WEAVER CONSTRUCTION MANAGEMENT, INC.
3679 S. Huron St., Suite 404
Englewood, CO 80110
Phone: (303) 789-4111 FAX: (303) 789-4310

SUBMITTAL TRANSMITAL

November 7, 2011
WGC Submittal No: 16700-001

PROJECT: **Harold Thompson Regional WRF**
Birdsall Rd.
Fountain, CO 80817
Job No. 2908

ENGINEER: **GMS, Inc.**
611 No. Weber St., #300
Colorado Springs, CO 80903
719-475-2935 Roger Sams

OWNER: **Lower Fountain Metropolitan Sewage Disposal District**
901 S. Santa Fe Ave.
Fountain, CO 80817
719-382-5303 James Heckman

CONTRACTOR: **McDade Woodcock, Inc.**
7222 Commerce Center Drive, #245
Colorado Springs, CO 80909
719-264-1236

SUBJECT: Submittal of SCADA System Design

SPEC SECTION: 16700 - Electrical

PREVIOUS SUBMISSION DATES:

DEVIATIONS FROM SPEC: __x__ YES ___ NO (created spec section)

CONTRACTOR'S STAMP: This submittal has been reviewed by Weaver Construction Management and approved with respect to the means, methods, techniques, & safety precautions & programs incidental thereto. Weaver General Construction also warrants that this submittal complies with contracted documents and comprises on deviations thereto:

Contractor's Stamp:	Engineer's Stamp:
Date: 11/07/11 Reviewed by: H.C. Myers (X) Reviewed Without Comments ( ) Reviewed With Comments	

ENGINEER'S COMMENTS:_____

McDade-Woodcock, Inc.

TRANSMITTAL
No. 00005

7222 Commerce Center Dr. Suite 245
Colorado Springs, CO 80919

Phone: 719-264-1236
Fax: 719-264-1450

PROJECT: Harold D. Thompson WRF

DATE: 11/4/2011

TO: Weaver General Construction
,

REF: Electrical Submittal
16700-001
SCADA System

ATTN: Wes Weaver

WE ARE SENDING:	SUBMITTED FOR:	ACTION TAKEN:
☑ Shop Drawings	☑ Approval	☐ Approved as Submitted
☐ Letter	☐ Your Use	☐ Approved as Noted
☐ Prints	☐ As Requested	☐ Returned After Loan
☐ Change Order	☑ Review and Comment	☐ Resubmit
☐ Plans		☑ Submit
☐ Samples	**SENT VIA:**	☐ Returned
☐ Specifications	☑ Attached	☐ Returned for Corrections
☐ Other:	☐ Separate Cover Via	☑ Due Date: 11/21/2011

ITEM	PACKAGE	SUBMITTAL	DRAWING	REV.	ITEM NO.	COPIES	DATE	DESCRIPTION	STATUS
					001	1	11/4/2011	Electrical Submittal 16700-001 SCADA System	OUT

Remarks: Electrical Submittal for Review and Approval
Via Email Only

CC:

Signed:
Janelle L Smith

McDADE-WOODCOCK, INC.

HAROLD D. THOMPSON RWRF HEADWORKS BUILDING

McDADE-WOODCOCK INC.
PROJECT NUMBER - 1402

ELECTRICAL SUBMITTAL

SCADA SYSTEM

16700-001

Owner: Lower Fountain Metropolitan Sewage District
901 S. Santa Fe Avenue
Fountain, CO 80817

General Contractor: Weaver General Construction Co.
3679 S. Huron St. – Suite 404
Englewood, CO 80110

Electrical Contractor: McDade-Woodcock, Inc.
7222 Commerce Center Dr.
#245
Colorado Springs, CO 80919

Engineer: GMS Inc.
611 N. Weber St., Suite 300
Colorado Springs, CO 80903

CORPORATE
2404 Claremont Ave. NE
Albuquerque, NM 87107
Mailing Address
P.O. Box 11592
Albuquerque, NM 87192
Ph 505-884-0155
Fax 505-884-6073

DENVER
10700 E. Geddes Avenue
Suite 170
Englewood CO 80112
Ph 303-803-1809
Fax 303-803-1818

COLORADO SPRINGS
7222 Commerce Center Drive
Suite 245
Colorado Springs, CO 80919
Mailing Address
P.O. Box 7349
Colorado Springs, CO 80933
Ph 719-264-1236
Fax 719-264-1450

MWIEIC.com

Harold D. Thompson Regional Water Reclamation Facility

SCADA System Design

October 2011

BROWNS HILL
ENGINEERING & CONTROLS

8119 Shaffer Parkway, Unit C • Littleton, Colorado 80127 • 720.344.7771


BROWNS HILL
ENGINEERING & CONTROLS

Harold D. Thompson Regional Water

SCADA System Design

TABLE OF CONTENTS


BROWNS HILL
ENGINEERING & CONTROLS

Section 1:

Lists

BROWNS HILL
ENGINEERING & CONTROLS


BROWNS HILL
ENGINEERING & CONTROLS

Harold D. Thompson Regional Water Reclamation Facility
SCADA System Design
Bill of Materials

Description	Quantity	Manuf.	Part #
Headworks Control Panel			
Enclosure	1	Hoffman	A723618FS
Backpanel	1	Hoffman	A72P36F1
Lighting Kit	1	Hoffman	LF120V18
Door Switch	1	Hoffman	ALFSWD
120VAC SPD	1	Phoenix Contact	28 39 33 4
120VAC SPD Base	1	Phoenix Contact	28 39 28 2
Main Circuit Breaker 10A-1P	1	Square D	QOU110
120VAC Receptacle	1	Leviton	5362-IG
Receptacle handy box and cover	1	Thomas & Betts	58361-1/2 & 58-C-7
Wire Duct (3X3)	As req.	Thomas & Betts	TY3X3WPG6
Wire Duct (2X3)	As req.	Thomas & Betts	TY2X3WPG6
Wire Duct cover (3")	As req.	Thomas & Betts	TY3CPG6
Wire Duct cover (2")	As req.	Thomas & Betts	TY2CPG6
1000VA UPS	1	APC	BR1000G
SPDT 120VAC Relay	16	Idec	RH1B-UL-AC120V
SPDT Socket (relay base)	16	Idec	SH1B-05
DPDT 120VAC Relay	2	Idec	RH2B-UL-AC120V
DPDP Socket (relay base)	2	Idec	SH2B-05
Terminal Blocks	As req.	Phoenix Contact	30 46 18 4
Fuse Terminal Blocks	As req.	Phoenix Contact	30 46 03 2
End Blocks	As req.	Phoenix Contact	30 22 21 8
Din Rail	As req.	Phoenix Contact	08 01 73 3
Power Supply 24VDC-30W	1	Idec	PS5R-SC24
Media Converter and Network Switch	1	Hirshman	942014018
Fiber Patch Panel	1	tii Networks	WM1PF006KSCN
Fiber Patch Cord (SC-SC 1meter)	2	Allen Tel Prod.	GBSC2-D2-01
Intrinsically Safe Barrier	2	Turck	IM1-22Ex-R
Current Monitoring Sensor	9	Cutler Hammer	EAC1420SP
PLC:			
Controller - Ehternet/IP communications	1	Allen Bradley	1769-L32E
Industrial Compact Flash card	1	Allen Bradley	1784-CF64
Digital Input module - 120VAC (16 pts)	4	Allen Bradley	1769-IA16
Digital Output module - 120VAC (16 pts)	1	Allen Bradley	1769-OW16
Analog Input module - 4-20mA (8 pts)	2	Allen Bradley	1769-IF8
Analog Output module - 4-20mA (4 pts)	1	Allen Bradley	1769-OF4CI
Right end cap	1	Allen Bradley	1769-ECR
Power Supply - 120VAC	1	Allen Bradley	1769-PA2
Opeartor Terminal Interface 10" 120VAC	1	Allen Bradley	2711P-T10C4A8


BROWNS HILL
ENGINEERING & CONTROLS

Harold D. Thompson Regional Water Reclamation Facility
SCADA System Design
Instrument List

Tag #	Description	Service	Scale	Manufacturer	Part #
FIT-100	Influent Flowmeter	Ultrasonic Transmitter	0 - 6 MGD	Siemens	7ML500-3BA00-0BA0
AIT-110	Influent Wastewater Sampler	4700 Refrigerated Sampler		ISCO	684700001
		Includes:control panel, refrigeration unit, distributor arm, two pump tubes, instruction manual, 1 bottle.			
ZIT-121	D-HW1 position switch	Intrusion Alarm, swing door		Allen Bradley	802X-A7 / 802MC-W12
ZIT-122	D-HW2 position switch	Intrusion Alarm, swing door C1-DII		Allen Bradley	802X-A7 / 802MC-W12
ZIT-123	D-HW3 position switch	Intrusion Alarm, garage door C1-DII		Allen Bradley	802X-A7 / 802MC-W12
ZIT-124	D-HW4 position switch	Intrusion Alarm, swing door C1-DII		Allen Bradley	802X-A7 / 802MC-W12
ZIT-125	D-HW5 position switch	Intrusion Alarm, garage door C1-DII		Allen Bradley	802X-A7 / 802MC-W12
ZIT-126A	D-HW6 position switch	Intrusion Alarm, swing door C1-DII		Allen Bradley	802X-A7 / 802MC-W12
ZIT-126B	D-HW6 position switch	Intrusion Alarm, swing door C1-DII		Allen Bradley	802X-A7 / 802MC-W12
AIT	Gas Detector	Oxygen, flume channel	4' - 6" AFF	MSA	Ultima X
AIT	Gas Detector	Oxygen, Grit Pump room	4' - 6" AFF	MSA	Ultima X
AIT	Gas Detector w/Splash Guard	Hydrogen Sulfide, flume channel	1' - 6" AFF	MSA	Ultima X - Remote Sensor
AIT	Gas Detector w/Splash Guard	Hydrogen Sulfide, Grit Pump rm.	1' - 6" AFF	MSA	Ultima X - Remote Sensor
AIT	Gas Detector	Methane LEL, Grip Pump rm.	Mount high on wall under corbel	MSA	Ultima X - Remote Sensor
AIT	Gas Detector	Methane LEL, Influent Box	Mount at ceiling	MSA	Ultima X - Remote Sensor
	High Temperature Screens Room	Hazard Location, DPDT switch		Columbus Electric	HLT-2-G
	High Temperature Electrical Room	SPDT Temperature Switch		Dayton	1UHH2
	Water-On-The-Floor	Relay in Control Panel		Warrick	16MB1B-05-05
		Probe holder in Pump Room		Warrick	3U2B- 1/2"
		Probes in Pump Room		Warrick	3W2
	Smoke Detector	Hazard Location in process area		Pyrotector	30-3003
	Smoke Detector	Non-hazardous in electrical room		American Sensors	ESA5011
	Beacon (Amber)	Alarm, North wall		Federal Signal	225-120A
	Beacon (Amber)	Alarm, South wall		Federal Signal	225-120A
	Beacon (Amber)	Alarm, West wall		Federal Signal	225-120A


BROWNS HILL
ENGINEERING & CONTROLS

Harold D. Thompson Regional Water Reclamation Facility
SCADA System Design
I/O List

Tag #	Description	Address	DI	DO	AI	AO	Scale	Notes
	Headworks PLC							
	Grit Separator System Shutdown Command			1				
	Grit Collector 1 Running		1					
	Grit Collector 1 Overload		1					
	Grit Collector 1 E-Stop		1					Add Aux contact for E-Stop
	Grit Collector 1 Current Draw				1			Add current transformer (BH)
	Grit Collector 2 Running		1					
	Grit Collector 2 Overload		1					
	Grit Collector 2 E-Stop		1					Add Aux contact for E-Stop
	Grit Collector 2 Current Draw				1			Add current transformer (BH)
	Grit Pump 1 Running		1					
	Grit Pump 1 Overload		1					
	Grit Pump 1 E-Stop		1					Add Aux contact for E-Stop
	Grit Pump 1 Current Draw				1			Add current transformer (BH)
	Grit Pump 1 in Auto		1					Add aux contact to HOA
	Grit Pump 2 Running		1					
	Grit Pump 2 Overload		1					
	Grit Pump 2 E-Stop		1					Add Aux contact for E-Stop
	Grit Pump 2 Current Draw				1			Add current transformer (BH)
	Grit Pump 2 in Auto		1					Add aux contact to HOA
	Grit Washer Running		1					
	Grit Washer Overload		1					
	Grit Washer Fault		1					
	Grit Washer E-Stop		1					Add Aux contact for E-Stop
	Grit Washer Current Draw				1			Add current transformer (BH)
	Screen 1 General Fault		1					
	Screen 1 Running		1					
	Screen 1 in Auto		1					Add aux contact to HOA
	Screen 1 Shutdown Command			1				
	Screen 1 E-Stop		1					Add Aux contact for E-Stop
	Screen 1 Current Draw				1			Add current transformer (BH)
	Screen 2 General Fault		1					
	Screen 2 Running		1					
	Screen 2 in Auto		1					Add aux contact to HOA
	Screen 2 Shutdown Command			1				
	Screen 2 E-Stop		1					Add Aux contact for E-Stop
	Screen 2 Current Draw				1			Add current transformer (BH)

Harold D. Thompson Regional Water Reclamation Facility
SCADA System Design
I/O List

Tag #	Description	Address	DI	DO	AI	AO	Scale	Notes
	Compactor 1 Washing in Auto		1					Add aux contact to HOA
	Compactor 1 Flushing in Auto		1					Add aux contact to HOA
	Compactor 1 Drive Motor in Auto		1					Add aux contact to HOA
	Compactor 1 Running		1					
	Compactor 1 General Fault		1					
	Compactor 1 Shutdown Command			1				
	Compactor 1 E-Stop		1					Add Aux contact for E-Stop
	Compactor 1 Current Draw				1			Add current transformer (BH)
	Compactor 2 Washing in Auto		1					Add aux contact to HOA
	Compactor 2 Flushing in Auto		1					Add aux contact to HOA
	Compactor 2 Drive Motor in Auto		1					Add aux contact to HOA
	Compactor 2 Running		1					
	Compactor 2 General Fault		1					
	Compactor 2 Shutdown Command			1				
	Compactor 2 E-Stop		1					Add Aux contact for E-Stop
	Compactor 2 Current Draw				1			Add current transformer (BH)
	Instrumentation I/O							
	Influent Flowmeter				1			
	Influent Wastewater Sampler pacing signal					1		
	Intrusion Alarm - Electrical Room		1					
	Intrusion Alarm - Headworks Building		1					
	Gas Detection Oxygen		1					
	Gas Detection Sulfide		1					
	Gas Detection Methane/LEL		1					
	High Temperature Alarm Process Room		1					
	High Temperature Alarm Electrical Room		1					
	Smoke Detector - Process Room		1					
	Smoke Detector - Electrical Room		1					
	Air Handling Unit - Run Status		1					
	Water-On-The-Floor (pump room)		1					
	Supply Fan - Run Status		1					
	Power Fail Alarm		1					
	UPS Fail Alarm		1					
	Gas Detection Alarm Beacons			1				
	Exhaust Fan Shutdown Command			1				
	Totals		52	7	10	1		

Total I/O points per module	16	16	8	4
# of Modules	4	1	2	1
Percent Spares	23%	129%	60%	300%

Section 2:

Instrumentation

BROWNS HILL
ENGINEERING & CONTROLS


BROWNS HILL
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Harold D. Thompson Regional Water Reclamation Facility
SCADA System Design
Instrument List

Tag #	Description	Service	Scale	Manufacturer	Part #
FIT-100	Influent Flowmeter	Ultrasonic Transmitter	0 - 6 MGD	Siemens	7ML500-3BA00-0BA0
AIT-110	Influent Wastewater Sampler	4700 Refrigerated Sampler		ISCO	684700001
		Includes:control panel, refrigeration unit, distributor arm, two pump tubes, instruction manual, 1 bottle.			
ZIT-121	D-HW1 position switch	Intrusion Alarm, swing door		Allen Bradley	802X-A7 / 802MC-W12
ZIT-122	D-HW2 position switch	Intrusion Alarm, swing door C1-DII		Allen Bradley	802X-A7 / 802MC-W12
ZIT-123	D-HW3 position switch	Intrusion Alarm, garage door C1-DII		Allen Bradley	802X-A7 / 802MC-W12
ZIT-124	D-HW4 position switch	Intrusion Alarm, swing door C1-DII		Allen Bradley	802X-A7 / 802MC-W12
ZIT-125	D-HW5 position switch	Intrusion Alarm, garage door C1-DII		Allen Bradley	802X-A7 / 802MC-W12
ZIT-126A	D-HW6 position switch	Intrusion Alarm, swing door C1-DII		Allen Bradley	802X-A7 / 802MC-W12
ZIT-126B	D-HW6 position switch	Intrusion Alarm, swing door C1-DII		Allen Bradley	802X-A7 / 802MC-W12
AIT	Gas Detector	Oxygen, flume channel	4' - 6" AFF	MSA	Ultima X
AIT	Gas Detector	Oxygen, Grit Pump room	4' - 6" AFF	MSA	Ultima X
AIT	Gas Detector w/Splash Guard	Hydrogen Sulfide, flume channel	1' - 6" AFF	MSA	Ultima X - Remote Sensor
AIT	Gas Detector w/Splash Guard	Hydrogen Sulfide, Grit Pump rm.	1' - 6" AFF	MSA	Ultima X - Remote Sensor
AIT	Gas Detector	Methane LEL, Grip Pump rm.	Mount high on wall under corbel	MSA	Ultima X - Remote Sensor
AIT	Gas Detector	Methane LEL, Influent Box	Mount at ceiling	MSA	Ultima X - Remote Sensor
	High Temperature Screens Room	Hazard Location, DPDT switch		Columbus Electric	HLT-2-G
	High Temperature Electrical Room	SPDT Temperature Switch		Dayton	1UHH2
	Water-On-The-Floor	Relay in Control Panel		Warrick	16MB1B-05-05
		Probe holder in Pump Room		Warrick	3U2B- 1/2"
		Probes in Pump Room		Warrick	3W2
	Smoke Detector	Hazard Location in process area		Pyrotector	30-3003
	Smoke Detector	Non-hazardous in electrical room		American Sensors	ESA5011
	Beacon (Amber)	Alarm, North wall		Federal Signal	225-120A
	Beacon (Amber)	Alarm, South wall		Federal Signal	225-120A
	Beacon (Amber)	Alarm, West wall		Federal Signal	225-120A


BROWNS HILL
ENGINEERING & CONTROLS

Overview

HydroRanger 200 is an ultrasonic level controller for up to six pumps and provides control, differential control and open channel flow monitoring.

Benefits

- Monitors wet wells, weirs and flumes
- Digital communications with built-in Modbus RTU via RS-485
- Compatible with SmartLinx system and SIMATIC PDM configuration software
- Single or dual point level monitoring
- 6 relay (standard), 1 or 3 relay (optional)
- Auto False-Echo Suppression for fixed obstruction avoidance
- Anti-grease ring/tide mark buildup
- Differential amplifier transceiver for common mode noise rejection and improved signal-to-noise ratio
- Wall and panel mounting options

Application

For water authorities, municipal water, and wastewater plants, HydroRanger 200 is an economical, low-maintenance solution delivering control efficiency and productivity needed to meet today's exacting standards. It offers single point monitoring with all models, and optional dual-point monitoring with 6 relay model. As well, it has digital communications with built-in Modbus RTU via RS-485.

The standard 6 relay HydroRanger 200 will monitor open channel flow and features more advanced relay alarming and pump control functions as well as volume conversion. It is compatible with SIMATIC PDM, allowing for PC configuration and setup. Sonic Intelligence® advanced echo-processing software provides increased reading reliability. The optional 1 or 3 relay models provide accurate level measurement functions only; these two models do not provide open channel flow, differential level measurement or volume conversion functions.

HydroRanger 200 uses proven continuous ultrasonic echo ranging technology to monitor water and wastewater of any consistency up to 15 m (50 ft) in depth. Achievable resolution is 0.1% with accuracy to 0.25% of range. Unlike contacting devices, HydroRanger 200 is immune to problems caused by suspended solids, harsh corrosives, grease or silt in the effluent, reducing downtime.

- Key Applications: wet wells, flumes/weirs, bar screen control

HydroRanger 200

Technical specifications

Mode of Operation	
Measuring principle	Ultrasonic level measurement
Measuring range	0.3 ... 15 m (1 ... 50 ft), transducer dependent
Measuring points	1 or 2
Input	
Analog	0 ... 20 mA or 4 ... 20 mA, from alternate device, scaleable (6 relay model)
Discrete	10 ... 50 V DC switching level Logical 0 = < 0.5 V DC Logical 1 = 10 ... 50 V DC Max. 3 mA
Output	
Echomax® Transducer	44 kHz
Ultrasonic transducer	Compatible transducers: ST-H and Echomax series XPS-10/10F, XPS 15/15F, XCT-8, XCT-12 and XRS-5
Relays[1]	Rating 5 A at 250 V AC, non-inductive
- Model with 1 relay[2]	1 SPST Form A
- Model with 3 relays[2]	2 SPST Form A/1 SPDT Form C
- Model with 6 relays	4 SPST Form A/2 SPDT Form C
mA output	0 ... 20 mA or 4 ... 20 mA
• Max. load	750 Ω, isolated
• Resolution	0.1 % of range
Accuracy	
Error in measurement	0.25% of range or 6 mm (0.24"), whichever is greater
Resolution	0.1% of measuring range or 2 mm (0.08"), whichever is greater[3]
Temperature compensation	• -50 ... +150 °C (-58 ... +302 °F) • Integral temperature sensor in transducer • External TS-3 temperature sensor (optional) • Programmable fixed temperature values
Rated operating conditions	
Installation conditions	
Location	indoor / outdoor
Installation category	II
Pollution degree	4
Ambient conditions	
Ambient temperature (enclosure)	-20 ... +50 °C (-4 ... +122 °F)
Design	
Weight	
• Wall mount	1.37 kg (3.02 lbs)
• Panel mount	1.50 kg (3.31 lbs)
Material (enclosure)	Polycarbonate
Degree of protection (enclosure)	
• Wall mount	IP65/Type 4X/NEMA 4X
• Panel mount	IP54/Type 3/NEMA 3

Cable	
Transducer and mA output signal	2-core copper conductor, twisted, shielded, 300 Vrms, 0.82 mm² (18 AWG), Belden® 8760 or equivalent is acceptable
Max. separation between transducer and transceiver	365 m (1200 ft)
Displays and controls	100 x 40 mm (4 x 1.5") multi-block LCD with backlighting
Programming	Programming using handheld programmer or via PC with SIMATIC PDM software
Power supply[4]	
AC version	100 ... 230 V AC ± 15%, 50/60 Hz, 36 VA (17 W)
DC version	12 ... 30 V DC (20 W)
Certificates and approvals	• CE, C-TICK[5] • Lloyd's Register of Shipping • ABS Type Approval • FM, $CSA_{US/C}$, UL listed • $CSA_{US/C}$ Class I, Div. 2, Groups A, B, C and D, Class II, Div. 2, Groups F and G, Class III (wall mount only) • MCERTS Class 1 approved for Open Channel Flow
Communication	• RS-232 with Modbus RTU or ASCII via RJ-11 connector • RS-485 with Modbus RTU or ASCII via terminal blocks • Optional: SmartLinx® cards for - PROFIBUS DP - DeviceNet™ - Allen-Bradley® Remote I/O

1) All relays certified for use with equipment that fails in a state at or under the rated maximums of the relays
2) This model is level control only; no open channel flow, differential level or volume conversion functions
3) Program range is defined as the empty distance to the face of the transducer plus any range extension
4) Maximum power consumption is listed
5) EMC performance available upon request

Selection and Ordering data		Order No.
Siemens HydroRanger 200 Ultrasonic level controller for up to six pumps that provides control, differential control and open channel flow monitoring. The HydroRanger 200 is also available as a level measurement controller only. Select option from model code below.	C)	**7ML5034-**
Mounting		
Wall mount, standard enclosure		**1**
Wall mount, 4 entries, 4 M20 cable glands included		**2**
Panel mount[1]		**3**
Power supply		
100 ... 230 V AC		**A**
12 ... 30 V DC		**B**
Number of measurement points		
Single point model, 6 relays		**A**
Dual point model, 6 relays		**B**
Single point model, level only, 1 relay[2]		**C**
Single point model, level only, 3 relays[2]		**D**
Communication (SmartLinx)		
Without module		**0**
SmartLinx® Allen-Bradley® Remote I/O module		**1**
SmartLinx PROFIBUS DP module		**2**
SmartLinx DeviceNet™ module See SmartLinx product page 5/301 for more information.		**3**
Approvals		
General Purpose CE, FM, $CSA_{US/C}$, UL listed, C-TICK		**1**
CSA Class I, Div. 2, Groups A, B, C and D; Class II, Div 2, Groups F and G; Class III (for wall mount applications only)		**2**
Further designs		Order code
Please add "**-Z**" to Order No. and specify Order code(s).		
Stainless steel tag [69 x 50 mm (2.71 x 1.97")]: Measuring-point number/identification (max. 16 characters) specify in plain text		**Y15**
Instruction manual		Order No.
English	C)	**7ML1998-5FC02**
French	C)	**7ML1998-5FC11**
German Note: The instruction manual should be ordered as a separate line on the order.	C)	**7ML1998-5FC32**
This device is shipped with the Siemens Milltronics manual CD containing the complete Quick Start and instruction manual library.		
Other instruction manuals		
SmartLinx Allen-Bradley Remote I/O, English	C)	**7ML1998-1AP03**
SmartLinx PROFIBUS DP, English	C)	**7ML1998-1AQ03**
SmartLinx PROFIBUS DP, German	C)	**7ML1998-1AQ33**
SmartLinx PROFIBUS DP, French	C)	**7ML1998-1AQ12**
SmartLinx DeviceNet, English Note: The appropriate SmartLinx instruction manual should be ordered as a separate line on the order.	C)	**7ML1998-1BH02**

Selection and Ordering data		Order No.
Siemens HydroRanger 200 Ultrasonic level controller for up to six pumps that provides control, differential control and open channel flow monitoring. The HydroRanger 200 is also available as a level measurement controller only. Select option from model code below.	C)	**7ML5034-**
Accessories		
Handheld programmer		**7ML1830-2AK**
Tag, stainless steel, 12 x 45 mm (0.47 x 1.77"), one text line, suitable for enclosure		**7ML1930-1AC**
TS-3 Temperature Sensor - see TS-3 on page 5/186		
SITRANS RD100 Remote display - see RD100 on page 5/304		
SITRANS RD200 Remote display - see RD200 on page 5/306		
Spare parts		
Power Supply Board (100 ... 230 V AC)	C)	**7ML1830-1MD**
Power Supply Board (12 ... 30 V DC)	C)	**7ML1830-1ME**
Display Board	C)	**7ML1830-1MF**
See SmartLinx product page 5/301 for more information.		

1) Available with approval option 1 only
2) This model is level control only; no open channel flow, differential level, or volume conversion functions

C) Subject to export regulations AL: N, ECCN: EAR99

5

HydroRanger 200

Selection and Ordering data

		Order No.
Milltronics HydroRanger 200 Ultrasonic level controller for up to six pumps that provides control, differential control and open channel flow monitoring. The HydroRanger 200 is also available as a level measurement controller only. Select option from model code below.	L)	**7ML1034 -**
Mounting		
Wall mount, standard enclosure		**1**
Wall mount, 4 entries, 4 M20 cable glands included		**2**
Panel mount[1]		**3**
Power supply		
100 ... 230 V AC		**A**
12 ... 30 V DC		**B**
Communication (SmartLinx)		
Without module		**A**
SmartLinx® Allen-Bradley® Remote I/O module		**B**
SmartLinx PROFIBUS DP module		**C**
SmartLinx DeviceNet™ module See SmartLinx product page 5/301 for more information.		**D**
Approvals		
General Purpose CE, FM, CSA$_{US/C}$, UL listed, C-TICK		**1**
CSA Class I, Div. 2, Groups A, B, C and D; Class II, Div 2, Groups F and G; Class III (for wall mount applications only)		**2**
Number of measurement points		
Single point model, 6 relays		**1**
Dual point model, 6 relays		**2**
Single point model, level only, 1 relay[2]		**3**
Single point model, level only, 3 relays[2]		**4**
Further designs		Order code
Please add "**-Z**" to Order No. and specify Order code(s).		
Stainless steel tag [69 x 50 mm (2.71 x 1.97")]: Measuring-point number/identification (max. 16 characters) specify in plain text		**Y15**
Instruction manual		Order No.
English	C)	**7ML1998-1FC05**
French	C)	**7ML1998-1FC14**
German Note: The instruction manual should be ordered as a separate line on the order.	C)	**7ML1998-1FC34**
This device is shipped with the Siemens Milltronics manual CD containing the complete ATEX Quick Start and instruction manual library.		
Other instruction manuals		
SmartLinx Allen-Bradley Remote I/O, English	C)	**7ML1998-1AP03**
SmartLinx PROFIBUS DP, English	C)	**7ML1998-1AQ03**
SmartLinx PROFIBUS DP, German	C)	**7ML1998-1AQ33**
SmartLinx PROFIBUS DP, French	C)	**7ML1998-1AQ12**
SmartLinx DeviceNet, English Note: The appropriate SmartLinx instruction manual should be ordered as a separate line on the order.	C)	**7ML1998-1BH02**

Selection and Ordering data

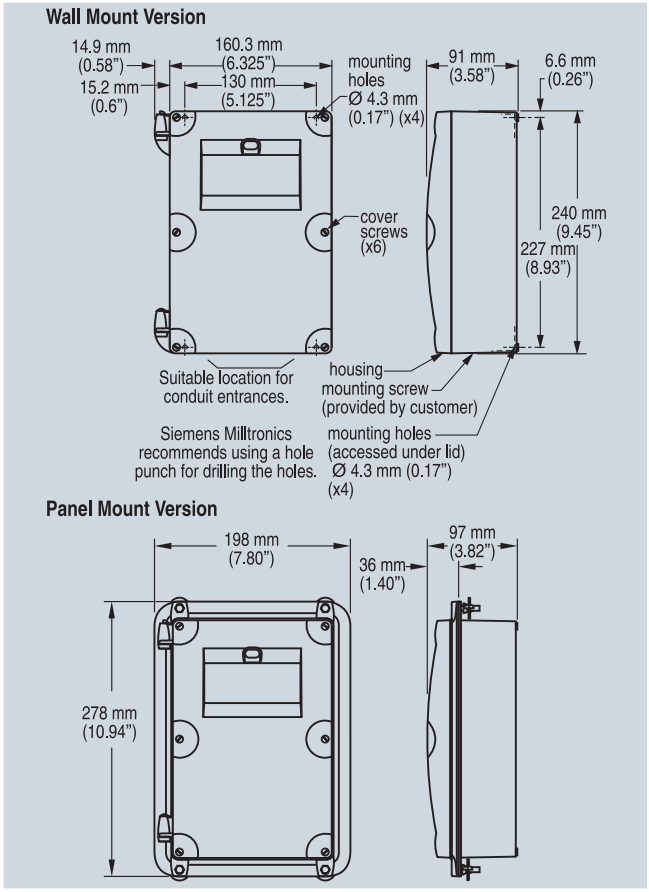
		Order No.
Milltronics HydroRanger 200 Ultrasonic level controller for up to six pumps that provides control, differential control and open channel flow monitoring. The HydroRanger 200 is also available as a level measurement controller only. Select option from model code below.	L)	**7ML1034 -**
Accessories		
Handheld programmer		**7ML1830-2AM**
Tag, stainless steel, 12 x 45 mm (0.47 x 1.77"), one text line, suitable for enclosure		**7ML1930-1AC**
TS-3 Temperature Sensor - see TS-3 on page 5/186		
SITRANS RD100 Remote display - see RD100 on page 5/304		
SITRANS RD200 Remote display - see RD200 on page 5/306		
Spare parts		
Power Supply Board (100 ... 230 V AC)	C)	**7ML1830-1MD**
Power Supply Board (12 ... 30 V DC)	C)	**7ML1830-1ME**
Display Board	C)	**7ML1830-1MF**
See SmartLinx product page 5/301 for more information.		

