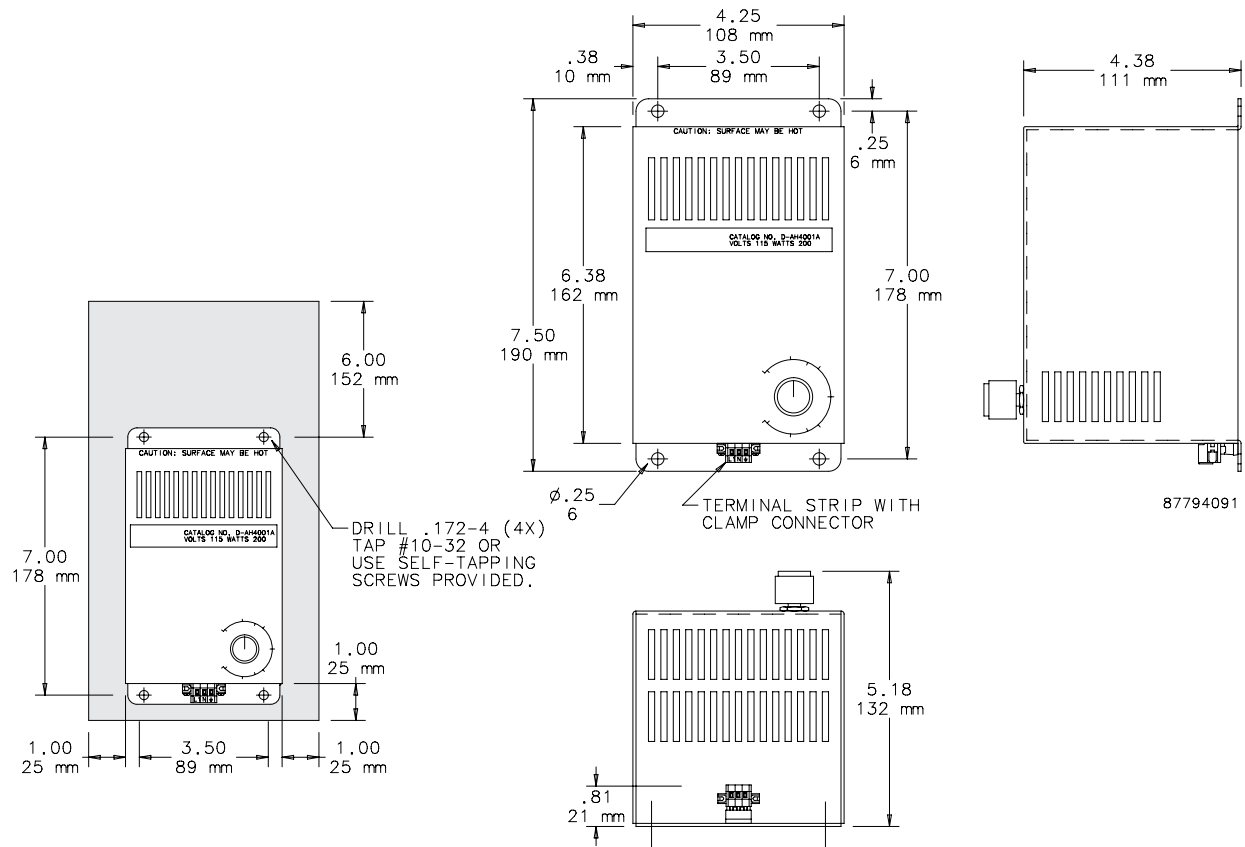
Catalog Number	Watts	Voltage	Hz	Amps	Weight (lbs.)	Weight (kg)
DAH1001A	100	115	50/60	0.98	4.00	181
DAH1002A	100	230	50/60	0.49	4.00	181
DAH2001A	200	115	50/60	1.89	4.00	181
DAH2002A	200	230	50/60	0.95	4.00	181
DAH4001B	400	115	50/60	3.72	6.00	2.72
DAH4002B	400	230	50/60	1.86	6.00	2.72
DAH8001B	800	115	50/60	7.37	6.00	2.72
DAH8002B	800	230	50/60	3.69	6.00	2.72

Heaters

Dimensions and Clearance Range Drawing for DAH1001A, -2A and DAH2001A, -2A



Dimensions and Clearance Range Drawing for DAH4001B, -2B and DAH8001B, -2B



DIVIDER



Controllers

Temperature Control Switches



Industry Standards

cURus; File No. E164102
UL94-VO

Protection rating IEC IP30
CSA Certified, File Number 215952
CE

Application

These easy-to-install thermostats regulate and monitor air temperature in enclosures that contain heat-emitting equipment. Thermostats prolong heater and fan life expectancy by controlling operation time and increase electrical component working efficiency by exposing them to fewer environmental contaminants.

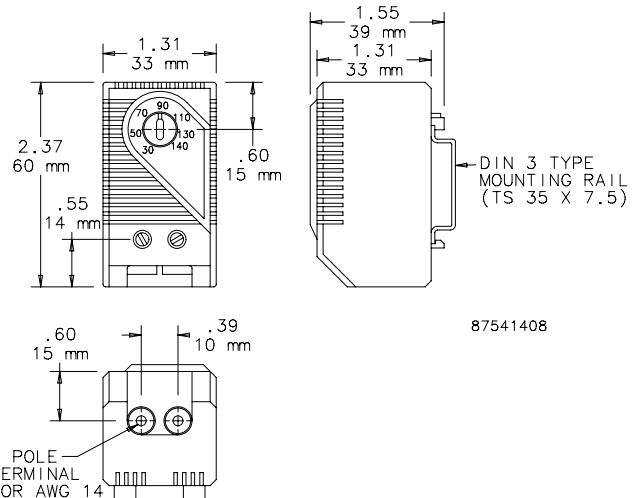
Features

- Additional label for conversion to Celsius scale and blank label to cover set point range label when adjustment after initial setting is not desired are included
- Bimetal temperature sensor
- Plastic housing
- Connections consist of tubular screw terminals for AWG 14 (.04 sq. in.)
- Provision for both panel mounting and DIN rail mounting

Finish

Molded plastic housing is black

Bulletin: D85



Standard Product

Catalog Number	Contact Type	Control Application
ATEMNC	NC (normally closed), quick acting	Heater
ATEMNO	NO (normally open), quick acting	Fan

Switching Capacity

Load	Amps
Maximum load	15 A resistive / 2 A inductive @ 120 VAC 10 A resistive / 2 A inductive @ 250 VAC DC 30 W
Minimum load	20 mA (all voltages)



TAB 2



Modicon® M340™ automation platform

Catalog
2010



Schneider
Electric

Modicon® M340™ automation platform

Modicon M340 processors

1

Modicon® M340™ platform for Unity Pro™ software offer

BMX 34 10 Standard processor

BMX 34 20 Performance processors



Racks	Number of racks	2 (4, 6, 8 or 12 slots)	4 (4, 6, 8 or 12 slots)
	Max. number of slots (excluding power supply module)	24	48
Inputs/Outputs	In-rack discrete I/O (1)	512 channels (modules with 8, 16, 32 or 64 channels)	1024 channels (modules with 8, 16, 32 or 64 channels)
	In-rack analog I/O (1)	128 channels (modules with 2, 4, 6 or 8 channels)	256 channels (modules with 2, 4, 6 or 8 channels)
	Distributed I/O	Limited depending on the type of medium: Over Ethernet Modbus/TCP network via network module (63 devices with I/O Scanning function), over Modbus link (32 devices)	
In-rack application-specific channels	Max. number of channels (counter, motion control and serial link)	20	36
	Counter (1)	BMX EHC 0200, 60 kHz 2 channels or BMX EHC 0800, 10 kHz 8 channels modules	
	Motion control (1)	BMX MSP 0200, 200 kHz 2 channels with PTO outputs "Pulse Train Output" module for servo drives	
	Process control, programmable loops	Process control EFB library	
Integrated communication ports	Ethernet Modbus®/TCP network	–	
	CANopen Master machine and installation bus	–	
	Serial link	1 in RTU/ASCII Modbus master/slave mode or in character mode (non-isolated RS232/RS485, 0.3...38.2 Kbit/s)	
	USB port	1 programming port (PC terminal)	
Communication modules	Max. number of networks (1)	1 (BMX NOE 0110/0110 network module)	2 (BMX NOE 0100/0110 network module)
	Ethernet Modbus/TCP network	1 x 10BASE-T/100BASE-TX (Modbus/TCP, BOOTP/DHCP, FDR client/server, Global Data, I/O Scanning, web server (standard, class B30 or configurable, class C30) (2)	
Internal memory capacity	Internal user RAM	2,048 Kb	4,096 Kb
	Program, constants and symbols	1,792 Kb	3,584 Kb
	Located/unlocated data	128 Kb	256 Kb
Memory card capacity (on processor)	Backup of program, constants and symbols	8 Mb as standard	
	Hosting and display of user web pages	– (2)	
	File storage	–	8 or 128 Mo (depending optional card BMX RMS ●●8MPF)
Application structure	Master task	1	
	Fast task	1	
	Event tasks	32	64
No. of K instructions executed per ms	100% Boolean	5.4 K instructions/ms	8.1 K instructions/ms
	65% Boolean + 35% fixed arithmetic	4.2 K instructions/ms	6.4 K instructions/ms
Rack power supply		24 V ~ isolated, 24...48 V ~ isolated or 100...240 V ~ power supply module	

Modicon M340 processor

BMX P34 1000 (3)

BMX P34 2000

Page

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(1) The maximum values for the number of discrete I/O, analog I/O and counter channels and the number of networks are not cumulative (they are limited by the max. number of slots in the configuration, 2 racks: 23, 3 racks: 35 and 4 racks: 47.

(2) User web pages with FactoryCast™ module BMX NOE 0110 (12 Mb) available.

(3) 5 Modicon M340 Packs references (pre-assembled configuration) with BMP P34 1000 66-processor are also available. See page 1/19.

BMX 34 20 Performance processors (continued)


1 (4, 6, 8 or 12 slots)		
48		
1,024 channels (modules with 8, 16, 32 or 64 channels)		
256/66 channels (modules with 2, 4, 6 or 8 channels)		
Limited depending on the type of medium: CANopen bus (63 devices), Ethernet Modbus®/TCP network via network module (63 devices with I/O Scanning function), Modbus link (32 devices)		
36		
BMX EHC 0200, 60 kHz 2 channels or BMX EHC 0800, 10 kHz 8 channels modules		
BMX MSP 0200, 200 kHz 2 channels with PTO outputs "Pulse Train Output" module for servo drives		
MFB (Motion Function Blocks) library (control of drives or servo drives on the CANopen bus)	–	MFB (Motion Function Blocks) library (control of drives or servo drives on the CANopen bus)
Process control EFB library		
–	1 x 10BASE-T/100BASE-TX (Modbus/TCP, BOOTP/DHCP, FDR client, E-mail notification, class B10 standard web server)	
1 (63 slaves, 50...1,000 Kbit/s, class M20)	–	1 (63 slaves, 50...1,000 Kbit/s, class M20)
1 in RTU/ASCII Modbus master/slave mode or in character mode (non-isolated RS232/RS485, 0.3...38.2 Kbit/s)		–
1 programming port (PC terminal)		
2 (BMX NOE 0100/0110 network module)		
1 x 10BASE-T/100BASE-TX (Modbus/TCP, BOOTP/DHCP, FDR client/server, Global Data, I/O Scanning, web server (standard, class B30 or configurable, class C30) (2)		
4,096 Kb		
3,584 Kb		
256 Kb		
8 Mb as standard		
– (2)		
8 or 128 Mb (depending optional card BMX RMS ●●8MPF)		
1		
1		
64		
8.1 K instructions/ms		
6.4 K instructions/ms		
24 V ≡ isolated, 24...48 V ≡ isolated or 100...240 V ~ power supply module		

BMX P34 2010
BMX P34 2020
BMX P34 2030

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Modicon® M340™ automation platform

Processor modules

1

Modicon M340 automation platform



Introduction

Standard and Performance processors from the Modicon® M340™ automation platform manage an entire PLC single-rack or multi-rack station on which slots can be equipped with:

- ☐ Discrete I/O modules
- ☐ Analog I/O modules
- ☐ Application-specific modules (counter, motion control, Ethernet Modbus®/TCP communication)

The five processors offered have different memory capacities, processing speeds, number of I/O, and type of communication ports.

In addition, depending on the model, they offer a maximum (non-cumulative) of:

- ☐ 512 to 1024 discrete I/O
- ☐ 128 to 256 analog I/O
- ☐ 20 to 36 application-specific channels (counter, motion control and serial link)
- ☐ 0 to 3 Ethernet Modbus/TCP networks (with or without integrated port and 2 network modules maximum)

Depending on the model, Modicon M340 processors include:

- ☐ A 10BASE-T/100BASE-TX Ethernet Modbus/TCP port
- ☐ A CANopen machine and installation bus
- ☐ A Modbus serial link
- ☐ A USB type TER port (for a programming terminal or a Human/Machine interface Magelis® XBT GT/GK/GTW)

Each processor is supplied with a memory card used for:

- ☐ Backing up the application (program, symbols and constants)
- ☐ Activating a standard web server for the Transparent Ready® B10 class integrated Ethernet port (depending on the model)

This memory card can be replaced with an optional memory card (ordered separately), that supports:

- ☐ Backing up the application and activating the standard web server
- ☐ An 8 or 128 Mb storage area for additional data organized in a file system (directories and sub-directories)

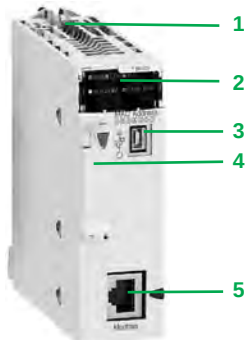
Programming Modicon® M340™ applications

To set up processors from the Modicon M340 automation platform, you will need either:

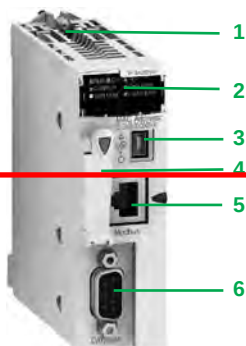
- Unity™ Pro Small programming software
- Unity Pro Medium, Large, Extra Large or XLS programming software identical to that used to set up Modicon® Premium™ and Modicon® Quantum™ automation platforms
- ☐ Unity EFB toolkit software for developing EF and EFB libraries in C language
- ☐ Unity™ SFC View software for viewing and diagnostics of applications written in Sequential Function Chart language (SFC) or Grafset™

The function block software libraries provide Modicon M340 processors with the processing capability required to meet the needs of special applications in the following areas:

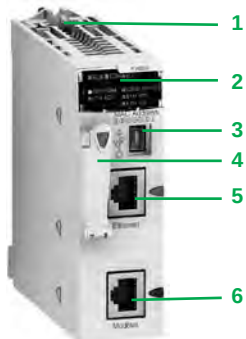
- Process control via programmable control loops (EF and EFB libraries)
- Motion control with multiple independent axis functions (MFB) library. The axes are controlled by Altivar® 31/71 variable speed drives or Lexium® 05/15 servo drives connected over the CANopen machine and installation bus.



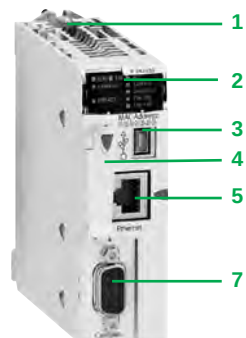
BMX P34 1000



BMX P34 2010



BMX P34 2020



BMX P34 2030

Description of BMX P34 1000/2000/2010 processors

BMX P34 1000/2000/2010 Standard and Performance single-format processors have the following on the front panel:

- 1 Safety screw for locking the module in its slot (marked 0) in the rack
- 2 A display block comprised of 5 or 7 LEDs, depending on the model:
 - ☐ RUN LED (green): Processor running (program executing)
 - ☐ ERR LED (red): Processor or system detected fault
 - ☐ I/O LED (red): I/O module detected fault
 - ☐ SER COM LED (yellow): Activity on the Modbus® serial link
 - ☐ CARD ERR LED (red): Memory card missing or inoperative
 - ☐ CAN RUN LED (green): Integrated CANopen bus operational (**BMX P34 2010** only)
 - ☐ CAN ERR LED (red): Integrated CANopen bus detected fault (**BMX P34 2010** only)
- 3 A mini B USB connector for a programming terminal (or Magelis® XBT GT/GK/GTW operator interface (1))
- 4 A slot equipped with Flash memory card for backing up the application (an LED, located above this slot, indicates recognition of or access to the memory card)
- 5 An RJ45 connector for the Modbus serial link or character mode link (RS 232C/RS 485, 2-wire, non-isolated)
- 6 A 9-way SUB-D connector for the integrated CANopen master bus (**BMX P34 2010** only)

Description of BMX P34 2020/2030 processors with integrated Ethernet Modbus®/TCP port

BMX P34 2020/2030 Performance single-format processors have the following on the front panel:

- 1 Safety screw for locking the module in its slot (marked 0) in the rack
- 2 A display block comprised of 8 or 10 LEDs, depending on the model:
 - ☐ RUN LED (green): Processor running (program executing)
 - ☐ ERR LED (red): Processor or system detected fault
 - ☐ I/O LED (red): I/O module detected fault
 - ☐ SER COM LED (yellow): Activity on the Modbus serial link
 - ☐ CARD ERR LED (red): Memory card missing or inoperative
 - ☐ ETH ACT LED (green): Activity on the Ethernet Modbus/TCP network
 - ☐ ETH STS LED (green): Ethernet Modbus/TCP network status
 - ☐ ETH 100 LED (red): Data rate on the Ethernet Modbus/TCP network (10 or 100 Mbit/s)
 - ☐ CAN RUN LED (green): Integrated CANopen bus operational (**BMX P34 2010** only)
 - ☐ CAN ERR LED (red): Integrated CANopen bus detected fault (**BMX P34 2010** only)
- 3 A mini B USB connector for a programming terminal or Magelis XBT GT/GK/GTW operator interface (1)
- 4 A slot equipped with Flash memory card for backing up the application (an LED located above this slot indicates recognition of or access to the memory card)
- 5 An RJ45 connector for connection to the Ethernet Modbus/TCP 10BASE-T/100BASE-TX network
- 6 **BMX P34 2020** processor: An RJ45 connector for the Modbus serial link or character mode link (RS 232C/RS 485, 2-wire, non-isolated)
- 7 **BMX P34 2030** processor: A 9-way SUB-D connector for the integrated CANopen master bus

On the back panel there are two rotary switches for assigning the IP address. There are three ways to define this assignment:

- ☐ Address set by the position of the two switches
- ☐ Address set by the application parameters
- ☐ Address set by the Ethernet Modbus/TCP BOOTP server

USB terminal port

The USB terminal port 3 with a data rate of 12 Mbit/s is compatible with the Unity™ Pro programming software and the OPC® Factory Server (OFS).

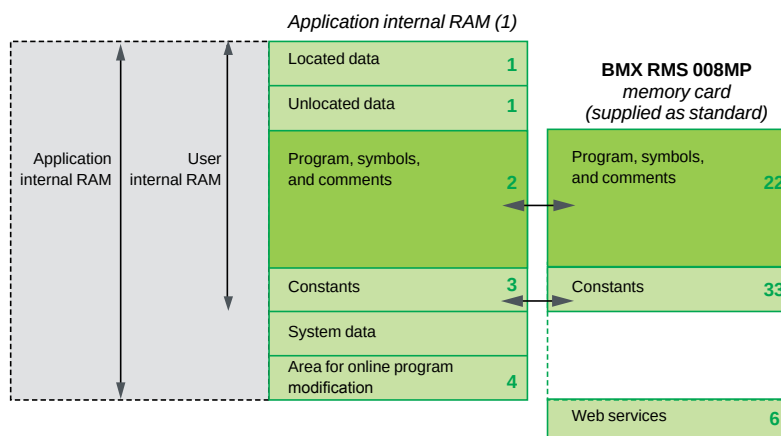
BMX P34 ●0●0 processors can be connected to a USB bus comprised of several peripheral devices, however:

- Only one processor must be connected to the USB bus.
- No device on the USB bus can be controlled by the PLC (modem, printer).

(1) Magelis® graphic terminals XBT GT/GK/GTW with USB port and Vijeo® Designer™ configuration software version ≥ 4.5. Please consult the "Human/Machine Interfaces" catalog.

Memory structure

BMX P34 1000/20●0 processor with memory card supplied as standard



Application internal RAM

The application memory is divided into memory areas, physically distributed in the Modicon® M340™ processor's internal RAM:

- 1 Application data area may be one of two 2 possible types:
 - Located data: corresponding to the data defined by an address (for example %MW237) with which a symbol can be associated (for example, Counter_reject).
 - Unlocated data: corresponding to data defined only by a symbol. The use of unlocated data eliminates the restrictions of managing the memory location since the addresses are assigned automatically. It also allows data to be structured and re-used.

This data area is backed up automatically when the PLC is turned off by duplicating its contents in a 256 Kbyte non-volatile internal memory integrated in the processor. It is also possible to back up this memory at any time with a user program.

- 2 Program, symbols and comments area: For program, this area contains the executable binary code and IEC source code.
- 3 Constants area: This area supports the constant located data (%KWi).
- 4 Area for online program modification, see page 1/7.

The user can choose to transfer the source data to the executable program in the PLC. The fact of having the program source in the PLC means that, when an empty programming terminal is connected to the PLC, the elements needed to debug or upgrade this application can be restored to the terminal. Comments and animation tables can be excluded from the data embedded in the PLC.

Memory card

Modicon M340 processors are supplied as standard with an SD (*Secure Digital*) type Flash memory card. This memory card is intended for backing up the program, symbols, and comments area 2 and the constants area 3.

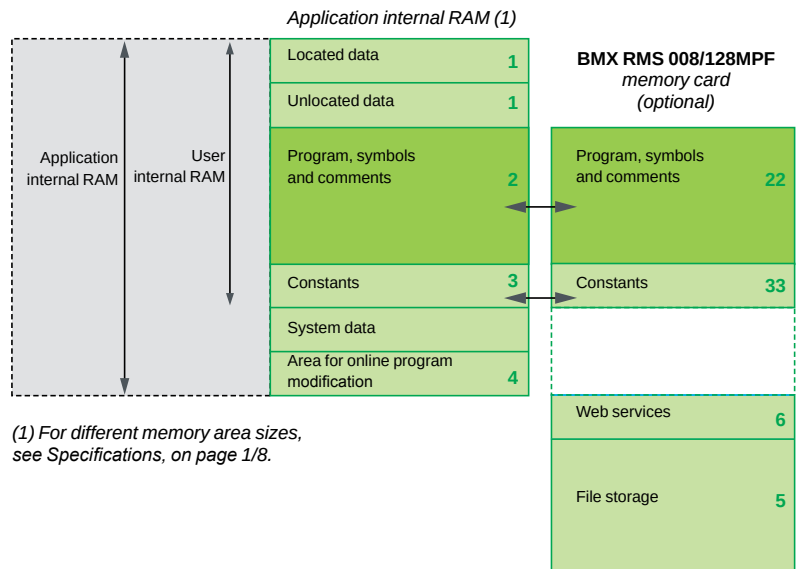
- 22, 33 Duplication areas: Duplication and retrieval (on return of power) operations are managed automatically by the system and are therefore transparent to the user.
- 6 Area for standard Web services: For **BMX P34 2020/2030** processors with integrated Ethernet Modbus®/TCP port, this area of 2 Mb is dedicated to standard Web services (Transparent Ready® Class B10). See page 3/4.

Formatted by Schneider Electric and supplied with each processor, this card is referenced as a replacement part **BMX RMS 008MP**.

(1) For different memory area sizes, see Specifications, on page 1/8.

Memory structure (continued)

BMX P34 20●0 processor with BMX RMS 008MPF memory card



(1) For different memory area sizes, see Specifications, on page 1/8.

BMX RMS 008/128MPF optional memory card

Instead of the **BMX RMS 008MP** memory card, the **BMX RMS 008/128MPF** memory card can be slotted in **BMX P34 2000/2010/2020/2030** processors.

With the four above mentioned processors, this card also offers (in addition to the features of the **BMX RMS 008MP** card supplied as standard described on page 1/6):

- 5 File storage area: This area of max. 8 Mb max. (with **BMX RMS 008MPF** card) or 128 Mb max. (with **BMX RMS 128MPF** card) allows:
- Via FTP, hosting any user-defined Word™, Excel™, PowerPoint™ or Acrobat Reader™ document (for example, maintenance manuals, wiring diagrams, etc)
 - Via EFBs user function blocks storage of the additional data (for example, production data, manufacturing recipes, etc)

The Unity™ Pro programming software assists the application designer with managing the structure and memory space occupation of the Modicon® M340™ automation platform.

Protecting the application

It is possible to prohibit access to the application (in terms of reading or modifying the program) by only loading the executable code to the PLC.

Additionally, a memory protection bit set in configuration mode is also available to prevent any program modification via the programming terminal or downloads.

Modifying the program in online mode

As with Modicon® Premium™ and Quantum™ platforms with Unity™ Pro software, the online program modification function is available on the Modicon M340 automation platform. The option of adding or modifying the program code and data in different places in the application in a single modification session helps to ensure that the modification is homogenous and consistent with the controlled process.

The application's internal RAM area 4 authorizes these program modification or addition sessions while observing the recommendation to structure the application program in several, reasonably-sized sections.

Modicon® M340™ automation platform

Processor modules

1

The Modicon® M340™ Micro-PLC is designed to conform with the main national and international standards relating to electronic devices for industrial control systems. See "Standards, certifications and environmental conditions" on pages 6/2 to 6/5.

Specifications and performance										
Processor				Standard BMX P34 1000	Performance BMX P34 2000		BMX P34 2010	BMX P34 2020	BMX P34 2030	
Maximum configuration	No. of racks	4, 6, 8 or 12 slots		2	4					
	Max. number of slots for processor and modules (excluding power supply module)			24	48					
Functions	Max. no. (1)	Discrete I/O		512	1,024					
		Analog I/O		128	256					
	Control channels		Programmable loops (via CONT-CTL process control EFB library)							
	Application-specific channels	Number		20	36					
		Type		Counter modules 2 channels (60 kHz) or 8 channels (10 kHz) Motion control module 2 channels with PTO outputs “Pulse Train Output” for servo drives Serial link integrated in processor (except BMX P34 2030 model)						
	Motion control			Module 2 channels with PTO outputs “Pulse Train Output” for servo drives						
				–	Independent axes on CANopen bus (via MFB library)		–	Independent axes on CANopen bus (via MFB library)		
	Integrated connections	Ethernet Modbus®/TCP		–					1 RJ45 port, 10/100 Mbit/s, with Transparent Ready® class B10 standard web server	
		CANopen master bus		–	–	1 (9-way SUB-D)		–	1 (9-way SUB-D)	
		Serial link		1 RJ45 port, Modbus master/slave RTU/ASCII or character mode (non-isolated RS 232C/RS 485), 0.3...38.2 Kbit/s						–
		USB port		1 slave port, 12 Mbit/s						
	Communication module	Ethernet Modbus/TCP 10/100 Mbit/s		1 RJ45 port, with: - Transparent Ready class B30 standard web server with BMX NOE 0100 module - Transparent Ready class C30 configurable web server with BMX NOE 0110 module						
Real-time clock	RTC		Yes. Backed up: Typical 6 weeks during 5 years and 4 weeks during 10 years, at 40°C (operating temperature), 30°C (storage temperature)							
Internal user RAM	Total capacity		Kb	2,048	4,096					
	Program, constants and symbols		Kb	1,792	3,584					
	Data		Kb	128	256					
Memory card	Supplied as standard (reference BMX RMS 008MP)			Backup of program, constants, symbol and data						
				–				Activation of standard web server, class B10 Standard web server area 2 Mb		
	To be ordered separately (BMX RMS 008MPF or BMX RMS 008MPF reference)			–	Backup of program, constants, symbol and data					
				–	File storage, min. 8 Mb or 128 Mb depending model card(3)					
			–					Activation of standard web server, class B10 Standard web server area 2 Mb		
Maximum size of object areas	Located internal bits	Maximum	bits	16,250%Mi	32,464%Mi					
		Dedetected fault	bits	256%Mi	512%Mi					
	Located internal data	Maximum	Bytes	32,464%MWi internal words, 32,760%KW constant words						
		Dedetected fault	Bytes	512%MWi internal words, 128%KW constant words	1,024%MWi internal words, 256%KW constant words					
	Max. unlocated internal data		Kb	128 (2)	256 (2)					
Application structure	Master task			1 cyclic or periodic						
	Fast task			1 periodic						
	Auxiliary tasks			–						
	Event tasks			32 (including 2 with priority)	64 (including 2 with priority)					
Execution time for one instruction	Boolean		µs	0.18	0.12					
	On words or fixed point arithmetic	% MS single-length	µs	0.38	0.25					
		% MD double-length	µs	0.26	0.17					
	On floating points	% MF	µs	1.74	1.16					
No. of Instructions executed per ms	100% Boolean		Kinst/ms	5.4	8.1					
	65% Boolean and 35% fixed arithmetic		Kinst/ms	4.2	6.4					
System overhead	Master task		ms	1.05	0.70					
	Fast task		ms	0.20	0.13					
Power consumption	With 24 V ~ voltage		mA	72	72	90	95	135		

(1) Only affects in-rack modules. The remote I/O on the CANopen bus is not included in these maximum numbers.

(2) Deduct the size of the located data (internal bits and data) and the configuration data from this value.

(3) BMX RMS 008MPF has the ability to use up to 14 Mb if the operating system update via OS-Loader software is not used.

Modicon® M340™ automation platform

Processor modules



BMX P34 1000



BMX P34 2000



BMX P34 2010/2030



BMX P34 2020



BMX RMS 008/128MPF



BMX XCA USB H0

BMX P34 Modicon M340 processors

Modicon® M340™ processor modules are supplied with the **BMX RMS 008MP** flash memory card. This card performs the following actions transparently:

- Backing up the application (program, symbols and constants) supported in the processor internal RAM that were not backed up
- Activating the Transparent Ready® class B10 standard web server with **BMX P34 2020/2030** performance processors.

This card can be replaced by a **BMX RMS 008MPF** or **BMX RMS 128MPF** card featuring a file storage option.

I/O capacity	Memory capacity	Max. no. of network modules	Integrated communication ports	Reference (3)	Weight kg
Standard BMX P34 10, 2 racks					
512 discrete I/O 128 analog I/O 20 application-specific channels	2,048 Kb integrated	1 Ethernet Modbus®/ TCP network	Modbus serial link	BMX P34 1000	0.200

Performance BMX P34 20, 4 racks					
1,024 discrete I/O 256 analog I/O 36 application-specific channels	4,096 Kb integrated	2 Ethernet Modbus/ TCP networks	Modbus serial link	BMX P34 2000	0.200
			Modbus serial link CANopen bus	BMX P34 2010	0.210
			Modbus serial link Ethernet network	BMX P34 2020	0.205
			Ethernet network CANopen bus	BMX P34 2030	0.215

Memory cards

Description	Processor compatibility	Capacity	Reference	Weight kg
Flash memory cards (1)	BMX P34 2000	8 Mb / 8 Mb files	BMX RMS 008MPF	0.002
	BMX P34 2010	8 Mb / 128 Mb files	BMX RMS 128MPF	0.002
	BMX P34 2020			
	BMX P34 2030			

Separate parts

Description	Use		Length	Reference	Weight kg
	From	To USB port type A			
Terminal port/USB cordsets	Mini B USB port on the Modicon® M340™ processor	PC terminal	1.8 m	BMX XCA USB H018	0.065
		Magelis® XBT GT/GK and XBT GTW graphic terminal	4.5 m	BMX XCA USB H045	0.110

Replacement parts

Description	Use	Processor compatibility	Reference	Weight kg
Flash memory card 8 Mb	Supplied as standard with each processor that is used for: - Backing up program, constants, symbol and data - Activating class B10 web server	BMX P34 1000 / 20●0	BMX RMS 008MP	0.002

(1) As replacement for the memory card supplied as standard with each processor that is used for:

- Backing up program, constants, symbol and data
- File storage
- Activating class B10 web server

Introduction

BMX CPS ●●●0 power supply modules provide the power supply for each BMX XBP ●●00 rack and the modules installed on it.

There are two types of power supply modules:

- Power supply modules for AC supplies
- Power supply modules for DC supplies

Description

The power supply module is selected according to:

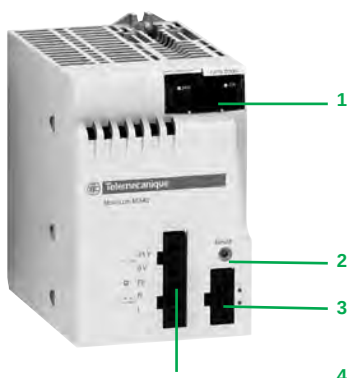
- The electrical line supply: 24 V $\overline{\text{---}}$, 48 V $\overline{\text{---}}$ or 100...240 V $\sim$
- The required power (see the power consumption table on page 6/13) (1)

BMX CPS ●●●0 power supply modules have the following on the front panel :

- 1 A display block comprised of:
 - OK LED (green), lit if rack voltages are present and correct
 - 24 V LED (green), lit when the sensor voltage is present (for BMX CPS 2000/3500 AC power supply modules only)
- 2 A pencil-point RESET pushbutton for a cold restart of the application
- 3 A 2-way connector that can take a removable terminal block (screw or spring-type) for connecting the alarm relay
- 4 A 5-way connector that can take a removable terminal block (screw or spring-type) for connecting the following:
 - $\overline{\text{---}}$ or $\sim$ line supply
 - protective earth ground
 - dedicated 24 V $\overline{\text{---}}$ power supply for the input sensors (for **BMX CPS 2000/3500** AC power supply modules only)

Included in the power supply modules: Set of two cage clamp removable terminal blocks (5-way and 2-way) **BMX XTS CPS10**.

To be ordered separately (if necessary): Set of two spring-type removable terminal blocks (5-way and 2-way) **BMX XTS CPS20**



(1) This power consumption calculation for the rack can also be performed by the Unity™ Pro programming software.

Functions

Alarm relay

The alarm relay located in each power supply module has a volt-free contact accessible from the front of the 2-way connector.

The operating principle is as follows:

In normal operation, with the PLC in RUN, the alarm relay is activated and its contact is closed (state 1).

The relay de-energizes and its associated contact opens (state 0) whenever the application stops, even partially, due to any of the following:

- Occurrence of a detected blocking fault
- Incorrect rack output voltages
- Loss of supply voltage

RESET push-button

The power supply module in each rack has a RESET button on the front panel; when activated, this triggers an initialization sequence for the processor and the rack modules it supplies.

Pressing this pushbutton triggers a sequence of service signals that is the same as:

- A power break when the pushbutton is pressed
- A power-up when the pushbutton is released

In terms of the application, these operations represent a cold start (forcing the I/O modules to state 0 and initializing the processor).

Sensor power supply

The **BMX CPS 2000/3500** AC power supply modules have an integrated 24 V $\overline{\text{---}}$ voltage supply for powering the input sensors. Connection to this sensor power supply is via the 5-way connector on the front panel.

The power available on this 24 V $\overline{\text{---}}$ voltage depends on the power supply model (0.45 or 0.9 A) (see Specifications on page 1/12).

Specifications							
--- Power supply module				BMX CPS 2010		BMX CPS 3020	
Primary	Voltage	Nominal	V	24 --- isolated		24...48 --- isolated	
		Limit (ripple included)	V	18...31.2 ---		18...62...4 ---	
	Current	Input nominal I rms	A	1 at 24 V ---		1.65 at 24 V ---; 0.83 at 48 V ---	
	Initial power-up at 25°C (1)		V	24 ---		24 ---	48 ---
		I inrush	A	30		30	60
		I²t on activation	A²s	≤ 0.6		≤ 1	≤ 3
		It on activation	As	≤ 0.15		≤ 0.2	≤ 0.3
	Micro-break duration	Line (accepted)	ms	≤ 1			
	Integrated protection			With internal fuse (not accessible)			
Secondary	Useful power	Max.	W	16.8		31.2	
	3.3 V --- voltage (2)	Nominal voltage	V	3.3			
		Nominal current	A	2.5		4.5	
		Typical power	W	8.3		15	
	24 V rack --- voltage (3)	Nominal voltage	V	24 ---			
		Nominal current	A	0.7		1.3	
		Typical power	W	16.8		31.2	
	Integrated protection on the voltages (4)			Yes, against overloads, short-circuits and overvoltages			
	Max. dissipated power		W	8.5			
Max. length of power supply cable	Copper wires with 1.5 mm² cross-section		m	20		10	
	Copper wires with 2.5 mm² cross-section		m	30		15	
Insulation	Dielectric strength	Primary/secondary and primary/ground	V rms	1,500 - 50 Hz for 1 min at an altitude of 0...4,000 m			
	Insulation resistance	Primary/secondary and primary/ground	MΩ	≥ 10			
~ Power supply module				BMX CPS 2000		BMX CPS 3500	
Primary	Voltages	Nominal	V	100...240 ~			
		Limit (ripple included)	V	85...264 ~			
	Frequencies	Nominal/limit	Hz	50-60/47-63			
	Power	Apparent	VA	70		120	
	Current	Input nominal I rms	A rms	0.61 at 115 V ~; 0.31 at 240 V ~		1.04 at 115 V ~; 0.52 at 240 V ~	
	Initial power-up at 25°C (1)		V	120 ~	240 ~	120 ~	240 ~
		I inrush	A	≤ 30	≤ 60	≤ 30	≤ 60
		I²t on activation	A²s	≤ 0.5	≤ 2	≤ 1	≤ 3
		It on activation	As	0.03	0.06	≤ 0.05	≤ 0.07
Micro-break duration	Line (accepted)	ms	≤ 10				
Integrated protection			With internal fuse (not accessible)				
Secondary	Useful power	Max. overall	W	20		36	
		Max. on 3.3 V --- and 24 V --- rack output voltages	W	16.8		31.2	
	3.3 V --- voltage (2)	Nominal voltage	V	3.3			
		Nominal current	A	2.5		4.5	
		Power (typical)	W	8.3		15	
	24 V rack --- voltage (3)	Nominal voltage	V	24 ---			
		Nominal current	A	0.7		1.3	
		Typical power	W	16.8		31.2	
	24 V --- sensor voltage (4)	Nominal voltage	V	24 ---			
		Nominal current	A	0.45		0.9	
		Typical power	W	10.8		21.6	
	Integrated protection on the voltages (5)			Yes, against overloads, short-circuits and overvoltages			
Maximum dissipated power		W	8.5				
Insulation	Dielectric strength	Primary/secondary (24 V/3.3 V)	V rms	1500			
		Primary/secondary (sensor 24 V)	V rms	2300			
		Primary/ground	V rms	1500			
		24 V sensor output/ground	V rms	500			
	Insulation resistance	Primary/secondary and primary/ground	MΩ	≥ 100			

(1) These values should be taken into account when starting several devices simultaneously and when sizing protection devices.

(2) 3.3 V --- voltage for the I/O module logic power supply

(3) 24 V --- rack voltage for the I/O module power supply and the processor

(4) 24 V --- sensors output for the sensor power supply

(5) Protected by fuse



BMX CPS 2010 / 3020



BMX CPS 2000 / 3500

References

Each **BMX XBP ●●00** rack must be equipped with a power supply module. These modules are inserted in the first two slots of each rack (marked CPS).
The power required to supply each rack depends on the type and number of modules installed in the rack. It is therefore necessary to draw up a power consumption table rack by rack to determine the **BMX CPS ●●●0** power supply module most suitable for each rack (see page 6/13).

Power supply modules (1)

Line supply	Available power (2)			Reference	Weight kg
	3.3 V $\overline{\text{---}}$ (3)	24 V rack $\overline{\text{---}}$ (3)	24 V sensor $\overline{\text{---}}$ (4)	Total	
24 V $\overline{\text{---}}$ isolated	8.3 W	16.8 W	–	16.8 W	BMX CPS 2010 0,290
24...48 V $\overline{\text{---}}$ isolated	15 W	31.2 W	–	31.2 W	BMX CPS 3020 0,340
100...240 V $\sim$	8.3 W	16.8 W	10.8 W	20 W	BMX CPS 2000 0.300
	15 W	31.2 W	21.6 W	36 W	BMX CPS 3500 0.360

Separate parts

Description	Composition	Type	Reference	Weight kg
Set of 2 removable connectors	One 5-way terminal block and one 2-way terminal block	Spring-type	BMX XTS CPS20	0.015

Replacement parts

Description	Composition	Type	Reference	Weight kg
Set of 2 removable connectors	One 5-way terminal block and one 2-way terminal block	Cage clamp	BMX XTS CPS10	0.020

- (1) Includes the set of 2 cage clamp removable connectors **BMX XTS CPS10**.
 (2) The sum of the absorbed power on each voltage (3.3 V $\overline{\text{---}}$ and 24 V $\overline{\text{---}}$) should not exceed the total power of the module. See the Power consumption table on page 6/13.
 (3) 3.3 V $\overline{\text{---}}$ and 24 V rack $\overline{\text{---}}$ voltages for powering Modicon® M340™ PLC modules
 (4) 24 V sensor $\overline{\text{---}}$ voltage for powering the input sensors (voltage available via the 2-way removable connector on the front panel)

Introduction

BMX XBP ●●00 racks are the basic element of the Modicon® M340™ automation platform in a single-rack and multi-rack configurations. These racks perform the following functions:

- **Mechanical function:** They are used to install all the modules in a PLC station (power supply, processor, discrete I/O, analog and application-specific I/O). These racks can be mounted on a panel, plate or DIN rail:
 - Inside enclosures
 - On machine frames, etc.
- **Electrical function:** The racks incorporate a Bus X (owner bus). They are used to:
 - Distribute the power supplies required for each module in the same rack
 - Distribute data and service signals for the entire PLC station
 - Hot swap modules during operation

Description

BMX XBP ●●00 racks are available in 4, 6, 8 or 12-slot versions, and comprise:

- 1** A metal frame that performs the following functions:
 - Holds the Bus X electronic card and protects it against EMI and ESD type interference
 - Holds the modules
 - Gives the rack mechanical rigidity
- 2** A ground terminal for grounding the rack
- 3** 4 holes for mounting the rack on a frame. These holes are big enough for M6 screws.
- 4** 2 mounting points for the shielding connection bar
- 5** Tapped holes to take each module locking screw
- 6** A connector for an expansion module, marked **XBE**.
- 7** 40-way female ½ DIN connectors forming the electrical connection between the rack and each module, marked **CPS, 00...11** (when the rack is delivered, each connectors are protected by covers that should be removed before inserting the modules).
- 8** Slots for anchoring the module pins.

To be ordered separately:

BMX XSP ●●00 cable shielding connection kit, used to protect against electrostatic discharge when connecting the shielding of cordsets for connecting:

- Analog, counter and motion control modules,
- A Magelis® XBT operator interface to the processor (via **BMX XCA USBH0●●** shielded USB cable)

The cable shielding connection kit **BMX XSP ●●00** is comprised of:

- 9** A metal bar that takes the clamping rings
- 10** Two sub-bases to be mounted on the rack
- 11** Not included on the shielding connection kit spring clamping rings **STB XSP 30●0** (sold in packs of 10, 1.5...6 mm² or 5...11 mm²).

Function

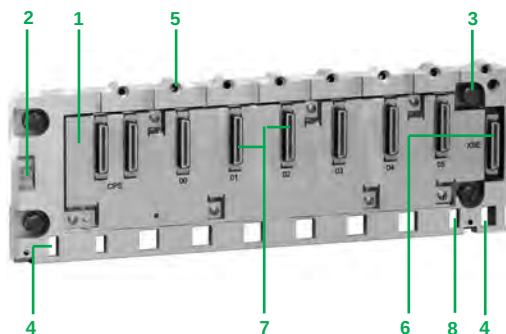
Addressing modules in a single-rack configuration (1)

Each rack must contain a power supply module and a processor module.

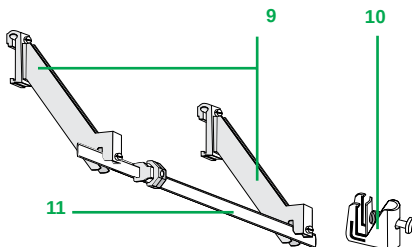
Inserting different modules in the rack:

- The power supply module always occupies the **CPS** slot.
- The processor module must always be installed in slot **00**.
- Its I/O modules and application-specific modules are installed in slot **01** to slot:
 - **03** with a 4-slot rack
 - **05** with a 6-slot rack
 - **07** with an 8-slot rack
 - **11** with a 12-slot rack

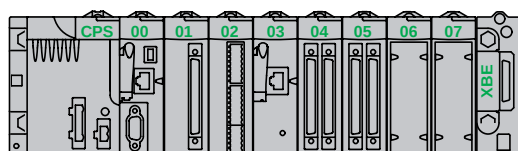
(1) Multi-rack configuration with extension rack module **BMX XBE 1000** (slot **XBE**).
See page 1/16.



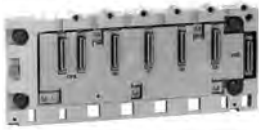
Rack 6 slots BMX XBP 0600



Shielding connection kits



Example of installation with 8-slot rack



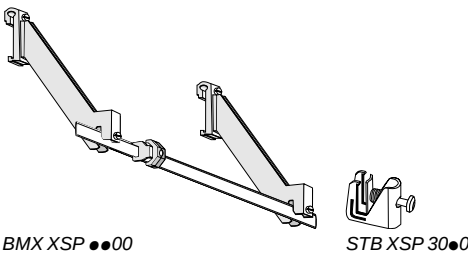
BMX XBP 0400



BMX XBP 0800



BMX XBP 1200



BMX XSP ●●00

STB XSP 30●0

Racks

Description	Type of module to be inserted	No. of slots (1)	Reference	Weight kg
Racks	BMX CPS power supply,	4	BMX XBP 0400	0.630
	BMX P34 processor, I/O modules and	6	BMX XBP 0600	0.790
	application-specific modules (counter, motion control and communication)	8	BMX XBP 0800	0.950
		12	BMX XBP 1200	1.270

Accessories

Description	For use with	Unit reference	Weight kg
Shielding connection kits comprised of: - a metal bar - two sub-bases	BMX XBP 0400 rack	BMX XSP 0400	0.280
	BMX XBP 0600 rack	BMX XSP 0600	0.310
	BMX XBP 0800 rack	BMX XSP 0800	0.340
	BMX XBP 1200 rack	BMX XSP1200	0.400

Spring clamping rings Sold in lots of 5	Cables with 1.5...6 mm ² cross-section	STB XSP 3010	0.050
	Cables with 5...11 mm ² cross-section	STB XSP 3020	0.070

Protective covers (replacement parts) Sold in lots of 5	Unoccupied slots on BMX XBP ●●00 rack	BMX XEM 010	0.005
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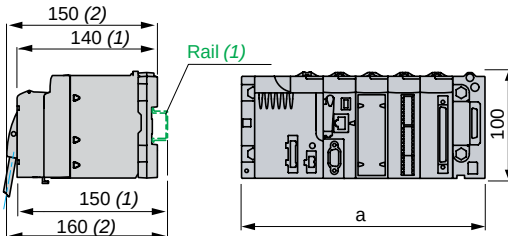
(1) Number of slots taking the processor module, I/O modules and application-specific modules (excluding power supply module).

Dimensions, mounting

BMX XBP

Common side view

Front view

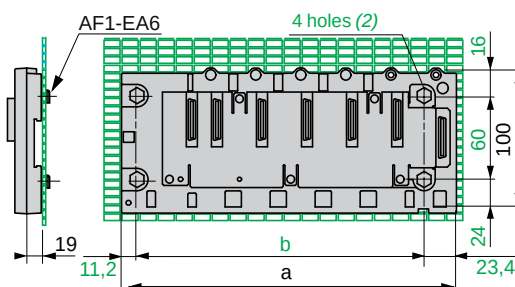


	a
BMX XBP 0400	242.4
BMX XBP 0600	307.6
BMX XBP 0800	372.8
BMX XBP 1200	503.2

(1) With removable terminal block (cage, screw or spring).
(2) With FCN connector.

Mounting the racks

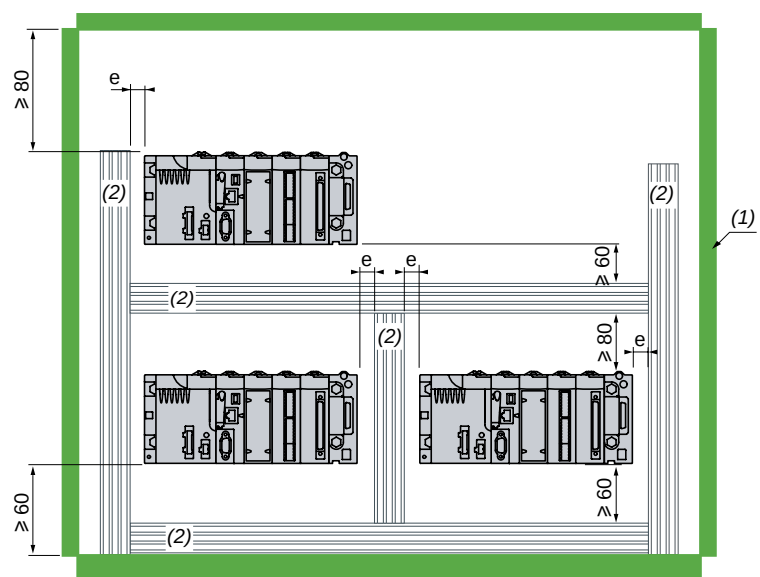
On AM1 PA and AM3 PA pre-slotted plate



	a	b
BMX XBP 0400	242.4	207.8
BMX XBP 0600	307.6	273
BMX XBP 0800	372.8	338.2
BMX XBP 1200	503.2	468.6

- (1) On AM1 ED rail: 35 mm wide, 15 mm deep Only possible with BMX XBP 0400/0600/0800 rack.
(2) For panel-mounting: The diameter of the mounting holes must be sufficient to accept M4, M5, M6 screws (4.32 to 6.35 mm).

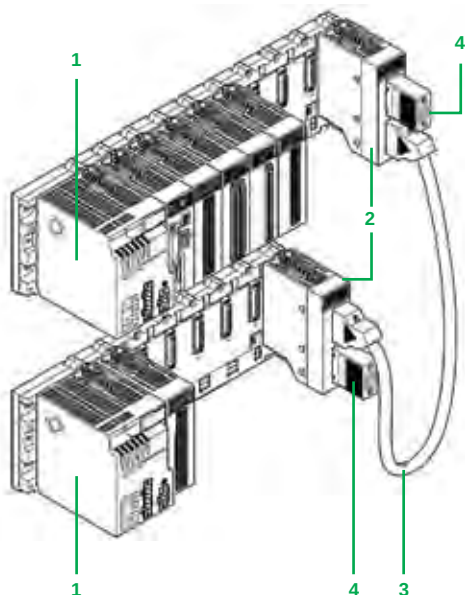
Installation rules



e ≥ 3 mm

- (1) Equipment or enclosure.
(2) Cable ducting or clip.

1



Constitution of a multi-rack configuration

Using **BMX XBP ●●●0** racks, a multi-rack configuration is comprised of up to:

- 2 racks for a station with BMX P34 1000 processor
- 4 racks for a station with BMX P34 2●●0 processor

Each rack is equipped with:

- 1 A BMX CPS ●●●0 power supply.
- 2 A BMX XBE 1000 extension rack module. This module inserted on the right of the rack (slot marked **XBE**, see page 43402-EN/2) does not occupy 00...11 slots of the rack (4, 6, 8 or 12 slots are available).
- 3 The BMX XBE 1000 extension rack modules are connected to each other by bus X extension cordsets.

Bus X

The racks distributed on bus X are connected to each other via **3** bus X extension cordsets whose total length is **30 m maximum**.

The racks are connected to each other using BMX XBC ●●0K (1) bus X extension cordsets that are connected to one of the **7** and **8** two 9-way SUB-D connectors on each **2** BMX XBE 1000 extension rack module.

Line terminators 4

The two BMX XBE 1000 extension rack modules located at the ends of the line must have a TSX TLY EX line terminator **4** fitted on the unused 9-way SUB-D type connector.

Note: The processor module is always positioned in the rack address 0. However on a bus X chaining, the order of racks does not affect the operation. For example, the chaining order can be 0-1-2-3, 2-0-3-1, 3-1-2-0, and so on.

Description

The BMX XBE 1000 extension rack module has the following on the front panel:

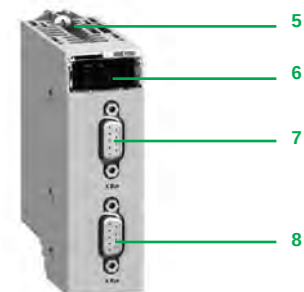
- 5 Safety screw for locking the module in its slot **XBE**.
- 6 A display block comprised of 5 LEDs:
 - RUN LED (green): module in operation,
 - COL LED (red): each rack has the same address or the rack address 0 is not equipped of **BMX P34 ●●●0** processor module,
 - 0, 1, 2 and 3 LEDs (green): 0, 1, 2 or 3 rack address.
- 7 A 9-way female SUB-D connector, marked bus X for to connect a **3** bus X cordset from the previous rack or, if the first rack, for line termination A/ included in the **4** TSX TLY EX lot.
- 8 A 9-way female SUB-D connector, marked bus X for to connect a **3** bus X cordset to next rack or, if the last rack, for line termination /B included in the **4** TSX TLY EX lot.

On the right side

Access to 3 micro-switches for defining the rack address: 0...3.

Installation rules of BMX XBP ●●●0 racks

Installation rules in cabinet, see page 1/15.



(1) BMX XBC ●●0K daisy chaining cordsets length 0.8 m, 1.5 m, 3 m, 5 m or 12 m with angled connectors or TSX CBY ●08K length 1 m, 3 m, 5 m, 12 m, 18 m or 28 m with straight connectors

Modicon® M340™ automation platform

Multi-rack configuration

1



BMX XBE 1000

Bent connector equipping the
BMX XBS ●●●K cordsets

TSX TLY EX

Extension rack

Description	Use	Reference	Weight kg
Extension rack module for Modicon® M340™	Standard module for each rack (XBE slot), allows the connection of extension racks: - 2 max. with BMX P34 1000 processor module - 4 max. with BMX P34 20●0 processor module	BMX XBE 1000	0.178
Extension rack kit	Kit for configuration with 2 racks including: - 2 BMX XBE 1000 extension rack modules - 1 BMX XBC 008K daisy chaining cordset length 0.8 m - 1 TSX TLY EX line terminators (lot of 2)	BMX XBE 2005	0.700

Cordsets and connecting accessories

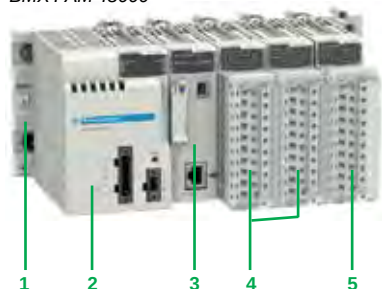
Description	Use	Composition	Type of connector	Length	Reference	Weight kg
Daisy chaining cordsets bus X (total length 30 m max.)	Between BMX XBE 1000 extension rack modules	2 x 9-way SUB-D 9 connectors	Bent	0,8 m	BMX XBC 008K	0.165
				1,5 m	BMX XBC 015K	0.250
				3 m	BMX XBC 030K	0.420
				5 m	BMX XBC 050K	0.650
				12 m	BMX XBC 120K	1.440
			Straight	1 m	TSX CBY 010K	0.160
				3 m	TSX CBY 030K	0.260
				5 m	TSX CBY 050K	0.360
				12 m	TSX CBY 120K	1.260
				18 m	TSX CBY 180K	1.860
				28 m	TSX CBY 280K	2.860

Cable on reel	Length to be fitted with TSX CBY K9 connectors	Cable with free ends, 2 line testers	—	100 m	TSX CBY 1000	12.320
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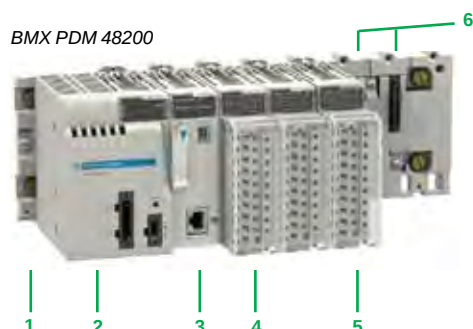
Description	Use	Composition	Sold in lots of	Reference	Weight kg
Line terminators	Compulsory on the BMX XBP ●●●0 end daisy chaining	2 x 9-way SUB-D connectors labelled A/ and /B	2	TSX TLY EX	0.050
Bus X straight connectors	For TSX CBY 1000 cable ends	2 x 9-way straight SUB-D connectors	2	TSX CBY K9	0.080
Installation of connectors	Mounting for TSX CBY K9 connectors	2 crimping pliers, 1 pen (1)	—	TSX CBY ACC 10	—

(1) Installation of connectors on the cable also required .

BMX PAM 48000



BMX PDM 48200



Introduction

The Modicon® M340™ packs offer is designed to provide compact solutions with optimized cost.

These 5 pre-assembled packs, built around the BMX P34 1000 Standard processor, include one non-extendable rack (4 or 6 slots) with an AC or DC power supply module and discrete I/O modules.

Note: The BMX FTB 2000 20-way removable terminals blocks of discrete I/O modules are included but delivered in separate packaging.

Description

Modicon® M340™ packs with ~ 100...240 V power supply (terminal blocks)

The BMX PAM 48000/48200 pre-assembled packs comprise:

- 1 One non-extendable rack 4 or 6 slots, depending on model.
- 2 One BMX CPS 2000 ~ 100...240 V, 20 W power supply module with a set of 2 cage clamp connectors.
- 3 One BMX P34 1000 Standard processor module (with Modbus® serial link).
- 4 2 BMX DDI 1602 modules of 16 isolated inputs ~ 24 V, positive logic and, delivered non-mounted, 2 BMX FTB 2000 20-way removable terminal blocks (cage clamp).
- 5 One BMX DRA 1605 module of 16 relay outputs and, delivered non-mounted, one BMX FTB 2000 20-way removable terminal block (cage clamp).
- 6 2 free slots (with rack 6 slots).

Modicon M340 packs with ~ 24 V power supply (terminal blocks)

The BMX PDM 48000/48200 pre-assembled packs comprise:

- 1 One non-extendable rack 4 or 6 slots, depending on model..
- 2 One BMX CPS 2010 ~ 24 V, 16.8 W power supply module with a set of 2 cage clamp connectors.
- 3 One BMX P34 1000 Standard processor module (with Modbus serial link).
- 4 2 BMX DDI 1602 modules of 16 isolated inputs ~ 24 V, positive logic and, delivered non-mounted, 2 BMX FTB 2000 20-way removable terminal blocks (cage clamp).
- 5 One BMX DDO 1602 module of 16 solid state outputs ~ 24 V and, delivered non-mounted, one BMX FTB 2000 20-way removable terminal block (cage clamp)..
- 6 2 free slots (with rack 6 slots).

Modicon M340 packs with ~ 24 V power supply (version with connectors)

The BMX PDM 64100 pre-assembled pack comprises:

- 1 One non-extendable rack 4 slots,
- 2 One BMX CPS 2010 ~ 24 V, 16.8 W power supply module with a set of 2 cage clamp connectors.
- 3 One BMX P34 1000 Standard processor module (with Modbus serial link).
- 4 One BMX DDI 3202K module of 32 isolated inputs ~ 24 V, positive logic, connection by one 40-way connector.
- 5 One BMX DDO 3202K module of 32 solid state outputs ~ 24 V 0.1 A with 40-way connector.
- 6 One free slot.

To be ordered separately:

- 2 BMX FCW/FCC ●●3 preformed cordsets with one connector 40-way.

Modicon® M340™ automation platform

Modicon M340 packs

References

These pre-assembled packs are comprised of:

- One non-extendable rack 4 or 6 slots (except power supply module).
- One BMX CPS 2000 AC power supply or BMX CPS 2010 DC power supply with a set of 2 cage clamp connectors.
- One BMX P34 1000 processor module with Modbus® serial link and USB port for a programming terminal (or Magelis® XBT GT/GK/GTW advanced panel).

Depending on model:

- The discrete I/O modules with cage clamp 20-way terminal blocks or 40-way connectors.
- 0, 1 or 2 free slot(s).



BMX PAM 48000

Packs with ~ 110...240 V power supply

No. of slots	Discrete I/O modules			No. free slots	Reference	Weight kg
	Inputs	Outputs	Connection			
4	2 x BMX DDI 1602 16 channels --- 24 V	1 x BMX DRA 1605 16 relays	3 x BMX FTB 2000 cage clamp terminal blocks	0	BMX PAM 48000	2.600
6	2 x BMX DDI 1602 16 channels --- 24 V	1 x BMX DRA 1605 16 relays	3 x BMX FTB 2000 cage clamp terminal blocks	2	BMX PAM 48200	2.900

Packs with --- 24 V power supply

No. of slots	Discrete I/O modules			No. free slots	Reference	Weight kg
	Inputs	Outputs	Connection			
4	2 x BMX DDI 1602 16 channels --- 24 V	1 x BMX DDO 1602 16 channels --- 24 V/0,5 A	3 x BMX FTB 2000 cage clamp terminal blocks	0	BMX PDM 48000	2,600
6	2 x BMX DDI 1602 16 channels --- 24 V	1 x BMX DDO 1602 16 channels --- 24 V/0,5 A	3 x BMX FTB 2000 cage clamp terminal blocks	2	BMX PDM 48200	2.900
4	1 x BMX DDI 3202K 32 channels --- 24 V	1 x BMX DDO 3202K 32 channels --- 24 V/0,1 A	2 x 40-way connectors (1)	1	BMX PDM 64100	2.200



BMX PDM 48200

(1) Preformed cordsets with 40-way connectors (and flying leads or HE10 connectors) BMX FCW/FCC ●●3 preformed cordsets with one connector 40-way.

Applications

16-channel input modules
Connection via cage clamp, screw clamp or spring-type removable terminals

2



Type	
Voltage	
Modularity (Number of channels)	
Connection	
Isolated inputs	IEC/EN 61131-2 conformity Logic Sensor compatibility in accordance with standard IEC/EN 60947-5-2
Isolated outputs	Fallback IEC/EN 61131-2 conformity Protection Logic
Module	
Page	

---	---	--- or ~	~	
24 V	48 V	24 V	48 V	100...120V
16 isolated channels				
Via BMX FTB 2000/2010/2020 20-way cage clamp, screw clamp or spring-type removable terminals				
Type 3	Type 1	Type 1 (~)	Type 3	
Positive		Negative	—	
2-wire ---, 3-wire --- PNP any type		2-wire ---/~, 3-wire --- PNP or NPN any type	2-wire ~	
—				
—				
—				
—				
BMX DDI 1602	BMX DDI 1603	BMX DAI 1602	BMX DAI 1603	BMX DAI 1604
2/16				

Compatibility with installation help system	TeSys® Quickfit®
Compatibility with Modicon® Telefast® ABE 7 pre-wired system	Connection sub-bases Input and output adaptor sub-bases
Passive connection sub-base	Optimum "Economy" Optimum "Miniature" Universal
Relay adaptor sub-base	Fixed relays Plug-in relays
Preformed cordsets with 40-way connector	
Pages	

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Connection via 40-way connectors with preformed cordsets



24 V		24 V I/O		24 V inputs, relay outputs		24 V I/O	
32 isolated channels		64 isolated channels		8 isolated inputs and 8 isolated outputs		16 isolated inputs and 16 isolated outputs	
Via one 40-way connector		Via two 40-way connectors		Via BMX FTB 2000/2010/2020 20-way cage clamp, screw clamp or spring-type removable terminals		Via one 40-way connector	
Type 3		Non-IEC		Type 3			
Positive		–		Positive			
2-wire ---, 3-wire --- PNP any type		–					
–				Configurable output fallback, continuous monitoring of output control and resetting of outputs in case of detected internal fault			
–				Yes			
–				Protected		Not protected	
–				Positive		Positive	
BMX DDI 3202K		BMX DDI 6402K		BMX DDM 16022		BMX DDM 16025	
2/16				2/17		BMX DDM 3202K	
LU9 G02 splitter boxes (8 motor starters) and BMX FCC ●●1/●●3 preformed cordsets				–		LU9 G02 splitter boxes (8 motor starters) and BMX FCC ●●1/●●3 preformed cordsets	
Depending on model, 8- or 16-channel passive sub-bases, with or without LED, with common or 2 terminals per channel							
Depending on model, 16-channel active sub-bases with solid state or electromechanical, fixed or removable relays, 5...48 V ---, 24 V ---, 24 V...240 V ~ or volt-free, with common or 2 terminals per channel, screw or spring-type connection							
ABE 7H34●●0		–		–		ABE 7H34●●0	
ABE 7H16C●●		–		–		ABE 7H16C●●	
ABE 7H08R●●/7H08S21, ABE 7H16R1●/7H16R50, ABE 7H16R2●/7H16S21, ABE 7H16R3●/7H16R23, ABE 7H16S43,		–		–		ABE 7H08R●●/7H08S21, ABE 7H16R1●/7H16R50, ABE 7H16R2●/7H16S21, ABE 7H16R3●/7H16R23, ABE 7H16S43/7H16F43	
ABE 7S16E2●●		–		–		ABE 7S16E2●●	
ABE 7P16F31●●		–		–		ABE 7S16S●●●/7R16S	
BMX FCC ●●1/FCC ●●3		–		–		ABE 7P16F31●●	
5/8 to 5/11, 2/17		–		–		ABE 7R16T●●●/7P16T●●●	
						BMX FCC ●●3	
						5/8 to 5/11, 2/17	

Applications

32/64-channel high-density output modules

Connection via 40-way connectors with preformed cordsets



Type

--- solid state

Voltage

24 V

Current

0.1 A per channel

Modularity
(Number of channels)

32 protected channels

64 protected channels

Connection

Via one 40-way connector

Via two 40-way connectors

Isolated outputs

Fallback

IEC/EN 61131-2 conformity

Protection

Logic

Configurable output fallback, continuous monitoring of output control and resetting of outputs in case of a detected internal fault

Yes

Current limiter with electronic tripping

Positive

Discrete output module

BMX DDO 3202K

BMX DDO 6402K

Page

2/16

Compatibility with
installation help system

TeSys® Quickfit®

Compatibility with
Modicon® Telefast® ABE 7
pre-wired system

Connection sub-bases

Input adaptor sub-bases

Passive sub-base

Optimum "Economy"

Optimum "Miniature"

Universal

ABE 7H34●●0

ABE 7H16C●●

ABE 7H08R●●/7H08S21,
ABE 7H16R1●/7H16R50,
ABE 7H16R2●/7H16S21,
ABE 7H16R3●
ABE 7H16F43

Relay adaptor sub-base

Fixed relays

Removable relays

ABE 7S16S●●● / 7R16S

ABE 7R16T●●●/7P16T●●●

Preformed cordsets with 40-way connector

BMX FCC●●1/FCC ●●3

Pages

5/8 to 5/11, 2/17

16-channel output modules

Connection via cage clamp, screw clamp or spring-type removable terminals

8/16-channel output modules



— solid state
24 V —
0.5 A per channel
16 protected channels

~ triac
100...240 V
0.6 A per channel
16 non-protected channels

---/~ relay	
24 V ---, 24...240 V ~	
3 A (lth) per channel	2 A (lth) per channel
8 non-protected channels	16 non-protected channels

Via BMX FTB 2000/2010/2020 20-way cage clamp, screw clamp or spring-type removable terminals

Configurable output fallback, continuous monitoring of output control and resetting of outputs in case of a detected internal fault	
Yes	
Current limiter with electronic tripping	
Positive	Negative

Configurable output fallback	
Yes	
—	
—	



2/16
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Introduction

Discrete I/O modules in the Modicon® M340® offer are standard modules occupying a single slot, equipped with either of the following:

- A connector for a screw or spring-type 20-way removable terminal block
- One or two 40-way connector(s)

A wide range of discrete inputs and outputs can be used to meet whatever requirements arise in terms of:

- functions, AC or DC I/O, positive or negative logic
- modularity, 8, 16, 32 or 64 channels per module

The inputs receive signals from the sensors and perform the following functions:

- acquisition
- adaptation
- electrical isolation
- filtering
- protection against interference signals

The outputs memorize commands issued by the processor to enable control of the preactuators via the decoupling and amplification circuits.

Description

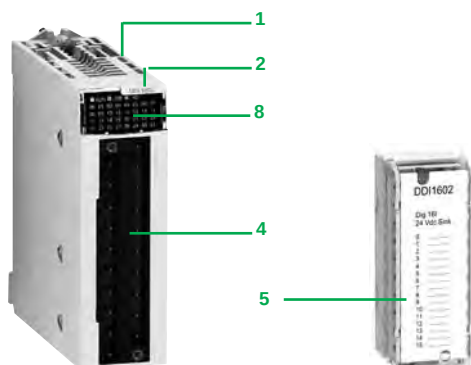
BMX D●I/D●O/DRA discrete I/O modules are standard format (1 slot). They have a case that helps to ensure IP 20 protection of the electronics, and are locked into position with a captive screw.

I/O modules connected via 20-way removable terminal block

- 1 Rigid body providing support and protection for the electronic card
- 2 Module reference marking (a label is also visible on the right-hand side of the module)
- 3 Channel status display block
- 4 Connector taking the 20-way removable terminal block for connecting sensors or preactuators

To be ordered separately:

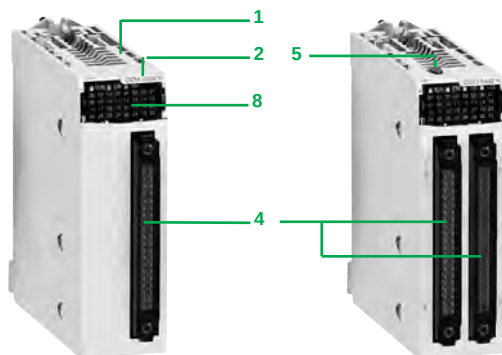
- 5 A **BMX FTB 20●0** 20-way removable terminal block (label supplied with each I/O module) or a preformed cordset with a 20-way removable terminal block at one end and flying leads at the other (see page 2/7).



Module and 20-way removable terminal block

I/O modules connected via 40-way connector

- 1 Rigid body providing support and protection for the electronic card
- 2 Module reference marking (a label is also visible on the right-hand side of the module)
- 3 Channel status display block
- 4 One or two 40-way connectors (32 or 64 channels) (1) for connecting sensors or preactuators
- 5 With the 64-channel module, successive actuations of a pushbutton cause the display of the states of channels 0 ... 31 or 32 ... 64 on the block 3 (see page 2/9)

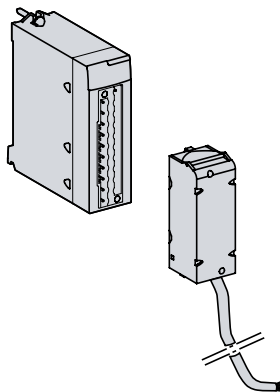


32- and 64-channel modules with for connection via 40-way connector(s)

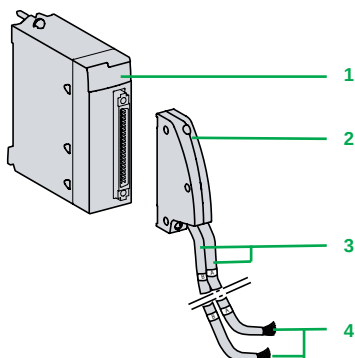
To be ordered separately, depending on the type of module:

One or two preformed cordset(s) with a 40-way connector (see page 2/7).

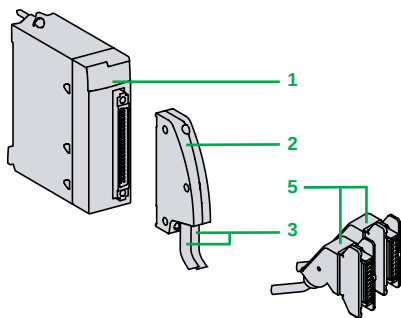
(1) Fujitsu FCN 40-way connector



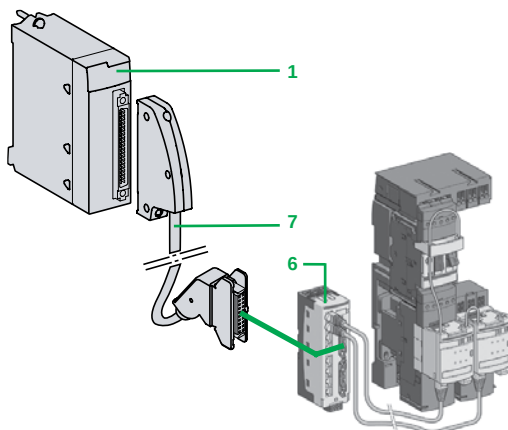
a Preformed cordset with removable terminal block at one end and flying leads at the other



b Preformed cordset with 40-way connector at one end and 2 flying leads at the others



c Preformed cordset with 40-way connector and HE 10 connector for Modicon® Telefast® ABE 7 system



d Example of connection to the TeSys Quickfit installation help system

Connecting modules with removable terminal blocks

There are three types of 20-way removable terminal block:

- ☐ Screw clamp terminal block
- ☐ Cage clamp terminal block
- ☐ Spring-type terminal block

Each removable terminal block can take:

- ☐ Bare wires
- ☐ Wires equipped with DZ5-CE cable ends

a One version of the removable terminal block is equipped with **BMX FTW●●1** cordsets with color-coded flying leads (3, 5 or 10 m long).

Cage clamp terminal blocks

The capacity of each terminal is:

- ☐ Minimum: One 0.34 mm² wire (AWG 22)
- ☐ Maximum: One 1 mm² wire (AWG 18)

BMX FTB 2000 cage clamp connectors are equipped with captive screws (maximum tightening torque 0.5 N.m).

Screw clamp terminal blocks

The capacity of each terminal is:

- ☐ Minimum: One or two 0.34 mm² wires (AWG 22)
- ☐ Maximum: Two 1.5 mm² wires (AWG 15)

BMX FTB 2010 screw clamp connectors are equipped with captive screws (maximum tightening torque 0.5 N.m).

Spring-type terminal blocks

The capacity of each terminal in the **BMX FTB 2020** spring-type terminal blocks is:

- ☐ Minimum: One 0.34 mm² wire (AWG 22)
- ☐ Maximum: One 1 mm² wire (AWG 18)

Connecting modules with 40-way connectors

Preformed cordsets with 40-way connector at one end and flying leads at the other

b Preformed cordsets can be used for easy direct wire-to-wire connection between the I/O of modules with connectors **1** and the sensors, preactuators or intermediate terminals.

These preformed cordsets are comprised of:

- ☐ At one end, a 40-way connector **2** with either of the following:
 - One sheath containing 20 wires with a cross-section of 0.34 mm² (AWG 22) (**BMX FCW ●●1**)
 - Two sheaths **3**, each containing 20 wires with a cross-section of 0.34 mm² (AWG 22) (**BMX FCW ●●3**)

- ☐ At the other end **4**, color-coded flying leads conforming to standard DIN 47100 (see page 2/21)

Preformed cordsets with 40-way connector and HE 10 connector(s)

c Two types of cordset can be used for connecting the I/O of modules with 40-way connectors **1** to rapid wiring connection and adaptation interfaces called Modicon Telefast ABE 7 **2** (see page 5/6).

These preformed cordsets are comprised of:

- ☐ At one end, a 40-way connector **2** with either of the following:
 - One sheath **4** containing 20 wires (**BMX FCC ●●1**)
 - Two sheaths **5** each containing 20 wires (**BMX FCC ●●3**)
- ☐ At the other end, one or two HE 10 connectors **5**

Connection to TeSys Quickfit system

d **BMX DDI 3202K/6402K** input modules, **BMX DDO 3202K/6402K** output modules or **BMX DDM 3202K** mixed input/output module **1** are designed for use with TeSys® Quickfit® installation help systems via **LU9 G02** splitter module **6** (for 8 motors starters).

The modules are easily connected using **BMX FCC ●●1/●●3** preformed cordsets **7**.

Functions

Hot swapping

Due to their integrated devices, I/O modules (including application-specific modules) can be removed and connected while powered up.

Note: When the PLC is powered up and running, the I/O modules can be removed without any material risk by performing the following sequence **before** removing the module:

- Disconnect the power voltage on the outputs
- Disconnect the sensor and preactuator power supply
- Remove the terminal block or connector

I/O module assignment

Discrete I/O modules have different parameters for each channel. The channels are grouped into blocks of 4, 8 or 16 consecutive channels depending on the type of module. Each group of channels can be assigned to a specific application task (master or fast).

Protection of DC inputs

The 24 and 48 V $\overline{\text{DC}}$ inputs are constant-current type. This characteristic makes it possible to:

- ☐ Help ensure minimum current in active state in compliance with the IEC standard
- ☐ Limit the current consumption when the input voltage increases to avoid unwanted temperature rise in the module
- ☐ Reduce the current consumption on the sensor power supply provided by the PLC power supply or by a process power supply

Protection of DC outputs

Protected solid state outputs have a protective device. When an output is active, the protective device can detect the occurrence of the following:

- ☐ An overload or short-circuit: This deactivates the output (tripping) and indicates a detected fault on the display on the module front panel (the LED for the affected channel flashes, the I/O module detected fault LED lights up).
- ☐ Reverse polarity: This will short-circuit the power supply without damaging the module. For this protection to work in optimum conditions, it is essential to place a fast-blow fuse on the power supply upstream of the preactuators.
- ☐ Inductive overvoltage: Each output is protected individually against inductive overvoltages and has a fast zener diode demagnetization circuit for electromagnets that can reduce the output response time for some fast machines.

Reactivation of DC outputs

If a detected fault has caused an output to trip, the output can be reactivated using this parameter if no other terminal detected fault is present.

Reactivation is defined for each group of 8 channels. It has no effect on an inactive channel or one that is OK.

The reactivation command can be:

- ☐ Programmed: Reactivation is carried out by a command from the PLC application or via the debug screen. To avoid repeated reactivations too close together, the module automatically allows a time delay of 10 s between two reactivations.
- ☐ Automatic: Reactivation takes place automatically every 10 s until the detected fault disappears.

RUN/STOP command

An input can be configured to control the RUN/STOP mode for the PLC.

This is taken into account on a rising edge. A STOP command from an input has priority over a RUN command from a programming terminal or via the network.

Functions (continued)

Output fallback

This parameter defines the fallback mode used by the DC solid state outputs when the PLC stops following a:

- ☐ Processor detected fault
- ☐ Detected rack fault
- ☐ Detected fault on the cable connecting the racks

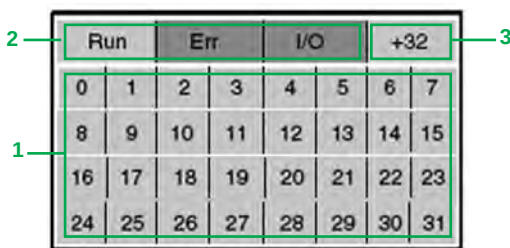
The outputs must be set to a state that is not harmful to the application. This state, known as the fallback position, is defined for each module when the DC solid state outputs are configured. This configuration offers a choice between:

- ☐ Fallback: The channels are set to 0 or 1 according to the fallback value defined for the group of 8 corresponding channels.
- ☐ Maintain: The outputs maintain the state they were in before the stop occurred.

I/O module diagnostics

Each discrete I/O module is equipped with a display block on the front panel centralizing all the information necessary for module control, diagnostics and maintenance. The display block comprises:

- 1 A set of 8, 16 or 32 green LEDs depending on the module modularity. Each LED is associated with one channel:
 - On: channel in state 1; Off: channel in state 0
 - Flashing: channel inoperative, overloaded or short-circuited
- 2 Three LEDs indicating the module status:
 - RUN (green): On: Normal operation
 - ERR (red): On: Detected internal module fault; Flashing: Detected communication fault between the module and the processor
 - I/O (red): On: External detected fault (sensor/preactuator voltage, overload, short-circuit, etc.); Flashing: Detected terminal block fault
- 3 A +32 LED (green) indicating, in the case of 64-channel modules, whether the set of 32 LEDs 1 displays the state of channels 0...31 (off) or the state of channels 32...63 (on). This +32 LED is activated or deactivated by a pushbutton located on top of the module.



Diagnostics via Unity Pro

Using the integrated diagnostics in Unity Pro, this local diagnostics on the module's front panel is complemented by system diagnostics based on predefined screens at global hardware configuration level, module level and channel level (see pages 4/23 and 4/24).

Remote diagnostics using a web browser on a "Thin Client" PC

In addition, the diagnostics described above can be performed remotely using a simple web browser thanks to the standard web server integrated in the Modicon® M340® platform (processor with integrated Ethernet port or Ethernet module), using the "ready-to-use" Rack Viewer function (see page 3/4).

Compatibility with 2-wire and 3-wire sensors						
Input type	24 V $\overline{\text{sink}}$ Non-IEC positive log. (sink)	48 V $\overline{\text{sink}}$ type 1 positive log. (sink)	24 V $\overline{\text{sink}}$ type 3 positive log. (sink)	24 V $\sim$ type 1	48 V $\sim$ type 3	100...120 V $\sim$ type 3
Any 3-wire $\overline{\text{sink}}$ sensor, PNP type	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible
Any 3-wire $\overline{\text{sink}}$ sensor, NPN type	Compatible	Compatible	Compatible	(1)	Compatible	Compatible
Schneider Electric 2-wire $\overline{\text{sink}}$ sensor or other brand, with the following specifications: - Residual voltage in closed state ≤ 7 V - Minimum switched current ≤ 2.5 mA - Residual current in open state ≤ 1.5 mA	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible
Schneider Electric 2-wire $\overline{\text{sink}}$ sensor or other brand with the following specifications: - Residual voltage in closed state ≤ 4 V - Minimum switched current ≤ 1 mA - Residual current in open state ≤ 0.5 mA	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible
2-wire $\overline{\text{sink}}/\sim$ sensor (1)	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible
2-wire $\sim$ sensor	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible

Compatible Compatible with restriction Not compatible

For combinations with Osiprox® inductive proximity sensors, see pages 6/10 and 6/11.

For combinations with Osiris® photo-electric sensors, see page 6/12.

(1) 24 V $\sim$ sensors can be used as negative logic (source) 24 V $\overline{\text{sink}}$ inputs compatible with 3-wire $\overline{\text{sink}}$ sensor NPN type, but in this case, are not IEC-compliant.

Common specifications

Environment

Temperature derating The specifications at 60°C are validated for 60% of inputs and 60% of outputs at state 1.

Specifications of DC input modules

Module			BMX DDI 1602		BMX DDI 1603	BMX DDI 3202K	BMX DDI 6402K	BMX DAI 1602	
Number of inputs			16			32	64	16	
Commons		Number	1			2	4	1	
Connection			Spring or screw-type 20-way removable terminal block			One 40-way connector	Two 40-way connectors	Spring or screw-type 20-way removable terminal block	
Nominal input values		Voltage	V	24 ---	48 ---	24 ---			
		Current	mA	3.5	2.5	2.5	1	3	
		Logic		Positive (sink)				Negative (source)	
Input limit values	At state 1	Voltage	V	≥ 11	≥ 34	≥ 11	≥ 15	≥ 14	
		Current	mA	> 2 (for U ≥ 11 V)	> 2 (for U ≥ 34 V)	> 2 (for U ≥ 11 V)	> 1 (for U ≥ 15 V)	> 2	
	At state 0	Voltage	V	< 5	< 10	< 5			
		Current	mA	≤ 1.5	≤ 0.5	≤ 1.5	≤ 0.5		
	Sensor power supply (ripple included)		V	19...30 (possible up to 34 V, limited to 1 hour in every 24 hours)	38...60	19...30 (possible up to 34 V, limited to 1 hour in every 24 hours)			
	Input impedance at nominal voltage			kΩ	6.8	19.2	9.6	24	6.4
Response time (filtering)	Typical	ms	4					10	
	Maximum	ms	7					20	
Reverse polarity			Protected					No	—
IEC/EN 61131-2 conformity			Type 3		Type 1	Type 3	Non-IEC		
Compatibility with 2-wire/3-wire sensors			IEC/EN 60947-5-2					—	
Paralleling of inputs (1)			Yes			No			
Protection of inputs			Use one 0.5 A fast-blow fuse per group of channels						
Insulation resistance			MΩ	> 10 at 500 V ---					
Dielectric strength	Primary/Secondary	V rms	1,500 - 50/60 Hz for 1 minute (up to 4,000 m)						
	Between groups of channels	V	—			500 ---		—	
Type of input			Current sink					Resistive	
Sensor voltage control threshold	OK	V	> 18 ---	> 36 ---	> 18 ---				
	Out of range	V	< 14 ---	< 24 ---	< 14 ---				
Consumption		Typical	mA	See Power consumption table on page 6/13					
Maximum dissipated power			W	2.5	3.6	3.9	4.3	3	
Temperature derating			None						

(1) This characteristic allows several inputs to be wired in parallel on the same module or on different modules for input redundancy.

Specifications of AC input modules						
Module			BMX DAI 1602		BMX DAI 1603	BMX DAI 1604
Number of inputs			16			
Commons		Number	1			
Connection			Spring or screw-type 20-way removable terminal block			
Nominal input values		Voltage	V	24 ~	48 ~	100...120 ~
		Current	mA	3	5	
		Frequency	Hz	50/60		
Input limit values	At state 1	Voltage	V	≥ 15	≥ 34	≥ 74
		Current	mA	≥ 2		≥ 2.5
	At state 0	Voltage	V	≤ 5	≤ 10	≤ 20
		Current	mA	≤ 1		
	Frequency		Hz	47...63		
	Sensor power supply (ripple included)		V	20...26	40...52	85...132
	Current peak on activation	At nominal voltage	mA	5	95	240
Input impedance at nominal voltage and F = 55 Hz			kΩ	6	9	13
Response time (filtering)		Activation	ms	15	10	
		Deactivation	ms	20		
IEC/EN 61131-2 conformity			Type 1		Type 3	
Compatibility with 2-wire/3-wire sensors			IEC/EN 60947-5-2			
Protection of inputs			Use one 0.5 A fast-blow fuse per group of channels			
Insulation resistance			MΩ	>10 at 500 V ---		
Dielectric strength			V rms	1,500 - 50/60 Hz for 1 minute (up to 4,000 m)		
Type of input			Resistive		Capacitive	
Sensor voltage control threshold		OK	V	> 18	> 36	> 82
		Out of range	V	< 14	< 24	< 40
Reliability	MTBF in hours	At T _{ambient} = 30°C	1,504,958			
Consumption		Typical	mA	See Power consumption table on page 6/13		
Maximum dissipated power			W	3	4	3.8
Temperature derating						

Specifications of triac output module			
Module			BMX DAO 1605
Number of outputs			16
Commons		Number	4
Connection			Spring or screw-type 20-way removable terminal block
Operating voltages		Nominal	V 100...240 ~
		Limit	V 85...288 ~
Currents		Maximum	A 0.6 per channel, 2.4 per common, 4.8 total for 4 commons
		Minimum	25 mA at 100 V ~, 25 mA at 240 V ~
Maximum inrush current			A ≤ 20/cycle
Leakage current		At state 0	mA ≤ 1.5 for 120 V ~, 60 Hz, ≤ 3 for 240 V ~, 60 Hz
Residual voltage		At state 1	V ≤ 1.5
Response time		Activation	ms ≤ 1 +/- 0.5 Hz
Nominal resistive load		Deactivation	ms ≤ 1 +/- 0.5 Hz
Type of command			Passage through zero
Built-in protection			Varistor
Protection fuses			None (use an external fast-blow fuse)
Dielectric strength			V rms 2,830 ~/3 cycles (up to 2,000 m)
Insulation resistance			MΩ > 10 at 500 V ---
Consumption		Typical	mA See Power consumption table on page 6/13
Maximum dissipated power			–

Specifications of DC solid state output modules

Module			BMX DDO 1602	BMX DDO 1612	BMX DDO 3202K	BMX DDO 6402K
Number of inputs				16	32	64
Commons	Number		1		2	4
Connection				Spring or screw-type 20-way removable terminal block		One 40-way connector Two 40-way connectors
Output nominal values	Voltage	V	24 ---			
	Current	A	0.5			0.1
	Logic		Positive (<i>source</i>)		Negative (<i>sink</i>)	Positive (<i>source</i>)
Output limit values	Voltage (ripple included)	V	19...30 (possible up to 34 V, limited to 1 hour in every 24 hours)			
	Current per channel	A	0.625			0.125
	Current per module	A	10			3.2
Tungsten filament lamp power		W	6 maximum			1.2 maximum
Leakage current	At state 0	mA	< 0.5			0.1 (for U = 30 V)
Residual voltage	At state 1	V	< 1.2			< 1.5 (for I = 0.1 A)
Minimum load impedance		Ω	48			220
Response time (1)		ms	1.2			
Maximum overload time		ms	–			15
Compatibility with IEC/EN 61131-2 DC inputs			Yes		–	Yes
Paralleling of outputs				Yes (2 max.)	Yes (3 max.)	
Switching frequency on inductive load		Hz	0.5/LI ²			
Built-in protection	Against overvoltages		Yes, by Transil diode			
	Against inversions		Yes, by reverse-mounted diode. Use a 2 A fuse on the + 24 V of the preactuators.			
	Against short-circuit and overloads		Yes, with current limiter and electronic circuit-breaker 1.5 In < Id < 2 In			Yes, with current limiter and electronic circuit-breaker 0.125 A < Id < 0.185 A
Preactuator voltage control threshold	At state 0	V	> 18			
	Out of range	V	< 14			
Insulation resistance		MΩ	> 10 at 500 V ---			
Dielectric strength	Output/ground or output/internal logic	V rms	1,500 ~ - 50/60 Hz for 1 minute			
	Between groups of channels	V	–			500 ---
Consumption		Typical	mA	See Power consumption table on page 6/13		
Maximum dissipated power		W	4	2.26	3.6	6.85
Temperature derating			None			See “Current per module” above

(1) Outputs are equipped with a fast demagnetization circuit for the electromagnets. Discharge time for the electromagnets < L/R.

Specifications of relay output modules												
Module			BMX DRA 0805					BMX DRA 1605				
Number of inputs				8					16			
Commons		Number		Without common point					2			
Connection				Spring or screw-type 20-way removable terminal block								
Limit operating voltages		DC	V	10...34 ---					24...125 --- (resistive load)			
		AC	V	19...264 ~					200...264 ~ (Cos φ = 1)			
Thermal current			A	3					2			
Switching load		Minimum	mA	1 at 5 V ---								
Electrical life				—					24 V	100 V	200 V	240 V
AC load		Power cos φ = 0.7	VA	—					—		300 (1), 80 (2)	240 (1), 72 (2)
		Power cos φ = 0.35	VA	—					—		200 (1), 60 (2)	120 (1), 36 (2)
DC load		Power	W	—					24 (1), 7.2 (2)	10 (1), 3 (2)	—	—
Voltage					24 V	48 V	110... 120 V	200... 240 V	24 V	100 V	200 V	240 V
AC load	Resistive loads AC-12	Power	VA	50 (3)	50 (4), 110 (5)	110 (4), 220 (5)	220 (4)	—				
	Inductive loads AC-15 (cos φ = 0.3)	Power	VA	24 (5)	10 (6), 24 (7)	10 (8), 50 (9), 110 (10)	10 (8), 50 (11), 110 (4), 220 (12)	—		200 (1), 60 (2)	120 (1), 36 (2)	
	Inductive loads AC-14 (cos φ = 0.7)	Power	VA	—					—		300 (1), 80 (2)	240 (1), 72 (2)
DC load	Resistive loads DC-12	Power	W	24 (4), 40 (13)	—							
	Inductive loads DC-13 (14)	Power	W	10 (7), 24 (4)	—			24 (1), 7.2 (2)	10 (1), 3 (2)	—		
Response time		Activation	ms	< 10					—			
		Deactivation	ms	< 8					< 12			
Built-in protection	Against overloads and short-circuits			None. Use a fast-blow fuse per channel or group of channels								
	Against AC inductive overvoltages			None. Use an RC circuit or ZNO surge limiter appropriate to the voltage in parallel on each output								
	Against DC inductive overvoltages			None. Use a discharge diode on each output								
Insulation resistance			MΩ	> 10 at 500 V ---								
Dielectric strength			V rms	2,000 - 50/60 Hz for 1 minute								
Consumption		Typical	mA	See Power consumption table on page 6/13								
Dissipated power			W	2.7 max.					3			
Temperature derating				None								

- (1) For 1 x 10⁵ operating cycles
 (2) For 3 x 10⁵ operating cycles
 (3) For 0.7 x 10⁶ operating cycles
 (4) For 1 x 10⁶ operating cycles
 (5) For 0.5 x 10⁶ operating cycles
 (6) For 5 x 10⁶ operating cycles
 (7) For 2 x 10⁶ operating cycles
 (8) For 10 x 10⁶ operating cycles
 (9) For 1.5 x 10⁶ operating cycles
 (10) For 0.15 x 10⁶ operating cycles
 (11) For 3 x 10⁶ operating cycles
 (12) For 0.1 x 10⁶ operating cycles
 (13) For 0.3 x 10⁶ operating cycles
 (14) Where L/R = 60 ms for BMX DRA 0805 module, L/R = 7 ms for BMX DRA 1605 module

Specifications of mixed I/O relay module

Module				BMX DDM 16025				
				24 V $\overline{\text{---}}$ inputs		24 V $\overline{\text{---}}$ or 24...240 V $\sim$ relay outputs		
Number of inputs/outputs				8	8			
Commons		Number		1	1			
Connection				Spring or screw-type 20-way removable terminal block				
Nominal values	Inputs	Voltage	V	24 $\overline{\text{---}}$ (positive logic)		–		
		Current	mA	3.5		–		
	Outputs	DC voltage	V	–		24 $\overline{\text{---}}$		
		Direct current	A	–		2 (resistive load)		
		AC voltage	V	–		220 $\sim$, Cos φ = 1		
		Alternating current	A	–		2		
Input limit values	At state 1	Voltage	V	≥ 11		–		
		Current	mA	≥ 2 (for U ≥ 11 V)		–		
	At state 0	Voltage	V	5		–		
		Current	mA	≤ 1.5		–		
	Sensor power supply (ripple included)		V	19...30 (possible up to 30 V, limited to 1 hour in every 24 hours)		–		
Input impedance at nominal voltage			k Ω	6.8		–		
Input response time		Typical	ms	4		–		
		Maximum	ms	7		–		
Reverse polarity on inputs				Protected		–		
IEC/EN 61131-2 conformity				Yes, type 3		–		
Compatibility with 2-wire/3-wire sensors				IEC/EN 60947-5-2		–		
Paralleling of inputs				No		–		
Input type				Current sink		–		
Output response time		Activation	ms	–		≤ 12		
		Deactivation	ms	–		≤ 10		
Switching load		Minimum		–		5 V $\overline{\text{---}}$ /1 mA		
		Maximum	V	–		264 $\sim$ /125 $\overline{\text{---}}$		
Mechanical durability		No. of switching operations		–		≥ 20 million		
Fuse protection				Use one 0.5 A fast-blow fuse per group of channels		No (use one fast-blow fuse per channel or group of channels)		
Sensor voltage control thresholds		OK	V	> 18		–		
		Out of range	V	< 14		–		
Relay output		Voltage				24 V	200 V	240 V
AC load	Inductive loads AC-14 (cos φ = 0.7)	Power	VA	–		–	300 (1), 80 (2)	240 (1), 72 (2)
		Power	VA	–		–	200 (1), 60 (2)	120 (1), 36 (2)
DC load	Inductive loads DC-13	Power	W	–		24 (1), 7.2 (2)	–	–
Maximum switching frequency				–		3,600 cycles/hour		
Insulation resistance			M Ω	> 10 at 500 V $\overline{\text{---}}$				
Dielectric strength	Primary/secondary		V rms	1,500 - 50/60 Hz for 1 minute		–		
	Between groups of I/O		V	500 $\overline{\text{---}}$		–		
	Max. voltage		V rms	–		2,830 $\sim$ /cycle		
Consumption		Typical	mA	See Power consumption table on page 6/13				
Dissipated power			W	3.1 maximum				
Temperature derating				None				

(1) For 1×10^5 operating cycles
 (2) For 3×10^5 operating cycles

Specifications of 24 V $\overline{\text{---}}$ mixed I/O modules

Module				BMX DDM 16022		BMX DDM 3202K	
				Inputs	Solid state outputs	Inputs	Solid state outputs
Number of inputs/outputs				8	8	16	16
Commons		Number		1	1	1	1
Connection				Spring or screw-type 20-way removable terminal block		One 40-way connector	
Nominal values		Voltage	V	24 ---			
		Current	mA	3.5	500	2.5	100
		Logic		Positive (sink)	Positive (source)	Positive (sink)	Positive (source)
Tungsten filament lamp power			W	–	6 maximum	–	1.2 maximum
Input limit values	At state 1	Voltage	V	≥ 11	–	≥ 11	–
		Current	mA	> 3 (for U ≥ 11 V)	–	≥ 2 (for U ≥ 11 V)	–
	At state 0	Voltage	V	5	–	5	–
		Current	mA	≤ 1.5	–	≤ 1.5	–
	Sensor power supply (ripple included)	Possible up to 30 V, limited to 1 hour in every 24 hours	V	19...30	–	19...30	–
Output limit values	Voltage (ripple included)	Possible up to 30 V, limited to 1 hour in every 24 hours	V	–	19...30	–	19...30
	Currents	Per channel	A	–	0,625	–	0,125
		Per module	A	–	5	–	3.2
Input impedance at nominal voltage			kΩ	6.8	–	9.6	–
Input response time		Typical	ms	4	–	4	–
		Maximum	ms	7	–	7	–
Reverse polarity on inputs				Protected	–	Protected	–
IEC/EN 61131-2 conformity				Yes, type 3	–	Yes, type 3	–
Compatibility with 2-wire/3-wire sensors				IEC/EN 60947-5-2	–	IEC/EN 60947-5-2	–
Input type				Current sink	–	Current sink	–
Leakage current		At state 0	mA	–	< 0.5	–	0.1
Residual voltage		At state 1	V	–	< 1.2	–	< 1.5 (for I=0.1 A)
Minimum load impedance			Ω	–	48	–	220
Output response time (1)			ms	–	1.2	–	1.2
Max. overload time before detected fault state			ms	–	15	–	15
Compatibility with IEC 61131-2 DC inputs				–	Yes	–	Yes
Paralleling of outputs				–	Yes (2 maximum)	–	Yes (3 maximum)
Switching frequency on inductive load			Hz	–	0.5/LI²	–	0.5/LI²
Built-in protection		Against overvoltages		–	Yes, by Transil diode	–	Yes, by Transil diode
		Against inversions		–	Yes, by reverse-mounted diode. Use a 2 A fuse on the preactuator + 24 V	–	Yes, by reverse-mounted diode. Use a 2 A fuse on the preactuator + 24 V
		Against short-circuits and overloads		Use one 0.5 A fast-blow fuse per group of channels	Yes, by current limiter and electronic circuit-breaker 1.5 In < Id < 2 In	Use one 0.5 A fast-blow fuse per group of channels	Yes, by current limiter and electronic circuit-breaker 0.125 A < Id < 0.185 A
Sensor and preactuator voltage control thresholds		OK	V	> 18			
		Out of range		< 14			
Insulation resistance			MΩ	> 10 at 500 V ---			
Dielectric strength	Primary/secondary		V rms	1,500 - 50/60 Hz for 1 minute			
	Between groups of inputs and outputs		V	500 ---			
	Outputs/ground or outputs/internal logic			–	1,500 - 50/60 Hz for 1 minute	–	1,500 - 50/60 Hz for 1 minute
Consumption	3.3 V ---	Typical	mA	79		125	
		Maximum	mA	111		166	
	24 V --- preactuators (2)	Typical	mA	59		69	
		Maximum	mA	67		104	
Maximum dissipated power			W	3.7		4	
Temperature derating				None			

(1) Outputs are equipped with a fast demagnetization circuit for the electromagnets. Discharge time for the electromagnets $< L/R$.
 (2) Excluding load current.

Modicon® M340™

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Discrete I/O modules

2



BMX DDI 160



BMX DDI 3202K



BMX DDI 6402K

References

Discrete input modules

Type of current	Input voltage	Connection by (1)	IEC/EN 61131-2 conformity	No. of channels (common)	Reference	Weight kg
⎓	24 V (positive logic)	Screw or spring-type 20-way removable terminal block	Type 3	16 isolated inputs (1 x 16)	BMX DDI 1602	0.115
		One 40-way connector	Type 3	32 isolated inputs (2 x 16)	BMX DDI 3202K	0.112
		Two 40-way connectors	Non-IEC	64 isolated inputs (4 x 16)	BMX DDI 6402K	0.145
⎓	24 V (negative logic)	Screw or spring-type 20-way removable terminal block	Non-IEC	16 isolated inputs (1 x 16)	BMX DAI 1602	0.115
	48 V (positive logic)	Screw or spring-type 20-way removable terminal block	Type 1	16 isolated inputs (1 x 16)	BMX DDI 1603	0.115
	24 V	Screw or spring-type 20-way removable terminal block	Type 1	16 isolated inputs (1 x 16)	BMX DAI 1602	0.115
~	48 V	Screw or spring-type 20-way removable terminal block	Type 3	16 isolated inputs (1 x 16)	BMX DAI 1603	0.115
	100...120 V	Screw or spring-type 20-way removable terminal block	Type 3	16 isolated inputs (1 x 16)	BMX DAI 1604	0.115



BMX DDO 1602



BMX DRA 0805/1605



BMX DDO 3202K



BMX DDO 6402K

Discrete output modules

Type of current	Output voltage	Connection by (1)	IEC/EN 61131-2 conformity	No. of channels (common)	Reference	Weight kg
⎓ solid state	24 V/0.5 A (positive logic)	Screw or spring-type 20-way removable terminal block	Yes	16 protected outputs (1 x 16)	BMX DDO 1602	0.120
	24 V/0.5 A (negative logic)	Screw or spring-type 20-way removable terminal block	Non-IEC	16 protected outputs (1 x 16)	BMX DDO 1612	0.120
	24 V/0.1 A (positive logic)	One 40-way connector	Yes	32 protected outputs (2 x 16)	BMX DDO 3202K	0.110
		Two 40-way connectors	Yes	64 protected outputs (4 x 16)	BMX DDO 6402K	0.150
~ triac	100...240	Screw or spring-type 20-way removable terminal block	–	16 outputs (4 x 4)	BMX DAO 1605	0.140
⎓ or ~ relay	12...24 V ⎓/3 A, 24...240 V ~/3 A	Screw or spring-type 20-way removable terminal block	Yes	8 non-protected outputs (without common)	BMX DRA 0805	0.145
	24 V ⎓/2 A, 240 V ~/2 A	Screw or spring-type 20-way removable terminal block	Yes	16 non-protected outputs (2 x 8)	BMX DRA 1605	0.150

(1) By connector module supplied with cover(s).

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automation platform

Discrete I/O modules



BMX DDM 160●2

BMX DDM 3202K

References (continued)

Discrete mixed I/O modules

Number of I/O	Connection via (1)	No. of inputs (common)	No. of outputs (common)	IEC/EN 61131-2 Reference conformity	Reference	Weight kg
16	Screw or spring-type 20-way removable terminal block	8 (positive logic) (1 x 8)	8, solid state 24 V $\overline{\text{---}}$ / 0,5 A (1 x 8)	Inputs, type 3	BMX DDM 16022	0.115
			8, relay 24 V $\overline{\text{---}}$ or 24...240 V $\sim$ (1 x 8)	Inputs, type 3	BMX DDM 16025	0.135
32	One 40-way connector	16 (positive logic) (1 x 16)	16, solid state 24 V $\overline{\text{---}}$ / 0,1 A (1 x 16)	Inputs, type 3	BMX DDM 3202K	0.110



BMX FTB 20●0

Removable connection blocks

Description	Use	Type	Reference	Weight kg
20-way removable terminal blocks	For module with 20-way removable terminal block	Cage clamp	BMX FTB 2000	0.093
		Screw clamp	BMX FTB 2010	0.075
		Spring-type	BMX FTB 2020	0.060



BMX FTW ●01

Preformed cordsets for I/O modules with removable terminal block

Description	Composition	Length	Reference	Weight kg
Preformed cordsets with one end with flying leads	One 20-way removable terminal block (BMX FTB 2020)	3 m	BMX FTW 301	0.850
	One end with color-coded flying leads	5 m	BMX FTW 501	1.400
		10 m	BMX FTW 1001	2.780



BMX FCW ●01

Preformed cordsets for I/O modules with 40-way connectors

Description	No. of sheaths	Composition	Cross-section	Length	Reference	Weight kg
Preformed cordsets with one end with flying leads	1 x 20 wires (16 channels)	One 40-way connector One end with color-coded flying leads	0.324 mm ²	3 m	BMX FCW 301	0.820
				5 m	BMX FCW 501	1.370
				10 m	BMX FCW 1001	2.770
	2 x 20 wires (32 channels)	One 40-way connector Two ends with color-coded flying leads	0.324 mm ²	3 m	BMX FCW 303	0.900
				5 m	BMX FCW 503	1.490
				10 m	BMX FCW 1003	2.960
Preformed cordsets for Modicon Telefast ABE 7 sub-bases	1 x 20 wires (16 channels)	One 40-way connector One HE 10 connector	0.324 mm ²	0.5 m	BMX FCC 051	0.140
				1 m	BMX FCC 101	0.195
				2 m	BMX FCC 201	0.560
				3 m	BMX FCC 301	0.840
				5 m	BMX FCC 501	1.390
				10 m	BMX FCC 1001	2.780
	2 x 20 wires (32 channels)	One 40-way connector Two HE 10 connectors	0.324 mm ²	0.5 m	BMX FCC 053	0.210
				1 m	BMX FCC 103	0.350
				2 m	BMX FCC 203	0.630
				3 m	BMX FCC 303	0.940
				5 m	BMX FCC 503	1.530
				10 m	BMX FCC 1003	3.000



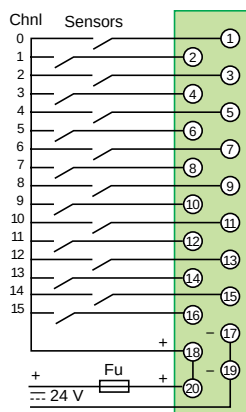
BMX FCW ●03



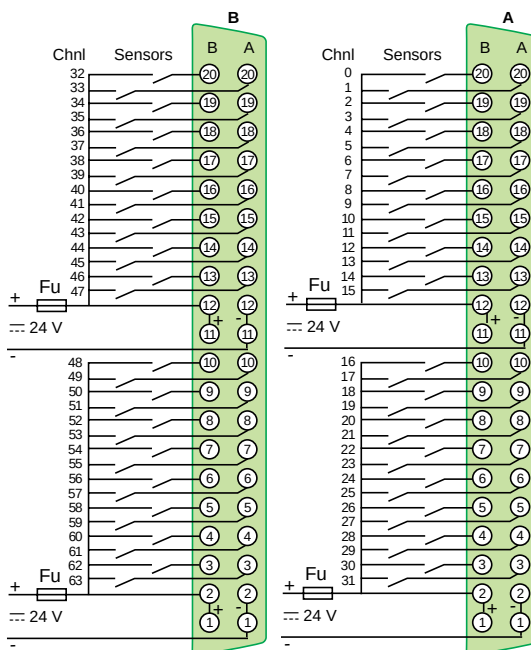
BMX FCC ●01

Input modules

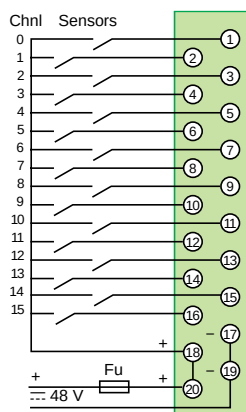
BMX DDI 1602



BMX DDI 3202K/6402K



BMX DDI 1603

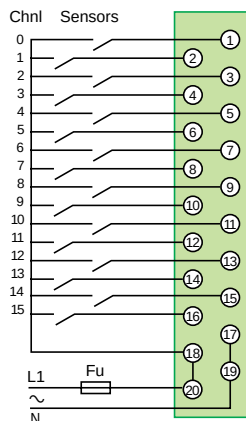


BMX DDI 3202K: Connector A (inputs I0...I31)

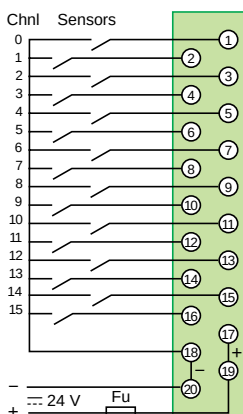
BMX DDI 6402K: Connector A (inputs I0...I31) and connector B (inputs I32...I63)

For correspondence of the 40-way connector pins with the wire colors of **BMX FCW ●01/●03** prewired cordsets, in accordance with DIN 47100, see table on page 2/21.

BMX DAI 1602/1603/1604



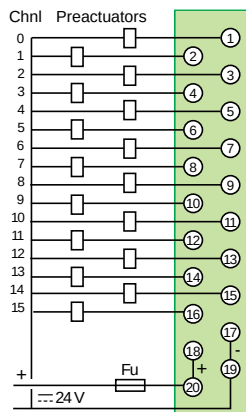
BMX DAI 1602, use in 24 V ~, negative logic



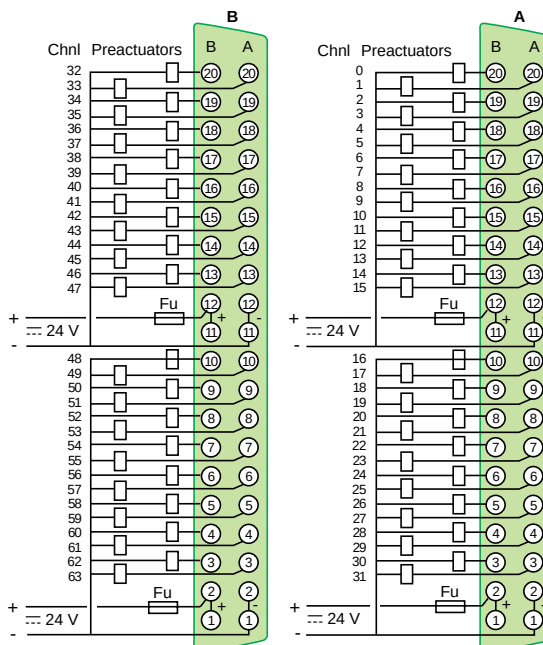
L1-N voltage: 24 V ~, **BMX DAI 1602**
 48 V ~, **BMX DAI 1603**
 100/120 V ~, **BMX DAI 1604**
 Fu: 0.5 A fast-blow fuse

Output modules

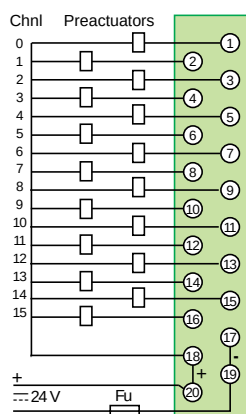
BMX DDO 1602



BMX DDO 3202K/6402K



BMX DDO 1612

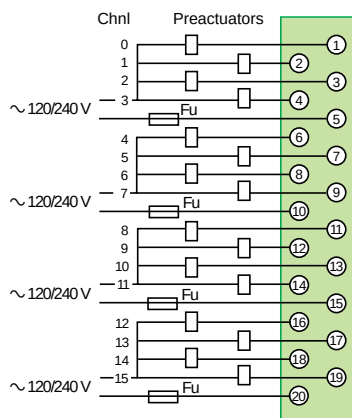


BMX DDO 3202K: Connector A (outputs I0...I31)

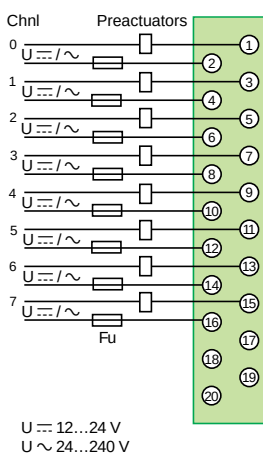
BMX DDO 6402K: Connector A (outputs I0...I31) and connector B (inputs I32...I63)

For correspondence of the 40-way connector pins with the wire colors of **BMX FCW ●01/●03** prewired cordsets, in accordance with DIN 47100, see table on page 2/21.

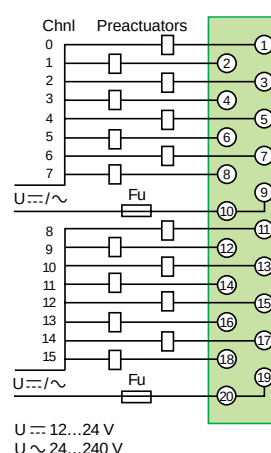
BMX DAO 1605



BMX DRA 0805



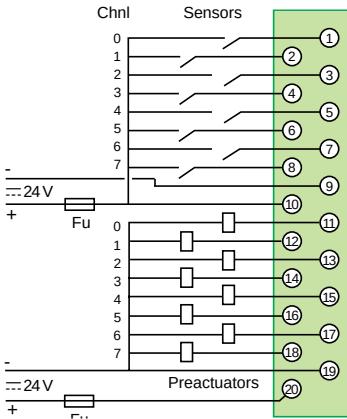
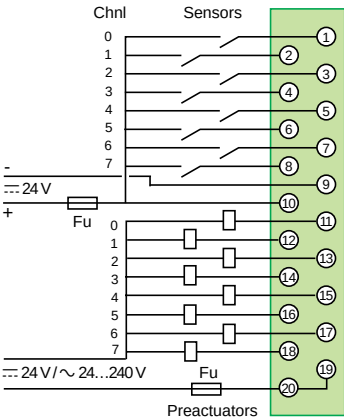
BMX DRA 1605



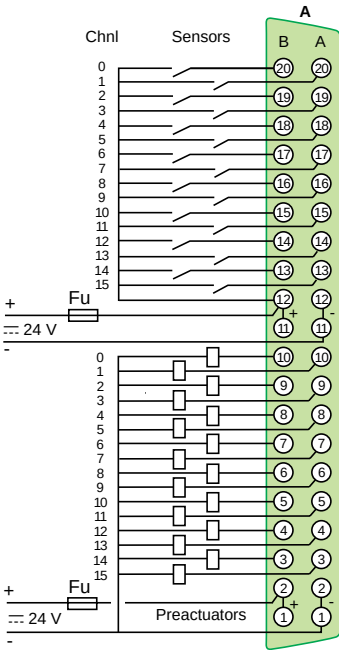
Mixed I/O modules

BMX DDM 16025

BMX DDM 16022



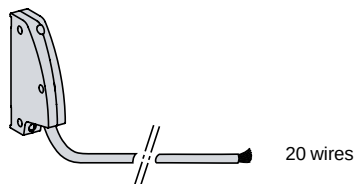
BMX DDM 3202K



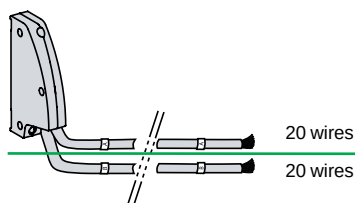
Fu: 0.5 A fast-blow fuse

Connection cables with 40-way connector and end(s) with flying leads BMX FCW ●01/●03

Correspondence of connector pins with the wire colors at the sheath end



Cordset with one sheathed end with flying leads
BMX FCW ●01



Cordset with two sheathed ends with flying lead
BMX FCW ●03

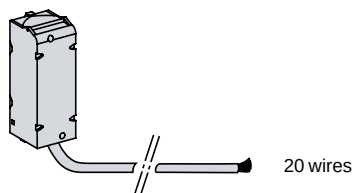
Note: Each input not used must be connected to 0 V in --- or neutral in ~ (Immunity to electromagnetic fields EMC).

Connector pin no.	Color at sheath end	32/64-channel inputs	32/64-channel outputs	32-channel I/O
B20	White	Input 0/32	Output 0/32	Input 0
A20	Brown	Input 1/33	Output 1/33	Input 1
B19	Green	Input 2/34	Output 2/34	Input 2
A19	Yellow	Input 3/35	Output 3/35	Input 3
B18	Gray	Input 4/36	Output 4/36	Input 4
A18	Pink	Input 5/37	Output 5/37	Input 5
B17	Blue	Input 6/38	Output 6/38	Input 6
A17	Red	Input 7/39	Output 7/39	Input 7
B16	Black	Input 8/40	Output 8/40	Input 8
A16	Purple	Input 9/41	Output 9/41	Input 9
B15	Gray/pink	Input 10/42	Output 10/42	Input 10
A15	Red/blue	Input 11/43	Output 11/43	Input 11
B14	White/green	Input 12/44	Output 12/44	Input 12
A14	Brown/green	Input 13/45	Output 13/45	Input 13
B13	White/yellow	Input 14/46	Output 14/46	Input 14
A13	Yellow/brown	Input 15/47	Output 15/47	Input 15
B12	White/gray	+ 24 V	+ 24 V	+ 24 V
A12	Gray/brown	- 24 V	- 24 V	- 24 V
B11	White/pink	+ 24 V	+ 24 V	+ 24 V
A11	Pink/brown	- 24 V	- 24 V	- 24 V
B10	White	Input 16/48	Output 16/48	Output 0
A10	Brown	Input 17/49	Output 17/49	Output 1
B9	Green	Input 18/50	Output 18/50	Output 2
A9	Yellow	Input 19/51	Output 19/51	Output 3
B8	Gray	Input 20/52	Output 20/52	Output 4
A8	Pink	Input 21/53	Output 21/53	Output 5
B7	Blue	Input 22/54	Output 22/54	Output 6
A7	Red	Input 23/55	Output 23/55	Output 7
B6	Black	Input 24/56	Output 24/56	Output 8
A6	Purple	Input 25/57	Output 25/57	Output 9
B5	Gray/pink	Input 26/58	Output 26/58	Output 10
A5	Red/blue	Input 27/59	Output 27/59	Output 11
B4	White/green	Input 28/60	Output 28/60	Output 12
A4	Brown/green	Input 29/61	Output 29/61	Output 13
B3	White/yellow	Input 30/62	Output 30/62	Output 14
A3	Yellow/brown	Input 31/63	Output 31/63	Output 15
B2	White/gray	+ 24 V	+ 24 V	+ 24 V
A2	Gray/brown	- 24 V	- 24 V	- 24 V
B1	White/pink	+ 24 V	+ 24 V	+ 24 V
A1	Pink/brown	- 24 V	- 24 V	- 24 V

Connection cables with 20-way terminal block at one end and flying leads at the other BMX FTW ●01

Correspondence of 20-way removable terminal block pins with the wire colors (at sheath end)

Correspondence of terminal block pins with the wire colors at the sheath end



Cordset with 1 sheathed end with flying lead
BMX FTW ●01

Terminal block pin no.	Color at sheath end	16-channel inputs	8- or 16-channel outputs	16-channel I/O
1	White	Input 0	See page 2/19	Input 0
2	Brown	Input 1	See page 2/19	Input 1
3	Green	Input 2	See page 2/19	Input 2
4	Yellow	Input 3	See page 2/19	Input 3
5	Gray	Input 4	See page 2/19	Input 4
6	Pink	Input 5	See page 2/19	Input 5
7	Blue	Input 6	See page 2/19	Input 6
8	Red	Input 7	See page 2/19	Input 7
9	Black	Input 8	See page 2/19	Sensor + common power supply
10	Purple	Input 9	See page 2/19	Sensor pwr supply
11	Gray/pink	Input 10	See page 2/19	Output 0
12	Red/blue	Input 11	See page 2/19	Output 1
13	White/green	Input 12	See page 2/19	Output 2
14	Brown/green	Input 13	See page 2/19	Output 3
15	White/yellow	Input 14	See page 2/19	Output 4
16	Yellow/brown	Input 15	See page 2/19	Output 5
17	White/gray	Power supply	See page 2/19	Output 6
18	Gray/brown	+ common pwr sup.	See page 2/19	Output 7
19	White/pink	Power supply	See page 2/19	Preactuator pwr sup.
20	Pink/brown	Power supply	See page 2/19	Preactuator pwr sup.

Applications

Analog inputs



Type of I/O

Type

Range

Voltage

Current

Thermocouple,
Temperature probe,
Resistor

Modularity

Acquisition period

Conversion time

Resolution

Isolation

Connection

Directly to the module

Via preformed cordsets

Module

Isolated low-level voltage inputs, resistors, thermocouples and temperature probes

Multi-range

 $\pm 40 \text{ mV}$, $\pm 80 \text{ mV}$, $\pm 160 \text{ mV}$, $\pm 320 \text{ mV}$, $\pm 640 \text{ mV}$ and $\pm 1.28 \text{ V}$

—

Thermocouples type B, E, J, K, L, N, R, S, T, U
 Temperature probes type Pt 100, Pt 1000, Ni 100, Ni 1000 and Cu 10, 2-, 3- or 4-wire
 Resistors 2-, 3- or 4-wire, 400Ω or $4,000 \Omega$

4 channels

8 channels

400 ms for 4 channels

400 ms for 8 channels

—

16 bits

Between channels: $750 \text{ V} \cdots$
 Between channels and bus: $1,400 \text{ V} \cdots$
 Between channels and ground: $750 \text{ V} \cdots$

Via 40-way connector

Via two 40-way connectors

BMX FCW●01S cordsets with one end with color-coded flying leads (3 or 5 m long)

BMX ART 0414

BMX ART 0814

Page

2/31



Compatibility with Modicon® Telefast® ABE 7 pre-wired system

Type of module

Connection sub-base

Preformed cordsets
(length 1.5, 3 or 5 m)

Sub-base with 4 channels for direct connection of 4 thermocouples plus connection and provision of cold-junction compensation

ABE 7CPA412

BMX FCA●●2

Pages

5/11 and 2/31

Analog inputs



Isolated high-level inputs

Voltage/current

 $\pm 10\text{ V}$, $0\ldots 10\text{ V}$, $0\ldots 5\text{ V}$, $1\ldots 5\text{ V}$, $\pm 5\text{ V}$
 $0\ldots 20\text{ mA}$, $4\ldots 20\text{ mA}$, $\pm 20\text{ mA}$

—

4 channels

 Fast: $1 + (1 \times \text{no. of declared channels})\text{ ms}$
 By default, 5 ms for 4 channels

—

16 bits

 Between channels: 300 V ---
 Between channels and bus: $1,400\text{ V}$ ---
 Between channels and ground: $1,400\text{ V}$ ---

Via 20-way removable terminals (screw or spring-type)

BMX FTW ●01S cordsets with one end with color-coded flying leads (3 or 5 m long)

Analog outputs



Isolated high-level outputs

Voltage/current

 $\pm 10\text{ V}$
 $0\ldots 20\text{ mA}$, $4\ldots 20\text{ mA}$

—

2 channels

—

 $\leq 1\text{ ms}$

16 bits

 Between channels: 750 V ---
 Between channels and bus: $1,400\text{ V}$ ---
 Between channels and ground: $1,400\text{ V}$ ---

Mixed analog I/O



Non-isolated high-level inputs

Voltage/current

 $\pm 10\text{ V}$, $0\ldots 10\text{ V}$, $0\ldots 5\text{ V}$, $1\ldots 5\text{ V}$
 $0\ldots 20\text{ mA}$, $4\ldots 20\text{ mA}$

—

4 channels

 Fast: $1 + (1 \times \text{no. of declared channels})\text{ ms}$
 By default, 5 ms for 4 channels

—

 $14\ldots 12\text{ bits in U range}$
 $12\text{ bits in I range}$

 Between group of input channels and group of output channels: 750 V ---
 Between channels and bus: $1,400\text{ V}$ ---
 Between channels and ground: $1,400\text{ V}$ ---

Non-isolated high-level outputs

Voltage/current

 $\pm 10\text{ V}$
 $0\ldots 20\text{ mA}$, $4\ldots 20\text{ mA}$

—

2 channels

—

 $\leq 1\text{ ms}$
 $12\text{ bits in U range}$
 $11\text{ bits in I range}$

BMX AMI 0410

BMX AMO 0210

BMX AMM 0600

2/31



4-channel sub-base for direct connection of 4 inputs, delivers and distributes 4 protected isolated power supplies

ABE 7CPA410

BMX FCA●●0



4-channel sub-base (only 2-channel used) for direct connection of 2 outputs

ABE 7CPA21

BMX FCA●●0

5/11 and 2/31

Introduction

The analog I/O module offer consists of:

- Three isolated analog input modules:
 - 4 analog high-speed channels (16 bits), voltage or current, **BMX AMI 0410**
 - 4 and 8 analog channels (15 bits + sign) for thermocouples, Pt, Ni or Cu temperature probes, **BMX ART 0414/0814**
- One analog output module with 2 voltage/current channels, **BMX AMO 0210**
- One mixed module (12 bits) with 4 analog input channels and 2 analog output channels, non-isolated, voltage or current, **BMX AMM 0600**

Analog I/O modules are equipped with a connector for a 20-way removable terminal block, except for **BMX ART 0414/0814** analog input modules with thermocouples/temperature probes that are equipped with a 40-way connector.

All analog modules occupy a single slot in the **BMX XBP ●●●** racks. These modules can be installed in any slot in the rack, except for the first two (PS and 00) which are reserved for the power supply module in the **BMX CPS ●●●** rack and the **BMX P34 ●●●** processor module respectively.

The power supply for the analog functions is supplied by the backplane bus (3.3 V and 24 V). Analog I/O modules are hot-swappable (see page 2/8).

In a Modicon M340 single-rack configuration, the maximum number of analog channels is limited by the number of slots available in the rack (11 slots maximum).

Description

BMX AM●/ART analog I/O modules are standard format (1 slot). They have a case that helps to ensure IP 20 protection of the electronics, and are locked into position by a captive screw.

I/O modules connected via 20-way removable terminal block

- 1 Rigid body providing support and protection for the electronic card
- 2 Module reference marking (a label is also visible on the right-hand side of the module)
- 3 Channel status display block
- 4 Connector taking the 20-way removable terminal block for connecting sensors or preactuators

To be ordered separately:

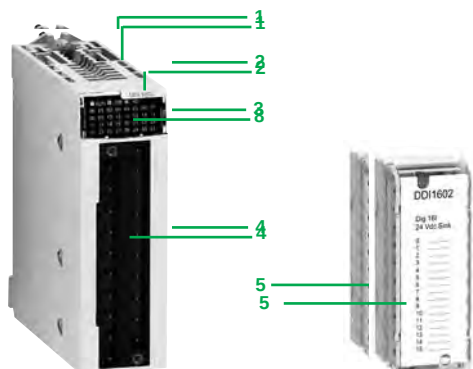
- 5 A **BMX FTB 20●●** 20-way removable terminal block (label supplied with each I/O module) or a preformed cordset with a 20-way removable terminal block at one end and flying leads at the other (see page 2/30).

I/O modules connected via 40-way connector

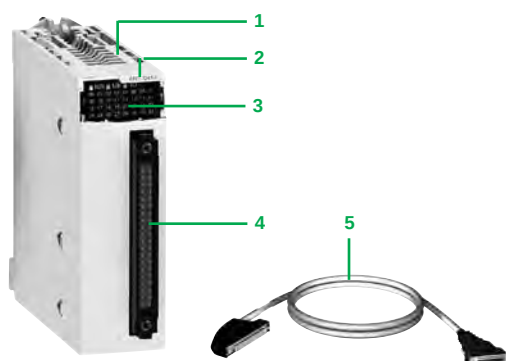
- 1 Rigid body providing support and protection for the electronic card
- 2 Module reference marking (a label is also visible on the right-hand side of the module)
- 3 Channel status display block
- 4 One or two 40-way connectors (32 or 64 channels) (1) for connecting sensors or preactuators
- 5 With the 64-channel module, successive actuations of a pushbutton cause the display of the states of channels 0 ... 31 or 32 ... 64 on the block 3 (see page 2/31)

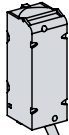
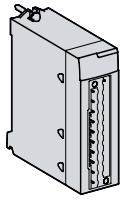
To be ordered separately, depending on the type of module:

One or two preformed cordset(s) with a 40-way connector (see page 2/30).

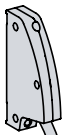
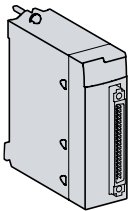


Module and 20-way removable terminal block

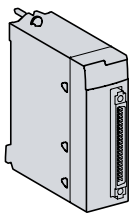




BMX FTW 001S cordset
(with 20-way removable terminal block at one end and flying leads at the other)

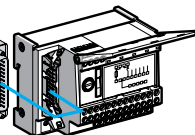


BMX FCW 001S cordset
(with 40-way connector at one end and flying leads at the other)



BMX FCA 002 cordsets

BMX ART 0414
4-channel module



ABE 7CPA412 sub-base

Connecting modules with removable terminal blocks

BMX AMI 0410/AMO 0210/AMM 0600 modules with 20-way terminal block

These 20-way removable terminal blocks are the same as those used for discrete I/O modules (screw clamp, cage clamp or spring-type). See page 2/7.

One version of the removable terminal block is equipped with a 3 or 5 m long cordset with color-coded flying leads (**BMX FTW 001S**). These preformed cordsets, with reinforced shielding have, at the other end **1**, color-coded flying leads.

Connecting modules with 40-way connectors

BMX ART 0014 modules with 40-way connectors

Two types of cordset are available:

- Preformed cordsets with reinforced shielding (**BMX FCW 001S**) have color-coded flying leads **2**. They are available in 3 or 5 m lengths, and provide easy direct wire-to-wire connection of the analog sensors via terminal blocks.
- Preformed cordsets with reinforced shielding (**BMX FCA 002**) that also have a 25-way SUB-D connector **3**. They are available in 1.5, 3 or 5 m lengths, and provide direct connection to the Modicon® Telefast® **ABE 7CPA412** sub-base (see below).

Use with Modicon Telefast ABE 7 sub-bases

Using the Modicon Telefast ABE 7 pre-wired system makes it easier to install the modules since the inputs (or outputs) can be accessed using screw terminals. Two special sub-bases are available:

Modicon Telefast ABE 7CPA410 sub-base

The Modicon Telefast **ABE 7CPA410** sub-base is mainly used in conjunction with the **BMX AMI 0410** voltage/current analog 4-input module. It is used to:

- Connect the four sensors directly
- Remotely locate the input terminals in voltage mode
- Power the 4...20 mA conditioners one channel at a time with a 24 V voltage, protected and limited to 25 mA, while maintaining isolation between channels
- Protect the current impedance matching resistors integrated in the sub-base against overvoltages

Connection is via the **BMX FCA 000** cordset (1.5, 3 or 5 m long).

Modicon Telefast ABE 7CPA412 sub-base

The Modicon Telefast **ABE 7CPA412** sub-base is specially designed as a wiring interface for the **BMX ART 0414** and **BMX ART 0814** thermocouple modules. It is used to:

- Connect the four thermocouple probes
- Provide external cold-junction compensation with a temperature probe integrated in the sub-base
- Help ensure continuity of the shielding

The **BMX ART 0814** module requires two Modicon Telefast **ABE 7CPA412** sub-bases. The connection with each sub-base is made via a **BMX FCA 002** cordset **3** (1.5, 3 or 5 m long).

Modicon Telefast ABE 7CPA21 sub-base

The Modicon Telefast **ABE 7CPA21** sub-base is compatible with the **BMX AMO** and **BMX ART 0210** voltage/current analog 2-output module. It is used to:

- Connect the two channels
- Help ensure continuity of the shielding

Connection is via the **BMX FCA 000** cordset (1.5, 3 or 5 m long).

BMX AMI 0410 analog input modules

The **BMX AMI 0410** module is a high-level analog input module with 4 isolated inputs (16 bits).

Used with sensors or transmitters, it performs monitoring, measurement and process control functions for continuous processes.

For each input, the **BMX AMI 0410** module offers the following ranges:

- ☐ Voltage ± 10 V, ± 5 V, 0...10 V, 0...5 V and 1...5 V
- ☐ Current 0...20 mA, 4...20 mA and ± 20 mA, depending on the choice made during configuration

The module operates with voltage inputs. It includes four reading resistors connected to the terminal block to form the current inputs.

Functions

The **BMX AMI 0410** module includes the following functions:

- Adaptation and multiplexing:
 - ☐ Physical connection to the process
 - ☐ Protection of the module against overvoltages
 - ☐ Protection of the current reading resistors
 - ☐ Adaptation of input signals by analog filtering
 - ☐ Scanning of input channels by solid state multiplexing, by optical commutator switches
- Adaptation to input signals: Gain selection, drift compensation
- Conversion: 24-bit analog/digital converter
- Conversion of input measurements to a unit that is suitable for the user:
 - ☐ Taking account of the alignment coefficients to be applied to measurements, as well as the module autocalibration coefficients
 - ☐ Measurement filtering, depending on the configuration parameters
 - ☐ Measurement scaling, depending on the configuration parameters
- Interface and communication with the application:
 - ☐ Receipt of the configuration parameters for the module and its channels
 - ☐ Transmission of measured values to the application, as well as module status
- Module power supply
- Module monitoring and indication of any detected faults to the application:
 - ☐ Conversion circuit test
 - ☐ Channel range overshoot test and watchdog test.