[1] Available with approval option 1 only
[2] This model is level control only; no open channel flow, differential level, or volume conversion functions

C) Subject to export regulations AL: N, ECCN: EAR99
L) Subject to export regulations AL: N, ECCN: 3A991X

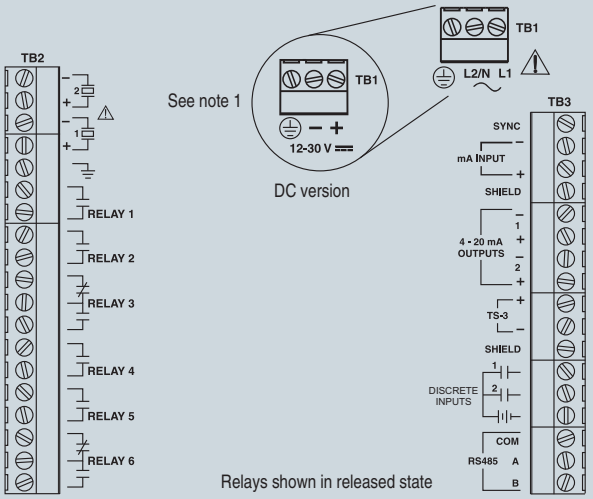
®Modbus is a registered trademark of Schneider Electric.
®Belden is a registered trademark of Belden Wire and Cable Company.
®Allen-Bradley is a registered trademark of Rockwell Automation.
™DeviceNet is a trademark of Open DeviceNet Vendor Association (ODVA)

Dimensional drawings



HydroRanger 200 dimensions

Schematics



Notes

1. Use 2-core copper wire, twisted, with shield, for expansion up to 365 m (1200 ft.). Route cable in grounded metal conduit, separate from other cables.
2. Verify that all system components are installed in accordance with instructions.
3. Connect all cable shields to the HydroRanger 200 Shield Connections. Avoid differential ground potentials by not connecting cable shields to ground (earth) anywhere else.
4. Keep exposed conductors on shielded cables as short as possible to reduce noise on the line caused by stray transmissions and noise pickup.

HydroRanger 200 connections

5

Echomax XPS and XCT

Overview

Echomax® XPS/XCT transducers use ultrasonic technology to measure level in a wide range of liquids and solids.

Benefits

- Integral temperature compensation
- Low ringing effect reduces blanking distance
- Optional foam facing for dusty applications
- Self-cleaning and low-maintenance
- Chemically resistant
- Hermetically sealed

Application

The transducers can be fully immersed, are resistant to steam and corrosive chemicals and can be installed without flanges.

The XPS series offers versions for various measuring ranges up to 40 m (130 ft) and up to a max. temperature of +95 °C (+203 °F).

The XCT series can be used in applications at higher temperatures to measure level up to a distance of 12 m (40 ft) and at a max. temperature of +145 °C (+293 °F).

During operation, the Echomax transducers emit acoustic pulses in a narrow beam. The level monitor measures the propagation time between pulse emission and its reflection (echo) to calculate the distance.

Technical specifications

Input	XPS-10 (standard and F models)	XPS-15 (standard and F models)	XPS-30	XPS-40	XCT-8 (standard and sanitary models)	XCT-12
Measuring range	0.3 to 10 m (1 to 33 ft)	Standard: 0.3 to 15 m (1 to 50 ft) Flanged: 0.45 to 15 m (1.5 to 50 ft)	0.6 to 30 m (2 to 100 ft)	0.9 to 40 m (3 to 130 ft)	0.6 to 8 m (2 to 26 ft)	0.6 to 12 m (2 to 40 ft)
Output						
Frequency	44 kHz	44 kHz	30 kHz	22 kHz	44 kHz	44 kHz
Beam angle	12°	6°	6°	6°	12°	6°
Environmental						
Location	Indoors/outdoors					
Ambient temperature	-40 to +95 °C (-40 to +203 °F)				Standard: -40 to +145 °C (-40 to +293 °F) Sanitary: -40 to +125 °C (-40 to +260 °F)	-40 to +145 °C (-40 to +293 °F)
Pollution degree	4					
Pressure	8 bar (120 psi) Flanged: 0.5 bar (7.25 psi)	8 bar (120 psi) Flanged: 0.5 bar (7.25 psi)	0.5 bar (7.25 psi) Flanged: 0.5 bar (7.25 psi)	0.5 bar (7.25 psi)	Standard: 4 bar (60 psi): -40 to +138 °C (-40 to +280 °F) Standard: 8 bar (120 psi): -40 to +95 °C (-40 to +203 °F) Flanged: 0.5 bar (7.25 psi) Sanitary: XCT-8: 0.5 bar (7.25 psi)	
Design						
Weight	0.8 kg (1.8 lbs)	1.3 kg (2.8 lbs) Flanged: 2 kg (4.4 lbs)	4.3 kg (9.5 lbs)	8 kg (18 lbs)	0.8 kg (1.7 lbs)	1.3 kg (2.8 lbs)
Power supply	Operation of transducer only with approved Siemens Milltronics controllers					
Material	Standard: PVDF Flanged: PVDF with CPVC flange Option: PTFE face with CPVC flange	Standard: PVDF Flanged: PVDF with CPVC flange Option: PTFE face with CPVC flange	Standard: PVDF Flanged: PVDF with CPVC flange Option: PTFE face with CPVC flange	PVDF	Standard: PVDF Options: DERAKANE® flange; PTFE face with universal PVDF flange	
Color	Standard: blue F: gray	Standard: blue F: gray	blue	blue	white	
Process connection	Standard: 1" NPT or 1" BSPT F: 1" NPT	Standard: 1" NPT or 1" BSPT F: 1" NPT	1.5" universal thread (NPT or BSPT)		1" NPT or 1" BSPT	
Cable	2 wire twisted pair/braided and foil shielded 0.5 mm² (20 AWG) PVC jacket				2 wire twisted pair/braided and foil shielded 0.5 mm² (20 AWG) silicone jacket	
Separation	Max. 365 m (1200 ft)					
Certificates and approvals	Standard: CE[1], CSA, FM, ATEX II 2GD F: FM Class I, Div 1, Groups A, B, C and D, Class II Div 1, Groups E, F and G, Class III	Standard: CE[1], CSA, FM, ATEX II 2GD F: FM Class I, Div 1, Groups A, B, C and D, Class II Div 1, Groups E, F and G, Class III	CE[1], CSA, FM, ATEX II 2G 1D	CE[1], CSA, FM, ATEX II 2G 1D	Standard: CE[1], CSA, FM, ATEX II 2G Sanitary: CSA, 3A	CE[1], CSA, FM, ATEX II 2G

[1] EMC certificate available on request.

® DERAKANE is a registered trademark of Ashland Inc.

Echomax XPS and XCT

Selection and Ordering data		Order No.
Echomax XPS-10 ultrasonic transducer	C)	7ML1115 -
High-frequency ultrasonic transducer designed for a wide variety of liquid and solid applications, for use with approved controllers. Includes integral temperature sensor. Measuring range: min. 0.3 m, max.10 m		0
Mounting thread and facing		
1" NPT (ANSI/ASME B1.20.1)		0
1" NPT (ANSI/ASME B1.20.1) with foam facing[1]		1
1" NPT (ANSI/ASME B1.20.1) with PTFE facing[2]		2
1" BSPT (EN 10226-1)		3
1" BSPT (EN 10226-1) with foam facing[1]		4
1" BSPT (EN 10226-1) with PTFE facing[2]		5
Cable length		
5 m (16.40 ft)		B
10 m (32.81 ft)		C
30 m (98.43 ft)		E
50 m (164.04 ft)		F
100 m (328.08 ft)		K
Mounting flange		
None		A
3" ASME, 150 lb, flat faced		C
4" ASME, 150 lb, flat faced		D
6" ASME, 150 lb, flat faced		E
8" ASME, 150 lb, flat faced		F
DN 80, PN 10/16, Type A, flat faced		G
DN 100, PN 10/16, Type A, flat faced		J
DN 150, PN 10/16, Type A, flat faced		L
JIS10K3B Style		M
JIS10K4B Style		P
JIS10K6B Style (Note: Flange bolting patterns and facings dimensionally correspond to the applicable ASME B16.5 or EN 1092-1, or JIS B 2238 standard.)		R
Approvals		
ATEX II 2 GD, FM Class I Div. 2, SAA Class I		3
CSA Class I Div. 1[3]		4
Further designs		Order code
Please add "**-Z**" to Order No. and specify Order code(s).		
Stainless steel tag [69 mm x 50 mm (2.71 x 1.97")]: Measuring-point number/identification (max. 16 characters) specify in plain text		**Y15**

Selection and Ordering data		Order No.
Instruction Manual		
Quick Start guide, multi-language	C)	**7ML1998-5QM82**
Applications Guidelines, multi-language Note: The Applications Guidelines should be ordered as a separate line item on the order.	C)	**7ML1998-5HV61**
This device is shipped with the Siemens Milltronics manual CD containing the complete instruction manual library.		
Accessories		
Submergence shield kit		**7ML1830-1BH**
Easy Aimer 2, with ¾" x 1" NPT PVC coupling		**7ML1830-1AQ**
Easy Aimer 2, aluminum with M20 adapter and 1" and 1½" BSPT aluminum couplings		**7ML1830-1AX**
Easy Aimer 304, with stainless steel coupling		**7ML1830-1AU**
Easy Aimer 304, with M20 adapter and 1" and 1½" BSPT 304 SS couplings		**7ML1830-1GN**
Universal box bracket, mounting kit		**7ML1830-1BK**
Channel bracket, wall mount		**7ML1830-1BL**
Extended channel bracket, wall mount		**7ML1830-1BM**
Channel bracket, floor mount		**7ML1830-1BN**
Extended channel bracket, floor mount		**7ML1830-1BP**
Bridge channel bracket, floor mount (See Mounting Brackets on page 5/118 for more information.)		**7ML1830-1BQ**
1" NPT locknut, plastic		**7ML1830-1DS**
1" BSPT locknut, plastic		**7ML1830-1DR**
Split flanges		
3", aluminum		**7ML1830-1AV**
3", 304 stainless steel		**7ML1830-1AW**
Gasket Kit 3", neoprene		**7ML1930-1BF**
4", aluminum		**7ML1830-1BA**
4", 304 stainless steel		**7ML1830-1BB**
Gasket Kit 4", neoprene		**7ML1930-1BG**
6", aluminum		**7ML1830-1BC**
6", 304 stainless steel		**7ML1830-1BD**
Gasket Kit 6", neoprene		**7ML1930-1BH**
Instruction manual		**7ML1998-1EP01**

[1] Not available with flanged versions

[2] Available with flanged versions only

[3] Valid with mounting thread and facing options 0, 1 and 2 only

C) Subject to export regulations AL: N, ECCN: EAR99

Refer to page 5/117 for split flanges for XPS-10 transducers.

Ordering data		Order No.
Echomax XPS-10F ultrasonic transducer	C)	**7ML1170-**
High-frequency ultrasonic transducer designed for a wide variety of liquid and solid applications, for use with approved controllers. Includes integral temperature sensor. Measuring range: min. 0.3 m, max.10 m		**0**
Mounting thread and facing		
1" NPT (ANSI/ASME B1.20.1)		**1**
Cable length		
5 m (16.40 ft)		**B**
10 m (32.81 ft)		**C**
30 m (98.43 ft)		**D**
50 m (164.04 ft)		**E**
100 m (328.08 ft)		**F**
Mounting flange, flush mount		
None		**A**
3" ASME, 150 lb, flat faced		**B**
4" ASME, 150 lb, flat faced		**C**
6" ASME, 150 lb, flat faced		**D**
8" ASME , 150 lb, flat faced (Note: Flange bolting patterns and facings dimensionally correspond to the applicable ASME B16.5, or EN 1092-1, or JIS B 2238 standard.)		**E**
Approvals		
FM Class I Div. 1		**1**
Further designs		Order code
Please add "**-Z**" to Order No. and specify Order code(s).		
Stainless steel tag [69 mm x 50 mm (2.71 x 1.97")]: Measuring-point number/identification (max. 16 characters) specify in plain text		**Y15**
Instruction manual		
English Note: The Instruction manual should be ordered as a separate line item on the order.	C)	**7ML1998-1DU01**
Applications Guidelines, multi-language Note: The Applications Guidelines should be ordered as a separate line item on the order.	C)	**7ML1998-5HV61**
This device is shipped with the Siemens Milltronics manual CD containing the complete instruction manual library.		
Accessories		
Submergence shield kit		**7ML1830-1BH**
Easy Aimer 2, with ¾" x 1" NPT PVC coupling		**7ML1830-1AQ**
Easy Aimer 304, with stainless steel coupling		**7ML1830-1AU**
Universal box bracket, mounting kit		**7ML1830-1BK**
Channel bracket, wall mount		**7ML1830-1BL**
Extended channel bracket, wall mount		**7ML1830-1BM**
Channel bracket, floor mount		**7ML1830-1BN**
Extended channel bracket, floor mount		**7ML1830-1BP**
Bridge channel bracket, floor mount (See Mounting Brackets on page 5/118 for more information.)		**7ML1830-1BQ**
1" NPT locknut, plastic		**7ML1830-1DS**
Split flanges		
3", aluminum		**7ML1830-1AV**
3", 304 stainless steel		**7ML1830-1AW**
Gasket Kit 3", neoprene		**7ML1930-1BF**
4", aluminum		**7ML1830-1BA**
4", 304 stainless steel		**7ML1830-1BB**
Gasket Kit 4", neoprene		**7ML1930-1BG**
6", aluminum		**7ML1830-1BC**
6", 304 stainless steel		**7ML1830-1BD**
Gasket Kit 6", neoprene		**7ML1930-1BH**
Instruction manual		**7ML1998-1EP01**

Refer to page 5/117 for split flanges for XPS-10 transducers.
C) Subject to export regulations AL: N, ECCN: EAR99

Echomax XPS and XCT

Selection and Ordering data		Order No.
Echomax XPS-15 ultrasonic transducer	C)	**7ML1118 -**
High-frequency ultrasonic transducer designed for a wide variety of liquid and solid applications, for use with approved controllers. Includes integral temperature sensor. Measuring range: min. 0.3 m, max. 15 m		**0**
Mounting thread and facing		
1" NPT (ANSI/ASME B1.20.1)		**0**
1" NPT (ANSI/ASME B1.20.1) with foam facing[1]		**1**
1" NPT (ANSI/ASME B1.20.1) with PTFE facing[2]		**2**
1" BSPT (EN 10226-1)		**3**
1" BSPT (EN 10226-1) with foam facing[1]		**4**
1" BSPT (EN 10226-1) with PTFE facing[2]		**5**
Cable length		
5 m (16.40 ft)		**B**
10 m (32.81 ft)		**C**
30 m (98.43 ft)		**E**
50 m (164.04 ft)		**F**
100 m (328.08 ft)		**K**
Mounting flange		
None		**A**
6" ASME, 150 lb, flat faced		**D**
8" ASME, 150 lb, flat faced		**E**
DN 150, PN 10/16, Type A, flat faced		**J**
DN 200, PN 10/16, Type A, flat faced		**K**
JIS10K 6B		**N**
JIS10K 8B (Note: Flange bolting patterns and facings dimensionally correspond to the applicable ASME B16.5 or EN 1092-1, or JIS B 2238 standard.)		**P**
Approvals		
ATEX II 2 GD, FM Class I Div. 2, SAA Class I		**3**
CSA Class I Div. 1, available with mounting options 0, 1, 2 only		**4**
Further designs		Order code
Please add "**-Z**" to Order No. and specify Order code(s).		
Stainless steel tag [69 mm x 50 mm (2.71 x 1.97")]: Measuring-point number/identification (max. 16 characters) specify in plain text		**Y15**
Instruction manual		
Quick Start Manual, multi-language Note: Due to ATEX regulations, one Quick Start Manual is included with every transducer.	C)	**7ML1998-5QM82**
Applications Guidelines, multi-language Note: The Applications Guidelines should be ordered as a separate line item on the order.	C)	**7ML1998-5HV61**
This device is shipped with the Siemens Milltronics manual CD containing the complete instruction manual library.		

Selection and Ordering data	Order No.
Accessories	
Submergence shield kit	**7ML1830-1BJ**
Universal box bracket, mounting kit	**7ML1830-1BK**
Channel bracket, wall mount	**7ML1830-1BL**
Extended channel bracket, wall mount	**7ML1830-1BM**
Channel bracket, floor mount	**7ML1830-1BN**
Extended channel bracket, floor mount	**7ML1830-1BP**
Bridge channel bracket, floor mount (See Mounting Brackets on page 5/118 for more information.)	**7ML1830-1BQ**
1" NPT locknut, plastic	**7ML1830-1DS**
1" BSPT locknut, plastic	**7ML1830-1DR**
Easy Aimer 2, with ¾" x 1" NPT PVC coupling	**7ML1830-1AQ**
Easy Aimer 2, aluminum with M20 adapter and 1" and 1½" BSPT aluminum couplings	**7ML1830-1AX**
Easy Aimer 304 with stainless steel coupling	**7ML1830-1AU**
Easy Aimer 304, with M20 adapter and 1" and 1½" BSPT 304 SS couplings	**7ML1830-1GN**
Split flanges	
6" aluminum	**7ML1830-1BE**
6" 304 stainless steel	**7ML1830-1BF**
Gasket Kit 6", neoprene	**7ML1930-1BH**
Split Flanges Instruction manual	**7ML1998-1EP01**

[1] Not available with flanged versions

[2] Available with flanged versions only

C) Subject to export regulations AL: N, ECCN: EAR99

Refer to page 5/117 for split flanges for XPS-15 transducers.

Selection and Ordering data — Order No.

Echomax XPS-15F ultrasonic transducer C) **7ML1171-**

High-frequency ultrasonic transducer designed for a wide variety of liquid and solid applications, for use with approved controllers. Includes integral temperature sensor.
Measuring range: min. 0.3 m, max. 15m — **0**

Mounting thread and facing
1" NPT (ANSI/ASME B1.20.1) — **1**

Cable length
5 m (16.40 ft) — **B**
10 m (32.81 ft) — **C**
30 m (98.43 ft) — **D**
50 m (164.04 ft) — **E**
100 m (328.08 ft) — **F**

Mounting flange, flush mount
None — **A**
6" ASME, 150 lb, flat faced — **B**
8" ASME, 150 lb, flat faced — **C**
(Note: Flange bolting patterns and facings dimensionally correspond to the applicable ASME B16.5, or EN 1092-1, or JIS B 2238 standard.)

Approvals
FM Class I Div. 1 — **1**

Further designs	Order code
Please add "**-Z**" to Order No. and specify Order code(s).	
Stainless steel tag [69 mm x 50 mm (2.71 x 1.97")]: Measuring-point number/identification (max. 16 characters) specify in plain text	**Y15**
Instruction manual	
English Note: The Instruction manual should be ordered as a separate line item on the order.	C) **7ML1998-1DU01**
Applications Guidelines, multi-language Note: The Applications Guidelines should be ordered as a separate line item on the order.	C) **7ML1998-5HV61**
This device is shipped with the Siemens Milltronics manual CD containing the complete instruction manual library.	
Accessories	
Submergence shield kit	**7ML1830-1BJ**
Universal box bracket, mounting kit	**7ML1830-1BK**
Channel bracket, wall mount	**7ML1830-1BL**
Extended channel bracket, wall mount	**7ML1830-1BM**
Channel bracket, floor mount	**7ML1830-1BN**
Extended channel bracket, floor mount	**7ML1830-1BP**
Bridge channel bracket, floor mount (See Mounting Brackets on page 5/118 for more information.)	**7ML1830-1BQ**
1" NPT locknut, plastic	**7ML1830-1DS**
Easy Aimer 2, with ¾" x 1" NPT PVC coupling	**7ML1830-1AQ**
Easy Aimer 304 with stainless steel coupling	**7ML1830-1AU**
Split Flanges 6" aluminum	**7ML1830-1BE**
Split Flanges 6" stainless steel	**7ML1830-1BF**
Split Flanges Gasket kit 6"	**7ML1930-1BH**
Split Flanges Instruction manual	**7ML1998-1EP01**

Refer to page 5/117 for split flanges for XPS-15 transducers.

Selection and Ordering data — Order No.

Echomax XPS-30 ultrasonic transducer C) **7ML1123-**

High-frequency ultrasonic transducer designed for a wide variety of liquid and solid applications, for use with approved controllers. Includes integral temperature sensor.
1½" universal thread compatible with 1½" NPT and 1½" BSPT
Measuring range: min. 0.6 m (1.97 ft), max. 30 m (98.43 ft) — **0**

Mounting thread and facing
1½" universal thread — **0**
1½" universal thread, foam facing[1] — **1**
1½" universal thread, PTFE facing[2] — **2**

Cable length
5 m (16.40 ft) — **B**
10 m (32.81 ft) — **C**
30 m (98.43 ft) — **E**
50 m (164.04 ft) — **F**
100 m (328.08 ft) — **K**

Mounting flange
None — **A**
6" ASME, 150 lb, flat faced — **D**
8" ASME, 150 lb, flat faced — **E**
DN 150, PN 10/16, Type A, flat faced — **J**
DN 200, PN 10/16, Type A, flat faced — **K**
JIS10K 6B — **N**
JIS10K 8B — **P**
(Note: Flange bolting patterns and facings dimensionally correspond to the applicable ASME B16.5 or EN 1092-1, or JIS B 2238 standard.)

Approvals
ATEX II 2G 1D, FM Class I Div 2, SAA — **5**

Further designs	Order code
Please add "**-Z**" to Order No. and specify Order code(s).	
Stainless steel tag [69 mm x 50 mm (2.71 x 1.97")]: Measuring-point number/identification (max. 16 characters) specify in plain text	**Y15**
Instruction manual	
Quick Start Manual, multi-language Note: Due to ATEX regulations, one Quick Start Manual is included with every transducer.	C) **7ML1998-5QM82**
Applications Guidelines, multi-language Note: The Applications Guidelines should be ordered as a separate line item on the order.	C) **7ML1998-5HV61**
This device is shipped with the Siemens Milltronics manual CD containing the complete instruction manual library.	
Accessories	
1½" BSPT locknut, plastic	**7ML1830-1DP**
Easy Aimer 2, 1½" NPT galvanized coupling	**7ML1830-1AN**
Easy Aimer 2, 1½" NPT with stainless steel coupling	**7ML1830-1AT**
Easy Aimer 2, aluminum with M20 adapter and 1" and 1½" BSPT aluminum couplings	**7ML1830-1AX**
Easy Aimer 304, with M20 adapter and 1" and 1½" BSPT 304 SS couplings	**7ML1830-1GN**

[1] Not available with flanged versions
[2] Available with flanged versions only
C) Subject to export regulations AL: N, ECCN: EAR99.

Echomax XPS and XCT

Selection and Ordering data		Order No.
Echomax XPS-40 ultrasonic transducer	C)	**7ML1127-**
High-frequency ultrasonic transducer designed for a wide variety of liquid and solid applications, for use with approved controllers. Includes integral temperature sensor. 1½" universal thread compatible with 1½" NPT and 1½" BSPT Measuring range: min. 0.9 m (2.95 ft), max. 40 m (131.23 ft)		**0**
Mounting thread and facing		
1½" universal thread		**0**
1½" universal thread, foam facing		**1**
Cable length		
5 m (16.40 ft)		**B**
10 m (32.81 ft)		**C**
30 m (98.43 ft)		**E**
50 m (164.04 ft)		**F**
100 m (328.08 ft)		**K**
Mounting flange		
None		**A**
Approvals		
ATEX II 2G 1D, FM Class I Div 2, SAA		**5**
Further designs		Order code
Please add "**-Z**" to Order No. and specify Order code(s).		
Stainless steel tag [69 mm x 50 mm (2.71 x 1.97")]: Measuring-point number/identification (max. 16 characters) specify in plain text		**Y15**
Instruction manual		
Quick Start Manual, multi-language Note: Due to ATEX regulations, one Quick Start Manual is included with every transducer.	C)	**7ML1998-5QM82**
Applications Guidelines, multi-language Note: The Applications Guidelines should be ordered as a separate line item on the order.	C)	**7ML1998-5HV61**
This device is shipped with the Siemens Milltronics manual CD containing the complete instruction manual library.		
Accessories		
1½" BSPT locknut, plastic		**7ML1830-1DP**
Easy Aimer 2, 1½" NPT galvanized coupling		**7ML1830-1AN**
Easy Aimer 2, 1½" NPT with stainless steel coupling		**7ML1830-1AT**
Easy Aimer 2, aluminum with M20 adapter and 1" and 1½" BSPT aluminum couplings		**7ML1830-1AX**
Easy Aimer 304, with M20 adapter and 1" and 1½" BSPT 304 SS couplings		**7ML1830-1GN**

C) Subject to export regulations AL: N, ECCN: EAR99

Selection and Ordering data		Order No.
Echomax XCT-8 ultrasonic transducer	C)	7 M L 1 1 3 2 -
High-frequency ultrasonic transducer designed for a wide variety of liquid and solid applications, for use with approved controllers. Includes integral temperature sensor. Ambient temperatures up to +145 °C Measuring range: min. 0.6 m (2 ft), max. 8 m (26 ft)		0
Mounting thread and facing		
1" NPT (ANSI/ASME B1.20.1)		0
1" NPT (ANSI/ASME B1.20.1), PTFE facing[1]		1
1" BSPT (EN 10226-1)		2
1" BSPT (EN 10226-1), PTFE facing[1]		3
Cable length		
1 m (3.28 ft)		A
5 m (16.40 ft)		B
10 m (32.81 ft)		C
30 m (98.43 ft)		E
50 m (164.04 ft)		F
100 m (328.08 ft)		K
Mounting flange		
None		A
3" ASME, 150 lb, flat faced		C
4" ASME, 150 lb, flat faced		D
6" ASME, 150 lb, flat faced		E
DN 80, PN 10/16, Type A, flat faced		G
DN 100, PN 10/16, Type A, flat faced		J
DN 150, PN 10/16, Type A, flat faced		L
JIS10K 3B		M
JIS10K 4B		P
JIS10K 6B (Note: Flange bolting patterns and facings dimensionally correspond to the applicable ASME B16.5 or EN 1092-1 or JIS B 2238 standard.)		R
3" universal[2]		S
4" universal[3]		T
6" universal[4]		U
4" sanitary flange, available with approval option 6 and PTFE facing only		V
Approvals		
ATEX II 2G, FM Class I, Div. 2, SAA		4
CSA Class I Div. 1, available with mounting thread and facing option 0		5
3A Sanitary (only with 4" sanitary flange, option V)		6
Further designs		Order code
Please add "**-Z**" to Order No. and specify Order code(s).		
Stainless steel tag [69 mm x 50 mm (2.71 x 1.97")]: Measuring-point number/identification (max. 16 characters) specify in plain text		**Y15**

Selection and Ordering data		Order No.
Instruction manual		
Quick start manual, multi-language Note: Due to ATEX regulations, one Quick start manual is included with every transducer.	C)	**7ML1998-5QM82**
XCT-8 with Sanitary Flange, multi-language Note: This manual should be ordered as a separate line item with Mounting Option V.	C)	**7ML1998-5HX61**
Applications Guidelines, multi-language Note: The Applications Guidelines should be ordered as a separate line item on the order.	C)	**7ML1998-5HV61**
This device is shipped with the Siemens Milltronics manual CD containing the complete instruction manual library.		
Accessories		
Submersible hood		**7ML1830-1BH**
Universal box bracket, mounting kit		**7ML1830-1BK**
Channel bracket, wall mount		**7ML1830-1BL**
Extended channel bracket, wall mount		**7ML1830-1BM**
Channel bracket, floor mount		**7ML1830-1BN**
Extended channel bracket, floor mount		**7ML1830-1BP**
Bridge channel bracket, floor mount (See Mounting Brackets on page 5/118 for more information.)		**7ML1830-1BQ**
1" NPT locknut, plastic		**7ML1830-1DS**
1" BSPT locknut, plastic		**7ML1830-1DR**
Easy Aimer 304 with stainless steel coupling		**7ML1830-1AU**
Easy Aimer, aluminum, with M20 adapter and ¾ to 1" and 1½" BSPT couplings		**7ML1830-1AX**
Easy Aimer 304, with M20 adapter and 1" and 1½" BSPT 304 SS couplings		**7ML1830-1GN**
Sanitary, 4" mounting clamp		**7ML1830-1BR**
Sanitary, isolating gasket	C)	**7ML1830-1KC**
Split flanges		
3", aluminum		**7ML1830-1AV**
3", 304 stainless steel		**7ML1830-1AW**
Gasket Kit 3", neoprene		**7ML1930-1BF**
4", aluminum		**7ML1830-1BA**
4", 304 stainless steel		**7ML1830-1BB**
Gasket Kit 4", neoprene		**7ML1930-1BG**
6", aluminum		**7ML1830-1BC**
6", 304 stainless steel		**7ML1830-1BD**
Gasket Kit 6", neoprene		**7ML1930-1BH**
Instruction manual		**7ML1998-1EP01**

[1] Available with flange versions S, T, U and V only
[2] Universal fits 3" ASME, DN 80, JIS 10K3B style
[3] Universal fits 4" ASME, DN 100, JIS 10K4B style
[4] Universal fits 6" ASME, DN 150, JIS 10K6B style
C) Subject to export regulations AL: N, ECCN: EAR99
Refer to page 5/117 for split flanges for XCT-8 transducers.