BMX ART 0414/0814 analog input modules

BMX ART 0414/0814 modules are multirange input modules with 4 or 8 low-level isolated inputs (15 bits + sign) respectively.

Depending on the choice made during configuration, the modules offer for each of the inputs the following range:

- Temperature probe: Pt100, Pt1000, Cu10, Ni100 or Ni1000, with open-circuit detection
- Thermocouple: B, E, J, K, L, N, R, S, T or U, with broken wire detection
- Resistor: 0...400 or 0...4000 Ω , 2-, 3- or 4-wire
- Voltage: ± 40 mV, ± 80 mV, ± 160 mV, ± 320 mV, ± 640 mV, ± 1.28 V.

Functions

BMX ART 0414/0814 modules offer the following functions

- Adaptation and current source per channel:
 - ☐ Accepting an overload of ± 7.5 V
 - ☐ Autocalibration of the analog module offset as close as possible to the input terminal
 - ☐ Selection of the cold-junction compensation sensor included in the Modicon® Telefast® **ABE 7CPA412** sub-base or externally by the Pt 100 probe
- Adaptation to input signals: Based on a low offset amplifier internal to the A/D converter
- Conversion: 16-bit converter
- Conversion of input measurements to a unit that is suitable for the user:
 - ☐ Taking account of the alignment coefficients to be applied to measurements, as well as the module autocalibration coefficients
 - ☐ Measurement filtering, depending on the configuration parameters
 - ☐ Measurement scaling, depending on the configuration parameters
- Interface and communication with the application:
 - ☐ Receipt of the configuration parameters for the module and its channels
 - ☐ Transmission of measured values to the application, as well as module status
- Module monitoring and indication of any detected faults to the application:
 - ☐ Conversion circuit test
 - ☐ Channel range overshoot test and watchdog test.

BMX AMO 0210 analog output module

The **BMX AMO 0210** module is a module with 2 high-level isolated outputs (15 bits + sign). It offers, for each of them, the ranges:

- ☐ Voltage: ± 10 V
- ☐ Current: 0...20 mA and 4...20 mA

The range is selected during configuration.

Functions

The **BMX AMO 210** module includes the following functions:

- Physical connection to the process
- Protection of the module against overvoltages
- Adaptation of the output signals:
 - ☐ Voltage or current adaptation by software configuration
 - ☐ Protection of the outputs against short-circuits and overloads
- Conversion to 15 bits with sign with redefinition of data
- Conversion of application values into data that can be used by the digital/analog converter:
 - ☐ Use of factory calibration parameters
- Interface and communication with the application:
 - ☐ Managing exchanges with the processor
 - ☐ Geographical addressing
 - ☐ Receipt of the configuration parameters for the module and its channels
 - ☐ Transmission of module status to the application
- Module monitoring and indication of any detected faults to the application:
 - ☐ Output power supply test
 - ☐ Channel range overshoot test
 - ☐ Detected output fault test
 - ☐ Watchdog test.

BMX AMM 0600 mixed analog I/O module

The **BMX AMM 0600** mixed module is a module with 4 inputs 14/12 bits and 2 outputs 12 bits non-isolated between one another. It offers, for each of them, the ranges:

- ☐ Voltage: ± 10 V, 0...10 V, 0...5 V and 1...5 V
- ☐ Current: 0...20 mA and 4...20 mA.

Functions

The **BMX AMM 0600** module has the following functions:

- Protection of the module against overvoltages
- Adaptation to the different actuators: voltage or current output
- Conversion of digital signals (11 bits or 12 bits depending on the range) to analog signals
- Conversion of application data into data that can be used by the digital/analog converter
- Module monitoring and detected fault indication to the application: Converter test, range overshoot test, watchdog test.

Specifications of BMX AMI 0410 analog input modules

Input module			BMX AMI 0410							
Input type			Isolated high-level inputs							
Number of channels			4							
Nature of inputs	Voltage		$\pm 10\text{ V}$, $0\ldots 10\text{ V}$, $0\ldots 5\text{ V}$, $1\ldots 5\text{ V}$, $\pm 5\text{ V}$							
	Current		$0\ldots 20\text{ mA}$, $4\ldots 20\text{ mA}$, $\pm 20\text{ mA}$ (via protected internal $250\ \Omega$ resistors)							
Analog/digital conversion			$\Sigma \Delta$ 24 bits							
Voltage/current range			$\pm 10\text{ V}$	$\pm 5\text{ V}$	$0\ldots 5\text{ V}$	$0\ldots 10\text{ V}$	$1\ldots 5\text{ V}$	$0\ldots 20\text{ mA}$	$4\ldots 20\text{ mA}$	$\pm 20\text{ mA}$
Maximum conversion value			$\pm 11.4\text{ V}$							
Resolution			0.35 mV							
Input impedance	Typical	M Ω	10 (regardless of the input level)							
Permitted overload on the inputs	Voltage range	V	$\pm 30\text{ ---}$							
	Current range	mA	± 90 at short-circuit to $+ 24\text{ V ---}$							
Voltage/current internal conversion resistor			Ω	$-$					250	
Precision of internal conversion resistor				$-$					0.1% - $15\text{ ppm}/^{\circ}\text{C}$	
Filtering			1^{st} order digital filtering							
Read cycle time	Fast	ms	$1 + 1 \times$ no. of channels used (periodic reading of no. of declared channels)							
	Default	ms	5 for 4 channels (periodic reading of each channel)							
Measurement tolerance (1)	At 25°C	%FS	0.075%					0.15% (2)		
	Maximum at $0\ldots 60^{\circ}\text{C}$	%FS	0.1%					0.3% (2)		
Temperature drift			$15\text{ ppm}/^{\circ}\text{C}$					$30\text{ ppm}/^{\circ}\text{C}$		
Recalibration			Internal							
Common mode between channels			dB	120						
Digital value format			$\pm 10,000$ by default, $\pm 32,000$ in user scale							
Isolation	Between channels	V	$\pm 300\text{ ---}$							
	Between channels and bus	V	$1,400\text{ ---}$							
	Between channels and ground	V	$1,400\text{ ---}$							
Consumption	Typical	mA	See Power consumption table on page 6/13							

Specifications of BMX ART 0414/0814 analog input modules

Input module			BMX ART 0414		BMX ART 0814	
Input type			Isolated inputs, low-level voltage, resistors, temperature probes, thermocouples			
Number of channels			4		8	
Nature of inputs			± 40 mV; ± 80 mV; ± 160 mV; ± 320 mV; ± 640 mV; ± 1.28 V			
Analog/digital conversion			Σ Δ 16 bits			
Resolution			mV	15 + sign		
Filtering			1 st order digital filtering			
Read cycle time			ms	400 with temperature probes (1...4) 200 with thermocouples (1...4)		400 with temperature probes (1...8) 200 with thermocouples (1...8)
Permitted overload on the inputs			V	± 7.5 ---		
50/60 Hz rejection	Differential mode	Typical	dB	60		
	Common mode	Typical	dB	120		
Cold junction compensation			External compensation by Pt100 probe using		- the dedicated Modicon® Telefast® ABE 7CPA412 sub-base including the probe - a Pt 100 temperature probe 2-wire on channel 0 and/or 4 (thermocouple channel maintained) - a Pt 100 temperature probe 3-wired on channel 0 and/or 4 (thermocouple channel non maintained)	
Recalibration			Internal			
Isolation	Between channels		V	750 ---		
	Between channels and bus		V	1,400 ---		
	Between channels and ground		V	750 ---		
Consumption	Typical		mA	See Power consumption table on page 6/13		

(1) %FS: Tolerance as a% of full scale

Specifications of BMX ART 0414/0814 analog input modules

Input ranges for BMX ART 0414/0814 modules

Voltage range			± 40 mV	± 80 mV	± 160 mV	± 320 mV	± 640 mV	± 1.28 V
Typical input impedance		MΩ	10					
Maximum conversion value			± 102.5%					
Maximum resolution		mV	40/2 ¹⁴	80/2 ¹⁴	160/2 ¹⁴	320/2 ¹⁴	640/2 ¹⁴	1280/2 ¹⁴
Measurement tolerance (1)	At 25°C	%FS	0.05					
	Maximum at 0...60°C	%FS	0.15					
Temperature drift		ppm/°C	30					
Resistor range			400 Ω			4,000 Ω		
Type			2-, 3- or 4-wire					
Maximum conversion value			± 100%					
Maximum resolution		mV	400/2 ¹⁴			4,000/2 ¹⁴		
Measurement tolerance (1)	At 25°C	%FS	0.12					
	Maximum at 0...60°C	%FS	0.2					
Temperature drift		ppm/°C	25					
Temperature probe ranges			Pt100	Pt1000	Cu10	Ni100	Ni1000	
Measurement range		°C	According to IEC: -200...+850 According to US/JIS: -100...+450		-100...+260	-60...+180		
Resolution		°C	0.1					
Detection type			Open circuit (detection on each channel)					
Measurement tolerance (1)	At 25°C (2)	°C	± 2.1		± 4	± 2.1	0.7	
	Maximum at 0...60°C	°C	± 2		± 4	± 3.0	1.3	
Max. wiring resistance	4-wire	Ω	50	500	50		500	
	2/3-wire	Ω	20	200	20		200	
Temperature drift			30 ppm/°C					
Thermocouple ranges			B	E	J	K	L	
Measurement range		°C	+130...+1820	-270...+1000	-200...+760	-270...+1370	-200...+900	
Resolution		°C	0.1					
Detection type			Open circuit (detection on each channel)					
Measurement tolerance (1)	At 25°C	°C	± 3.5	± 3.7	± 2.8	± 3.7	± 3.0	
	Maximum at 0...60°C	°C	± 5	± 5	± 4.5	± 5	± 4.5	
Temperature drift		ppm/°C	25					
Thermocouple ranges (continued)			N	R	S	T	U	
Measurement range		°C	+270...+1300	-50...+1769	-50...+1769	-270...+400	-200...+600	
Resolution		°C	0.1					
Detection type			Open circuit (detection on each channel)					
Measurement tolerance (1)	At 25°C	°C	± 3.7	± 3.2	± 3.2	± 3.7	± 2.7	
	Maximum at 0...60°C	°C	± 5	± 4.5	± 4.5	± 5	± 4.5	
Temperature drift		ppm/°C	25					

(1) %FS: Tolerance as a% of full scale. ± 1°C with Pt100 temperature probe range, -100...+200°C

Specifications of the BMX AMO 0210 analog output module

Module			BMX AMO 0210	
Output type			Isolated high-level outputs	
Number of channels			2	
Ranges	Voltage		± 10 V	
	Current		0...20 mA and 4...20 mA	
Resolution		bits	15 + sign	
Conversion time		ms	≤ 1	
Output power supply			Internal power supply via rack	
Output ranges			Voltage	Current
Adjustment range	Nominal	V	± 10 V	0...20 mA, 4...20 mA
	Maximum	V	± 11.25 V	24 mA
Load impedance		Ω	≥ 1,000	≤ 600
Detection type			Short-circuit	Open circuit
Measurement tolerance (1)	At 25°C	%FS	0.10	
	Maximum at 0...60°C	%FS	0.25	
Temperature drift			40 ppm/°C	
Recalibration			None, factory-calibrated	
Fallback mode (2)			Default or configurable	
Isolation	Between channels	V	750 ---	
	Between channels and bus	V	1,400 ---	
	Between channels and ground	V	1,400 ---	
Consumption	Typical	mA	See Power consumption table on page 6/13	

Specifications of BMX AMM 0600 mixed analog I/O module

Module			BMX AMM 0600									
Channel type			Non-isolated high-level inputs							Non-isolated high-level outputs		
Number of channels			4							2		
Ranges			± 10 V	0...5 V	0...10 V	1...5 V	0...20 mA	4...20 mA	± 10 V	0...20 mA	4...20 mA	
Maximum conversion value	Voltage	V	± 11.25				–		± 11.25	–		
	Current	mA	–				0...30		–	0...24 mA		
Resolution			bits	14	12	13	12	12	12	11		
Filtering			1 st order digital filtering by firmware									
Precision of internal conversion resistor			250 Ω, 0.2% - 25 ppm/°C							–		
Read cycle time	Fast	ms	1 + 1 x no. of channels used (periodic reading of no. of declared channels)							–		
	Default	ms	5 for 4 channels							–		
Conversion time			ms	≤ 1							≤ 2	
Permitted overload on the input channels	Voltage	V	± 30				–		± 11.25	–		
	Current	mA	–				± 30		–	0...24		
Measurement tolerance (1)	At 25°C	%FS	0.25				0.35		0.25			
	Maximum at 0...60°C	%FS	0.35				0.50		0.60			
Temperature drift			30 ppm/°C				50 ppm/°C		100 ppm/°C			
Recalibration			Internal							None, factory-calibrated		
Fallback mode (2)			–							Default or configurable		
Isolation	Between group of input channels and group of output channels	V	750 ---									
	Between channels and bus	V	1,400 ---									
	Between channels and ground	V	1,400 ---									
Consumption	Typical	mA	See Power consumption table on page 6/13									

(1) %FS: Error as a% of full scale

(2) Default: Output at 0 (V or mA). Configurable: Hold last value or set at predefined value for each channel.

Modicon® M340™ automation platform

Analog I/O modules



BMX AM 0000



BMX ART 0414



BMX FTB 2000



BMX FTW 001S



ABE 7CPA412/ ABE 7CPA21



BMX FCA 001



BMX FCA 002

References

Analog input modules

Input type	Input signal range	Resolution	Connection	No. of channels	Reference	Weight kg
Isolated high-level inputs	± 10 V, 0...10 V, 0...5 V, 1...5 V, ± 5 V 0...20 mA, 4...20 mA, ± 20 mA	16 bits	Via cage clamp, screw clamp or spring-type removable terminal block	4 fast channels	BMX AMI 0410	0.143
Isolated low-level inputs	Temperature probe, thermocouple ± 40 mV, ± 80 mV, ± 160 mV, ± 320 mV, ± 640 mV, ± 1.28 V 0...400 Ω, 0...4000 Ω	15 bits + sign	40-way connector	4 channels	BMX ART 0414	0.135
				8 channels	BMX ART 0814	0.165

Analog output module

Output type	Output signal range	Resolution	Connection	No. of channels	Reference	Weight kg
Isolated high-level outputs	± 10 V, 0...20 mA, 4...20 mA	16 bits	Via cage clamp, screw clamp or spring-type removable terminal block	2 channels	BMX AMO 0210	0.144

Mixed analog I/O module

Channel type	Signal range	Resolution	Connection	No. of channels	Reference	Weight kg
Mixed I/O, non-isolated	± 10 V, 0...10 V, 0...5 V, 1...5 V, 0...20 mA, 4...20 mA	14 bits or 12 bits depending on the range	Via cage clamp, screw clamp or spring-type removable terminal block	I: 4 channels Q: 2 channels	BMX AMM 0600	0.155

Connection accessories for analog modules (1)

Description	For use with modules	Type, composition	Length	Reference	Weight kg
20-way removable terminal blocks	BMX AMI 0410	Cage clamp	–	BMX FTB 2000	0.093
	BMX AMO 0210	Screw clamp	–	BMX FTB 2010	0.075
	BMX AMM 0600	Spring-type	–	BMX FTB 2020	0.060
Preformed cordsets	BMX AMI 0410	One 20-way removable terminal block (BMX FTB 2020) One end with color-coded flying leads	3 m	BMX FTW 301S	0.470
	BMX AMO 0210		5 m	BMX FTW 501S	0.700
	BMX AMM 0600	One 20-way removable terminal block (BMX FTB 2020) One end with color-coded flying leads	3 m	BMX FCW 301S	0.480
	BMX ART 0414		5 m	BMX FCW 501S	0.710
	BMX ART 0814 (2)	One 40-way connector One end with color-coded flying leads	3 m	BMX FCW 301S	0.480
	BMX ART 0814 (2)		5 m	BMX FCW 501S	0.710

Modicon® Telefast® ABE 7 pre-wired system

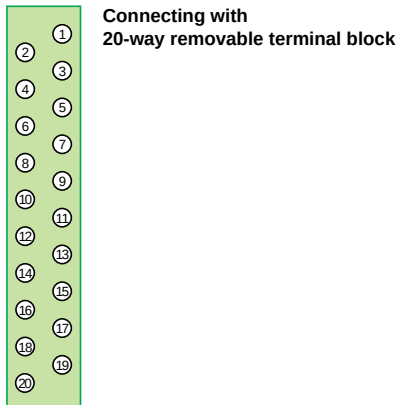
Modicon Telefast ABE 7 sub-bases	BMX AMI 0410	Distribution of isolated power supplies Delivers 4 protected isolated power supplies for 4...20 mA inputs Direct connection of 4 inputs	–	ABE 7CPA410	0.180
	BMX ART 0414 BMX ART 0814	Connection and provision of cold junction compensation for thermocouples Direct connection of 4 inputs	–	ABE 7CPA412	0.180
	BMX AMO 0210	Direct connection of 2 outputs (2-channels of sub-bases are not used)	–	ABE 7CPA21	0.210
Preformed cordsets for ABE 7CPA sub-bases	BMX AMI 0410	One 20-way removable terminal block and one 25-way SUB-D connector for ABE 7CPA410/21 sub-base	1.5 m	BMX FCA150	0.320
	BMX AMO 0210		3 m	BMX FCA300	0.500
	BMX AMO 0210		5 m	BMX FCA500	0.730
	BMX ART 0414	One 40-way connector and one 25-way SUB-D connector for ABE 7CPA412 sub-base	1.5 m	BMX FCA152	0.330
	BMX ART 0814		3 m	BMX FCA302	0.510
	BMX ART 0814		5 m	BMX FCA502	0.740

(1) The shielding on the cordsets carrying the analog signals must always be connected to the **BMX XSP 0000** shielding connection kit mounted under the rack holding the analog modules. See page 1/15.

(2) The **BMX ART 0814** 8-channel module requires two **ABE 7CPA412** sub-bases and two **BMX FCA 002** cordsets.

Analog input/output modules

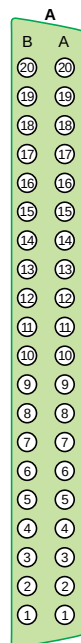
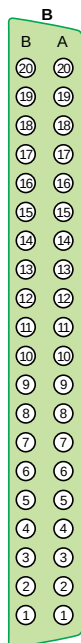
BMX AMI 0410/AMO 0210/AMM 0600



Connecting with
20-way removable terminal block

Correspondence of terminal block with the wire colors at the sheath end **BMX FTW 301S/501S** preformed cordsets. See table on page 2/33.

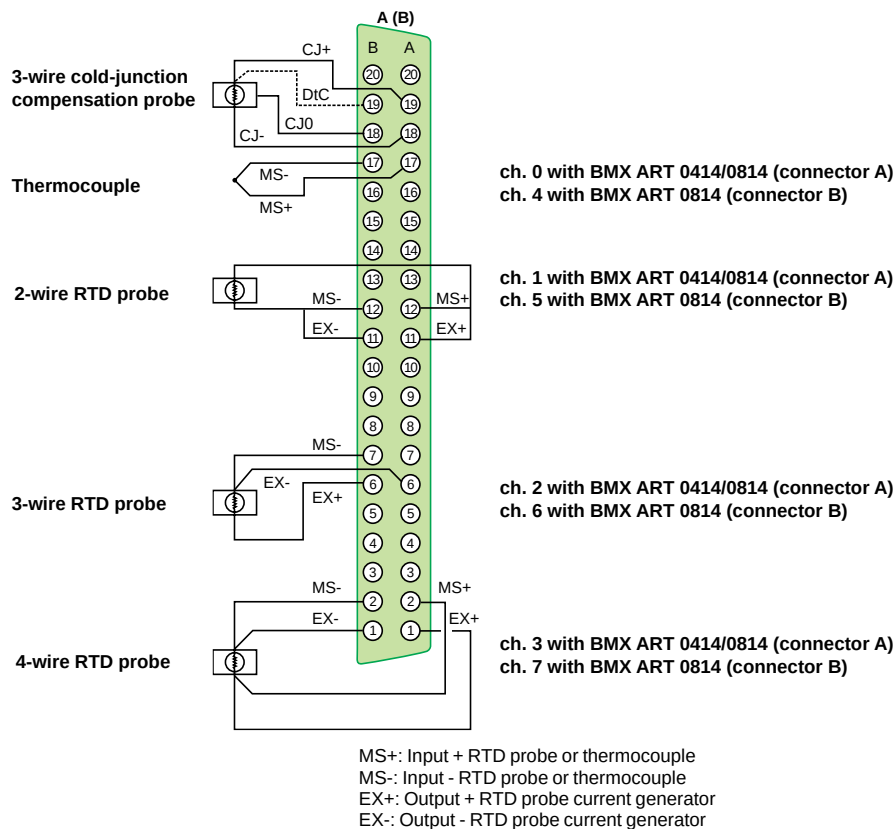
BMX ART 0414 (A) and BMX ART 0814 (A and B)



Connecting via one or two 40-way connector(s)

Correspondence of connector(s) 40-pin with the wire colors at the sheath end of **BMX FCW 301S/501S** preformed cordsets. See table on page 2/33.

Connecting example of 2, 3 or 4-wire temperature probes with cold-junction compensation

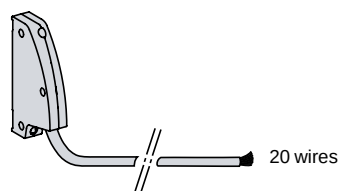


Modicon® M340™

automation platform

Analog I/O modules
Cordset color codes

BMX FCW 301S/501S preformed cordsets with 40-way connector and flying leads

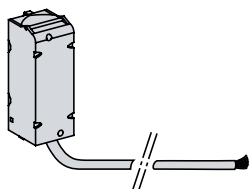


BMX FCW 01S cordset with one sheathed end with flying leads

Connector pin No.	Color at sheath end	BMX ART 0414/0814 (A)	BMX ART 0814 (B)	Label
B20	N/C	—	—	
A20	N/C	—	—	
B19	White/blue	Cold-junction compensation	Cold-junction compensation	DtC
A19	White/amber			CJ+
B18	Blue/white			CJ0
A18	Amber/white			CJ-
B17	White/brown	Input - ch. 0	Input - ch. 4	MS-
A17	Brown/white	Input + ch. 0	Input + ch. 4	MS+
B16	White/green	I - generator ch. 0	I - generator ch. 4	EX-
A16	Green/white	I + generator ch. 0	I + generator ch. 4	EX+
B15	N/C	—	—	—
A15	N/C	—	—	—
B14	N/C	—	—	—
A14	N/C	—	—	—
B13	N/C	—	—	—
A13	N/C	—	—	—
B12	Red/blue	Input - ch. 1	Input - ch. 5	MS-
A12	Blue/red	Input + ch. 1	Input + ch. 5	MS+
B11	White/gray	I - generator ch. 1	I - generator ch. 5	EX-
A11	Gray/white	I + generator ch. 1	I + generator ch. 5	EX+
B10	N/C	—	—	—
A10	N/C	—	—	—
B9	N/C	—	—	—
A9	N/C	—	—	—
B8	N/C	—	—	—
A8	N/C	—	—	—
B7	Red/green	Input - ch. 2	Input - ch. 6	MS-
A7	Green/red	Input + ch. 2	Input + ch. 6	MS+
B6	Red/amber	I - generator ch. 2	I - generator ch. 6	EX-
A6	Amber/red	I + generator ch. 2	I + generator ch. 6	EX+
B5	N/C	—	—	—
A5	N/C	—	—	—
B4	N/C	—	—	—
A4	N/C	—	—	—
B3	N/C	—	—	—
A3	N/C	—	—	—
B2	Red/gray	Input - ch. 3	Input - ch. 7	MS-
A2	Gray/red	Input + ch. 3	Input + ch. 7	MS+
B1	Red/brown	I - generator ch. 3	I - generator ch. 7	EX-
A1	Brown/red	I + generator ch. 3	I + generator ch. 7	EX+

BMX FTW 301S/501S preformed cordsets with 20-way terminal block at one and flying leads at the other

Correspondence between terminal block way and colored of wire



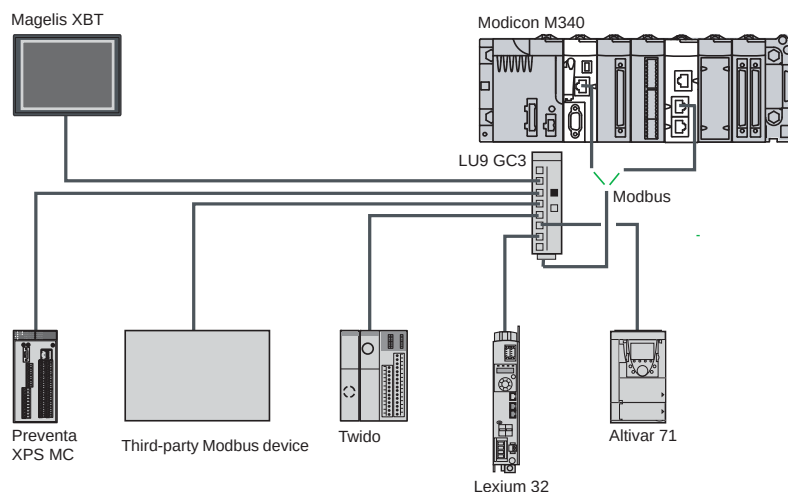
BMX FTW 01S cordset with one sheathed end with flying leads

Terminal block way No.	Color at sheath end	BMX AMI 0410	BMX AMO 0210	BMX AMM 0600
1	Blue/white	V input ch. 0	—	V input ch. 0
2	White/blue	Common ch. 0	—	I input ch. 0
3	Amber/white	I input ch. 0	Output ch. 0	—
4	White/amber	—	Common ch. 0	—
5	Green/white	—	—	Common ch. 0
6	White/green	—	—	V input ch. 1
7	Brown/white	V input ch. 1	—	I input ch. 1
8	White/brown	Common ch. 1	—	Common ch. 1
9	Gray/white	I input ch. 1	—	V input ch. 2
10	White/gray	—	—	I input ch. 2
11	Blue/red	V input ch. 2	—	Common ch. 2
12	Red/blue	Common ch. 2	—	V input ch. 3
13	Amber/red	I input ch. 2	—	I input ch. 3
14	Red/amber	—	—	Common ch. 3
15	Green/red	—	—	—
16	Red/green	—	—	—
17	Red/brown	V input ch. 3	Output ch. 1	Output ch. 0
18	Brown/red	Common ch. 3	Common ch. 1	Common ch. 0
19	Gray/red	I input ch. 3	—	Output ch. 1
20	Red/gray	—	—	Common ch. 1

Modicon M340 automation platform

Modbus and Character mode serial links

Presentation



The Modbus serial link is used for master/slave architectures (it is necessary, however, to check that the Modbus services used by the application have been implemented on all relevant devices).

The bus consists of a master station and slave stations. Only the master station can initiate the exchange (direct communication between slave stations is not possible). Two exchange mechanisms are available:

- Question/response, where requests from the master are addressed to a given slave. The master then waits for the response from the slave which has been interrogated.
- Broadcasting, where the master broadcasts a message to all slave stations on the bus. The latter execute the order without transmitting a reply.

The Modicon M340 platform offers two serial link connection options for Modbus or Character mode:

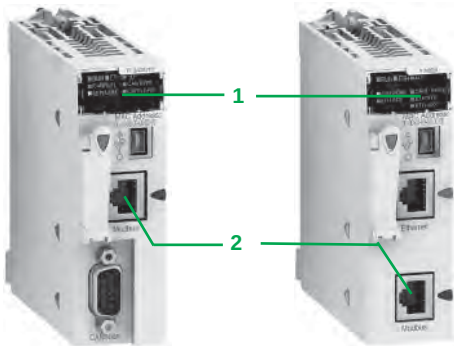
- Via the serial link integrated in the following processors:
 - Standard processor **BMX P34 1000**
 - Performance processors **BMX P34 2000/20102/2020**
- Via the 2-channel serial link module **BMX NOM 0200**.

Although both these types of serial link can support modems, the **BMX NOM 0200** module is particularly recommended for this type of use. Its performance and numerous parameter-setting options make it ideal for any type of configuration, especially when using radio modems.

The number of serial link modules is limited by the maximum number of application-specific channels permitted per station, depending on the type of processor:

- Standard processor **BMX P34 1000**: maximum of 20 application-specific channels (1).
- Performance processors **BMX P34 2●●●●**: maximum of 36 application-specific channels (1).

(1) Application-specific channels: **BMX EHC 0200** counter modules (2 channels), **BMX EHC 0800** (8 channels), **BMX MSP 0200** motion control modules (2 channels), **BMX NOM 0200** serial link module (2 channels) and **BMX NOR 0200H** RTU communication module (1 channel).



BMX P34 20102

BMX P34 1000/2000/2020

Description

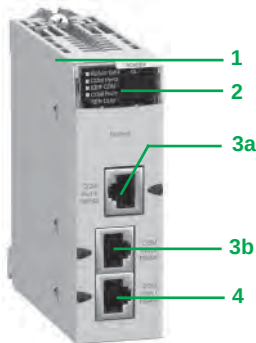
Processors with integrated serial link

BMX P34 1000/2000/20102/2020 processors integrate a serial link which can be used with either the Modbus RTU/ASCII master/slave protocol or with the Character mode protocol.

These processors have the following elements on the front panel, relating to the serial port:

- 1 A display block including at least the following LEDs:
 - SER COM LED (yellow): Activity on the serial link (lit) or fault on a device present on the serial link (flashing).
- 2 An RJ45 connector for Modbus serial link or Character mode link (non-isolated RS 232C/RS 485) with its black indicator.

Note: For more information about the processors, see page 43465/3.



BMX NOM 0200

BMX NOM 0200 serial link module

The front panel of the **BMX NOM 0200** serial link module features:

- 1 A safety screw for locking the module in a slot in the rack.
- 2 A display block with 4 LEDs:
 - RUN (green) and ERR (red): Module status
 - For each of the two channels: SER COM (green): Activity on the serial link (lit)/ fault on a device present on the serial link (flashing).
- 3 Two RJ45 connectors (exclusive use) for connection of channel 0 (with black indicator):
 - 3a A connector for RS 232C connection, marked COM Port 0 RS232
 - 3b A connector for RS 485 connection, marked COM Port 0 RS485
- 4 An RJ45 connector for RS 485 connection of channel 1, marked COM Port 1 RS485, with black indicator.

To be ordered separately:

RS 485 cordsets (see page 43453/2) or RS 232 cordsets for DCE terminal (see page 43452/5).

(1) For isolated serial links, the **TWD XCA ISO** isolation box must be used.

Complementary characteristics

The following characteristics complement those indicated in the selection guide on page 0504Q/5.

Serial link integrated in the processors

- Physical interface:
 - In Modbus: RS 232 4-wire or RS 485 2-wire, non-isolated (1)
 - In Character mode: RS 232 4-wire or RS 485 2-wire
- Frame:
 - In Modbus: RTU/ASCII half duplex
 - In Character mode: full duplex in RS 232, half duplex in RS 485
- Maximum length of a tap link in RS 485 2-wire:
 - 15 m in a non-isolated serial link
 - 40 m in an isolated serial link (1)

BMX NOM 0200 module serial links

- Physical interface:
 - RS 232 port 0: RS 232 8-wire, non-isolated
 - RS 485 port 0 and port 1: RS 485 2-wire, isolated
- Frame:
 - Modbus: RTU/ASCII, full duplex in RS 232, half duplex in RS 485
 - Character mode: full duplex in RS 232, half duplex in RS 485
- Data rate:
 - RS 232 port 0: 0.3...115 Kbps (Modbus/Character mode)
 - RS 485 port 0 and port 1: 0.3...57.6 Kbps (Modbus/Character mode)
- Line polarization:
 - Modbus RS 485: automatic
 - RS 485 character mode: configurable with Unity Pro software
- Maximum length of a tap link in RS 485 2-wire:
 - 15 m in a non-isolated link
 - 40 m in an isolated link
- Expert mode (from version V1.2 of the module and version V5 of Unity Pro): used to configure the time out links individually from the application and thus adapt to the specific characteristics of certain modems.

(1) For isolated serial links, the **TWD XCA ISO** isolation box must be used.

Modicon M340 automation platform

Modbus and Character mode serial links



BMX P34 1000/2000



BMX P34 2020



BMX NOM 0200

References

I/O capacity	Memory capacity	Integrated communication ports	Reference	Weight kg
BMX P34 10 Standard processor with integrated serial link, 2 racks				
512 discrete I/O 128 analog I/O 20 application-specific channels	2048 KB integrated	Modbus serial link	BMX P34 1000	0.200

BMX P34 20 Performance processors with integrated serial link, 4 racks

1024 discrete I/O 256 analog I/O 36 application-specific channels	4096 KB integrated	Modbus serial link	BMX P34 2000	0.200
		Modbus serial link CANopen bus	BMX P34 2010	0.210
		Modbus serial link CANopen bus version V2.1 (1)	BMX P34 20102	0.210
		Modbus serial link Ethernet Modbus/TCP network	BMX P34 2020	0.205

Modbus serial link

Designation	Protocol	Physical layer	Reference	Weight kg
Modbus serial link 2 channels (2)	Modbus master/slave RTU/ASCII, Character mode, GSM/GPRS modem	1 non-isolated RS 232 channel (Port 0) 2 isolated RS 485 channels (Port 0 and Port 1)	BMX NOM 0200	0.230

Cordsets for RS 232 serial link (3)

Designation	Description	Length	Reference	Weight kg
Cordset for Data Terminal Equipment (DTE) (printer)	Equipped with an RJ45 connector and a 9-way female SUB-D connector	3 m	TCS MCN 3M4F3C2	0.150
Cordset for Data Communication Equipment (DCE) (modem, etc.)	Equipped with an RJ45 connector and a 9-way male SUB-D connector	4-wire (RX, TX, RTS, CTS)	TCS MCN 3M4M3S2	0.150
		8-wire (excluding RI signal)	TCS XCN 3M4F3S4	0.165

(1) Version which can be used to customize configuration of the device Boot Up procedure compatible with all third-party CANopen products. Requires Unity Pro version V4.1.

(2) For the ruggedized version, **BMX NOM 0200H**, see characteristics on pages 43469/2 and 43470/4.

(3) RS 485 serial link connection (see pages 43453/2 and 43453/3).



DIVIDER





Main

Range of product	Magelis SCU
Product or component type	Small touch HMI controller
Display size	5.7 inch
Display type	Backlit LED colour TFT LCD
Pixel resolution	320 x 240 pixels QVGA
Touch panel	Analogue

Complementary

Backlight lifespan	Lifespan: 50000 hours with 65000 colours
Brightness	16 levels via touch panel
View angle horiz x vert	60° bottom 40° top 60° right 60° left
Character font	ASCII Chinese (simplified Chinese) Japanese (ANK, Kanji) Korean Taiwanese (traditional Chinese)
Supply	External source
[Us] rated supply voltage	24 V at 20.4...28.8 V DC
Immunity to microbreaks	<= 10 ms
Inrush current	<= 30 A
Power consumption	24 W
Local signalling	No indicator
Number of pages	Limited by internal memory capacity
Software designation	SoMachine
Operating system	Magelis
Processor name	CPU RISC
Processor frequency	333 MHz
Memory description	128 MB application run memory, type: DRAM 128 kB internal data storage memory, type: FRAM 128 MB flash memory, type: NAND
Integrated connection type	CANopen master bus, connector type: SUB-D 9 1 USB (V2.0) port, connector type: USB A 1 USB (V2.0) port, connector type: mini B USB 1 serial link, communication ports RS485/RS232, connector type: RJ45, transmission rate: <= 115.2 kbits/s 1 Ethernet TCP/IP, connector type: RJ45
Realtime clock	Built-in
Downloadable protocols	Modbus Modbus TCP/IP Third party protocols Uni-TE CANopen
Fixing mode	By 1 nut - diameter: Ø 22 mm, mounting on: 1...6 mm thick panel
Enclosure material	PC/PBT and PAA
Shock resistance	294 m/s ² (duration=6 ms) conforming to IEC 60068-2-27 on panel mounting 147 m/s ² (duration=11 ms) conforming to IEC 60068-2-27 on DIN rail

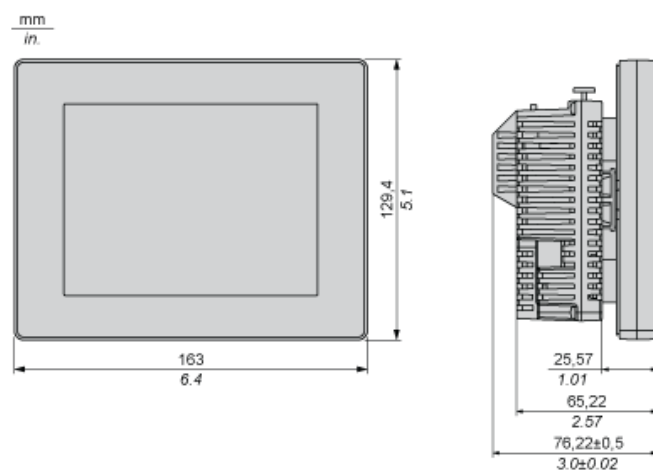
Vibration resistance	1 gn (f=9...150 Hz) conforming to IEC 60068-2-6 +/- 3.5 mm (f=5...9 Hz) conforming to IEC 60068-2-6
Electromagnetic compatibility	Radiated emission - test level: 30 MHz...1 GHz conforming to EN 55011 Conducted emission - test level: 150 kHz...30 MHz conforming to EN 55011 Conducted RF disturbances - test level: 10 V, 0.15...80 MHz conforming to IEC 61000-4-6 Surge immunity test - test level: 0.5 kV differential mode, digital I/O conforming to IEC 61000-4-5 Surge immunity test - test level: 1 kV common mode, digital I/O conforming to IEC 61000-4-5 Surge immunity test - test level: 1 kV, power supply (differential mode) conforming to IEC 61000-4-5 Surge immunity test - test level: 2 kV, power supply (common mode) conforming to IEC 61000-4-5 Electrical fast transient/burst immunity test - test level: 1 kV, CAN line conforming to IEC 61000-4-4 Electrical fast transient/burst immunity test - test level: 1 kV, COM line conforming to IEC 61000-4-4 Electrical fast transient/burst immunity test - test level: 1 kV, Ethernet line conforming to IEC 61000-4-4 Electrical fast transient/burst immunity test - test level: 2 kV, relay wires conforming to IEC 61000-4-4 Electrical fast transient/burst immunity test - test level: 1 kV, between analogue I/O and operating voltage conforming to IEC 61000-4-4 Electrical fast transient/burst immunity test - test level: 2 kV, power lines conforming to IEC 61000-4-4 Susceptibility to electromagnetic fields - test level: 10 V/m, 80 MHz...3 GHz conforming to IEC 61000-4-3 Electrostatic discharge immunity test - test level: 6 kV, contact discharge conforming to IEC 61000-4-2 Electrostatic discharge immunity test - test level: 8 kV, air discharge conforming to IEC 61000-4-2
Discrete input number	14 for digital input conforming to IEC 61131-2 Type 1 2 for fast input (normal mode) conforming to IEC 61131-2 Type 1
Discrete input voltage	24 V DC discrete input logic:sink or source (positive/negative)
Number of common point	2 for digital input 1 for fast input (HSC mode)
Discrete input current	5 mA for digital 7.83 mA for fast input
Input impedance	4.7 kOhm 2.81 kOhm
Sensor power supply	15...28.8 V DC, voltage (state 1): >= 15 V, current (state 1): >= 2.5 mA, voltage (state 0): <= 5 V, current (state 0): <= 1 mA 15...28.8 V DC, voltage (state 1): >= 15 V, current (state 1): >= 5 mA, voltage (state 0): <= 5 V, current (state 0): <= 1.5 mA
Configurable filtering time	3...12 ms integrator (none/run/stop) 0.004...0.04 ms bounce filter (latch/event and cumulative filter by step Nx0.5ms (64>=N>=2)) 0 ms no filter (none)
Input frequency	100 kHz for fast input - control type pulse/direction 100 kHz for fast input - control type single phase 100 kHz for fast input (encoder mode) - control type A/B
Cable length	50 m unshielded cable for digital input 100 m shielded cable for digital input 10 m shielded cable for fast input
Connection pitch	3.5 mm
Overvoltage protection	With
Isolation between channels and internal logic	500 V DC
Isolation between channels	None
Discrete output number	8 digital output, output logic: source 2 fast output (normal mode), output logic: source
Discrete output voltage	220 V AC (voltage limit: 100...250 V) with relay discrete output(s) 24 V DC (voltage limit: 5...30 V) with relay discrete output(s) 24 V DC (voltage limit: 19.2...28.8 V) with transistor discrete output(s)
Input/Output number	8 for digital output, terminal(s): DQ0...DQ7 2 for fast output, terminal(s): FQ0...FQ1 14 for digital input, terminal(s): DI0...DI13 2 for fast input, terminal(s): FI0...FI1

Discrete output current	2 A (current per output common:4 A), response time 2 ms with closing contact for digital output 2 A (current per output common:4 A), response time 5 ms with opening contact for digital output 50 mA, response time 2 ms for fast output (PWM or PTO mode) 300 mA, response time 2 ms for fast output (normal mode)
Insulation resistance	> 10 MOhm between power supply and earth > 10 MOhm between the I/O and internal logic
Output frequency	<= 1 kHz for fast output (PWM mode) <= 100 kHz for fast output (PTO mode)
Absolute accuracy error	+/- 15 % of full scale of cyclic ratio 30...70% for fast output (PWM or PTO mode) +/- 10 % of full scale of cyclic ratio 20...80% for fast output (PWM or PTO mode) +/- 5 % of full scale of cyclic ratio 10...90% for fast output (PWM or PTO mode) 1 % of full scale of cyclic ratio 1...99% for fast output (PWM or PTO mode) +/- 0.1 % of full scale of cyclic ratio 1...99% for fast output (PWM or PTO mode)
Height	129.4 mm
Width	163 mm
Depth	76.22 mm
Product weight	0.764 kg

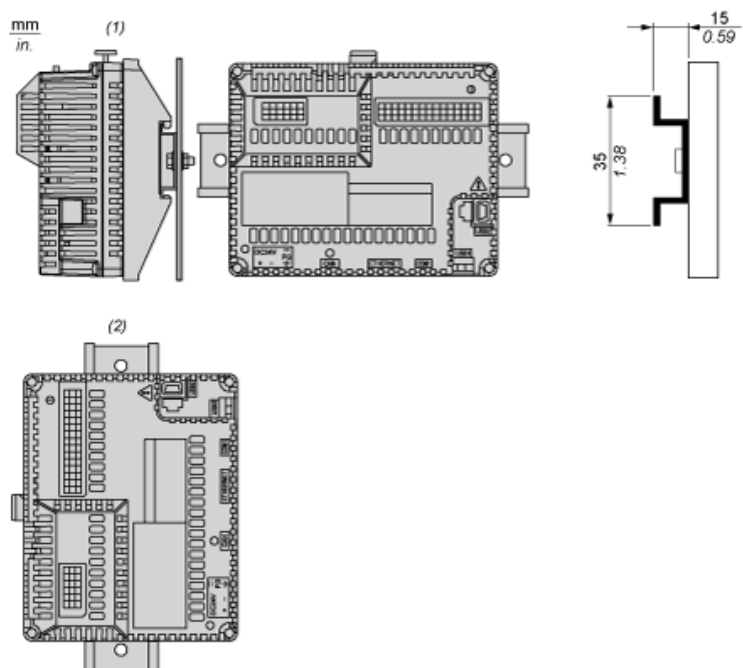
Environment

Standards	EN 61131-2 FCC Class A IEC 61000-6-2 RoHS compliant UL 508 ANSI/ISA 12-12-01 WEEE directive 2002/96/EC CSA C22.2 No 213 Class I Division 2 RoHS China SJ/T 11363-2006
Product certifications	C-Tick CULus 508 GOST CUL 1604 Class 1 Division 2 KCC CULus CSA 22-2 No 142
Marking	CE
Ambient air temperature for operation	0...50 °C
Ambient air temperature for storage	-20...60 °C
Relative humidity	5...85 % without condensation
Operating altitude	<= 2000 m
Storage altitude	<= 10000 m
Maximum pressure	800...1114 hPa
IP degree of protection	IP65 for front panel conforming to IEC 60529 IP20 for rear panel conforming to IEC 60529
NEMA degree of protection	NEMA 4X for front panel
Pollution degree	2 conforming to IEC 60664
Environmental characteristic	Corrosive gas free

Dimensions

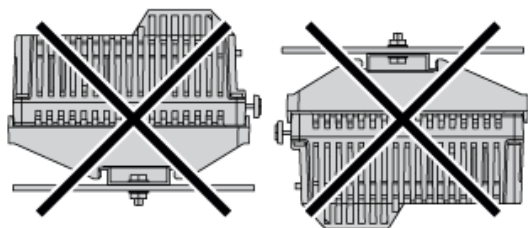


Recommended Mounting position

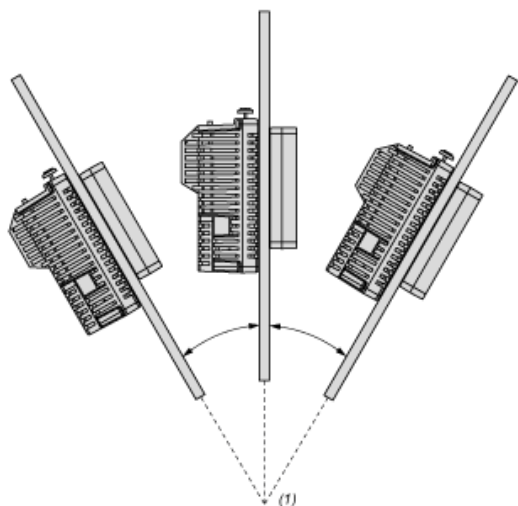


- (1) Horizontal mounting
- (2) Vertical mounting

No Recommended Mounting Position

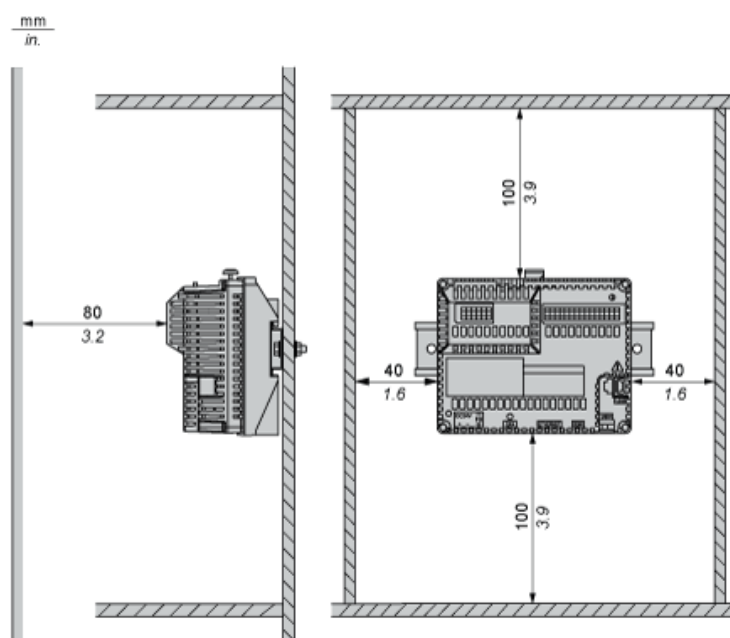


Mounting on a Slanted Panel



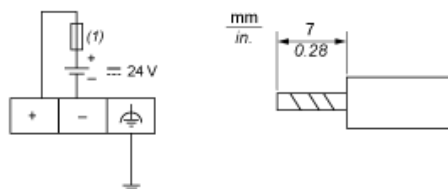
(1) 30° or less

Clearance



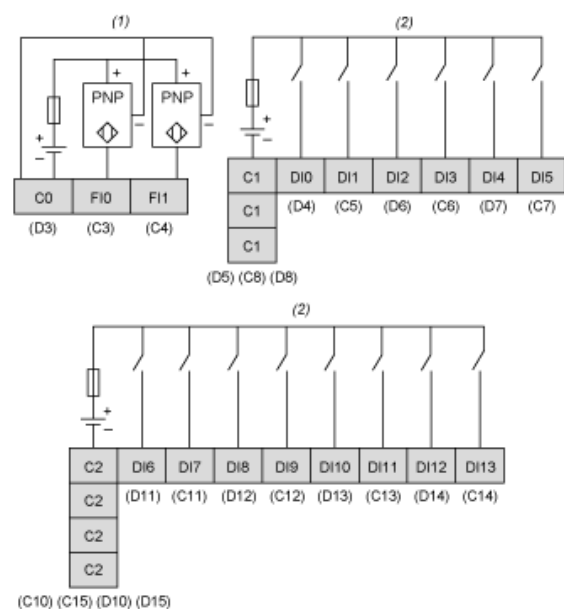
Keep adequate spacing for proper ventilation to maintain an ambient temperature between 0...50 °C (32...122 °F) for horizontal installation and 0...40 °C (32...104 °F) for vertical installation.

Wiring Diagram



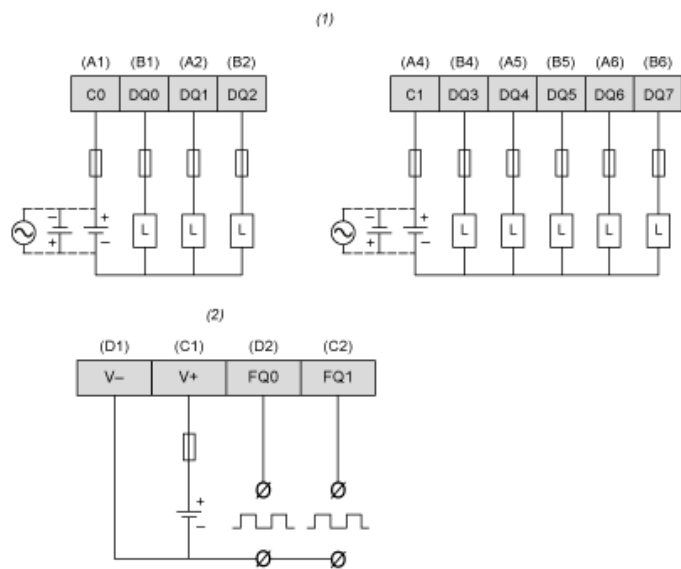
- (1) Slow-blow 2A type T fuse

Wiring Diagram of Digital Inputs



- (1) HSC inputs with pin assignment of terminal blocks C,D.
(2) Digital inputs with pin assignment of terminal blocks C,D.

Wiring Diagram of Digital Outputs



- (1) Digital outputs with pin assignment of terminal blocks A,B.
 (2) PWM outputs with pin assignment of terminal blocks C,D.
 (L) Load

TAB 3



MDS™ SD Series

Long Range IP/Ethernet & Serial SD1, SD2, SD4 & SD9

Data Acquisition | Ethernet and Serial

The MDS SD Series are industrial wireless solutions that provide long distance communications over licensed radio bands, allowing users to interface to both Ethernet and serial devices such as PLCs, RTUs and meters with host monitoring and control systems.

The SD Series is the latest generation of MDS licensed narrowband wireless devices providing exceptional communication performance and reliability to meet demands for IP/Ethernet services as well as support for multiple devices and host systems. The SD is compatible with previous generations allowing for a smooth and controlled migration for existing systems.

Key Benefits

- High speed, up to 65 Kbps in 50 KHz channel in SD2 and SD9
- Operate IP/Ethernet and serial communication on a single network
- Connect multiple host systems to a single Access Point radio
- Connect multiple devices to a single remote radio
- Implement push communication and report by exception from remote devices
- Simple, intuitive web based configuration and maintenance
- Easy migration path from serial to IP/Ethernet
- Backward compatible with existing MDS x710 networks

Application Specific Wireless Solution



Oil & Gas

- Remote data collection from meters and flow devices
- Monitor and transmit wellhead performance and status data collected by RTUs



Energy

- Remote control of IEDs and controllers at distribution substations
- Condition monitoring for pole-top circuit breakers and capacitor banks



Water & Wastewater

- Monitor lift stations across multiple sites from control room
- Communicate with remote PLCs controlling tank levels and water flow



Heavy Industrial

- Activation of perimeter gates based on detection of vehicle
- Monitor and control remote pumps and compressors



Industrially Hardened

- Operational temperature range from -40°C to 70°C
- CSA Class I, Div. 2 groups A,B,C,D for Hazardous Locations
- IEEE1613, IEC 61850-3 and EN61000 for electric substation environments

Application Flexibility

- Supports two serial ports and an IP/Ethernet port simultaneously
- Broad coverage flexibility over distances up to 50 miles
- Extend Communication paths using single radio Store and Forward
- Supports Ethernet Bridging, IP to serial and serial to serial communications
- Low power consumption with sleep mode for solar and battery powered applications
- Fast-serial features with embedded terminal server functions for serial to IP/Ethernet encapsulation

Reliable & Scalable

- Exclusive, non-shared licensed band operation
- High performance Media Access Control for asynchronous polling and exception reporting
- Collision detection and avoidance insures data arrives at destination without lost messages
- High receive sensitivity for long distance communications
- Compatible with multiple industry protocols including Modbus, Modbus TCP, and DNP3

Secure

- AES 128-bit data encryption
- Password protected access
- VLAN data segregation



Long Range Communications

The MDS SD Series of industrial-strength radios offer secure, reliable, long distance transmission of data for your mission critical applications. The SD Series combines 5 Watt transmit power and exceptional receive sensitivity to support wide coverage areas and maximum performance when difficult terrain or obstructions such as trees and buildings limit the effectiveness of other wireless devices. The SD Series operates in the 100 MHz (SD1), 200 MHz (SD2), 400 MHz (SD4) and 900 MHz (SD9) frequencies and allows users to select the channel size and modulation option best suited to their unique requirements. The combination of these features results in the ideal data acquisition product for error free, long distance communication.

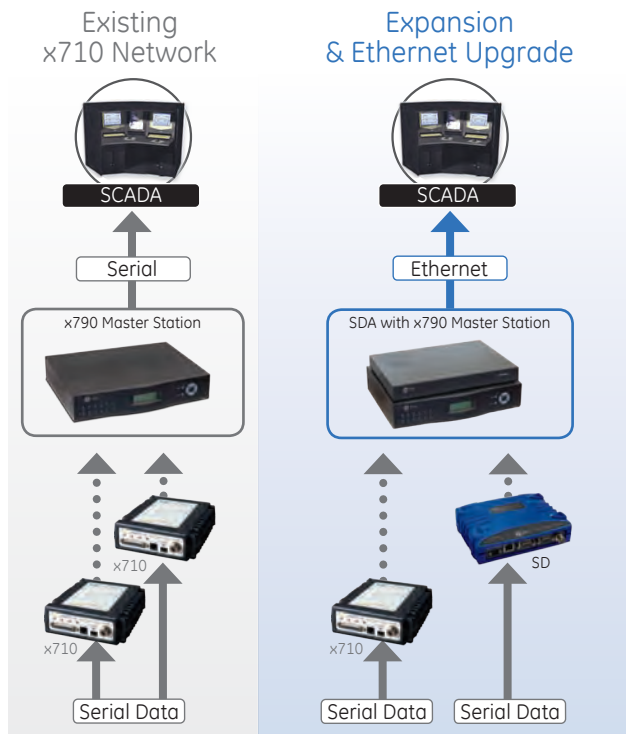
Exceptional Network Performance

The performance of a wireless network is more than a measurement of speed. It also includes the efficiency of the radio system in mediating over-the-air channel access. This is particularly important for operating IP/Ethernet in narrow licensed channel sizes. The SD Series implements several features designed to provide maximum performance. The SD's Media Access Control (MAC) is optimized to reduce Ethernet overhead and preserve bandwidth for higher usable data speed. The IP Payload feature removes unneeded Ethernet frames to shrink messages and improve throughput.

The SD Series automatically controls over-the-air communication between host systems and remote devices to insure that data collisions are detected and avoided. The result is exceptional performance for networks requiring connections to multiple host systems, multiple device types connected to a single remote radio, or a mix of Ethernet and serial devices. The SD also insures maximum reliability for systems implementing unsolicited communication and exception reporting from remote devices and RTUs, which is particularly important for non-pollled protocols such as DNP3.

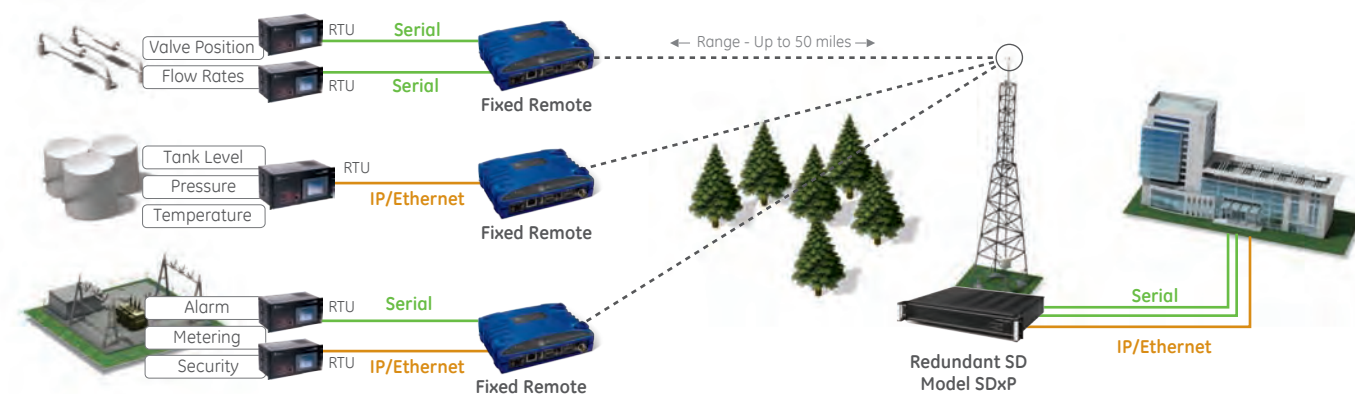
Backward Compatibility

MDS SD Series radios can be directly added to existing MDS x710 and x790 systems, providing both "drop-in" compatibility for expansions and replacements, and adding Ethernet support. Backward compatibility preserves your investment and allows a smooth transition from a serial based SCADA infrastructure to IP/Ethernet without disrupting day-to-day operations.



SD Series Application Advantages

Remote Data Acquisition



Unmatched Connectivity

- Connect multiple RTUs and controllers to a single remote radio
- Operate serial and Ethernet devices concurrently on the same network
- Implement exception reporting and pushed communication initiated by remote devices.

Highest Network Performance

- SD Media Access Control reduces network overhead, prevents data collisions and insures successful data delivery.
- High transmit power and exceptional receiver sensitivity maximizes performance over significant distances and challenging terrains

Flexible System Communications

- Provides IP/Ethernet and serial communication for multiple hosts and asynchronous polling
- Embedded terminal server functions support serial & Ethernet connections without adaptors.
- Secure AES 128 encryption for IP/Ethernet UDP, TCP Client and TCP Server and serial.

Low Power Consumption

The SD Series low power consumption and sleep mode make it ideal for applications requiring solar power operation. The SD Series requires less energy resulting in lower costs for solar panels and batteries.

Simple Intuitive Configuration

Use the web based SD Device Manager for easy configuration of all SD Series parameters including transmit and receive frequencies, channel size and modem speed. SD Device Manager is also used to access important performance and maintenance information.

The SD Series supports 3 Virtual Radio Channels (VRC) that allow users to assign communication to specific serial ports or IP addresses and ports when multiple devices or systems are connected.

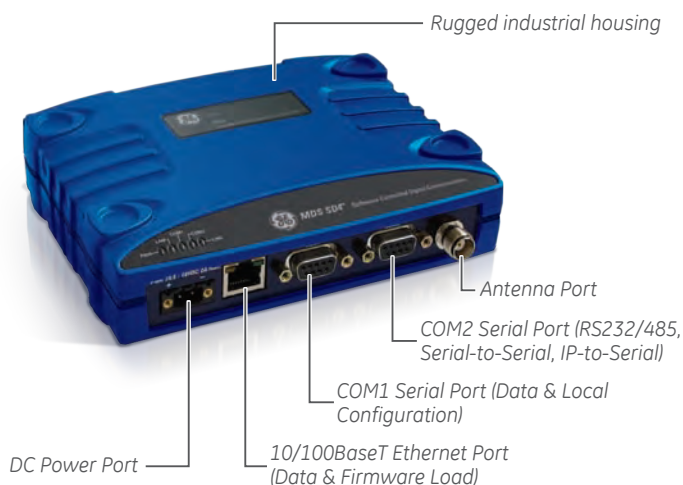
SD Series configuration and maintenance can also be performed using Telnet and HyperTerminal sessions.



SD Series Remote

The SD1 radio operates in the 100 MHz frequency band, SD2 operates in the 200 MHz frequency band, SD4 operates in the 300 MHz, 400 MHz and 500 MHz frequency bands and SD9 operates in the 800 MHz and 900 MHz frequency bands. Choose between models that support both Ethernet and serial, or only serial interface.

The SD Series handles concurrent Ethernet and serial traffic using built-in terminal server plus industry-standard TCP or UDP protocols.



SDxP Redundant/Protected Models

The SDxP is used when applications demand no single point of failure for the communications system. The MDS SDxP incorporates two MDS SD transceivers and power supplies with automatic or manual switchover capability. On detection of a failure, the MDS SDxP switches immediately to the standby transceiver. The switchover occurs for selectable transceiver alarm conditions. Switchover also occurs when no valid packets are received in a programmable time frame of 1 to 30 minutes, or upon loss of power to the operating radio. An internal back-up battery is provided in AC-powered models for continued operation during a loss of primary power.



SDA Adaptor for 4790/9790 Radios

The SDA adaptor is used with 4790 and 9790 Master Stations to add IP/Ethernet connectivity. The SDA can be ordered with new Master Stations or easily added to equipment already installed. Once connected to a 4790/9790, one (1) serial port and one (1) Ethernet port are available for connection to external systems or devices.



Comprehensive Network Management

Manage your SD network using PulseNET™ NMS. PulseNET is purpose-built for industrial communications and includes sophisticated and meaningful pre-built workflows along with intuitive graphical representations of the network at your fingertips.



Specifications

SD1

RF Data Rate & Channel Size	3,200 bps @ 6.25 kHz 9,600 & 19,200 bps @ 12.5 kHz 19,200 & 38,400 bps @ 25 kHz
Frequency bands	150-174 MHz

SD2

RF Data Rate & Channel Size	3,200 bps @ 5 kHz 4,800 bps @ 6.25 kHz 9,600 & 19,200 bps @ 12.5 kHz 19,200 & 38,400 bps @ 25 kHz 65,000 bps @ 50 kHz (Band D)
Frequency bands	216 - 220 MHz 220 - 235 MHz

SD4

RF data rate & bandwidth	4,800 bps @ 6.25 kHz 9,600 & 19,200 bps @ 12.5 kHz 19,200 & 38,400 bps @ 25 kHz
Frequency bands	300 - 360 MHz 350 - 400 MHz 400 - 450 MHz 450 - 512 MHz

SD9

RF data rate & bandwidth	9,600 & 19,200 bps @ 12.5 kHz 19,200 & 38,400 bps @ 25 kHz 65,000 bps @ 50 kHz
Frequency bands	820-870 MHz 880-915 MHz 850-860/926-936 MHz 928-960 MHz

GENERAL

Frequency	Configurable
Operational modes	Simplex, half-duplex
Modulation	Digital, CPFSK
Range	Up to 50 miles

TRANSMITTER

Frequency Stability	+/- 0.5 ppm
Carrier power	0.1 to 5 Watts Programmable
Carrier power Accuracy	Normal +/- 1.5 dB
Duty Cycle	Continuous
Output Impedance	50 Ohms

RECEIVER

Type	Double Conversion Superheterodyne
Sensitivity	-112 dBm typical @ 1x10 ⁻⁶ BER, -104 dBm (SD2 Band D) -100 dBm (SD9 Band D)
Selectivity	>70dB
Adjacent Channel Rejection	40 dB nominal

INTERFACES

Serial COM1	RS-232, DB-9
Serial COM2	RS-232, RS-485 DB-9
Ethernet	10/100 BaseT, RJ 45
Antenna	TNC Female

MANAGEMENT

MDS PulseNET NMS, MDS InSite software,
MDS Radio Configuration Software

ENVIRONMENTAL

Temperature	-40°C to +70°C (-40°F to +158°F)
Humidity	95% @ 40°C (104°F) non-condensing

ELECTRICAL

Tx Current	2.2A Typical at 5 Watts
Rx Current	<125 mA
Sleep mode	9 mA nominal
Primary power	10 Vdc to 30 Vdc

MECHANICAL

Case	Rugged die-cast aluminum
Dimensions	1.5 H x 6.5 W x 4.625 D in (3.81 H x 16.51 W x 11.75 D cm)
Weight	0.55 kg (1.22 lbs)

AGENCY APPROVALS

CSA Class 1 Div 2 for hazardous locations
IEEE 1613, IEC 61850-3, EN61000 for electric substation environment
Industry Canada & ENTELA
FCC Part 90: SD1, SD2, SD4, SD9
FCC Part 80: SD2
FCC Part 95: SD2
FCC Part 101: SD9
CE, ETSI: SD1, SD4

Ordering

SD1 Remote**SD01MD** * ** -NNSNN

Subband	B	150-174 MHz
Model	SS	Serial
	ES	Ethernet and Serial
	MS	9710 Emulation

SD2 Remote**SD02MD** * ** -NNSNN

Subband	A	216-220 MHz
	B	220-222 MHz
	C	220-235 MHz
	D	216-220 MHz/50 KHz Channel
Model	SS	Serial
	ES	Ethernet and Serial

SD4 Remote**SD04MD** * ** -NNSNN

Subband	A	350-400 MHz
	B	400-450 MHz
	C	450-512 MHz
	D	300-360 MHz
Model	SS	Serial
	ES	Ethernet and Serial
	MS	4710 Emulation

SD9 Remote**SD09MD** * ** -NNSNN

Subband	A	820-870 MHz
	C	928-960 MHz
	D	928-960 MHz/50 KHz Channel
	E	880-915 MHz
	F	880-915 MHz / 50 kHz Channel
	G	850-860 / 926-936 MHz, Transmit Low
	H	850-860 / 926-936 MHz, Transmit High
Model	SS	Serial
	ES	Ethernet and Serial
	MS	9710 Emulation

Order Code Example

SD01MD-BES-NNSNN

- Remote radio
- 150 - 174 MHz
- Ethernet & serial communications
- Standard mounting brackets
- No special assembly

Order Code Example

SD02MD-AES-NNSNN

- Remote radio
- 216 - 220 MHz
- Ethernet & serial communications
- Standard mounting brackets
- No special assembly

Order Code Example

SD04MD-CSS-NNSNN

- Remote radio
- 450 - 512 MHz
- Serial only communication
- Standard mounting brackets
- No special assembly

Order Code Example

SD09MD-CES-NNSNN

- Remote radio
- Ethernet and Serial
- Standard mounting brackets
- No special assembly

Accessories for the SD Series

Fixed Remote Kits with Yagi

KFR-S04-C1 (406-430 MHz)
KFR-S04-C2 (430-450 MHz)
KFR-S04-C3 (450-470 MHz)
KFR-S09-D1 (900 MHz)
KFR-S02-A (216-235 MHz)

Visit GEDigitalEnergy.com/SDSeries to:

- Buy SD through the online store
- Download guideform specifications
- Download user documentation
- Read application notes and white papers

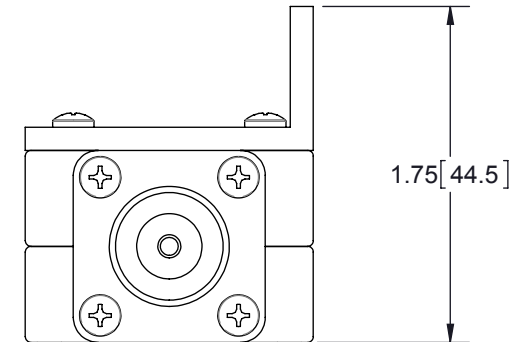
DIVIDER



REVISIONS				
REV.	DESCRIPTION	ECN	DATE	APPROVED
G	REFER TO ECN	11976	8/29/13	KCB

HARDWARE KIT INCLUDES:

QTY	DESCRIPTION
1	SCREW 10-32 X .50 SLOT F PAN 4-10 SS
1	SCREW 10-32x.50 SLOT MS PAN 18-8 SS
1	NUT 10-32 HEX 18-8 SS
2	WASHER 10 EXT TOOTH SS



MAXIMUM CHARACTERISTICS

APPLICATION:

For two way radio and SCADA applications.
Non-weatherized, Flange mount

SURGE:

50kA IEC 61000-4-5 8/20μs waveform 500J

TURN ON:

600Vdc ± 20%

TURN ON TIME:

2.5ns for 2kV/ns

FREQUENCY RANGE:

1.5MHz to 700MHz

VSWR:

≤1.1 to 1 over frequency range

INSERTION LOSS:

≤0.1dB over frequency range

MAX POWER:

2kW @ 1.5 to 50MHz

375W @ 50 to 220MHz

125W @ 220 to 700MHz

THROUGHPUT ENERGY:

≤10mJ 3kA 8/20μs waveform

TEMPERATURE:

Storage: -55°C to +85°C

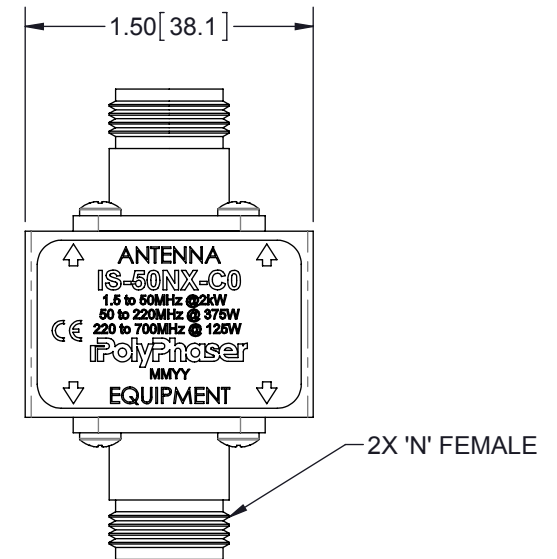
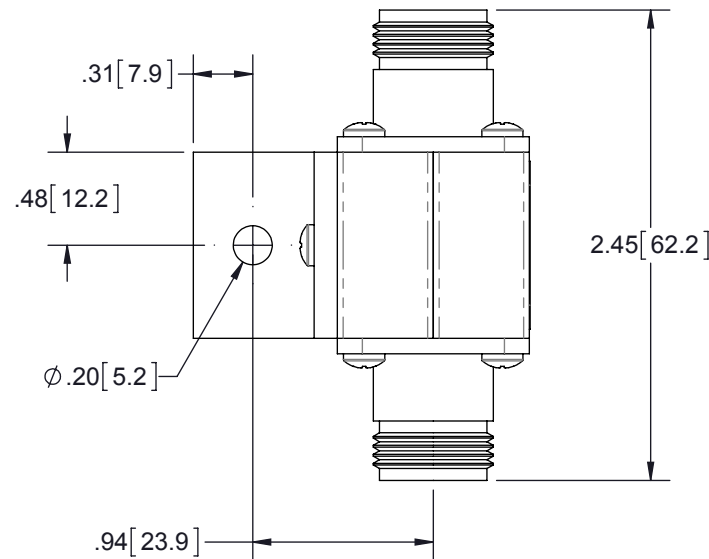
Operating: -50°C to +50°C

VIBRATION:

1G at 5Hz to 100Hz

CE COMPLIANT

RoHS COMPLIANT



CUSTOMER APPROVAL: _____ DATE: _____

ALL DIMENSIONS SHOWN ARE FOR REFERENCE ONLY.

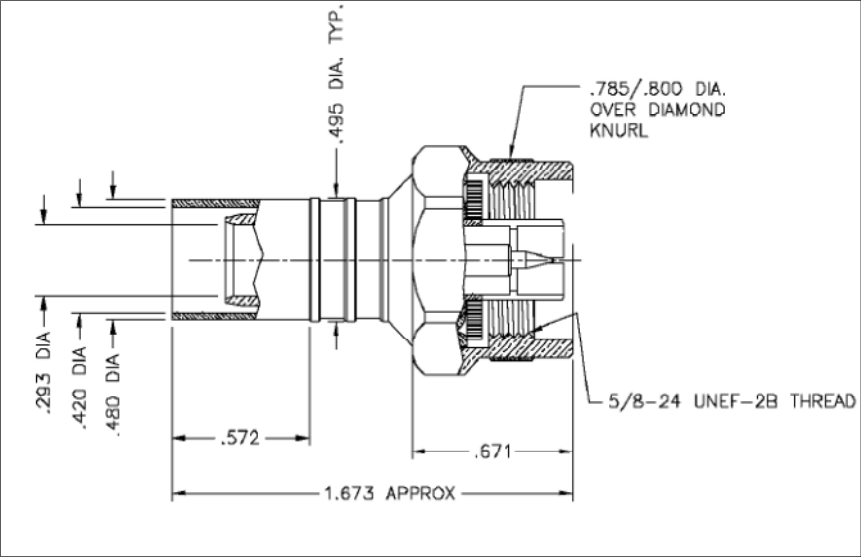
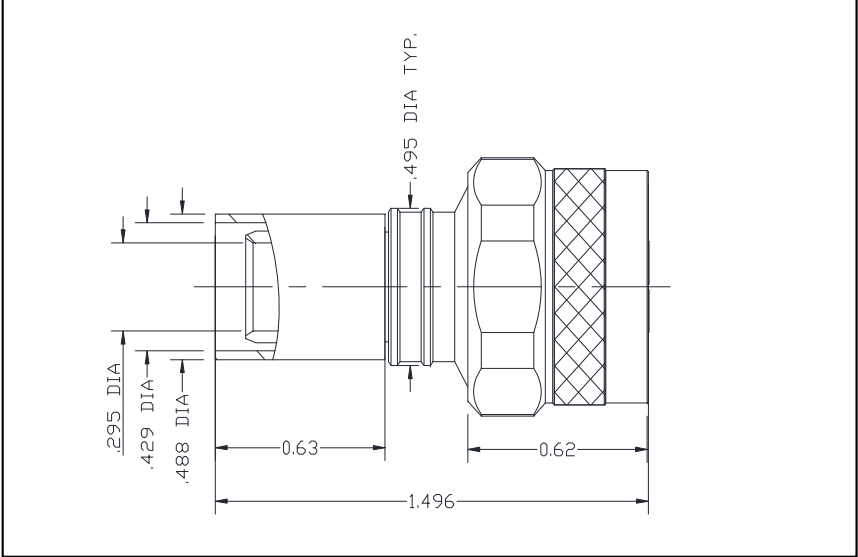
UNLESS OTHERWISE SPECIFIED LEADING DIMENSIONS ARE INCHES DIMENSIONS IN [] ARE MILLIMETERS TOLERANCES: FRACTIONS=± 1/32 .XX=± .03 ANGLES=± 1° .XXX=± .010 NOTICE: THE INFORMATION AND DESIGN IN THIS DOCUMENT IS THE PROPERTY OF POLYPHASER CORPORATION. ALL RIGHTS RESERVED. THIRD-ANGLE PROJECTION 	DRAWN J. CALLISTER	DATE 2/24/98					SHEET 1 OF 1	
	ENG APPD O. AKDAG	3/20/98					SCALE 1:1	
	PRODUCT MGR K. BARTEL	3/16/98	TITLE BROADBAND 1.5-700MHz R50 T.O. 600Vdc N FEM CUSTOMER SPECIFICATION					
	MARKETING APPD R. MATHEUS	3/20/98						
	PROJECT NO.							
DOCUMENT NAME IS-50NX-C0-C	SIZE A	CAGE 61114	PROD CAT RFP	PART NUMBER IS-50NX-C0	REV G			



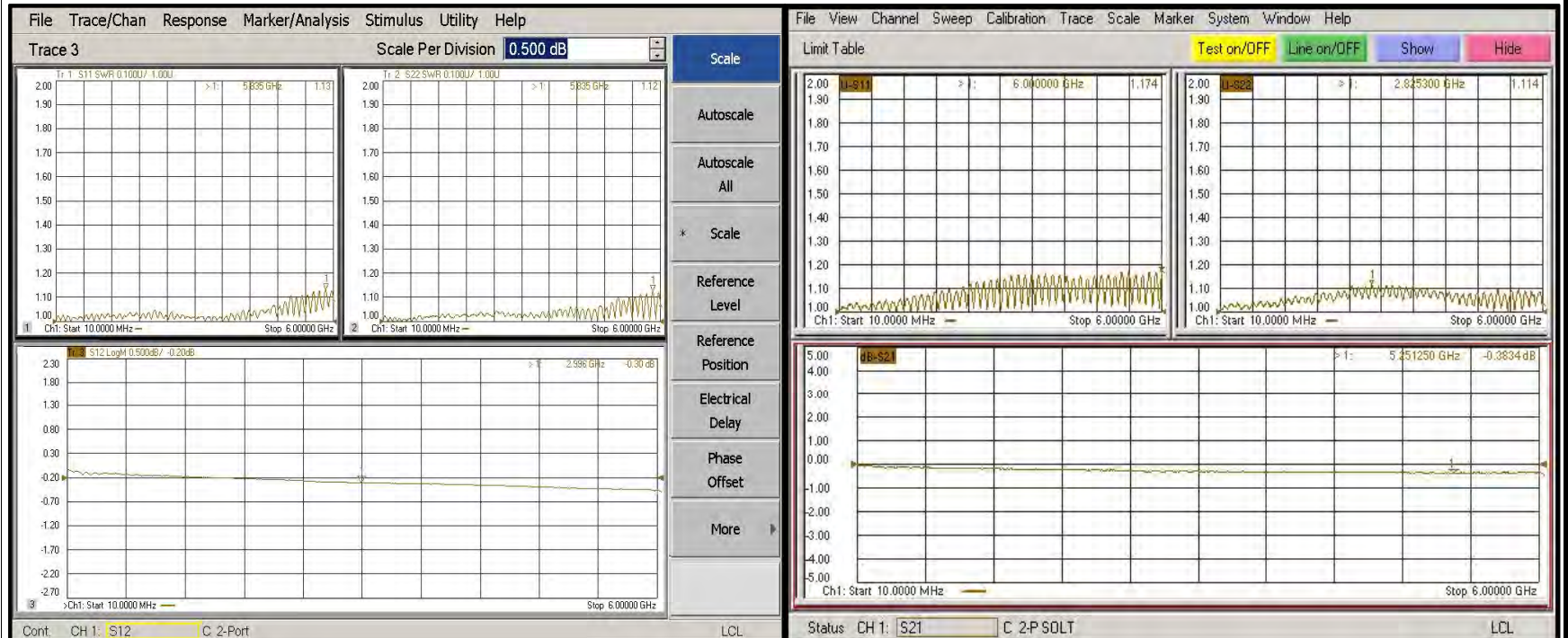
DIVIDER



Connector Comparison Sheet

	Old Connector 3190-400 EZ-400-NMH-D	New Connector 3190-2590 EZ-400-NMH-X																																								
1. Materials&Plating	<table><tr><td></td><td><u>Material</u></td><td><u>Plating</u></td><td><u>Thickness</u></td></tr><tr><td>1) Body</td><td>Brass</td><td>Albaloy</td><td></td></tr><tr><td>2) Center Contact</td><td>Beryllium Copper</td><td>Gold</td><td></td></tr><tr><td>3) Coupling nut</td><td>Brass</td><td>Albaloy</td><td></td></tr><tr><td>4) Ferruel</td><td>Copper</td><td>Albaloy</td><td></td></tr></table>		<u>Material</u>	<u>Plating</u>	<u>Thickness</u>	1) Body	Brass	Albaloy		2) Center Contact	Beryllium Copper	Gold		3) Coupling nut	Brass	Albaloy		4) Ferruel	Copper	Albaloy		<table><tr><td></td><td><u>Material</u></td><td><u>Plating</u></td><td><u>Thickness</u></td></tr><tr><td>Brass</td><td>Albaloy</td><td>>79μ"(2μm)</td><td></td></tr><tr><td>Beryllium Copper</td><td>Gold</td><td>>50μ"(1.27μm)</td><td></td></tr><tr><td>Brass</td><td>Albaloy</td><td>>79μ"(2μm)</td><td></td></tr><tr><td>Copper</td><td>Albaloy</td><td>>79μ"(2μm)</td><td></td></tr></table>		<u>Material</u>	<u>Plating</u>	<u>Thickness</u>	Brass	Albaloy	>79μ"(2μm)		Beryllium Copper	Gold	>50μ"(1.27μm)		Brass	Albaloy	>79μ"(2μm)		Copper	Albaloy	>79μ"(2μm)	
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3. Installation	Need Braid Trim	No Braid Trim																																								

4. Test Curve



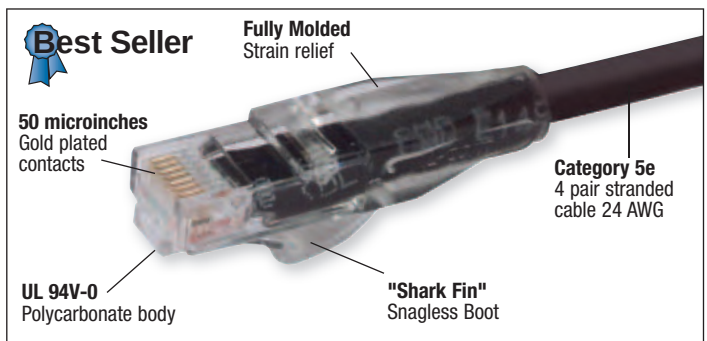
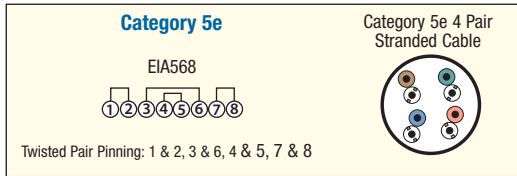
* The test curve is based on the assembly 1m cable with 2 connectors on each end.

DIVIDER



Premium Category 5e RJ45 Molded Ethernet Patch Cords

Designed for today's high-density patch panels, these unique Category 5e molded patch cords feature an easy to depress "shark fin" snagless molded boot that makes connecting cables easier. The clear boot also allows the color of each cable to be easily seen on each port for easy cable identification. Each cable is tested for Category 5e performance to ensure maximum network throughput.



BL	BLK	GR	R	Y	GRY	WHT	OR	V
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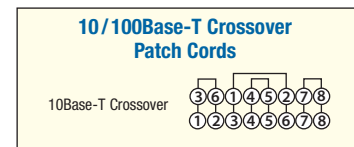
Ordering is easy, add the desired color code to the part number. Ex: TRD815BL-3

Item #	Description	Length	1-9	10-24	25-99	100+
TRD815BL-3	Category 5e Patch Cord, RJ45/RJ45	3.0ft (0.9m)	4.29	3.86	3.43	CALL
TRD815BLK-5	Category 5e Patch Cord, RJ45/RJ45	5.0ft (1.5m)	5.29	4.76	4.23	CALL
TRD815GR-7	Category 5e Patch Cord, RJ45/RJ45	7.0ft (2.1m)	6.39	5.75	5.11	CALL
TRD815R-10	Category 5e Patch Cord, RJ45/RJ45	10.0ft (3.0m)	7.39	6.65	5.91	CALL
TRD815Y-14	Category 5e Patch Cord, RJ45/RJ45	14.0ft (4.3m)	9.49	8.54	7.59	CALL
TRD815GRY-25	Category 5e Patch Cord, RJ45/RJ45	25.0ft (7.6m)	14.79	13.31	11.83	CALL
TRD815WHT-50	Category 5e Patch Cord, RJ45/RJ45	50.0ft (15.2m)	26.29	23.66	21.03	CALL
TRD815OR-75	Category 5e Patch Cord, RJ45/RJ45	75.0ft (22.9m)	37.89	34.10	30.31	CALL
TRD815V-100	Category 5e Patch Cord, RJ45/RJ45	100.0ft (30.4m)	49.39	44.45	39.51	CALL

Premium Category 5e RJ45 Molded Crossover Ethernet Patch Cords

Also designed for today's high-density patch panels, these unique Category 5e molded patch cords feature an easy to depress "shark fin" snagless molded boot that makes connecting cables effortless. The clear boot also allows the color of each cable to be easily seen up to

each port for easy cable identification. Each cable is crossover wired (EIA568A/B) for usage as either uplink connections or for direct connecting of two computers. Contact us today for all your patch cord needs.



Ordering is easy, add the desired color code to the part number Ex: TRD815CRBL-3

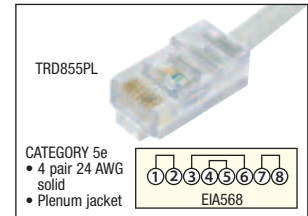
TRD815CRBL-3	Cat5e 10/100Base-T Crossover Patch Cord, RJ45/RJ45	3.0ft (0.9m)	4.39	4.04	3.69	CALL
TRD815CRBLK-7	Cat5e 10/100Base-T Crossover Patch Cord, RJ45/RJ45	7.0ft (2.1m)	6.59	6.06	5.54	CALL
TRD815CRGR-10	Cat5e 10/100Base-T Crossover Patch Cord, RJ45/RJ45	10.0ft (3.0m)	7.59	6.98	6.38	CALL
TRD815CRY-15	Cat5e 10/100Base-T Crossover Patch Cord, RJ45/RJ45	15.0ft (4.6m)	9.79	9.01	8.22	CALL

Item #	Description	Length	Color	1-9	10-24	25-99	100+
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Category 5e RJ45 to RJ45 Plenum Patch Cords - 4 Pair Solid for EIA568 Wiring

Designed for environments where PVC's combustible toxicity is restricted, L-com's Plenum Ethernet Cables provide the ideal alternative. The Category 5E rated plug and cable is designed for high-speed network systems. Ensure the protection of your investment by utilizing these L-com exclusive Plenum cables.

TRD855PL-1	Cat5e EIA568 Plenum Patch Cord, RJ45/RJ45	1.0ft (0.3m)	White	12.69	12.44	11.93	CALL
TRD855PL-2	Cat5e EIA568 Plenum Patch Cord, RJ45/RJ45	2.0ft (0.6m)	White	13.29	13.02	12.49	CALL
TRD855PL-3	Cat5e EIA568 Plenum Patch Cord, RJ45/RJ45	3.0ft (0.9m)	White	13.99	13.71	13.15	CALL
TRD855PL-5	Cat5e EIA568 Plenum Patch Cord, RJ45/RJ45	5.0ft (1.5m)	White	15.29	14.98	14.37	CALL
TRD855PL-7	Cat5e EIA568 Plenum Patch Cord, RJ45/RJ45	7.0ft (2.1m)	White	16.59	16.26	15.59	CALL
TRD855PL-10	Cat5e EIA568 Plenum Patch Cord, RJ45/RJ45	10.0ft (3.0m)	White	18.49	18.12	17.38	CALL
TRD855PL-15	Cat5e EIA568 Plenum Patch Cord, RJ45/RJ45	15.0ft (4.6m)	White	21.79	21.35	20.48	CALL
TRD855PL-25	Cat5e EIA568 Plenum Patch Cord, RJ45/RJ45	25.0ft (7.6m)	White	28.29	27.72	26.59	CALL
TRD855PL-50	Cat5e EIA568 Plenum Patch Cord, RJ45/RJ45	50.0ft (15.2m)	White	44.49	43.60	41.82	CALL
TRD855PL-75	Cat5e EIA568 Plenum Patch Cord, RJ45/RJ45	75.0ft (22.9m)	White	60.79	59.57	57.14	CALL
TRD855PL-100	Cat5e EIA568 Plenum Patch Cord, RJ45/RJ45	100.0ft (30.4m)	White	76.99	75.45	72.37	CALL
TRD855PL-150	Cat5e EIA568 Plenum Patch Cord, RJ45/RJ45	150.0ft (45.7m)	White	109.49	107.30	102.92	CALL
TRD855PL-200	Cat5e EIA568 Plenum Patch Cord, RJ45/RJ45	200.0ft (60.9m)	White	141.99	139.15	133.47	CALL
TRD855PL-250	Cat5e EIA568 Plenum Patch Cord, RJ45/RJ45	250.0ft (76.2m)	White	174.49	171.00	164.02	CALL
TRD855PL-300	Cat5e EIA568 Plenum Patch Cord, RJ45/RJ45	300.0ft (91.4m)	White	206.99	202.85	194.57	CALL



What is the difference between stranded and solid cable?

Online Video

L-com.com/Videos/A19

Premium Grade

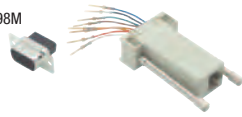
50 microinches GOLD with thumbscrews

REC098M

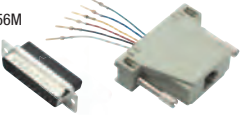
**Deluxe Grade**

30 microinches GOLD with thumbscrews

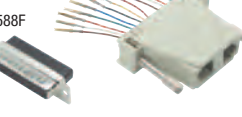
RA098M



RA256M

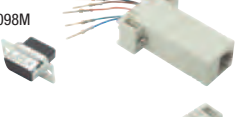


RA2588F

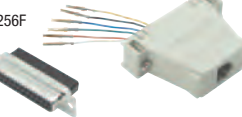
**Deluxe Grade**

30 microinches GOLD w/slotted screws

RBA098M

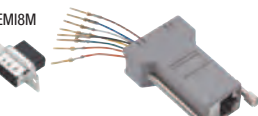


RBA256F

**Deluxe Grade Shielded**

30 microinches GOLD with thumbscrews

RS9EMI8M



RS25EMI8F



SHIELDED

RA2588FS



RA2588MS



TDT

TDTPRO

Item #	Description	1-9	10-24	25-99	100+
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Premium Modular Adapter Kits - Design Features Molded Knurled Hold Down Screws

The increased popularity of modular adapters prompted L-com to offer an off-the-shelf product that is a superior design featuring dark Gray 94V-0 plastic and 50 microinches (1.27µm) of gold plating on the pins. L-com offers quotations for custom programming to fit your needs and with legends and/or logo, either molded-in or on labels for your application. TDT series insertion/extraction tools are necessary for programming.

REC096F	Modular Adapter, DB9 Female/RJ12 (6x6) Jack	7.45	7.30	7.00	CALL
REC096M	Modular Adapter, DB9 Male/RJ12 (6x6) Jack	7.45	7.30	7.00	CALL
REC096FD	Modular Adapter, DB9 Female/MMJ (6x6) Jack	8.95	8.77	8.41	CALL
REC098F	Modular Adapter, DB9 Female/RJ45 (8x8) Jack	7.45	7.30	7.00	CALL
REC098M	Modular Adapter, DB9 Male/RJ45 (8x8) Jack	7.45	7.30	7.00	CALL
REC256M	Modular Adapter, DB25 Male/RJ12 (6x6) Jack	7.95	7.79	7.47	CALL
REC258F	Modular Adapter, DB25 Female/RJ45 (8x8) Jack	7.95	7.79	7.47	CALL
REC258M	Modular Adapter, DB25 Male/RJ45 (8x8) Jack	7.95	7.79	7.47	CALL

Modular Adapter Kits With Long Thumbscrews, Mate with DB9, DB15 and DB25

With one-piece housing, the modular adapter kits offer users a simple way to prepare custom wired adapters in the field. Featuring 30 microinches (0.762µm) gold plating on the contact pins and long metal thumbscrews. Each unit is programmable to your needs by simply inserting the prepared flying leads into the appropriate positions. TDT series insertion/extraction tools are necessary for programming.

RA096F	Modular Adapter, DB9 Female/RJ12 (6x6) Jack	6.95	6.81	6.53	CALL
RA096M	Modular Adapter, DB9 Male/RJ12 (6x6) Jack	6.95	6.81	6.53	CALL
RA098F	Modular Adapter, DB9 Female/RJ45 (8x8) Jack	6.95	6.81	6.53	CALL
RA098M	Modular Adapter, DB9 Male/RJ45 (8x8) Jack	6.95	6.81	6.53	CALL
RA158M	Modular Adapter, DB15 Male/RJ45 (8x8) Jack	6.95	6.81	6.53	CALL
RA256M	Modular Adapter, DB25 Male/RJ12 (6x6) Jack	7.45	7.30	7.00	CALL
RA258F	Modular Adapter, DB25 Female/RJ45 (8x8) Jack	7.45	7.30	7.00	CALL
RA258M	Modular Adapter, DB25 Male/RJ45 (8x8) Jack	7.45	7.30	7.00	CALL
RA2510F	Modular Adapter, DB25 Female/10 Pin Modular Jack	7.45	7.30	7.00	CALL
RA2510M	Modular Adapter, DB25 Male/10 Pin Modular Jack	7.45	7.30	7.00	CALL
RA2588F	Modular Adapter, DB25 Female/Dual RJ45 Modular Jack	11.95	11.71	11.23	CALL
RA2588M	Modular Adapter, DB25 Male/Dual RJ45 Modular Jack	11.95	11.71	11.23	CALL

Modular Adapter Kits -With Slotted Screws, Mate with DB9 and DB25

This series is identical to the RA Series except for the fact that the thumbscrew is replaced with a shorter screw head requiring a screwdriver for fastening to the system. A full range is provided which includes the DB9 and DB25 interface, available with RJ11/12 or RJ45 jacks. Modular contacts have 30 microinches (0.762µm) of gold plating. TDT series insertion/extraction tools are necessary for programming.

RBA096F	Modular Adapter, DB9 Female/RJ12 (6x6) Jack	6.45	6.32	6.06	CALL
RBA096M	Modular Adapter, DB9 Male/RJ12 (6x6) Jack	6.45	6.32	6.06	CALL
RBA098F	Modular Adapter, DB9 Female/RJ45 (8x8) Jack	6.45	6.32	6.06	CALL
RBA098M	Modular Adapter, DB9 Male/RJ45 (8x8) Jack	6.45	6.32	6.06	CALL
RBA256F	Modular Adapter, DB25 Female/RJ12 (6x6) Jack	7.45	7.30	7.00	CALL
RBA256M	Modular Adapter, DB25 Male/RJ12 (6x6) Jack	7.45	7.30	7.00	CALL
RBA258F	Modular Adapter, DB25 Female/RJ45 (8x8) Jack	7.45	7.30	7.00	CALL
RBA258M	Modular Adapter, DB25 Male/RJ45 (8x8) Jack	7.45	7.30	7.00	CALL

Shielded Modular Adapter Kits - Feature Special Internal Design - EMI/RFI Shield

Similar in appearance and use to our standard RA Series but the similarity ends there. Built into the Gray plastic case assembly is an inner formed metal shield. This provides 100% EMI/RFI protection when used with the fully shielded modular plugs as listed on page 65. Modular contacts have 30 microinches (0.762µm) of gold plating. This is our best adapter; guaranteed to provide the best shielding effectiveness. Mandatory for systems utilizing fully shielded cabling and shielded modular plugs. Use TDT series tools to insert/remove contacts. 4-40 hardware.

RS9EMI8F	Shielded Modular Adapter, DB9 Female/RJ45 (8x8) Jack	10.45	10.14	9.82	CALL
RS9EMI8M	Shielded Modular Adapter, DB9 Male/RJ45 (8x8) Jack	10.45	10.14	9.82	CALL
RS25EMI8F	Shielded Modular Adapter, DB25 Female/RJ45 (8x8) Jack	10.45	10.14	9.82	CALL
RS25EMI8M	Shielded Modular Adapter, DB25 Male/RJ45 (8x8) Jack	10.45	10.14	9.82	CALL

Shielded Dual RJ45 Die-cast Adapters

L-com's exclusive die cast dual RJ45 to D-Sub 25 male or female adapters provide 100% shield coverage. These unique fully die cast adapter housings ship as a kit so that you can terminate as needed for your project. L-com can custom wire these for you with modest minimums. Contact us today with your project.

RA2588FS	Shielded Adapter, DB25 Female/Dual RJ45 (8x8) Jack	27.95	27.11	26.27	CALL
RA2588MS	Shielded Adapter, DB25 Male/Dual RJ45 (8x8) Jack	27.95	27.11	26.27	CALL

Insertion and Removal Tools For Crimp & Poke Type Contacts - Professional and Economy Versions

Two insertion/extraction tools are available for inserting contacts into D-Subs. Professional model is made for multiple insertions and is built on a larger, more ergonomic tool body. The economy version is also available when limited insertions are necessary.

TDT	Economy Contact Insertion/Extraction Tool	2.95	2.89	2.83	CALL
TDTPRO	Pro Contact Insertion/Extraction Tool	24.95	24.45	23.95	CALL

HANDSET 4x4	RJ11 6x4	RJ12 6x6	MMJ OFFSET 6x6	RJ45 8x8	RJ45 KEYED 8x8	10 POSITION 10x10

Modular Jack Configuration**Jack**
(Female Gender)

DIVIDER



The Scala CA5-400 five-element yagi antenna is intended for use in professional fixed-station applications in the 400–512 MHz band. It features:

- Balanced feed system with no capacitors for superior performance in icing conditions.
- Internal balun and dipole feedpoint sealed within the boom assembly.
- Anodized 6061-T6 aluminum tubing.
- Heavy-duty aluminum castings and stainless steel hardware.
- Entire antenna at DC ground potential.
- Dual and quad arrays available.

Specifications:

Frequency range	400–512 MHz in 6 MHz segments
Gain	12 dBi
Impedance	50 ohms
VSWR	<1.3:1 $\pm$ 1 MHz <1.5:1 $\pm$ 3 MHz
Polarization	Horizontal or vertical
Front-to-back ratio	>20 dB
Maximum input power	250 watts (at 50°C)
H-plane beamwidth	64 degrees (half-power)
E-plane beamwidth	48 degrees (half-power)
Termination	N female
Weight	4 lb (1.82 kg)
Dimensions	31.5 x 14.3 x 4 inches (maximum) (800 x 364 x 102 mm)
Wind load Front	at 100 mph (160 kph) 13 lbf (57 N)
Wind survival rating	200 mph (322 kph)
Shipping dimensions	41 x 15 x 6 inches (1041 x 381 x 152 mm)
Shipping weight	7 lb (3.18 kg)
Mounting	For masts of 2.375 inches (60 mm) OD.

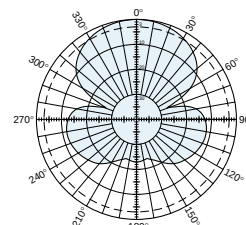
Order Information:

Contact Scala Customer Service for detailed order information.

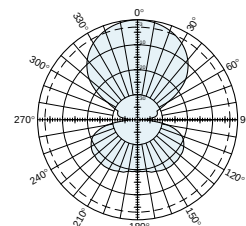
* Mechanical design is based on environmental conditions as stipulated in TIA-222-G-2 (December 2009) and/or ETS 300 019-1-4 which include the static mechanical load imposed on an antenna by wind at maximum velocity. See the Engineering Section of the catalog for further details.



(Shown vertically polarized)



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

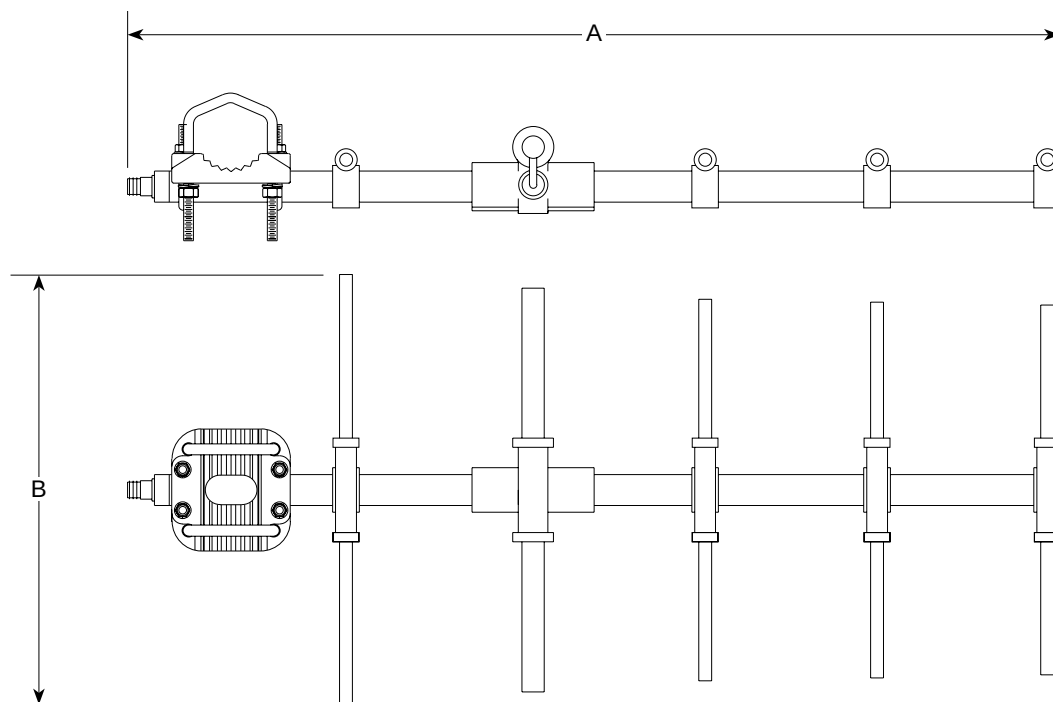


E-plane
Horizontal pattern – H-polarization
Vertical pattern – V-polarization



10243-C





(Shown vertically polarized)

Dimensions:		A	B
Frequency	410 MHz	31.3 inches (795 mm)	14 inches (356 mm)
	460 MHz	28.6 inches (727 mm)	13.3 inches (337 mm)
	490 MHz	27.9 inches (707 mm)	11.1 inches (303 mm)

Order Information:

Contact Scala Customer Service for detailed order information.

TAB 4



Best Value Battery Backup & Protection for Home and Home Office Computers

* \$40 savings based on comparable competitive models, and is comprised of an ultra-efficient electrical design, and power-saving "Master" and "Controlled" outlets (assumes three hours of daily computer use at \$0.10/kw hr, with three peripherals plugged into 'Controlled' outlets: 3-in-1 printer, speakers, external storage device).

5 “Battery Backup & Surge” Outlets keep CPU, monitor and another critical device running when the power goes out or fluctuates outside safe levels.

5 “Surge Only” Outlets protect printers, faxes or other equipment without reducing battery capacity (including three power-saving “Controlled” outlets).

PowerChute Software lets you use your computer to access additional power protection and management features:

- Preserves your work, shuts down system during outages
- Restarts your system, minimizing work disruptions
- Enables customization of your Back-UPS settings
- Monitors and displays power and battery status

Data Line Surge Protection guards against surges and spikes traveling over phone, network and coax cable lines.

Combination Power Button/LED Indicator provides visual and audible status of unit.

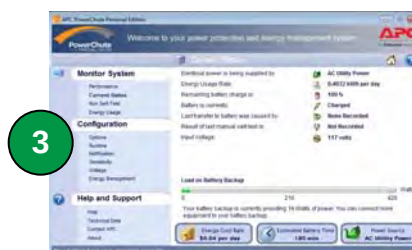
Ultra Efficient Electrical Design, RoHS compliance and all recyclable packaging materials minimize environmental impact and maximize efficiency.

Building Wiring Fault Indicator lets you know if there are problems in your building's wiring.

Push Button Circuit Breaker enables quick recovery from overload.

Automatic Diagnostic Testing ensures your unit is ready when you need it.

3 Yr Warranty, \$75,000 Equipment Protection Policy, free technical phone and online support.



Back-UPS 750 Specifications

Model Number	BE750G
Output	
Output Capacity	750 VA / 450 Watts
Output Voltage, Frequency (On utility)	120V, 50 or 60Hz (auto-sensing)
Output Voltage, Frequency (On battery)	115V +/-8%, 50 or 60 Hz +/-3Hz (auto-sensing)
Output Connections	10 total NEMA 5-15R outlets: 5 battery backup & surge 5 surge protection only (incl. 3 <i>Controlled</i> outlets)
Waveform Type	Stepped Approximation to Sine Wave
Input	
Input Voltage / Frequency	120V, 50 or 60 Hz
Input Connection	6 ft cord with right angle plug (NEMA 5-15P)
Surge Protection	
AC Power Surge Protection	All outlets
Data Line Surge Protection	Analog phone line (Fax/Modem/DSL) Network line (Ethernet 10/100 Base-T) Coax cable (CATV, SATV, modem, A/V)
Physical	
Unit Dimensions (H x W x D)	13.5" x 7.1" x 3.5"
Unit Weight	10.34 lbs
Shipping Dimensions (H x W x D)	17.8" x 10.2"x 5.94"
Shipping Weight	12.54 lbs
Color	Black
UPC Code	731304256601
Battery	
Battery Type	Maintenance-free, sealed lead-acid battery, leakproof
Management	
Alarms	Visual (LED) and audible alarms
Auto-Shutdown Software	PowerChute Personal Edition (via USB interface)
Safety	
Certification/Approvals	TUV, UL1778, CSA C22.2 No.107.1, FCC Part 68 & Part 15 Class B, NOM

APC by Schneider Electric

132 Fairgrounds Rd
West Kingston, RI 02892
Tel: 800-800-4272
www.apc.com



DIVIDER



CP M SNT 120W 24V 5A

Weidmüller Interface GmbH & Co. KG
 Klingenbergstraße 16
 D-32758 Detmold
 Germany
 Fon: +49 5231 14-0
 Fax: +49 5231 14-2083
 www.weidmueller.com


PRO-M = Power-Reliable-Optimized

The perfectly reliable power supply for automation technology.

The ten different versions for the 24V-DC power supply all feature a solid but thin metal housing which enables them to be installed without any side gaps. This results in less space required on the mounting rail. Wide range of AC/DC inputs and a wide temperature range enable them to be used anywhere. Because of its high efficiency, resistance to overloads and high power reserves, the PRO-M is a trusted power supply for use in any application. The three-phase PRO-M power supply modules continue to function reliably when one phase fails (i.e., in two-phase mode).

General ordering data

Order No.	8951340000
Type	CP M SNT 120W 24V 5A
Version	Power supply, switch-mode power supply unit
EAN	4032248742554
Qty.	1 pc(s).

CP M SNT 120W 24V 5A

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Technical data

Dimensions

Length	125 mm	Width	40 mm
Height	130 mm	Weight	0.7 kg

Temperatures

Operating temperature	-25 °C...+70 °C	Storage temperature	-40 °C...+85 °C
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Input

AC current consumption	1.1 A @ 230 V AC / 2.0 A @ 115 V AC	Conductor connection system	Screw connection
DC current consumption	0.4 A @ 370 V DC / 1.2 A @ 120 V DC	DC input voltage range	80...370 V DC (Derating @ 120 V DC)
Frequency range AC	47...63 Hz	Input fuse	Yes
Input fuse (internal)	Yes	Input voltage AC, max.	264 V
Input voltage AC, min.	85 V	Input voltage DC, max.	370 V
Input voltage DC, min.	80 V	Input voltage range AC	85...264 V AC (Derating @ 100 V AC)
Recommended back-up fuse	4 A / DI, safety fuse 6 A, Char. B, circuit breaker 3...5 A, Char. C, circuit breaker	making current	max. 40 A
rated input voltage	100...240 V AC (wide-range input)		

output

Conductor connection system	Screw connection	Output current	5 A
Output voltage	22.5...29.5 V DC (adjustable via potentiometer on front)	Parallel connection option	yes, max. 5
Powerboost @ 24 V DC, 60 °C	6 A for 1 min, ED = 5 %	Rated (nominal) output current @ U _{Nom}	5 A @ 60 °C
continuous output current @ 24 V DC	6.0 A @ 45 °C 5.3 A @ 55 °C 3.8 A @ 70 °C	rated output voltage	24 V DC ± 1 %
residual ripple, breaking spikes	< 50 mV _{PP} @ 24 V DC, I _N		

General data

AC failure bridging time @ I _{Nom}	> 100 ms @ 230 V AC / > 20 ms @ 115 V AC	Current limiting	> 120 % I _N
Degree of efficiency	90 % @ 230 V AC / 88 % @ 115 V AC	Housing version	Metal, corrosion resistant
Indication	Operation, green LED	MTBF	> 500,000 h acc. to IEC 1709 (SN29500)
Mounting position, installation notice	Horizontal on TS35 mounting rail, with 50 mm of clearance at top and bottom for air circulation. Can be mounted side by side with no space in between.	Operating temperature	-25 °C...+70 °C
Power factor (approx.)	> 0.5 @ 230 V AC / > 0.6 @ 115 V AC	Protection against reverse voltages from the load	30...35 V DC

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Technical data

Insulation coordination

Class of protection	I, with PE connection	Insulation voltage	3 kV input/output; 2 kV input/earth; 0.5 kV output/earth
Pollution severity	2	Protection class	IP 20
electrical isolation, input-earth	2 kV	electrical isolation, input-output	3 kV
electrical isolation, output-earth	0.5 kV		

Connection data

Conductor cross-section, AWG/kcmil, max.	12	Conductor cross-section, AWG/kcmil, max.	12
Conductor cross-section, AWG/kcmil, min.	26	Conductor cross-section, AWG/kcmil, min.	26
Conductor cross-section, flexible, max.	2.5 mm ²	Conductor cross-section, flexible, max.	2.5 mm ²
Conductor cross-section, flexible, min.	0.5 mm ²	Conductor cross-section, flexible, min.	0.5 mm ²
Conductor cross-section, rigid, max.	6 mm ²	Conductor cross-section, rigid, max.	6 mm ²
Conductor cross-section, rigid, min.	0.5 mm ²	Conductor cross-section, rigid, min.	0.5 mm ²
Connection system [Input]	Screw connection	Connection system [Output]	Screw connection
Number of terminals [Input]	3 for L/N/PE	Number of terminals [Output]	5 (++) / (---)

Classifications

ETIM 3.0	EC001039	ETIM 4.0	EC002541
eClass 5.1	27-04-90-02	eClass 6.0	EC27049201

Approvals

Approvals	CE; GERMILLOYD; ROHS
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Notes

Note, technical data	*) Recommendation applies only for AC operation; the max. permissible operating voltage must be observed in all cases! The internal varistor found in a switch-mode power supply does not replace the need for surge protection within a system.
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Downloads

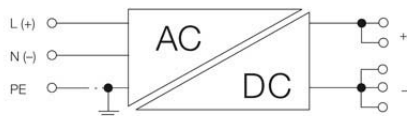
PDF	Warranty information
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Drawings

Electric symbol



With DC connection, note polarity

TAB 5

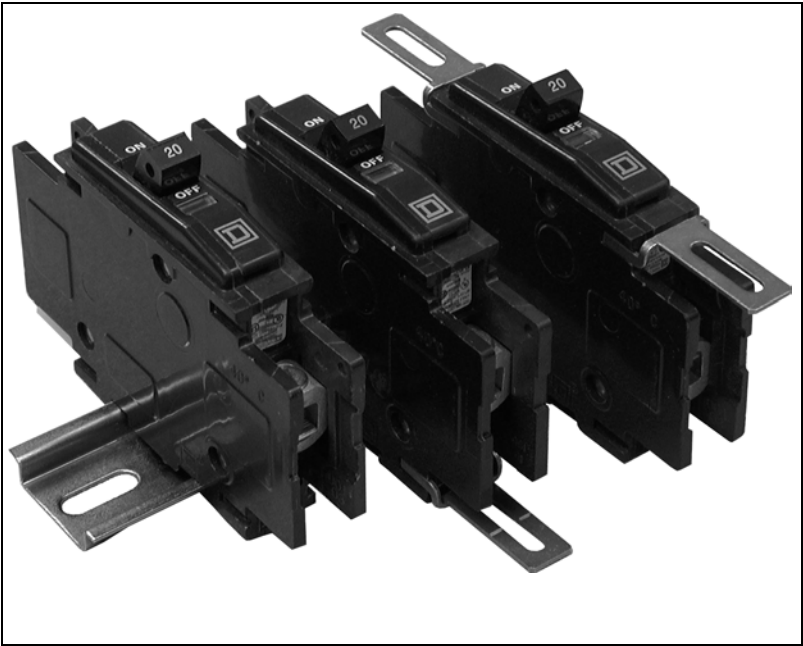


QOU115
QOU315

QOU Miniature Circuit Breakers and Switches Unit Mount (Cable-in/Cable-out)

Catalog
September
2005

Class 720



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QOU Miniature Circuit Breakers and Switches

Application Information

APPLICATION INFORMATION

QOU Miniature Circuit Breaker Types

Miniature molded case circuit breakers are intended for use in residential and commercial applications. They are tested and listed according to UL Standard 489 and CSA Standard C22.2 No. 5-02 for molded case circuit breakers and enclosures.

QOU miniature circuit breakers are unit-mount (lug/lug) thermal-magnetic circuit breakers which:

- Provide a means to manually open a circuit.
- Automatically open a circuit under overload or short circuit conditions.
- Feature common tripping of all poles.
- Have a Visi-Trip® trip indicator.
- Can be flush-, surface-, or DIN rail-mounted.
- Has lugs at both ends (cable-in/cable-out construction)
- Operate in any position.
- Are fully tested, UL Listed, and CSA certified for reverse connection without restrictive line/load markings.

Non-automatic Switches

QOU non-automatic switches are intended for use as disconnect devices only. UL Standard 489 requires switches to be protected by a thermal-magnetic circuit breaker (or fuse) of equivalent rating. QOU switches are UL Listed for use on circuits capable of delivering not more than 10,000 amperes when protected by an equivalent rated circuit breaker or fuse. QOU switches contain no automatic tripping mechanisms and do not provide overcurrent protection.

Description

QOU miniature circuit breakers and switches are available for surface-, flush-, or DIN rail mounted applications in one-, two-, and three-pole constructions. QOU miniature circuit breakers are used for overcurrent protection and switching on both ac and dc electrical systems. QOU circuit breakers and switches measure 0.75 in. (19 mm) wide per pole. Two- and three-pole circuit breakers are both equipped with an internal crossbar for common tripping of all poles. QOU switches are available in one-pole, 60 ampere and two- and three-pole, 60, 100 and 125 ampere construction.

Cases for QOU miniature circuit breakers and switches are constructed of a glass-reinforced insulating material that provides high dielectric strength. Current carrying components are isolated from the handle. The handle position indicates whether the circuit breaker is off, on or tripped.

Applications

One-pole QOU miniature circuit breakers rated 120/240 Vac are UL Listed for use on 120/240 Vac single-phase, three-wire or 208Y/120 Vac three-phase, four-wire electrical systems.

Two-pole QOU circuit breakers rated 120/240 Vac are UL Listed for use on 120/240 Vac single-phase, three-wire or 208Y/120 Vac three-phase, four-wire electrical systems. They cannot be used on 240 Vac delta systems. Use QOU-H two-pole circuit breakers rated 240 Vac on 240 Vac delta and 240 Vac single-phase, two wire systems.

Three-pole QOU circuit breakers rated 240 Vac are UL Listed for use on any system where the maximum phase-to-phase or phase-to-ground voltage is 240 Vac or less.

For application information on other systems, contact your local field office

QOU Miniature Circuit Breakers and Switches

Application Information

Table 1: Selection Data

Catalog Number							Terminal Lug Wire Size (AWG)
Rating	One-Pole		Two-Pole			Three-Pole	
	120/240 Vac		120/240 Vac	240 Vac	120/240 Vac	240 Vac	
	10K AIR	22K AIR	10 K AIR		22K AIR	10K AIR	
10 A	QOU110	—	QOU210	—	—	QOU310	1—#14—#2 Cu or Al
15 A	QOU115*	QOU115VH	QOU215*	QOU215H*	QOU215VH	QOU315*	
15 A	QOU115HM*†	—	—	—	—	—	
20 A	QOU120*	QOU120VH	QOU220*	QOU220H*	QOU220VH	QOU320*	
20 A	QOU120HM*†	—	—	—	—	—	
25 A	QOU125*	QOU125VH	QOU225*	QOU225H*	QOU225VH	QOU325*	
30 A	QOU130*	QOU130VH	QOU230*	QOU230H*	QOU230VH	QOU330*	
35 A	QOU135*	QOU135VH	QOU235*	—	QOU235VH	QOU335*	
40 A	QOU140*	QOU140VH	QOU240*	—	QOU240VH	QOU340*	
45 A	QOU145*	QOU145VH	QOU245*	—	QOU245VH	QOU345*	
50 A	QOU150*	QOU150VH	QOU250*	—	QOU250VH	QOU350*	
60 A	QOU160*	QOU160VH	QOU260*	—	QOU260VH	QOU360*	
70 A	QOU170*	—	QOU270*	—	—	QOU370‡	1—#12—#2/0 Cu or Al
80 A	QOU180‡	—	QOU280‡	—	—	QOU380‡	
90 A	QOU190‡	—	QOU290‡	—	—	QOU390‡	
100 A	QOU1100‡	—	QOU2100‡	—	—	QOU3100‡	
125 A	—	—	QOU2125‡	—	—	—	
Switch—60 Amperes Max.—240 Vac				QOU200	—	QOU300	1—#14—#2
Switch—100 Amperes Max.—240 Vac				QOU2000‡	—	QOU3000‡	1—#12—#2/0
Switch—125 Amperes Max.—240 Vac				QOU20001‡	—	QOU30001‡	1—#12—#2/0

* UL Listed as HACR type for use with heating, air conditioning and refrigeration equipment containing motor-group combinations and marked for use with HACR type circuit breakers.

† High-magnetic trip circuit breakers. Recommended for applications where high initial inrush current can occur and for individual dimmer applications.

‡ Available as Series 1 with forward box lugs only. (No optional terminations)

Tripping Mechanisms

A tripping mechanism is an assembly within the circuit breaker molded case that causes the circuit breaker to open automatically under sustained overload or short circuit conditions.

The tripping mechanisms in two- and three-pole circuit breakers operate such that an overcurrent on any pole of the circuit breaker will cause all poles of the circuit breaker to open simultaneously. Thermal and magnetic factory calibration (with current) is performed on each pole of every Square D circuit breaker.

These mechanisms operate to trip the circuit breaker:

- Thermal trip
- Magnetic trip
- Optional shunt trip accessory (see Accessories, page 12)

The sensing system is an integral part of a thermal-magnetic circuit breaker. The sensing system continually monitors current flowing through the circuit breaker. It detects abnormal current conditions and, depending on the magnitude of the current, initiates an inverse-time or an instantaneous tripping response. This action causes the tripping mechanism to open the circuit breaker contacts and interrupt current flow. The speed of the tripping process must be controllable and inversely matched to the severity of the overcurrent. QOU miniature circuit breakers have an over-center toggle mechanism for quick-make, quick-break action with positive handle indication. The handle assumes a position between ON (I) and OFF (O) when the circuit breaker has tripped.

QOU Miniature Circuit Breakers and Switches

Application Information

Thermal Trip

The thermal trip element of a circuit breaker is a root-mean-squared (rms) current sensing device. The thermal element, or bimetal, is constructed from metals with dissimilar rates of expansion bonded together. The thermal element responds to overloads by reacting to the heat generated both by the current flowing through the circuit breaker and by the heat contribution from ambient conditions. The bending force of the bimetal causes the circuit breaker to trip (see Figure 1). The deflection of the bimetal is predictable as a function of current and time. This is the inverse time tripping characteristic of the thermal element, i.e., the tripping time decreases as the magnitude of the current increases.

Square D calibrates the thermal elements and they are not field-adjustable. The thermal trip elements are calibrated for 40° C (104° F) ambient temperature, per UL Standard 489 and CSA Standard C22.2 No. 5-02.

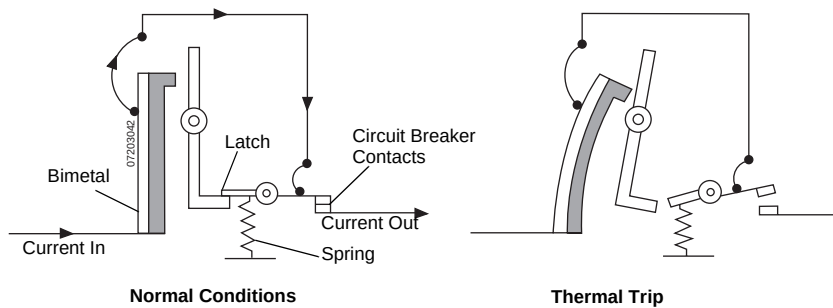


Figure 1: Thermal Tripping

Magnetic Trip

The magnetic (instantaneous) trip element uses an electromagnetic assembly to trip the circuit breaker instantaneously (with no intentional delay) at or above a predetermined current value. During a short circuit of sufficient magnitude, the high-level current passing through the conductor rapidly increases the magnetic field of the electromagnet that attracts the armature. As the armature is drawn toward the electromagnet, it initiates an unlatching action and opens the circuit breaker contact (see Figure 2).

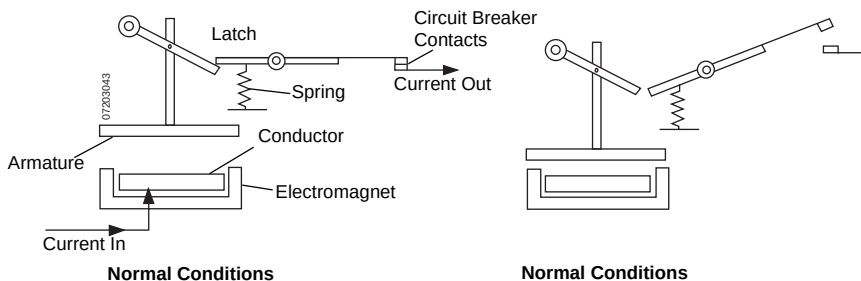


Figure 2: Magnetic Tripping

Trip Indicator

When the QOU miniature circuit breaker is tripped, the handle assumes a position between ON (I) and OFF (O) and the red Visi-Trip® indicator (A) appears in a window in the circuit breaker case. Reset the circuit breaker and Visi-Trip indicator by pushing the handle to OFF and then to ON.

QOU Miniature Circuit Breakers and Switches

Application Information

Line and Load Connections

QOU miniature circuit breakers are supplied with two types of lug configuration as standard, depending on the continuous current rating:

- 10–70 ampere one- and two-pole; reversible lugs
- 10–60 ampere three-pole; reversible lugs
- Other ampere ratings; forward lugs only

The box-type lugs supplied on QOU miniature circuit breakers are UL Listed and CSA certified to accept solid or stranded, aluminum or copper conductors. These lugs are UL Listed to be used with wire rated at 140° F, 167° F and 194° F (60° C, 75° C and 90° C), sized according to the NEC 176° F (75° C) temperature rating. See the Accessories section for more information on terminations.

Optional terminations, such as quick connectors, are also available. See the Accessories section for more information on terminations.

Ring-tongue terminals can be factory ordered using the following catalog number designations:

- QOU__ _3100 (ring-tongue terminal wired from front)
- QOUR__ _5283 (ring-tongue terminal wired from rear)

Mounting Provisions

QOU miniature circuit breakers are supplied with mounting brackets for both line and load side support. Mounting brackets are field installable and can be attached to the front or back of the circuit breaker molded case. See the Accessories section for more information on mounting brackets. Tapped mounting feet can be ordered using the catalog number designation QOU__ _3100.

All QOU miniature circuit breakers also come equipped with slots in the molded case for DIN rail mounting.

These miniature circuit breakers are designed for use with a standard 35 mm DIN mounting rail (DIN/EU 50 022, 0.30 x 1.38 in. [7.5 mm x 35 mm]).

Standards

Square D brand QOU miniature circuit breakers are manufactured and tested according to the following standards:

- UL Standard 489 (File E84967)
- NEMA Standard AB1
- Canadian Standards Association CSA C22.2 No. 5-02
- IEC 60947-2
- CE

Square D brand QOU non-automatic switches comply with:

- UL Standard 489
- Canadian Standards Association CSA C22.2 No. 5-02

NOTE: Circuit breakers are to be applied by guidelines detailed in the NEC and other applicable electrical codes.

QOU Miniature Circuit Breakers and Switches

Application Information

Catalog Numbers

Square D brand circuit breakers are ordered by a catalog number that includes the circuit breaker family, description, number of poles, amperage rating and suffix.

Table 2: Catalog Numbers

Typical Catalog Number:						
	QO	U	2	30	H	2100
QO Miniature Circuit Breaker Family						
Description						
U – Unit Mounted (Lugs on Both Ends)						
No. of Poles						
1 – 1-pole						
2 – 2-pole						
3 – 3-pole						
Ampere Rating						
10–125 Ampere Rating						
00 = 60 A, 000 = 100 A, and 0001 = 125 A QOU Switch						
Rating						
1- and 2-pole		2-pole		3-pole		
No Letter-Standard 120/240 Vac Rating		VH - 22,000 AIR		No Letter - 240 Vac Rating		
VH - 22,000 AIR		H-240 Vac Rating		VH - 22,000 AIR		
Suffix						
XXX (i.e., 2100) - Indicates Factory-installed Accessory (See page 12)						

Ratings for QOU Miniature Circuit Breakers

When designing an electrical distribution system, overcurrent protective devices are generally selected based on performance requirements. Factors influencing this selection include system voltage, continuous current, interrupting rating and frequency.

QOU circuit breakers are selected by their ratings. A circuit breaker's rating must meet or exceed the parameters of the electrical system on which they are used.

Voltage Rating

A circuit breaker can be rated for alternating current (ac) or direct current (dc) or both. The established voltage rating of a circuit breaker is based on design parameters such as clearance of current carrying parts and dielectric withstand tests both through air and over surfaces. Voltage ratings indicate the maximum voltage for the electrical system on which the circuit breaker can be applied.

The circuit breaker must have a voltage rating greater than or equal to the system voltage. When a circuit breaker clears an overcurrent, it does so in two steps: First, the current sensing system identifies the overcurrent and releases the tripping mechanism. This results in a parting of the contacts. Then the circuit breaker must extinguish the voltage arc across the contacts. If the circuit breaker has the correct voltage rating, it can efficiently extinguish this voltage arc. QOU miniature circuit breakers are rated in the following UL 489 voltages, as shown in Table 3:

- 120/240 Vac
- 240 Vac
- 48 Vdc
- 60 Vdc
- 277 Vac for QYU, UL 1077 recognized supplementary protector only (not a branch circuit breaker)

QOU Miniature Circuit Breakers and Switches

Application Information

Interrupting Rating

The interrupting rating of a circuit breaker is the highest current at rated voltage that the circuit breaker is intended to interrupt under standard test conditions. Circuit breakers must be chosen with interrupting ratings equal to or greater than the maximum available short-circuit current at the point where the circuit breaker is applied in the system (See Table 3).

Table 3: Interrupting Rating

Circuit Breaker Type	No. of Poles	Ampere Rating	UL Listed Interrupting Rating—RMS Sym. Amperes				
			AC Volts			DC Volts ¹	
			120/240	240	277	48	60
QOU	1	10–30	NA	NA	5 kA		
		10–70	10 kA	NA	NA	5 kA	NA
		80–100	10 kA	NA	NA	NA	5 kA
	2	10–70	10 kA	NA	NA	5 kA	NA
		80–125	10 kA	NA	NA	NA	5 kA
	3	10–70	NA	10 kA	NA	5 kA	NA
		80–100	NA	10 kA	NA	NA	5 kA
QOU-H	2	15–30	NA	10 kA	NA	5 kA	NA
QOU-VH	2	15–60	22 kA	NA	NA	5 kA	NA

NA = Not Applicable

¹ DC ratings do not apply to circuit breakers rated for 10 A

Continuous Current Rating

The continuous current rating of a circuit breaker is defined by the National Electrical Manufacturers Association (NEMA) as: "The maximum direct current or rms current, in amperes, at rated frequency which a device or assembly will carry continuously without exceeding the specified limits of observable temperature rise." Sometimes referred to as the ampere rating or handle rating of the circuit breaker, the continuous current rating relates to the system current flow under normal conditions.

UL Standard 489 states that circuit breakers must carry 100% of their continuous current rating indefinitely (without tripping) at 104° F (40° C) in free air. QOU circuit breakers should be applied, per the NEC, to carry 80% of their continuous current ratings in the intended enclosure. The continuous current rating is indicated on the handle of each circuit breaker. See Table 1.

Switching Duty

The switching duty (SWD) listing applies only to 15 A and 20 A circuit breakers rated at 277 Vac or less. The circuit breakers are subjected to specified temperature rise tests at predetermined periods during the endurance operations.

QOU Miniature Circuit Breakers and Switches
Application Information

UL HACR Type

HACR is an acronym that designates circuit breakers certified to be used on heating, air conditioning, and refrigeration loads. The 9th edition of UL489 eliminated special testing requirements for HACR certification, and the 2005 NEC eliminated the requirement for special HACR marking. HACR marking is no longer necessary for circuit breakers used in these applications in states and localities where the 2005 NEC has been adopted.

QOU circuit breakers will continue to carry the HACR marking to meet the requirements of previous NEC Sections 430 and 440 in areas where the 2005 NEC has not yet been adopted. In older versions of the NEC, Article 430-53(c) required that each circuit breaker must be of the inverse time type, and be approved for group installation. The 2005 NEC eliminated the group installation clause of this article.

The following QOU miniature circuit breakers will continue to carry the HACR label:

- 10–100 A, one-pole
- 10–125 A, two-pole
- 10–100 A, three-pole

High Magnetic

QOU-HM circuit breakers are recommended for area lighting (athletic fields, parking lots, outdoor signs, etc.) when using lamps of inherent high inrush current or individual dimmer applications, or other applications where high inrush current exceeds standard tripping conditions. These circuit breakers are available in 15 A and 20 A only.

QOU-HM circuit breakers are manufactured with the magnetic trip point calibrated at a much higher level than standard QOU circuit breakers. Table 4 lists the magnetic trip levels to which high-magnetic circuit breakers are calibrated:

Table 4: QOU-HM Circuit Breaker Magnetic Trip Levels

QOU-HM Circuit Breakers	Max. Full-Cycle Magnetic Hold Level	
15 A	21–35 x In	315–525 A
20 A	16–26 x In	322–537 A

QOU Miniature Circuit Breakers and Switches

Application Information

Ambient Temperature Rating

To meet the requirements of UL 489 and the Canadian Standards Association, thermal-magnetic circuit breakers are designed, built and calibrated for use on 50/60 Hz ac systems in a 104° F (40° C) ambient temperature. Time/current characteristic trip curves are drawn from actual test data that meets UL 489 testing requirements.

The ambient temperature is the temperature of the air surrounding the circuit breaker. Thermal-magnetic circuit breakers are temperature-sensitive devices, and their rated continuous current carrying capacity is based on a UL specified 104° F (40° C) calibration temperature. The ambient temperature can affect the performance characteristics of the circuit breaker. Thus, when applying a circuit breaker at temperatures other than 104° F (40° C), it is necessary to determine the circuit breaker's actual current carrying capacity under this condition. Further, it may be necessary to derate the circuit breaker to compensate for these ambient conditions. See Figure 3:

Thermal-magnetic circuit breakers use bimetal strips that bend in response to temperature changes. Current flowing through the circuit breaker creates most of the heat that causes the tripping action. The ambient temperature surrounding the circuit breaker either adds to or subtracts from this available heat. Conductors are sized using the ampacity derating factors shown on the bottom of NEC Table 310-16 when designing systems for ambient temperatures other than 40° C.

Derating of Thermal-magnetic Circuit Breakers for Ambient Conditions

Square D thermal-magnetic circuit breakers are to be applied in ambient temperatures within the range of 14° F to 140° F (-10° C to 60° C). Use the following derating guidelines:

- Ambient Temperatures Between 77° F and 104° F (25° C and 40° C):
 - No derating is necessary.
- Ambient Temperatures Between 14° F and 75° F (-10° C and 24° C):
 - Thermal-magnetic circuit breakers operating within this ambient temperature range will carry more than their continuous current rating without tripping. Conductor and equipment damage can result if they are not in the same low ambient environment as the circuit breaker.
 - Nuisance tripping will not be a problem. However, if closer protection of the equipment and conductor is required, the increased current carrying capacity of the circuit breaker at the lower ambient temperature should be taken into consideration.
- Ambient Temperatures Between 106° F and 140° F (41° C and 60° C):
 - Thermal-magnetic circuit breakers operating within this ambient temperature range will carry less than their continuous current rating and must be carefully selected to prevent nuisance tripping.