Echomax XPS and XCT

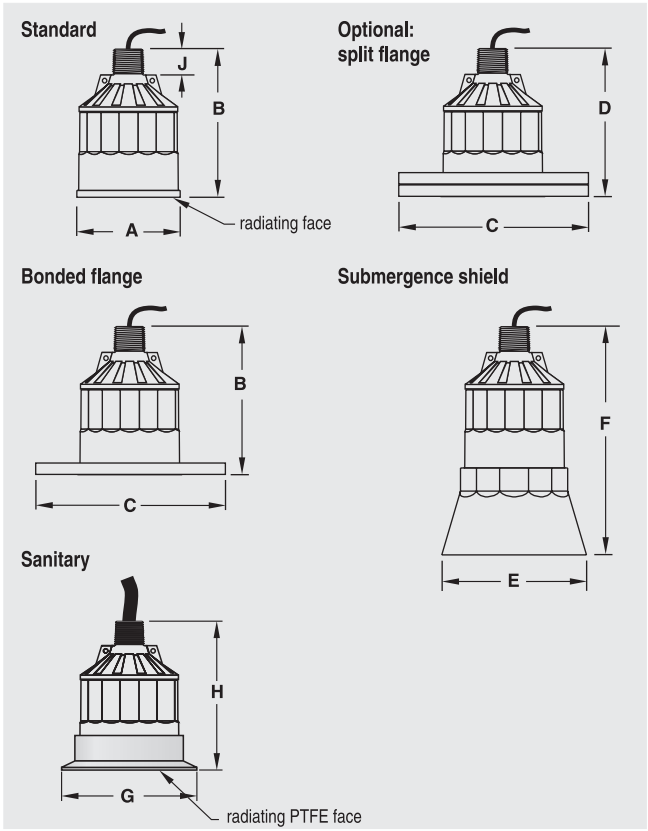
Selection and Ordering data		Order No.
Echomax XCT-12 ultrasonic transducer High-frequency ultrasonic transducer designed for a wide variety of liquid and solid applications, for use with approved controllers. Includes integral temperature sensor. Ambient temperatures up to +145 °C Measuring range: min. 0.6 m (2 ft), max.12 m (40 ft)	C)	**7ML1136 - ■■■■ 0**
Mounting thread and facing		
1" NPT (ANSI/ASME B1.20.1)		**0**
1" NPT (ANSI/ASME B1.20.1), PTFE facing, available for flange options U only		**1**
1" BSPT (EN 10226-1)		**2**
1" BSPT (EN 10226-1), PTFE facing, available for flange options U only		**3**
Cable length		
1 m (3.28 ft)		**A**
5 m (16.40 ft)		**B**
10 m (32.81 ft)		**C**
30 m (98.43 ft)		**E**
50 m (164.04 ft)		**F**
100 m (328.08 ft)		**K**
Mounting flange		
None		**A**
6" ASME, 150 lb, flat faced		**D**
8" ASME, 150 lb, flat faced		**E**
DN 150, PN 10/16, Type A, flat faced		**J**
DN 200, PN 10/16, Type A, flat faced		**K**
JIS10K 6B		**N**
JIS10K 8B (Note: Flange bolting patterns and facings dimensionally correspond to the applicable ASME B16.5 or EN 1092-1 or JIS B 2238 standard.)		**P**
6" universal for 6" ASME, DIN 150 or JIS 10K6B style		**U**
Approvals		
ATEX II 2G, FM Class I, Div. 2, SAA		**3**
CSA Class I, Div. 1, available with mounting thread and facing option 0 only		**4**
Further designs		Order code
Please add "**-Z**" to Order No. and specify Order code(s).		
Stainless steel tag [69 mm x 50 mm (2.71 x 1.97")]: Measuring-point number/identification (max. 16 characters) specify in plain text		**Y15**
Instruction manual		
Quick Start Manual, multi-language Note: Due to ATEX regulations, one Quick Start Manual is included with every transducer.	C)	**7ML1998-5QM82**
Applications Guidelines, multi-language Note: The Applications Guidelines should be ordered as a separate line item on the order.	C)	**7ML1998-5HV61**
This device is shipped with the Siemens Milltronics manual CD containing the complete instruction manual library.		

Selection and Ordering data	Order No.
Accessories	
Submergence shield kit	**7ML1830-1BJ**
Universal box bracket, mounting kit	**7ML1830-1BK**
Channel bracket, wall mount	**7ML1830-1BL**
Extended channel bracket, wall mount	**7ML1830-1BM**
Channel bracket, floor mount	**7ML1830-1BN**
Extended channel bracket, floor mount	**7ML1830-1BP**
Bridge channel bracket, floor mount (See Mounting Brackets on page 5/118 for more information.)	**7ML1830-1BQ**
1" NPT locknut, plastic	**7ML1830-1DS**
1" BSPT locknut, plastic	**7ML1830-1DR**
Easy Aimer 304 with stainless steel coupling	**7ML1830-1AU**
Easy Aimer 2, aluminum with M20 adapter and 1" and 1½" BSPT aluminum couplings	**7ML1830-1AX**
Easy Aimer 304, with M20 adapter and 1" and 1½" BSPT 304 SS couplings	**7ML1830-1GN**
Split Flanges 6" aluminum	**7ML1830-1BE**
Split Flanges 6" stainless steel	**7ML1830-1BF**
Split Flanges Gasket Kit 6", neoprene	**7ML1930-1BH**
Split Flanges Instruction manual	**7ML1998-1EP01**

C) Subject to export regulations AL: N, ECCN: EAR99

Refer to page 5/117 for split flanges for XCT-12 transducers.

Dimensional drawings

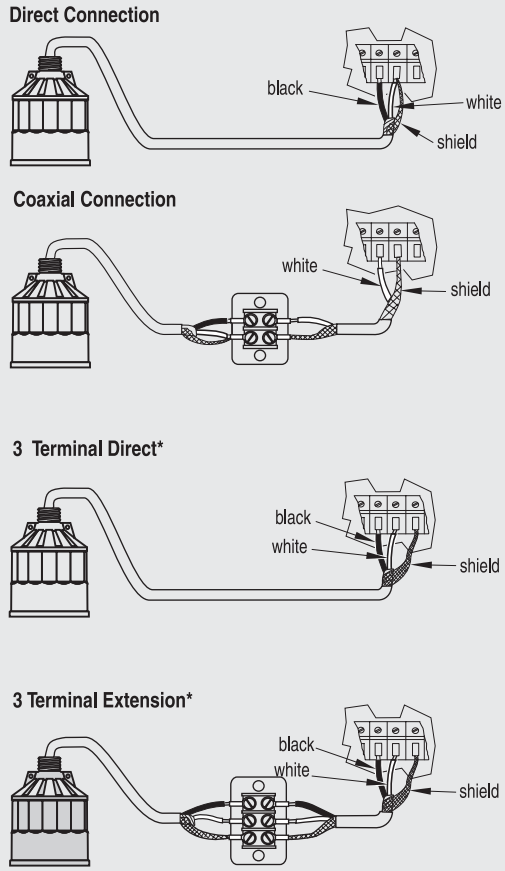


XPS and XCT ultrasonic transducer dimensions

Version				
Dimen.	**XPS-10**	**XPS-15**	**XPS-30**	**XPS-40**
A	88 mm (3.464")	121 mm (4.764")	175 mm (6.890")	206 mm (8.110")
B	122 mm (4.803")	132 mm (5.197")	198 mm (7.795")	229 mm (9.016")
C	According to ASME, DIN and JIS	n/a		
D	128 mm (5.039")	138 mm (5.433")	204 mm (8.031")	n/a
E	124 mm (4.882")	158 mm (6.220")	n/a	n/a
F	152 mm (5.984")	198 mm (7.795")	n/a	n/a
J	28 mm (1.1")	28 mm (1.1")	28 mm (1.1")	28 mm (1.1")

Version		
Dimen.	**XCT-8**	**XCT-12**
A	88 mm (3.464")	121 mm (4.764")
B	122 mm (4.803")	132 mm (5.197")
C	According to ASME, DIN and JIS	
D	128 mm (5.039")	138 mm (5.433")
E	n/a	n/a
F	n/a	n/a
G	sanitary version: 119 mm (4.68")	n/a
H	sanitary version: 122 mm (4.8")	n/a
J	28 mm (1.1")	28 mm (1.1")

Schematics



* For SITRANS LUC500, MultiRanger 100/200, HydroRanger 200

Mounting

Make particularly sure that the radiating face of the transducer is protected from damage. Mount the transducer so that it is above the maximum material level by at least the blanking value. On liquid applications, the transducer must be mounted so that the axis of transmission is perpendicular to the liquid surface. On solids applications, a Milltronics Easy Aimer should be used to facilitate aiming the transducer. Consider the optional temperature sensor when mounting the transducer.

Interconnection

Do not route cable openly or near high voltage or current runs, contactors and SCR control drives. For optimum isolation against electrical noise, run cable separately in a grounded metal conduit. Seal all thread connections to prevent ingress of moisture.

XPS and XCT ultrasonic transducer connections

5


BROWNS HILL
ENGINEERING & CONTROLS

Isco Product Data

Isco 4700 Refrigerated Sampler

Forward thinking is evident from top to bottom in Isco's groundbreaking 4700 Refrigerated Sampler. Its rotationally-molded polyethylene construction, user-friendly controls, and workplace-savvy features make it the first choice for stationary sampling in both municipal and industrial wastewater applications.

Control and programming are fast, simple, and easily accomplished on-site. A unique slide-out bottle rack eliminates awkward stooping and bending to reach sample containers.

The controller actively regulates and displays the sample compartment temperature, and logs a 24-hour summary to confirm proper sample cooling. You can download the temperature record with a basic utility program such as HyperTerminal®.

Isco tough - and environmentally friendly, too

The 4700 ushers in a new standard for weather and corrosion resistance. The tough, double-wall LLDPE cabinet shrugs off exposure to weather and harsh environments. It's filled from top to bottom with insulation for efficient, economical cooling even in hot, humid environments.

Heat-treated polyester powder coating protects the refrigeration system, ensuring long life and reliability in corrosive treatment plant conditions.

A slide-out bottle rack and swing-away distributor arm allow obstacle-free access to your samples.

Advanced delivery system

The 4700 features Isco's proven peristaltic pump to gather samples at the EPA-recommended rate of 2 ft/sec, at head heights as great as 25 feet.

Sample volume accuracy is assured by the pump revolution counter and Isco's patented* liquid detection system. Pump tubing replacement is simple and fast without requiring tools. A safety interlock cuts power during tube replacement.

Sampling modes

- Uniform time intervals – uniform sample volumes
- Uniform time intervals – flow-proportioned sample volumes
- Uniform sample volumes – flow-proportioned time intervals

Standard features

- Composite or sequential sampling
- -20° to 120° F operating range – without additional heaters
- Four digital alarm outputs
- 4-20 mA flow meter input
- Powerful 1/4 HP compressor delivers energy-efficient, high-performance cooling

**** Patent # 5,125,801***

Specifications

Isco 4700 Refrigerated Sampler	
Size (HxWxD):	51 x 28 x 33 in (130 x 72 x 84 cm)
Weight: (empty)	159 lb (72 kg)
Bottle configurations:	12 different configurations available. 24 bottles, 1-liter polypro or 350 ml glass; 4 bottles, 10-liter polypro or glass; 2 bottles, 10-liter polypro or glass; 1 bottle, 20-liter polypro or glass; 1 bottle, 10-liter polypro or glass; 24 ProPaks, 1-liter wedge-shaped; 1 ProPak, 10-liter round
Refrigerator body:	Linear low-density polyethylene (LLDPE)
Power requirements:	120 VAC, 60 Hz, or 240 VAC, 50 Hz (specify)
Operational temperature:	-20° to 120°F (-29° to 49°C)
Pump	
Intake suction tubing	
Length: Material: Inside diameter:	3 to 99 feet (1 to 30 m) Vinyl or PTFE-lined vinyl. 3/8 inch (9 mm)
Pump tubing life:	Typically 1,000,000 pump counts.
Maximum suction lift:	28 feet (8.5 m)
Typical repeatability:	±5 ml or ±5% of the average volume in a set.
Typical line velocity at head height (with 3/8-inch ID vinyl suction line)	
3 ft. (0.9 m): 10 ft. (3.1 m): 15 ft. (4.6 m):	3.0 ft./s (0.91 m/s) 2.9 ft./s (0.87 m/s) 2.7 ft./s (0.83 m/s)
Liquid presence detector:	Non-wetted, non-conductive sensor detects when liquid sample reaches the pump to automatically compensate for changes in head heights.

Controller	
Enclosure rating:	NEMA 4X, 6 (IP67)
Program memory:	Non-volatile ROM.
Flow meter signal input:	5 to 15 volt DC pulse or 25 millisecond isolated contact closure.
Number of composite samples:	Programmable from 1 to 999 samples.
Internal clock accuracy:	1 minute per month, typical
Software	
Sample frequency:	1 minute to 99 hours 59 minutes, in 1-minute increments. Non-uniform times in minutes or clock times. 1 to 9,999 flow pulses.
Sampling modes:	Uniform time, non-uniform time, flow, event. (Flow mode is controlled by external flow meter signal.)
Programmable sample volumes:	10 to 9,990 ml in 1 ml increments.
Sample retries:	If no sample is detected, up to 3 attempts; user selectable.
Rinse cycles:	Automatic rinsing of suction line up to 3 rinses for each sample collection.
Controller diagnostics:	Tests for RAM, ROM, pump, display, and electrical components.
Digital alarm outputs:	5V, 100 mA

The 4700 is especially well suited for outdoor environments.

Its exclusive roto-molded cabinet provides a degree of durability and insulation that's unmatched in the industry.

Ordering information

Contact the factory or your Isco representative for complete ordering information.

Description	Part Number
Isco 4700 Refrigerated Sampler. Suction line, strainer, and bottle configuration not included; order separately. 115V/60Hz 220V/50Hz	68-4700-001 68-4700-002
Bottle Configurations	
Twenty-four 1-liter polypropylene bottles	68-4700-003
Twenty-four 350-ml glass bottles	68-4700-004
Four 10-liter round polypropylene bottles	68-4700-005
Four 10-liter round glass bottles	68-4700-006
Two 10-liter round polypropylene bottles	68-4700-007
Two 10-liter round glass bottles	68-4700-008
One 20-liter round polypropylene bottle	68-4700-011
One 20-liter round glass bottle	68-4700-012
One 10-liter round polypropylene bottle	68-4700-009
One 10-liter round glass bottle	68-4700-010
Twenty-four 1-liter ProPaks bottles	68-4700-017
One 10-liter ProPak bottle	68-4700-018

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E-Mail: iscoinfo@teledyne.com
Internet: www.isco.com

802X

Watertight or Hazardous Location Switches

Description

Bulletin 802X NEMA Type 7 and 9 limit switches are designed for use in atmospheres and locations defined as Class I, Groups B, C or D, Division 1, Class II, Groups E, F or G, or Class III in the National Electrical Code. Typical applications for this switch include refineries, distilleries, grain elevators and flour mills. For Class I, Division 2 locations, a Bulletin 802R limit switch may also be used (see page 5–34).

Bulletin 802X NEMA Type 4 watertight limit switches are designed for use indoors in locations where their internal parts require protection against seepage of water and splashing, falling or hose-directed water within the limits of the NEMA specified tests for Type 4 watertight enclosures. They are not sleet- (ice-) proof. Typical applications are dairies and food processing plants.

Specifications

Enclosure Rating	NEMA 7 and 9/Class I, Groups B, C and D or Class II, Groups E, F and G or Class III; NEMA 4/nonhazardous locations
Certifications	UL Listed and CSA Certified
Ambient Temperature [C (F)]❶	Push type with spring return and all lever types except neutral position: -46…+121° (-50…+250°) Wobble stick and cat whisker devices: -29…+54° (-20…+130°) Side push maintained: -46…+121° (-50…+250°) Neutral position: -18…+121° (0…+250°).

AC Contact Rating (Maximum per Pole, 50 or 60Hz, same polarity)

NEMA Rating Designation	Max Voltage	A		Continuous Carrying Current	VA	
		Make	Break		Make	Break
A600	120	60	6.00	10	7200	720
	240	30	3.00	10	7200	720
	480	15	1.50	10	7200	720
	600	12	1.20	10	7200	720

DC Contact Rating (Maximum per Pole)

NEMA Rating Designation	Max Voltage	A		Continuous Carrying Current	VA	
		Make	Break		Make	Break
P150	125	1.1		5	138	

❶ Temperature ranges below 0°C (+32°F) are based on the absence of freezing moisture or water.

A wide variety of operating heads and operating levers are available. Operating heads can be mounted in four positions, 90° apart. The enclosure base has two through holes for front mounting, two tapped holes for rear mounting and two tapped holes for side mounting.

Features

- Multiple operator styles: side rotary, wobble stick, cat whisker, adjustable top push and top or side push with or without rollers

Watertight or Hazardous Location

Lever Type • Spring Return page 5–75
Standard and Neutral Position Models

Lever Type • . . . . . page 5–76
Maintained Contact

Push Type • Spring Return . page 5–77

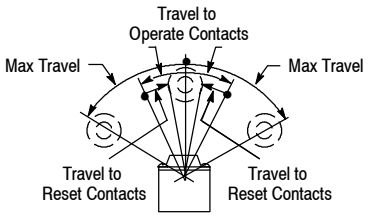
Push Type • . . . . . page 5–79
Maintained Contact

Wobble Stick and . . . . . page 5–80
Cat Whisker • Spring Return

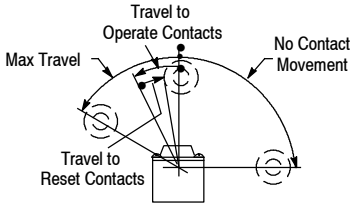
802X Lever Type • Spring Return

Watertight or Hazardous Location Switches

Range of Operation



Lever Operation When Levers Except 802T-W7 and W8 Are Used



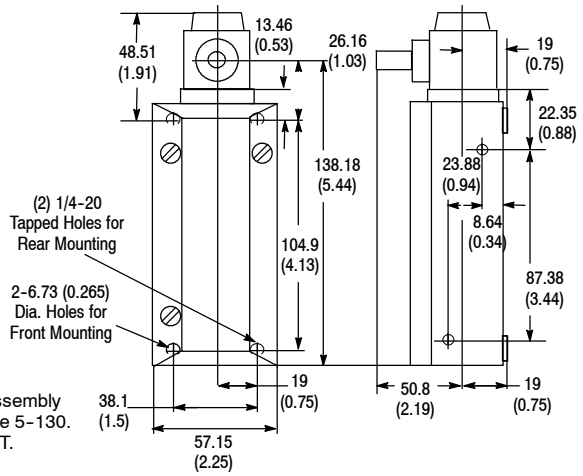
Lever Operation When 802T-W7 and W8 "One-Way" Levers Are Used

Switch Without Lever

Product Selection—Standard and Neutral Position Models

Lever Movement vs. Contact Operation	Torque to Operate (Max)	Travel to Operate Contacts (Max)	Max Travel	Travel to Reset Contacts (Max)	Cat. No.	
					NEMA 4	NEMA 7 and 9
Clockwise or Counterclockwise	0.34 N•m (3 lb•in)	16.5°	43°	8°	**802X-A4**	**802X-A7**
	0.51 N•m (4.5 lb•in)	6°	50°	3°	—	**802X-H7**
Clockwise	0.34 N•m (3.5 lb•in)	16.5°	43°	8°	802X-A14	802X-A17
	0.51 N•m (4.5 lb•in)	6°	50°	3°	—	802X-H17
Counterclockwise	0.34 N•m (3.5 lb•in)	16.5°	43°	8°	802X-A24	802X-A27
	0.51 N•m (4.5 lb•in)	6°	50°	3°	—	802X-H27
Clockwise	0.45 N•m (4 lb•in)	20°	91°	11°	802X-L14	802X-L17
Counterclockwise					802X-L24	802X-L27
Neutral Position Switch with Normally Open Contacts	0.25 N•m (2.25 lb•in)	12°	53°	6°	—	802X-N27

Approximate Dimensions [mm (in.)]



Note: For operating head and lever assembly dimensions not shown, see page 5-130. Conduit pipe opening 1/2 in. NPT.

Approximate Shipping Wt. 0.9 kg (2 lbs)

Mounting Hole Dimensions

2—0.265 Dia. through hole with 0.500 Dia. x 0.25 in. deep C'Bore for front mounting.

2—1/4-20 x 0.56 in. deep Tapped holes for rear mounting.

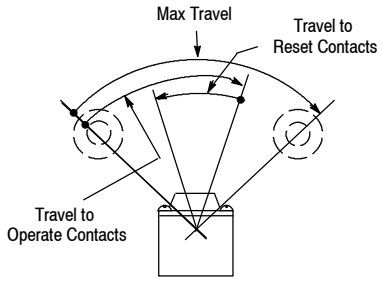
2—1/4-20 x 0.5 in. deep Tapped holes for side mounting.

Levers—See page 5-130 for a complete listing of operating levers.

802X Lever Type • Maintained Contact

Watertight or Hazardous Location Switches

Range of Operation



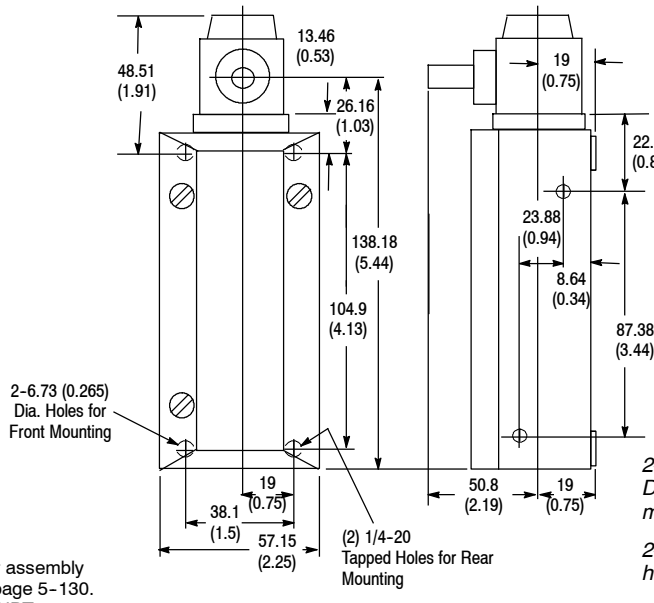
Switch Without Lever

Product Selection

Lever Movement vs. Contact Operation	Torque to Operate (Max)	Travel to Operate Contacts (Max)	Max Travel	Travel to Reset Contacts (Max)	Cat. No.	
					NEMA 4	NEMA 7 & 9
Clockwise or Counterclockwise 	0.25 N•m (2.25 lb•in)	70° ❶	84° ❶	35°	802X-AM4	**802X-AM7**

❶ From one maintained position to the other.

Approximate Dimensions [mm (in.)]



Approximate Shipping Wt. 0.9 kg (2 lbs)

Mounting Hole Dimensions

2—0.265 Dia. through hole with 0.500 Dia. x 0.25 in. deep C'Bore for front mounting.

2—1/4-20 x 0.56 in. deep Tapped holes for rear mounting.

2—1/4-20 x 0.5 in. deep Tapped holes for side mounting.

Note: For operating head and lever assembly dimensions not shown, see page 5-130. Conduit pipe opening 1/2 in. NPT.

Levers—See page 5-130 for a complete listing of operating levers.

Operating Levers

For use with 802T, 802M, 802MC, 802X, 802XR

Roller Levers

Type	Roller Material	Roller Dia.	Roller Width	Cat. No.
 *Non-Adj. Cast Lever 0.75″ Radius*	Metal	0.75″	0.27″	802T-W9A
 *Non-Adj. Cast Lever 1.5″ Radius Roller on Front*	Nylon	0.75″	0.28″	**802T-W1**
	Nylon	0.75″	1″	**802T-W1H**
	Dual Nylon	0.75″	1″ each	802T-W1HH
	Steel	0.75″	0.25″	**802T-W1A**
	Steel	0.75″	0.75″	802T-W1N
	Ball Bearing	0.75″	0.28″	**802T-W1B**
	Beryllium Copper (Nonsparking)	0.75″	0.28″	802T-W1J
	Nylon	0.75″	0.75″	802T-W1L
 *Non-Adj. Cast Lever 1.5″ Radius Roller on Rear*	Nylon	0.75″	0.28″	802T-W1E
	Nylon	0.75″	1″	**802T-W1D**
	Nylon	1.5″	0.28″	802T-W1G
	Steel	0.75″	0.25″	**802T-W1F**
	Steel	0.75″	0.75″	**802T-W1C**
	Nylon	0.75″	0.75″	802T-W1M
 *Non-Adj. Steel Lever 2.0″ Radius Roller on Front*	Nylon	0.75″	0.28″	802T-W20
	Nylon	0.75″	1″	802T-W20D
	Steel	0.75″	0.25″	802T-W20A
	Steel	0.75″	0.75″	802T-W20B
	Ball Bearing	0.75″	0.23″	802T-W20C
	Beryllium Copper	0.75″	0.28″	802T-W20E
 *Non-Adj. Steel Lever 2.0″ Radius Roller on Rear*	Nylon	0.75″	0.28″	802T-W20J
	Nylon	0.75″	1″	802T-W20K
	Steel	0.75″	0.25″	802T-W20L
	Steel	0.75″	0.75″	802T-W20M
	Ball Bearing	0.75″	0.23″	802T-W20N
	Beryllium Copper	0.75″	0.28″	802T-W20P
 *Non-Adj. Steel Lever 2 1/8″ Radius Roller on Front*	Nylon	0.75″	0.75″	802T-W18
	Nylon	0.75″	1″	802T-W18A

Approximate Dimensions—See page 5-133.

Type	Roller Material	Roller Dia.	Roller Width	Cat. No.
 *Non-Adj. Steel Lever 2.5″ Radius Roller on Front*	Nylon	0.75″	0.28″	802T-W25
	Nylon	0.75″	1″	802T-W25D
	Steel	0.75″	0.25″	802T-W25A
	Steel	0.75″	0.75″	802T-W25B
	Ball Bearing	0.75″	0.23″	802T-W25C
	Beryllium Copper	0.75″	0.28″	802T-W25E
 *Non-Adj. Steel Lever 2.5″ Radius Roller on Rear*	Nylon	0.75″	0.28″	802T-W25J
	Nylon	0.75″	1″	802T-W25K
	Steel	0.75″	0.25″	802T-W25L
	Steel	0.75″	0.75″	802T-W25M
	Ball Bearing	0.75″	0.23″	802T-W25N
	Beryllium Copper	0.75″	0.28″	802T-W25P
 *Non-Adj. Steel Lever 3.0″ Radius Roller on Front*	Nylon	0.75″	0.28″	802T-W30
	Nylon	0.75″	1″	802T-W30D
	Steel	0.75″	0.25″	802T-W30A
	Steel	0.75″	0.75″	802T-W30B
	Ball Bearing	0.75″	0.23″	802T-W30C
	Beryllium Copper	0.75″	0.28″	802T-W30E
 *Non-Adj. Steel Lever 3.0″ Radius Roller on Rear*	Nylon	0.75″	0.28″	802T-W30J
	Nylon	0.75″	1″	802T-W30K
	Steel	0.75″	0.25″	802T-W30L
	Steel	0.75″	0.75″	802T-W30M
	Ball Bearing	0.75″	0.23″	802T-W30N
	Beryllium Copper	0.75″	0.28″	802T-W30P
 *Adjustable Lever 1.19″ to 3″ Radius*	Nylon	0.75″	0.28″	**802T-W2**
	Nylon	0.75″	1″	**802T-W2D**
	Nylon	1.5″	0.28″	**802T-W2A**
	Steel	0.75″	0.25″	**802T-W2B**
	Ball Bearing	0.75″	0.23″	**802T-W2C**
	Steel	1.4″	0.27″	802T-W2E
	Rubber	1.5″	0.5″	802T-W2R
	Beryllium Copper	0.75″	0.28″	802T-NX94
 *Adjustable Lever 1.19″ to 3.5″ Radius*	Nylon	0.75″	0.28″	**802T-W17**
	Metal			802T-W17B
	Nylon	1.5″		802T-W17A

Operating Levers

For use with 802T, 802M, 802MC, 802X, 802XR

Roller Levers (continued)

Type	Roller Material	Roller Dia.	Roller Width	Cat. No.
 *Fork Lever 1.5″ Radius*	Nylon; L.H. Roller on Front; R.H. Roller on Back	0.75″	0.28″	802T-W4
	Steel; L.H. Roller on Front; R.H. Roller on Back	0.75″	0.25″	802T-W4B
	Nylon; Both Rollers on Front	0.75″	0.28″	**802T-W4A**
	Nylon; Both Rollers on Rear	0.75″	0.28	802T-NX115
	Nylon; Both Rollers on Front	0.75″	1″	802T-W4F
	Steel; Both Rollers on Front	0.75″	0.25″	**802T-W4C**
	Nylon; L.H. Roller on Back; R.H. Roller on Front	0.75″	0.28″	802T-W4D
 *Micrometer Adjustment Lever ❹ 1.5″ Radius*	Nylon R.H. Adj.	0.75″	0.28″	802T-W6
	Steel R.H. Adj.	0.75″	0.25″	**802T-W6A**
	Ball Bearing R.H. Adj.	0.75″	0.23″	802T-W6B
	Nylon L.H. Adj.	0.75″	0.28″	802T-W6C
	Steel L.H. Adj.	0.75″	0.25″	802T-W6D
	Ball Bearing L.H. Adj.	0.75″	0.23″	802T-W6E
	Nylon R.H. Adj.	0.75″	1″	802T-W6F
 *Non-Adj. One-Way Lever 1.5″ Radius*	Nylon	0.75″	0.28″	802T-W7❶
	Steel	0.75″	0.25″	802T-W7A❶
	Ball Bearing	0.75″	0.23″	802T-W7B❶
 *Non-Adj. Offset Lever 1.44″ Radius Roller on Front*	Nylon	0.75″	0.28″	802T-W12❷
	Steel	0.75″	0.25″	**802T-W12A❷**
	Bearing Roller	0.75″	0.23″	802T-W12B
 *Non-Adj. Offset Lever 1.44″ Radius Roller on Rear*	Nylon	0.75″	0.28″	802T-W12E
	Steel	0.75″	0.25″	802T-W12F

Approximate Dimensions—See page 5-133.

Roller Levers—Corrosion-Resistant

Type	Material	Roller Dia.	Roller Width	Cat. No.
 *1.5″ Radius Roller on Front*	Type 316 stainless steel roller, roller pin and clamp pin One-piece cast aluminum arm is protected with TUFRAM®❸	0.75″	0.25″	**802MC-W1A**
 *1.5″ Radius Roller on Rear*	Nylon Roller One-piece cast aluminum arm is protected with TUFRAM®❸	1.5″	0.28″	802MC-W1G
 *Non-Adj. Offset Lever 1.44″ Radius Roller on Front*	Nylon Roller One-piece cast aluminum arm is protected with TUFRAM®❸	0.75″	0.28″	802MC-W12
 *Adjustable 1.19″-3″ Radius*	Type 316 stainless steel roller, roller pin, clamp pin and adjustable lever arm Block is cast aluminum protected with TUFRAM®❸	0.75″	0.25″	**802MC-W2B**

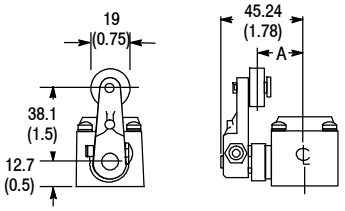
❶ Do not use on maintained contact limit switches.

❷ When mounted on Plug-In devices, the offset lever provides equivalent cam tracking to the NonPlug-In devices using catalog number 802T-W1 levers.

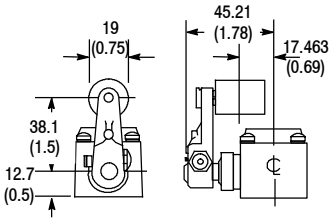
❸ TUFRAM is a synergistic coating which combines the advantages of anodizing with a controlled infusion of PTFE for added corrosion resistance.

❹ The micrometer adjustment roller lever is designed especially for installations where the position of the roller is a critical factor. This lever has a pivoted roller which can be turned laterally. After clamping the lever to the switch shaft, the position of the roller can be precisely adjusted through an arc of 7.5° on either side of the center or straight-line position.

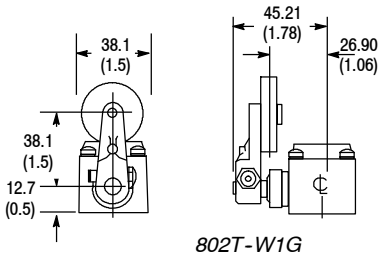
Approximate Dimensions [mm (in.)]



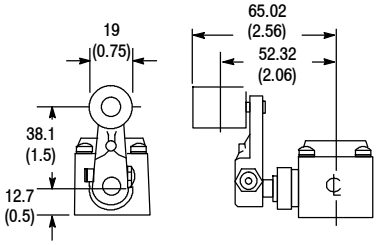
802T-W1C (Dim. A = 0.81″);
802T-W1E and 802T-W1F (Dim. A = 1.03″)
Shipping Wt. 57g (2oz). (W1C), 1 oz. (W1E), 43g (1.5oz) (W1F)



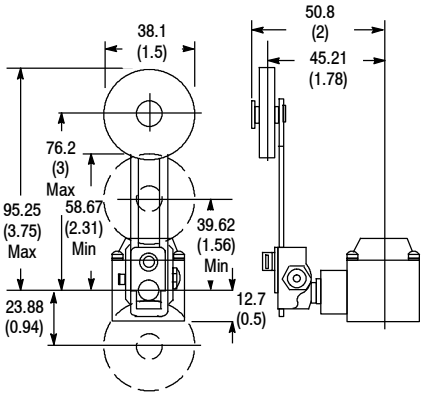
802T-W1D
Shipping Wt. 43g (1.5oz)



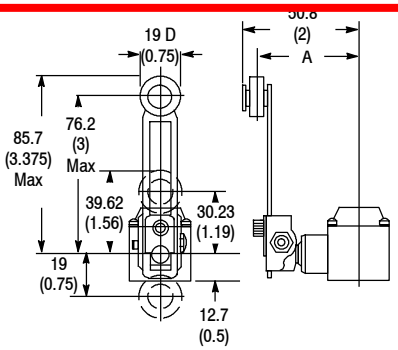
802T-W1G
Shipping Wt. 28g (1oz)



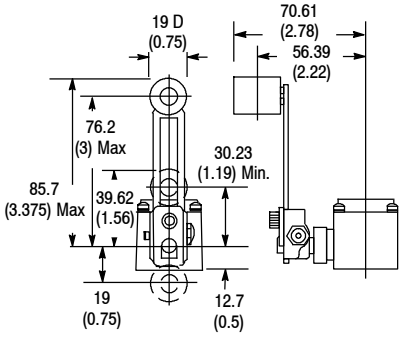
802T-W1H
Shipping Wt. 43g (1.5o)



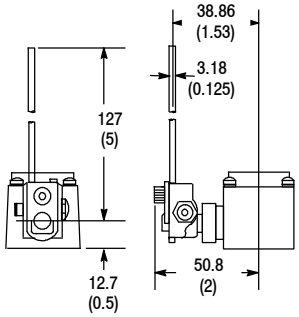
802T-W2A
Shipping Wt. 57g (2oz)



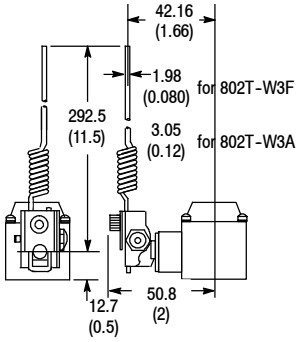
802T-W2 & 802T-W2B (Dim. A = 1.78″);
802T-W2C (Dim. A = 1.81″)
Shipping Wt. 57g (2oz)



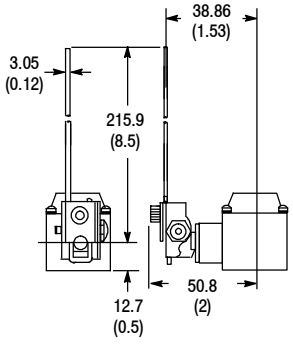
802T-W2D
Shipping Wt. 57g (2oz)



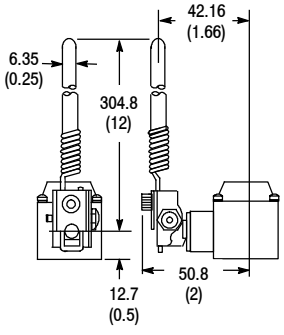
802T-W3
Shipping Wt. 43g (1.5oz)



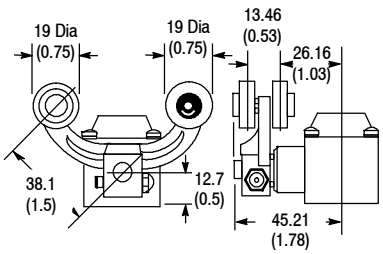
802T-W3A and 802T-W3F
Shipping Wt. 57g (2oz)



802T-W3B and 802T-W3F
Shipping Wt. 43g (1.5oz)



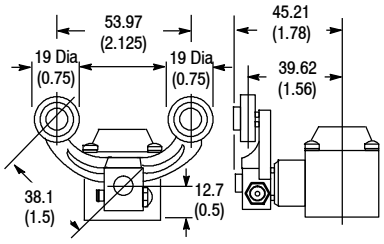
802T-W3C
Shipping Wt. 57g (2oz)



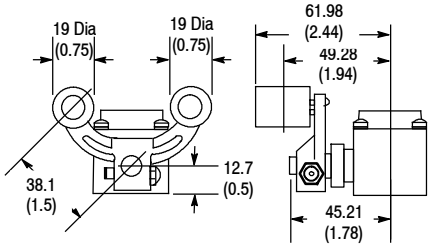
802T-W4 and 802T-W4D
Shipping Wt. 43g (1.5oz) 802T-W4B
Shipping Wt. 57g (2oz)

Operating Levers

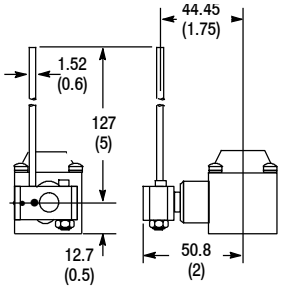
Approximate Dimensions [mm (in.)] (continued)



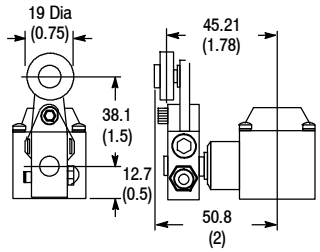
802T-W4A and 802T-W4C
Shipping Wt. 57g (2oz)



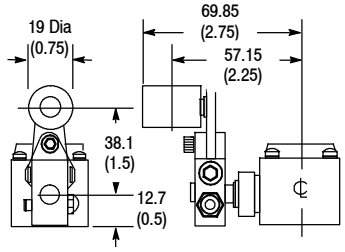
802T-W4F
Shipping Wt. 57g (2oz)



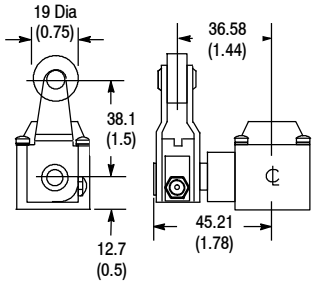
802T-W5
Shipping Wt. 28g (1oz)



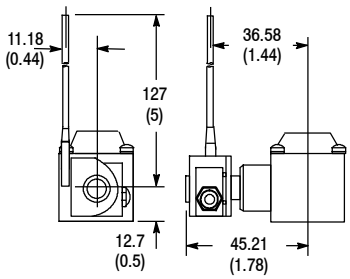
802T-W6, 802T-W6A,
802T-W6B, 802T-W6E
Shipping Wt. 57g (2oz)



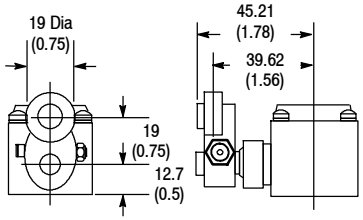
802T-W6F
Shipping Wt. 57g (2oz)



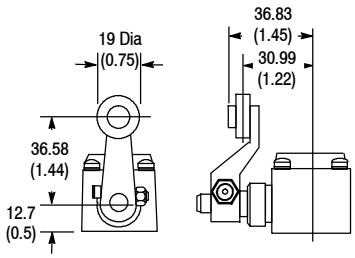
802T-W7, 802T-W7A
and 802T-W7B
Shipping Wt. 57g (2oz)



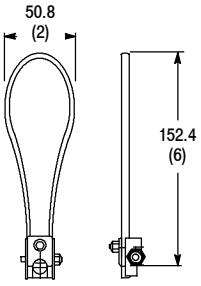
802T-W8
Shipping Wt. 43g (1.5oz)



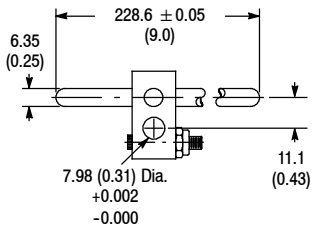
802T-W9
Shipping Wt. 28g (1oz)



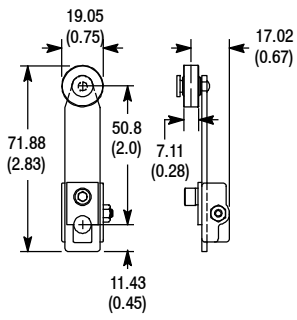
802T-W12 Shipping Wt. 1 oz. and
802T-W12A 802T-W6B, 802T-W6E
Shipping Wt. 43g (1.5oz)



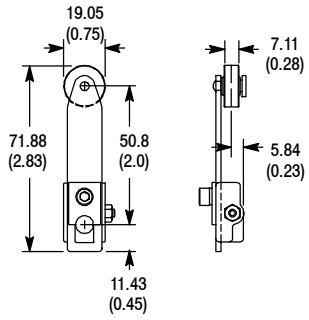
802T-W14
Shipping Wt. 43g (1.5oz)



802T-W16
802T-W16A



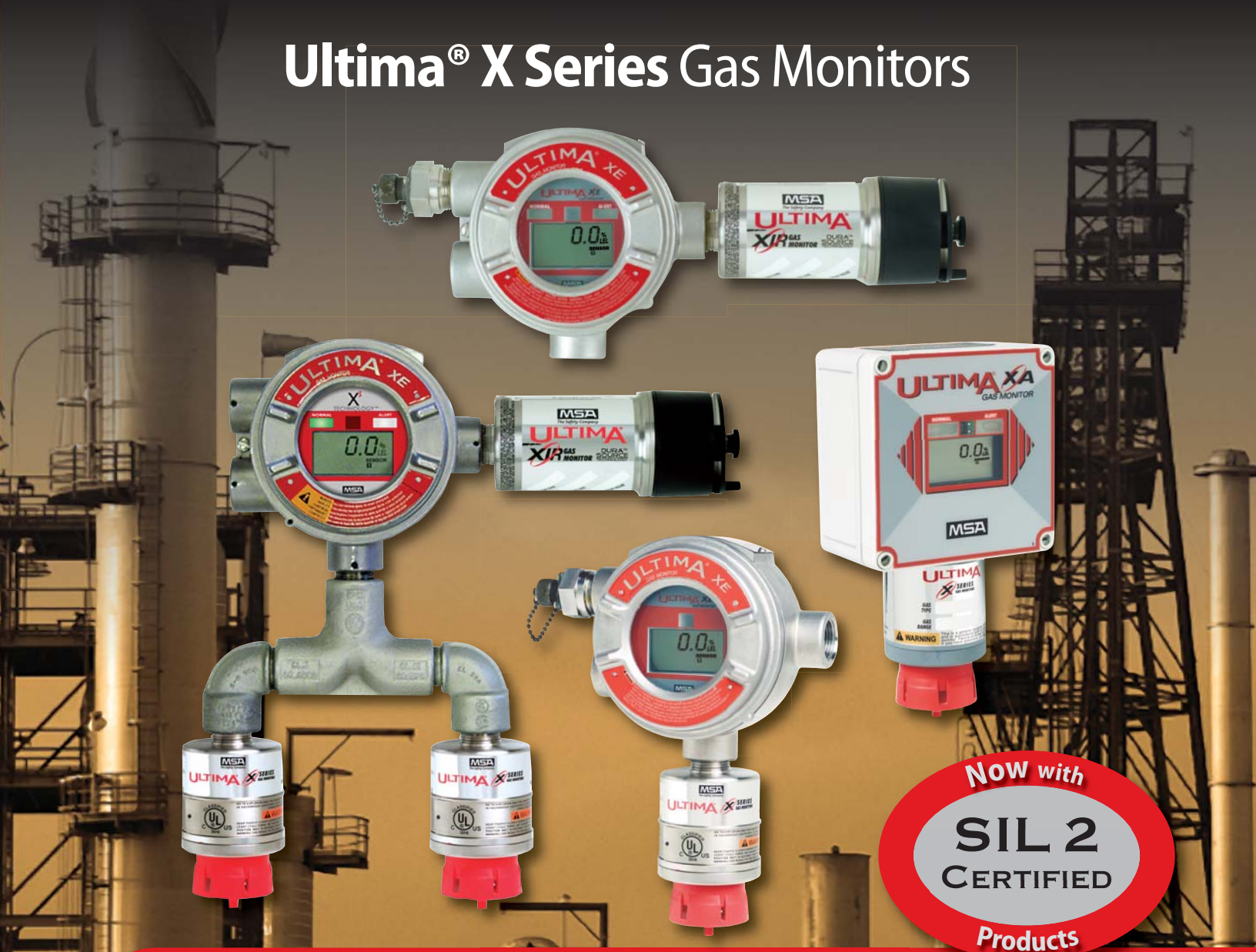
802T-W20
Shipping Wt. 57g (2oz)



802T-W20J
Shipping Wt. 57g (2oz)


BROWNS HILL
ENGINEERING & CONTROLS

Ultima® X Series Gas Monitors



Versatile fixed instruments provide continuous monitoring of many hazardous gases using catalytic, electrochemical, and infrared gas detection methods.

New features & EXtreme design, now with HART Protocol and DuraSource™ Technology.

X Factors

- DuraSource Technology providing extended infrared sensor life
- HART field communications protocol option for improved asset management.
- Patented sensor disconnect-under-power allows sensor change-out without declassifying a hazardous area
- Interchangeable smart sensors: pre-calibrated, installation-ready sensor modules, field-replaceable without tools
- New sensor type quick recognition and reconfiguration of alarm and relay settings
- LCD conveniently alternates between sensor reading and gas type plus scrolling messaging for ongoing diagnostic checks
- Single-board design for ultimate reliability and serviceability

MSA
The Safety Company

Ultima X Series Gas Monitors

With a number of new and exciting features, Ultima X Series Gas Monitors are suitable for indoor and outdoor applications in virtually any type of industry including offshore, refineries, chemical and petrochemical facilities, steel mills, water and wastewater plants, mining, and general industry.

MSA's Ultima X Series Gas Monitors are microprocessor-based transmitters, engineered with the customer in mind.

Ultima X Series Gas Monitors, available in either stainless steel or polycarbonate enclosure housings, provide continuous monitoring of combustible and toxic gases, and oxygen deficiency. Installation is both simple and flexible. Ultima X Series Gas Monitors are suitable for indoor and outdoor applications in virtually any type of industry including offshore, refineries, chemical and petrochemical facilities, steel mills, water and wastewater plants, mining, and general industry.

MSA's Ultima X Series Gas Monitors, engineered using microprocessor-based technology and designed for varied gas detection needs, provide HART protocol. Ultima XIR and XI Gas Monitors offer DuraSource Technology, a new and improved light source providing extended sensor life.

HART Field Communications Protocol provides increased sensor data, part of cost-effective asset management. HART also provides convenient setup, calibration, and diagnostics. Calibrate, set up or perform diagnostics with HART from any point along the 4-20mA line. HART allows for existing component install and wiring to be used, reducing installation costs.

Installation and Operation

Installation is both simple and flexible. Ultima X Series Gas Monitors:

- Operate in diffusion mode, with factory-calibrated sensors ready to perform immediately after installation
- Offer HART upgrade of existing units via replacement PCBA
- Are available for remote sensing applications, where installations require the sensor to be separated from electronics
- Can operate completely stand-alone with a large LCD display, optional quick-check LEDs and four relay outputs (three alarm and one fault), or connected with a standard 4-20mA output to a control system (PLC, DCS, etc)
- Have an adjustable full-scale range
- Provide for easy installation with the two-piece, field-wiring connectors

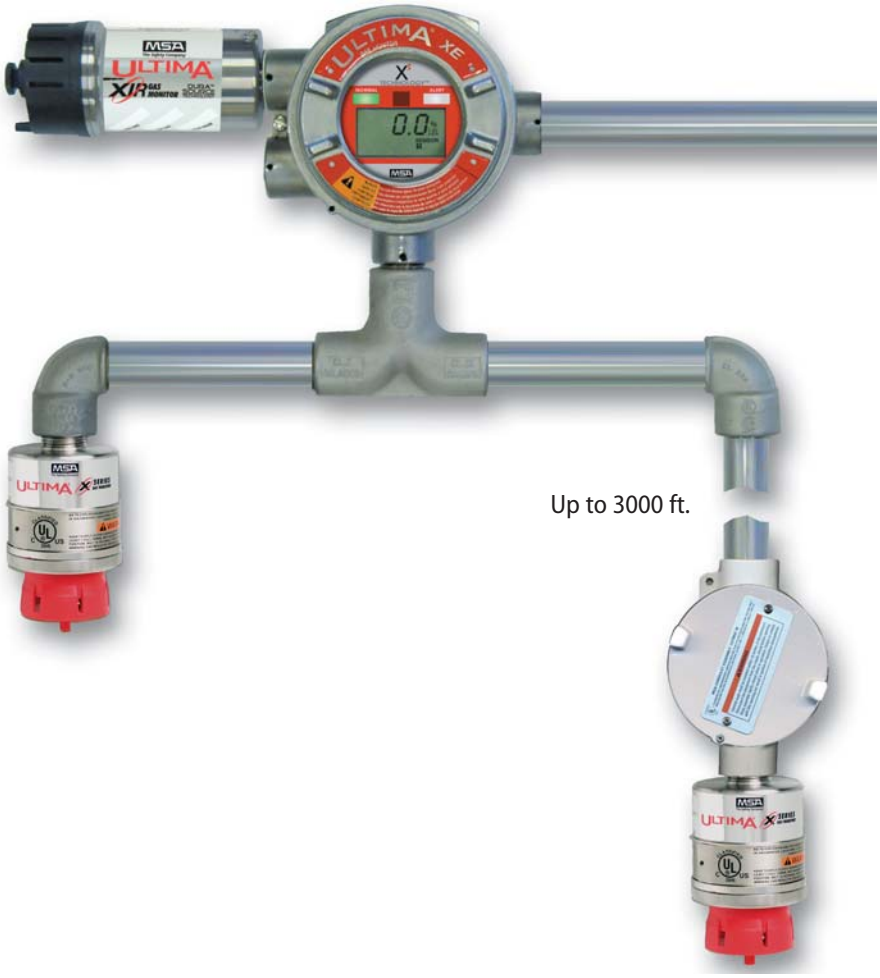
Calibration

As with all gas monitors, Ultima X Series Gas Monitors must be calibrated periodically with the gas of interest to ensure proper operation. The calibration process offers:

- Automatic adjustments
- Date stamping
- Calibration instructions displayed on monitor
- Selectable lockout of output signal during calibration
- Ability to calibrate at the installation location or remotely without systems interruption
- Accessory calibrator, controller, or pushbutton for calibration initiation

Ultima X³® Technology

(X to the Power of 3)



PLC/DCS [ProSoft-Tested]

Connect the X³ unit to PLC/DCS control systems. X³ technology is ProSoft-certified. It has been tested and found to be compatible with Allen-Bradley PLC/ModBUS connectivity by ProSoft Technology, Inc.

Ultima X³ Technology for Ultima X Series Gas Monitors features:

Multi-sensing

- Up to 31 monitors with up to 3 sensors inputted per monitor for 93-sensor total
- Combination of electrochemical-, catalytic-, and infrared-type sensors is available
- Scrolling display – monitor scrolls through type and reading for all attached sensors
- Operation of monitor as network slave device

Signal boost

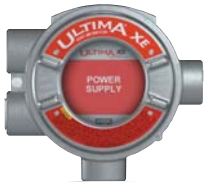
- Each sensor is remotely observable up-to 3000ft. from the monitor
- Universal 85-256VAC or 8-30VDC power supply available at remote condulet

ModBUS RTU output

- Industry-standard format
- RS-485 half-duplex communication interface
- PLC/DCS systems integration

Accessories

Power Supply



Ultima X Series external power supply can power sensors remotely; one remote power supply module can power:

- up to 5 electrochemical or oxygen sensors
- up to 3 combustible sensors
- internal power supply option also available

Pushbutton

Pushbutton feature lets users view various functions without calibrator:

- alarm acknowledge
- zero calibration initialization
- SPAN calibration initialization
- iCAL calibration initialization
- calibration abort

Duct-Mount Kit

Duct-mount Kit allows the user to monitor air within ductwork using the Ultima XE, XA or XIR sensor. Quick-disconnect fitting enables calibration gas to reach sensors without duct-mounted sensor removal.

Pump

Sampling pumps bring remote samples to sensors. Sampling modules are available in GP and XP versions of aspirated and pumped modules.

Calibrator

Ultima Monitor Calibrator offers the industry's simplest calibration method, a three-button device allowing Ultima X Series calibration and address changes.

Controller

Ultima Monitor Controller provides complete access to all features through its full-function keypad: alarm level set, span gas value changes, and last calibration date display.

HART Port

Intrinsically safe connection for a HART communicator.

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Ultima® X Series Gas Monitors

Ultimate Features. . . EXtreme Design

Ultima XE Gas Monitor –
Explosion-Proof, Stainless Steel Gas Detector with Display

The Ultima XE Gas Monitor offers:

- Explosion-proof 316 stainless steel
- Multiple-entry mounting enclosure
- Type 4X, IP66

Ultima XA Gas Monitor –
Water- and Corrosion- Resistant, All-Purpose, Polycarbonate Gas Detector with Display

The Ultima XA Gas Monitor offers:

- Nema 4X rating
- Light weight (only 1.5 lbs)

Ultima XIR Gas Monitor –
Explosion-Proof, Stainless Steel, Infrared Gas Detector with Display

The Ultima XIR Gas Monitor offers:

- DuraSource Technology for improved IR sensor life
- 316 Stainless steel
- Multiple-entry mounting enclosure
- Fast response time
- Operation based on dual-wavelength, heated-optics technology, providing definitive compensation for temperature, humidity and aging effects
- IR technology which offers excellent long-term stability, eliminating the need for frequent calibrations
- A sintered-disk-free design for optimum performance in harsh environments
- No-gas calibration. Only a zero adjustment is required for full calibration.
- Type 4X, IP66

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Gases

Acetylene IR- 0-2.5%
Ammonia- 0-50 PPM
Ammonia- 0-100 PPM
Ammonia- 0-1000 PPM
Arsine- 0-2 PPM
Bromine- 0-5 PPM
Carbon Dioxide IR- 0-0.5%
Carbon Dioxide IR- 0-2%
Carbon Dioxide IR- 0-5%
Carbon Monoxide- 0-100 PPM
Carbon Monoxide- 0-500 PPM
Carbon Monoxide- 0-1000 PPM
Chlorine- 0-5 PPM
Chlorine- 0-10 PPM
Chlorine- 0-20 PPM
Chlorine Dioxide- 0-3 PPM
IR Combustible Gas -
Methane - 0-100% LEL
IR Combustible Gas -
Non-Methane- 0-100% LEL
Combustible Gas- 0-100%
LEL Natural Gas and H_2
Combustible Gas- 0-100%
LEL Petroleum Vapors
Combustible Gas- 0-100% Solvents
Diborane- 0-50 PPM
Ethylene Oxide- 0-10 PPM
Fluorine- 0-5 PPM
Hydrogen Fluoride- 0-10 PPM
Hydrogen- 0-1000 PPM
Hydrogen Chloride- 0-50 PPM
Hydrogen Cyanide- 0-50 PPM
Hydrogen Sulfide- 0-10 PPM
Hydrogen Sulfide- 0-50 PPM
Hydrogen Sulfide- 0-100 PPM
Hydrogen Sulfide- 0-500 PPM
Nitric Oxide- 0-100 PPM
Nitrogen Dioxide- 0-10 PPM
Oxygen- 0-10% - compensated
Oxygen- 0-25% - compensated
Oxygen - CO_2 Tolerant- 0-25%
Oxygen - Solvent Tolerant- 0-25%
Phosphine- 0-2 PPM
Silane- 0-25 PPM
Sulfur Dioxide- 0-25 PPM
Sulfur Dioxide- 0-100 PPM

Specifications for Ultima XE, Ultima XA and Ultima XIR

Gas Types	XE, XA	Combustibles, oxygen and toxics
	XIR	Combustibles; 0-100%LEL
Temperature Range		-40°C to +60°C (-40°F to +140°F) (Typical-range for some gases may differ)
Drift		
Zero Drift	XE, XA	<5%/year, typical
	XIR	±2%/year, typical
Span Drift	XE, XA	<10%/year, typical
Noise		<1% Full Scale
Accuracy		
Repeatability	XE, XA, XIR	±1%Full Scale or 2ppm, typical
Linearity	XE, XA	±2%Full Scale or 2ppm, (O_2, CO)
	XIR	±2%Full Scale (≤50% LEL)
	XE, XA	±3%Full Scale (<50% LEL combustibles)
	XE, XA, XIR	±5%Full Scale (>50% LEL combustibles)
	XE, XA	±10%Full Scale or 2ppm, (non-CO toxics)
Response Times		
T20 O_2 & toxics	XE, XA	<12 seconds (typically 6 seconds)
T50 O_2 & toxics	XE, XA	<30 seconds (typically 12 seconds)
T50 combustible	XE, XA	<8 seconds
T90 combustible	XE, XA	<30 seconds
T90 combustible	XIR	<2 seconds
Humidity	XE, XA	15%-95% RH, non-condensing
	XIR	0%-95% RH, non-condensing
Sensor Life		
Oxygen & Toxics	XE, XA	2 years typical
Combustible	XE, XA	3 years typical
Combustible	XIR	10 years typical
Warranty		1 year XE, XA; 2 years XIR; 10 years XIR, XI (IR source only)
Power Input	XE, XA	7-30VDC (oxygen and toxics)
	XE, XA	7-30VDC @ 450mA maximum (combustibles)
	XIR	7-30VDC @ 750mA maximum (combustibles)
Wiring Requirements		
Combustible	XE, XA, XIR	3-wire
Oxygen & Toxics	XE, XA	2-wire; no LEDs or relays
Oxygen & Toxics	XE, XA	3-wire; LEDs and/or relays
Signal Output	XE, XA	4-20mA 2-wire current sink
	XE, XA, XIR	4-20mA 3-wire current source
Relay Contact Rating		5amp @ 220 VAC; 5amp @ 30 VDC
Housing Entries	XE, XIR	Four conduit entries, 3/4" NPT or 25mm
	XA	One entry
Physical	XE	316 Stainless Steel; 10.4lbs (4.7kg) 6.3"W x 3.9"D x 10.3"L (160 x 99 x 261mm)
	XA	Polycarbonate; 1.5lbs (0.68kg) 5.1"W x 2.9"D x 9.4"L (130 x 76 x 239mm)
	XIR	316 Stainless Steel; 10.8lbs (4.9kg) 12.6"W x 3.9"D x 5.7"L (320 x 99 x 144mm)
Approval Ratings	Ultima X Series	**USA/Canada** $_cFM_{us}$, $_cUL_{us}$, CSA Class I, Div. 1 and 2, Groups A, B, C, D Class II, Div. 1, Groups F & G, Class III Type 4X, IP66 ANSI/ISA 12.13.01 CSA C22.2 No.152 Class I, Div. 1, Groups A,B,C,D CSA C22.2 No. 152 Class I, Div. 1, Groups B,C,D (XIR)
	XA	Nema 4X rating
	Ultima X Series	**Europe** CE Low Voltage/EMC/ATEX, EN 60079-1 ⟨Ex⟩ II 2G Ex d IIC T4 IP 66
	Ultima X Series (not including X3 Technology or Hart)	**SIL Certification** SIL 2 @ HFT=0 (Oxygen, catalytic combustible and IR) SIL 1 @ HFT = 0: SIL 2 @ HFT = 1 (Toxic)

Note: This Bulletin contains only a general description of the products shown. While uses and performance capabilities are described, under no circumstances shall the products be used by untrained or unqualified individuals and not until the product instructions including any warnings or cautions provided have been thoroughly read and understood. Only they contain the complete and detailed information concerning proper use and care of these products.