To determine the continuous current carrying capacity of a thermal-magnetic circuit breaker at an ambient temperature other than 104° F (40° C), perform the following steps:

1. Choose the ambient derating curve in Figure 3 for the specific ampere rating of the circuit breaker you wish to apply. Note that the curve crosses the 104° F (40° C) ambient temperature line at the circuit breaker's rated continuous current carrying capacity (Circuit Breaker Handle Rating on the curve).
2. Follow this curve to the appropriate ambient temperature.
3. Read the adjusted continuous current carrying capacity at this point (on the left axis).
4. Add in any other applicable factors, such as continuous loading, per the NEC requirement.

QOU Miniature Circuit Breakers and Switches

Application Information

Figure 3: Ambient Derating of QOU Circuit Breaker

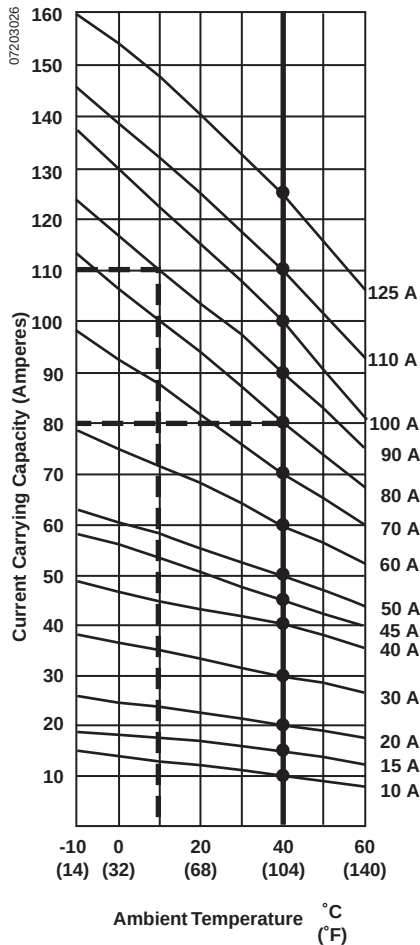
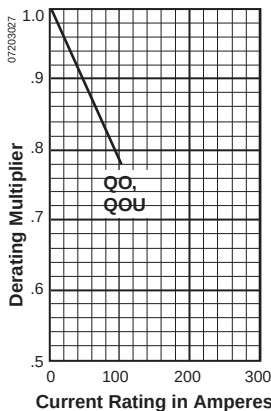


Figure 4: Frequency Derating of QOU Circuit Breaker at 400 Hz



For example, Figure 3 shows the ambient derating curves for QOU miniature circuit breakers. What is the continuous current capacity of a 80 A circuit breaker applied at 104° F (40° C)? A 90 A circuit breaker at 50° F (10° C)?

By finding 40° C on the horizontal axis and reading up to the 80 A curve, you find that the circuit breaker will carry 80 A, which is its rated current carrying capacity. If the circuit breaker will be used on a continuous load (defined as three hours or more), Section 210-20(a) of the 2005 NEC requires that loading not exceed 80% of the rating. Here, $80 \text{ A} \times .80 = 64 \text{ A}$.

Locate 50° F (10° C) on the horizontal axis and move straight up to the 90 A curve. The circuit breaker will carry 110 A. Again, if the circuit is used on a continuous load, it must be applied at 80% of its rating. In this example the equation is $110 \text{ A} \times .80 = 88 \text{ A}$.

As explained in Section 210-20(a) of the NEC:

“Where a branch circuit supplies continuous loads or any combination of continuous and noncontinuous loads, the rating of the overcurrent device shall not be less than the noncontinuous load plus 125 percent of the continuous load.

“Exception: Where the assembly, including the overcurrent devices protecting the branch circuit(s), is listed for operation at 100 percent of its rating, the ampere rating of the overcurrent device shall be permitted to be not less than the sum of the continuous load plus the noncontinuous load.”

Frequency Rating

The standard-rated frequency for circuit breakers is 60 Hz, but Square D circuit breakers can be applied on 50 Hz systems without thermal or magnetic derating. Other frequencies can affect the thermal, magnetic and short-circuit tripping characteristics of circuit breakers.

Applying thermal-magnetic circuit breakers at frequencies above 50/60 Hz requires special consideration of the effects of high frequency on circuit breaker tripping characteristics. Thermal and magnetic operations must be treated separately.

Thermal Tripping Performance at High Frequency

At frequencies below 60 Hz, the thermal derating of thermal-magnetic circuit breakers is negligible. However, at frequencies above 60 Hz, thermal derating is required. High-frequency operation causes abnormal heat rise in the current-carrying parts because of the skin effect.

One of the most common high-frequency applications is at 400 Hz. Figure 4 indicates the thermal derating multiplier to be used with each circuit breaker family when applied on 400 Hz systems.

When applying a 100 A QOU circuit breaker on a 400 Hz system, the circuit breaker's current carrying capacity is as follows:

- Non-continuous Loads (less than three hours): Using Figure 4, the QOU circuit breaker may be applied at .78 of rating, or 78 A.
- Continuous Loads (three hours or more): NEC Article 210-20(a) requires that standard circuit breaker loading does not exceed 80% of the circuit breaker's rating when used for continuous loads. Therefore, the current-carrying capacity of a 100 A QOU circuit breaker operating under continuous load at 400 Hz would be $100 \text{ A} \times .78 \times .80 = 62 \text{ A}$.

QOU Miniature Circuit Breakers and Switches Application Information

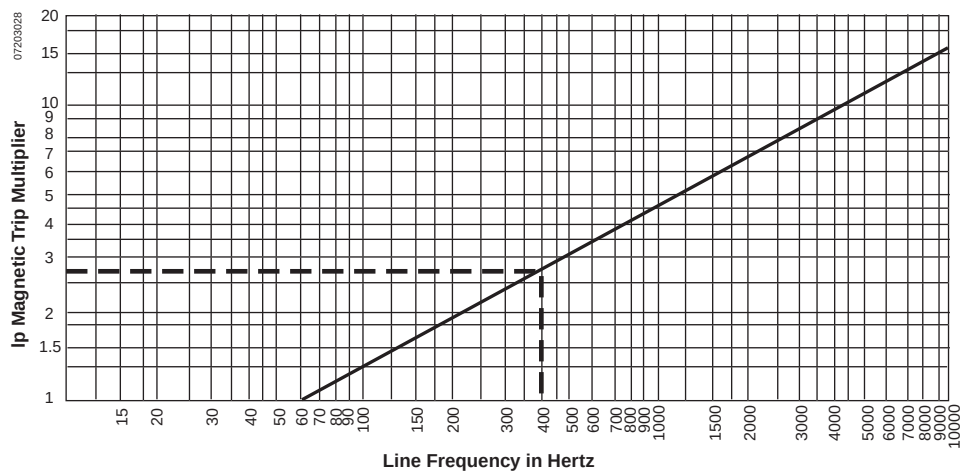
Interrupting Rating (AIR) at 400 Hz.

At frequencies above 60 Hz, the interrupting rating of thermal-magnetic circuit breakers is less than the 60 Hz interrupting rating. Unless specifically marked for use of 400 Hz systems, the interrupting rating of Square D circuit breakers is reduced to 1/10th of the 60 Hz interrupting rating.

Magnetic Tripping Performance

At frequencies above 60 Hz more current is necessary to magnetically trip a circuit breaker than at 60 Hz. Fig. 3 shows the multipliers of 60 Hz current that it takes to instantaneously trip a circuit breaker when applied at various frequencies. For example, at 60 Hz, it takes 700 A or more to magnetically trip a 100 A QOU circuit breaker per trip curve 730-7 (page 26). At 400 Hz, it takes 1820 A (2.6 multiplier) or more to magnetically trip the same circuit breaker.

Figure 5: 60 Hz Current Multiplier



QOU Miniature Circuit Breakers and Switches
Accessories

ACCESSORIES

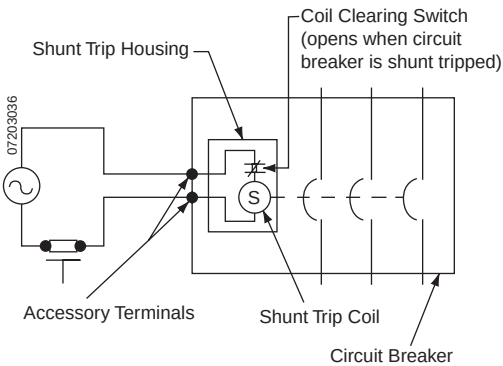
Factory-installed Accessories

QOU circuit breakers and QYU supplementary protectors can be supplied with electrical accessories factory-installed. Available factory-installed accessories are shown in Table 5 below. Each QOU circuit breaker or QYU supplementary protector can be equipped with only one (1) factory-installed electrical accessory from the table below. These devices cannot be added, modified or removed once assembled. All electrical accessories occupy one additional pole space, 3/4 in. (19.05 mm). The proper suffix number must be added to the circuit breaker catalog number to order an accessory.

Table 5: Factory-installed Accessories

Accessory	Description	Volts, 50/60 Hz	Coil Burden, VA	Catalog Suffix
Shunt Trip	Used for tripping the circuit breaker electrically using a remote control source. Includes coil clearing contact.	12 ac/dc	60	1042
		24 ac/dc	168	
		120 Vac	72	1021
		208 Vac	228	
		240 Vac	288	
Auxiliary Switch "A" Contact	One contact only; opens when circuit breaker is OFF or tripped; 5 A max. at 120 Vac, 50/60 Hz			1200
Auxiliary Switch "B" Contact	One contact only; closed when circuit breaker is OFF or tripped; 5 A max. at 120 Vac, 50/60 Hz			1201
Alarm Switch	One contact only; closed when circuit breaker is tripped; open when circuit breaker is ON or OFF; 5 A max. at 120 Vac, 50/60 Hz			2100
Ring-tongue Terminal	Factory-installed ring tongue terminal, 10-32 screw, for 1-, 2-, and 3-pole QOU 10–60 A			5283
Wire Binding Screw	Hex drive 5/32 in. wire binding screw for QOU			5280
Mounting Foot	Tapped mounting foot for QOU, 1- and 2-pole 10–70 A, 3-pole 10–60 A			3100

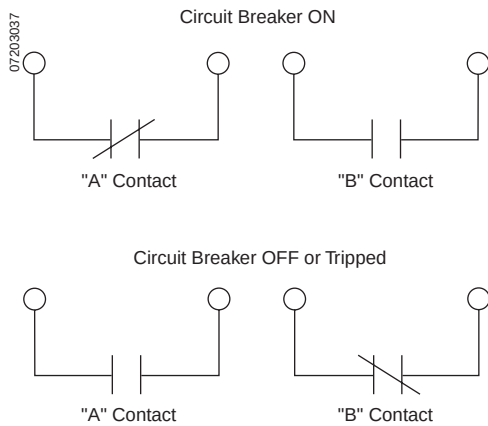
Figure 6: Shunt Trip Accessory



Shunt Trip

The shunt trip accessory is used to trip the circuit breaker from a remote location by using a trip coil energized from a separate electrical source. When energized by a push button or other pilot device, the shunt trip causes the circuit breaker to trip. The handle moves to the tripped position and the Visi-Trip indicator appears. The trip coil has a coil clearing contact to break the coil circuit when the circuit breaker trips. Shunt trips operate at 75% or more of rated voltage. See the wiring diagram in Figure 6.

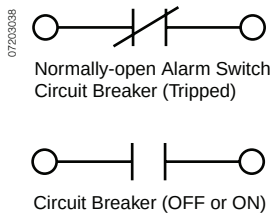
Figure 7: Auxiliary Switch Accessory



Auxiliary Switch

The auxiliary switch accessory monitors the circuit breaker contact status and provides a remote signal indicating whether the circuit breaker contacts are open or closed. When the circuit breaker is OFF or tripped, the auxiliary switch with an "A" contact is open and the auxiliary switch with a "B" contact is closed. When the circuit breaker is on, the auxiliary switch with an "A" contact is closed and the auxiliary switch with a "B" contact is open. See the wiring diagram in Figure 7.

Figure 8: Alarm Switch Accessory



Alarm Switch

The alarm switch accessory monitors the circuit breaker trip status and is used to provide a remote warning signal indicating that the circuit breaker has tripped. This signal can be a horn, pilot light, or some other indicator. The contact on the standard alarm switch is open when the circuit breaker is in the off or on position and is closed when the circuit breaker is in the tripped position.

Alarm switches are actuated when the circuit breaker has tripped as a result of an overload, short circuit or shunt trip operation. See the wiring diagram in Figure 8.

QOU Miniature Circuit Breakers and Switches Accessories

Field-installed Accessories

Table 6: Field-installed Accessories

Accessory	Description	Catalog Number
Handle Tie	Ties two 1-pole circuit breakers together.	QO1HT
	Ties three 1-pole circuit breakers together; includes lock-off for California Title 24.	QO3HT
Handle Lock-off (Clamp)	Clamp for holding QOU single-pole handle in ON or OFF position.	QO1LO
	Attaches to 1-, 2-, or 3-pole circuit breaker handles.	HLO1
Handle Padlock Attachment	For padlocking 1-pole circuit breaker in "OFF" or "ON" position. Attaches to circuit breaker escutcheon—Fixed	QOU1PA
	For padlocking 2- and 3-pole circuit breaker in "OFF" or "ON" position. Attaches to circuit breaker escutcheon—Fixed	QOU1PL
	For padlocking 1-pole circuit breaker in "OFF" position only	QOU1PAFLA
	For padlocking 2- and 3-pole circuit breaker in "OFF" position only (1- and 2-pole 10–70 A, 3-pole 10–60 A)	QOU2PAFLA
	One-pole circuit breakers. Attaches to circuit breaker handle—Removable	QOHPL
	Two- and 3-pole circuit breakers. Attaches to circuit breaker handle—Removable	QO1HPL
Mechanical Interlock	Interlocks two 2-pole or one 2-pole and one 1-pole QOU circuit breakers	QO2DTILA
Mechanical Interlock with Retaining Kit	For interlocking two adjacent back-fed circuit breakers in dual power supply applications. Interlocks two 2-pole or one 2-pole and one 1-pole QOU circuit breakers.	QO2DTIM
Mounting Feet	For mounting 1-, 2-, or 3-pole circuit breakers (Two mounting feet required per circuit breaker)	QOUMF1
		QOUMF2
		QOUMF3
	Tapped mounting foot for QOU, 1- and 2-pole 10–70 A, 3-pole 10–60 A (Two mounting feet required per pole)	QOUMFS1
Quick Connectors	For forward or reverse wiring of 60 A maximum circuit breakers	QOUFR
	For end connection wiring of 60 A maximum circuit breakers	QOUEC
Finger Safe Cover	For 10–70 A 1- and 2-pole 10–60 A 3-pole circuit breakers (Two covers required per pole)	QOULFSC1
	For 80–100 A 1-, 2-, and 3-pole circuit breakers (Two covers required per pole)	QOUHFSC1
Jumper Bars for 2-pole Low Ampere QOUs	4-pole jumper bar with front wiring, base, cover, and screw	QOU14100JBAF
	4-pole jumper bar with wiring, base, cover, and screw to left	QOU14100JBAL
	4-pole jumper bar with wiring, base, cover, and screw to right	QOU14100JBAR
	4-pole, 100 A jumper bar base with front wiring	QOU14100BAFB
	4-pole, 100 A jumper bar base with left-side wiring	QOU14100BALB
	4-pole, 100 A jumper bar base with right-side wiring	QOU14100BARB
	4-pole jumper bar cover	QOU14100CAB
	Mounting screw for jumper bar cover	QOUQCMSB
	6-pole jumper bar with front wiring, base, cover, and screw	QOU16150JBAF
	6-pole, 150 A jumper bar base with front wiring	QOU16150BAFB
	6-pole, 150 A jumper bar base with left-side wiring	QOU16150BALB
	6-pole, 150 A jumper bar base with right-side wiring	QOU16150BARB
	6-pole jumper bar cover	QOU16150CAB
Cover Plates	For one 2-pole circuit breaker	QOUCP2
	For one 3-pole circuit breaker	QOUCP3
	For two 2-pole circuit breakers	QOUCP4
	For three 2-pole circuit breakers	QOUCP6
Rainproof Cover	Vertical cover for 2- and 3-pole circuit breakers	BCV
	Horizontal cover for 2-pole circuit breakers	BCH
Ring Tongue Terminal Adapter	For ring tongue terminal wiring of 60 A maximum circuit breakers	QOURT

QOU Miniature Circuit Breakers and Switches Accessories

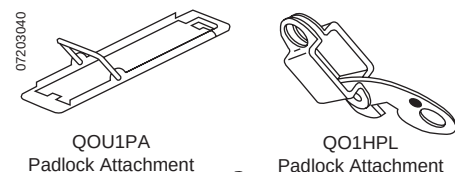


Handle Tie

The handle tie accessory converts any adjacent 1-pole QOU circuit breaker to one independent-trip multi-pole circuit breaker.

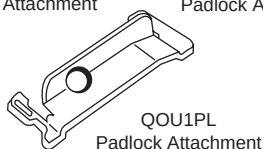
Handle Lock-off

The handle lock-off accessories fasten the handle in the on or off position. The mechanism will still be able to trip and open the contacts even if the handle is held on. The handle lock-off cannot be padlocked.



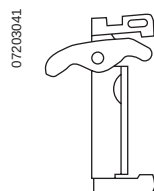
Handle Padlock Attachment

The handle padlock attachments allow padlocking the circuit breaker handles in the on or off position. The mechanism will still be able to trip and open the contacts even if the handle is held on.

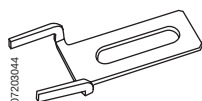


Mechanical Interlock Attachment

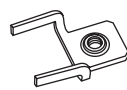
The mechanical interlock attachment locks the handles of two adjacent circuit breakers to prevent both circuit breakers from being on at the same time. Both circuit breakers may be switched to the off position with the mechanical interlock in place. The mechanism will still be able to trip and open the contacts even if the handle is held on.



Mechanical Interlock Attachment



Mounting Foot



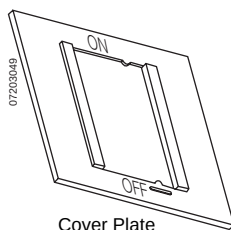
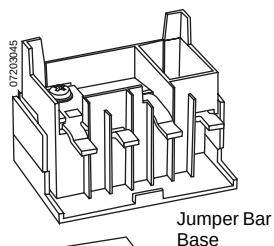
suffix -3100 or QOUMFSI
Tapped Mounting Foot

Mounting Feet

Mounting feet are available to mount 1-, 2-, and 3-pole circuit breakers. Two brackets (two kits) are required to mount each circuit breaker.

Tapped Mounting Feet

Tapped versions of the mounting feet are available to mount 1-, 2-, and 3-pole circuit breakers. Two brackets (one kit) are required to mount each circuit breaker.

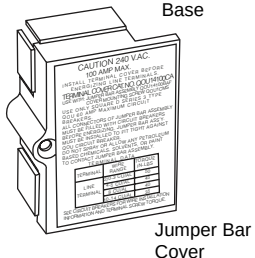


Jumper Bars

For added wiring convenience, jumper bars are available for common connections to two 2-pole or three 2-pole 60 A maximum QOU circuit breakers. Jumper bars are available with front, left-side, or right-side wiring bases and covers.

Cover Plates

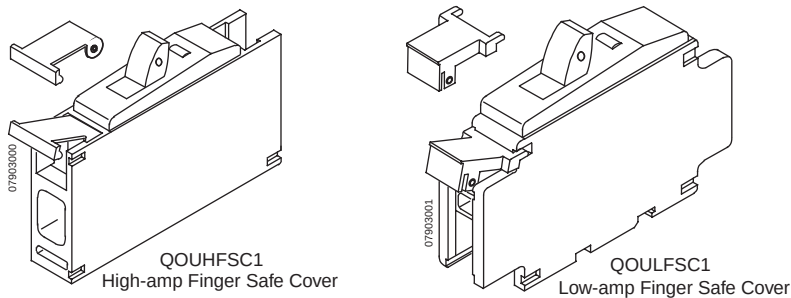
Cover plates are available to fit one 2-pole, one 3-pole, two 2-pole, or three 2-pole circuit breakers. The cover plates fasten to the escutcheon and provide 1 in. (25.4 mm) per pole finish trim to cover the circuit breaker.



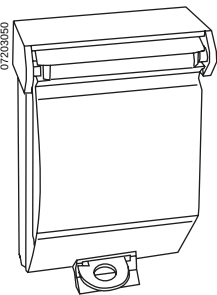
QOU Miniature Circuit Breakers and Switches
Accessories

Finger Safe Covers

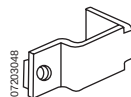
Finger safe covers are installed over the top of the terminal connections to prevent accidental contact with energized parts. Two covers are required per pole of each circuit breaker.



Rainproof Covers



Ring-tongue
Terminal Adapter



Rainproof Covers

Rainproof covers plates are available for vertical mounted 2- and 3-pole circuit breakers and horizontal mounted 2-pole circuit breakers.

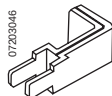
Ring-tongue Terminal Adapters

Ring-tongue terminal adapters are available for ring tongue terminal wiring of 60 A maximum circuit breakers.

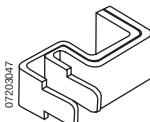
Reversible Lugs

For added wiring convenience, QOUR 10–70 A 1- and 2-pole, and 10–60 A 3-pole QOUR circuit breakers have reversible lugs. Removing the wire binding screw allows the captive lug body to be rotated and the wire binding screw reinstalled. This permits the circuit breaker to be flush mounted and then conveniently wired from the back.

Forward or Reverse
Quick Connector



End Quick
Connector



Quick Connectors

In addition to the reversible lugs previously described, 10–70 A 1- and 2-pole, and 10–60 A 3-pole A QOU circuit breakers have optional field installable quick connectors.

Quick connectors provide a convenient way to attach two wires using two standard, 0.25 in. insulated quick connectors per terminal (30 A maximum per connector). Quick connectors are not furnished with the circuit breakers, but are commercially available. Connectors suitable for wire sizes up to AWG #10 can be selected for use with these circuit breakers.

Table 7: Optional Terminations

Type	Wiring Method	Quantity	Catalog Number
Field-installed Quick Connectors	Forward or Reverse	1	QOUFR
Field-installed Quick Connectors	End Connection	1	QOUEC
Factory-installed Quick Connectors	One each end of QOU for end connection	—	QOUQ prefix

Available only on 10–60 ampere circuit breakers.

QOU Miniature Circuit Breakers and Switches

UL Requirements

UL REQUIREMENTS

A UL label on the QOU miniature circuit breaker indicates that the circuit breaker meets the requirements of UL Standard 489 for molded case circuit breakers.

Underwriters Laboratories Inc. (UL), the Canadian Standards Association (CSA), the National Electrical Manufacturers Association (NEMA), and the National Electrical Code (NEC) all define a circuit breaker as “a device designed to open and close a circuit by non-automatic means and to open the circuit automatically at a predetermined overcurrent without damage to itself when properly applied within its rating.”

A molded case circuit breaker is one “that is assembled as an integral unit in a supportive and enclosing housing of insulated material.”

A UL label also means the production procedure is monitored by UL inspectors for continuing conformance to UL performance requirements. These requirements are based on sound engineering principles, research, records of test and field experience, and information gathered from users and inspection authorities.

UL 489 and CSA 22.2 #5-02 Test Procedures

Limited Available Fault Current Tests

UL and CSA require a series of tests on a single set of sample circuit breakers for compliance with UL Standard 489. The tests for thermal-magnetic circuit breakers are described below and conducted in the order presented.

Since QOU switches are derivatives of QOU miniature circuit breakers, they do not have to go through an overload test. They have to complete a withstand test (paragraph 11.1.7).

200% Thermal Calibration

Each pole of the circuit breaker must trip within a specified time limit when carrying 200% of its ampere rating.

135% Thermal Calibration

With all poles connected in series, the circuit breaker must trip within a specified time limit when carrying 135% of its ampere rating.

Overload

The circuit breaker is operated making and breaking 600% of its ampere rating, but not less than 150 A. For circuit breakers through 100 A, the number of 600% operations is 35 manual open and close and 15 manual close and automatic open. For 125 A circuit breakers, the number of operations is 50 manual open and close.

Temperature Rise

While carrying 100% of rated current at a 104° F (40° C) ambient temperature and mounted in open air, the circuit breaker is checked for temperature rise on a wiring terminal. The temperature rise must not exceed a 122° F (50° C) rise above ambient temperature and must be within specified limits.

Endurance

The circuit breaker must successfully complete the number of switching operations shown in the table below. One switching operation includes a motion to turn the circuit breaker on and a motion to turn the circuit breaker off.

Table 8: QOU Circuit Breaker Switching Operations

Amperes	Full Load Operations	No Load Operations
0–100 A	6000	4000
125 A	4000	4000

QOU Miniature Circuit Breakers and Switches

UL Requirements

Calibration Retest

Both the 200% and 135% thermal calibration tests are repeated.

Short Circuit

For circuit breakers rated 240 V, two short-circuit tests per pole and one test with all poles connected in series are performed. For example, a three-pole circuit breaker receives seven short-circuit tests. For circuit breakers rated 120/240 V, three tests are made with all poles connected in series. The circuit breaker is connected to the test circuit using wire correctly sized for the rating of the circuit breaker. The line leads are not more than 4 ft. (1.22 m) in length and the load leads are not more than 10 in. (25.4 cm) in length.

NOTE: Successful testing requires that the current be interrupted while maintaining the integrity of all conductors and connections.

Trip Out

The 200% thermal calibration test is repeated following the short-circuit tests.

Dielectric

The circuit breaker must withstand, for one minute, twice its rated voltage plus 1000 V:

- Between line and load terminals with the circuit breaker open, that is, with the circuit breaker either tripped or off.
- Between terminals of opposite polarity with the circuit breaker open.
- Between live parts and the overall enclosure with the circuit breaker both open and closed.

No conditioning of the circuit breaker can take place during or between tests. There also can be no failure of functional parts at the conclusion of the sequences.

High Available Fault Current Tests

After qualifying a set of circuit breakers to the standard tests, a manufacturer can have additional circuit breaker samples tested on higher than standard available fault currents.

The following performance requirements apply:

200% Thermal Calibration

Each pole of the circuit breaker must trip within a specified time limit when carrying 200% of its continuous current rating.

Short Circuit

With the load side terminals connected by 10 in. (25.4 cm) lengths of specified wire, the circuit breaker is exposed to a short-circuit current. After successful interruption, the circuit breaker is reset and closed again on the short circuit. An additional short-circuit bus-connected test is required for frame sizes or construction groups below 100 A.

Trip Out

Each pole of the circuit breaker must trip within a specified time limit when carrying 250% of its continuous current rating.

Dielectric Withstand

The circuit breaker is subjected to twice its rated voltage, but not less than 900 V.

QOU Miniature Circuit Breakers and Switches

Circuit Breaker Tripping Characteristics (Trip Curves)

CIRCUIT BREAKER TRIPPING CHARACTERISTICS (TRIP CURVES)

The tripping characteristics of thermal-magnetic circuit breakers are represented by a characteristic tripping curve that plots tripping time versus current level. See page 20. The curve shows the amount of time required for a circuit breaker to trip for overcurrent through the entire tripping range of the circuit breaker. Manufacturing tolerances result in a curve that is a band bound by minimum and maximum values of total clearing time. Total clearing time is the sum of the sensing time, unlatching time, mechanical operating time, and arcing time of the circuit breaker. For currents in excess of 135 percent of the circuit breaker rating at ambient temperature (40°C/104°F), the circuit breaker will automatically open the circuit within limits specified by the band.

Thermal Tripping Characteristics

The upper left portion of the characteristic tripping curve displays the thermal response of the circuit breaker. On overcurrent levels, up to the instantaneous tripping level, thermal tripping occurs when the bimetal in the circuit breaker responds to the heat associated with the overcurrent. The bimetal deflects, unlatching the mechanism and mechanically causing the circuit breaker to trip and open the circuit. The larger the overcurrent, the faster the circuit breaker operates to open the circuit (inverse time).

Magnetic (Instantaneous) Tripping Characteristics

The lower right portion of the characteristic tripping curve displays the magnetic (instantaneous) tripping response of the circuit breaker. This takes place when overcurrents of sufficient magnitude operate the magnetic tripping mechanism. Magnetic tripping occurs with no intentional delay.

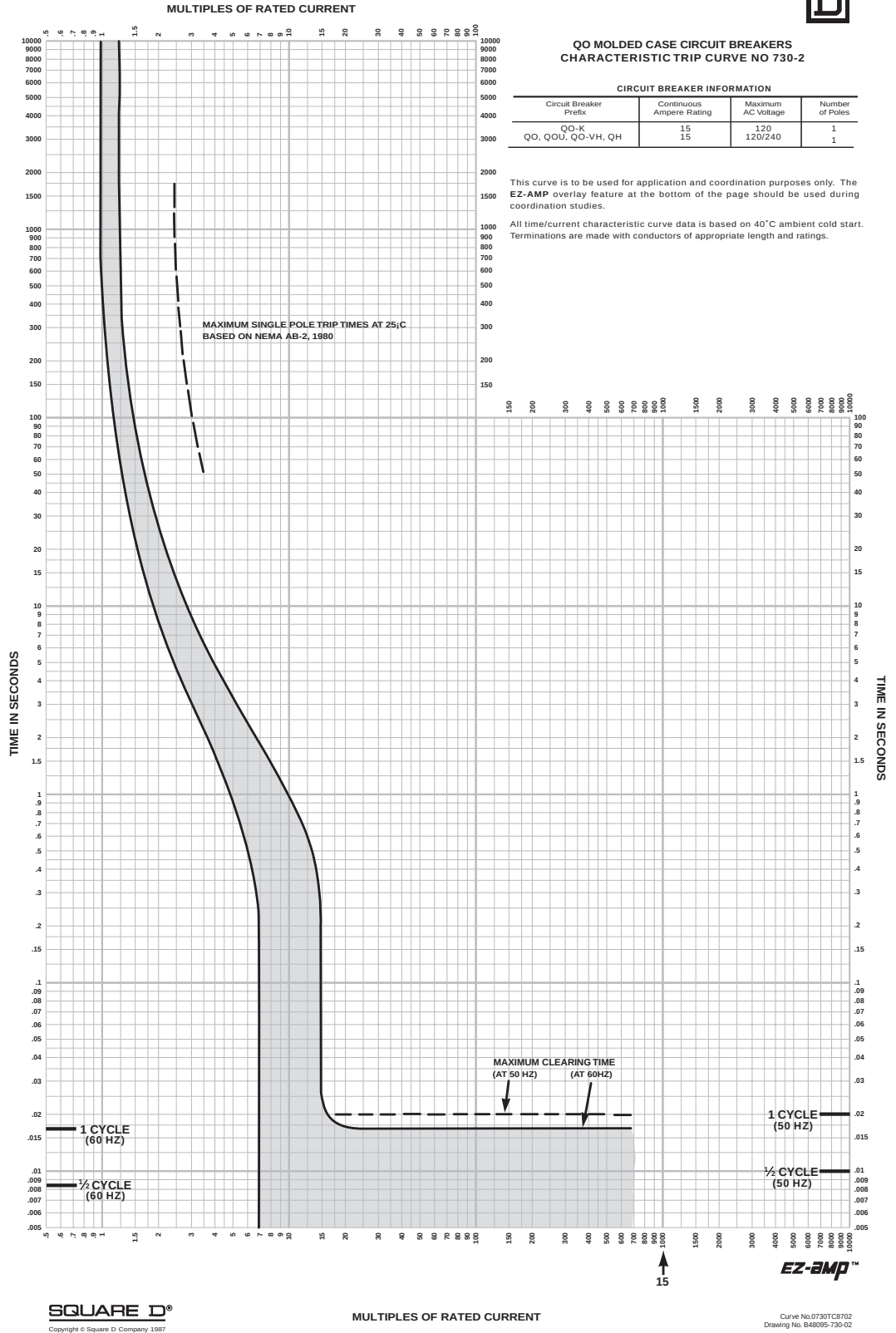
TRIPPING CURVES

D



QOU Miniature Circuit Breakers and Switches Tripping Curves

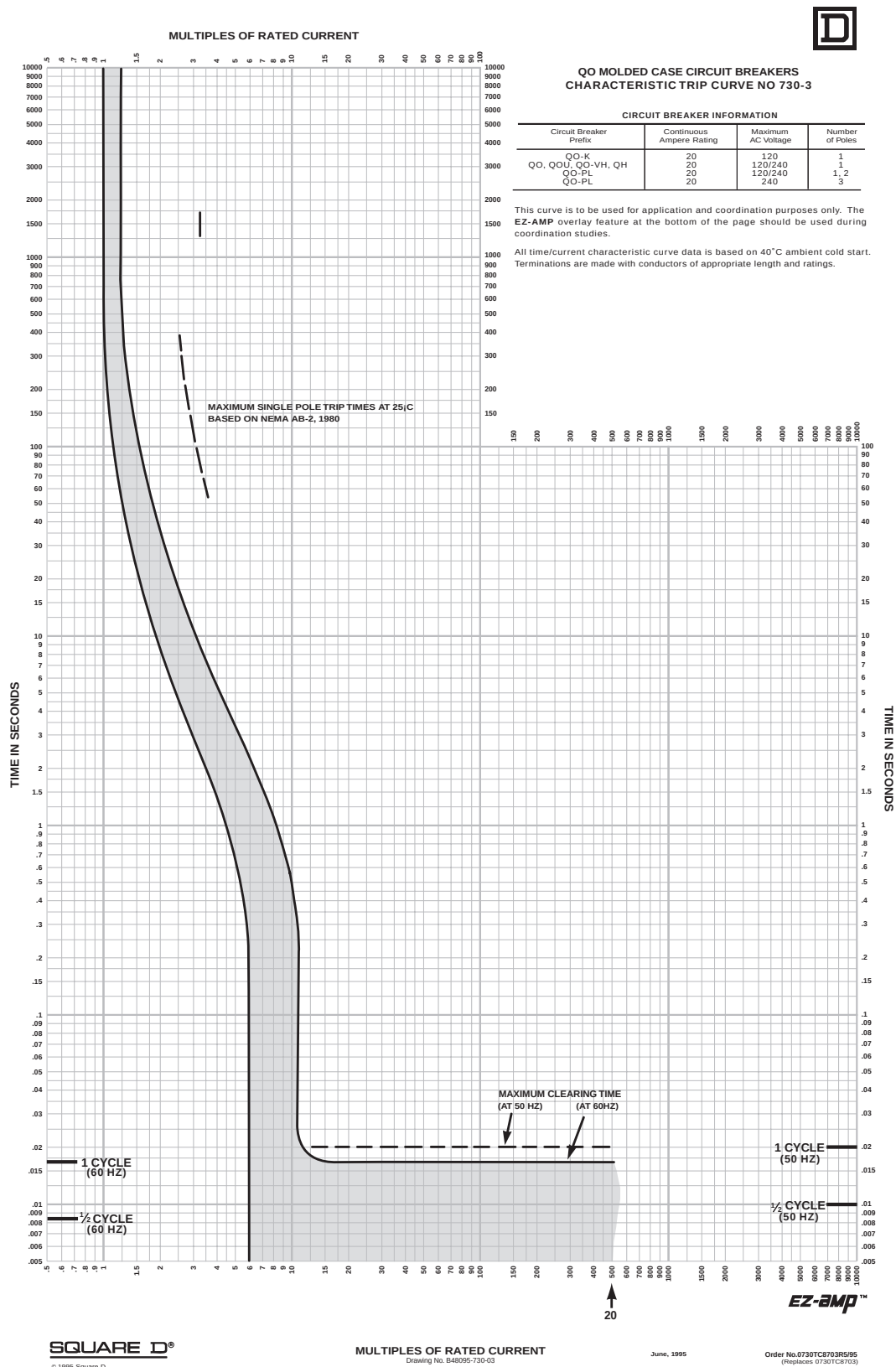
Curve 730-2



QOU Miniature Circuit Breakers and Switches

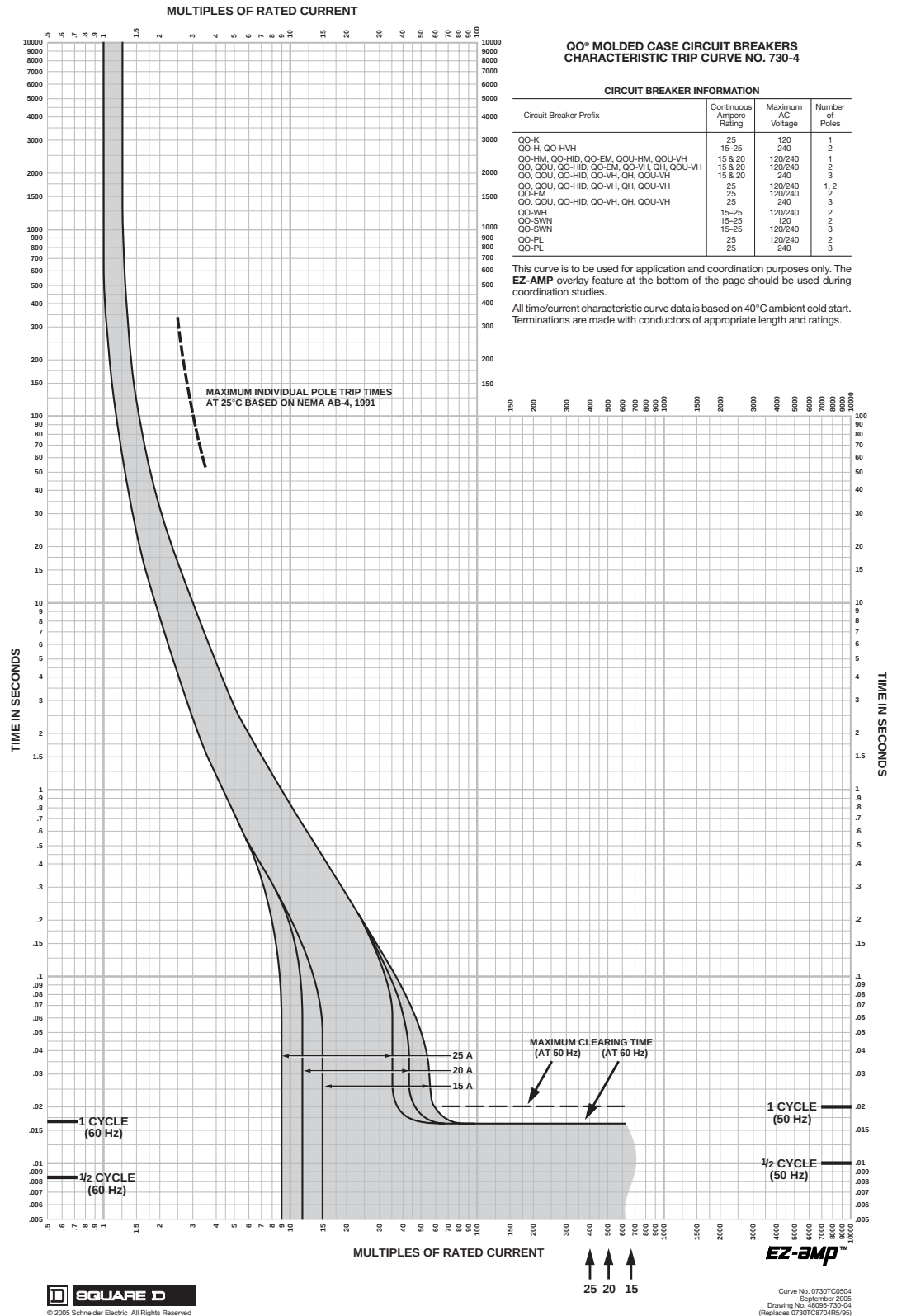
Tripping Curves

Curve 730-3



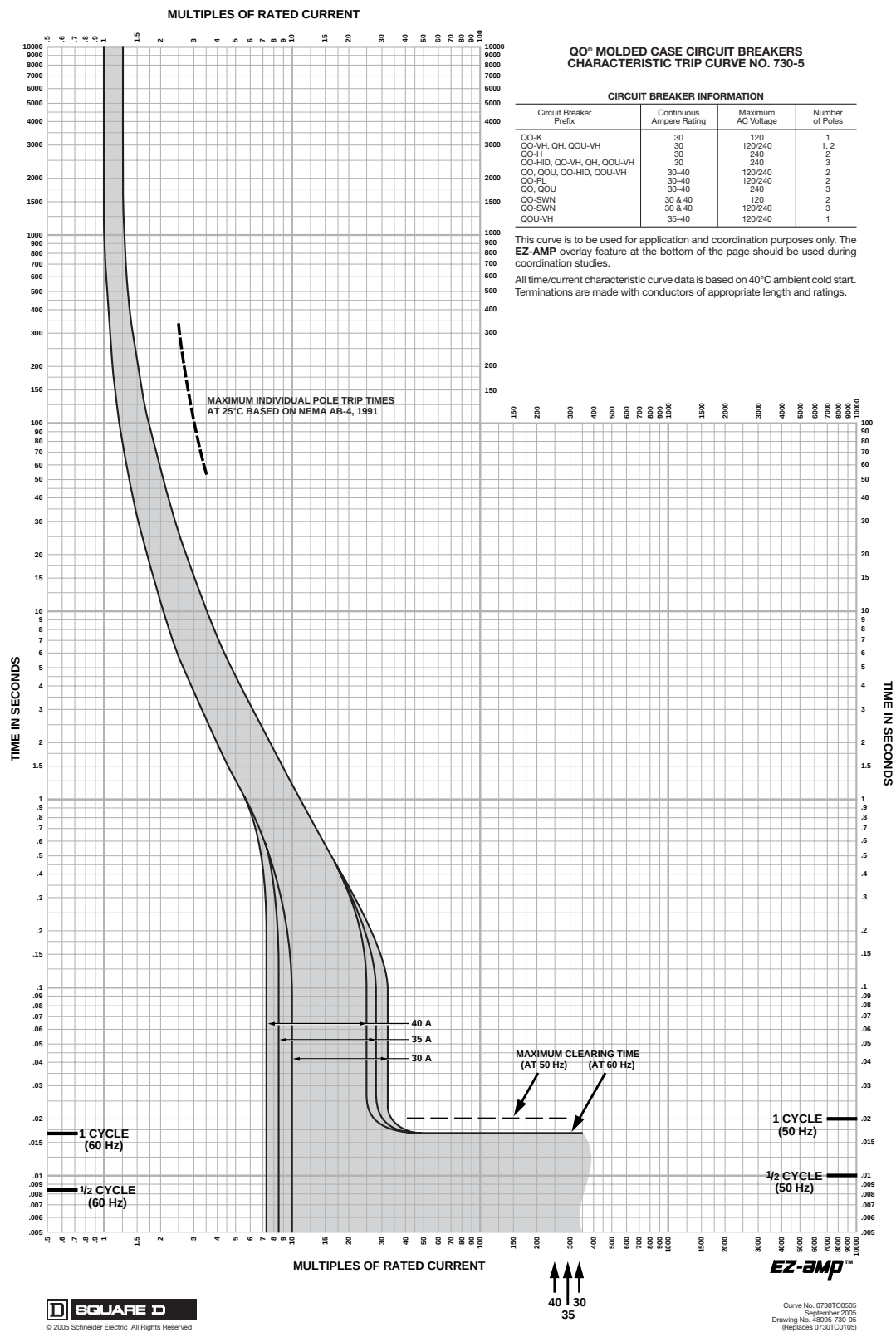
QOU Miniature Circuit Breakers and Switches Tripping Curves

Curve 730-4



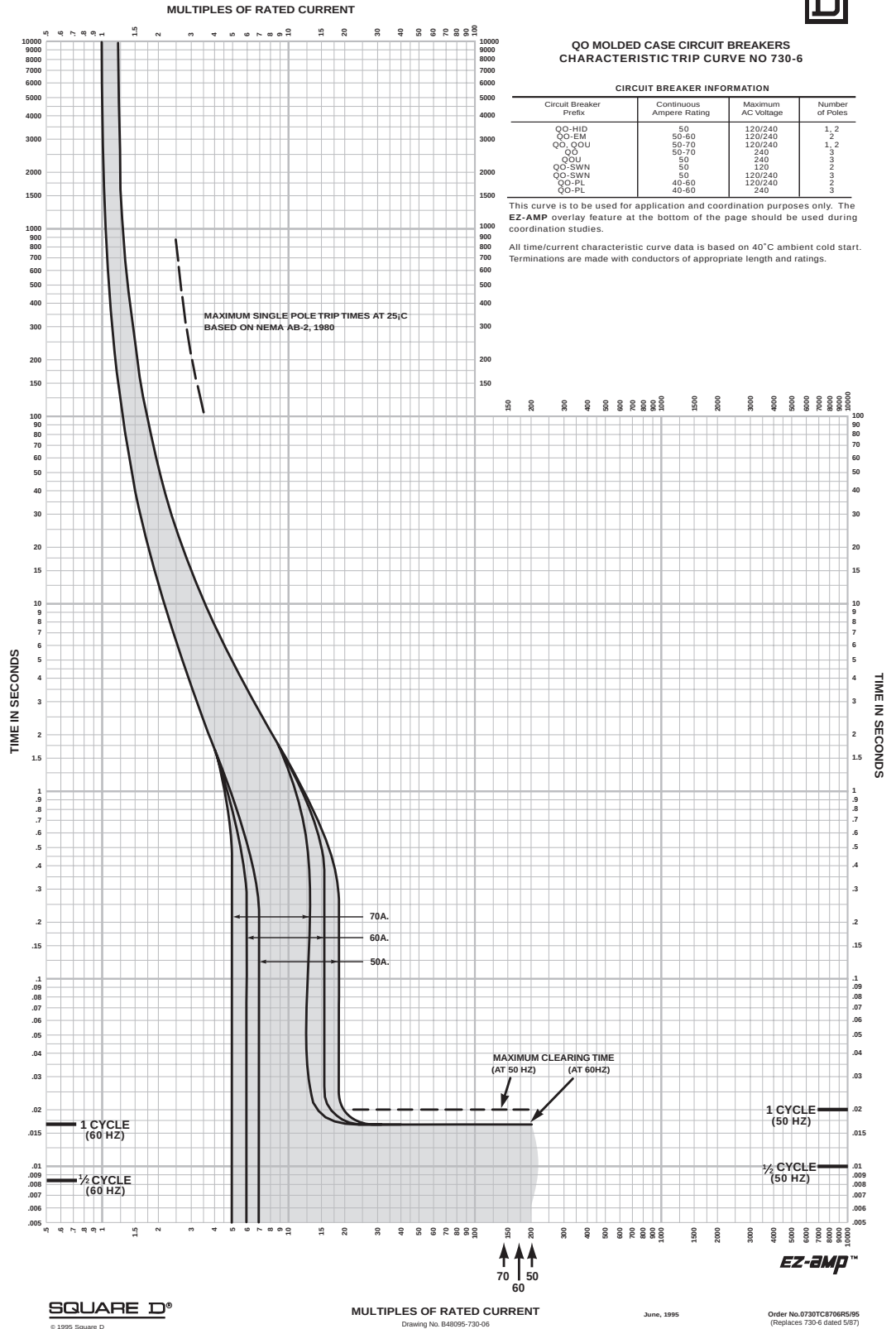
QOU Miniature Circuit Breakers and Switches
Tripping Curves

Curve 730-5



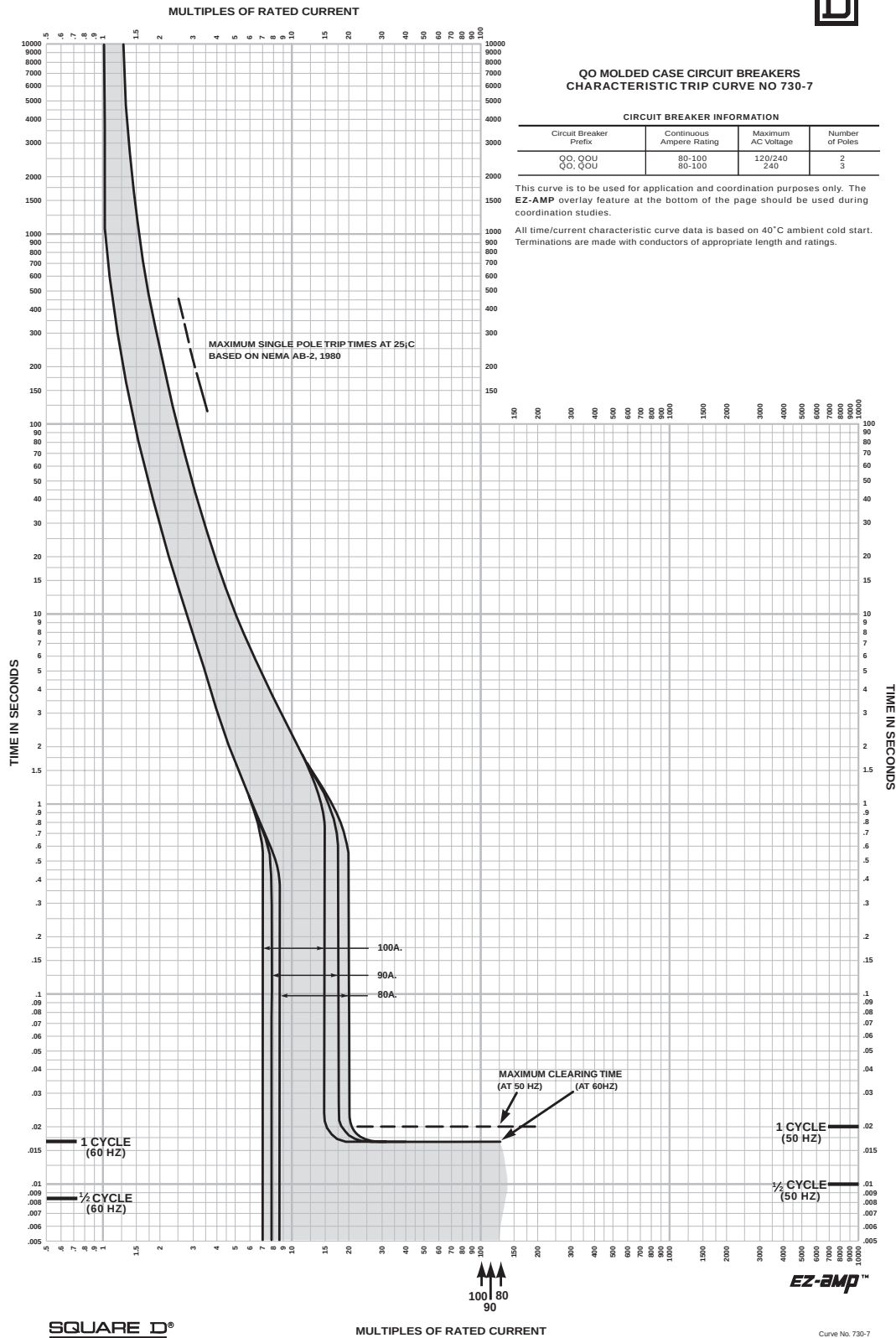
QOU Miniature Circuit Breakers and Switches Tripping Curves

Curve 730-6



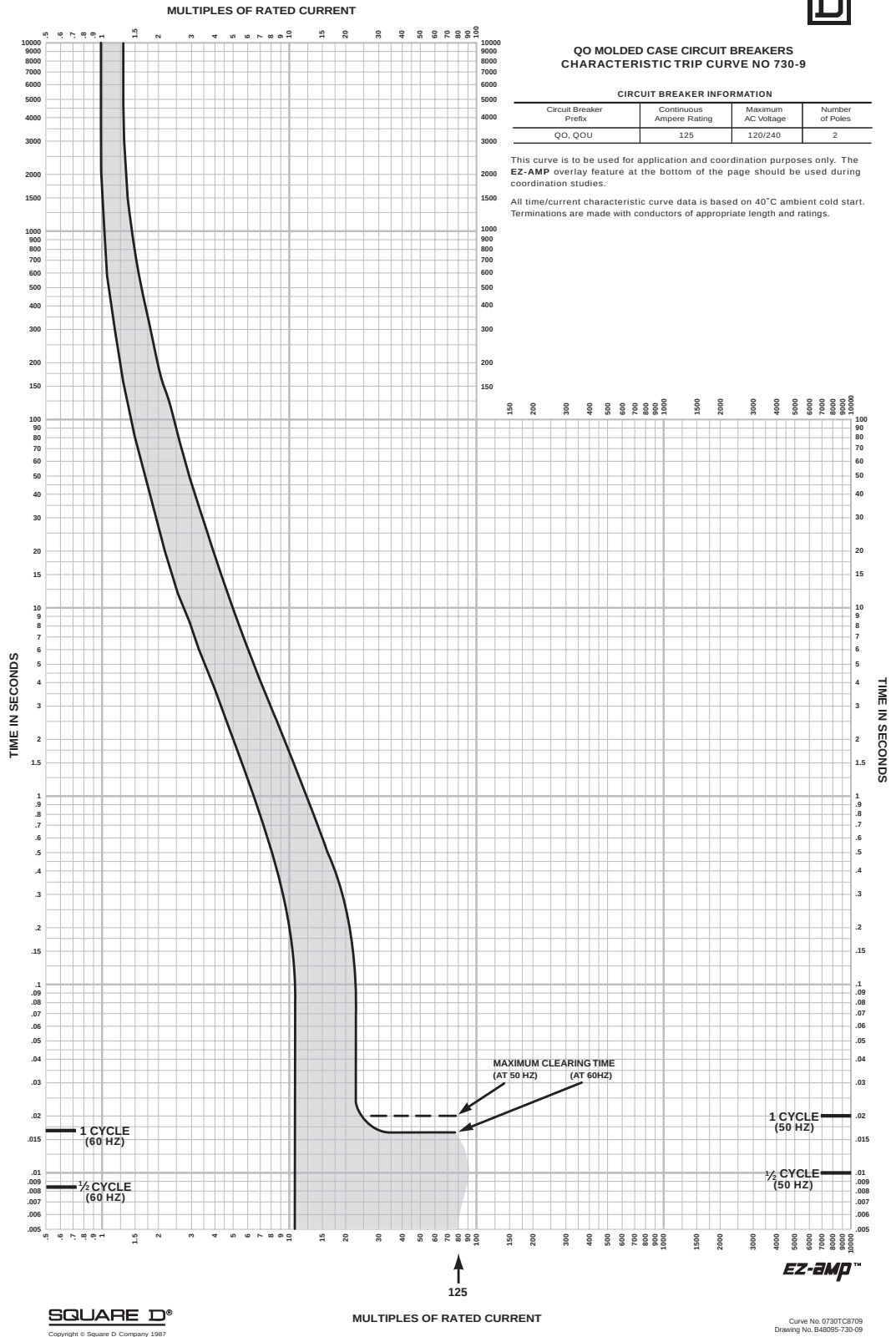
QOU Miniature Circuit Breakers and Switches
Tripping Curves

Curve 730-7



QOU Miniature Circuit Breakers and Switches Tripping Curves

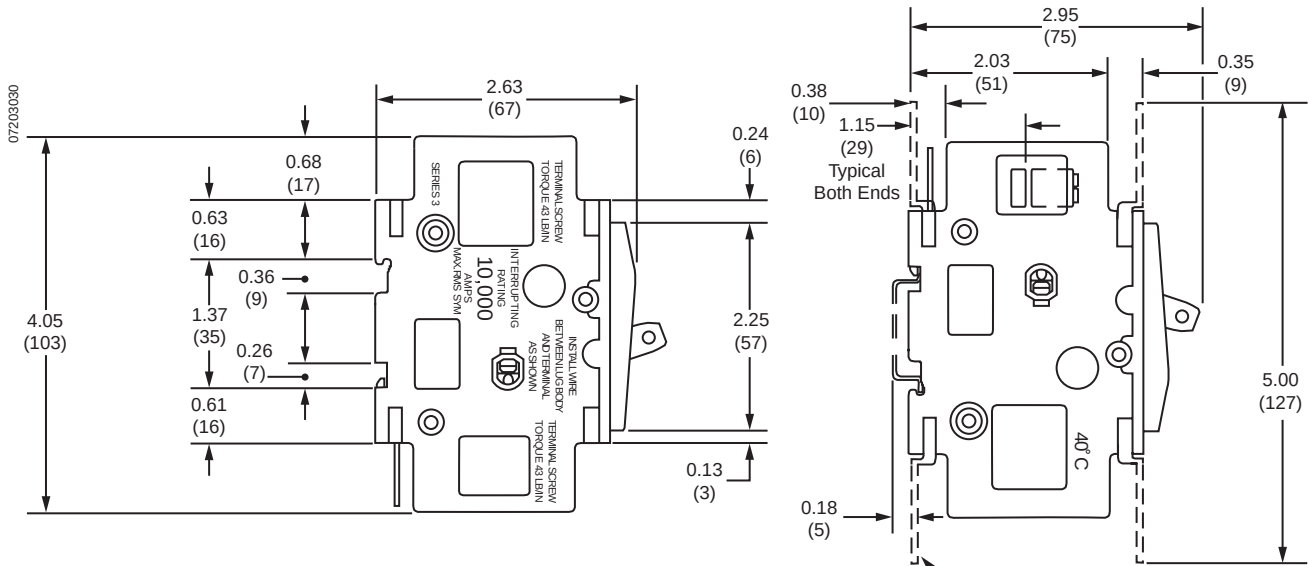
Curve 730-9



QOU Miniature Circuit Breakers and Switches Dimensions

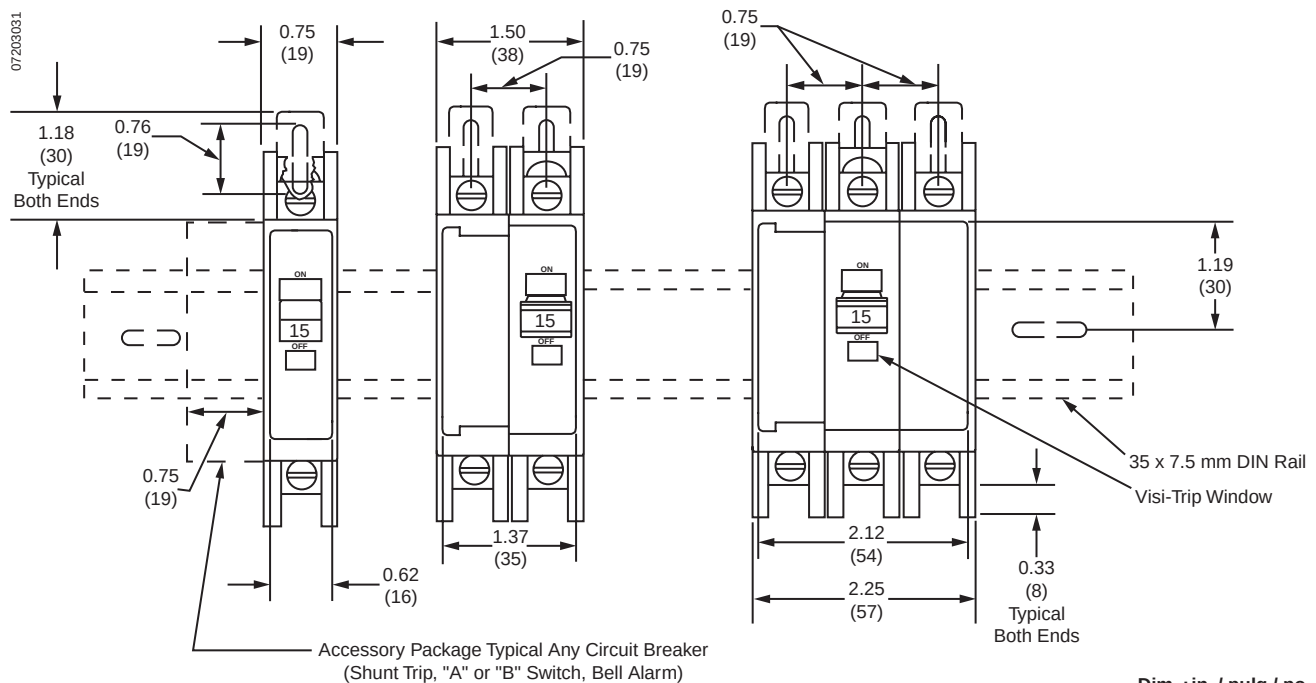
DIMENSIONS

1 & 2 pole 10A - 70A and 3 pole 10A -60A QOU Circuit Breakers



Mounting Brackets to be installed on both ends as shown.

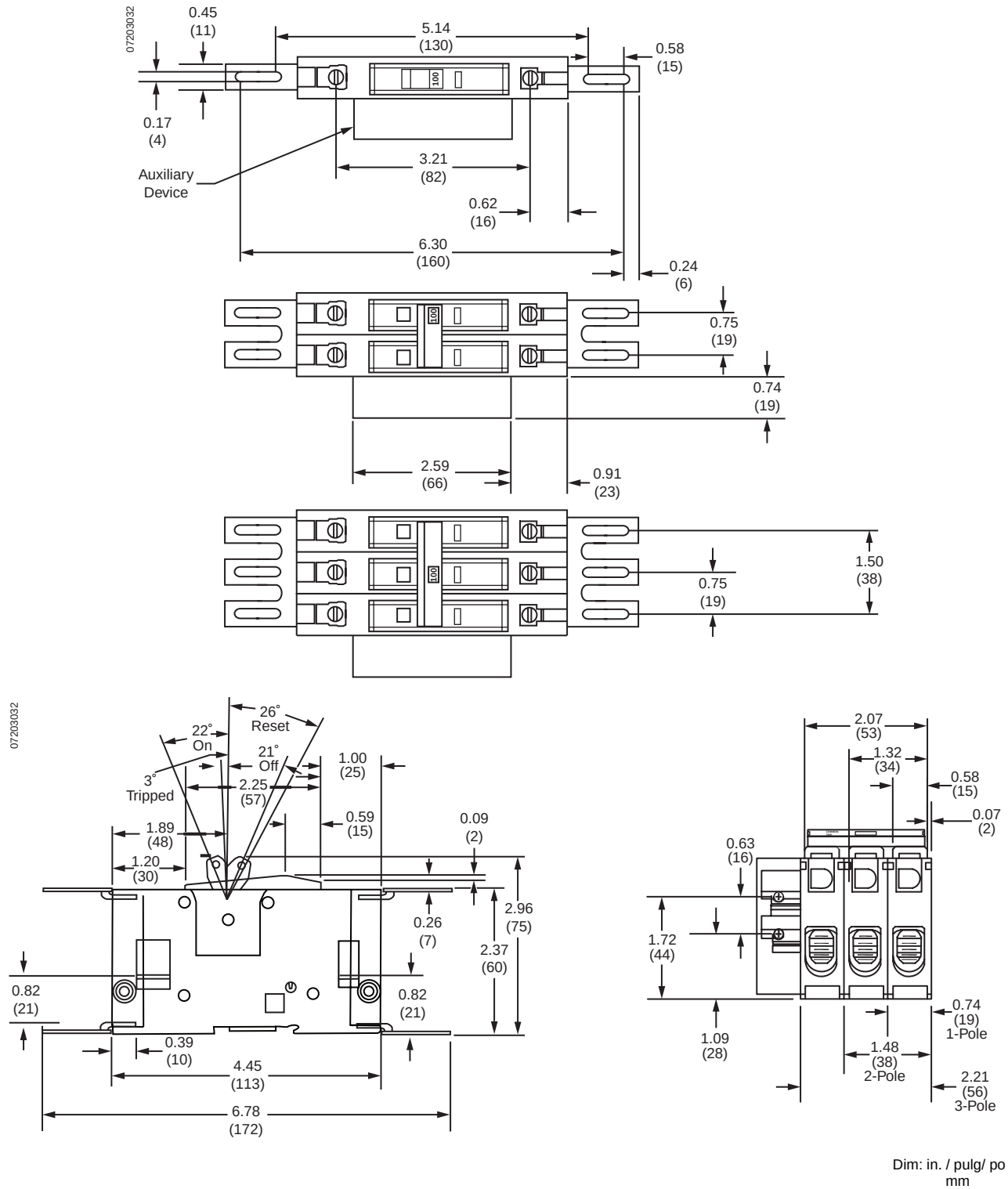
Catalog Numbers:
One-Pole—QOUMF1
Two-Pole—QOUMF2
Three-Pole—QOUMF3



Dim. : in. / pulg / po
mm

QOU Miniature Circuit Breakers and Switches Dimensions

80A - 125A Circuit Breakers



QOU Miniature Circuit Breakers and Switches

QYU One-Pole 277 Vac Supplementary Protectors

QYU ONE-POLE 277 VAC SUPPLEMENTARY PROTECTORS

Description

QYU 277 Vac supplementary protectors are available for surface, flush or DIN-rail mounting in 1-pole construction. Supplementary protectors are 3/4 in. (19.05 mm) wide.

Table 9: Selection Data

UL Component Recognized Interrupting 5000 RMS Symmetrical Amperes		
1-Pole—277 Vac		
Ampere Rating	Catalog Number	Terminal Lug Wire Size (AWG)
10	QYU110	1—#14–2 Cu or Al
20	QYU120	
25	QYU125	
30	QYU130	

Applications

One-pole QYU 277 Vac supplementary protectors are UL Recognized Component (meets UL 1077) to be applied on systems where the maximum phase-to-ground voltage is 277 Vac or less, including use of 240 Vac corner grounded delta “grounded B” systems.

These devices are designed to provide supplemental overcurrent protection in accordance with Article 240-10 of the 2005 NEC, which states that thermal-magnetic supplementary protectors cannot be used to replace the primary branch-circuit protection in an application. When used in combination with branch-circuit protection, as required in Article 210 of the 2005 NEC, these supplementary protectors can be used to protect lighting fixtures, appliances and other equipment or internal circuits and components of equipment.