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For further information:

MSA
The Safety Company

Methane -E-31-U-3-D-2-0-0-0-0-1-0-0
Hydrogen Sulfide -E-16-U-3-D-2-0-0-0-0-1-0-0
Oxygen -E-14-U-3-S-2-0-0-0-0-1-0-0

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Ultima® X Series Gas Monitors – ATO Order Form

A-ULTIMA X-XP [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]

(1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13)

(1) Model
E = Explosion proof, with display
I = XP (IR sensor with no display)
L = Explosion proof, no display
Catalytic & Electrochemical Infrared
Infrared
J = X series junction box (No electronics)
Note: Subtract $730 if no sensor selected

(2) Gas Code –*See list for gas type*
NOTE: The following codes will provide enclosure and electronics only. No sensor components.
01 = "Standard" toxics and oxygen
02 = Catalytic
03 = IR
04 = "Reactive" toxics (ex. Cl_2, HCl, ClO_2, NH3, HF, EtO)
05 = IR CO2
Note: If (2) = IR, (4) ≠ 0.
For XIR sensors use A-ULT-SENS

(3) Configuration
• A = ATEX w/metric threads
• B = ATEX w/NPT threads
* C = CSA approval w/NPT threads
> F = FM approval ($_cFM_{us}$) w/NPT threads
+ U = UL approval w/NPT threads
• I = IEC approval w/metric threads
Note: If (2) = IR, (4) ≠ 0.
For XIR sensors use A-ULT-SENS

(4) Sensor Output
0 = No PCBA, (use when ordering sensor body & sensor only)
1 = 2-Wire mA output
2 = 2-Wire (mA + HART) output
3 = 3-Wire mA output
4 =3-Wire (mA + HART) output

(5) Sensor Mounting Style –
S = Sensor mounted on control unit
D = Sensor mounted on remote housing
N = No condulet

(6) Relays and LEDs
0 = No relays and no LEDs *(Required if 2-wire)*
1 = LEDs, no relays *(Required if Model = L)*
2 = Relays and LEDs

(7) Display Language/Features
0 = English
S = Spanish
H = English with custom horn software

(8) Optional Power Supply
0 = None
1 = 12 VDC Internal
2 = 24 VDC Internal
3 = 12 VDC External
4 = 24 VDC External
NOTE: Power supplies not available for ATEX or IEC

(9) Gas Sample Selection
0 = None – Standard diffusion method
1 = Flow cap assembly
XE
XIR

(10) Integrated Accessories
0 = None
1 = XP HART port
2 = Reset/Cal switch – approved for Div. 1, Gr. B-D only
3 = Both XP HART port and Reset/Cal switch
Note: option 3 requires use of a HART module

(11) Installation Hardware
0 = None
1 = Brackets
2 = Duct Mount Kit
3 = Brackets + Duct Mount Kit

(12) Manuals – alternate quantities can be ordered separately
0 = Standard
1 = Hardcopy + CD

(13) Custom Features
0 = None
C = Custom operation necessary
T = Custom Tagging, SS
TC = Custom Tagging/Custom operations necessary
CC = Certificate of calibration request
CF = Certificate of conformance request
CB = Both Certificates

Key:
+ UL approved Class I, Div 1 & 2, Groups A, B , C & D; Class II, Div 1, Groups E, F & G for IR, Groups F & G for E-chem and catalytic; Class III
> FM approved Class I, Div 1 & 2, Groups A, B, C & D for oxygen, catalytic and IR
* CSA approved Class I, Div 1, Groups A, B, C & D for E-chem and Catalytic, Groups B, C & D for IR
• ATEX & IEC approved Ex d IIc T4, IP66

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Sensor Selection Table

	0	None
	11	Carbon Monoxide 0-100 PPM
	12	Carbon Monoxide 0-500 PPM
	13	Oxygen 0- 10%
	14	Oxygen 0-25%
	15	Hydrogen Sulfide 0-10 PPM
	16	Hydrogen Sulfide 0-50 PPM
	17	Hydrogen Sulfide 0-100 PPM
" ~	18	Chlorine 0-5 PPM
	19	Sulfur Dioxide 0-25 PPM
	20	Nitric Oxide 0-100 PPM
	21	Nitrogen Dioxide 0-10 PPM
	22	Hydrogen Cyanide 0-50 PPM
" ~	23	Hydrogen Chloride 0-50 PPM
" ~	24	Chlorine Dioxide 0-3 PPM
	25	Hydrogen Sulfide 0-500PPM
" ~	26	Hydrogen Fluoride 0-10 PPM
	27	Sulfur Dioxide 0-100PPM
" ~	28	Chlorine 0-10 PPM
	31	Combustible gas 0-100% LEL - Natural Gas & H_2
	32	Combustible gas 0-100% LEL – Petroleum Vapors
	33	Combustible gas 0-100% LEL – Solvents
} " ^	34	Acetylene IR 0-2.5%
} "	35	Carbon Dioxide IR 0-0.5%
} "	36	Carbon Dioxide IR 0-2%
} "	37	Carbon Dioxide IR 0-5%
**	38	IR combustible 0-100% LEL- Methane
**	39	IR combustible 0-100% LEL – Propane
	41	Phosphine 0-2 PPM
	42	Arsine 0-2 PPM
	43	Silane 0-25 PPM
	44	Germane 0-3 PPM
" ~	45	Diborane 0-50 PPM
" ~	46	Bromine 0-5 PPM
" ~	47	Fluorine 0-10 PPM
" ~	48	Ammonia 0–100 PPM
	49	Hydrogen 0-1000 PPM
" ~	50	Ethylene Oxide 0-10 PPM
	51	Comb. Gas 0-100% LEL - ATEX - 4.4% CH4 Natural Gas and H2
	52	Comb. Gas 0-100% LEL - ATEX - 1.7% Propane Petroleum Vapors
	53	Comb. Gas 0-100% LEL - ATEX - 1.7% 1.7% Propane Solvents
"~	54	Ammonia 0-1000 PPM
} " x	55	Solvent Tolerant O2
	57	Carbon Monoxide 0-1000 PPM
	58	Comb Gas IR – Methane 0-100% LEL – ATEX - 4.4% CH4
	59	Comb Gas IR - Non Methane 0-100% LEL – ATEX 1.7% Propane
"~	61	Chlorine 0-20 PPM
} " x	62	Solvent & CO2 Tolerant Oxygen
} " x	63	Low oxygen
} " x	64	Low solvent tolerant oxygen

SELECTION GUIDE FOR ULTIMA XIR COMBUSTIBLE

CATEGORY 38: Methane Calibration

	Controller Code	Cal Cylinder	Cylinder P/N	Cal Span Value
Methane	1	2.5% Methane	10028032	50% LEL

CATEGORY 39: Non-Methane Calibration

	Controller Code	Cal Cylinder	Cylinder P/N	Cal Span Value
Propane	2	0.6% Propane	10028034	29% LEL
Ethane	3	0.6% Propane	10028034	25% LEL
Butane	4	0.6% Propane	10028034	28% LEL
Pentane	5	0.6% Propane	10028034	33% LEL
Hexane	6	0.6% Propane	10028034	41% LEL
Cyclopentane	7	0.6% Propane	10028034	30% LEL
Ethylene	8	0.1% Propane	711054	28% LEL

For sensing multiple gases always calibrate for the least sensitive gas or vapor expected to be measured (highest response factor within category).

All other combustible gas span values available upon request.

Key:

+	UL approved, Class I, Div 1 & 2, Groups A, B, C, D; Class II, Div. 1, Groups E, F, G for IR, Groups F, G for E-chem and catalytic; Class III
>	FM approved Class I, Div. 1 & 2, Groups A, B, C, D for oxygen, catalytic and IR
*	CSA approved Class I, Div. 1, Groups A, B, C & D for E-chem and catalytic, Groups B, C & D for IR
**	Selections 3 – 11 must be zero
●	ATEX & IEC approved Ex d IIc T4, IP66
^	Available as custom product only
x	XP Stainless Steel only
--	X^3IR must have condulet
~	Available with intrinsically safe barrier and ATEX approval or UL Div. 2 approval
"	Not available as XL model
}	Not available as XT model

ET Series - Line Voltage

Features

- Single pole and double pole
- Heat only, cool only, & heat or cool
- DP models include positive off
- Celsius and Fahrenheit temperature scale
- Optional Thermometer
- 22 Amps, 277 Volts AC

UPC # 686334	MODEL	DESCRIPTION
538725	AET5DWS	Double Pole 22 Amp, 120-277V with leads, Anticipator
538732	AET5SWS	Single Pole 22 Amp, 120-277V with leads, Anticipator
538886	ET5DS	Double Pole 22 Amp, 120-277V, Heat Only
538749	ET5D4S	Double Pole 22 Amp, 120-277V, 35-75°F Temp Range
538756	ET5DTS	Double Pole 22 Amp, 120-277V, with Thermometer, Heat Only
538763	ET5DWS	Double Pole 22 Amp, 120-277V, Heat Only with Leads
538770	ET5MS	Heat Only, 2 Stage
538787	ET5SS	Single Pole 22 Amp, 120-277V, Heat Only
538794	ET5S4S	Single Pole 22 Amp, 120-277V, 35-75°F Temp Range
538800	ET5SRS	Single Pole 22 Amp, Cooling Only
538817	ET5STS	Single Pole 22 Amp, Heat Only with Thermometer
538824	ET5SWS	Single Pole 22 Amp, Heat Only with Leads
538831	ETD5MS	Double Throw, 2 Stage Heat, 1 Stage Cool
538855	ETD5SS	Single Pole Double Throw Heat/Cool
538862	ETD5STS	Single Pole Double Throw Heat/Cool with Thermometer

EPET Series and HLT Series Hazardous Location

Motor Rating (full load): 3/4 HP @ 125V, 1-1/2 HP @250V
Pilot Duty Rating 125VA @ 24VAC
NEMA Class Seven Div. 1 Approved
Class I Group C & D, Class II Group E, F, & G
Not rated for Group B

Features

- SPDT & DPDT Models
- Heat or cool compatible
- Celsius and Fahrenheit temperature scale
- Bi-Metal or capillary sensor
- Snap action switch
- Casting tapered top and bottom for 3/4" conduit
- 1/2" thick cast Aluminum housing
- Dimension 5-3/4" x 6-3/8" x 5.57"

UPC# 686334	MODEL	DESCRIPTION	LOAD RATINGS	RANGE
538077	EPETD8D	DPDT - Bi-Metal	22A @120-277VAC	50-90°F
538107	EPETD8S	SPDT - Bi-Metal	22A @120-277VAC	50-90°F
528078	EPETP8D	DPDT - Bi-Metal	22A @120-480VAC	50-90°F
528061	EPETP8S	SPDT - Bi-Metal	22A @120-480VAC	50-90°F
523158	HLT-1	SPDT - Capillary	22A @120-277VAC	40-110°F
523165	HLT-2	DPDT - Capillary	22A @120-277VAC	40-110°F

Master ctn: 4 pcs, 24 lbs (varies slightly by model), 16" x 14.5" x 6"

EPET Series incorporate plastic knob & Bi-Metal Sensor housing.

HLT Series incorporates screwdriver temperature adjustment slot and all metal housing. External bulb and capillary sensor.

2000 Series - Line Voltage

Features

- White or Ivory
- Single pole and double pole
- Heat Only
- DP models include positive off
- Optional wire leads or terminals
- 22 Amps, 277 Volts AC

UPC# 686334	MODEL	COLOR	DESCRIPTION
502849	S2022H10AA	White	Single Pole with leads, 22 Amp
502436	S2022H10AB	Ivory	
502856	D2022H10BA	White	Double pole with leads, 22 Amp
502443	D2022H10BB	Ivory	
502917	S2025H10AA	White	Single Pole with leads, 25 Amp
502924	D2025H10DA	White	Double pole with leads, 25 Amp


BROWNS HILL
ENGINEERING & CONTROLS

Line Voltage Control, SPDT, Gray, Analog

Line Voltage Control, Ventilation, Switch Type SPDT, Switch Action Open on Rise, Number Of Switches 1, Control Range 30-110 F, Differential +/- 3 Deg F, Height 4 5/8 In, Width 2 3/8 In, Depth 2 1/4 In, Temp Sensitivity +/- 3 Deg F, Sensor Type Hydraulic Cap, For Use With Heating or Cooling, Color Gray, Application Heating or Cooling, Analog Display, Enclosure Type Steel, Includes Screws and Mounting Plate

1

Price (ea.)

Brand	DAYTON
Mfr. Model #	1UHH2
Ship Qty.	1
Sell Qty. (Will-Call)	1
Ship Weight (lbs.)	0.85
Usually Ships	Today
Catalog Page No.	3821

Price shown may not reflect your price. Log in or register.

Additional Info

Heating, Cooling, and Ventilation Controls

All models are UL Listed.

No. 2E340 has a heavy-duty snap-action switch. Mounts on standard 2 x 4" vertical box. Nos. 1UHH1 to 1UHH4, 4E636, and 4MY92 use stainless steel sensing elements for corrosive conditions. Nos. 4LZ94, 4LZ95, 4E636, and 4MY92 have NEMA 4X enclosures suitable for locations that are wet or mildly corrosive, with high humidity or airborne contaminants. Ambient sensing No. 4MY92 can be field configured for heating only or cooling only through 2-stage heat/cool. SPDT. Also CSA Certified.

Tech Specs

Item: Line Voltage Thermostat
Type: Heating/Cooling
Switch Type: SPDT
Switch Action: Open / Close on rise
Number of Switches: 1
Control Range (F): 30 to 110
Differential (Deg. F): +/-3.5
Height (In.): 5 3/4
Width (In.): 2 1/4
Depth (In.): 2 1/4
Temp. Sensitivity (Deg. F): +/- 3
Sensor Type: Hydraulic Cap
Characteristics: Commonly Used as a Ventilation Control
For Use With: Heating or Cooling
Color: Grey
Application: Heating or Cooling
Display: Analog
Enclosure Type: STEEL
Voltage Range: 24 to 240 VAC
Inductive Amps @ 120V: 16
Inductive Amps @ 240V: 8
Cooling Full Load @ 120V: 16
Cooling Full Load @ 240V: 8
Cooling Locked Rotor @ 120V: 96
Cooling Locked Rotor @ 240V: 48
Full Load Amps @ 120V: 16
Full Load Amps @ 240VAC: 8

Locked Rotor Amps @ 120V: 96
Locked Rotor Amps @ 240V: 48
Contact Rating Resistive @ 120V (A): 22
Contact Rating Resistive @ 240V (A): 22
Pilot Duty Contacts (VA): 125
Mounting: Wall Mount
Number of Stages: 1
Includes: Screws and Mounting Plate
Agency Compliance: UL, CUL

Notes & Restrictions

There are currently no notes or restrictions for this item.

MSDS

This item does not require a **Material Safety Data Sheet (MSDS).**

Required Accessories

There are currently no required accessories for this item.

Series 16M – General Purpose Control
Series 16HM – High Sensitivity Version

- Compact Size
- Modular Plug-In Design
- LED Monitoring
- Surge Protection
- Various Time Delays
- Low Voltage Sensor
- Solid State Reliability
- Up to 5.5 Million Ohms/cm Sensitivity
- 8-Pin Plugs
- CSA Approved
- U.L. “Motor Control”

Engineered for general purpose single-level or differential service, Series 16M controls combine the reliability of solid state electronics and the convenience of plug-in design. Series 16HM provides higher sensitivity up to 5.5M ohm/cm (probe voltage is 12 VDC).

Series 16M

Specifications

Contact Design	1 N.O. & 1 N.C. (1 form C)
Contact Rating (120/240 VAC)	10 amp Resistive 1/3 hp
Mode of Operation	Direct/Inverse, factory set
Sensitivity	
Series 16M	0-1M ohm, factory set
Series 16HM	0-5.5M ohm, factory set
Primary Voltage	24 VAC, 120 VAC, 240 VAC (+10%/-15%), 50/60 Hz
Secondary Voltage	
Series 16M	12 VAC, 1.5 mA
Series 16HM	12 VDC
Temperature	-40°F to 150°F
Approvals	U.L. 508 File # E44426, CSA
Terminal Style	Screw connector
Options	Time Delays

How to Order

Use the **Bold** characters from the chart below to construct a product code.

16M X X X X X XX XX

Series
16M **16HM**

Mode of Operation

Direct
A – 4.7K
B – 10K
C – 26K
D – 50K
E – 100K
F – 470K
G – 1M
H – 3M[1]
J – 5.5M[1]

Inverse
K – 4.7K[2]
L – 10K[2]
M – 26K[2]
N – 50K[2]
P – 100K[2]
R – 470K[2]
S – 1M[2]
T – 3M[1]
W – 5.5M[1]

Supply Voltage
1 – 120 VAC **2** – 240 VAC[3] **3** – 24 VAC

Socket Style
A – 8 Pin Octal **B** – DIN Mount **M** – None, Module Only

Enclosure
0 – None **1** – NEMA 1 **4** – NEMA 4

Optional Character[4]

Time Delay (increasing level)
01-20 – seconds

Time Delay (decreasing level)
01-20 – seconds

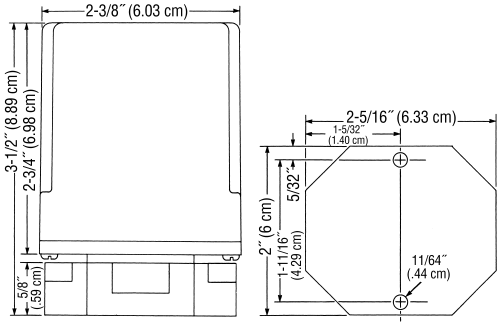
– Standard part numbers

Notes:
1. 16HM only.
2. 16M only.
3. Standard on 16M only.
4. See page E-29 for descriptions.

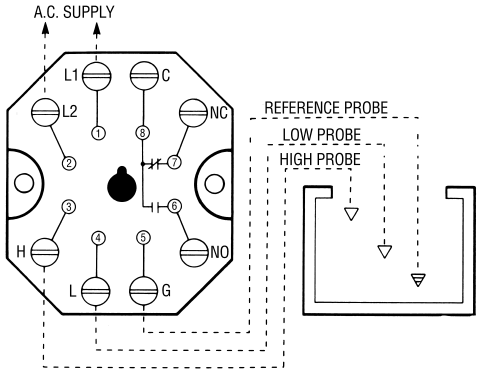
Applications

- Single Level Service
- Differential Service
- Point Level
- Alarms
- Valve Control
- Pump Control

Dimensions



Wiring



Note: For single level service, use “H” and “G” connections.

CONDUCTIVITY

Series 3W – Wire Suspended Probes

- Metallic Bars
- Plastic Shield Protected
- Adaptable to Many Fittings
- Field Assembled

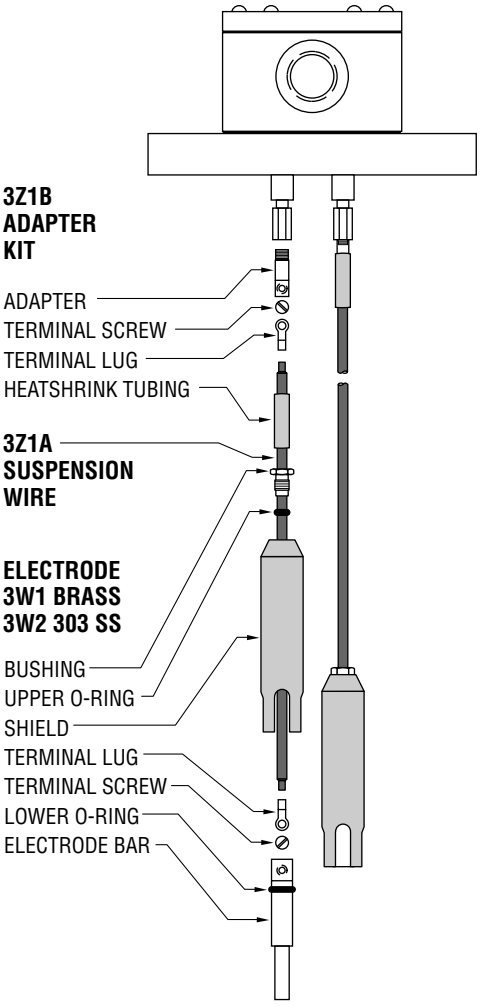
Series 3W probes, consisting of metallic bars within a protective plastic shield, are designed to be suspended above liquid with PVC-insulated wires. They are ideal for applications such as:

- Deep Wells
- Pump Control
- Waste Water
- Deep Tanks

7/8˝ (2.22 cm) diameter x 3-3/4˝ (9.52 cm) length. 3Z1A wire and 3Z1B adaptor kit required for use with 3E, 3F and 3N fittings.

Series 3W

Components Detail



How to Order

Select a 3W electrode, a 3Z1B adaptor and a length of 3Z1A suspension wire to form a complete suspended probe.

3W Electrodes

Probe Material	Part Number
Brass	**3W1**
316 Stainless Steel	**3W2**

3Z1B Adaptor Kit

For use with 3E, 3F and 3N fittings.

Part Number: 3Z1B

3Z1A Suspension Wire

Order in standard or custom length.

Length (Feet)	Part Number
500	**100325-500**
1000	**100325-1000**
5000	**7761782**
Custom	**3Z1A-XX** Specify in one foot increments up to 5000 ft.

CONDUCTIVITY

Series 3U – Multi-Wire Suspended Fittings

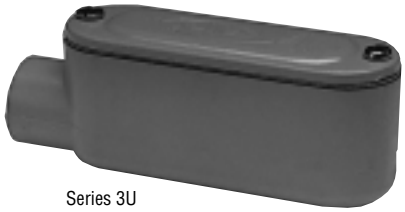
- Low Cost
- 1 - 10 Probes

Applications

- Tanks
- Ponds
- Sumps
- Reservoirs

Specifications

Probes	1 thru 10
Materials of Construction	PVC, Cast Iron
Type of Connection	1/2", 3/4" 1" Conduit
Pressure	Atmosphere
Temperature	150°F (66°C), Max.



Series 3U

How to Order

Use the **Bold** characters from the chart below to construct a product code.

3U **X** **X**

Series
3U

Conduit Size and No. of Probes
1 – 1/2˝ (1-7 probes)
2 – 3/4˝ (1-7 probes)
3 – 1˝ (1-10 probes)

Body Material
A – PVC **B** – Cast Iron


BROWNS HILL
ENGINEERING & CONTROLS

Pyrotector

INSTRUCTIONS

Explosion-Proof Smoke Detector

Model 30-3003

APPLICATION

The Pyrotector Model 30-3003 Explosion-Proof Smoke Detector is a sensitive yet rugged, state-of-the-art protection device that is designed for classified areas in hazardous industrial and commercial locations. The detector is designed to operate effectively with both slow smoldering and fast burning fires. Typical applications include:

- Combustible storage facilities
- Munitions manufacturing
- Volatile chemical storage
- Chemical processing plants
- Petroleum refineries
- Turbine enclosures.

DESCRIPTION

The photoelectric smoke detector uses a solid state infrared emitting diode (IRED) and a light sensing photovoltaic cell arranged in a labyrinth assembly. The labyrinth permits free access to smoke but restricts external light. Because of its critical function to the operation of the detector, each IRED is selected with extreme care and is subjected to rigorous pre-production testing to ensure long-term reliability and performance.

During normal operation (no smoke), the detector samples the air approximately every four seconds for a period of less than one millisecond. The photovoltaic smoke cell, which is placed at an angle to the pulsed invisible light source, is sensitive to the infrared light in the specified frequency emitted by the IRED light source and is designed to receive a signal only when the pulsed IRED source is activated. See Figure 1.

When smoke enters the chamber, the light from the IRED reflects off the smoke particles and reaches the photovoltaic smoke cell. When the amount of light reflected by smoke reaches the factory set threshold level, the smoke alarm circuit is actuated.

The detector will respond to a slow smoldering fire when smoke in the chamber reaches the pre-set sensitivity setting, typically 2.3%.

If a fast burning fire should occur, including fires in flammable liquids and other materials such as plastics that generate black smoke, the abnormally rapid movement of smoke into the detection chamber is sensed by a special rate compensating circuit. An increase in smoke within the detection chamber that exceeds a pre-set rate causes the rate compensation circuit to increase the intensity of the light source, which increases detector sensitivity. If the smoke continues to build at this rate, an amplifier circuit is triggered and the unit generates an alarm. If not, the detector reverts to normal sensitivity.

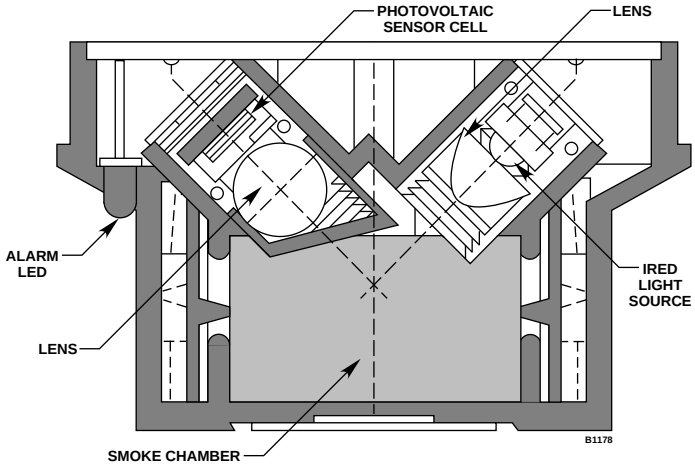


Figure 1—Cross Section of Sensing Chamber Assembly

In normally smoky atmospheres the detector will not go into alarm as long as the concentration is less than the fixed sensitivity of the detector. This results in a sensitive and positive response with the lowest potential for unwanted alarms.

The main enclosure of the detector contains the electronic circuitry, alarm relay, and supervision relay.

FAILSAFE OPERATION

To ensure reliable operation, the Model 30-3003 is equipped with self-checking circuitry. A regulation photodiode, which is matched to the smoke detection circuit, continuously monitors the output intensity of the IRED and adjusts it as necessary to compensate for an accumulation of dust or other contaminants, or any other variation that can occur with temperature and time. A power supervision relay in the detector provides a trouble output signal in the event of an input power failure.

The detector uses extensive filtering against RF and transient interference. In addition, there is a 2 second time delay before an alarm is generated.

The printed circuit board inside the detector is coated to minimize the possibility of problems caused by moisture accumulation.

DETECTOR OUTPUTS

The detector provides a set of Form A (SPST) NO contacts for connection to the alarm output circuitry and a set of SPST NC contacts for supervision of input power. An auxiliary set of Form C (SPDT) NO/NC alarm relay contacts is also provided for controlling remote annunciation devices.

The alarm output latches on in the event of an alarm and an LED located on the outer surface of the housing is illuminated to provide a visual indication that an alarm condition has occurred. The detector is reset by momentarily interrupting input power.

SPECIFICATIONS

OPERATING VOLTAGE—
20 to 28 vdc filtered supply, with less than 1.4 vpp at 60 to 120 Hz.

OPERATING CURRENT—
Standby: 10 milliamperes.
Alarm: 35 milliamperes.

TEMPERATURE RANGE—
Operating: –13°F to +140°F (–25°C to +60°C).
Storage: –67°F to +185°F (–55°C to +85°C).

ALARM AND SUPERVISORY RELAY CONTACT RATING—
1.0 ampere at 30 vdc, SPST.

AUXILIARY ALARM RELAY CONTACT RATING—
2.0 amperes at 30 vdc, Form C, SPDT.

JUNCTION BOX—
Body material: Copper-free aluminum.
Cover: Feraloy.
Conduit Fitting: 25 mm (female).

CERTIFICATIONS—
CSA Certified for use in Class I, Division 2, Groups A, B, C and D hazardous locations.

DIMENSIONS—
See Figure 2.

WEIGHT—
2 pounds (0.91 kilogram)

INSTALLATION

The Model 30-3003 is intended for surface mounting. See Figure 2. The mounting screw holes are counterbored for No. 8 flat-head screws. Electrical equipment that is used in conjunction with the smoke detector is connected to the detector using a terminal strip located in the junction box that is furnished with the unit.

DETECTOR LOCATION

The smoke detector is normally mounted on the ceiling not less than six inches from a side wall. The exact location of the detector must be determined by an evaluation based on engineering judgment supplemented, if possible, by field tests.

For additional information on detector location and spacing, contact the National Fire Protection Association, Batterymarch Park, Quincy, Mass. 02269, and request a copy of NFPA Number 72, the Standard on Automatic Fire Detectors.

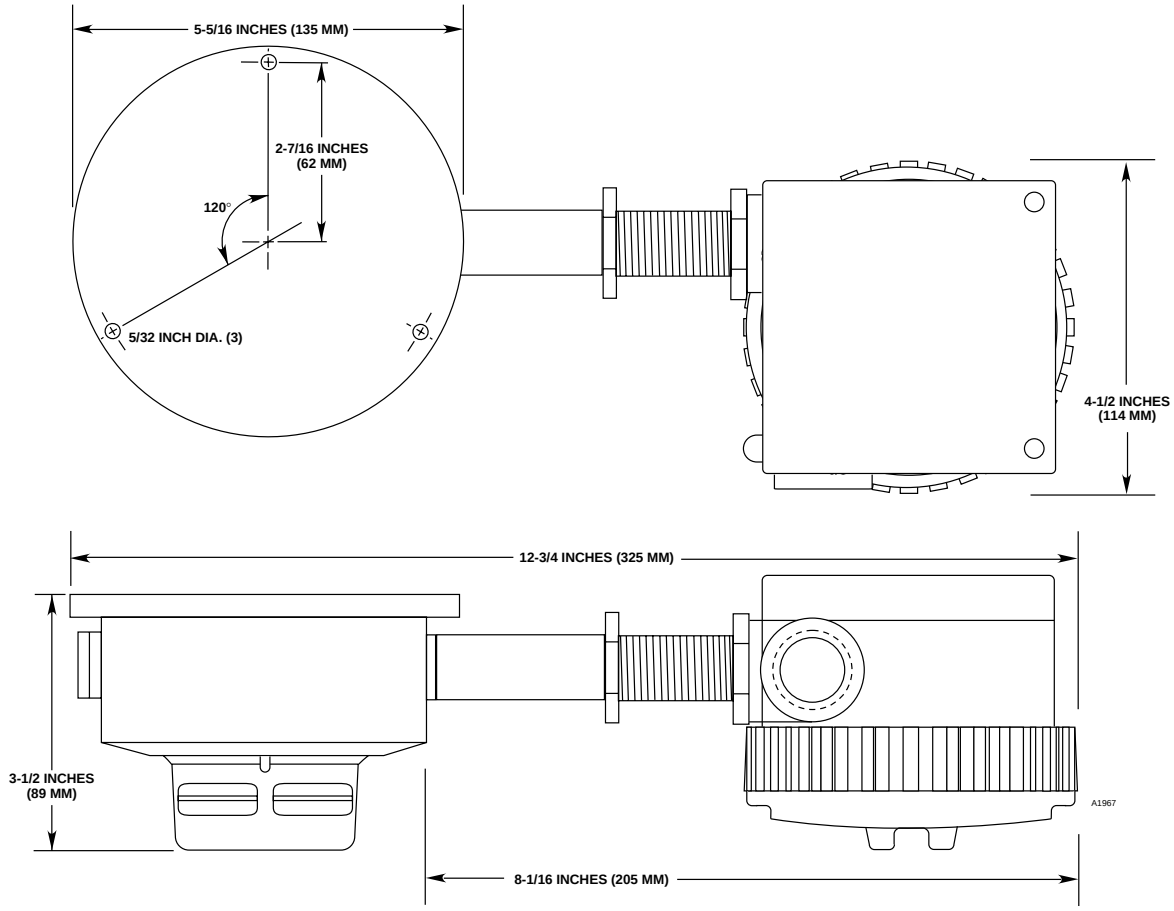


Figure 2—U5005 Dimensions in Inches (MM)

MOUNTING THE DETECTOR

1. Using three No. 8 flat head screws placed through the counterbored holes in the detector flange, secure the detector to the surface location. Secure the junction box if necessary.