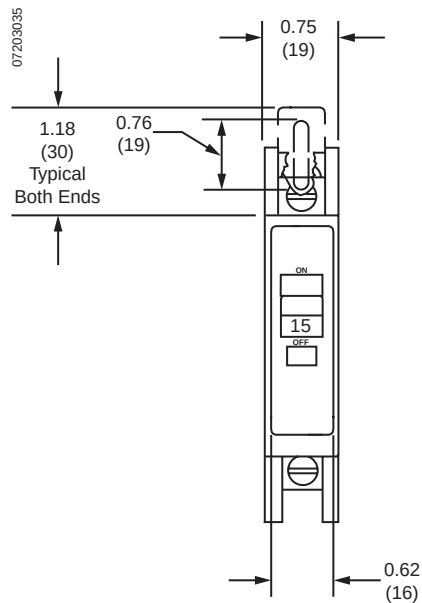
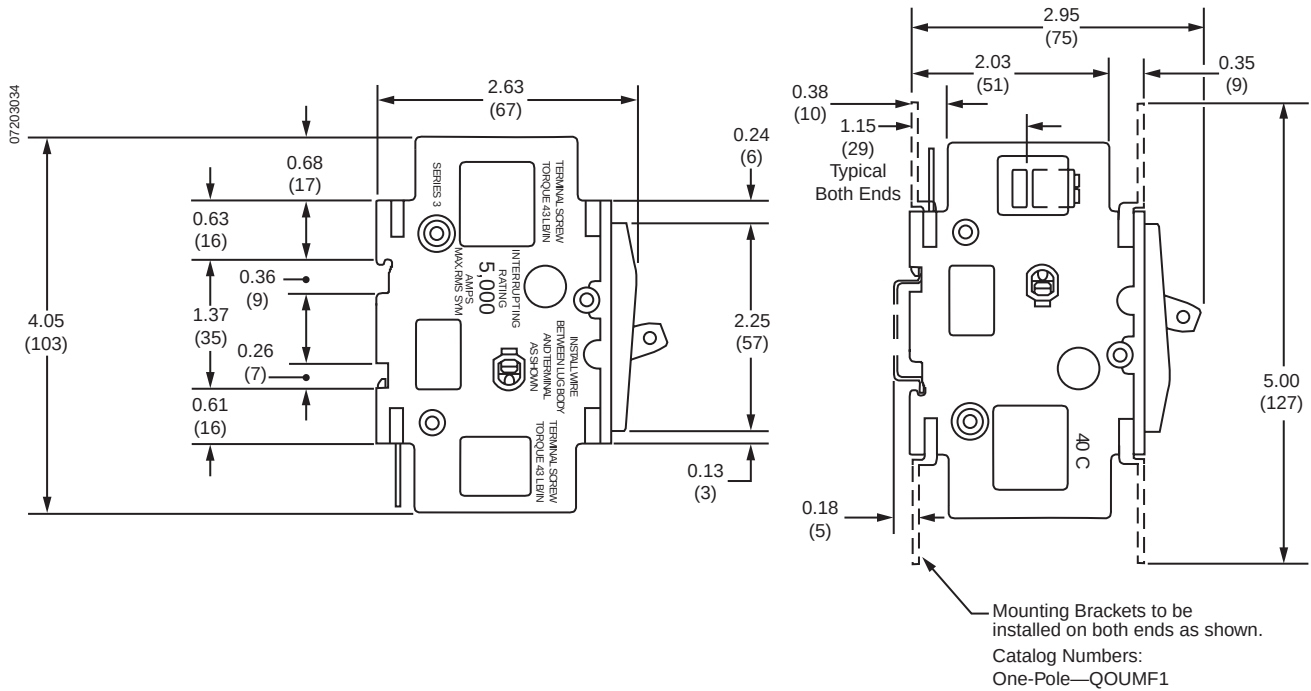
Tripping Characteristics

The QYU trip characteristics are identical to those of the same amperage QOU circuit breaker. See trip curves 730-1, -3, -4 and -5.

QOU Miniature Circuit Breakers and Switches Dimensions

DIMENSIONS

QYU One-pole 277 Vac Supplementary Protectors



Schneider Electric USA

3700 Sixth St. SW
Cedar Rapids, IA 52404
USA
1-888-Square D
1-888-778-2733

0720CT9401R1/05 © 2005 Schneider Electric All Rights Reserved
Replaces 0720CT9401 dated 08/1994

09/2005

DIVIDER





Product availability: Stock - Normally stocked in distribution facility



Main

Commercial Status	Commercialised
Product or component type	Circuit breaker
Range of product	PowerPact H
Line Rated Current	100 A
Poles description	3P
Breaking capacity	20 kA 250 V DC 14 kA 600 V AC 18 kA 480 V AC 25 kA 240 V AC
System Voltage	250 V DC 600 V AC
[Ics] rated service short-circuit breaking capacity	80 %
Trip unit technology	Thermal-magnetic
Product certifications	CSA IEC UL listed
Mounting mode	Unit mount
Breaking capacity code	D
Electrical connection	Lugs line Lugs load
AWG gauge	AWG 14...AWG 3/0 (aluminium/copper)
Magnetic hold current	900 A
Magnetic tripping current	1700 A

Ordering and shipping details

Category	01110 - HD,JD UNIT MT BREAKER/SWITCH
Discount Schedule	DE2
GTIN	00785901839934
Nbr. of units in pkg.	1
Product availability	Stock - Normally stocked in distribution facility
Returnability	Y
Country of origin	MX

Offer Sustainability

Sustainable offer status	Green Premium product
RoHS (date code: YYWW)	Compliant - since 0832 - Schneider Electric declaration of conformity
REACH	Reference not containing SVHC above the threshold
Product environmental profile	Available
Product end of life instructions	Need no specific recycling operations

Contractual warranty

Warranty period	18 months
-----------------	-----------

TAB 6



Features

1 & 2 pole relay interface modules,
screw terminal socket, 15.8 mm wide.

Ideal interface for PLC and electronic systems

4C.01 - 1 Pole 16 A

4C.02 - 2 Pole 8 A

- AC coils or DC coils
- Instant ejection of relay using plastic retaining clip
- Supply status indication and coil suppression module as standard
- Identification label
- UL Listing (certain relay/socket combinations)
- 35 mm rail (EN 60715) mounting

4C.01 / 4C.02
Screw terminal



4C.01

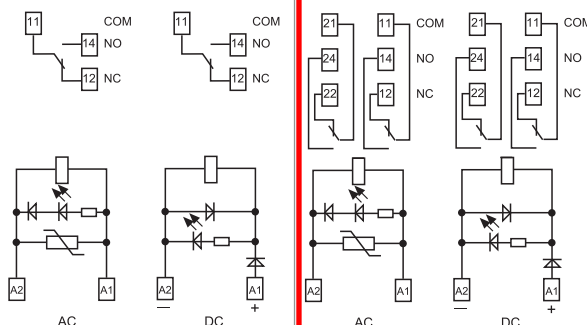


- 1 pole, 16 A
- Screw terminal connection
- 35 mm rail (EN 60715) mounting

4C.02



- 2 pole, 8 A
- Screw terminal connection
- 35 mm rail (EN 60715) mounting



For outline drawing of 4C.01/02 see page 5

Contact specification

Contact configuration		1 CO (SPDT)	2 CO (DPDT)
Rated current/Maximum peak current	A	16/25	8/15
Rated voltage/Maximum switching voltage V AC		250/440	250/440
Rated load AC1	VA	4,000	2,000
Rated load AC15 (230 V AC)	VA	750	350
Single phase motor rating (230 V AC)	kW	0.55	0.37
Breaking capacity DC1: 30/110/220V	A	16/0.5/0.15	6/0.5/0.15
Minimum switching load	mW (V/mA)	300 (5/5)	300 (5/5)
Standard contact material		AgNi	AgNi

Coil specification

Nominal voltage (U_N)	V AC (50/60 Hz)	12 - 24 - 110 - 120 - 230	12 - 24 - 110 - 120 - 230
	V DC	12 - 24 - 125	12 - 24 - 125
Rated power AC/DC	VA (50 Hz)/W	1.2/0.5	1.2/0.5
Operating range	AC	$(0.8...1.1)U_N$	$(0.8...1.1)U_N$
	DC	$(0.73...1.1)U_N$	$(0.73...1.1)U_N$
Holding voltage	AC/DC	$0.8 U_N / 0.4 U_N$	$0.8 U_N / 0.4 U_N$
Must drop-out voltage	AC/DC	$0.2 U_N / 0.1 U_N$	$0.2 U_N / 0.1 U_N$

Technical data

Mechanical life AC/DC	cycles	$10 \cdot 10^6$	$10 \cdot 10^6$
Electrical life at rated load AC1	cycles	$100 \cdot 10^3$	$100 \cdot 10^3$
Operate/release time	ms	15/5 (AC) - 15/12 (DC)	10/3 (AC) - 10/10 (DC)
Insulation between coil and contacts (1.2/50 μ s)	kV	6 (8 mm)	6 (8 mm)
Dielectric strength between open contacts	V AC	1,000	1,000
Ambient temperature range	°C	$\leq 12A: -40...+70 > 12A: -40...+50$	$-40...+70$
Protection category		IP 20	IP 20

Approvals - relay (according to type)



Ordering information

Example: 4C series, 35 mm rail (EN 60715) mount screw terminal relay interface module, 1 CO (SPDT) 16 A contacts, 24 V DC coil, green LED + diode.

4C.0.1.9.024.00.50

Series

Type

0 = 35 mm rail (EN 60715) mount screw terminal socket

5 = 35 mm rail (EN 60715) mount screwless terminal socket

No. of poles

1 = 1 pole

2 = 2 pole

Coil version

8 = AC (50/60 Hz)

9 = DC

Coil voltage

See coil specifications

A: Contact material

0 = AgNi

4 = AgSnO₂

5 = AgNi + Au (5 µm)

B: Contact circuit

0 = CO (nPDT)

D: Special version

0 = Standard

C: Options

5 = Standard for DC: green LED + diode (polarity +A1)

6 = Standard for AC: green LED + Varistor

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

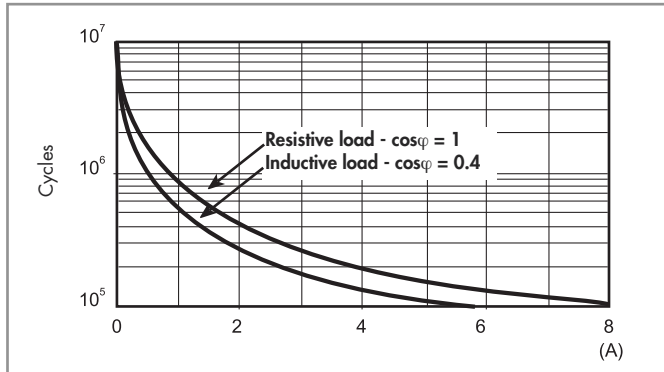
Type	Coil version	A	B	C	D
4C.02	AC	0 - 5	0	6	0
4C.52	DC	0 - 5	0	5	0
4C.01	AC	0 - 4 - 5	0	6	0
4C.51	DC	0 - 4 - 5	0	5	0

Technical data

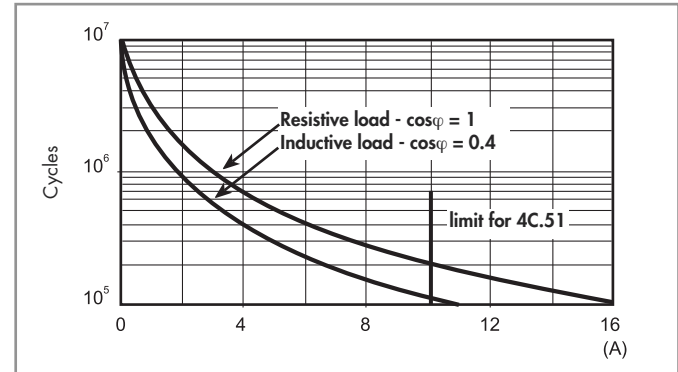
Insulation						
Insulation according to EN 61810-1	insulation rated voltage	V	250		440	
	rated impulse withstand voltage	kV	4		4	
	pollution degree		3		2	
	overvoltage category		III		III	
Insulation between coil and contacts (1.2/50 µs)		kV	6 (8 mm)			
Dielectric strength between open contacts		V AC	1,000			
Dielectric strength between adjacent contacts		V AC	2,000			
Conducted disturbance immunity						
Burst (5...50)ns, 5 kHz, on A1 - A2			EN 61000-4-4		level 4 (4 kV)	
Surge (1.2/50 µs) on A1 - A2 (differential mode)			EN 61000-4-5		level 3 (2 kV)	
Other data						
Bounce time: NO/NC		ms	2/6 (4C.01/51)		1/4 (4C.02/52)	
Vibration resistance (10...150)Hz: NO/NC		g	20/12			
Power lost to the environment	without contact current	W	0.6			
	with rated current	W	1.6 (4C.01/51)		2 (4C.02/52)	
Terminals			4C.01/4C.02		4C.51/4C.52	
Wire strip length		mm	8		8	
 Screw torque		Nm	0.8		—	
Max. wire size			solid cable	stranded cable	solid cable	stranded cable
		mm²	1x6/2x2.5	1x4/2x2.5	2x(0.2...1.5)	2x(0.2...1.5)
		AWG	1x10/2x14	1x12/2x14	2x(24...18)	2x(24...18)

Contact specification

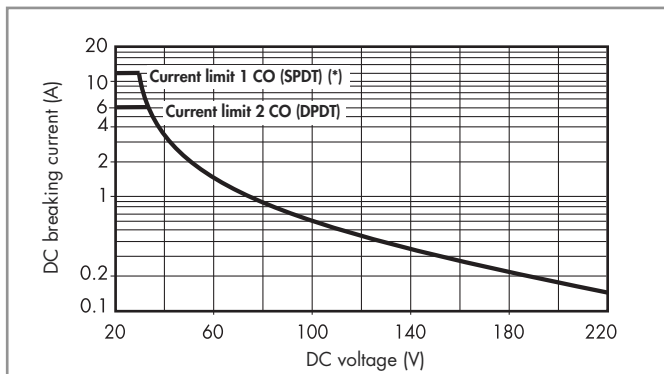
F 4C - Electrical life (AC) v contact current
Types 4C.02/52



F 4C - Electrical life (AC) v contact current
Types 4C.01/51



H 4C - Maximum DC1 breaking capacity



(*) Type 4C.01 = 12 A, Type 4C.51 = 10 A

- 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.

Coil specifications

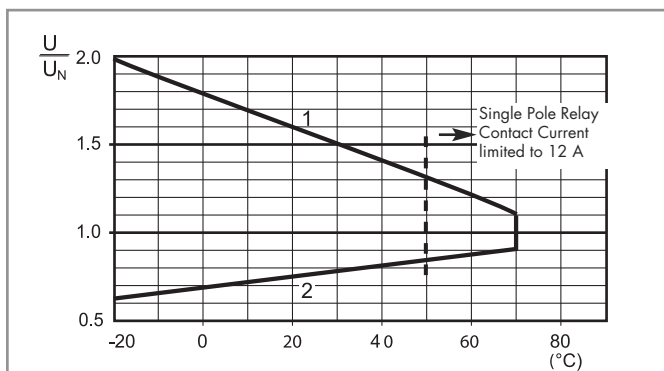
DC coil data

Nominal voltage U_N V	Coil code	Operating range		Resistance R Ω	Rated coil consumption I at U_N mA
		U_{min} V	U_{max} V		
12	9.012	8.8	13.2	300	40
24	9.024	17.5	26.4	1,200	20
125	9.125	91.2	138	32,000	3.9

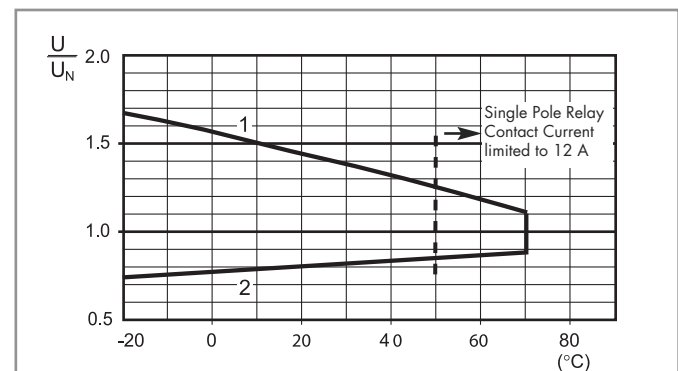
AC coil data

Nominal voltage U_N V	Coil code	Operating range		Resistance R Ω	Rated coil consumption I at U_N mA
		U_{min} V	U_{max} V		
12	8.012	9.6	13.2	80	90
24	8.024	19.2	26.4	320	45
110	8.110	88	121	6,900	9.4
120	8.120	96	132	9,000	8.4
230	8.230	184	253	28,000	5

R 4C - DC coil operating range v ambient temperature



R 4C - AC coil operating range v ambient temperature



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

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

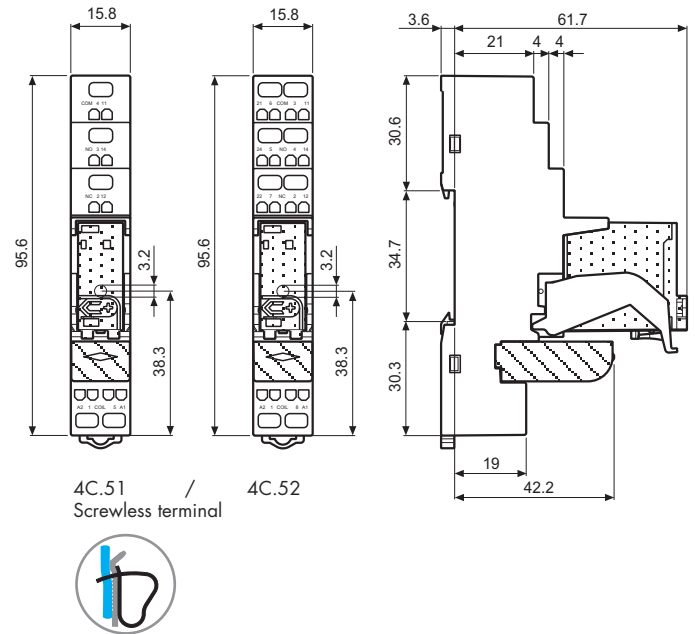
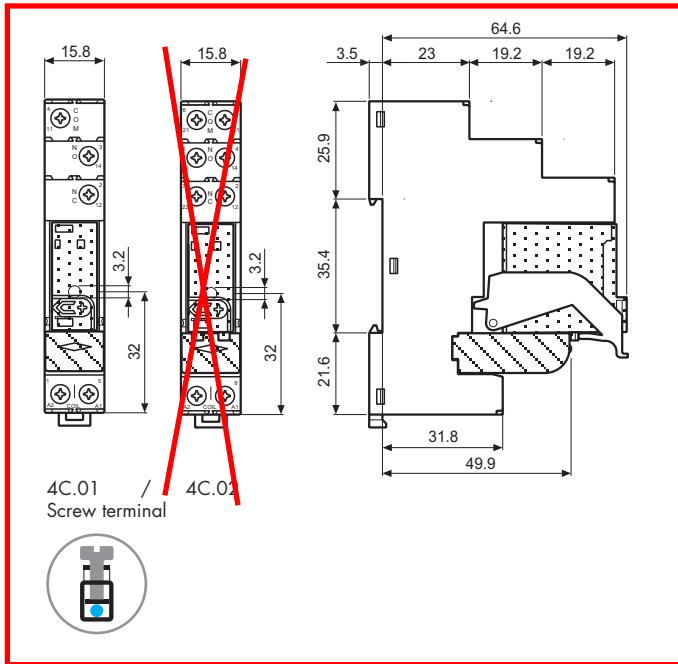
----- Temperature limit for the single pole version under full 16 A contact current.

Combinations

Certain relay/socket combinations

Code	Type of socket	Type of relay	Module	Retaining clip
4C.01	97.01	46.61	99.02	097.01
4C.02	97.02	46.52	99.02	097.01
4C.51	97.51	46.61	99.02	097.01
4C.52	97.52	46.52	99.02	097.01

Outline drawing

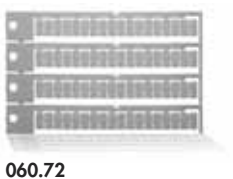
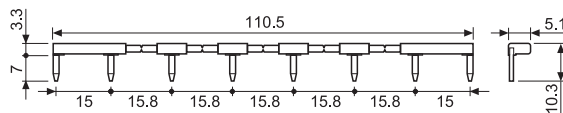


Accessories



8-way jumper link for 4C.01 and 4C.02
Rated values

095.18 (blue)
10 A - 250 V



Sheet of marker tags, plastic, 72 tags, 6x12 mm

060.72

Packaging code

How to code and identify retaining clip and packaging options for relay interface module.

Example:

4 C . 0 1 . 9 . 0 2 4 . 0 0 5 0 S P A

A Standard packaging
B Blister packaging

SP Plastic retaining clip

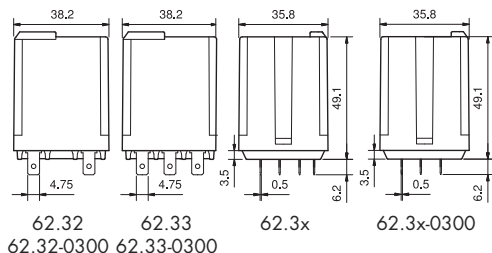
DIVIDER



Features

Plug-in mount/Faston 187 16 A Power relay

- Plug-in (92 series sockets) or Faston 187 (4.8x0.5 mm) with optional mounting adaptors
- 2 & 3 Pole changeover contacts or NO (≥ 3 mm contact gap)
- AC coils & DC coils
- UL Listing (certain relay/socket combinations)
- LED, mechanical indicator & test button options
- Reinforced insulation between coil and contacts according to EN 60335-1, with 6 mm clearance & 8 mm creepage distance
- SELV coil-contact separator option
- Cadmium Free contact material options
- Sockets and accessories
- European Patent



* Distance between contacts ≥ 3 mm (EN 60730-1)

** With the AgSnO₂ material the maximum peak current is 120 A - 5 ms (NO contact).

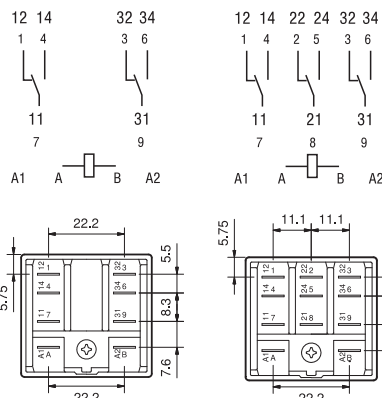
FOR UL RATINGS SEE:

"General technical information" page V

62.32 / 62.33



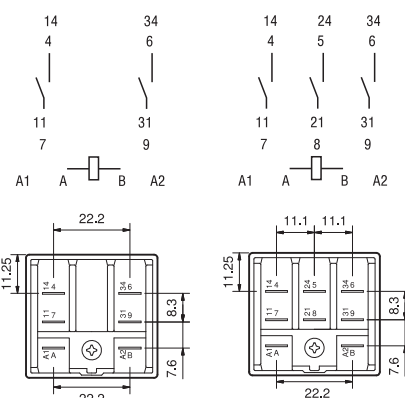
- 2 & 3 pole changeover contact
- Plug-in / Faston 187



62.32-0300 / 62.33-0300



- 2 & 3 pole normally open contact (≥ 3 mm contact gap)
- Plug-in / Faston 187



Contact specification

Contact configuration	2 CO (DPDT)	3 CO (3PDT)	2 NO (DPST-NO), ≥ 3 mm*	3 NO (3PST-NO), ≥ 3 mm*
Rated current/Maximum peak current A	16/30**		16/30**	
Rated voltage/Maximum switching voltage V AC	250/400		250/400	
Rated load AC1 VA	4,000		4,000	
Rated load AC15 (230 V AC) VA	750		750	
Motor rating (230/400 V AC) kW	0.8/—	0.8/1.5	0.8/—	0.8/1.5
Breaking capacity DC1: 30/110/220 V A	16/0.6/0.4		16/1.1/0.7	
Minimum switching load mW (V/mA)	1,000 (10/10)		1,000 (10/10)	
Standard contact material	AgCdO		AgCdO	

Coil specification

Nominal voltage (U _N)	V AC (50/60 Hz)	6 - 12 - 24 - 48 - 60 - 110 - 120 - 230 - 240 - 400	
	V DC	6 - 12 - 24 - 48 - 60 - 110 - 125 - 220	
Rated power AC/DC	VA (50 Hz)/W	2.2/1.3	3/3
Operating range	AC	(0.8...1.1)U _N	(0.85...1.1)U _N
	DC	(0.8...1.1)U _N	(0.85...1.1)U _N
Holding voltage	AC/DC	0.8 U _N /0.6 U _N	0.8 U _N /0.6 U _N
Must drop-out voltage	AC/DC	0.2 U _N /0.1 U _N	0.2 U _N /0.1 U _N

Technical data

Mechanical life AC/DC	cycles	10 · 10 ⁶ /30 · 10 ⁶	10 · 10 ⁶ /30 · 10 ⁶
Electrical life at rated load AC1	cycles	100 · 10 ³	100 · 10 ³
Operate/release time	ms	11/4	15/3
Insulation between coil and contacts (1.2/50 μs)	kV	6	6
Dielectric strength between open contacts	V AC	1,500	2,500
Ambient temperature range	°C	-40...+70	-40...+50
Environmental protection		RT I	RT I

Approvals (according to type)



Ordering information

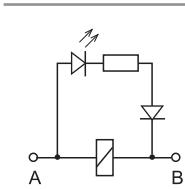
Example: 62 series power relay + Faston 250 (6.3x0.8 mm), rear flange mount, 2 NO (DPST-NO), 12 V DC coil.

Series Type 2 = PCB 3 = Plug-in 8 = Faston 250 (6.3x0.8 mm) with rear flange mount No. of poles 2 = 2 pole 3 = 3 pole Coil version 8 = AC (50/60 Hz) 9 = DC Coil voltage See coil specifications	A: Contact material 0 = Standard AgCdO 4 = AgSnO₂ B: Contact circuit 0 = CO (nPDT) 3 = NO (nPST), ≥ 3 mm contact gap 5 = CO (nPDT) + additional physical separator between coil and contacts (for SELV applications) 6 = NO (nPST), ≥ 3 mm contact gap + additional physical separator between coil and contacts (for SELV applications)	C: Options 0 = None 2 = Mechanical indicator 3 = LED (AC) 4 = Lockable test button + mechanical indicator 5* = Lockable test button + LED (AC) 54* = Lockable test button + LED (AC) + mechanical indicator 6* = LED + diode (DC, polarity positive to pin A/A1) 7* = Lockable test button + LED + diode (DC, polarity positive to pin A/A1) 74* = Lockable test button + LED + diode (DC, polarity positive to pin A/A1) + mechanical indicator * Options not available for 220 V DC and 400 V AC versions.
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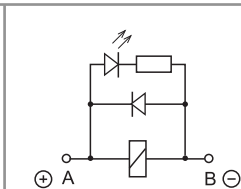
Selecting features and options: only combinations in the same row are possible.
Preferred selections for best availability are shown in **bold**.

Type	Coil version	A	B	C	D
62.22/23	AC-DC	0 - 4	0 - 3 - 5 - 6	0	0
62.32/33	AC-DC	0 - 4	0 - 3 - 5 - 6	0	0 - 6
	AC-DC	0 - 4	0 - 5	2 - 4	0 - 6
	AC	0 - 4	0	2 - 3 - 4 - 5	0 - 6
	AC	0 - 4	0 - 3	3	0 - 6
	AC	0 - 4	0	54	/
	DC	0 - 4	0	4 - 6 - 7	0 - 6
	DC	0 - 4	0 - 3	6	0 - 6
	DC	0 - 4	0	74	/
62.82/83	AC-DC	0 - 4	0 - 3 - 5 - 6	0	0 - 9
	AC-DC	0 - 4	0 - 5	2 - 4	0
	AC	0 - 4	0	2 - 3 - 4 - 5	0
	AC	0 - 4	0 - 3	3	0
	DC	0 - 4	0	4 - 6 - 7	0
	DC	0 - 4	0 - 3	6	0

Descriptions: Options and Special versions



C: Option 3, 5, 54
LED (AC)



C: Option 6, 7, 74
LED + diode (DC, polarity positive to pin A/A1)



B: Contact circuit 5, 6
Additional physical separator between coil and contacts (for SELV applications)



Lockable test button and mechanical flag indicator (0040, 0050, 0054, 0070, 0074)

The dual-purpose Finder test button can be used in two ways:

Case 1) The plastic pip (located directly above the test button) remains intact. In this case, when the test button is pushed, the contacts operate. When the test button is released the contacts return to their former state.

Case 2) The plastic pip is broken-off (using an appropriate cutting tool). In this case, (in addition to the above function), when the test button is pushed and rotated, the contacts are latched in the operating state, and remain so until the test button is rotated back to its former position. In both cases ensure that the test button actuation is swift and decisive.

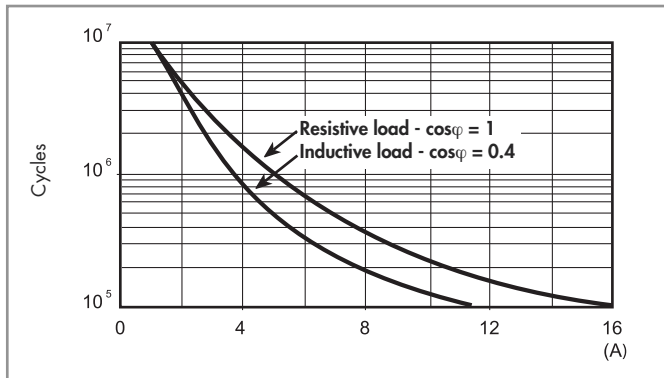


Technical data

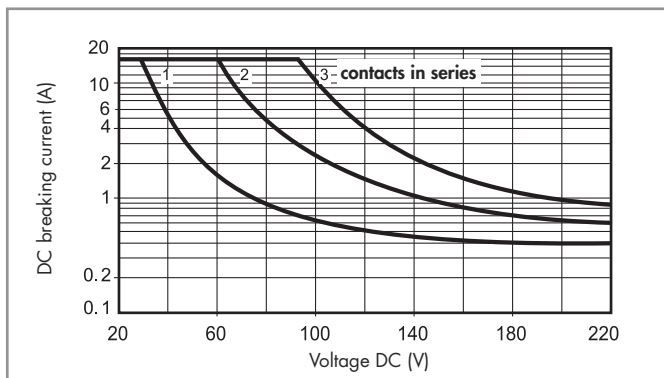
Insulation according to EN 61810-1						
		2 CO - 3 CO		2 NO - 3 NO		
Nominal voltage of supply system	V AC	230/400		230/400		
Rated insulation voltage	V AC	400		400		
Pollution degree		3		3		
Insulation between coil and contact set						
Type of insulation		Reinforced		Reinforced		
Overvoltage category		III		III		
Rated impulse voltage	kV (1.2/50 µs)	6		6		
Dielectric strength	V AC	4,000		4,000		
Insulation between adjacent contacts						
Type of insulation		Basic		Basic		
Overvoltage category		III		III		
Rated impulse voltage	kV (1.2/50 µs)	4		4		
Dielectric strength	V AC	2,500		2,500		
Insulation between open contacts						
Type of disconnection		Micro-disconnection		Full-disconnection		
Overvoltage category		—		III		
Rated impulse voltage	kV (1.2/50 µs)	—		4		
Dielectric strength	V AC/kV (1.2/50 µs)	1,500/2		2,500/4		
Conducted disturbance immunity						
Burst (5...50)ns, 5 kHz, on A1 - A2		EN 61000-4-4		level 4 (4 kV)		
Surge (1.2/50 µs) on A1 - A2 (differential mode)		EN 61000-4-5		level 4 (4 kV)		
Other data						
Bounce time: NO/NC	ms	1/5 (changeover)		3/— (normally open)		
Vibration resistance (10...150)Hz: NO/NC	g	20/8				
Shock resistance	g	15				
Power lost to the environment		2 pole (CO)	3 pole (CO)	2 pole (NO)	3 pole (NO)	
	without contact current	W	1.3	1.3	3	3
	with rated current	W	3.3	4.3	5	6
Recommended distance between relays mounted on PCB		mm	≥ 5			

Contact specification

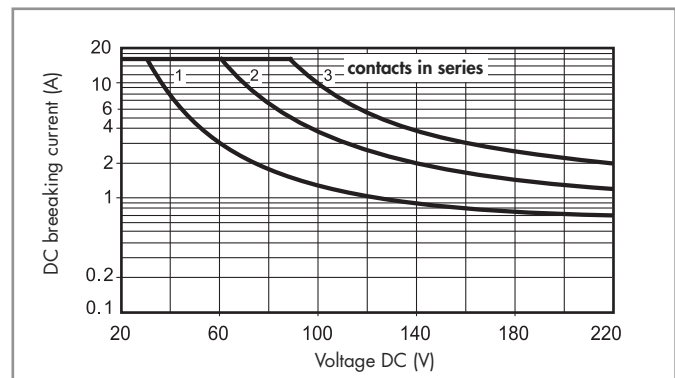
F 62 - Electrical life (AC) v contact current



H 62 - Maximum DC1 breaking capacity Changeover contacts



H 62 - Maximum DC1 breaking capacity Normally open contacts



- 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 of the load will be increased.

Coil specifications

DC version data

Nominal voltage U_N V	Coil code	Operating range		Resistance R Ω	Rated coil consumption I at U_N mA
		U_{min} V	U_{max} V		
6	9.006	4.8	6.6	28	214
12	9.012	9.6	13.2	110	109
24	9.024	19.2	26.4	445	54
48	9.048	38.4	52.8	1,770	27
60	9.060	48	66	2,760	21.7
110	9.110	88	121	9,420	11.7
125	9.125	100	138	12,000	10.4
220	9.220	176	242	37,300	5.8

AC version data

Nominal voltage U_N V	Coil code	Operating range		Resistance R Ω	Rated coil consumption I at U_N (50Hz) mA
		U_{min} V	U_{max} V		
6	8.006	4.8	6.6	4.6	367
12	8.012	9.6	13.2	19	183
24	8.024	19.2	26.4	74	90
48	8.048	38.4	52.8	290	47
60	8.060	48	66	450	37
110	8.110	88	121	1,600	20
120	8.120	96	132	1,940	18.6
230	8.230	184	253	7,250	10.5
240	8.240	192	264	8,500	9.2
400	8.400	320	440	19,800	6

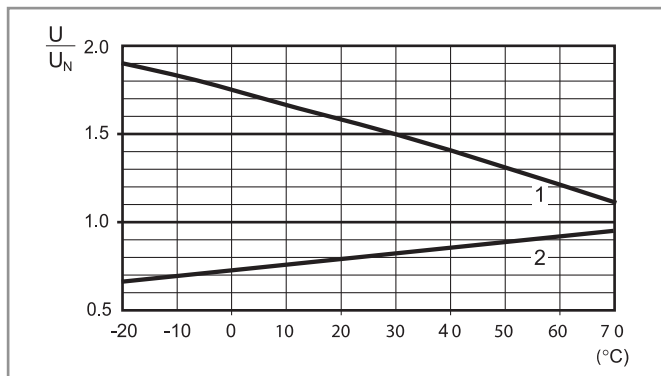
DC (NO/nPST-NO) version data - ≥ 3 mm

Nominal voltage U_N V	Coil code	Operating range		Resistance R Ω	Rated coil consumption I at U_N mA
		U_{min} V	U_{max} V		
6	9.006	5.1	6.6	12	500
12	9.012	10.2	13.2	48	250
24	9.024	20.4	26.4	192	125
48	9.048	40.8	52.8	770	63
60	9.060	51	66	1,200	50
110	9.110	93.5	121	4,200	26
125	9.125	106	138	5,200	24
220	9.220	187	242	17,600	12.5

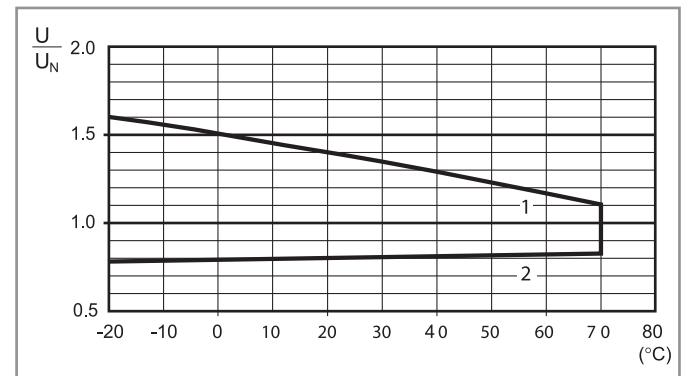
AC (NO/nPST-NO) version data - ≥ 3 mm

Nominal voltage U_N V	Coil code	Operating range		Resistance R Ω	Rated coil consumption I at U_N (50Hz) mA
		U_{min} V	U_{max} V		
6	8.006	5.1	6.6	4	540
12	8.012	10.2	13.2	14	275
24	8.024	20.4	26.4	62	130
48	8.048	40.8	52.8	220	70
60	8.060	51	66	348	55
110	8.110	93.5	121	1,200	30
120	8.120	106	137	1,350	24
230	8.230	196	253	5,000	14
240	8.240	204	264	6,300	12.5
400	8.400	340	440	14,700	7.8

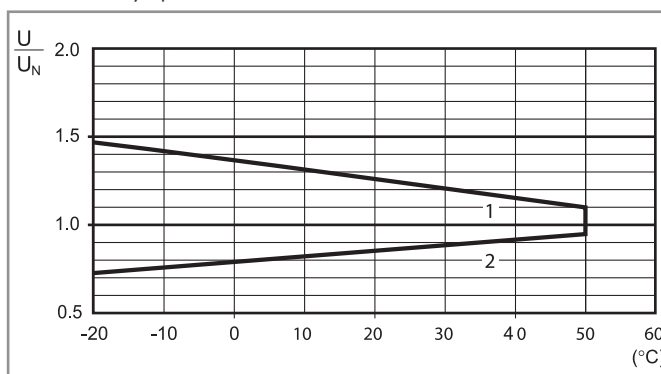
R 62 - DC coil operating range v ambient temperature Changeover contacts



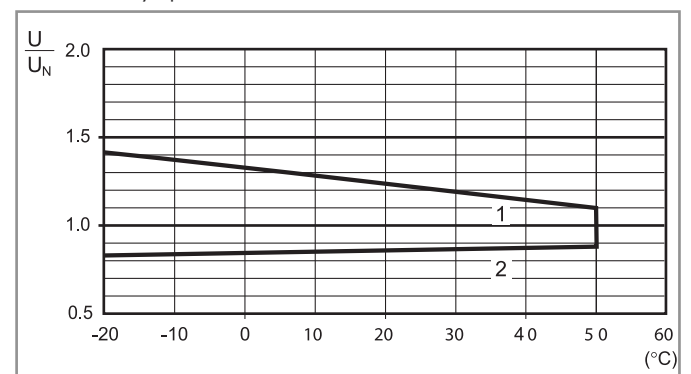
R 62 - AC coil operating range v ambient temperature Changeover contacts



R 62 - DC coil operating range v ambient temperature Normally open contacts

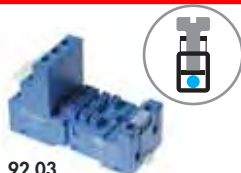


R 62 - AC coil operating range v ambient temperature Normally open contacts



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

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

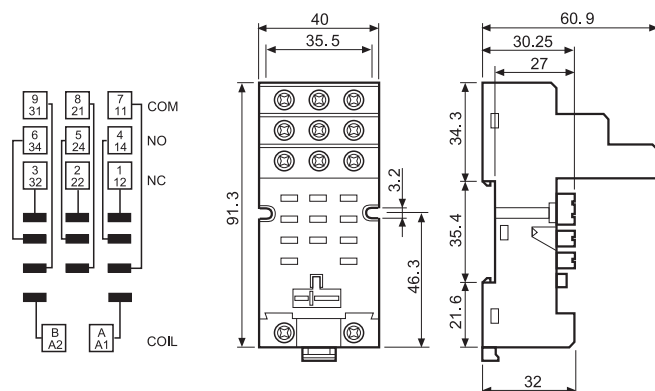


92.03

Approvals
(according to type):



Screw terminal (Box clamp) socket		92.03	~~92.03.0~~ ~~Black~~
panel or 35 mm rail (EN 60715) mount		Blue	
For relay type		62.32, 62.33	
Accessories			
Metal retaining clip (supplied with socket - packaging code SMA)			092.71
Identification tag			092.00.2
Modules (see table below)			99.02
Timer modules (see table below)			86.00, 86.30
Technical data			
Rated values		16 A - 250 V	
Dielectric strength		6 kV (1.2/50 µs) between coil and contacts	
Protection category		IP 20	
Ambient temperature		°C -40...+70	
Screw torque		Nm 0.8	
Wire strip length		mm 10	
Max. wire size for 92.03 socket		solid wire	stranded wire
		mm ² 1x10 / 2x4	1x6 / 2x4
		AWG 1x8 / 2x12	1x10 / 2x12



86.00



86.30

86 series timer modules	
Multi-voltage: (12...240)V AC/DC;	
Multi-functions: AI, DI, SW, BE, CE, DE, EE, FE; (0.05s...100h)	86.00.0.240.0000
(12...24)V AC/DC; Bi-function: AI, DI; (0.05s...100h)	86.30.0.024.0000
(110...125)V AC; Bi-function: AI, DI; (0.05s...100h)	86.30.8.120.0000
(230...240)V AC; Bi-function: AI, DI; (0.05s...100h)	86.30.8.240.0000

Approvals
(according to type):



99.02

Approvals
(according to type):



99.02 coil indication and EMC suppression modules for 92.03 socket		
Diode (+A1, standard polarity)	(6...220)V DC	99.02.3.000.00
LED	(6...24)V DC/AC	99.02.0.024.59
LED	(28...60)V DC/AC	99.02.0.060.59
LED	(110...240)V DC/AC	99.02.0.230.59
LED + Diode (+A1, standard polarity)	(6...24)V DC	99.02.9.024.99
LED + Diode (+A1, standard polarity)	(28...60)V DC	99.02.9.060.99
LED + Diode (+A1, standard polarity)	(110...220)V DC	99.02.9.220.99
LED + Varistor	(6...24)V DC/AC	99.02.0.024.98
LED + Varistor	(28...60)V DC/AC	99.02.0.060.98
LED + Varistor	(110...240)V DC/AC	99.02.0.230.98
RC circuit	(6...24)V DC/AC	99.02.0.024.09
RC circuit	(28...60)V DC/AC	99.02.0.060.09
RC circuit	(110...240)V DC/AC	99.02.0.230.09
Residual current by-pass	(110...240)V AC	99.02.8.230.07

DC Modules with
non-standard polarity
(+A2) on request.

TAB 7



Modular PE terminals

Identical profiles from 2.5 to 10 mm² with uniform end and partition plates. An unsurpassed combination of many advantages!

Their small size compared to the respective rated cross-section makes the modular terminals with the compact design very popular.

In hazardous area applications, the installation instructions and the rated data specifications for accessories given in the technical appendix must be followed.

Width/Length/height with TS35x7.5	mm
max. cond. cross-section	mm ²
Max. clamping range	mm ²

Technical data

Rated data	
Rated cross-section	mm ²
Rated voltage to adjacent terminal	V
Rated impulse withstand voltage to adjacent terminal	kV
Short-time withstand current	
Pollution severity	
Gauge to IEC 60947-1 / UL94 Flammability class	
Approvals	
Clamped conductors (H05V/H07V)	
solid / stranded	mm ²
flexible / Stranded wire with end ferrules	mm ²
Tightening torque range (clamping screw)	
Tightening torque range (fixing screw)	
Stripping length / Blade size	mm/-

Note

Ordering data

Version	green/yellow Wemid
Note	

Accessories

End plate / partition	Dark beige Wemid
End bracket	Dark beige Wemid Dark beige Wemid
Screwdriver	Standard

Marking systems (see assortment in catalogue 7)

Marking tags

For detailed information on other accessories and applications, refer to the „Accessories“ section

WPE 2.5

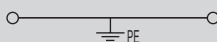
2.5 mm²



5.1 x 60 x 47

4

0.05...4



IEC 60947-7-2

Ex e ll



II 2 G D

IEC	UL	CSA	EN 60079-7
2.5	AWG 30...12	AWG 30...12	2.5
800			
8			
	300 A (2.5 mm ²)		
	3		
	A3 / V-0		



Rated connection	Further connection
0.5...4 / 1.5...4	
0.5...4 / 0.5...2.5	
0.4...0.8 Nm (M 2.5)	
0.4...0.8 Nm	
10 / 0.6 x 3.5 mm	

2.5 mm² conductor with wire end ferrule plus plastic collar only with collar optimised for diameter (order No. 1333100000, 500 pcs)

Type	Qty	Order No.
WPE 2.5	100	1010000000

Type	Width	Qty	Order No.
WAP 2.5-10	1.5 mm	50	1050000000
WEW 35/2	8 mm	100	1061200000
SD 0.6x3.5x100		1	9008330000

DEK 5/5 / WS 12/5

Rail support for insulated installation of terminal rail „SH 2“ order no. 0494920000 (10 pcs)

WPE 2.5N

2.5 mm²

Compact design



5.1 x 54 x 37.5

4

0.05...4



IEC 60947-7-2

Ex e ll



II 2 G D

IEC	UL	CSA	EN 60079-7
2.5	AWG 30...12	AWG 26...12	2.5
500			
6			
	300 A (2.5 mm ²)		
	3		
	A3 / V-0		



Rated connection	Further connection
0.5...4 / 1.5...4	
0.5...4 / 0.5...2.5	
0.4...0.6 Nm (M 2.5)	
0.4...0.6 Nm	
10 / 0.6 x 3.5 mm	

2.5 mm² conductor with wire end ferrule plus plastic collar only with collar optimised for diameter (order No. 1333100000, 500 pcs)

Type	Qty	Order No.
WPE 2.5N	100	1016200000

Type	Width	Qty	Order No.
WAP WDU2.5N/4N	1.5 mm	50	1060000000
EW 35	8.5 mm	50	0383560000
SD 0.6x3.5x100		1	9008330000

DEK 5/5 / WS 12/5

Rail support for insulated installation of terminal rail „SH 2“ order no. 0494920000 (10 pcs)



General ordering data

Order No.	1050000000
Part designation	WAP 2.5-10
Version	Modular terminal, accessories, End and intermediate plate, dark beige, 1.5 mm
EAN	4008190103149
Qty.	50 pc(s).

Additional technical data

Installation advice	Direct mounting
UL 94 flammability rating of insulation material	V0

Dimensions

Width	1.5 mm
Length	56 mm

End plate

Colour	dark beige
Function	End plate
Height	33.5 mm
Length	56 mm
Material	Wemid
Snap-on	No
UL 94 flammability rating of insulation material	V0

Approvals

Approvals institutes



Downloads

STEP	1050000000_09214_WAP_2.5-10_STP.stp
------	-------------------------------------

Classifications

eClass 4.1	27-14-11-99
eClass 5.0	27-14-11-33
eClass 5.1	27-14-11-33

Similar products

Order No.	Part designation	Version
1050080000	WAP 2.5-10 BL	Modular terminal, accessories, End and intermediate plate, blue/light blue, 1.5 mm
1050070000	WAP 2.5-10 BR	Modular terminal, accessories, End and intermediate plate, brown, 1.5 mm
1050020000	WAP 2.5-10 GE	Modular terminal, accessories, End and intermediate plate, yellow, 1.5 mm
1072200000	WAP 2.5-10 GN	Modular terminal, accessories, End and intermediate plate, green, 1.5 mm
1050050000	WAP 2.5-10 GR	Modular terminal, accessories, End and intermediate plate, grey, 1.5 mm
1050060000	WAP 2.5-10 OR	Modular terminal, accessories, End and intermediate plate, Orange, 1.5 mm
1050040000	WAP 2.5-10 RT	Modular terminal, accessories, End and intermediate plate, red, 1.5 mm
1050010000	WAP 2.5-10 SW	Modular terminal, accessories, End and intermediate plate, black, 1.5 mm
1072210000	WAP 2.5-10 VI	Modular terminal, accessories, End and intermediate plate, violet, 1.5 mm
1050090000	WAP 2.5-10 WS	Modular terminal, accessories, End and intermediate plate, white, 1.5 mm

Accessories
WEW 35/2

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 16
D-32758 Detmold
Germany
Fon: +49 5231 14-0
Fax: +49 5231 14-292083
www.weidmueller.com



Weidmüller's range of products includes end brackets that guarantee a permanent, reliable mounting on the terminal rail and prevent sliding. Versions with and without screws are available. The end brackets include marking options, also for group markers, and also a test plug holder.

General ordering data

Type	WEW 35/2
Order No.	1061200000
Version	Accessories, End bracket
GTIN (EAN)	4008190030230
Qty.	100 pc(s).

Accessories

WEW 35/2

Weidmüller Interface GmbH & Co. KG
 Klingenbergstraße 16
 D-32758 Detmold
 Germany
 Fon: +49 5231 14-0
 Fax: +49 5231 14-292083
 www.weidmueller.com

Technical data

Dimensions and weights

Width	8 mm	Height	56 mm
Height of lowest version	47 mm	Depth	46.5 mm
Net weight	14.442 g		

Temperatures

Continuous operating temp., min.	-50 °C	Continuous operating temp., max.	100 °C
----------------------------------	--------	----------------------------------	--------

Additional technical data

Installation advice	Direct mounting	Type of mounting	Screwed
Version	For the terminals		

Clampable wires (rated connection)

Tightening torque, min.	0.5 Nm	Tightening torque, max.	1 Nm
-------------------------	--------	-------------------------	------

Dimensions

TS 35 offset	28 mm
--------------	-------

Material data

Material	PA 66 GF 30	Colour	Dark Beige
UL 94 flammability rating	HB		

System specifications

Product family	Accessories	Mounting rail	TS 35
----------------	-------------	---------------	-------

Classifications

ETIM 3.0	EC001041	UNSPSC	30-21-18-01
eClass 5.1	27-08-10-03	eClass 6.2	27-08-10-03
eClass 7.1	27-08-10-03		

Approvals

ROHS	Conform
------	---------

Downloads

STEP	_WEW 35_2_1061200000.stp
3-D model	

ZQV 2.5N



Continuous cross-connection

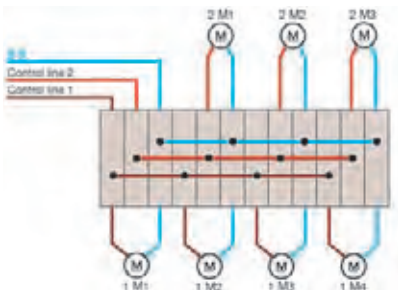
ZQV 2.5N/20 (20-pole) and ZQV 4N/20 (20-pole) are ideal for shortening (e.g. with tool KT ZQV – 9002170000) to produce customised configurations with the required number of poles. More than 20 poles in a row are not recommended because of the resulting tolerances in the terminals.



Special features of

WDU 2.5, WDU 4 and WDU 2.5/1.5/ZR

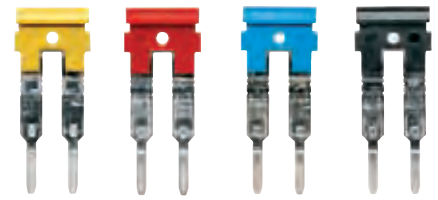
- Parallel distribution of 3 potentials
Important! Rated voltage reduced to 125 V!
- Parallel distribution of 2 potentials
Important! Only when using the outer cross-connection holes at 400 V
- The middle cross-connection hole can be used for either ZQV or WQV



Important! For shortened ZQV located adjacent to each other (with bare cut edges), end plates or partition plates are necessary for rated voltage of 250 V.



No. of poles
2
3
4
5
6
7
8
9
10
20



Type	I [A]	Qty.	Order No. yellow	Order No. red	Order No. blue	Order No. black
ZQV 2.5N/2	24	60	1693800000	1717900000	1717990000	1718080000
ZQV 2.5N/3	24	60	1693810000	1717910000	1718000000	1718090000
ZQV 2.5N/4	24	60	1693820000	1717920000	1718010000	1718100000
ZQV 2.5N/5	24	20	1693830000	1717930000	1718020000	1718110000
ZQV 2.5N/6	24	20	1693840000	1717940000	1718030000	1718120000
ZQV 2.5N/7	24	20	1693850000	1717950000	1718040000	1718130000
ZQV 2.5N/8	24	20	1693860000	1717960000	1718050000	1718140000
ZQV 2.5N/9	24	20	1693870000	1717970000	1718060000	1718150000
ZQV 2.5N/10	24	20	1693880000	1717980000	1718070000	1718160000
ZQV 2.5N/20	24	20	1909000000	1909110000	1909140000	1909130000

For standard terminal	For compact terminal
WDU 2.5/1.5 ZR	WDU 2.5N
WDU 2.5	WDK 2.5N
WDK 2.5/ ZQV	WDK 2.5N V
WDU 1.5 BLZ 5.08/ ZQV	WDK 2.5N DU-PE

ZQV 4N

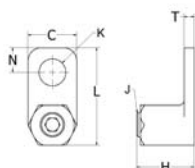


No. of poles
2
3
4
5
6
7
8
9
10
20



Type	I [A]	Qty.	Order No. yellow	Order No. red	Order No. blue	Order No. black
ZQV 4N/2	32	60	1758250000	1793950000	1793960000	1793970000
ZQV 4N/3	32	60	1762630000	1793980000	1793990000	1794000000
ZQV 4N/4	32	60	1762620000	1794010000	1794020000	1794030000
ZQV 4N/10	32	20	1758260000	1794040000	1794050000	1794060000
ZQV 4N/20	32	20	1909020000	1909150000	1909100000	1909120000

For standard terminal	For compact terminal
WDU 4	WDU 4N
WTR 4	WDK 4N
WTR 4 SI	WDK 4N V
WTR 4 SL	WDK 4N DU-PE
WTR 4/ZZ+ZR	WDK 2.5N V
WDU/PE4/ZZ+ZR	WDK 2.5N DU-PE


[On Line Catalog](#)
**BURNDY Catalog Number****KA4C****UPC Number**

781810361405

Description

14-4 CU LUG ST SCR 1H

Status

Active

Web Use

BURNDY Product Line

Dimensional

Size (Hex) or Size (Bolt)	5/16
Length (in)	1.11
Thickness (in)	1/10
Height (in)	0.77
B Length (Fraction)	8/17
Hole Size (Fraction)	9/32
Stud Size (in)	1/4
Thickness	0.10
Size (Hex) or Size (Bolt) - in	0.31
B Length (in)	0.47
Pad Width (in)	0.54
N (Fraction)	1/4
N (in)	0.25
Hole Size (in)	0.28
Length (Fraction)	1-1/8
Height (Fraction) (in)	3/4

General**Product Description**Copper Terminal, 1 Hole, 14 AWG
(Sol)-4 AWG (Str), 1/4" Stud, 1
Screw**Conductor(s)**Copper Solid Size (Range)
Copper Stranded (Range)14 AWG-4 AWG
14 AWG-4 AWG**Physical**Screw Type
Type of Hardware
Installation Torque
Type of Plating
Connector Type
Plated (Yes or No)
Product MaterialSlot
5 / 16 "
45
Unplated
Terminal
N
Copper**Approvals / Certifications**UL Listed
CSA Certified
ROHS Compatible
UL Recognized
CULUS
Industry StandardsY
Y
Compliant
N
N
UL468A-468B**Documentation**

For further technical assistance, please contact us

BURNDY LLC - USA

BURNDY Technical Servcies

Hours: 8.00 AM - 5.00 PM
Monday - Friday
Phone: 000-346-4175



Item # 9080LBA362104, Power Distribution Block LBA

Power Distribution Block

Specifications

Ampere Rating	175A/135A (Cu/Al)
UL File	E60616 XCFR2
CSA File	70361 6228-01
RoHS	Yes
CE Marked	Yes
Flammability Rating	UL94V-0
Service Class	C
For Use With	Copper or Aluminum Wire
Maximum Voltage Rating	600VAC
Number of Poles	3
Terminal Type	Lugs
Wire Range - Main	(1)#14 to #2/0 AWG
Wire Range - Branch	(4)#14 to #4 AWG
Cover	9080LB23
Short Circuit Current Ratings with Circuit Breakers	Up to 65 kA
Short Circuit Current Ratings with Fuses	Up to 100kA
35mm Track Adapter	N/A





Schneider Electric USA
1415 South Roselle Road
Palatine, IL 60067
Customer Care Center: 1-888-778-2733
Web: www.schneider-electric.us

ITEM # 9080LBA161101, POWER DISTRIBUTION BLOCK LBA

Power Distribution Block



Specifications	
Ampere Rating	115A/90A (Cu/Al)
UL File	E60616 XCFR2
CSA File	70361 6228-01
RoHS	Yes
CE Marked	Yes
Flammability Rating	UL94V-0
Service Class	C
For Use With	Copper or Aluminum Wire
Maximum Voltage Rating	600VAC
Number of Poles	1
Terminal Type	Lugs
Wire Range - Main	(1)#14 to #2 AWG
Wire Range - Branch	(1)#14 to #2 AWG
Cover	N/A

Short Circuit Current Ratings with Circuit Breakers	Up to 65 kA
Short Circuit Current Ratings with Fuses	Up to 100kA
35mm Track Adapter	N/A

TAB 8



312/318 Series Lead-Free 3AG, Fast-Acting Fuse



Agency Approvals

Agency	Agency File Number	Ampere Range
	E10480	312 Series: 0.062A - 30A 318 Series: 0.062A - 10A
	29862	312 Series: 0.062A - 30A 318 Series: 0.062A - 10A
	NBK040205-E10480B/F NBK040205-E10480D/H	312/318 Series 1A-5A 312/318 Series 6A-10A
	E10480	318 Series: 12A - 30A
	SU05001-6008 SU05001-5005 SU05001-5006	312/318 Series: 1-2A 312/318 Series: 3-6A 312/318 Series: 7-10A
	N/A	312 Series: 0.062A - 10A 318 Series: 0.062A - 10A

Description

The 3AG Fast-Acting Fuse solves a broad range of application requirements while offering reliable performance and cost-effective circuit protection.

Features

- In accordance with UL Standard 248-14
- RoHS compliant and Lead-free
- Available in cartridge and axial lead format and with various forming dimensions

Applications

Used as supplementary protection in appliance or utilization equipment to provide individual protection for components or internal circuits.

Electrical Characteristics for Series

% of Ampere Rating	Ampere Rating	Opening Time
100%	0.062A – 35A	4 hours, Minimum
135%	0.062A – 35A	1 hour, Maximum
200%	0.062A – 10A	5 sec., Maximum
	12A – 30A	10 sec., Maximum
	35A	20 sec., Maximum

Additional Information



**Datasheet
312 Series**



**Resources
312 Series**



**Samples
312 Series**



**Datasheet
318 Series**



**Resources
318 Series**



**Samples
318 Series**

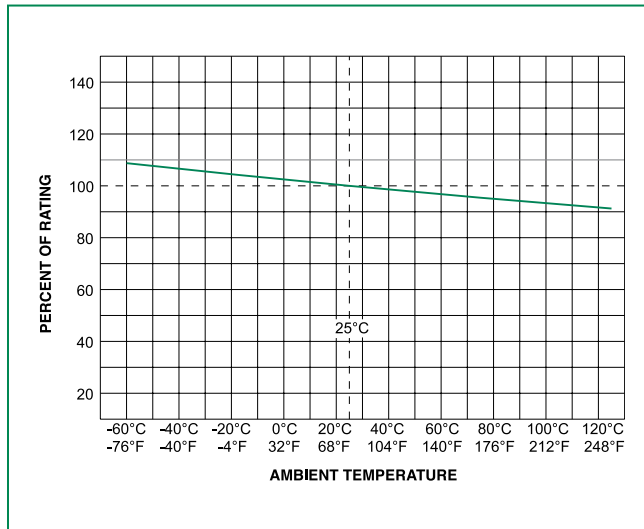
Electrical Characteristic Specifications by Item

Amp Code	Ampere Rating (A)	Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I ² t (A ² sec)	Agency Approvals					
						UL	cULus	K	PSE	SR	CE
.062	0.062	250	35A@250Vac 10KA@125Vac	24.7000	0.000249	x				x	x
.100	0.1	250		11.2800	0.00171	x				x	x
.125	0.125	250		7.1450	0.00289	x				x	x
.150	0.15	250		5.1300	0.00550	x				x	x
.175	0.175	250		3.8750	0.00960	x				x	x
.187	0.187	250		3.4200	0.0128	x				x	x
.200	0.2	250		3.0200	0.0165	x				x	x
.250	0.25	250		2.0100	0.0355	x				x	x
.300	0.3	250		1.4050	0.0689	x				x	x
.375	0.375	250		0.8250	0.185	x				x	x
.500	0.5	250		0.4980	0.483	x				x	x
.600	.6	250		0.3620	0.880	x				x	x
.750	0.75	250		0.2445	1.84	x				x	x
001.	1	250		0.1900	0.760	x		x	x	x	x
1.25	1.25	250	100A@250Vac 10KA@125Vac	0.1385	1.45	x		x	x	x	x
01.5	1.5	250		0.1036	2.35	x			x	x	x
01.6	1.6	250		0.0934	2.80	x		x	x	x	x
1.75	1.75	250		0.0856	3.60	x			x	x	x
01.8	1.8	250		0.0825	3.85	x			x	x	x
002.	2	250		0.0704	5.20	x		x	x	x	x
2.25	2.25	250		0.0594	7.20	x		x	x	x	x
02.5	2.5	250		0.0513	9.54	x		x	x	x	x
003.	3	250		0.0427	14.0	x		x	x	x	x
004.	4	250		0.0293	28.5	x		x	x	x	x
005.	5	250	200A@250Vac 10KA@125Vac	0.0224	50.0	x		x	x	x	x
006.	6	250		0.0178	118.0	x		x	x	x	x
007.	7	250		0.0146	81.0	x		x	x	x	x
008.	8	250		0.0122	166.0	x		x	x	x	x
010.	10	250		0.0093	298.0	x		x	x	x	x
012.*	12	32	300A@32 Vac	0.0072	234.6	x	x**			x	
015.*	15	32		0.0052	490.5	x	x**			x	
020.*	20	32		0.0035	1414	x	x**			x	
025.*	25	32		0.0024	2041	x	x**			x	
030.*	30	32		0.0019	3717	x	x**			x	
035.	35	32		0.0013	7531						

NOTES:

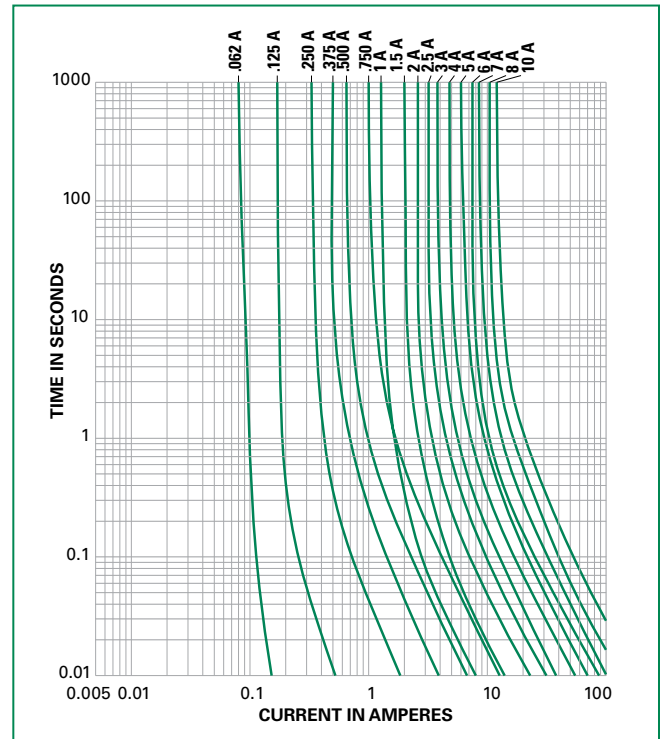
** For 318 Series 12A to 30A, the agency approval is only cULus.

Temperature Re-rating Curve



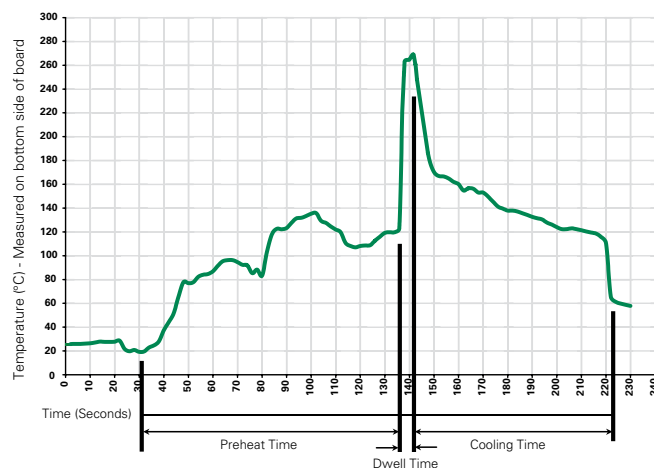
Note:
Derating depicted in this curve is in addition to the standard derating of 25% for continuous operation.

Average Time Current Curves



Please contact Littelfuse for more details on those T-C Curves of other ampere ratings which are not published.

Soldering Parameters - Wave Soldering



Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat:	
(Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260°C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

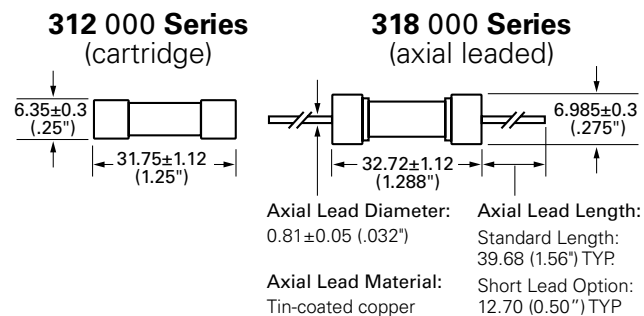
Product Characteristics

Materials	Body: Glass Cap: Nickel-plated brass Leads: Tin-plated Copper
Terminal Strength	MIL-STD-202, Method 211, Test Condition A
Solderability	MIL-STD-202 method 208
Product Marking	Cap1: Brand logo, current and voltage ratings Cap2: Series and agency approval marks

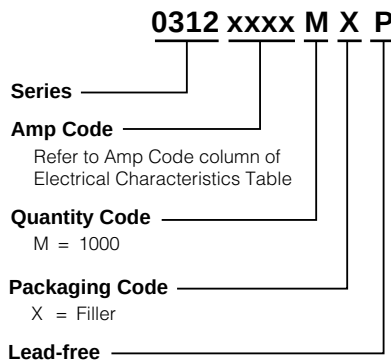
Operating Temperature	-55°C to +125°C
Thermal Shock	MIL-STD-202, Method 107, Test Condition B: (5 cycles -65°C to +125°C)
Vibration	MIL-STD-202, Method 201
Humidity	MIL-STD-202, Method 103, Test Condition A: High RH (95%), and Elevated temperature (40°C) for 240 hours
Salt Spray	MIL-STD-202, Method 101, Test Condition B

Dimensions

Measurements displayed in millimeters (inches)



Part Numbering System



Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code	Taping Width
312 Series				
Bulk	N/A	1000	MX	N/A
Bulk	N/A	100	HX	N/A
318 Series				
Bulk	N/A	1000	MX	N/A
Bulk	N/A	100	HX	N/A
Bulk	N/A	1000	MXB	N/A

Axial Lead & Cartridge Fuses

3AB > Fast-Acting > 314/324 Series

314/324 Series Lead-free 3AB, Fast-Acting Fuse



Agency Approvals

Agency	Agency File Number	Ampere Range
	E10480	0.375A - 15A
	29862	0.375A - 20A
	E10480	15A* - 40A
	NBK030805-E10480A/B NBK030805-E10480C/D NBK030805-E10480E/F NBK260106-JP1021A/B	1-3.5A 4-5A 6-15A 20-30A
	SU05001-6003 SU05001-6001 SU05001-6006 SU05001-8002 SU05001-8003 SU05001-6002	3A 4-6A 7-10A 12-15A 20A 25-30A
	N/A	0.375A - 30A

Description

The 3AB Fast-Acting Fuse with ceramic body construction permits higher interrupting ratings and voltage ratings. Ideal for applications where high current loads are expected.

Features

- In accordance with UL Standard 248-14
- RoHS compliant and Lead-free
- Available in cartridge and axial lead format and with various forming dimensions

Applications

Used as supplementary protection in appliance or utilization equipment to provide individual protection for components or internal circuits.

Electrical Characteristics for Series

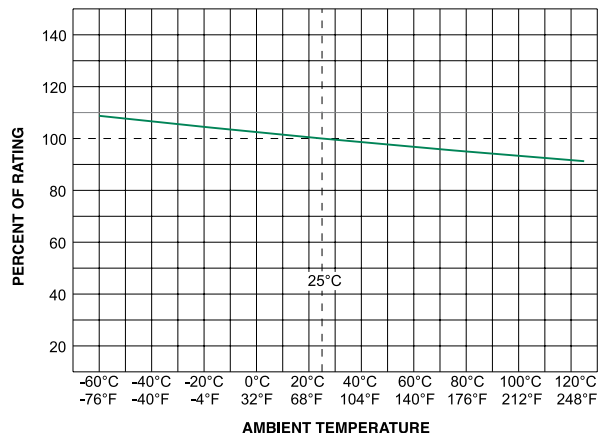
% of Ampere Rating	Ampere Rating	Opening Time
100%	1/8 - 40	4 hours, Minimum
135%	1/8 - 30	1 hour, Maximum
200%	1/8 - 12	15 secs., Maximum
	15 - 30	30 secs., Maximum
250%	40	30 secs., Maximum

Electrical Specification by Item

Amp Code	Ampere Rating (A)	Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I ² t (A ² sec)	Agency Approvals					
.375	0.375	250	35 A @ 250 VAC 10 kA @ 125 VAC 10 kA @ 125 VDC	0.820	0.210	x	x				x
.500	0.5	250		0.500	0.639	x	x				x
.750	0.75	250		0.250	2.061	x	x				x
001	1	250	100 A @ 250 VAC 10 kA @ 125 VAC 10 kA @ 125 VDC	0.189	0.690	x	x			x	x
002.	2	250		0.0700	5.700	x	x			x	x
003.	3	250		0.0432	14.6	x	x	x		x	x
004.	4	250	750 A @ 250 VAC 10 kA @ 125 VAC 10 kA @ 125 VDC	0.0470	10.4	x	x	x		x	x
005.	5	250		0.0300	26.0	x	x	x		x	x
006.	6	250		0.0240	45.0	x	x	x		x	x
007.	7	250		0.0187	71.0	x	x	x		x	x
008.	8	250		0.0153	105	x	x	x		x	x
010.	10	250		0.0105	206	x	x	x		x	x
010.*	10	280		0.0105	206				x		x
012.	12	250		0.00760	570	x	x	x		x	x
015.	15	250		0.00505	292	x	x	x		x	x
015.*	15	280		0.00505	292				x		x
020.	20	250		0.00355	631		x	x	x	x	x
020.*	20	280		0.00355	631				x		x
025.	25	250		0.00235	1450			x	x	x	x
025.**	25	280		0.00235	1450				x		x
030.	30	250		0.00182	2490			x	x	x	x
040.	40	250	1000 A @ 250 VAC 400 A @ 150 VDC	0.0014	22925				x		x

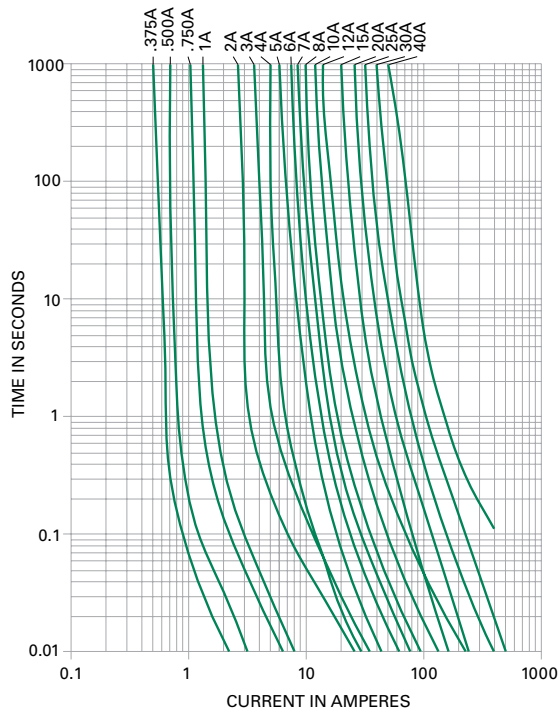
* 350A@280VAC interrupting rating available for 10A, 15A and 20A. ** 50A@280VAC for 25A. Add suffix '280'. Example: 0324020.MX280P.
I²t test at 10x rated current

Temperature Re-rating Curve

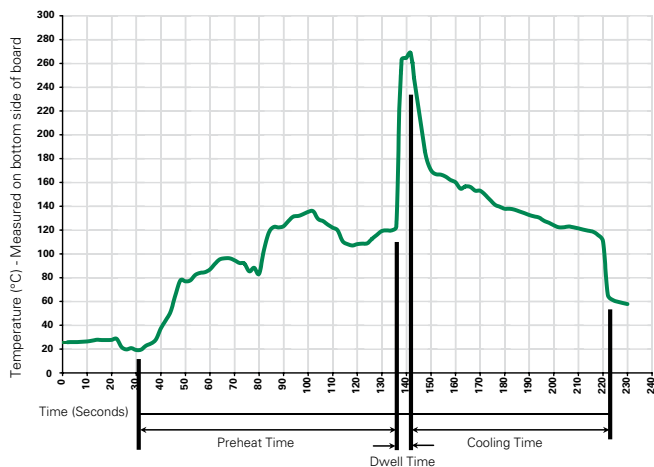


Note:
Derating depicted in this curve is in addition to the standard derating of 25% for continuous operation.

Average Time Current Curves



Soldering Parameters - Wave Soldering



Recommended Process Parameters:

Wave Parameter	Lead-Free Recommendation
Preheat:	
(Depends on Flux Activation Temperature)	(Typical Industry Recommendation)
Temperature Minimum:	100°C
Temperature Maximum:	150°C
Preheat Time:	60-180 seconds
Solder Pot Temperature:	260°C Maximum
Solder Dwell Time:	2-5 seconds

Recommended Hand-Solder Parameters:

Solder Iron Temperature: 350°C +/- 5°C
Heating Time: 5 seconds max.

Note: These devices are not recommended for IR or Convection Reflow process.

Axial Lead & Cartridge Fuses

3AB > Fast-Acting > 314/324 Series

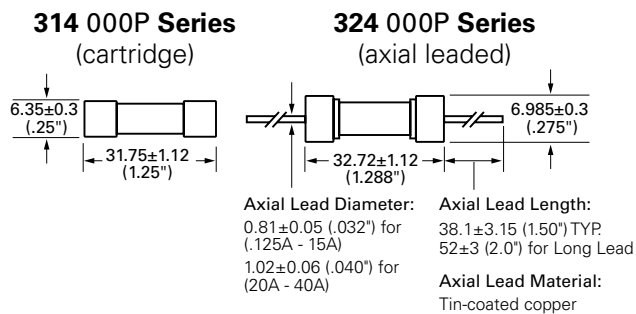
Product Characteristics

Materials	Body: Ceramic Cap: Nickel-plated Brass Leads: Tin-plated Copper
Terminal Strength	MIL-STD-202, Method 211, Test Condition A
Solderability	MIL-STD-202 Method 208
Product Marking	Cap1: Brand logo, current and voltage ratings Cap2: Series and agency approval marks

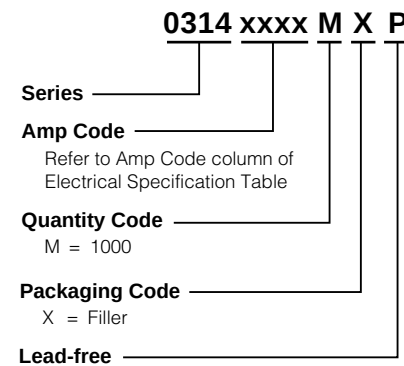
Operating Temperature	-55°C to +125°C
Thermal Shock	MIL-STD-202, Method 107, Test Condition B (5 cycles, -65°C to +125°C)
Vibration	MIL-STD-202, Method 201
Humidity	MIL-STD-202, Method 103, Test Condition A (High RH (95%) and Elevated temperature (40°C) for 240 hours)
Salt Spray	MIL-STD-202, Method 101, Test Condition B

Dimensions

Measurements displayed in millimeters (inches)



Part Numbering System



Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code	Taping Width
314 Series				
Bulk	N/A	5	VX	N/A
Bulk	N/A	100	HX	N/A
Bulk	N/A	1000	MX	N/A
Bulk	N/A	1000	MX52L (long lead)	N/A
Bulk	N/A	1000	MXCC	N/A
Bulk	N/A	1000	MX52LE (long lead)	N/A
324 Series				
Bulk	N/A	5	VX	N/A
Bulk	N/A	100	HX	N/A
Bulk	N/A	1000	MX	N/A
Bulk	N/A	1000	MX280	N/A
Bulk	N/A	1000	MX52 (long lead)	N/A
Bulk	N/A	1000	MXF24	N/A

Additional Information



Datasheet
314 Series



Resources
314 Series



Samples
314 Series



Datasheet
324 Series



Resources
324 Series



Samples
324 Series

Fuse terminals

In hazardous area applications, the installation instructions and the rated data specifications for accessories given in the technical appendix must be followed.

Width/Length/height with TS35x7.5	mm
max. current / max. cond. cross-section	A/mm ²
Max. clamping range	mm ²

Technical data

Rated data	
Rated voltage	V
Rated current	A
Rated cross-section	mm ²
Rated impulse voltage / Pollution severity	kV/-
Gauge to IEC 60947-1 / UL94 Flammability class	
Approvals	

Clamped conductors (H05V/H07V)

solid / stranded	mm ²
flexible / Stranded wire with end ferrules	mm ²
Tightening torque range (clamping screw)	
Stripping length / Blade size	mm/-

2 conductors with same cross-section (H05V/H07V)

solid / stranded	mm ²
flexible / Stranded wire with end ferrules	mm ²

Note

Ordering data

Version	
400 V AC/DC, without LED	
10-36 V AC/DC, with LED	
30-70 V AC/DC, with LED	
60-150 V AC/DC, with LED	
140-250 V AC/DC, with LED	

Note

Accessories

Screwable cross-connection	
2-pole	
3-pole	
4-pole	
10-pole	
Lock washer	
Mounting screw	

End plate / partition

Dark beige Wemid	
Dark beige Wemid	

Fuse cartridges

GZ 2.0A	10	0294500000
GZ 3.0A	10	0295700000
GZ 5.0A	10	0294600000
GZ 10.0A	10	0293900000

Marking systems (see assortment in catalogue 7)

Marking tags

For detailed information on other accessories and applications, refer to the „Accessories“ section

WSI 6/2

6 mm²

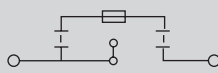
Imperial fuses



11.9 x 60 x 67

6.3 / 10

0.5...10



IEC 60947-7-3

IEC	UL	CSA
500	600	600
6.3	20	16
6	AWG 20...8	AWG 20...8
6 / 3		
A5 / V-0		

Rated connection

0.5...10 / 1.5...10
0.5...10 / 0.5...6
0.8...1.6 Nm (M 3.5)
12 / 4.0 x 0.8 mm

0.5...2.5
0.5...2.5 / 0.5...2.5

Cartridge fuses or contact sleeves have to be inserted centrally.

Type	Qty	Order No.
WSI 6/2 GZ/DEF63	25	1014000000

Max. power loss (1.6 W) at the cartridge fuse limits the rated current.

Type	current	Qty	Order No.
QL 2 SAK16	76 A	50	0470700000
QL 3 SAK16	76 A	50	0470800000
QL 4 SAK16	76 A	50	0470900000
QL 10 SAK16	76 A	20	0471000000
SS M3 D 128-A 3		50	0164400000
KISC M3X5		100	1052100000

Width	
WAP 2.5-10	1.5 mm
WAP 16+35 WTW 2.5-10	1.5 mm

GZ 2.0A	10	0294500000
GZ 3.0A	10	0295700000
GZ 5.0A	10	0294600000
GZ 10.0A	10	0293900000

DEK 5/8 / WS 12/6,5

Cross-connection, see section „W-series accessories“

WSI 6/2 m. LED

6 mm²

Imperial fuses / bipolar LED



11.9 x 60 x 79.5

6.3 / 10

0.5...10



IEC 60947-7-3

IEC	UL	CSA
500	220	220
6.3	6.3	6.3
6	AWG 20...8	AWG 20...8
6 / 3		
A5 / V-0		

Rated connection

0.5...10 / 1.5...10
0.5...10 / 0.5...6
0.8...1.6 Nm (M 3.5)
12 / 4.0 x 0.8 mm

0.5...2.5
0.5...2.5 / 0.5...2.5

Cartridge fuses or contact sleeves have to be inserted centrally.

Type	Qty	Order No.
WSI 6/2/LD 10-36V DC/AC	25	1014100000
~~WSI 6/2/LD 60-76V DC/AC~~	~~25~~	~~1014200000~~
WSI 6/2/LD 60-150VDC/AC	25	1014300000
~~WSI 6/2/LD 250VAC~~	~~25~~	~~1014400000~~

Max. power loss (1.6 W) at the cartridge fuse limits the rated current.

Type	current	Qty	Order No.
QL 2 SAK16	76 A	50	0470700000
QL 3 SAK16	76 A	50	0470800000
QL 4 SAK16	76 A	50	0470900000
QL 10 SAK16	76 A	20	0471000000
SS M3 D 128-A 3		50	0164400000
KISC M3X5		100	1052100000

Width	
WAP 2.5-10	1.5 mm
WAP 16+35 WTW 2.5-10	1.5 mm

GZ 2.0A	10	0294500000
GZ 3.0A	10	0295700000
GZ 5.0A	10	0294600000
GZ 10.0A	10	0293900000

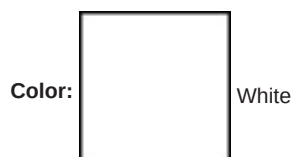
DEK 5/8 / WS 12/6,5

Cross-connection, see section „W-series accessories“

TAB 9



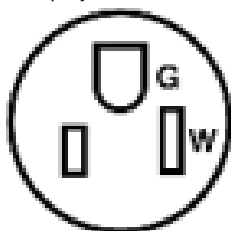
5015-W



UPC Code: 07847720605

Country of Origin: United States - *Eligible for ARRA funded projects

NEMA: 5-15R



*May include one or more globally sourced components.



Straight Blade Wiring Devices

Brand Features

Leviton's line of Heavy-Duty Specification Grade receptacles are designed and manufactured to withstand the most demanding environments. Available in a wide variety of configurations, including isolated ground, tamper-resistant, etc., these Commercial Grade devices are the electrical contractor's choice for use in hotels, schools, hospitals and commercial office buildings.

Item Description

15 Amp, 125 Volt, NEMA 5-15R, 2P, 3W, Narrow Body Single Receptacle, Straight Blade, Commercial Grade, Grounding, , , Side Wired, Steel Strap, - White

Technical Information

AC Horsepower Ratings

At Rated Voltage: 1/2 HP

Electrical Specifications

Grounding: Grounding

Amperage: 15 Amp

Voltage: 125 Volt

NEMA: 5-15R

Pole: 2

Wire: 3

Dielectric Voltage: Withstands 2000V per UL498

Current Limiting: Full Rated Current

Temperature Rise: Max 30C after 100 cycles OL at 150 percent rated current

Environmental Specifications

Flammability: Rated V-2 per UL94

Operating Temperature: -40C to 60C

Material Specifications

Face Material: Nylon

Body Material: Nylon

Line Contacts: Brass Double Wipe .031 Thick

Terminal Screws: Brass 8-32

Grounding Screw: Brass 8-32

Strap Material: Zinc-Plated Steel

Color: White

Mechanical Specifications

Terminal ID: Brass-Hot, Green-Ground, White-Neutral

Terminal ID: Brass-Hot, Green-Ground, Silver-Neutral

Terminal Accom.: 14-10 AWG

Product ID: Ratings are permanently marked on device

Termination: Side

Product Features

NEMA: 5-15R

Color: White

Standards and Certifications

NEMA: WD-2 WD-6

ANSI: C-73

UL498: File E13399

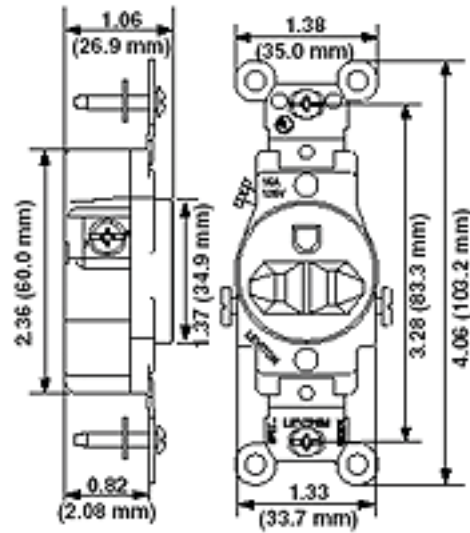
UL Fed Spec WC-596: File E13399

CSA C22.2 No. 42: File 152105

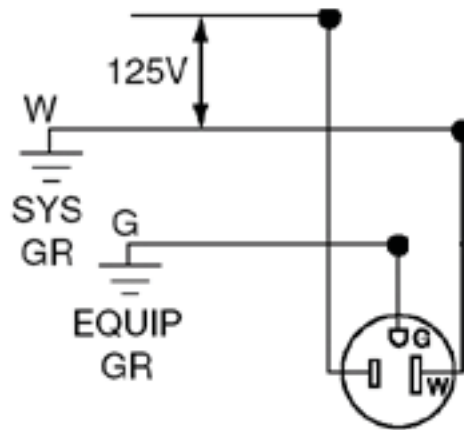
NOM: 057

Warranty: 10 Year Limited

Dimensional Diagram



Wiring Diagram



5-15R

SPECIFICATION SUBMITTAL

JOB NAME:	CATALOG NUMBERS:	
JOB NUMBER:		

Leviton Manufacturing Co., Inc.

201 North Service Road, Melville, NY 11747

Telephone: 1-800-323-8920 · FAX: 1-800-832-9538 · Tech Line (8:30AM-7:30PM E.S.T. Monday-Friday): 1-800-824-3005

Leviton Manufacturing of Canada, Ltd.

165 Hymus Boulevard, Pointe Claire, Quebec H9R 1E9 · Telephone: 1-800-469-7890 ·

FAX: 1-800-824-3005 · www.leviton.com/canada**Leviton S. de R.L. de C.V.**Lago Tana 43, Mexico DF, Mexico CP 11290 · Tel.: (+52)55-5082-1040 · FAX: (+52)5386-1797 · www.leviton.com.mx**Visit our Website at: www.leviton.com**

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DIVIDER



DIN-Rail Receptacle

DRAC DP 15

DRAC GF 15

DRAC DP 20

DRAC GF 20

NEW



DIN-Rail receptacles are enclosed 15A and 20A power outlets that provide a convenient power source for portable computers or test devices for in-the-panel troubleshooting.

- Easily snaps onto 35mm DIN-rail
- Panel mountable
- 15A or 20A versions
- Easy to wire
- Available with ground fault current interrupt (GFCI) or standard duplex outlets
- Option for visual indication of power included with GFCI
- NEMA rated enclosure with UL94 VO flammability rating
- UL508A and cULus approved

Canada

Weidmüller, Canada
10 Spy Court
Markham, Ontario L3R 5H6
Telephone: (800) 268-4080
Facsimile: (905) 475-2798
Email: info1@weidmuller.ca
Website: www.weidmuller.ca

Mexico

Weidmüller, Mexico
Blvd. Hermanos Serdán 698
Col. San Rafael Oriente
Puebla, Puebla, Mexico
C.P. 72029
Telephone: 01 222 2686267
Facsimile: 01 222 2686219
Email: clientes@weidmuller.com.mx
Website: www.weidmuller.com.mx

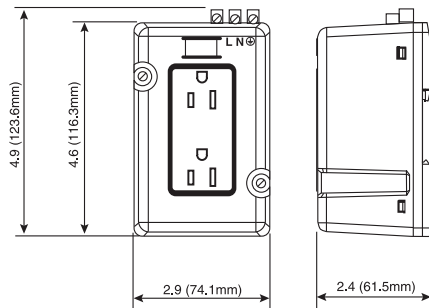
United States

Weidmüller
821 Southlake Blvd.
Richmond, Virginia 23236
Telephone: (800) 849-9343
Facsimile: (804) 379-2593
Email: info@weidmuller.com
Website: www.weidmuller.com

Weidmüller 

DIN-Rail Receptacle

Dimensional Drawing



15 Amp Duplex



15 Amp GFCI



Technical data

Voltage	125 VAC
Current	15A
Operating Frequency	50 - 60 Hz
Dielectric Voltage	Withstands 2000V per UL498
Current Interrupting	Full rated current
Trip Level	N/A
Termination Wire Size	#20 - #10 AWG solid or stranded
Terminal Torque	7 lb.-in. (.79 Nm)
Temperature:	
Operating	-35°C to 60°C
Storage	-25°C to 80°C
Material Listing	
Enclosure Cover, Flammibility	PBT/polycarbonate blend, UL94 rating V0 @ .63mm
Enclosure Base, Flammibility	Polyamide 6/6 30% GF, UL94 rating V0 @ .63mm
Spring	Stainless Steel

Voltage	125 VAC
Current	15A
Operating Frequency	50 - 60 Hz
Dielectric Voltage	Withstands 2000V per UL498
Current Interrupting	Full rated current
Trip Level	N/A
Termination Wire Size	#20 - #10 AWG solid or stranded
Terminal Torque	7 lb.-in. (.79 Nm)
Temperature:	
Operating	-35°C to 60°C
Storage	-25°C to 80°C
Material Listing	
Enclosure Cover, Flammibility	PBT/polycarbonate blend, UL94 rating V0 @ .63mm
Enclosure Base, Flammibility	Polyamide 6/6 30% GF, UL94 rating V0 @ .63mm
Spring	Stainless Steel

Voltage	125 VAC
Current	15A
Operating Frequency	50 - 60 Hz
Dielectric Voltage	Withstands 1500V per UL498
Current Interrupting	10 kA
Trip Level	5±1 mA
Termination Wire Size	#20 - #10 AWG solid or stranded
Terminal Torque	7 lb.-in. (.79 Nm)
Temperature:	
Operating	-35°C to 60°C
Storage	-25°C to 80°C
Material Listing	
Enclosure Cover, Flammibility	PBT/polycarbonate blend, UL94 rating V0 @ .63mm
Enclosure Base, Flammibility	Polyamide 6/6 30% GF, UL94 rating V0 @ .63mm
Spring	Stainless Steel

Approvals/Certifications

--

Description
TUL 508A (file # E223801)
cULus
UL498
NEMA WD-6
NEMA 5-15R

Description
TUL 508A (file # E223801)
cULus
UL 943
NEMA WD-6
NEMA 5-15R

Ordering data

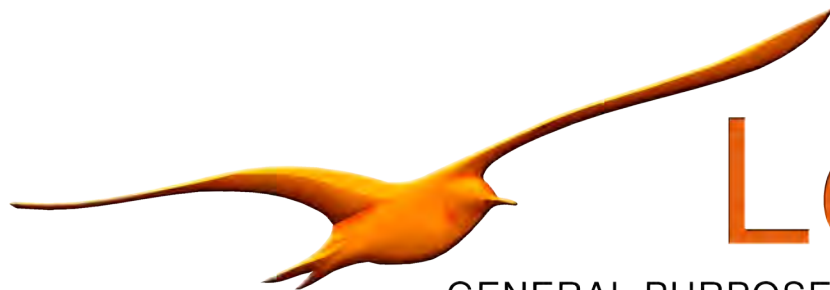
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Type	Part No.
DRAC DP 15	6720005421

Type	Part No.
DRAC GF 15	6720005422

TAB 10





Levelgage

GENERAL PURPOSE SUBMERSIBLE LEVEL TRANSMITTER

The Levelgage by Keller America provides standard features that far exceed those of comparably priced transmitters, including standard $\pm 1\%$ FS Total Error Band (TEB)₃ or optional $\pm 0.5\%$ FS TEB₃ accuracy.

The ability of the Levelgage to provide this level of sustained performance over a wide range of operating conditions makes it ideally suited to environmental monitoring applications such as surface water, streams, and reservoirs.

Keller America's guaranteed lightning protection makes this transmitter ideal for installation in areas prone to chronic damage due to transients caused by lightning.

For more information on the Levelgage, or any other Keller product, please contact Keller America, or view the entire Keller catalog at <http://www.kelleramerica.com/datasheets.html>.

FEATURES

4...20mA models include guaranteed lightning protection at no additional cost.

16-bit internal digital error correction for cost-effective low Total Error Band (TEB)₃

316L stainless steel construction

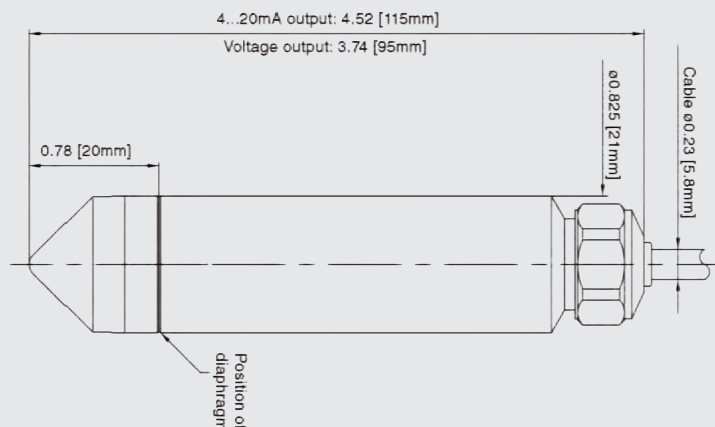
2-year warranty covers defects in materials and workmanship.

Industry standard analog outputs simplify interface to controls, data collection, and telemetry systems.

Built in the U.S.A. ARRA Section 1605 Compliant.

Standard 3-day lead time

Part# 0407.01607.021311.13
0-20ft, 4-20mA



Output	White	Black	Red
2-wire (mA)	OUT / GND	+Vcc	N/A
3-wire (VDC)	GND	+VCC	+OUT
Braided shield wire connected to transmitter housing			

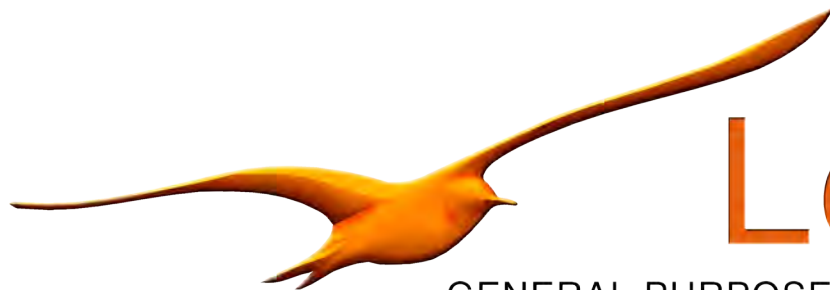
SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE

06/15

KELLER AMERICA INC

351 BELL KING ROAD · NEWPORT NEWS, VA 23606 · TOLL FREE 877-253-5537 · PHONE (757) 596-6680 · FAX (757) 596-6659

EMAIL SALES@KELLERAMERICA.COM · WEBSITE WWW.KELLERAMERICA.COM



Levelgage

GENERAL PURPOSE SUBMERSIBLE LEVEL TRANSMITTER

Pressure Ranges_{1,2}

Relative	Infinite between 0...3 thru 0...900 ft W.C
Absolute	Infinite between 0...2 thru 0...11 bar

1. The Acculevel can be provided with custom calibration at no extra cost. For fluids other than water, the specific gravity must be given at the time the order is placed.

2. Level range may be specified in units of lb/in2(psi), inches WC or feet WC. Keller America uses the International Standard conversion of 2.3067 feet WC/psi.

Accuracy₃

Static	Standard $\pm 0.25\%$ FS
Total Error Band	Standard $\pm 1\%$ FS, Optional $\pm 0.5\%$ FS

3. Static accuracy includes the combined effects of non-linearity, hysteresis, and non-repeatability at room temperature (25°C). Total Error Band (TEB) includes static accuracy, plus thermal dependencies, over the compensated temperature range.

Output

Current	4...20mA
Voltage	0...5, 0...10VDC ₄

4. Other voltage output options available on request.

Certifications

CE	EN50081-1, EN50082-2
----	----------------------

Electrical₅

Supply (4-20mA)	11...28 VDC
Supply (0-5VDC)	8...28 VDC
Supply (0-10VDC)	13...28 VDC
Load Resistance (mA)	$< (\text{Supply} - 11\text{V}) / 0.022\text{A}$
Load Resistance (VDC)	$> 4\text{k ohm}$

5. Nominal values may be higher depending upon cable length. Internal lightning protection increases the minimum-required supply voltage from 8VDC to 11VDC, due to internal resistance of the surge protectors. In addition, cable resistance ($\sim 70\Omega / 1000\text{ft}$) adds to the supply requirement. In order to insure proper system operation, calculate the minimum required supply voltage (at the source) as follows:

For two-part (internal+external) system (recommended):

$$\text{MINIMUM SUPPLY VOLTAGE} = 11.6 + 0.022 (\text{CABLE LENGTH} \times 0.07) \text{ VDC}$$

For internal only protector (standard with 4-20mA output):

$$\text{MINIMUM SUPPLY VOLTAGE} = 11 + 0.022 (\text{CABLE LENGTH} \times 0.07) \text{ VDC}$$

Environmental

Protection Rating	IP68
Operating Temp.	-10...60° C
Compensated Temp.	-10...80° C
Wetted Materials	316 L Stainless Steel Polyamide Fluorocarbon
Cable Options	Polyethylene for general purpose Hytrek for hydrocarbon Tefzel for chemical interaction

Optional Accessories



1/2" NPT Conduit Fitting



Drying Tube Assembly



Bellows Assembly



Cable Hanger



Termination Enclosure



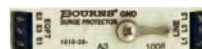
Stabilizing Weight



Process Meter



Open-faced Nose Cap



Signal Line Surge Protector



Pressure Test Adapter

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Level and Pressure Measurement

Part Number Decoder





Series: Levelgage
Drawing: 81355
Pressure Range: 0 - 20 ft WC
Output: 4 - 20 mA
Electrical Termination: Cable / Vented, 5C, PE
Cable Length: 50 Feet
Option: Lightning Protection, Internal Only

Keller America has always considered it very important to ensure that each customer receives the very best product for their application, and custom built to their specifications.

As a result, Keller America has created thousands of application-specific products, each with a unique part number as assigned by Keller's internal database.

If you have an existing Keller America part number, this form will "decode" the part number to provide a complete breakdown of the specifications to which your product has been built.

Or, if you require new specifications and would like to request a quote, discuss your application in more detail, or would like assistance with a product recommendation, we encourage to contact us via the contact form [here](#), call our toll-free number, or take advantage of our live chat feature. You may also take advantage of the online quote request forms located on several product pages.

We look forward to the opportunity to become your preferred supplier of level and pressure measurement instrumentation.

MAIN MENU

> [Home](#)

TAB 11



GAYLORD MFG. CO

1088 MONTCLAIRE DR.
POST OFFICE BOX 547
CERES, CA 95307

TELEPHONE (209)538-3313
FAX NO. (209)538-8638

TO: MCC

Date 7/29/2016

Quotation No. M072916V-4

Your Inquiry : EMAIL

ATTN: ROBERT

Date : 11/04/15

QUOTATION

Job:

Prices Firm 60 Days

Discount : NET

Terms: 2% 10TH NET 30

**Shipping Date : 10-14 working days ARO

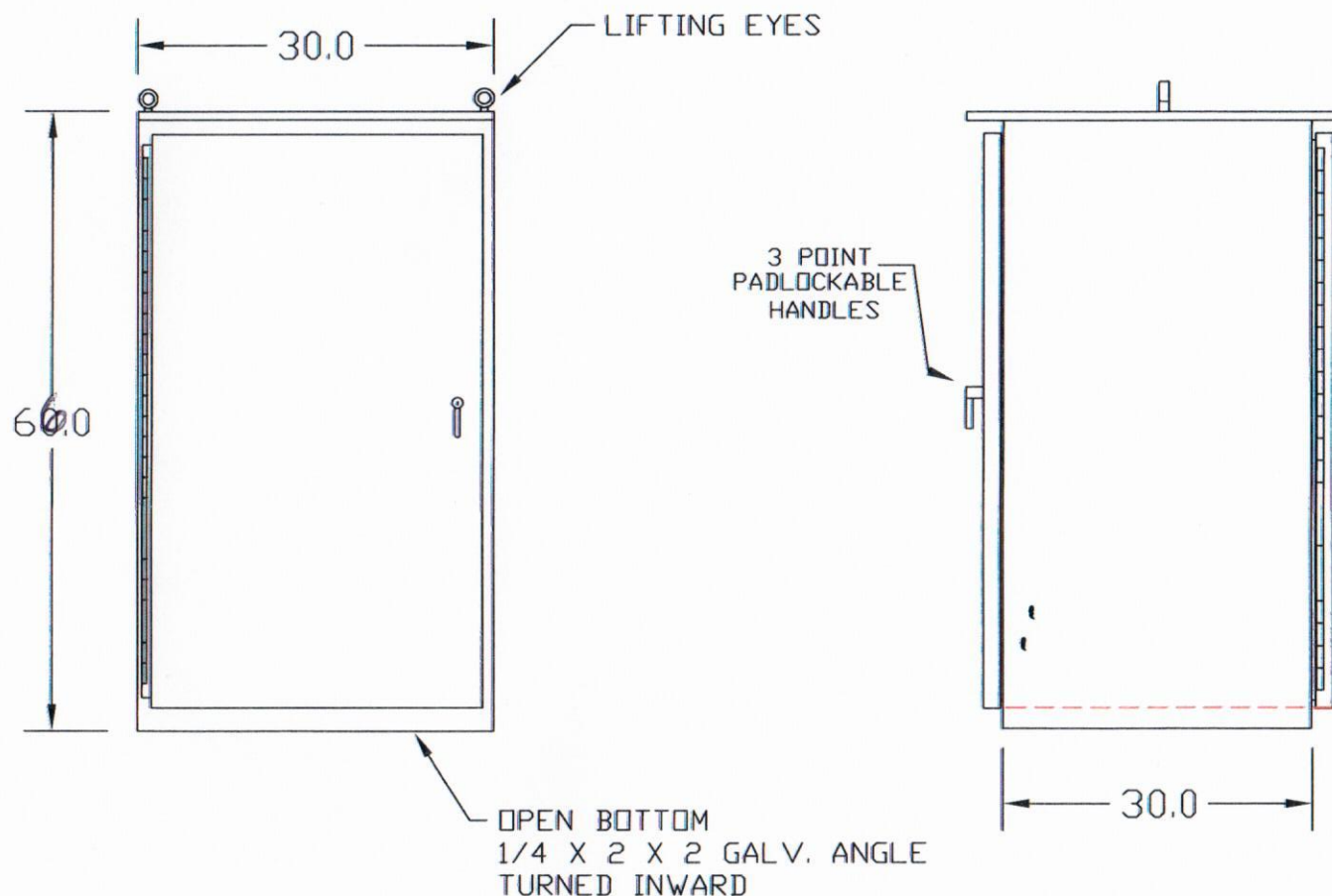
FOB Factory - Ceres, CA

QTY.	ITEM NO.	CATALOG NO.	SIZE AND DESCRIPTION	NET EACH
1	1		66"hx30"wx30"d Free Standing Dual Access NEMA 3R Raintight Hinge Cover Enclosure w/ open bottom. Made from 12 ga. galvanized steel powder coated RAL1015. Single door with continuous hinge and 3 point padlockable handle & roller locking bars, front and back. With lifting eye bolts. Enclosure reinforced as necessary to maintain rigidity. Open bottom to have 1/4x2x2 galv. angle all around turned inward. 361#	

**The above shipping date is approximate and is subject to correction on date of receipt of order.

QUOTED BY _____
Vicki Ewald

DUAL ACCESS LARGE NEMA 3R



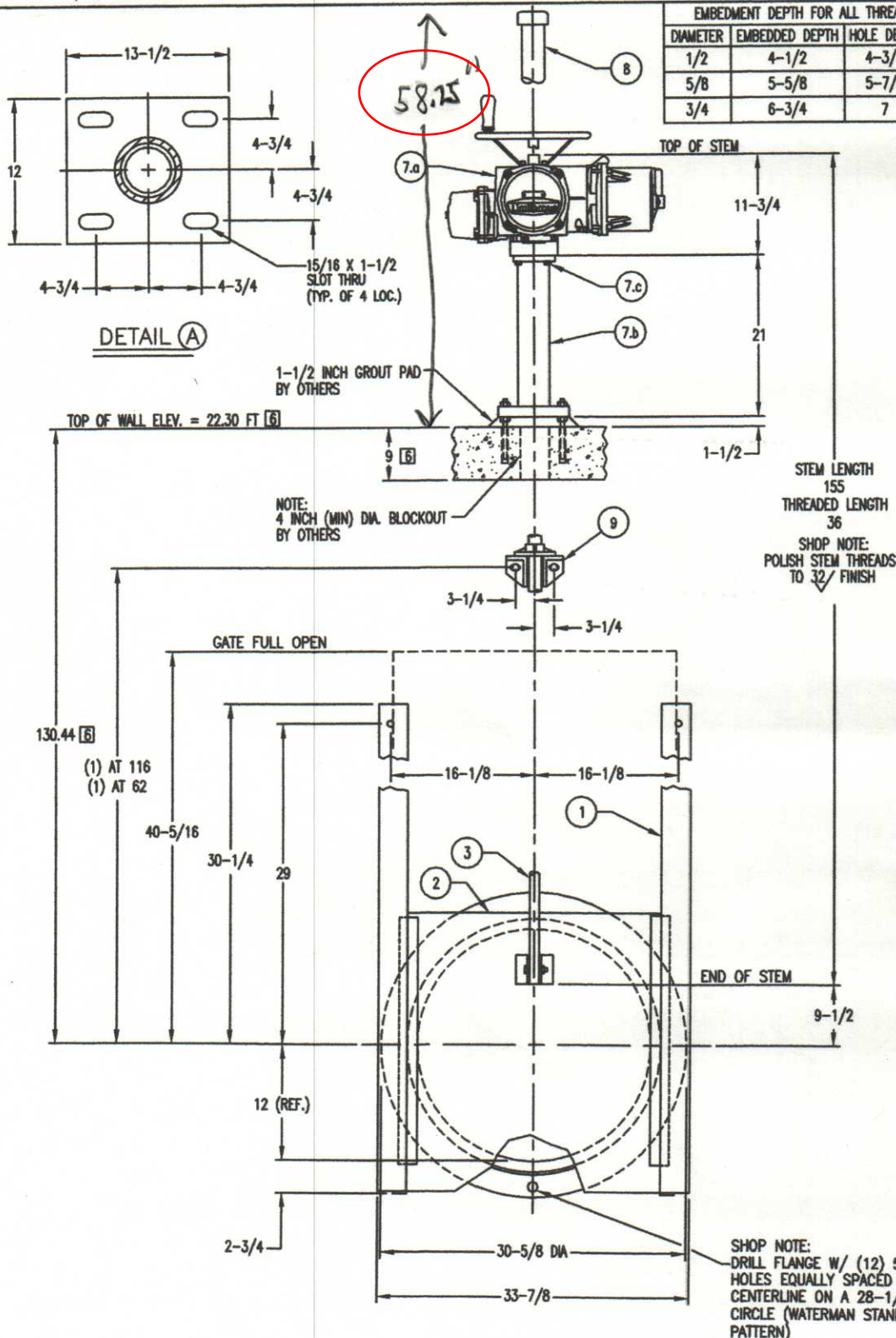
NOTES: MADE FROM 12GA. GALV. SHEET STEEL POWDER COATED PER CUSTOMER COLOR
SINGLE DOORS WITH 3 POINT PADLOCKABLE HANDLES
OPEN BOTTOM WITH 1/4 X 2 X 2 GALV. ANGLE TURNED INWARD

QUOTE NO. ~~M110415K-2~~ ^{M092916V-4}

GAYLORD MFG. CO.
1730 E. WHITMORE AVE.
P.O. BOX 547
CERES, CA. 95307
PH. (209)538-3313
FAX (209)538-8638

DRAWN BY KM	DWG. NO. M110415K	SCALE NONE
CHKD BY. WL		DATE 2-2-16

Monte Bello Control Box



EMBEDMENT DEPTH FOR ALL THREADED STUDS			
DIAMETER	EMBEDDED DEPTH	HOLE DEPTH	HOLE DIA.
1/2	4-1/2	4-3/4	9/16
5/8	5-5/8	5-7/8	3/4
3/4	6-3/4	7	7/8

NOTE: HANDRAIL BY OTHERS (NO CONTRACTOR TO ENSURE CLEARANCE FOR HANDWHEEL OPERATION.)

NOTE: ALUMINUM IN CONTACT WITH CONCRETE TO BE FIELD PAINTED BY OTHERS

Waterman
INDUSTRIES

24 DIA. WATERMAN MODEL
AC-31-F
CANAL GATE

FOR: FALCO CONS
3808 FARM
STOCKTON,
PO: 782386
REF: MONTE BELL
MANTECA, CA

P.O. BOX 458 * 25500 Road 204 * Exeter, California 93221 * Phone (559)562-4000 * FAX (559)562-2277 * www.watermanusa.com

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ENG:

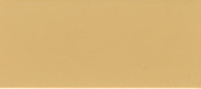
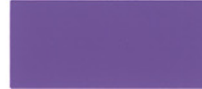
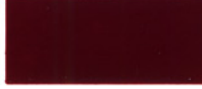
TIGER Drylac®

ral colors

exterior powder coatings



TIGER Drylac®
Powder Coatings

					
RAL 1000 49/15200 38/15000	RAL 1015 49/15320 38/15015	RAL 1033 49/22240	RAL 2012 49/24690	RAL 3014 49/31080	RAL 4004 49/31020 38/30024
					
RAL 1001 49/15190 38/15001	RAL 1016 49/22520 38/20016	RAL 1034 49/23910	RAL 3000 49/33120 38/30000	RAL 3015 49/33670	RAL 4005 49/42780
					
RAL 1002 49/22590 38/20002	RAL 1017 49/22510 38/20017	RAL 1037 49/20096	RAL 3001 49/31120 38/30001	RAL 3016 49/31980 38/30016	RAL 4006 49/32090
					
RAL 1003 49/22580	RAL 1018 49/21830 38/20018	RAL 2000 49/24570	RAL 3002 49/31110 38/30002	RAL 3017 49/31060	RAL 4007 49/32540 38/30025
					
RAL 1004 49/22570 38/20004	RAL 1019 49/13660 38/15019	RAL 2001 49/24560 38/23170	RAL 3003 49/31100 38/30003	RAL 3018 49/31050	RAL 4008 49/32280
					
RAL 1005 49/22560 38/20005	RAL 1020 49/22500 38/20020	RAL 2002 49/24550 38/25002	RAL 3004 49/33900 38/30004	RAL 3020 49/31040 38/30021	RAL 4009 49/34740
					
RAL 1006 49/22550 38/20006	RAL 1021 49/22280 38/20021	RAL 2003 49/24540	RAL 3005 49/31900 38/30005	RAL 3022 49/33700	RAL 4010 49/40490
					
RAL 1007 49/22540	RAL 1023 49/22490 38/20023	RAL 2004 49/24530	RAL 3007 49/31910 38/30007	RAL 3027 49/33660	RAL 5000 49/42200 38/40000
					
RAL 1011 49/15180 38/15011	RAL 1024 49/22480 38/20024	RAL 2008 49/24340	RAL 3009 49/31920 38/30009	RAL 3031 49/34730 38/30031	RAL 5001 49/42210 38/40001
					
RAL 1012 49/22530 38/20012	RAL 1027 49/22470 38/20027	RAL 2009 49/24360	RAL 3011 49/31090 38/30011	RAL 4001 49/43160	RAL 5002 49/42220 38/40002
					
RAL 1013 49/11280 38/10013	RAL 1028 49/22460	RAL 2010 49/24520 38/25001	RAL 3012 49/31940 38/30012	RAL 4002 49/31030 38/30008	RAL 5003 49/42230 38/40003
					
RAL 1014 49/15170 38/15014	RAL 1032 49/22450 38/20032	RAL 2011 49/24580	RAL 3013 49/31950 38/30013	RAL 4003 49/32270	RAL 5004 49/42240 38/40004

TAB 12



ABBREVIATIONS			
A	AMPERES	MFR	MANUFACTURER
ABS	ACRYLONITRILE BUTADIENE STYRENE	MH	MANHOLE
AC	ALTERNATING CURRENT	MIN	MINIMUM
A/C	AIR CONDITIONER	MINS	MINUTES
AE	ANALYZER ELEMENT	MLO	MAIN LUGS ONLY
AF	CIRCUIT BREAKER FRAME SIZE	MOV	MOTOR OPERATED VALVE
AFD	ADJUSTABLE FREQUENCY DRIVE	MS	MOISTURE SWITCH
AI	ANALOG INPUT	MTG	MOUNTING
AIT	ANALYZER INDICATING TRANSMITTER	MTS	MANUAL TRANSFER SWITCH
AMB	AMBER COLOR (A)	MUX	MULTIPLEXER
AO	ANALOG OUTPUT	N	NEUTRAL
AS	ANALYZER SWITCH	NC	NORMALLY CLOSED
AT	AMPERE TRIP	NO	NORMALLY OPEN
ATS	AUTOMATIC TRANSFER SWITCH	NP	NAMEPLATE
AUTO	AUTOMATIC	NPT	NATIONAL PIPE THREAD
AWG	AMERICAN WIRE GAUGE	NTS	NOT TO SCALE
BATT	BATTERY	(N)	NEW
BGE	BEIGE COLOR	OIT	OPERATOR INTERFACE TERMINAL
BLK	BLACK COLOR	OL	OVERLOAD
BLU	BLUE COLOR (B)	ORN	ORANGE COLOR (O)
BRN	BROWN COLOR	PA	PUBLIC ADDRESS
CAT	CATEGORY	PB	PULL BOX
CB	CIRCUIT BREAKER	PC	PHOTOCELL
CLR	CLEAR COLOR	PE	PRESSURE ELEMENT
COAX	COAXIAL	PF	POWER FACTOR
COM	COMMON	PFR	POWER (PHASE) FAIL RELAY
COMM	COMMUNICATIONS	PH	PHASE
CPT	CONTROL POWER TRANSFORMER	PIT	PRESSURE INDICATING TRANSMITTER
CPU	CENTRAL PROCESSING UNIT	PLC	PROGRAMMABLE LOGIC CONTROLLER
CPVC	CHLORINATED POLYVINYL CHLORIDE	PNLBD	PANELBOARD
CR	CONTROL RELAY	PNK	PINK COLOR
CS	CONTROL STATION	PNL	PANEL
CT	CURRENT TRANSFORMER	POS	POSITION
DC	DIRECT CURRENT	POT	POTENTIOMETER
DCS	DISTRIBUTED CONTROL SYSTEM	PRI	PRIMARY
DE	DENSITY ELEMENT	PS	PRESSURE SWITCH
DI	DIGITAL INPUT	PSI	POUNDS PER SQUARE INCH
DIT	DENSITY INDICATING TRANSMITTER	PSIA	POUNDS PER SQUARE INCH ABSOLUTE
DISC	DISCONNECT	PSIG	POUNDS PER SQUARE INCH GAUGE
DO	DIGITAL OUTPUT	PT	PRESSURE TRANSMITTER
DPDT	DOUBLE POLE DOUBLE THROW	PTFE	POLYTETRAFLUOROETHYLENE (TEFLON)
DWG	DRAWING	PTT	PUSH TO TEST
E	EMERGENCY	PUR	PURPLE COLOR (P)
ELEV	ELEVATION	PVC	POLYVINYL CHLORIDE
EMT	ELECTRICAL METALLIC TUBING	PVDF	POLYVINYLDENE FLUORIDE (KYNAR)
ETM	ELASPED TIME METER	PWR	POWER
(E)	EXISTING	QTY	QUANTITY
F	FUSE	RECEPT	RECEPTACLE
FE	FLOW ELEMENT	RED	RED COLOR (R)
FIT	FLOW INDICATING TRANSMITTER	REF	REFERENCE
FLA	FULL LOAD AMPERES	REM	REMOTE
FLUOR	FLUORESCENT	RGS	RIGID GALVANIZED STEEL
FO	FIBER OPTICS	RIO	REMOTE INPUT/OUTPUT
FS	FLOW SWITCH	RMS	ROOT MEAN SQUARED
FVNR	FULL VOLTAGE NON-REVERSING	RTD	RESISTIVE THERMAL DEVICE
FVR	FULL VOLTAGE REVERSING	RTU	REMOTE TELEMETRY UNIT
(F)	FUTURE	RVAT	REDUCED VOLTAGE AUTO TRANSFORMER
G	GROUND	(R)	RELOCATED
GEN	GENERATOR	SEC	SECONDS, SECONDARY
GFCI	GROUND FAULT CIRCUIT INTERRUPTER	SER	SERIAL
GND	GROUND	SHD	SHIELD
GRN	GREEN COLOR (G)	SIC	SPEED INDICATING CONTROLLER
GRY	GRAY COLOR	SIT	SPEED INDICATING TRANSMITTER
H	HAND	SP	SETPOINT
HH	HAND HOLE	SPDT	SINGLE POLE DOUBLE THROW
HOA	HAND-OFF-AUTO	SPST	SINGLE POLE SINGLE THROW
HP	HORSEPOWER	SS	SOFT STARTER
HRS	HOURS	SV	SOLENOID VALVE
HS	HAND SWITCH	SW	SWITCH
HTR	HEATER	SWBD	SWITCHBOARD
HZ	HERTZ	SWGR	SWITCHGEAR
IMC	INTERMEDIATE METALLIC CONDUIT	TB	TERMINAL BLOCK
INCAND	INCANDESCENT	TDOD	TIME DELAY ON DE-ENERGIZATION
IND	INDICATION	TDOE	TIME DELAY ON ENERGIZATION
INST	INSTRUMENT	TE	TEMPERATURE ELEMENT
I/O	INPUT/OUTPUT	TEL	TELEMETRY
ISB	INTRINSICALLY SAFE BARRIER	TELCO	TELEPHONE COMPANY
ISR	INTRINSICALLY SAFE RELAY	TEMP	TEMPERATURE
JB	JUNCTION BOX	TIT	TEMPERATURE INDICATING TRANSMITTER
KAIC	THOUSAND AMP INTERRUPTING CURRENT	TM	THERMAL MAGNETIC
KCMIL	THOUSAND CIRCULAR MILS	TR	TIME DELAY RELAY
KVA	KILOVOLT AMPERE	TS	TEMPERATURE SWITCH
L	LINE	TT	TEMPERATURE TRANSMITTER
LBL	LIGHT BLUE COLOR	TVSS	TRANSIENT VOLTAGE SURGE SUPPRESSOR
LBS	POUNDS	UPS	UNINTERRUPTIBLE POWER SUPPLY
LCP	LOCAL CONTROL PANEL	V	VOLTAGE
LCS	LOCAL CONTROL STATION	VA	VOLT AMPS
LE	LEVEL ELEMENT	VAR	VOLT AMPERE REACTIVE
LIT	LEVEL INDICATING TRANSMITTER	VFD	VARIABLE FREQUENCY DRIVE
LOC	LOCAL	VLT	VIOLET COLOR
LOR	LOCAL-OFF-REMOTE	VM	VOLTMETER
LP	LIGHTING PANEL	W	WATTS
LR	LATCHING RELAY	WHT	WHITE COLOR (W)
LS	LEVEL SWITCH	WP	WEATHERPROOF
LT	LEVEL TRANSMITTER	WS	TORQUE SWITCH
LTG	LIGHTING	XFMR	TRANSFORMER
M	MOTOR STARTER	XMTR	TRANSMITTER
MA	MILLIAMPERE	YEL	YELLOW COLOR (Y)
MAX	MAXIMUM	ZIC	POSITION INDICATING CONTROLLER
MCC	MOTOR CONTROL CENTER	ZIT	POSITION INDICATING TRANSMITTER
MCP	MOTOR CIRCUIT PROTECTOR	ZS	LIMIT SWITCH

ELECTRICAL SYMBOLS			
	CIRCUIT BREAKER OR MOTOR CIRCUIT PROTECTOR		CURRENT TRANSFORMER
	TOGGLE SWITCH		FUSE & RATING
	OPERATOR CONTACT NORMALLY OPEN		POWER TRANSFORMER
	OPERATOR CONTACT NORMALLY CLOSED		MOTOR STARTER COIL
	LOCK-OUT STOP PUSHBUTTON		SOLENOID
	EMERGENCY STOP PUSHBUTTON		METAL OXIDE VARISTOR
	SELECTOR SWITCH		HEATING ELEMENT
	NORMALLY OPEN CONTROL RELAY CONTACT		OVERLOAD RELAY
	NORMALLY CLOSED CONTROL RELAY CONTACT		COOLING FAN
	NORMALLY OPEN TIME DELAY ON DE-ENERGIZATION		DUPLEX RECEPTACLE
	NORMALLY CLOSED TIME DELAY ON DE-ENERGIZATION		CONTROL RELAY COIL
	NORMALLY OPEN TIME DELAY ON ENERGIZATION		TIME DELAY RELAY COIL
	NORMALLY CLOSED TIME DELAY ON ENERGIZATION		STROBE LIGHT
	NORMALLY OPEN SWITCH CLOSES ON RISING FLOW		INDICATOR LAMP
	NORMALLY CLOSED SWITCH OPENS ON RISING FLOW		INDICATOR LAMP PUSH TO TEST
	NORMALLY OPEN SWITCH CLOSES ON RISING LEVEL		SOLENOID VALVE
	NORMALLY CLOSED SWITCH OPENS ON RISING LEVEL		AUDIBLE ALARM HORN
	NORMALLY OPEN SWITCH CLOSES ON RISING PRESS		TWISTED PAIR CABLE
	NORMALLY CLOSED SWITCH OPENS ON RISING PRESS		6P4C & 8P8C UTP/STP NETWORK CONNECTOR
	NORMALLY OPEN SWITCH CLOSES ON RISING TEMP		BAYONET & THREADED COAX & F/O CONNECTOR
	NORMALLY CLOSED SWITCH OPENS ON RISING TEMP		GROUNDING STUD
	NORMALLY OPEN SWITCH CLOSES ON LIMIT/POSITION		ISOLATED GROUND
	NORMALLY CLOSED SWITCH OPENS ON LIMIT/POSITION		CHASSIS GROUND
	FIXED JUMPER		EARTH GROUND
PANEL WIRING			
INTERCONNECT WIRING			
TERMINAL BLOCKS			

GENERAL NOTES	
1	NOT SUPPLIED BY MCC-CS.
2	EXISTING EQUIPMENT.
3	SUPPLIED BY MCC-CS, MOUNTED & WIRED BY OTHERS.
4	SUPPLIED BY OTHERS, MOUNTED & WIRED BY MCC-CS.
5.	NOTE PERTAINS ONLY TO SHEET ON WHICH IT APPEARS
6.	(XX) BILL OF MATERIAL ITEM [XX] NAMEPLATE SCHEDULE ITEM
7.	PANEL WIRING: 600V STRANDED TINNED COPPER, TYPE MTW.
8.	120VAC POWER AND CONTROL WIRING: 16 AWG MINIMUM.
9.	24VDC POWER AND CONTROL WIRING: 16 AWG MINIMUM.
10.	ANALOG SIGNAL WIRING: TSP, 16 AWG MIN, BELDEN 8719.
11.	USE WIRING LUGS WITH ALL NON-CAGED TERMINATIONS.
12.	WIRE MARKERS: HEATSHRINK, WHITE W/ BLACK LETTERING.
13.	SHRINK WIRE MARKERS LOOSELY TO ALLOW FOR ROTATION.
14.	UNLESS OTHERWISE NOTED, NUMBER WIRING AS TERMINALS.
15.	DISCONNECT TERMINAL HINGE SIDE OPPOSITE FIELD WIRING.
16.	MOUNTING PAN COMPONENTS IDENTIFIED W/ KROY LABELS.
17.	BOND ENCLOSURES, DOORS, & PANS WITH 12 AWG WIRING.
18.	MOUNT ALL COMPONENTS W/ STAINLESS STEEL HARDWARE.
19.	
20.	
UL 508 LISTED PANEL	

WIRING COLORS		
480/277 VAC POWER, PHASE A	BRN	
480/277 VAC POWER, PHASE B	ORN	
480/277 VAC POWER, PHASE C	YEL	
480/277 VAC NEUTRAL	GRY	
240/120 VAC POWER, LINE 1	BLK	
240/120 VAC POWER, LINE 2	RED	
208/120 VAC POWER, PHASE A	BLK	
208/120 VAC POWER, PHASE B	RED	
208/120 VAC POWER, PHASE C	BLU	
120 VAC UPS POWER	BLK	
120 VAC UPS NEUTRAL	WHT	
120 VAC NEUTRAL	WHT	
120 VAC CONTROL	RED	
120 VAC DIGITAL INPUTS	RED	
120 VAC DIGITAL OUTPUTS	RED	
125 VDC POWER	GRY	
125 VDC CONTROL	GRY	
125 VDC COMMON	GRY	
24 VDC POWER	BLU	
24 VDC CONTROL	BLU	
24 VDC DIGITAL INPUTS	BLU	
24 VDC DIGITAL OUTPUTS	BLU	
24 VDC COMMON	BRN	
12 VDC POWER/COMMON	LBL	
4-20mA CONTROL, POSITIVE	CLR	
4-20mA CONTROL, NEGATIVE	BLK	
UNSPECIFIED FOREIGN	YEL	
CHASSIS GROUND	GRN	

DRAWING LIST		
DRAWING	SHEETS	TITLE
2914-A00	1	PLC CONTROL PANEL COVER SHEET & DRAWING LIST
2914-A01	3	PLC CONTROL PANEL ELEVATION VIEWS & COMPONENT LAYOUT
2914-A02	1	PLC CONTROL PANEL NAMEPLATE SCHEDULE & PANEL LABELS
2914-A03	1	PLC CONTROL PANEL BILL OF MATERIALS
2914-A04	2	PLC CONTROL PANEL POWER DISTRIBUTION SCHEMATIC
2914-A05	1	PLC CONTROL PANEL PLC CHASSIS DIAGRAM
2914-A06	1	PLC CONTROL PANEL NETWORK DIAGRAM
2914-A07	1	PLC CONTROL PANEL DISCRETE INPUT MODULE SCHEMATIC
2914-A08	1	PLC CONTROL PANEL DISCRETE OUTPUT MODULE SCHEMATIC
2914-A09	1	PLC CONTROL PANEL ANALOG INPUT MODULE SCHEMATIC

TESTING		
TEST	DATE	BY

PROJECT	
MANTECA MONTE BELLO STATES SLIDE GATE	
TITLE	
PLC CONTROL PANEL COVER SHEET & DRAWING LIST	
CUSTOMER	
FALCO CONSTRUCTION	
DESIGNED BY	ET
DATE:	4/26/16
DRAWN BY	ET
SCALE:	N/A
CHECKED BY	JP
REF:	2906-B
APPROVED BY	TR
SHEET	1 OF 1

SIZE	B
DRAWING:	2914-A00

MCC CONTROL SYSTEMS
YOUR PARTNER IN AUTOMATION



859 COTTING COURT, SUITE G
VACAVILLE, CALIFORNIA 95688
707-449-0341 www.mccwater.com

DIMENSIONS

UNLESS OTHERWISE SPECIFIED
INCHES

AND TOLERANCES FOR

1 PLACE DIMS ± 0.1
2 PLACE DIMS ± 0.01
3 PLACE DIMS ± 0.002
ANGULAR DIMS ± 30'
FRACTION DIMS ± 1⁄32"

0" 1"

THIS LINE EQUALS ONE INCH
IF NOT ONE INCH ON THIS SHEET
ADJUST SCALES ACCORDINGLY

REVISIONS

NO.	DATE	REVISION	BY	APP
1.0	4/26/16	SUBMITTAL	ET	TR
1.1	6/20/16	SUBMITTAL	RH	TR
1.2	6/21/16	SUBMITTAL	RH	TR

TESTING

TEST	DATE	BY

PROJECT

MANTECA MONTE BELLO
STATES SLIDE GATE

TITLE

PLC CONTROL PANEL
COVER SHEET & DRAWING LIST

CUSTOMER

FALCO CONSTRUCTION

DESIGNED BY	ET	DATE:	4/26/16
DRAWN BY	ET	SCALE:	N/A
CHECKED BY	JP	REF:	2906-B
APPROVED BY	TR	SHEET	1 OF 1

SIZE

B

DRAWING:

2914-A00



DIMENSIONS

UNLESS OTHERWISE SPECIFIED
INCHES

AND TOLERANCES FOR

1 PLACE DIMS ± 0.1

2 PLACE DIMS ± 0.01

3 PLACE DIMS ± 0.002

ANGULAR DIMS $\pm 30'$

FRACTION DIMS $\pm \frac{1}{32}$

0" 1"

THIS LINE EQUALS ONE INCH
IF NOT ONE INCH ON THIS SHEET
ADJUST SCALES ACCORDINGLY

REVISIONS

NO.	DATE	REVISION	BY	APP
1.0	4/26/16	SUBMITTAL	ET	TR
1.1	6/20/16	SUBMITTAL	RH	TR

TESTING

TEST	DATE	BY

PROJECT

MANTECA MONTE BELLO
STATES SLIDE GATE

TITLE

PLC CONTROL PANEL
ELEVATION VIEWS

CUSTOMER

FALCO CONSTRUCTION

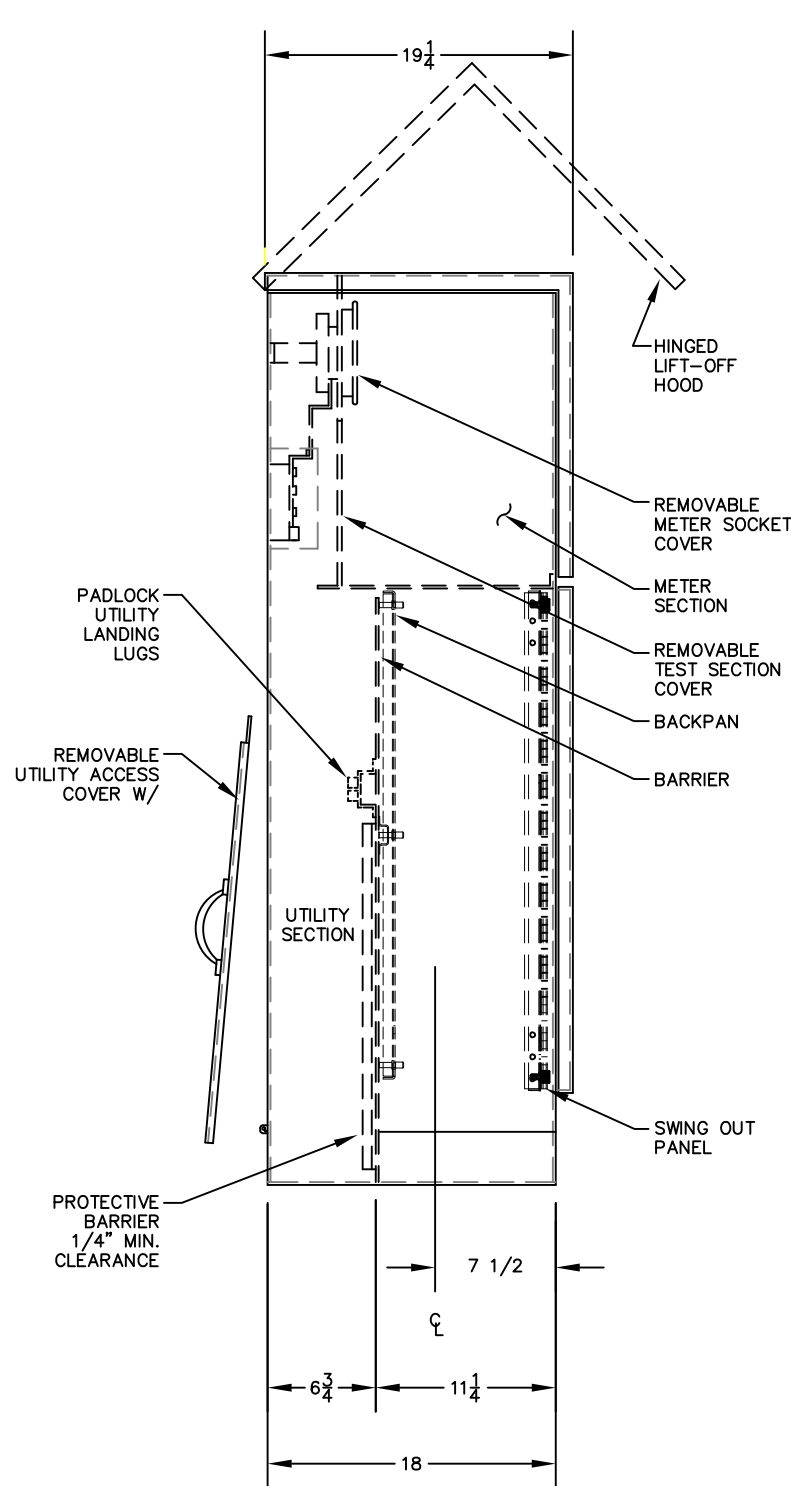
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DRAWN BY ET SCALE: N/A