2. Remove the cover from the junction box and complete installation of system conduit. Feed the external wiring through the remaining junction box entry or M25 to 3/4 inch adapter. Use care not to damage the wires by twisting them when installing the junction box.

3. Connect the external wiring to the appropriate terminals and re-install the junction box cover. See Figures 3, 4 and 5 for wiring details.

DETECTOR CONNECTIONS

The detector contains two sets of relay contacts:

1. One set of NO Alarm contacts close upon detection of smoke.

2. One set of NC Trouble contacts close when the detector is powered.

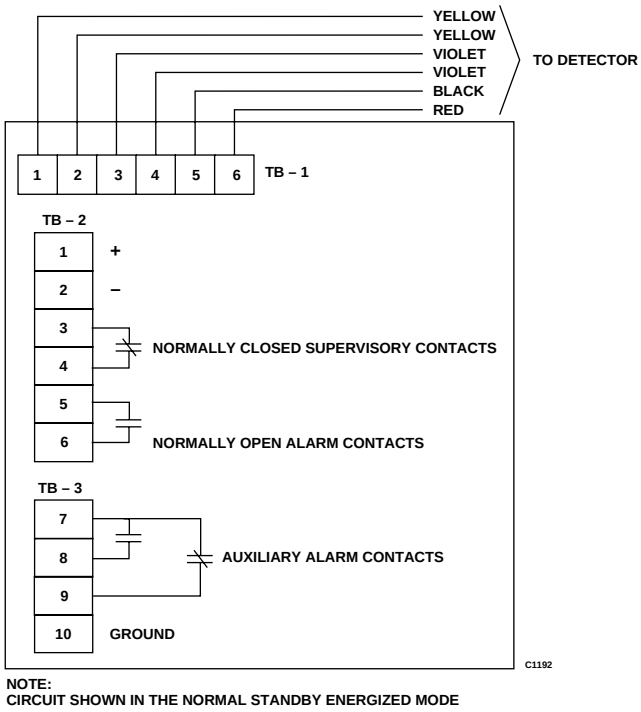


Figure 3—Wiring Terminals

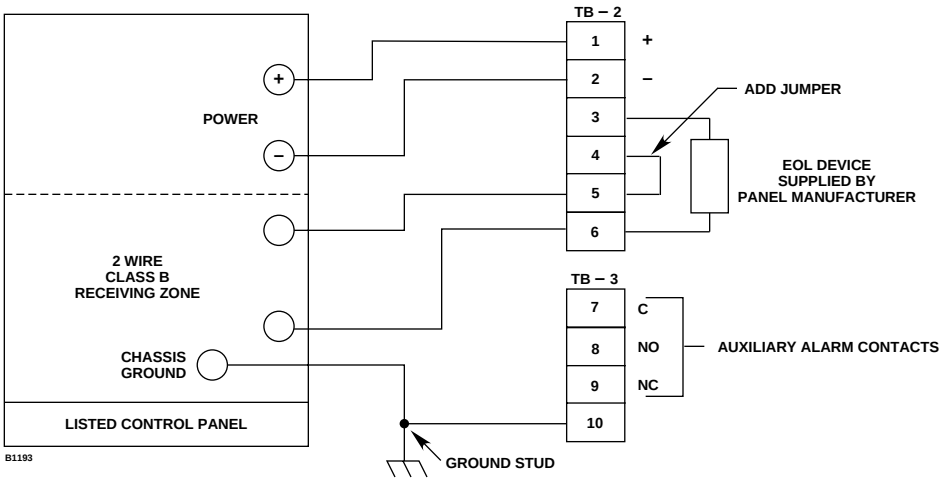


Figure 4—Single Detector Wiring

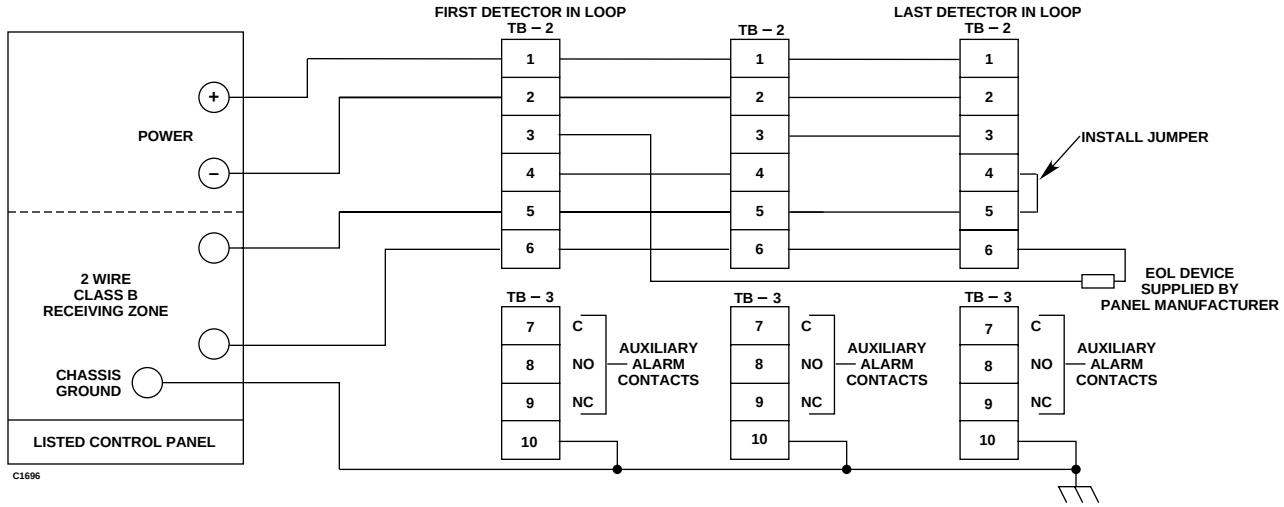


Figure 5—Multiple Detector Wiring

MAINTENANCE

Regularly scheduled maintenance is normally not needed, however, periodic cleaning of the smoke chamber may be necessary when detectors are located in abnormally dirty or dusty environments. Vacuuming around the smoke chamber housing prior to blowing out the chamber with a “dry air” hose is recommended.

NOTE

The Model 30-3003 is not designed to be serviced or repaired in the field. Disassembly of the detector in the field will void the warranty. If service or repairs are required, return the entire unit to the factory.

The smoke detector can be tested using the same methods employed for any photo-electric detector.

Do not use canned aerosol smoke devices to test the detector, since damage can result.

DEVICE REPAIR AND RETURN

Prior to returning devices or components, contact Detector Electronics so that a Service Order number can be assigned. A written statement describing the malfunction must accompany the returned device or component to expedite finding the cause of the failure. Return all equipment transportation prepaid to the factory in Minneapolis.

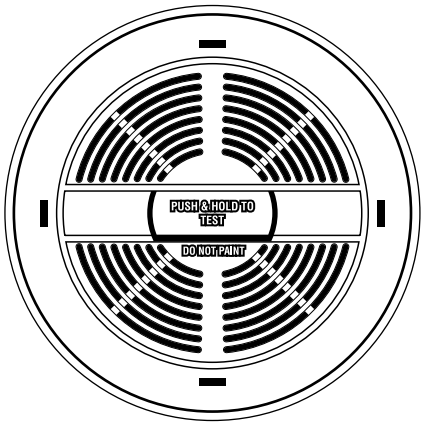
Detector Electronics Corporation

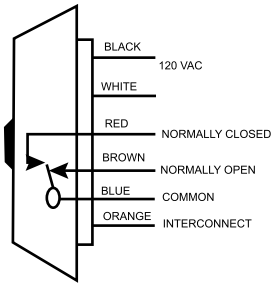
6901 West 110th Street • Minneapolis, Minnesota 55438 • Operator (952) 941-5665 or (800) 765-FIRE

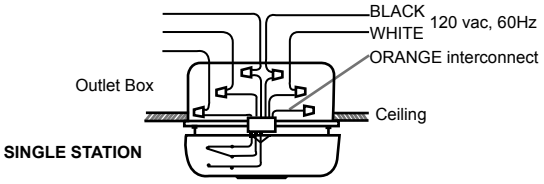
Customer Service (952) 946-6491 • Fax (952) 829-8750 • www.detronics.com • E-mail: detronics@detronics.com

120 VAC Hardwire Ionization Smoke Alarm with Built-in Relay

ESA5011







RELAY CONNECTION:
ESA5011 provides one Form C(NO/NC) contact which activates on alarm.
Contact rating (resistive): 10 A at 120 VAC/ 10A at 28 VDC.
Relay wires (red/brown/blue) 14 gauge stranded copper, install in accordance with Electrical code and local building codes.

INTERCONNECTION:

The ESA5011 may be interconnected with up to a maximum of 18 units.
May also be interconnected to the following models:
American Sensors: SA360, SA379, ESA5011, COS2010
Dicon: 670L, 670LR, 370LBX
ASI Electronics: ESA5010, ESA5011, ESA6010
Maximum interconnect length is 150 feet (50 meters)

TECHNICAL INFORMATION:

Listings:	UL 217, ULC S531
Detection Technology:	Dual-ionization
Operating Voltage:	100-130 VAC, 60HZ
Standby Current:	20mA AC
Alarm Current:	70 mA AC
Alarm Level:	85 dB at 10 feet (3 m)
Interconnections:	Up to 18 smoke alarms
Relay Type:	Form C (NO/NC)
Relay Contact Rating:	Max. 10 amp 120 VAC/28 VDC
Indicator Light:	Green LED remains on when unit is powered. Red LED flashes when unit is in alarm.
Test Button:	Electronically tests sensitivity, circuitry and horn
Temperature:	40^{O}F to 100^{O}F (4^{O}C to 38^{O}C)
Relative Humidity:	10% to 85%
Dimensions:	5.25" diameter x 1.5" depth
Model Replaces:	Dicon 670L

Specifications are subject to change.

ARCHITECTURAL SPECIFICATIONS:

The smoke alarm shall be white or off-white in color, circular in design and powered by a 100 to 130 VAC, 60 HZ power source. It shall utilize solid-state dual-ionization technology as its detection method. The smoke alarm shall consume no more than 20 mA in standby condition and no more than 70 mA in alarm condition. The smoke alarm shall have one set of Form C rating of 120 VAC or 28 VDC and a relay load rating of 10 A. The sensing chamber shall be insect resistant. The smoke alarm shall be capable of operating between 40^{O}F and 100^{O}F (4^{O}C and 38^{O}C) and within a humidity range of 10% to 85%. The smoke alarm shall have two LED indicator lights. The green LED light shall be lit continually while the unit is receiving AC power. The red LED indicator light shall flash when the unit is in alarm. For interconnected units in alarm, the red LED indicator light shall flash every second in the unit originating the alarm and shall flash every 45 seconds in the inter-connected units. The built-in test button shall electronically activate the chamber to simulate smoke and check for proper operation. The electronic sounder shall sound at a minimum of 85 dB at 10 feet (3 m) if smoke is detected. The alarm shall be interconnectable with up to 17 other compatible units. The unit shall be capable of mounting to any electrical box up to 4" in size and shall utilize a quick disconnect power connector. It shall have a separate base mounting plate. It shall have a locking key or some method of securing the alarm to the base plate to deter tampering and theft. The smoke alarm shall come with the required screws and anchors required for installation. ***The smoke alarm shall be listed to UL 217 for U.S.A.*** applications and shall be calibrated to the sensitivity specified by that standard. The smoke alarm shall be an American Sensors model ESA5011 or equivalent.

In ***Canada***, ***the smoke alarm shall be listed to ULC standard S531*** and calibrated to the sensitivity specified by that standard.

SHIPPING SPECIFICATIONS:

Item Number	ESA-5011A (U.S.A.) ESA-5011KA (Canada)
Unit UPC (U.S.A.):	0 80715 80005 8
Unit UPC (Canada):	0 80715 81005 7
Box Dimensions:	5.5"(w) x 5.5"(h) x 2.4"(d)
Weight:	0.55 lb.
10 Pack Master	
Case UPC (U.S.A.):	5 0080715 80005 3
Case UPC (Canada):	7 0080715 81005 6
Case Dimensions:	11.75" (l) x 10.5" (w) x 6.25 " (h)
Weight:	6.1 lb.

Listings:

Dicon Global Inc.
88B East Beaver Creek Road, Unit 6
Richmond Hill, Ontario, Canada L4B 4W2
905-482-3720 Fax: 905-731-8267
info@diconglobal.com
www.diconglobal.com

AMERICAN SENSORS™
WE SAVE LIVES FOR A LIVING

Printed in Canada


BROWNS HILL
ENGINEERING & CONTROLS

FEDERAL SIGNAL CORPORATION

Electraray® Rotating Warning Light

Model 225

ECONOMICAL LIGHT DUTY WARNING LIGHT

- Available in 120VAC
- Five dome colors
- 40 watt incandescent lamp
- Integrated 1/2-inch NPT pipe mount
- Indoor/outdoor use
- Type 4X, IP66 enclosure
- UL and cUL Listed

The Federal Signal Electraray® Model 225 is a compact, economical rotating warning light designed for industrial uses. This innovative dome design features a single retaining screw that allows quick and easy access for inspection and relamping.

The Federal Signal Electraray has a closed cell neoprene gasket that makes it water resistant. The injection molded reflector rotates around an incandescent lamp and produces 90 flashes per minute. It is available in five dome colors (Amber, Blue, Clear, Green and Red) and is UL Listed for Type 4X. Constructed to IP66 specifications, the Electraray 225 is ready to mount on a 1/2-inch NPT pipe. Optional mounting brackets are available, simplifying installation on walls and in corners.

The Electraray 225 is one of the most economical rotating signaling lights in the Federal Signal product line. Its design makes it easily adaptable for a multitude of indoor and outdoor applications. It is designed for permanent mounting where a 120VAC, 50/60Hz line is available. This light provides an effective, economical means of supplementing audible signaling devices.

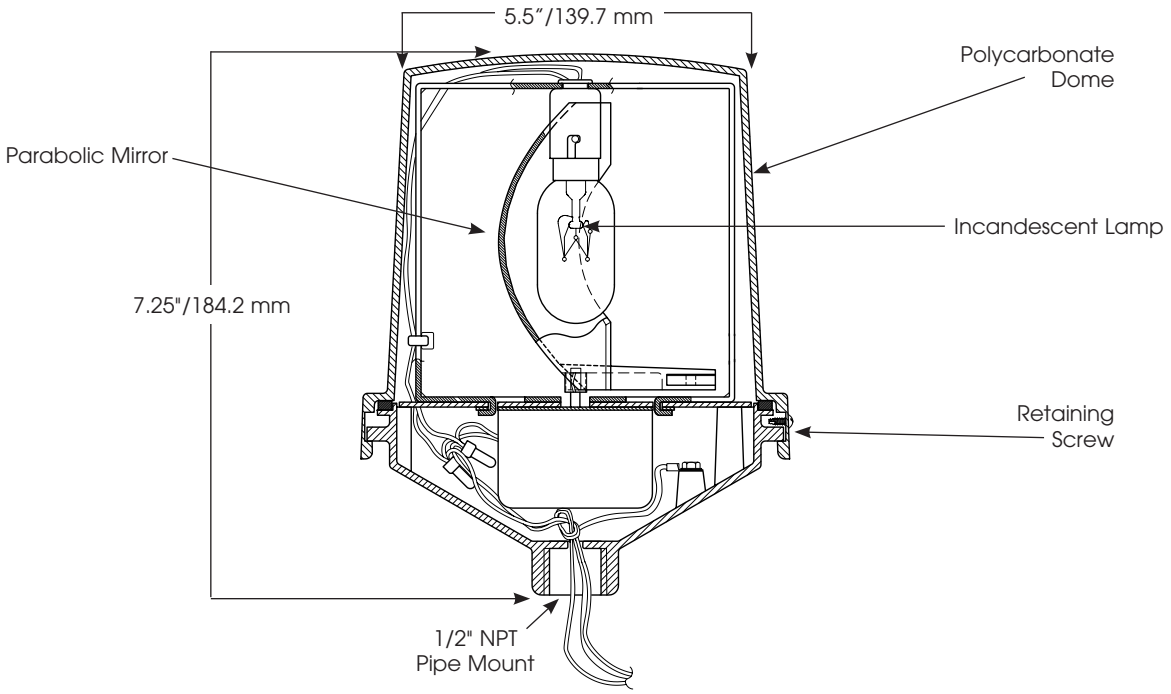
Federal Signal's Electraray rotating light is an inexpensive warning light for calling attention to emergency situations or process status changes.

Model	Voltage	Operating Current	Flash Rate/ Minute	Candela	Mount
225-120*	120VAC 50/60HZ	0.22 amps	90	1,000	1/2" NPT Pipe

** Indicates color (A) Amber, (B) Blue, (C) Clear, (G) Green or (R) Red*

5 yr FEDERAL SIGNAL WARRANTY

ELECTRARAY® (225)



SPECIFICATIONS

Lamp Life:	1,000	1,000
Light Source:	Incandescent	Incandescent
Operating Temperature:	-31°F to 150°F	-35°C to 66°C
Net Weight:	2.0 lbs.	0.9 kg
Shipping Weight:	2.7 lbs.	1.2 kg
Height:	7.25"	184.0 mm
Diameter:	5.5"	140.0 mm

HOW TO ORDER

- Specify model, voltage and color
- Optional Accessories:
  Corner Bracket (LCMB2)
  Wall Bracket (LWMB2)
- Please refer to Model Number Index 225 beginning on page 369

REPLACEMENT PARTS

Description	***Part Number***
Dome, Amber	K8444D219C-03
Dome, Blue	K8444D219C-01
Dome, Clear	K8444D219C-04
Dome, Green	K8444D219C-02
Dome, Red	K8444D219C
Lamp	K149123A
Motor, 120VAC	K8241A030-02

Section 3:

Control Panel Devices

BROWNS HILL
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BROWNS HILL
ENGINEERING & CONTROLS

Harold D. Thompson Regional Water Reclamation Facility
SCADA System Design
Bill of Materials

Description	Quantity	Manuf.	Part #
Headworks Control Panel			
Enclosure	1	Hoffman	A723618FS
Backpanel	1	Hoffman	A72P36F1
Lighting Kit	1	Hoffman	LF120V18
Door Switch	1	Hoffman	ALFSWD
120VAC SPD	1	Phoenix Contact	28 39 33 4
120VAC SPD Base	1	Phoenix Contact	28 39 28 2
Main Circuit Breaker 10A-1P	1	Square D	QOU110
120VAC Receptacle	1	Leviton	5362-IG
Receptacle handy box and cover	1	Thomas & Betts	58361-1/2 & 58-C-7
Wire Duct (3X3)	As req.	Thomas & Betts	TY3X3WPG6
Wire Duct (2X3)	As req.	Thomas & Betts	TY2X3WPG6
Wire Duct cover (3")	As req.	Thomas & Betts	TY3CPG6
Wire Duct cover (2")	As req.	Thomas & Betts	TY2CPG6
1000VA UPS	1	APC	BR1000G
SPDT 120VAC Relay	16	Idec	RH1B-UL-AC120V
SPDT Socket (relay base)	16	Idec	SH1B-05
DPDT 120VAC Relay	2	Idec	RH2B-UL-AC120V
DPDP Socket (relay base)	2	Idec	SH2B-05
Terminal Blocks	As req.	Phoenix Contact	30 46 18 4
Fuse Terminal Blocks	As req.	Phoenix Contact	30 46 03 2
End Blocks	As req.	Phoenix Contact	30 22 21 8
Din Rail	As req.	Phoenix Contact	08 01 73 3
Power Supply 24VDC-30W	1	Idec	PS5R-SC24
Media Converter and Network Switch	1	Hirshman	942014018
Fiber Patch Panel	1	tii Networks	WM1PF006KSCN
Fiber Patch Cord (SC-SC 1meter)	2	Allen Tel Prod.	GBSC2-D2-01
Intrinsically Safe Barrier	2	Turck	IM1-22Ex-R
Current Monitoring Sensor	9	Cutler Hammer	EAC1420SP
PLC:			
Controller - Ehternet/IP communications	1	Allen Bradley	1769-L32E
Industrial Compact Flash card	1	Allen Bradley	1784-CF64
Digital Input module - 120VAC (16 pts)	4	Allen Bradley	1769-IA16
Digital Output module - 120VAC (16 pts)	1	Allen Bradley	1769-OW16
Analog Input module - 4-20mA (8 pts)	2	Allen Bradley	1769-IF8
Analog Output module - 4-20mA (4 pts)	1	Allen Bradley	1769-OF4CI
Right end cap	1	Allen Bradley	1769-ECR
Power Supply - 120VAC	1	Allen Bradley	1769-PA2
Opeartor Terminal Interface 10" 120VAC	1	Allen Bradley	2711P-T10C4A8


BROWNS HILL
ENGINEERING & CONTROLS

Free-Standing Type 12 Enclosures

Rev B March 2001

Application

Designed to protect electrical and electronic controls, components, and instruments in typical industrial environments. The Type 12 rating protects enclosed equipment from dust, dirt, oil, and dripping water. These enclosures are used in machine tool applications for housing motor starters, drives, contactors, PLCs, as well as a wide variety of other electrical and electronic equipment. The addition of 19-inch rack mounting accessories make these enclosures ideal for providing rugged protection for sensitive rack mounted components in harsh industrial environments. The enclosures are found extensively in automotive, pulp and paper, wood products, textile, and similar industries. Four styles are available to provide maximum flexibility:

1. Single-Door Single Access Enclosures (single door on front)
2. Single-Door Dual Access Enclosures (single door on front and rear)
3. Two-Door Single Access Enclosures (overlapping doors on front)
4. Two-Door Dual Access Enclosures (overlapping doors on front and rear)

Construction

- 12 gauge steel (backs of two-door single access enclosures are 10 gauge steel)
- Seams continuously welded and ground smooth, no holes or knockouts
- Stiffeners welded to back of two-door enclosures maintain flatness and increase rigidity
- Lifting eyes for easy handling
- 3-point latching operated by oil-tight key-locking handle
- Latch rods have rollers for easier door closing
- Heavy gauge continuous hinges support each door
- Data pocket, provided on door(s) with 3-point latches, is high-impact thermoplastic
- Mounting channels welded horizontally to interior body sides at top, bottom, and center
- Optional panels and rack mounting angles can be mounted anywhere along channels
- Oil-resistant door gasket attached with oil-resistant adhesive and held in place with steel retaining strips
- Grounding stud on door
- Provision for mounting fluorescent light

Finish

White inside with ANSI 61 gray outside finish over phosphatized surfaces. Optional panels, swing-out panels, side mounted panels, rack mounting frames, heavy duty panel supports and center panel supports are white.

Industry Standards

UL 508, File No. E61997, Type 12
NEMA/EEMAC Type 12
E.I.A. RS-310-D
CSA, File No. LR42186, Type 12
IEC 60529, IP65

Accessories

See General Accessories index

Blower Package
Casters
Clamping Nut Kit
Corrosion Inhibitors
Electric Heaters
Electrical Interlocks
Fan Cooling Products
Floor Stand Kit
Folding Shelf
Keyboard Kit
Lighting Kit
Panel Support Kit
Panels
Touch-Up Paint (A-TPG15GLS)
Window Kit
Wiring Duct

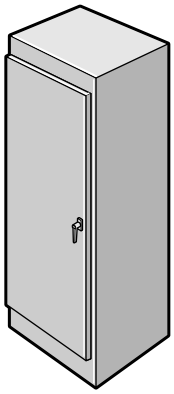
Modification Services™ Program

You can customize this product to your unique requirements by specifying from these options:

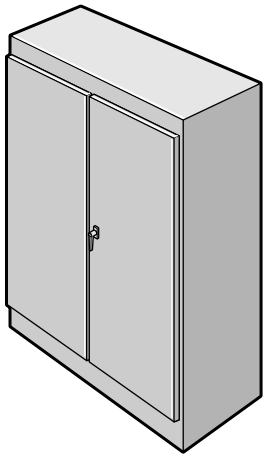
- Enclosure height, width, depth
- Over 100 standard finish colors and textures
- Holes and cutouts in body, doors, subpanels
- Tapped holes, fasteners, mounting channel in enclosure or subpanel
- Mounting
- Doors
- Subpanels
- Structural changes
- Environmental control (louvers, fans, filters)
- Windows
- Standard accessories

For details, see Modification Services at hoffmanonline.com.
To order, contact your local Hoffman sales representative.

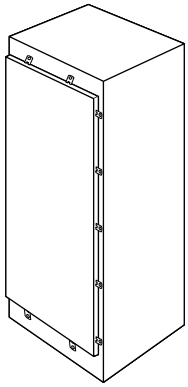
Free-Standing Enclosure Group Accessory Selection Guide *See General Accessories, Section 11*



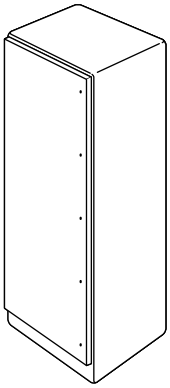
Free-Standing Type 12 Single-Door Enclosure
(Single Access or Dual Access)



Free-Standing Type 12 Two-Door Enclosure
(Single Access or Dual Access)

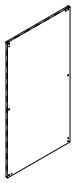


Free-Standing Type 4 Enclosure

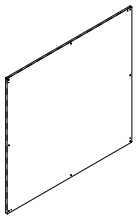


Free-Standing Fiberglass Type 4X Enclosure

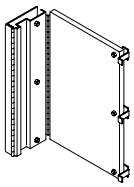
Internal Accessories



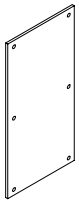
Panel for Single-Door Enclosures



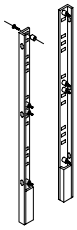
Panel for Two-Door Enclosures



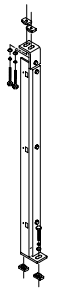
Swing-Out Panel



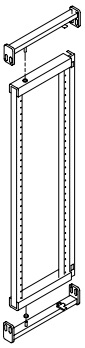
Side-Mounted Panel



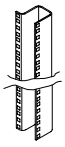
Heavy-Duty Panel Supports



Center Panel Support

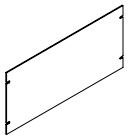


Swing-Out Rack Mounting Frame



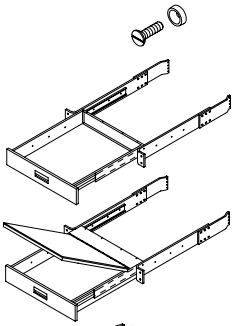
Rack Mounting Angles

Clip Nut Package



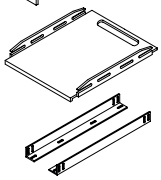
Rack Panels

Screw Package



Drawer

Writing Surface for Drawers



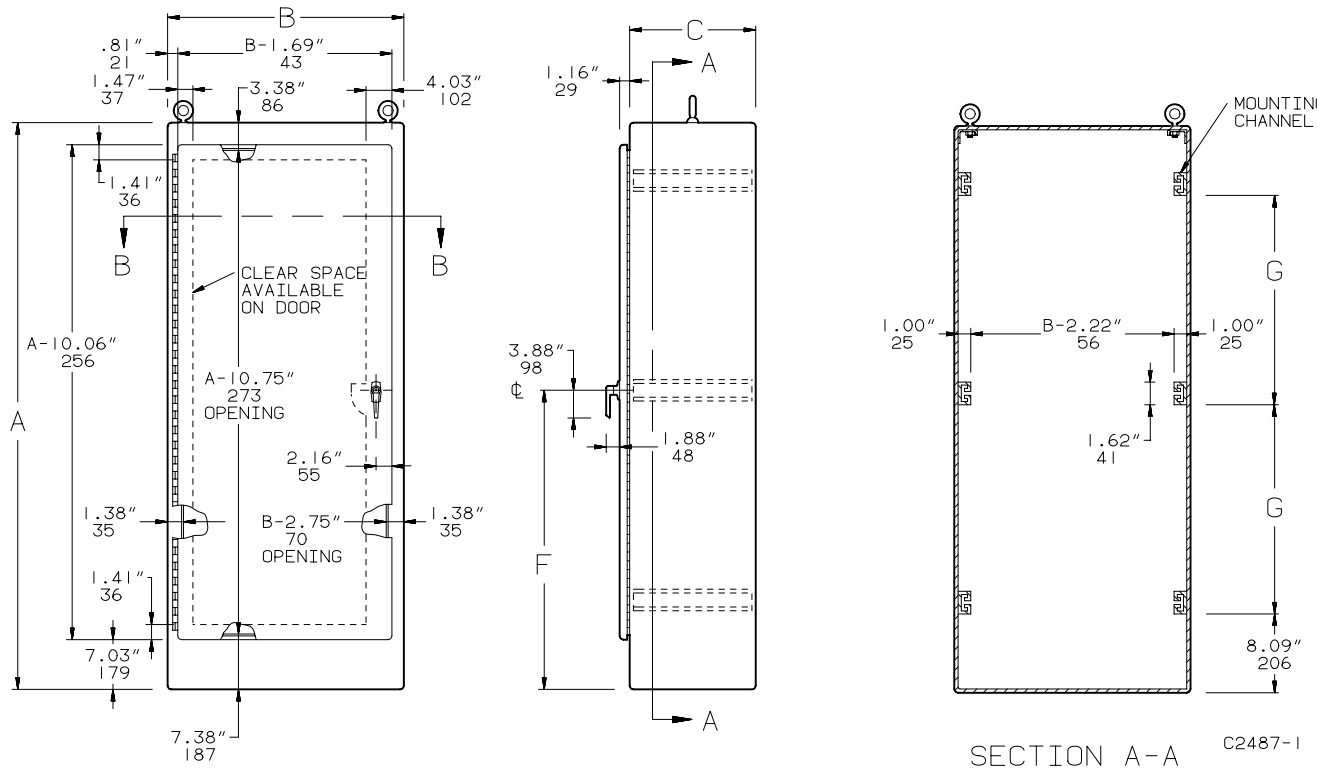
Shelf

Guides

To select an accessory for the enclosure, see the following Free-Standing Enclosure Accessory tables

C2586

Single-Door Single Access



Inch
Millimeter

NOTE:
1. Four lifting eyes are furnished if C = 30.06 (764) or more.
2. See General Accessories for section views A-A and B-B showing accessories.
3. Removable 12.00x12.00 (305x305) data pocket.