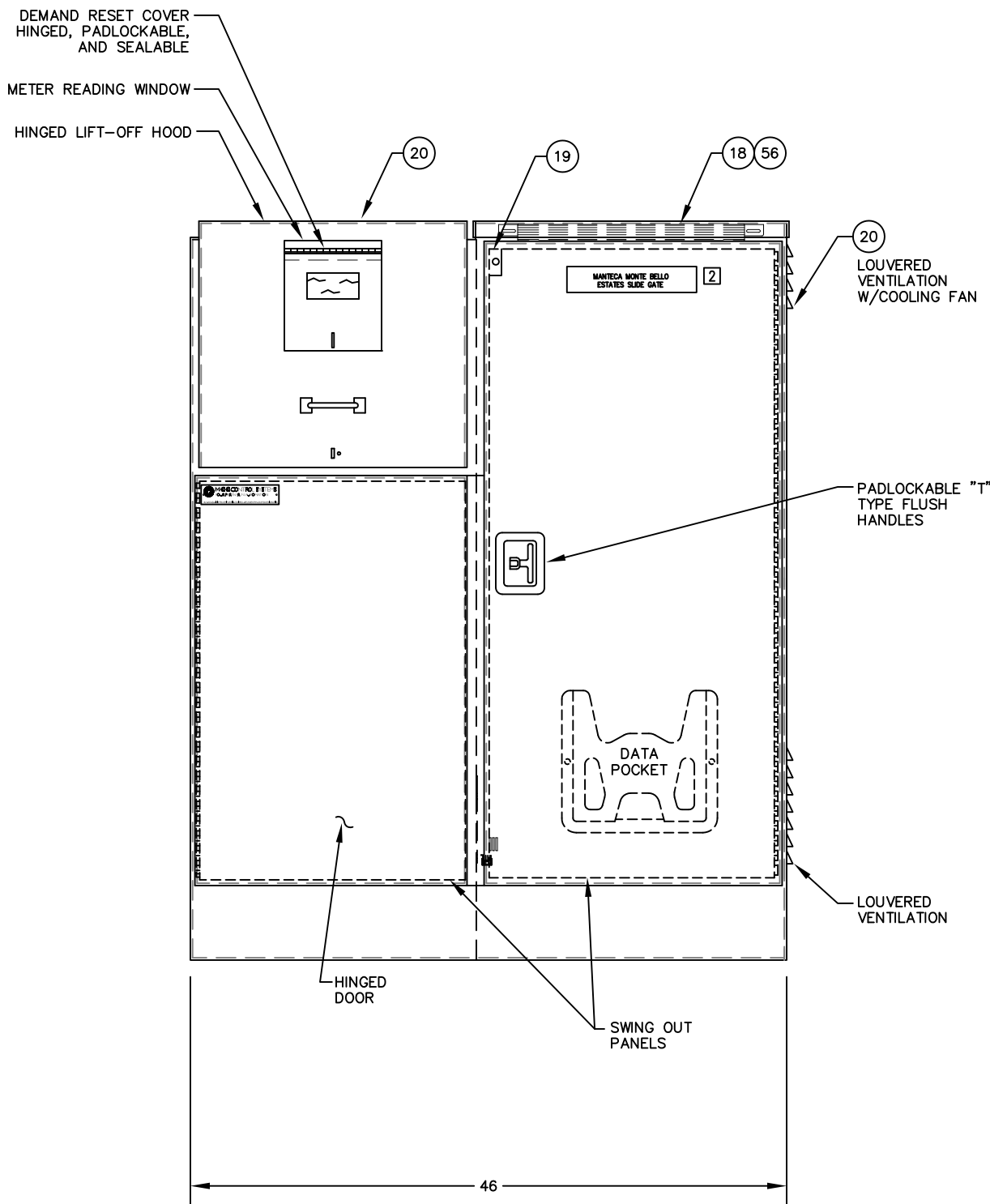
CHECKED BY JP REF: 2906-B

APPROVED BY TR SHEET 1 OF 3

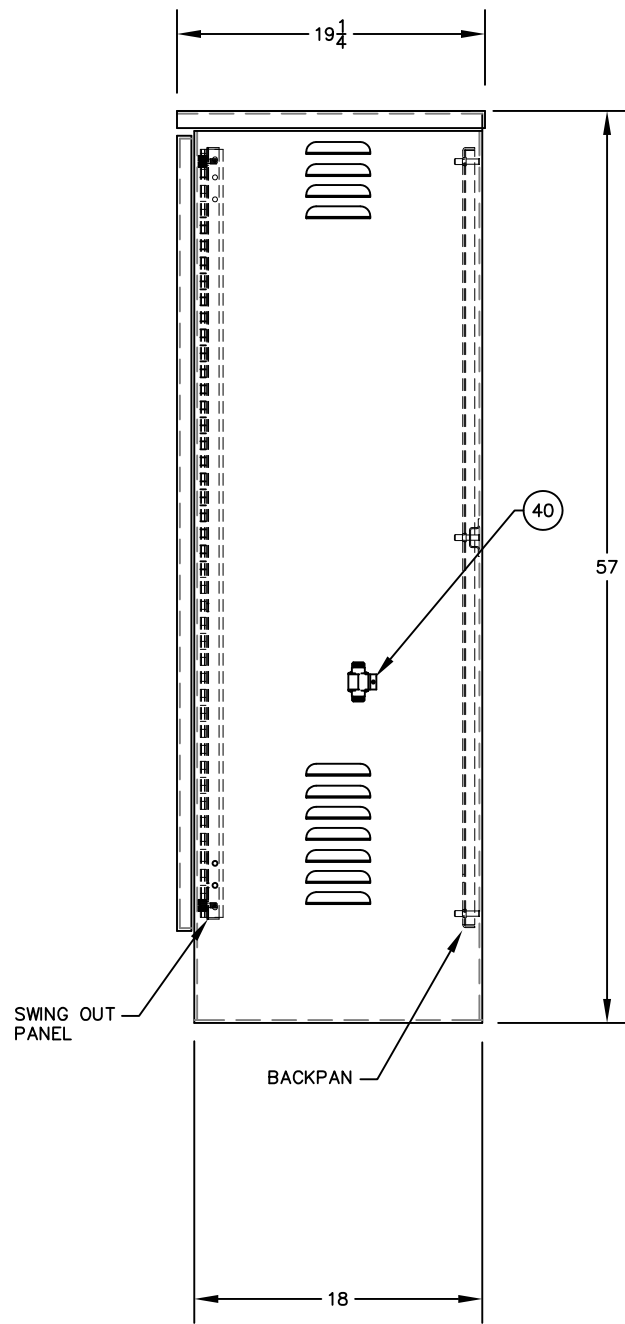
SIZE B DRAWING: 2914-A01



LEFT SIDE VIEW



FRONT ELEVATION VIEW
TYPE 3R PEDESTAL ENCLOSURE



RIGHT SIDE VIEW



DIMENSIONS

UNLESS OTHERWISE SPECIFIED
INCHES

AND TOLERANCES FOR

- 1 PLACE DIMS ± 0.1
- 2 PLACE DIMS ± 0.01
- 3 PLACE DIMS ± 0.002
- ANGULAR DIMS $\pm 30'$
- FRACTION DIMS $\pm \frac{1}{32}$

0" 1"

THIS LINE EQUALS ONE INCH
IF NOT ONE INCH ON THIS SHEET
ADJUST SCALES ACCORDINGLY

REVISIONS

NO.	DATE	REVISION	BY	APP
1.0	4/26/16	SUBMITTAL	ET	TR
1.1	6/20/16	SUBMITTAL	RH	TR

TESTING

TEST	DATE	BY

PROJECT

MANTECA MONTE BELLO
STATES SLIDE GATE

TITLE

PLC CONTROL PANEL
ELEVATION VIEWS AND
COMPONENT LAYOUT

CUSTOMER

FALCO CONSTRUCTION

DESIGNED BY

ET

DATE

4/26/16

DRAWN BY

ET

SCALE

N/A

CHECKED BY

JP

REF

2906-B

APPROVED BY

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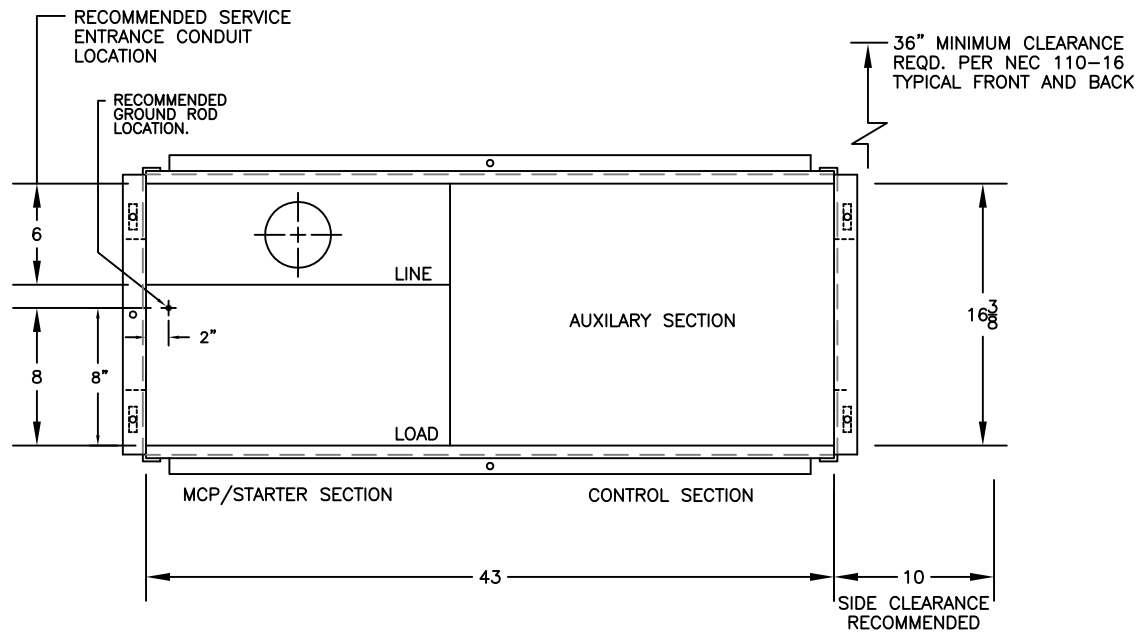
2 OF 3

SIZE

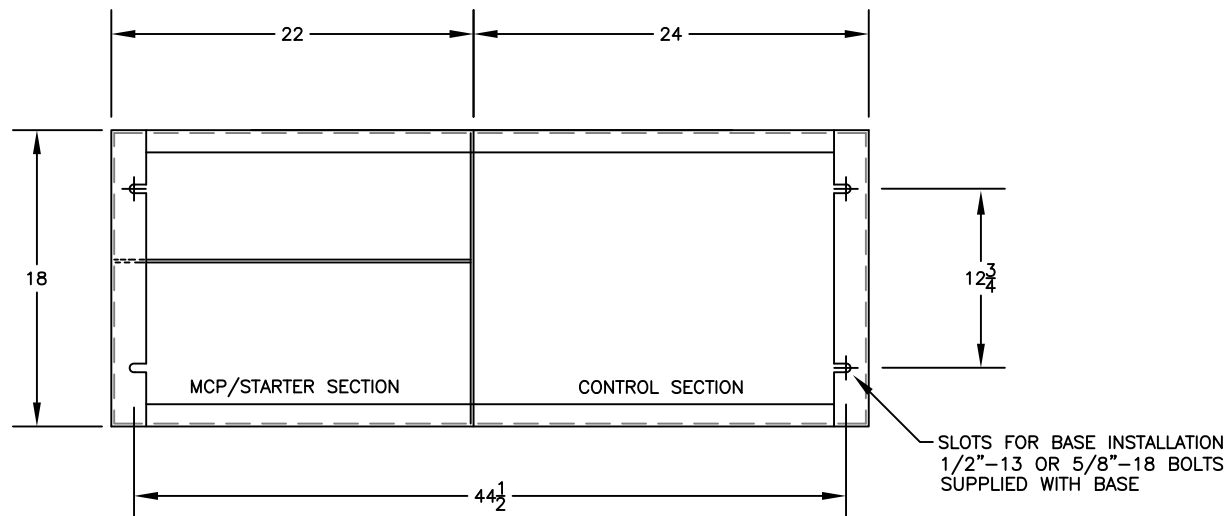
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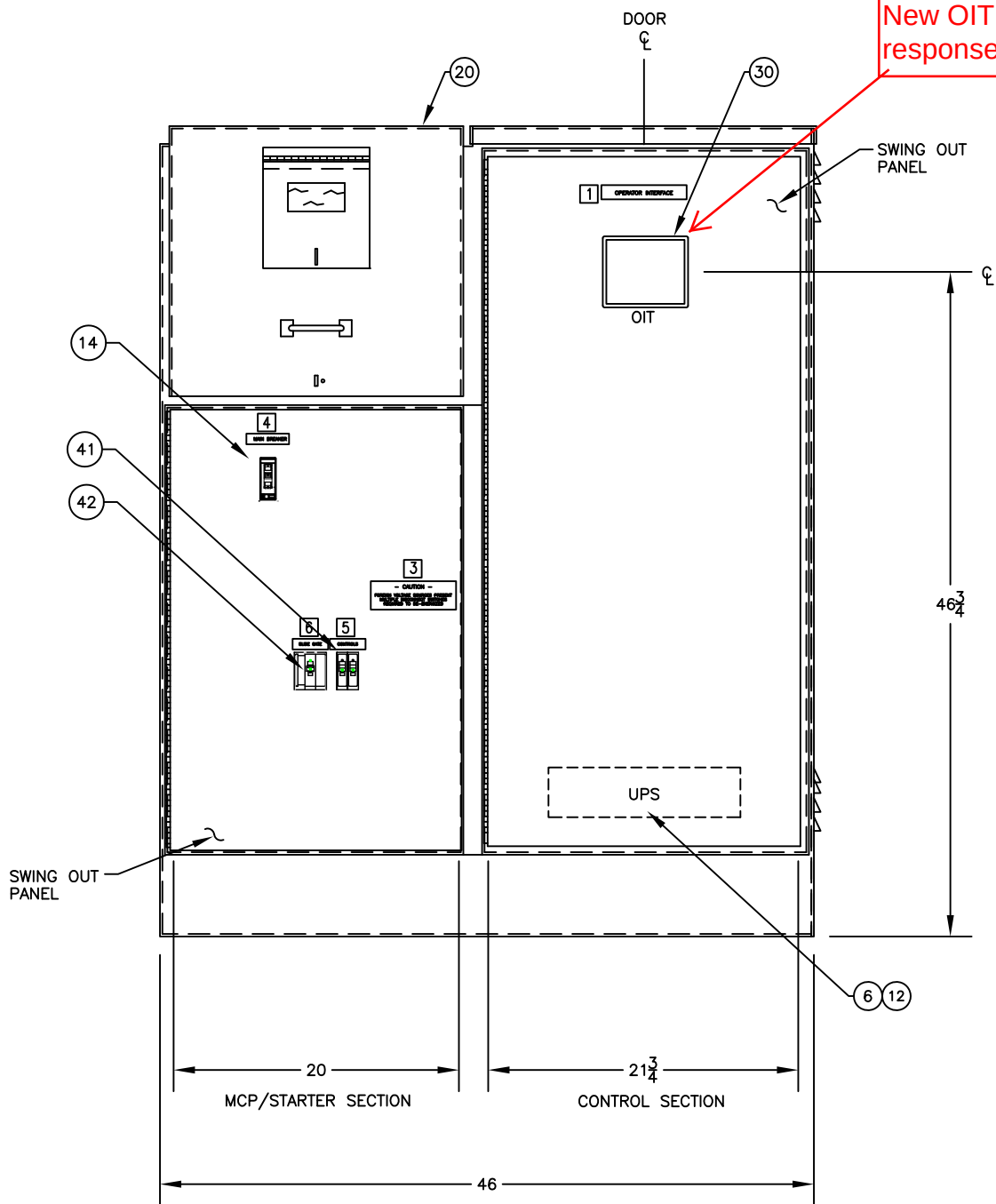
2914-A01



PLAN VIEW

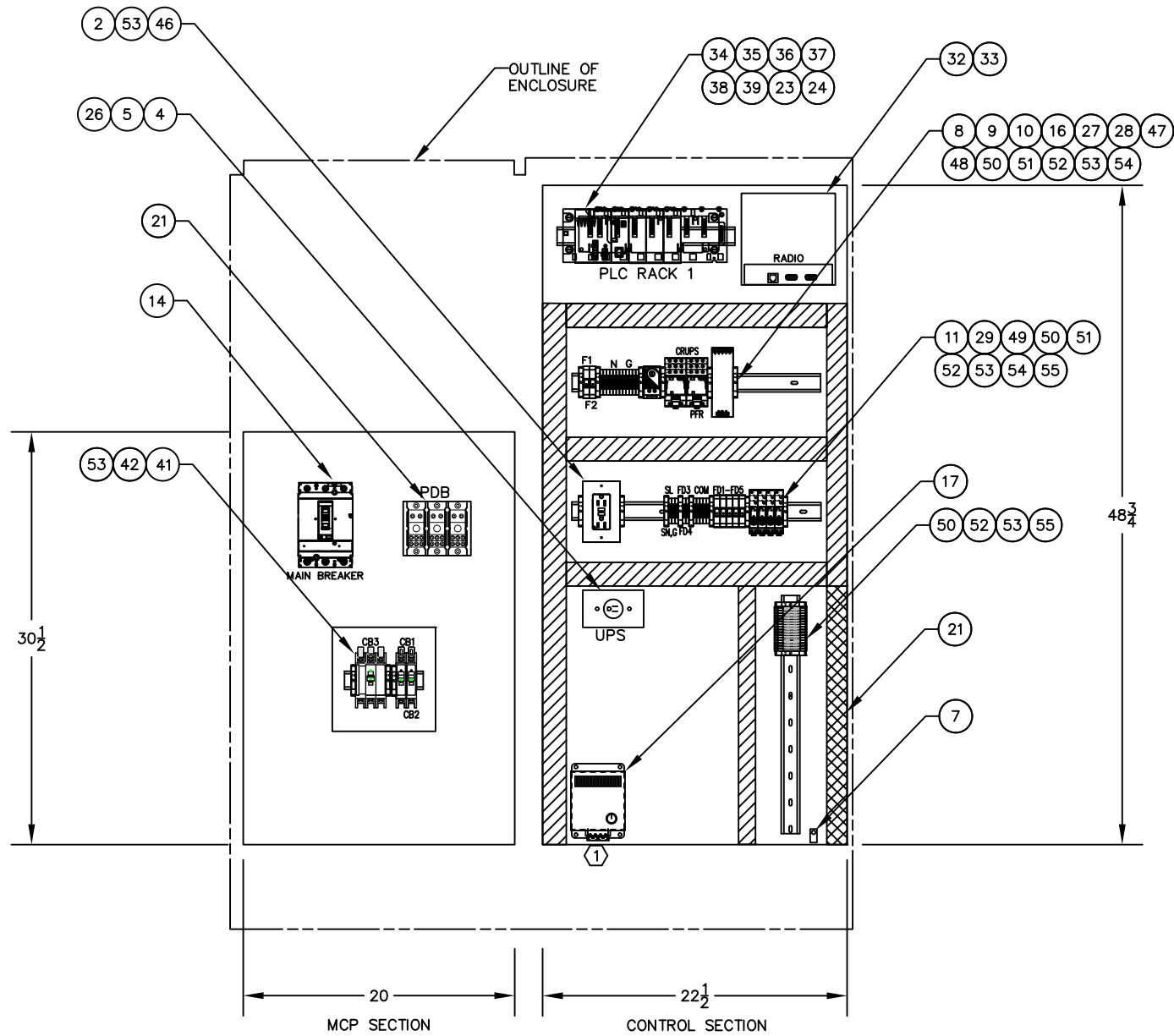


BOTTOM VIEW
MOUNTING SLOT DETAIL



FRONT ELEVATION VIEW
(OUTER DOORS REMOVED FOR CLARITY)

New OIT, see our
responses for details.



MTG PAN LAYOUT

① - MINIMUM 4" CLEARANCE ABOVE
2" CLEARANCE BELOW &
2" CLEARANCE ON LEFT/RIGHT SIDE

MCC CONTROL SYSTEMS
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707-449-0341 www.mccwater.com

DIMENSIONS

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ANGULAR DIMS ± 30'
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REVISIONS					
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1.1	6/20/16	SUBMITTAL	RH	TR	

TESTING		
TEST	DATE	BY

PROJECT

MANTECA MONTE BELLO
STATES SLIDE GATE

TITLE

PLC CONTROL PANEL
COMPONENT LAYOUT

CUSTOMER

FALCO CONSTRUCTION

DESIGNED BY

ET

DATE

4/26/16

DRAWN BY

ET

SCALE

N/A

CHECKED BY

JP

REF

2906-B

APPROVED BY

TR

SHEET

3 OF 3

SIZE

B

DRAWING

2914-A01

NAMEPLATE SCHEDULE							
ITEM	DESCRIPTION	QTY	LTR SIZE	N/P SIZE	TAG NAME	INSCRIPTION	NOTES
1	NAMEPLATE	1	1/4	1 X 6	N/A	OPERATOR INTERFACE	A,B,C,H
2	NAMEPLATE	1	3/8 3/8	2" X 10"	N/A	MANTECA MONTE BELLO ESTATES SLIDE GATE	A,B,C,H
3	NAMEPLATE	1	1/4 3/16 3/16 3/16	2 X 6	N/A	– CAUTION – FOREIGN VOLTAGE SOURCES PRESENT MULTIPLE DISCONNECT SWITCHES REQUIRED TO DE-ENERGIZE	A,B,D,H
4	NAMEPLATE	1	3/16	.75 X 2.5	N/A	MAIN BREAKER	A,B,C,H
5	NAMEPLATE	1	3/16	.75 X 2.5	N/A	CONTROLS	A,B,C,H
6	NAMEPLATE	1	3/16	.75 X 2.5	N/A	SLIDE GATE	A,B,C,H

NAMEPLATE NOTES	
NOTE	DESCRIPTION
A	LAYOUT ALL INSCRIPTION ENGRAVING AS SHOWN.
B	CENTER ENGRAVING HORIZONTALLY AND VERTICALLY.
C	NAMEPLATE MATERIAL: PHENOLIC, BLACK WITH WHITE CORE.
D	NAMEPLATE MATERIAL: PHENOLIC, RED WITH WHITE CORE.
E	NAMEPLATE MATERIAL: PHENOLIC, WHITE WITH BLACK CORE.
F	NAMEPLATE MATERIAL: PHENOLIC, GRAY WITH BLACK CORE.
G	NAMEPLATE MATERIAL: PHENOLIC, YELLOW WITH BLACK CORE.
H	NAMEPLATE TO BE ATTACHED WITH ADHESIVE STRIPS.
J	NAMEPLATE TO BE ATTACHED WITH SILICONE ADHESIVE.
K	NAMEPLATE TO BE ATTACHED WITH STAINLESS STEEL SCREWS.
L	LEGEND PLATE BY MANUFACTURER, PROVIDED BY MCC-CS.
M	LEGEND PLATE TO BE ATTACHED WITH OPERATOR BEZEL.

INDUSTRIAL CONTROL PANEL

MCC

CONTROL SYSTEMS

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VACAVILLE, CALIFORNIA 95688

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PANEL NAME

STORM WATER LIFT STATION

ENCLOSURE

TYPE 3R

FACTORY SHOP

VACAVILLE

JOB NO.-DWGS

2914-A

SUPPLY POWER REQUIREMENTS	WIRING TERMINATIONS TERMINAL - TORQUE	
VOLTAGE <u>240</u>	FUSE BLOCK 8MM	<u>14 IN-LBS</u>
PHASE <u>3</u>	FEED-THRU 8MM	<u>14 IN-LBS</u>
HERTZ <u>60</u>	FEED-THRU 6MM	<u>9 IN-LBS</u>
AMPERES <u>30</u>	FEED-THRU 5MM	<u>7 IN-LBS</u>
SHORT CIRCUIT CURRENT RATING	DISCONNECT 5MM	<u>7 IN-LBS</u>
	GND BLOCK 8MM	<u>14 IN-LBS</u>
	GND BLOCK 6MM	<u>9 IN-LBS</u>
	GND BLOCK 5MM	<u>7 IN-LBS</u>
<u> N/A </u>		

CLASS 1 POWER CIRCUITS USE COPPER CONDUCTORS ONLY WITH MINIMUM 60°C TEMP RATING. CLASS 2 POWER CIRCUITS USE COPPER CONDUCTORS ONLY

FUSE CHART

NO. / RANGE	AMP	VOLTS
F1	2A	120VAC
F2	1A	120VAC
FD1 – FD5	2A	24VDC

CAUTION

DE-ENERGIZE THIS CONTROL PANEL BEFORE PERFORMING ANY REPAIRS

FOR QUESTIONS REGARDING THE PROPER REPAIR OR REPLACEMENT OF COMPONENTS IN THIS CONTROL PANEL ASSEMBLY CONTACT M.C.C. AND PROVIDE THE (JOB NO.-DWGS) INFORMATION AS LISTED ABOVE

CAUTION: TO REDUCE THE RISK OF FIRE, REPLACE ONLY WITH THE SAME TYPE & RATING OF FUSE

PRINT PANEL LABEL FULL SIZE AND AFFIX TO INSIDE OF ENCLOSURE.

[illegible]

Item #	Description	Manufacturer / Model	Part No.	Tag No.	Qty
1	WIREWAY WITH COVER, WHITE, 2 X 4	< VARIES >	< VARIES >		1.5FT
2	MOUNTING RAIL, STANDARD, 35 MM	< VARIES >	< VARIES >		LOT
3	WIRE, MTW 4 AWG, BLK	< VARIES >	< VARIES >		LOT
4	SINGLE RECEPTACLE FACE PLATE, WHITE	< VARIES >	< VARIES >	UPS RECEPTACLE	1
5	RECEPTACLE DEVICE BOX, 1 1/2"	< VARIES >	< VARIES >	UPS RECEPTACLE	1
6	UNINTERRUPTIBLE POWER SUPPLY, 750VA	APC	BE750G	UPS	1
7	GROUNDING LUG	BURNDY	KA4C	GND LUG	1
8	POWER RELAY, 120VAC, 3-POLE, LED, 16A	FINDER	62.33.8.120.0040	CR-UPS, PFR	2
9	POWER RELAY SOCKET	FINDER	92.03	CR-UPS, PFR	2
10	LED INDICATOR FOR SERIES 62	FINDER	99.02.0.230.59	CR-UPS, PFR	2
11	DIGITAL OUTPUT INTERPOSING RELAY, 1P, 24VDC, LED, DIODE	FINDER	4C.01.9.024.0050.SPA	D01-D04	4
12	POWER CORD, 5-15P, SJT, 8FT., BLK, 15A, 14/3	GRAINGER	1FD92	CORD	1
13					
14					
15	YAGI ANTENNA	KATHREIN SCALA DIVISION	CA5-400		1
16	TERMPERATURE CONTROL SWITCH	HOFFMAN	ATEMNO	TS1	1
17	ENCLOSURE HEATER, 100W, 120VAC, W/ TS	HOFFMAN	DAH1001A	HTR	1
18	ENCLOSURE WORKLIGHT FLUORESCENT	HOFFMAN	LF120V18	LT	1
19	DOOR SWITCH	HOFFMAN	ALFSWD	DOOR SWITCH	1
20	ENCLOSURE TYPE 3R, PEDESTAL W/ SWING OUT DOORS, 100A BREAKER & COOLING FANS	MYERS	MEUG46-M100 (MOD)	ENCLOSURE	1
21	POWER DISTRIBUTION BLOCK, 3P	SQUARE D	9080LBA362104		1
22					
23	PATCH CABLE	L-COM	TRD815BLK-3	E1	1
24	PATCH CABLE	L-COM	CUSTOM	E2	1
25	SERIAL CONVERTER, DB-9 TO RJ45	L-COM	RAO98M		1
26	SINGLE RECEPTACLE, 2P, 3W, 15A-125V, WHITE	LEVITON	5015-W	UPS RECEPTACLE	1
27	FUSE, 1/4 X 1-1/4, FAST-ACTING, 1A	LITTELFUSE	312001	F2	1
28	FUSE, 1/4 X 1-1/4, FAST-ACTING, 2A	LITTELFUSE	312002	F1	1
29	FUSE, 1/4 X 1-1/4, CERAMIC, FAST-ACTING, 2A	LITTELFUSE	314002	FD1-FD5	7
30	OPERATOR INTERFACE	SQUARE-D	HMISCU8A5	OIT	1
31	NAMEPLATES	MCC-CS	2914-A02	NP	LOT
32	RADIO SHELF	MCC-CS	CUSTOM	RADIO ACC	1
33	RADIO	MDS	SD04MDCSSNNSNN	RADIO	1
34	M340 6-SLOT RACK	MODICON	BMXXBP0600	PLC	1
35	M340 PLC POWER SUPPLY	MODICON	BMXCP52010	PLC	1
36	M340 PROCESSOR	MODICON	BMXP342020	PLC	1
37	M340 16 POINT DICRETE IN/OUT PUT MODULE	MODICON	BMXDDM3202K	PLC	1
38	M340 CONNECTOR CABLE FOR DISCRETE IN/OUT PUT MODULE	MODICON	BMXFCW303	PLC	1
39	M340 SERIAL COMMUNICATION MODULE	MODICON	BMXNOM0200	PLC	1
40	LIGHTNING ARRESTOR	POLYPHASER	IS-50NX-C0	RADIO ACC	1
41	CIRCUIT BREAKER, 1-POLE, 15A	SQUARED	QOU115	CB1,CB2	2
42	CIRCUIT BREAKER, 3-POLE, 15A	SQUARE D	QOU315	CB3	1
43	3/8" COAXIAL CABLE W/ONE END	TALLEY	TIMA40X-50	RADIO ACC	1
44	3/8" MALE END	TALLEY	EZ400NMH	RADIO ACC	2
45	FLEX CONNECTOR	TALLEY	CXTA58G-3	RADIO ACC	1
46	GFCI RECEPTACLE, DUPLEX, 15A	WEIDMULLER	6720005422	GFCI	1
47	24VDC POWER SUPPLY, 5A, 120W	WEIDMULLER	8951340000	PS	1
48	TERMINAL BLOCK, FUSED, 120VAC, 1/4 X 1-1/4	WEIDMULLER	1014300000	F1-F2	2
49	TERMINAL BLOCK, FUSED, 24VDC, 1/4 X 1-1/4	WEIDMULLER	1014100000	FD1-FD7	F73
50	TERMINAL BLOCK, FEED THRU	WEIDMULLER	1020000000	G	42
51	GROUND TERMINAL BLOCK, POWER DISTRIBUTION	WEIDMULLER	1010000000		9
52	TERMINAL BLOCK, END COVER	WEIDMULLER	1050000000		4
53	MOUNTING RAIL CLAMP	WEIDMULLER	1061200000	N	1
54	TERMINAL BLOCK JUMPER, BLACK, 4-POLE	WEIDMULLER	1718100000		3
55	TERMINAL BLOCK MARKER	WEIDMULLER	CUSTOM		2EA
56	FLUORESCENT BULB	GRAINGER	1V173 F15T8/CW		1
57	POWER DISTRIBUTION BLOCK, 1P	SQUARE D	9080LBA161101		1
58	TERMINAL BLOCK FUSED, 5X20mm	WEIDMULLER	1011000000	F100-F116	4
59	FUSE, FAST ACTING, 5X20MM, FOR AI,1/8A	LITTELFUSE	235.125		4
60	LEVEL TRANSDUCER, 0-20FT, 4-20mA	KELLER AMERICA	0407.01607.021311.13		1
61	AI Module, 4-Channel, Isolated	MODICON	BMXAMI0410	PLC AI	1
62	Cordset, flying leads, for AI, 3m Length	MODICON	BMXFTW3015	FOR AI	1
63	VALVE BOX	GAYLORD	Quote: M072916V-4		1

MCC CONTROL SYSTEMS
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DIMENSIONS

UNLESS OTHERWISE SPECIFIED
INCHES
AND TOLERANCES FOR

1 PLACE DIMS ± 0.1
2 PLACE DIMS ± 0.01
3 PLACE DIMS ± 0.002
ANGULAR DIMS ± 30'
FRACTION DIMS ± 1⁄2"

0"  1"

THIS LINE EQUALS ONE INCH
IF NOT ONE INCH ON THIS SHEET
ADJUST SCALES ACCORDINGLY

REVISIONS				
NO.	DATE	REVISION	BY	APP
1.0	4/26/16	SUBMITTAL	ET	TR
1.1	6/20/16	SUBMITTAL	RH	TR

TESTING		
TEST	DATE	BY

PROJECT
MANTECA MONTE BELLO STATES SLIDE GATE

TITLE
PLC CONTROL PANEL
BILL OF MATERIALS

CUSTOMER
FALCO CONSTRUCTION

DESIGNED BY
ET

DATE
4/26/16

DRAWN BY
ET

SCALE
N/A

CHECKED BY
JP

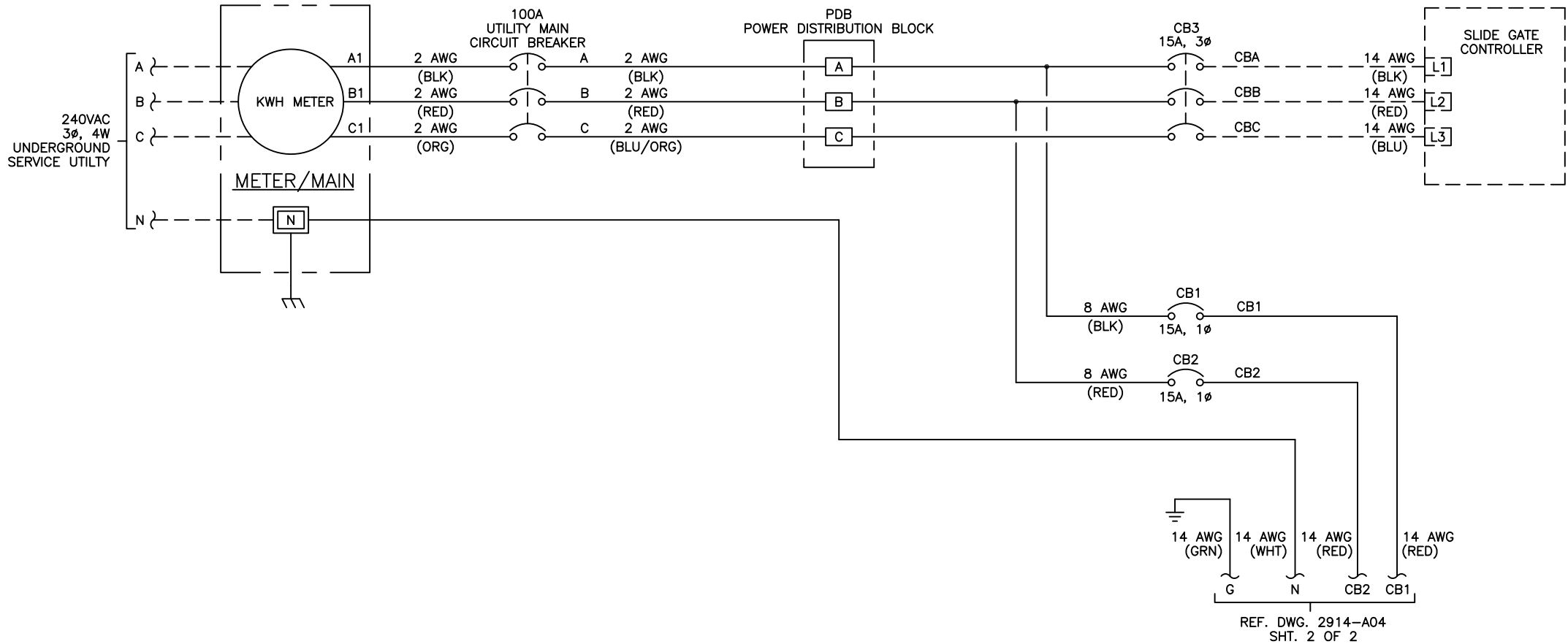
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TR

SHEET
1 OF 1

SIZE
B

DRAWING
2914-A03



- WARNING -
C PHASE TO NEUTRAL IS 208 VOLTS



DIMENSIONS

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INCHES
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3 PLACE DIMS ± 0.002
ANGULAR DIMS $\pm 30'$
FRACTION DIMS $\pm \frac{1}{32}$
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1.0	4/26/16	SUBMITTAL	ET	TR

TESTING

TEST	DATE	BY

PROJECT

MANTECA MONTE BELLO
STATES SLIDE GATE

TITLE

PLC CONTROL PANEL
POWER DISTRIBUTION
SCHEMATIC

CUSTOMER

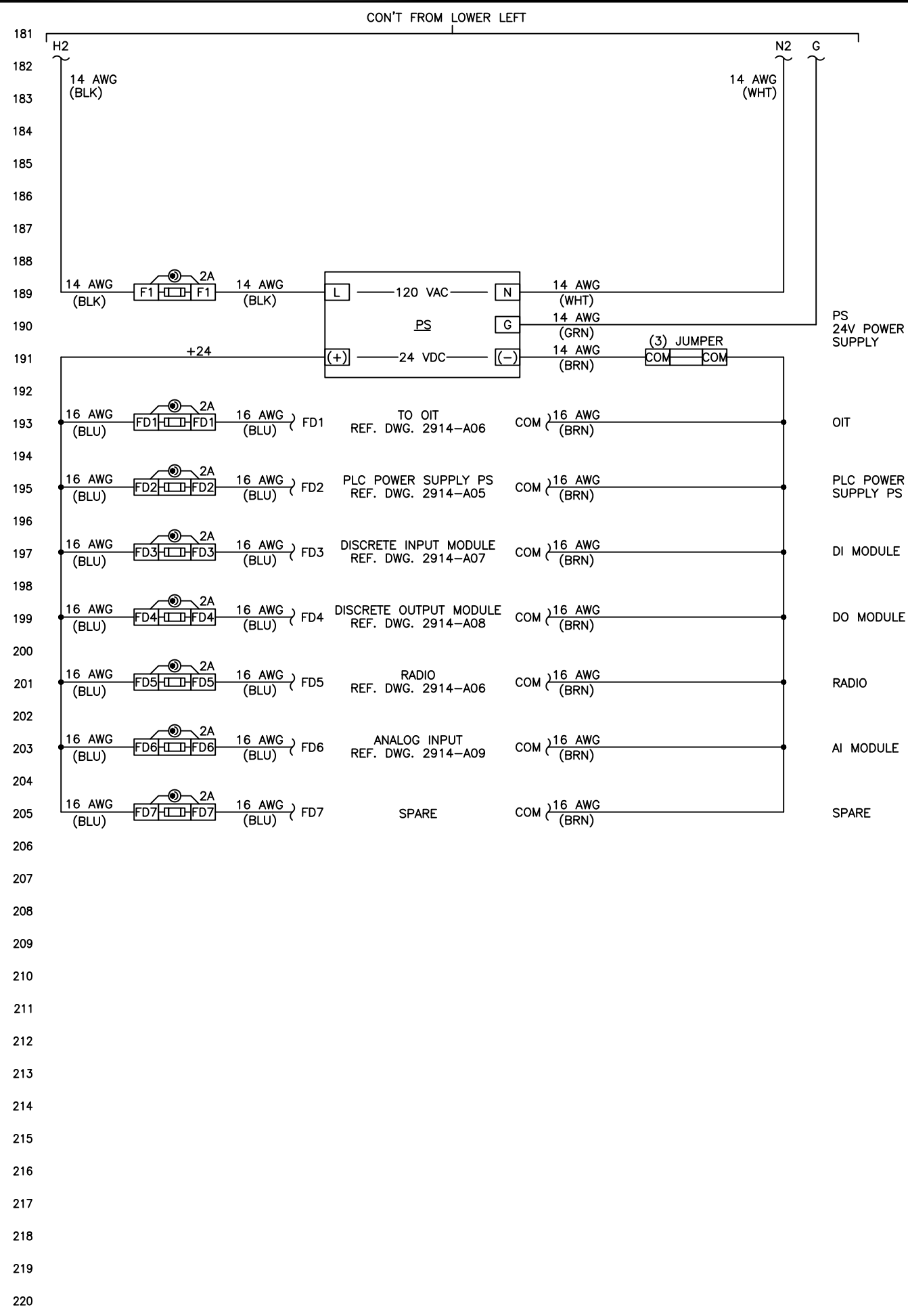
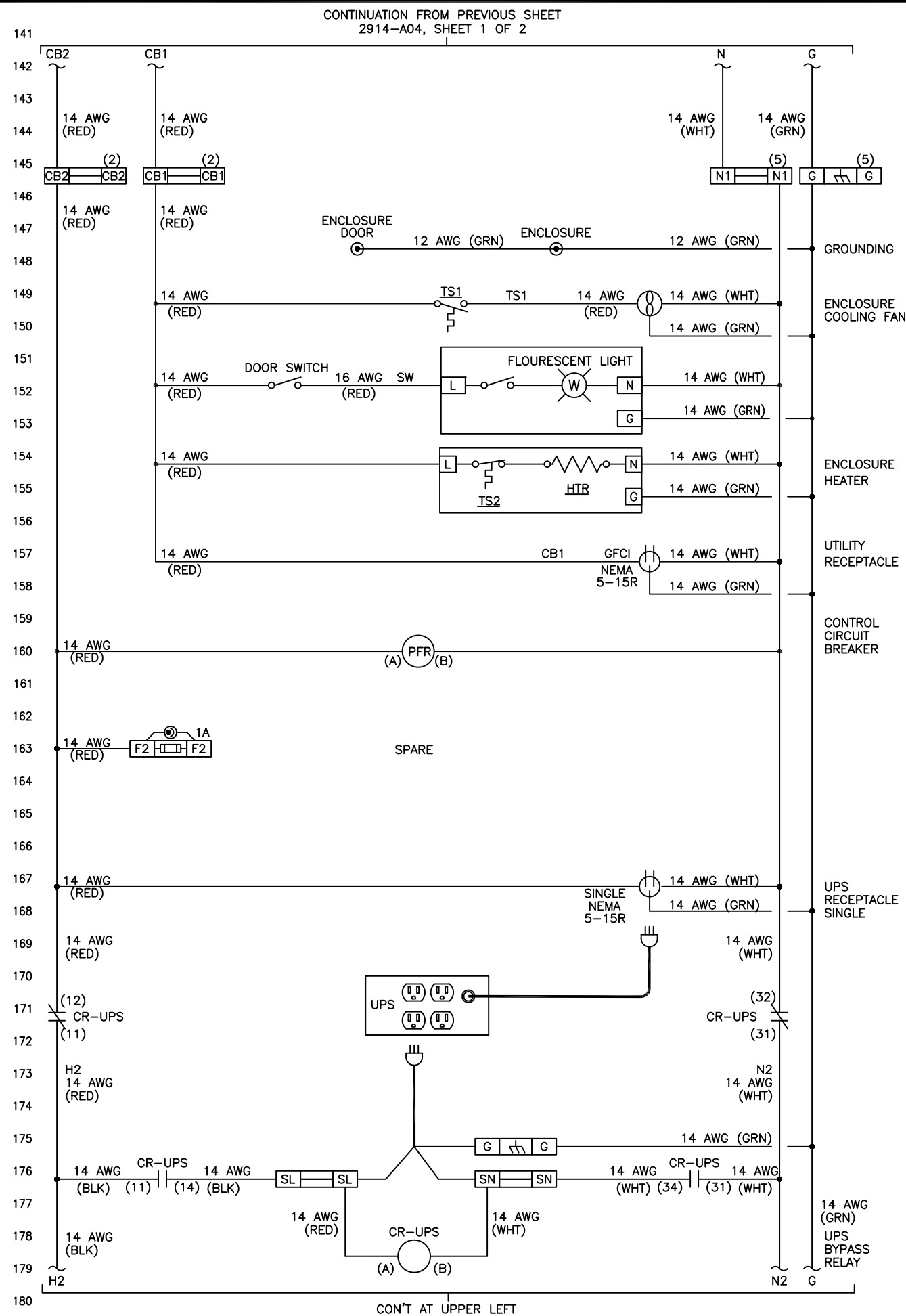
FALCO CONSTRUCTION

DESIGNED BY	ET	DATE	4/26/16
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CHECKED BY	JP	REF	2906-B
APPROVED BY	TR	SHEET	1 OF 2

SIZE

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B 2914-A04

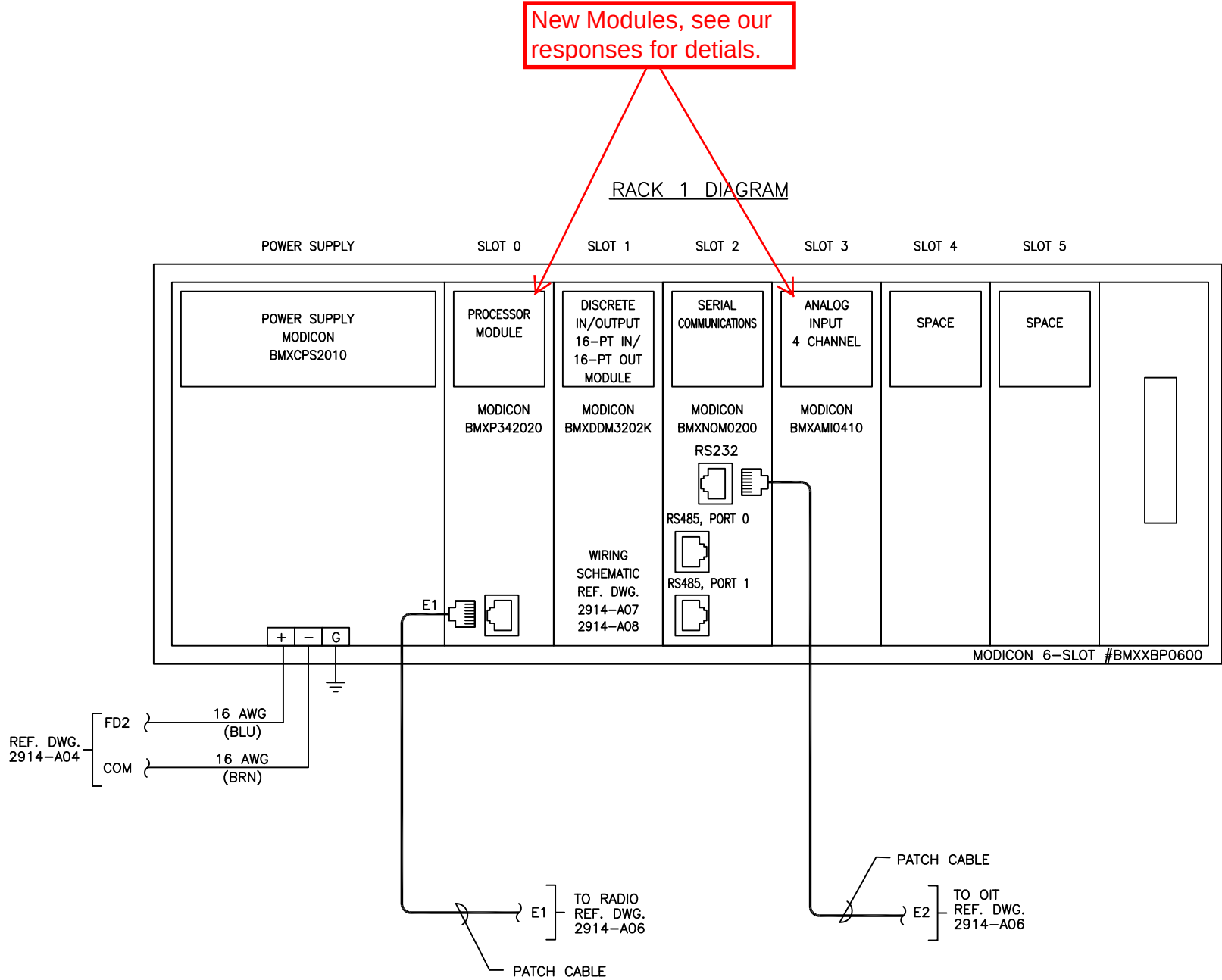


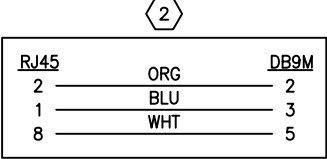
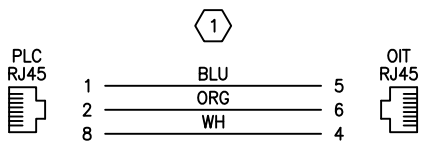
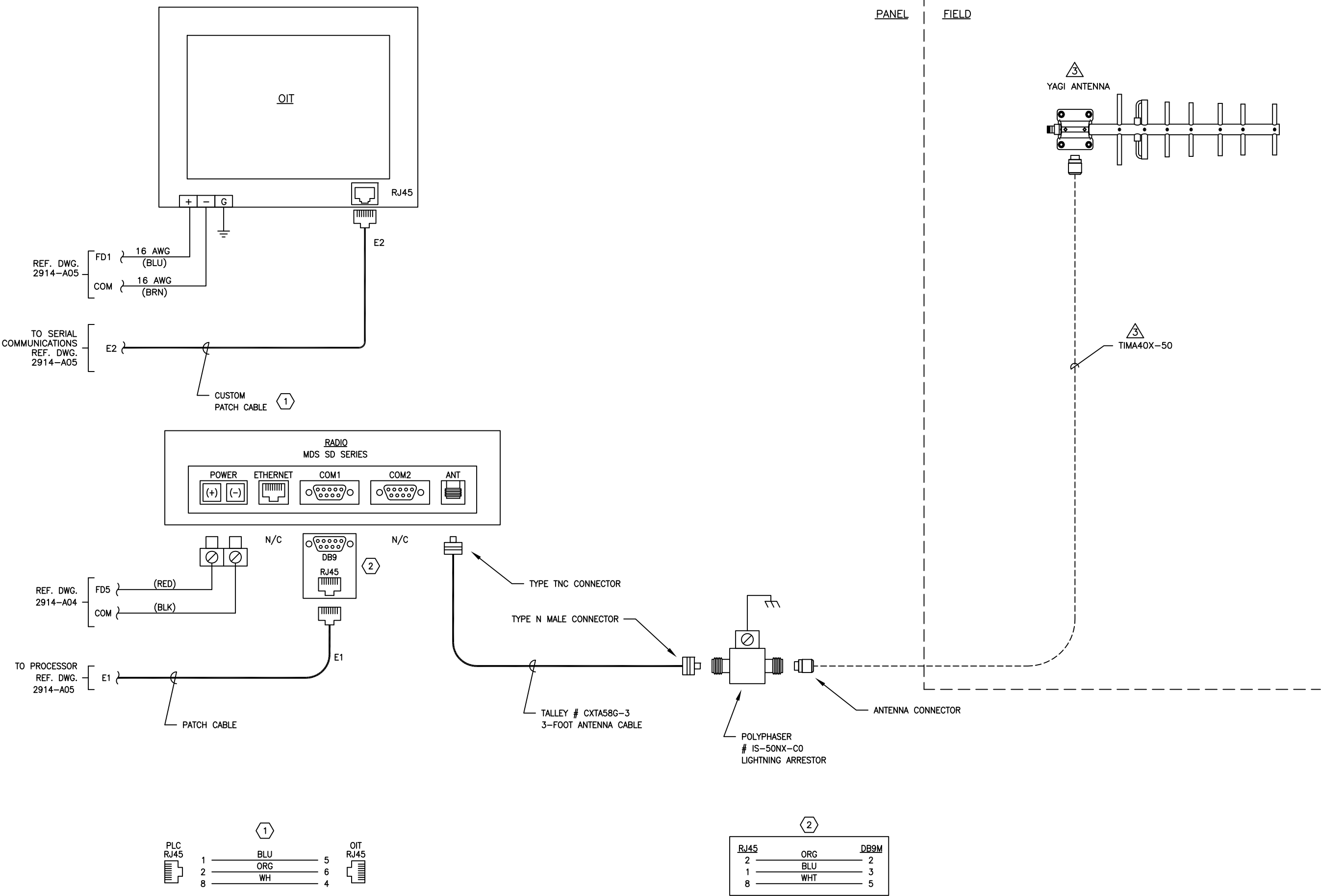
DIMENSIONS	
UNLESS OTHERWISE SPECIFIED INCHES	
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1 PLACE DIMS	± 0.1
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ANGULAR DIMS	± 30°
FRACTION DIMS	± 1⁄32"
0"  1"	
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1.1	6/20/16	SUBMITTAL	RH	TR	

TESTING		
TEST	DATE	BY

PROJECT	
MANTECA MONTE BELLO STATES SLIDE GATE	
TITLE	
PLC CONTROL PANEL PLC CHASSIS DIAGRAM	
CUSTOMER	
FALCO CONSTRUCTION	
DESIGNED BY	ET
DATE:	4/26/16
DRAWN BY	ET
SCALE:	N/A
CHECKED BY	JP
REF:	2906-B
APPROVED BY	TR
SHEET	1 OF 1
SIZE	B
DRAWING:	2914-A05





OIT TO PLC CONNECTION DIAGRAM

PLC TO RADIO CONNECTION DIAGRAM

MCC CONTROL SYSTEMS
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FRACTION DIMS ± 1/32"

0"  1"

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TESTING

TEST	DATE	BY

PROJECT

MANTECA MONTE BELLO
STATES SLIDE GATE

TITLE

PLC CONTROL PANEL
NETWORK DIAGRAM

CUSTOMER

FALCO CONSTRUCTION

DESIGNED BY ET DATE: 4/26/16

DRAWN BY ET SCALE: N/A

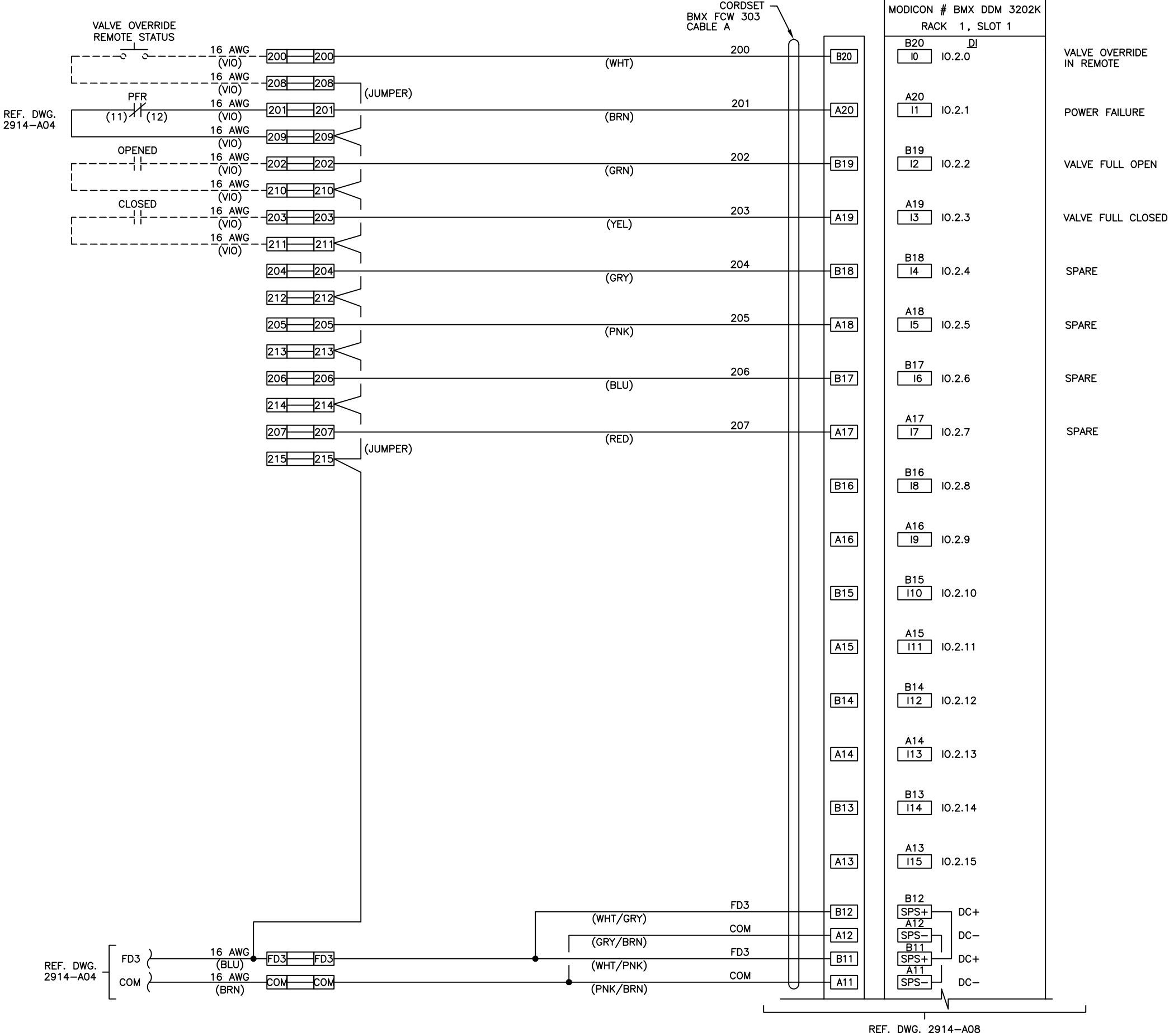
CHECKED BY JP REF: 2906-B

APPROVED BY TR SHEET 1 OF 1

SIZE B

DRAWING: 2914-A06

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PROJECT
MANTECA MONTE BELLO
STATES SLIDE GATE

TITLE
PLC CONTROL PANEL
DISCRETE INPUT MODULE

CUSTOMER
FALCO CONSTRUCTION

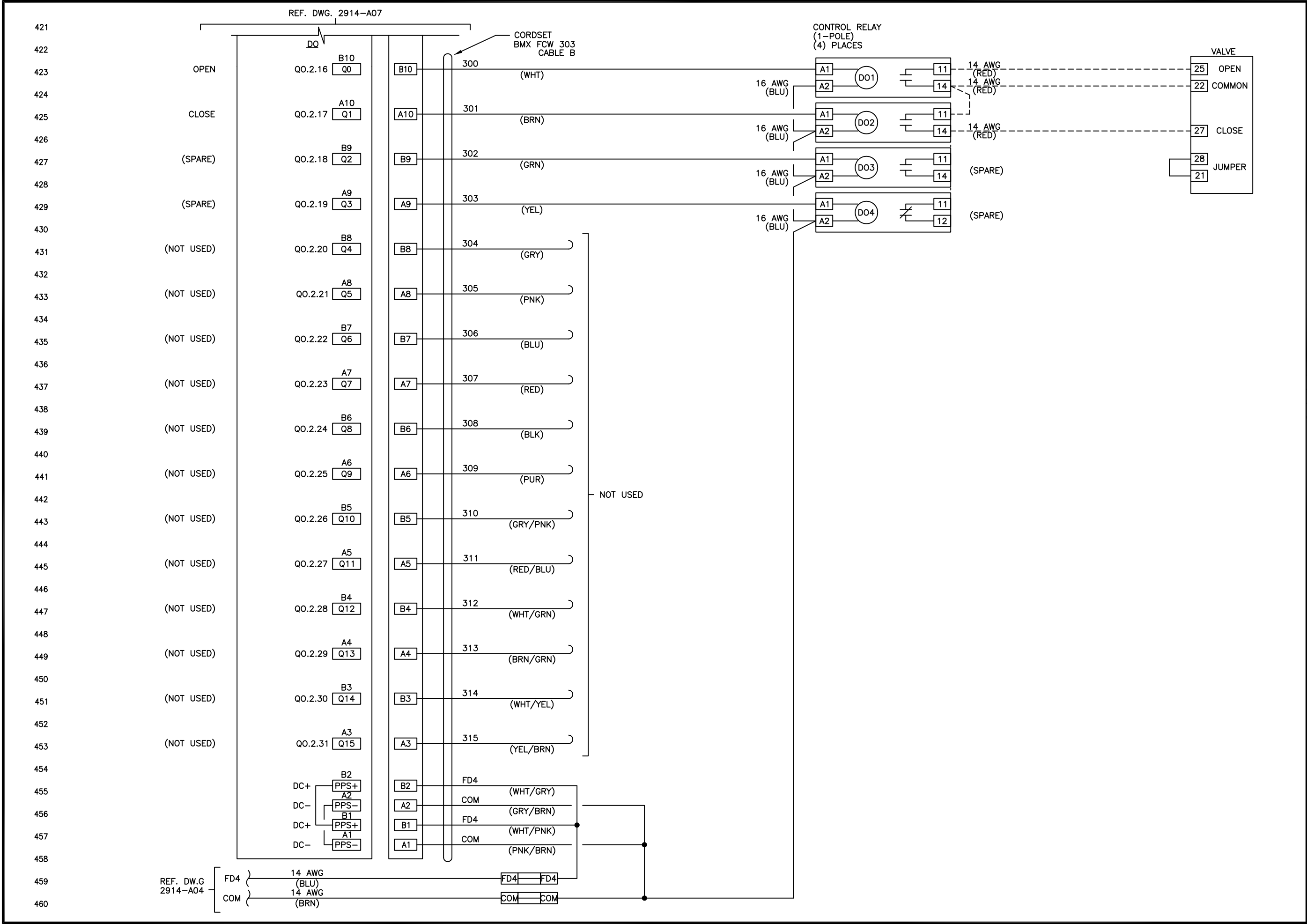
DESIGNED BY ET DATE: 4/26/16

DRAWN BY ET SCALE: N/A

CHECKED BY JP REF: 2906-B

APPROVED BY TR SHEET 1 OF 1

SIZE B DRAWING: 2914-A07



MCC CONTROL SYSTEMS
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STATES SLIDE GATE

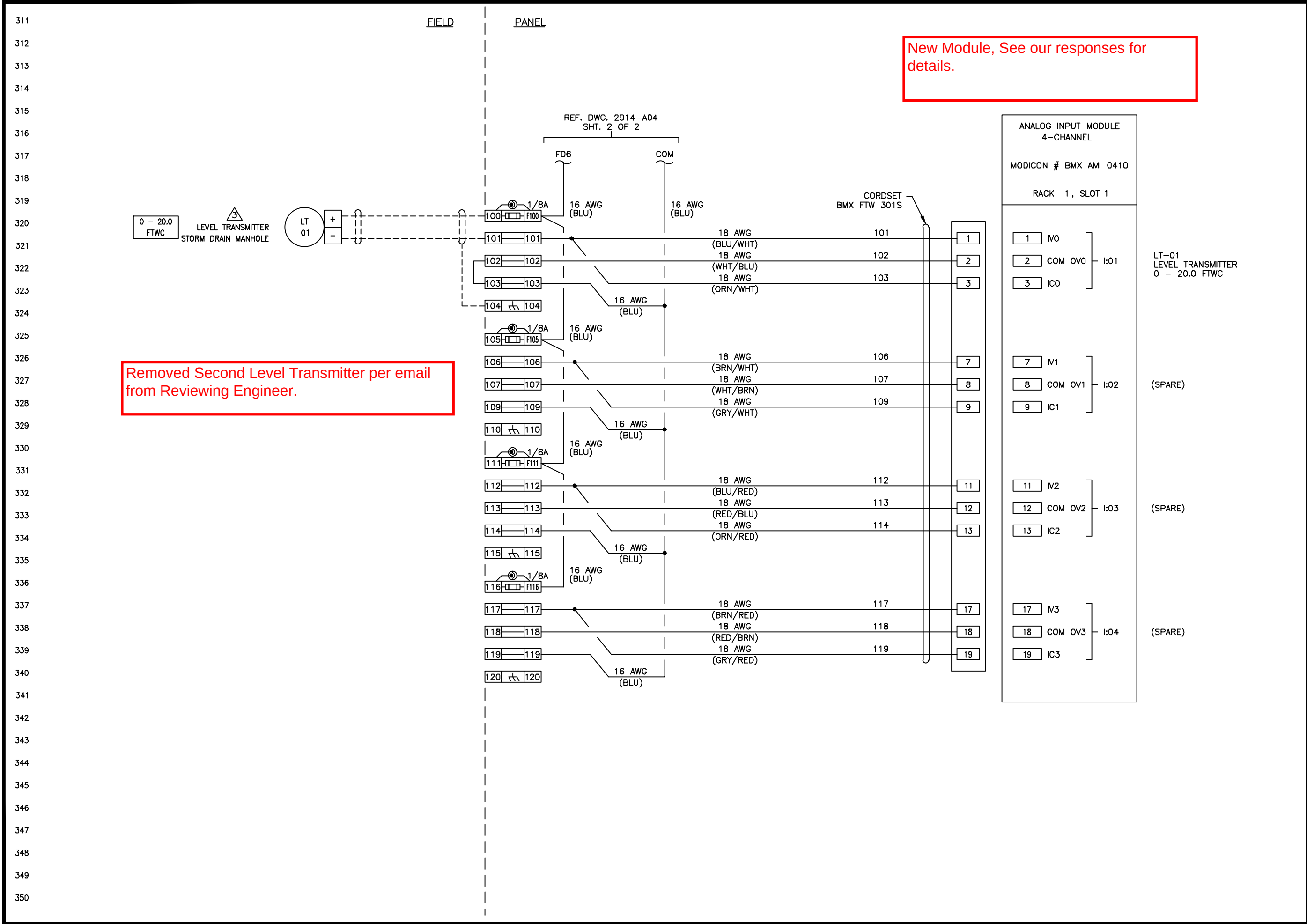
TITLE
PLC CONTROL PANEL
DISCRETE OUTPUT MODULE
SCHEMATIC

CUSTOMER
FALCO CONSTRUCTION

DESIGNED BY ET	DATE 4/26/16
DRAWN BY ET	SCALE N/A
CHECKED BY JP	REF. 2906-B
APPROVED BY TR	SHEET 1 OF 1

SIZE
B

DRAWING:
2914-A08



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REVISIONS

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1.1	6/20/16	SUBMITTAL	RH	TR
1.2	6/21/16	SUBMITTAL	RH	TR

TESTING

TEST	DATE	BY

PROJECT
MANTECA MONTE BELLO
STATES SLIDE GATE

TITLE
PLC CONTROL PANEL
ANALOG INPUT MODULE
SCHEMATIC 1

CUSTOMER
FALCO CONSTRUCTION

DESIGNED BY	DATE
ET	4/26/16

DRAWN BY	SCALE
ET	N/A

CHECKED BY	REP.
JP	2906-A

APPROVED BY	SHEET
TR	1 OF 1

SIZE
B

DRAWING
2914-A09