Standard Sizes Single-Door Single Access Free-Standing Type 12 Enclosures

Enclosure Catalog Number	Enclosure Size A x B x C inch	(millimeter)	F inch	(mm)	G inch	(mm)
A-602418FS	60.06 x 24.06 x 18.06	(1526 x 611 x 459)	32.03	(814)	23.12	(587)
A-722418FS	72.06 x 24.06 x 18.06	(1830 x 611 x 459)	38.03	(966)	29.12	(740)
A-723018FS	72.06 x 30.06 x 18.06	(1830 x 764 x 459)	38.03	(966)	29.12	(740)
A-723618FS	72.06 x 36.06 x 18.06	(1830 x 916 x 459)	38.03	(966)	29.12	(740)
A-902420FS	90.06 x 24.06 x 20.06	(2288 x 611 x 510)	47.03	(1195)	38.12	(968)
A-903620FS	90.06 x 36.06 x 20.06	(2288 x 916 x 510)	47.03	(1195)	38.12	(968)
A-603624FS	60.06 x 36.06 x 24.06	(1526 x 916 x 611)	32.03	(814)	23.12	(587)
A-722424FS	72.06 x 24.06 x 24.06	(1830 x 611 x 611)	38.03	(966)	29.12	(740)
A-723024FS	72.06 x 30.06 x 24.06	(1830 x 764 x 611)	38.03	(966)	29.12	(740)
A-723624FS	72.06 x 36.06 x 24.06	(1830 x 916 x 611)	38.03	(966)	29.12	(740)
A-903624FS	90.06 x 36.06 x 24.06	(2288 x 916 x 611)	47.03	(1195)	38.12	(968)
A-723630FS	72.06 x 36.06 x 30.06	(1830 x 916 x 764)	38.03	(966)	29.12	(740)
A-723636FS	72.06 x 36.06 x 36.06	(1830 x 916 x 916)	38.03	(966)	29.12	(740)
A-903636FS	90.06 x 36.06 x 36.06	(2288 x 916 x 916)	47.03	(1195)	38.12	(968)

Millimeter dimensions ( ) are for reference only; do not convert metric dimensions to inch.

Panels for Enclosures

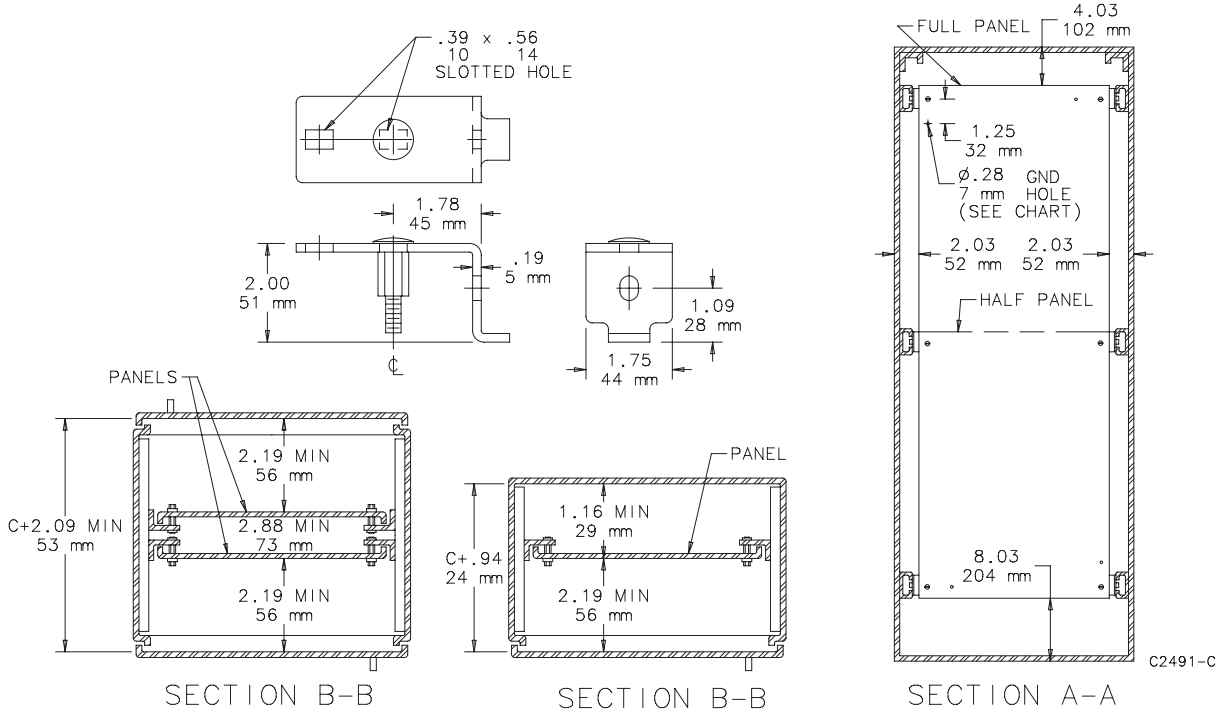
Panels for Free-Stand Type 4, 4X and 12 Single- and Dual-Access One-Door Enclosures with Mounting Channel

Panels for one-door, single-access and one-door, dual-access Free-Stand Type 12 Enclosures, Free-Stand Type 4 Enclosures and One-Door Type 4X Free-Stand Fiberglass Enclosures. Panels are 12 gauge steel and can be positioned anywhere along horizontal mounting channels (see dimension drawing Sections B-B for limitations). Half-length panels can be located in the upper or lower portion of the enclosure. Panels are finished with white polyester powder paint or a conductive, corrosion-resistant coating and furnished with plated mounting hardware.

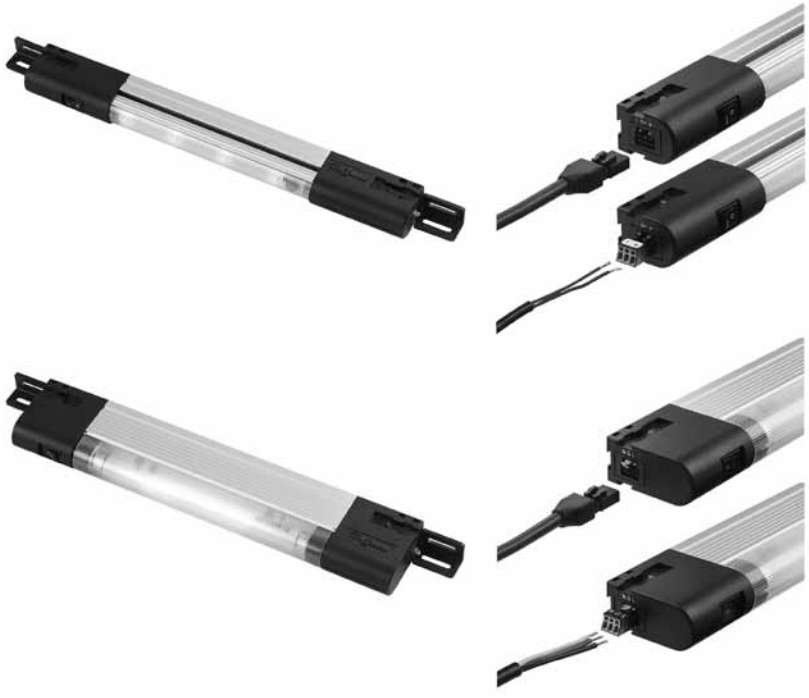
Bulletin: PNL30, PNLFS

Catalog Number	Description	Finish	Panel Size (in.)	Panel Size (mm)	Fits Enclosure A x B (in.)	Fits Enclosure A x B (mm)
A60P24F1	Full Panel	Painted steel	48.00 x 20.00	1218 x 508	60.00 x 24.00	1524 x 610
A60P24F1G	Full Panel	Conductive	48.00 x 20.00	1218 x 508	60.00 x 24.00	1524 x 610
A60P24F2	Half Panel	Painted steel	24.88 x 20.00	632 x 508	60.00 x 24.00	1524 x 610
A60P24F2G	Half Panel	Conductive	24.88 x 20.00	632 x 508	60.00 x 24.00	1524 x 610
A72P24F1	Full Panel	Painted steel	60.00 x 20.00	1524 x 508	72.00 x 24.00	1829 x 610
A72P24F1G	Full Panel	Conductive	60.00 x 20.00	1524 x 508	72.00 x 24.00	1829 x 610
A72P24F2	Half Panel	Painted steel	30.88 x 20.00	784 x 508	72.00 x 24.00	1829 x 610
A72P24F2G	Half Panel	Conductive	30.88 x 20.00	784 x 508	72.00 x 24.00	1829 x 610
A90P24F1	Full Panel	Painted steel	78.00 x 20.00	1981 x 508	90.00 x 24.00	2286 x 610
A90P24F1G	Full Panel	Conductive	78.00 x 20.00	1981 x 508	90.00 x 24.00	2286 x 610
A90P24F2	Half Panel	Painted steel	39.88 x 20.00	1013 x 508	90.00 x 24.00	2286 x 610
A90P24F2G	Half Panel	Conductive	39.88 x 20.00	1013 x 508	90.00 x 24.00	2286 x 610
A72P30F1	Full Panel	Painted steel	60.00 x 26.00	1524 x 660	72.00 x 30.00	1829 x 762
A72P30F1G	Full Panel	Conductive	60.00 x 26.00	1524 x 660	72.00 x 30.00	1829 x 762
A72P30F2	Half Panel	Painted steel	30.88 x 26.00	784 x 660	72.00 x 30.00	1829 x 762
A72P30F2G	Half Panel	Conductive	30.88 x 26.00	784 x 660	72.00 x 30.00	1829 x 762
A60P36F1	Full Panel	Painted steel	48.00 x 32.00	1219 x 813	60.00 x 36.00	1524 x 914
A60P36F1G	Full Panel	Conductive	48.00 x 32.00	1219 x 813	60.00 x 36.00	1524 x 914
A60P36F2	Half Panel	Painted steel	24.88 x 32.00	632 x 813	60.00 x 36.00	1524 x 914
A60P36F2G	Half Panel	Conductive	24.88 x 32.00	632 x 813	60.00 x 36.00	1524 x 914
A72P36F1	Full Panel	Painted steel	60.00 x 32.00	1524 x 813	72.00 x 36.00	1829 x 914
A72P36F1G	Full Panel	Conductive	60.00 x 32.00	1524 x 813	72.00 x 36.00	1829 x 914
A72P36F2	Half Panel	Painted steel	30.88 x 32.00	784 x 813	72.00 x 36.00	1829 x 914
A72P36F2G	Half Panel	Conductive	30.88 x 32.00	784 x 813	72.00 x 36.00	1829 x 914
A90P36F1	Full Panel	Painted steel	78.00 x 32.00	1981 x 813	90.00 x 36.00	2286 x 914
A90P36F1G	Full Panel	Conductive	78.00 x 32.00	1981 x 813	90.00 x 36.00	2286 x 914
A90P36F2	Half Panel	Painted steel	39.88 x 32.00	1013 x 813	90.00 x 36.00	2286 x 914
A90P36F2G	Half Panel	Conductive	39.88 x 32.00	1013 x 813	90.00 x 36.00	2286 x 914

Use combinations of panels for 3-5 door A 28 enclosures.



PANELITE™ Enclosure Lights Overview



Industry Standards

PANELITE LED and Fluorescent Enclosure Lights

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.

230 VAC Fluorescent Enclosure Light

UL 508A Component Recognized; File No. E234324 cUL Component Recognized per CSA C22.2 No 14; File No. E61997 CE

Application

Versatile, slim-profile LED and fluorescent lights provide mounting flexibility and are easy to install in any enclosure. Terminal blocks 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 allows the light to be positioned horizontally or vertically; two-way mounting provides for ideal orientation
- 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 (230 VAC Fluorescent Enclosure Light has switch or door-activated sensor)

PANELITE Only:

- Mounting tabs provide easy access point for attachment hardware; light does not need to be disassembled for installation
- 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

PANELITE:

- 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)

230 VAC Fluorescent Enclosure Light:

- Light gray composite construction – UL 94V-O material
- Hardware kit provides fasteners to mount to PROLINE, NEMA (4, 4X, 12, and 13), CONCEPT®, FUSION™ and other cabinets
- Easy-access terminal block that accommodates up to 16 AWG wires
- Fluorescent light bulb included (2G7 Base)

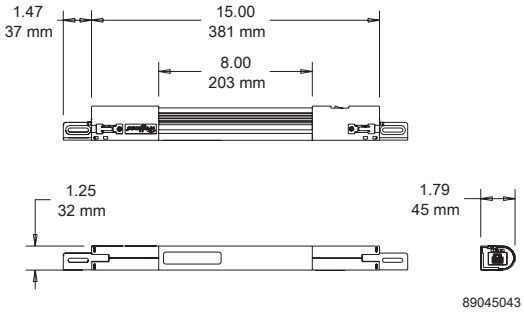
Lighting Packages

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

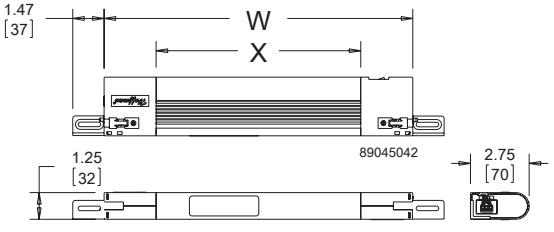
Catalog Number	Description	VDC	Amps	W in./mm	X in./mm
LED24V15	LED Light, 15 in.	24	.5	15.00 381	8.00 203



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)	Replacement Lens Cover
LF120V15	Fluorescent Light, 15 in.	120	50/60	.13	14.50 368	9.63 245	F6T5	LFL15
LF120V18	Fluorescent Light, 18 in.	120	50/60	.13	17.50 445	12.63 321	F8T5	LFL18
LF120V28	Fluorescent Light, 28 in.	120	50/60	.26	27.75 705	22.88 581	F14T5	LFL28

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

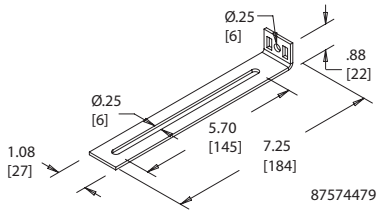
Catalog Number	Description
ALFSWD	Door switch assembly (order connection cable separately)
PLFSWD	Door switch assembly for PROLINE® (order connection cable separately)

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



PT 2-PE/S-... Z

Surge voltage protection for single-phase power supplies
Housing width 17.5 (1 div.)

(IEC) [mm²]	rigid solid	flexible stranded	AWG
Connection data	0.2-4	0.2-2.5	24-12

Description	Voltage U_N [1)]	Type	Order No.	Pcs. Pkt.
MAINS-PLUGTRAB-base element [2)] with universal foot for mounting on 4 or 3 **Coding pins**		**PT-BE/FM**	28 39 28 2	10
MAINS-PLUGTRAB plug, for AC voltage	24 V AC	**PT 2-PE/S- 24AC-ST**	28 39 31 8	10
	60 V AC	**PT 2-PE/S- 60AC-ST**	28 39 32 1	10
	120 V AC	**PT 2-PE/S-120AC-ST**	28 39 33 4	10
	230 V AC	**PT 2-PE/S-230AC-ST**	28 39 34 7	10

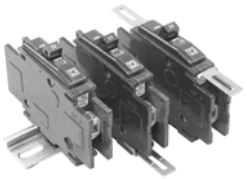
Accessories	
Zack strip, 10-section, white	**ZB 5** (see info)
	ZB 5,8 (see info)

Technical data		**PT 2-PE/S-... ...24AC**	...60AC	...120AC	...230AC
IEC category/VDE requirement class:		III / D	III / D	III / D	III / D
Nominal voltage U_N: [V AC]		24	60	120	230
Arrester rated voltage U_C: [V AC]		34	100	150	250
Nominal current I_N/40 °C: [A]		20	20	20	20
Operating current I_C at U_C (L-N): [mA]		≤ 2.5	≤ 1.5	≤ 1.1	≤ 1.1
Discharge current to PE at U_N: [µA]		≤ 1	≤ 1.5	≤ 1.5	≤ 1.5
Nominal discharge surge current I_n (8/20) s: [kA]	sym./asym.(6)	1/1	2.5 /2.5	2.5 /2.5	2.5 /2.5
Max. discharge surge	sym./asym.(6)	2/2	6.5 /6.5	6.5 /6.5	6.5/6.5

current Imax (8/20) µs: [kA]	sym./asym.(6)				
Protection level: [kV]	sym./asym.(6)	≤ 0.22/≤ 0.2	≤ 0.55/≤ 0.5	≤ 0.7/≤ 0.8	≤ 1.2 /≤ 1.2
Response time t_a: [ns]	sym./asym.(6)	≤ 25 /≤ 100	≤ 25 /≤ 100	≤ 25 /≤ 100	≤ 25 /≤ 100
Required back-up fuse max.: [A gL/C]		20	20	20	20
Temperature range: [°C]		–25 up to +85	–25 up to +85	–25 up to +85	–25 up to +85
Protection type in acc. with IEC 529/ EN 60 529:		IP 20	IP 20	IP 20	IP 20
Insulation housing:		PA	PA	PA	PA
Inflammability class in acc. with UL 94:		V0	V0	V0	V0
Stripping length:		8 mm	8 mm	8 mm	8 mm
Thread / Torque		M3/0.8 Nm	M3/0.8 Nm	M3/0.8 Nm	M3/0.8 Nm
Test standards:		IEC 61643-1:1998-02, E DIN VDE 0675 part 6:1989-11/A1:1996-03/A2:1996-10			

[1]) Conversion table (AC > DC or DC > AC) (see info)

[2]) White labels printed with 6 are enclosed for mounting rail identification.



Low Ampere QOU Miniature Circuit Breakers

General Specifications Common to All Low Ampere QOU Circuit Breakers

- For convenient flush mount, surface mount or DIN mount (symmetrical rail 35 x 7.5 DIN/EN 50 022)
- Single handle with internal common trip
- Terminal lug wire size (1) #14–#2 AWG Cu or Al
- Reversible line and load lugs
- Field-installable quick connectors
- UL Listed 48 Vdc (5,000 AIR)
- UL Listed as HACR Type—10–70 A

High Ampere QOU Circuit Breakers

General Specifications Common to All High Ampere QOU Circuit Breakers

- Flush mount, surface mount, and DIN rail mount
- Internal common trip
- Lugs supplied in standard position only
- Terminal lug wire size (1) #12–#2/0 AWG Cu or Al
- UL Listed 60 Vdc per pole (5000 AIR)—**Note:** except switches
- UL Listed as HACR type—80–125 A

QOU Miniature Circuit Breakers
QOU unit mount miniature circuit breakers (cable-in/cable-out) are ideal for OEM applications. They have Square D's unique Visi-Trip feature and can be DIN rail-mounted or surface- or flush-mounted using mounting feet.

Ampere Rating	1-pole 1 20 Vac Catalog No.	Price	2-pole 120/240 Vac Catalog No.	Price	2-pole 240 Vac Catalog No.	Price	3-pole 240 Vac Catalog No.	Price
10,000 AIR								
10	QOU110		QOU210		QOU210H		QOU310	
15	QOU115		QOU215		QOU215H		QOU315	
20	QOU120		QOU220		QOU220H	**$112.00**	QOU320	
25	QOU125		QOU225		QOU225H		QOU325	
30	QOU130	**$26.80**	QOU230	**$ 58.00**	QOU230H		QOU330	**$190.00**
35	QOU135		QOU235		....	...	QOU335	
40	QOU140		QOU240		....	...	QOU340	
45	QOU145		QOU245		....	...	QOU345	
50	QOU150		QOU250		....	...	QOU350	
60	QOU160		QOU260		....	...	QOU360	
70	QOU170	**52.00**	QOU270	**114.00**	....	...	QOU370▲	**242.00**
80	QOU180▲		QOU280▲		....	...	QOU380▲	
90	QOU190▲	**117.00**	QOU290▲	**164.00**	....	...	QOU390▲	**277.00**
100	QOU1100▲		QOU2100▲		....	...	QOU3100▲	
125	....	...	QOU2125▲	**301.00**	....	...	....	...
22,000 AIR								
15	QOU115VH		QOU215VH		....	...	QOU315VH	
20	QOU120VH		QOU220VH		....	...	QOU320VH	**284.00**
25	QOU125VH		QOU225VH		....	...	QOU325VH	
30	QOU130VH	**67.00**	QOU230VH	**126.00**	....	...	QOU330VH	
35	QOU135VH		QOU235VH		....	...	....	...
40	QOU140VH		QOU240VH		....	...	....	...
45	QOU145VH		QOU245VH		....	...	....	...
50	QOU150VH		QOU250VH		....	...	....	...
60	QOU160VH		QOU260VH		....	...	....	...

QOU-HM
High magnetic trip circuit breakers are recommended for applications where high initial inrush may occur and for individual dimmer applications.

15	QOU115HM	**26.80**	....	...	....	...	....	...
20	QOU120HM		....	...	....	...	....	...

QYU UL1077 Recognized Supplementary Protectors (5,000 AIR)

	1-pole 277 Vac							
15	QYU115		....	...	....	...	....	...
20	QYU120	**81.00**	....	...	....	...	....	...
25	QYU125		....	...	....	...	....	...
30	QYU130		....	...	....	...	....	...

QOU Non-Automatic Switches
Non-automatic switches have the same physical packaging as miniature circuit breakers, but provide no overcurrent or short circuit protection. They are UL Listed per UL1087 and are CSA certified.

60	....	...	....	...	QOU200	**58.00**	QOU300	**190.00**
100	....	...	....	...	QOU2000	**164.00**	QOU3000	**277.00**
125	....	...	....	...	QOU20001	**301.00**	QOU30001	**477.00**

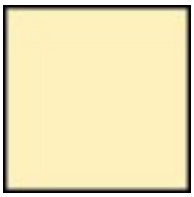
▲ High-ampere QOUs use appropriately sized terminal lugs and accessories.

Interrupting Ratings . . . . . page 6-3
Accessories . . . . . pages 6-12, 6-15
Dimensions . . . . . page 6-49


BROWNS HILL
ENGINEERING & CONTROLS

PRODUCT SPECIFICATIONS / INFO

Color: Ivory



NEMA: 5-20R

5362-IGI

Description

20 Amp, 125 Volt, NEMA 5-20R, 2P, 3W, Slim Body Duplex Receptacle, Straight Blade, Industrial Grade, Isolated Ground, , Back & Side 8 Hole Feed-Thru Wired, Steel Strap, - Ivory

Product Features

Grounding:	Isolated Ground
Amperage:	20 Amp
Voltage:	125 Volt
NEMA:	5-20R
Pole:	2
Wire:	3
Termination:	Back & Side 8 Hole Feed-Thru
Face Material:	Thermoplastic Nylon
Body Material:	Thermoplastic Nylon
Strap Material:	Steel
Color:	Ivory
Standards and Certifications:	UL/CSA
Warranty:	10 Year Limited

AC Horsepower Ratings	
At Rated Voltage	1 HP

Environmental Specifications	
Flammability	Rated V-2 per UL94
Operating Temperature	-40C to 60C

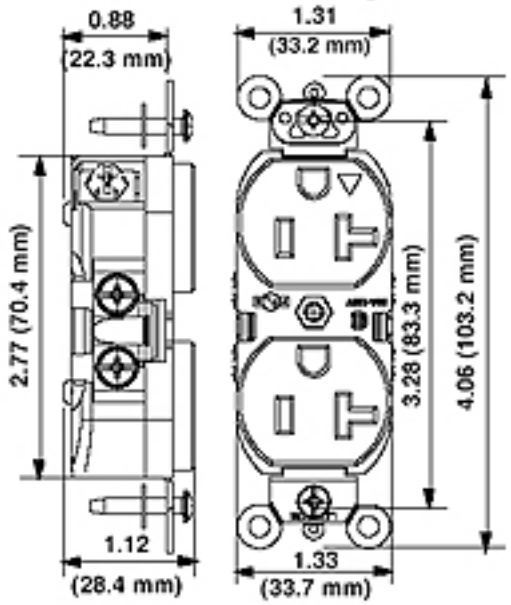
Mechanical Specifications	
Terminal ID	Brass-Hot, Green-Ground, White-Neutral
Terminal Accom.	14-10 AWG
Product ID	Ratings are permanently marked on device

Electrical Specifications	
Dielectric Voltage	Withstands 2000V per UL498
Current Limiting	Full Rated Current
Temperature Rise	Max 30C after 250 cycles OL at 200 percent rated current

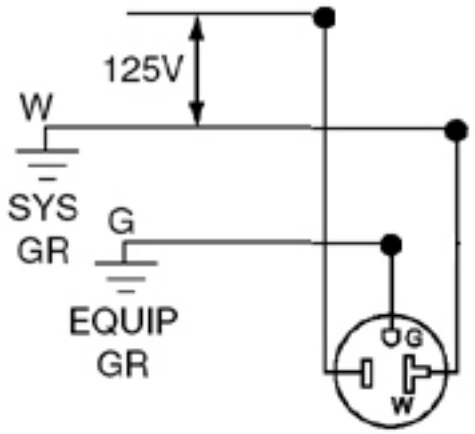
Material Specifications	
Face Material	Thermoplastic Nylon
Body Material	Thermoplastic Nylon
Line Contacts	Brass Triple-Wipe
Terminal Screws	Brass 10-32
Grounding Screw	Brass 8-32
Yoke	Zinc-Plated Steel
Clamp Nuts	Zinc-Plated Steel

Standards and Certifications	
NEMA	WD-6
ANSI	C-73
UL498	File E13399
UL Fed Spec WC-596	File E13399
CSA C22.2 No. 42	File 152105
NOM	057

Dimensional Diagram



Wiring Diagram



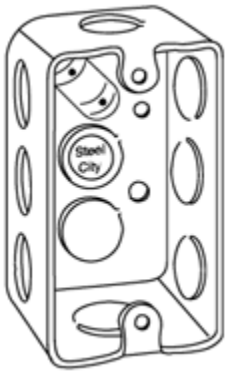
5-20R

SPECIFICATION SUBMITTAL

JOB NAME:	CATALOG NUMBERS:	
JOB NUMBER:		

Utility Boxes and Accessories

4" x 2 1/8" Utility Boxes



Dimension Information In F.P.S (U.S)

Display in metric standards (C.G.S)

Catalog No	Category Details	Knockouts Ea.Side Conduit	Knockouts Ea.End Conduit	Knockouts Bottom Conduit
58361-1/2*	1 7/8" deep - with conduit KO?s - 13.0 cubic inch capacity	3 1/2"	1 1/2"	2 1/2"

Table Continued Below...

Catalog No	Old / New Work	Volume (Cu. In.)	Metallic / Nonmetallic	Welded Drawn	KO Size
58361-1/2*	New	13.000	Metallic	Drawn	1/2

* Factory provided raised ground screw location.

Packaging Information

Catalog#	Unit Quantity	Standard Quantity Package	Weight (lbs.)	Weight UOM
58361 1/2	0	50	47.100	Per 100

Listed / Certified By

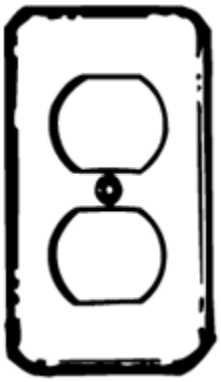
UL Listed
(Catalog# 58361 1/2)
(File# 2969)

CSA Certified
(Catalog# 58361 1/2)
(File# 12798000)

View Product Category Print Back

Utility Boxes and Accessories

4" x 2 1/8" Utility Box Covers



Dimension Information In F.P.S (U.S)

Display in metric standards (C.G.S)

Catalog No	Category Details	Description	Old / New Work	Metallic / Nonmetallic
58-C-7	Raised 1/4"	For duplex flush receptacle	New	Metallic

Packaging Information

Catalog#	Unit Quantity	Standard Quantity Package	Weight (lbs.)	Weight UOM
58 C 7	0	25	7.900	Per 100

Listed / Certified By

UL Listed
(Catalog# 58 C 7)
(File# 2969)

CSA Certified
(Catalog# 58 C 7)
(File# 12798000,5043208)

View Product Category Print Back

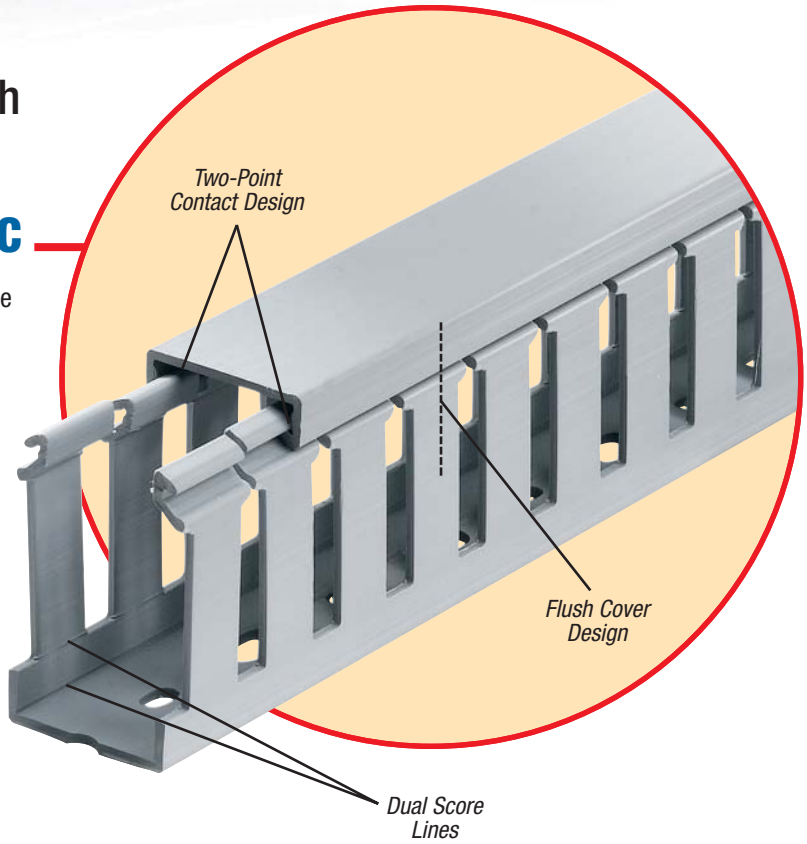
Thomas&Betts

Wide Slot Wiring Duct

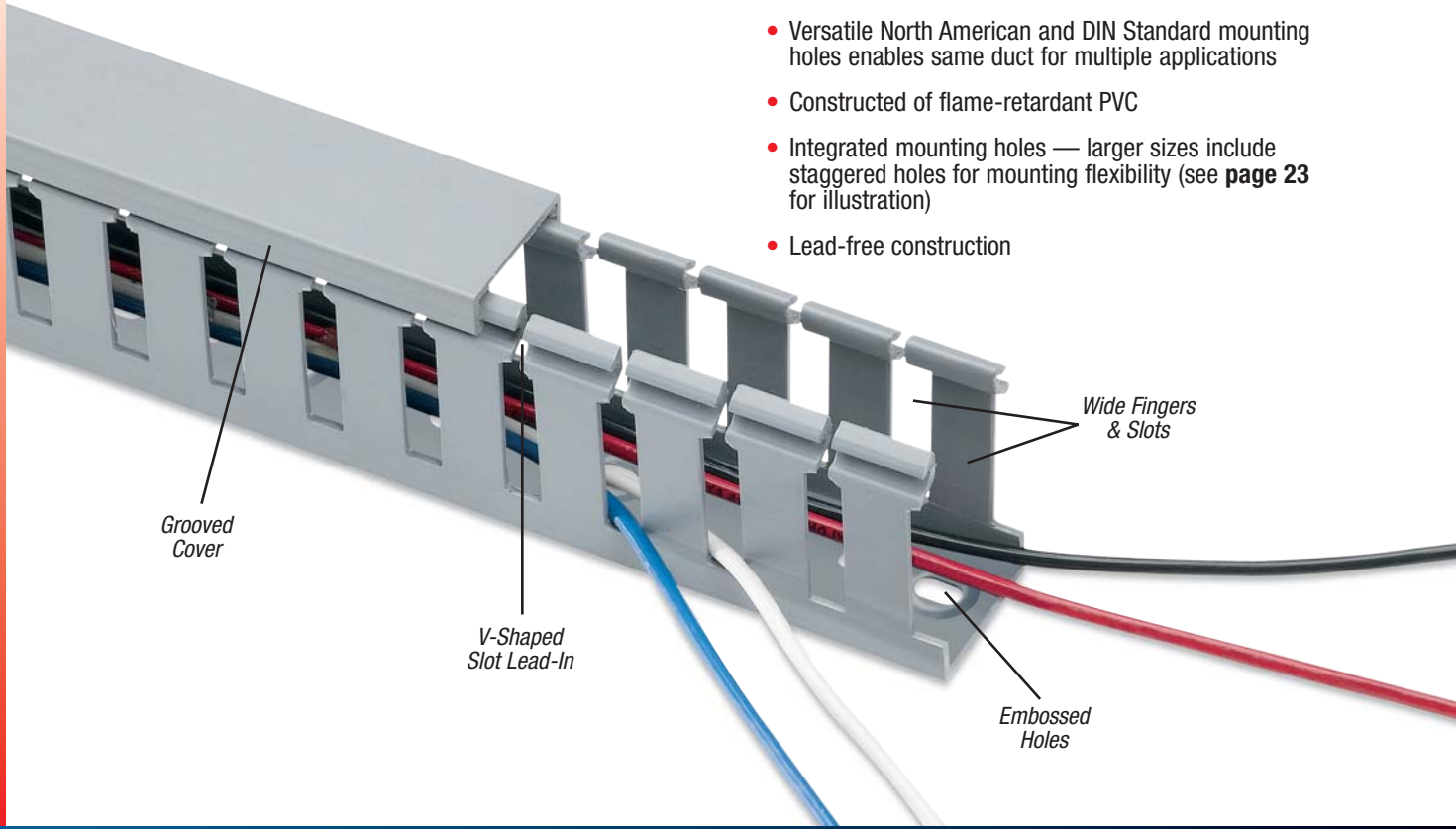
Greater sidewall rigidity with increased versatility!

Wide Slot Wiring Duct–PVC

- Wide fingers and slots increase rigidity and enable insertion of bundles
- Non-slip cover does not slide easily and resists vibration
- Rounded edges keep hands and wires free of abrasion
- V-shaped slot lead-in enables easier and faster wire installation
- Dual score lines are designed to yield clean breakoffs at the base of the slot and the duct
- Restricted slot design makes sure that wires are held with or without the cover inserted
- Flush cover attaches flush with sidewall for finished look
- Improved flush sidewall and cover style for greater wire capacity



- Versatile North American and DIN Standard mounting holes enables same duct for multiple applications
- Constructed of flame-retardant PVC
- Integrated mounting holes — larger sizes include staggered holes for mounting flexibility (see **page 23** for illustration)
- Lead-free construction



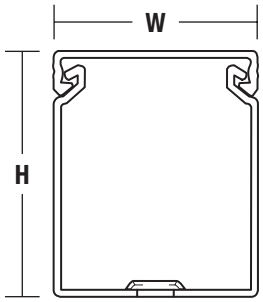
Thomas&Betts
www.tnb.com

United States
Tel: 901.252.8000
Fax: 901.252.1354

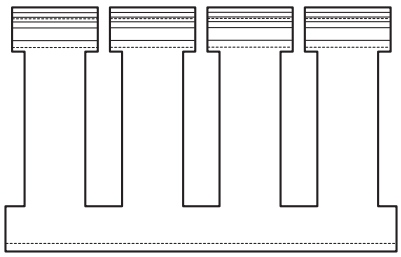
Canada
Tel: 450.347.5318
Fax: 450.347.1976

Technical Services
Tel: 888.862.3289

Wide Slot Wiring Duct

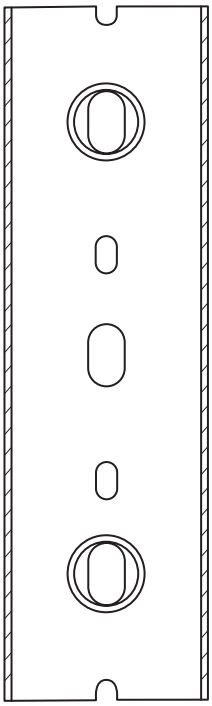


Front View w/Cover



Side View

For a complete listing of Wide Slot dimensional details see page 23.



Bottom View

CAT. NO.	DESCRIPTION	SIZE (W x H) IN.	SIZE (W x H) MM	COVER CAT. NO.	DUCT STD. CTN. QTY	COVER STD. CTN. QTY	LENGTH (FT.)
TY75X1WP[_]6	.75 x 1 Wide Slot Duct	0.94 x 1.14	23.9 x 27.7		120		
TY75X15WP[_]6	.75 x 1.5 Wide Slot Duct	0.94 x 1.60	23.9 x 39.6	TY75CP[_]6	120	120	6
TY75X2WP[_]6	.75 x 2 Wide Slot Duct	0.94 x 2.10	23.9 x 52.6		120		
TY1X1WP[_]6	1 x 1 Wide Slot Duct	1.25 x 1.14	31.8 x 27.7		120		
TY1X15WP[_]6	1 x 1.5 Wide Slot Duct	1.25 x 1.60	31.8 x 39.9		120		
TY1X2WP[_]6	1 x 2 Wide Slot Duct	1.25 x 2.10	31.8 x 52.8	TY1CP[_]6	120	120	6
TY1X3WP[_]6	1 x 3 Wide Slot Duct	1.25 x 3.05	31.8 x 77.7		120		
TY1X4WP[_]6	1 x 4 Wide Slot Duct	1.25 x 4.37	31.8 x 111.3		60		
TY15X1WP[_]6	1.5 x 1 Wide Slot Duct	1.75 x 1.14	44.5 x 27.7		120		
TY15X15WP[_]6	1.5 x 1.5 Wide Slot Duct	1.75 x 1.60	44.5 x 39.9		120		
TY15X2WP[_]6	1.5 x 2 Wide SlotDuct	1.75 x 2.10	44.5 x 52.8	TY15CP[_]6	120	120	6
TY15X3WP[_]6	1.5 x 3 Wide Slot Duct	1.75 x 3.05	44.5 x 77.7		120		
TY15X4WP[_]6	1.5 x 4 Wide Slot Duct	1.75 x 4.37	44.5 x 111.3		60		
TY2X1WP[_]6	2 x 1 Wide Slot Duct	2.25 x 1.24	57.2 x 28.4		120		
TY2X15WP[_]6	2 x 1.5 Wide Slot Duct	2.25 x 1.70	57.2 x 40.4		120		
TY2X2WP[_]6	2 x 2 Wide Slot Duct	2.25 x 2.19	57.2 x 53.3	TY2CP[_]6	120	120	6
TY2X3WP[_]6	2 x 3 Wide Slot Duct	2.25 x 3.14	57.2 x 78.2		60		
TY2X4WP[_]6	2 x 4 Wide Slot Duct	2.25 x 4.46	57.2 x 111.8		60		
TY2X5WP[_]6	2 x 5 Wide Slot Duct	2.25 x 5.15	57.2 x 129.3		60		
TY25X2WP[_]6	2.5 x 2 Wide Slot Duct	2.75 x 2.19	69.9 x 53.6		120		
TY25X3WP[_]6	2.5 x 3 Wide Slot Duct	2.75 x 3.14	69.9 x 78.2	TY25CP[_]6	60	120	6
TY25X4WP[_]6	2.5 x 4 Wide Slot Duct	2.75 x 4.46	69.9 x 111.8		60		
TY3X1WP[_]6	3 x 1 Wide SlotDuct	3.25 x 1.24	82.6 x 29.0		120		
TY3X2WP[_]6	3 x 2 Wide Slot Duct	3.25 x 2.19	82.6 x 54.9		60		
TY3X3WP[_]6	3 x 3 Wide Slot Duct	3.25 x 3.14	82.6 x 79.8	TY3CP[_]6	60	120	6
TY3X4WP[_]6	3 x 4 Wide Slot Duct	3.25 x 4.46	82.6 x 113.3		60		
TY3X5WP[_]6	3 x 5 Wide Slot Duct	3.25 x 5.15	82.6 x 130.6		60		
TY4X15WP[_]6	4 x 1.5 Wide Slot Duct	4.25 x 1.70	108.0 x 42.4		60		
TY4X2WP[_]6	4 x 2 Wide Slot Duct	4.25 x 2.19	108.0 x 55.1		60		
TY4X3WP[_]6	4 x 3 Wide Slot Duct	4.25 x 3.14	108.0 x 80.0	TY4CP[_]6	60	120	6
TY4X4WP[_]6	4 x 4 Wide Slot Duct	4.25 x 4.46	108.0 x 113.8		30		
TY4X5WP[_]6	4 x 5 Wide Slot Duct	4.25 x 5.15	108.0 x 130.8		30		
TY6X4WP[_]6	6 x 4 Wide Slot Duct	6.25 x 4.46	158.8 x 114.0	TY6CP[_]6	30	60	6

[_] = space for color identifier:

- G = Gray
- W = White
- B = Black
- I = Intrinsic Blue

- *Standard lengths are 6 feet.*

+ Catalog Number must be completed by adding suffix G for Gray, W for White, I for Intrinsic Blue, B for Black.
Example: *TY75X1WPG6 is a .75" x 1" wide slot gray duct.*

To order duct without mounting holes, add suffix NM to catalog number.
Example: *TY75X1WPGNM6 is a .75" x 1" wide slot gray duct with no mounting holes.*

To order Adhesive-Backed Duct, add suffix A to Catalog Number.
Example: *TY75X1WPGA6 is a .75" x 1" wide slot gray duct with adhesive backing. Shelf life for adhesive is 1 year.*

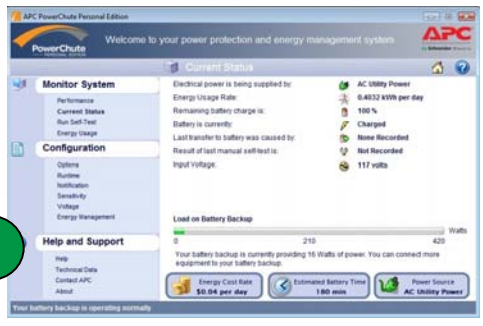
PVC vinyl duct is UL® Recognized, CSA Certified and CE Compliant.

APC Back-UPS® Pro 1000

Power-Saving, high performance power protection for office computers

The Back-UPS Pro provides abundant battery backup power, so you can work through medium and extended length power outages. It safeguards your equipment against damaging surges and spikes that travel along utility and data lines. And it features automatic voltage regulation (AVR), which instantly adjusts high and low voltages to safe levels, so you can work indefinitely during brownouts and overvoltages.

The Back-UPS Pro also includes unique “green” features, like power-saving outlets that automatically turn off idle peripherals. A high efficiency charging system and “AVR Bypass” also reduce power consumption. With the rest of the Back-UPS Pro’s standard features, this is the perfect unit to protect your productivity from the constant threat of bad power and lost data.



Product Features:

1. **LCD (Liquid Crystal Display)** gives the status of over 20 different utility and battery backup conditions.
2. **Automatic Voltage Regulation (AVR)** instantly corrects voltage fluctuations so you can work indefinitely through brownouts and overvoltages.
3. **4 “Battery Backup & Surge Protected” Outlets** keep a CPU, monitor and other critical devices running when the power goes out or fluctuates outside safe levels. (Includes one power-saving “*Controlled*” outlet).
4. **4 “Surge Only” Outlets** protect printers, faxes or other equipment without reducing battery capacity. (Includes two power-saving “*Controlled*” outlets).
5. **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
6. **Data Line Surge Protection** guards against surges and spikes traveling over Ethernet or coax cable lines.
7. **Push Button Circuit Breaker** enables quick recovery from overloads.
8. **3 Yr Warranty**, $150,000 Equipment Protection Policy and free technical support via phone or web.
9. **Automatic Diagnostic Testing** ensures your unit is ready when you need it.

APC by Schneider Electric

Back-UPS Pro 1000 Specifications

Model Number	BR1000G
Output	
Output Capacity	1000 VA / 600 Watts
Output Voltage, Freq. (on utility)	120V, 50 or 60 Hz, +/- 3Hz (auto sensing)
Output Voltage, Freq. (on battery)	115V +/-8%, 50 or 60Hz +/-1Hz (auto sensing)
Output Connections	8 total NEMA 5-15R outlets: 4 battery & surge (including 1 *Master* & 1 *Controlled*) 4 surge protection only (including 2 *Controlled* outlets)
Waveform Type	Stepped Approximation to Sine Wave
Input	
Input Voltage, Frequency	120V, 50 or 60 Hz, +/- 3 Hz
Input Connection	6 ft cord with NEMA 5-15 plug
Surge Protection	
AC Power Surge Protection	All outlets
Data Line Surge Protection	Network: 10/100/1000 Base-T Ethernet (gigabit) Coax cable (CATV, SATV, modem, A/V)
Physical	
Unit Dimensions (H x W x D)	9.8 x 3.9 x 15.0” (25.0 x 10.0 x 38.2 cm)
Unit Weight	23.6 lbs (10.7 kg)
Shipping Dims. (H x W x D)	15.0 x 9.0 x 19.0” (38.1 x 22.9 x 48.3 cm)
Shipping Weight	28.0 lbs (12.7 kg)
Color	Black
UPC Code	731304278788
Battery	
Battery Type	Sealed, lead-acid, maintenance-free
Extended run battery pack compatibility	No
Management	
Alarms	Visual (LCD) and audible alarms
Auto-Shutdown Software	PowerChute Personal Edition (via USB and serial interface)
Safety	
Certification/Approvals	FCC Part 15 Class B, TUV, UL1778

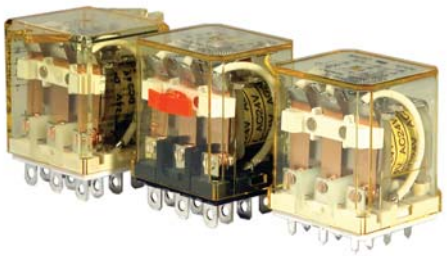
APC *by Schneider Electric*
132 Fairgrounds Rd
West Kingston, RI 02892
Tel: 800-800-4272
www.apc.com

APC by Schneider Electric

RH Series Compact Power Relays

SPDT through 4PDT, 10A contacts
Compact power type relays

The RH series are miniature power relays with a large capacity. The RH relays feature 10A contact capacity as large as the RR series but in a miniature package. The compact size saves space.



Part Number Selection

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

1. *Carries no UL recognition mark.
2. PCB terminal relays are designed to mount directly to a circuit board without any socket.

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

Sockets (for Blade Terminal Models)

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

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

Hold Down Springs & Clips

Appearance	Description	Relay	For DIN Mount Socket	For Through Panel & PCB Mount Socket	Min Order Qty
	Pullover Wire Spring	RH1B	SY2S-02F1 [2]	SY4S-51F1	10
		RH2B	SY4S-02F1 [2]		
		RH3B	SH3B-05F1 [2]		
		RH4B	SH4B-02F1 [2]		
	Leaf Spring (side latch)	RH1B, RH2B, RH3B, RH4B	SFA-202 [3]	SFA-302 [3]	20
	Leaf Spring (top latch)	RH1B, RH2B, RH3B, RH4B	SFA-101 [3]	SFA-301 [3]	

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

AC Coil Ratings

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

DC Coil Ratings

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

Standard coil voltages are in **BOLD**.

Contact Ratings

Maximum Contact Capacity						
Model	Continuous Current	Allowable Contact Power		Rated Load		
		Resistive Load	Inductive Load	Voltage (V)	Res. Load	Ind. Load
SPDT	10A	1540VA 300W	990VA 210W	110 AC	10A	7A
				220 AC	7A	4.5A
				30 DC	10A	7A
DPDT 3PDT 4PDT	10A	1650VA 300W	1100VA 225W	110 AC	10A	7.5A
				220 AC	7.5A	5A
				30 DC	10A	7.5A

Note: Inductive load for the rated load — cos ø = 0.3, L/R = 7 ms

TÜV Ratings

Voltage	RH1	RH2	RH3	RH4
240V AC	10A	10A	7.5A	7.5A
30V DC	10A	10A	10A	10A

AC: cos ø = 1.0, DC: L/R = 0 ms

UL Ratings

Voltage	Resistive			General Use			Horse Power Rating		
	RH1 RH2	RH3	RH4	RH1 RH2	RH3	RH4	RH1 RH2	RH3	RH4
240V AC	10A	7.5A	7.5A	7A	6.5A	5A	1/3 HP	1/3 HP	—
120V AC	—	10A	10A	—	7.5A	7.5A	1/6 HP	1/6 HP	—
30V DC	10A	10A	—	7A	—	—	—	—	—
28V DC	—	—	10A	—	—	—	—	—	—

CSA Ratings

Voltage	Resistive				General Use				Horse Power Rating
	RH1	RH2	RH3	RH4	RH1	RH2	RH3	RH4	RH1, 2, 3
240V AC	10A	10A	—	7.5A	7A	7A	7A	5A	1/3 HP
120V AC	10A	10A	10A	10A	7.5A	7.5A	—	7.5A	1/6 HP
30V DC	10A	10A	10A	10A	7A	7.5A	—	—	—

Socket Specifications

	Sockets	Terminal	Electrical Rating	Wire Size	Torque
DIN Rail Mount Sockets	SH1B-05	(Coil) M3 screws (contact) M3.5 screws with captive wire clamp	250V, 10A	Maximum up to 2–#12AWG	5.5 - 9 in•lbs 9 - 11.5 in•lbs
	SH2B-05 SH3B-05 SH4B-05	M3.5 screws with captive wire clamp	300V, 10A	Maximum up to 2–#12AWG	9 - 11.5 in•lbs
Finger-safe DIN Rail Mount	SH1B-05C	(coil) M3 screws (contact) M3.5 screws with captive wire clamp, fingersafe	250V, 10A	Maximum up to 2–#12AWG	5.5 - 9 in•lbs 9 - 11.5 in•lbs
	SH2B-05C SH3B-05C SH4B-05C	M3.5 screws with captive wire clamp, fingersafe	300V, 10A	Maximum up to 2–#12AWG	9 - 11.5 in•lbs
Through Panel Mount Socket	SH1B-51 SH2B-51 SH3B-51 SH4B-51	Solder	300V, 10A	—	—
PCB Mount Socket	SH1B-62	PCB mount	250V, 10A	—	—
	SH2B-62 SH3B-62 SH4B-62	PCB mount	300V, 10A	—	—

Accessories

Description	Appearance	Use with	Part No.	Remarks
Aluminum DIN Rail (1 meter length)		All DIN rail sockets	BNDN1000	IDEC offers a low-profile DIN rail (BNDN1000). The BNDN1000 is designed to accommodate DIN mount sockets. Made of durable extruded aluminum, the BNDN1000 measures 0.413 (10.5mm) in height and 1.37 (35mm) in width (DIN standard). Standard length is 39" (1,000mm).
DIN Rail End Stop		DIN rail	BNL5	9.1 mm wide.
Replacement Hold-Down Spring Anchor		DIN mount sockets and hold down springs.	Y778-011	For use on DIN rail mount socket when using pullover wire hold down spring. 2 pieces included with each socket.

Specifications

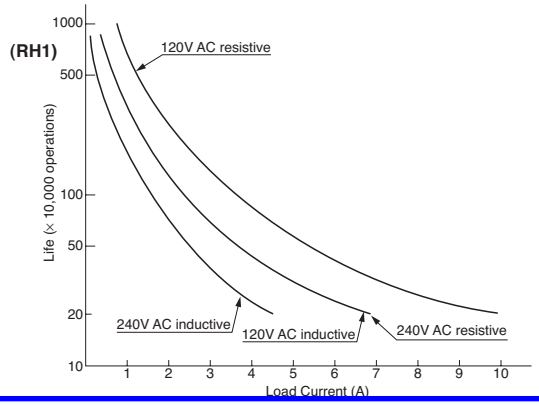
Contact Material		Silver cadmium oxide
Contact Resistance [1]		50mΩ maximum
Minimum Applicable Load		24V DC, 30 mA; 5V DC, 100 mA (reference value)
Operate Time [2]	SPDT DPDT	20ms maximum
	3PDT 4PDT	25ms maximum
Release Time [2]	SPDT DPDT	20ms maximum
	3PDT 4PDT	25ms maximum
Power Consumption (approx.)	SPDT	AC: 1.1VA (50Hz), 1VA (60Hz) DC: 0.8W
	DPDT	AC: 1.4VA (50Hz), 1.2VA (60Hz) DC: 0.9W
	3PDT	AC: 2VA (50Hz), 1.7VA (60Hz) DC: 1.5W
	4PDT	AC: 2.5VA (50Hz), 2VA (60Hz) DC: 1.5W
Insulation Resistance		100MΩ minimum (500V DC megger)
Dielectric Strength [3]	SPDT	Between live and dead parts: 2,000V AC, 1 minute Between contact and coil: 2,000V AC, 1 minute Between contacts of the same pole: 1,000V AC, 1 minute
	DPDT 3PDT 4PDT	Between live and dead parts: 2,000V AC, 1 minute Between contact and coil: 2,000V AC, 1 minute Between contacts of different poles: 2,000V AC, 1 minute Between contacts of the same pole: 1,000V AC, 1 minute
Operating Frequency		Electrical: 1,800 operations/hour maximum Mechanical: 18,000 operations/hour maximum
Vibration Resistance		Damage limits: 10 to 55Hz, amplitude 0.5 mm Operating extremes: 10 to 55Hz, amplitude 0.5 mm
Shock Resistance		Damage limits: 1,000m/s^2 (100G) Operating extremes: 200m/s^2 (20G - SPDT, DPDT) 100m/s^2 (10G - 3PDT, 4PDT)
Mechanical Life		50,000,000 operations minimum
Electrical Life	DPDT	500,000 operations minimum (120V AC, 10A)
	SPDT 3PDT 4PDT	200,000 operations minimum (120V AC, 10A)
Operating Temperature [4]	SPDT	–25 to +50°C (no freezing)
	DPDT 3PDT 4PDT	–25 to +40°C (no freezing)
Operating Humidity		45 to 85% RH (no condensation)
Weight (approx.)		SPDT: 24g, DPDT: 37g, 3PDT: 50g, 4PDT: 74g

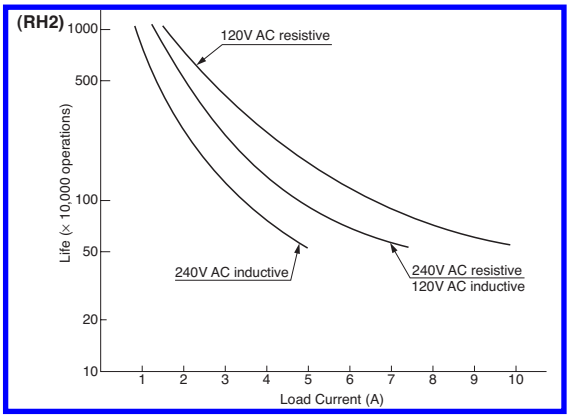
Note: Above values are initial values.
1. Measured using 5V DC, 1A voltage drop method
2. Measured at the rated voltage (at 20°C), excluding contact bouncing
   Release time of relays with diode: 40 ms maximum
3. Relays with indicator or diode: 1000V AC, 1 minute
4. For use under different temperature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

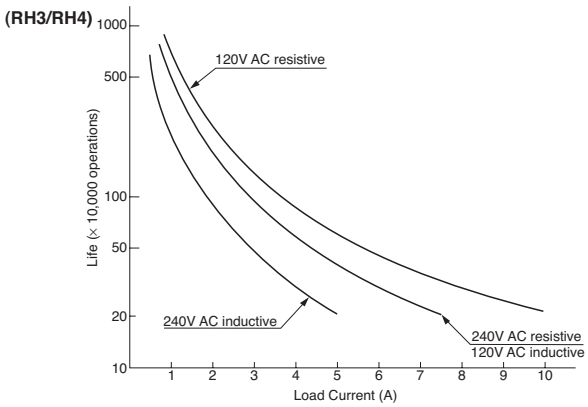
Characteristics (Reference Data)

Electrical Life Curves

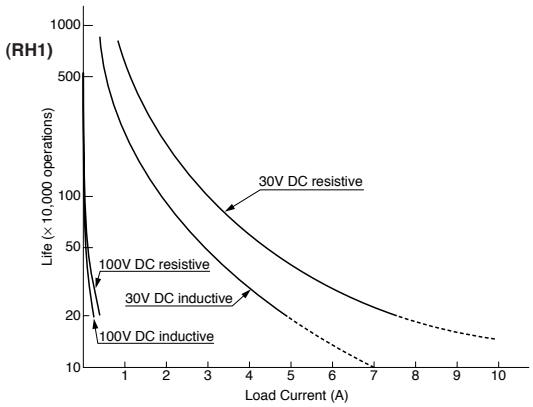
AC Load

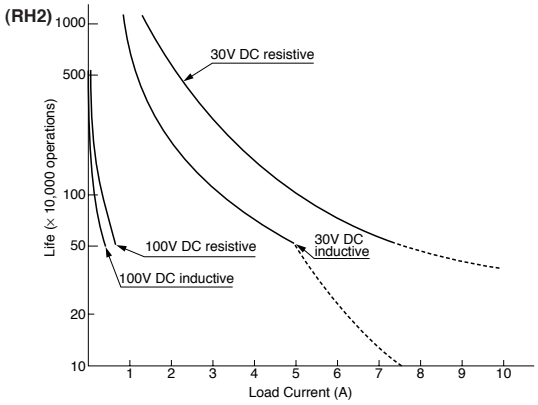


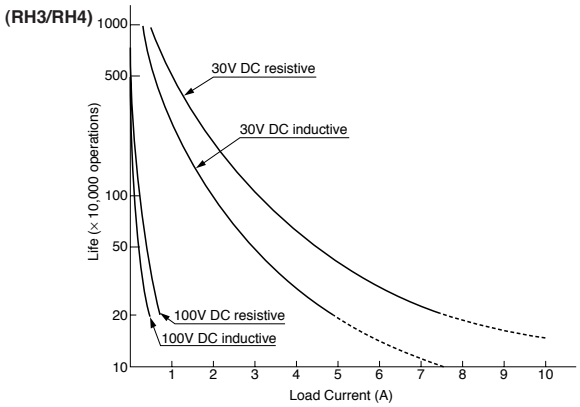




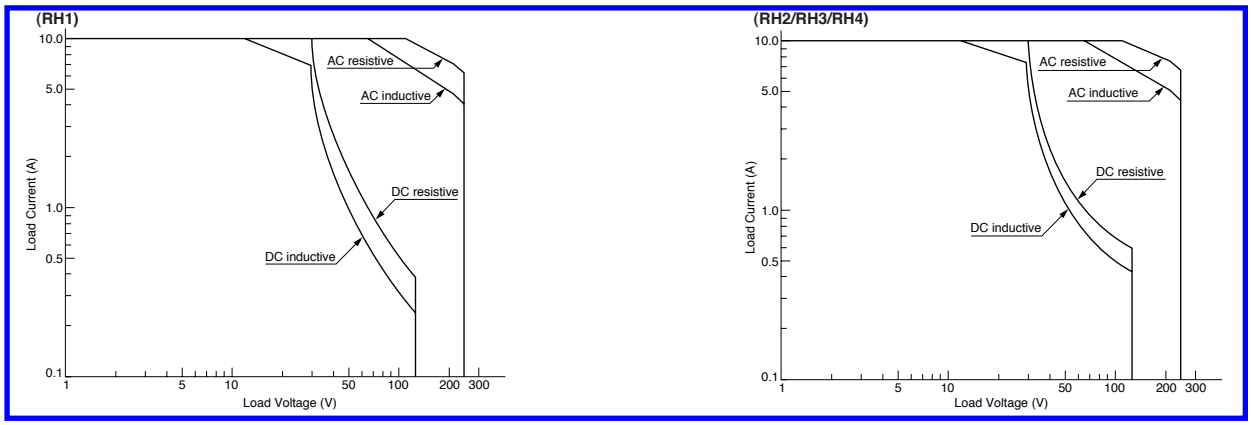
DC Load



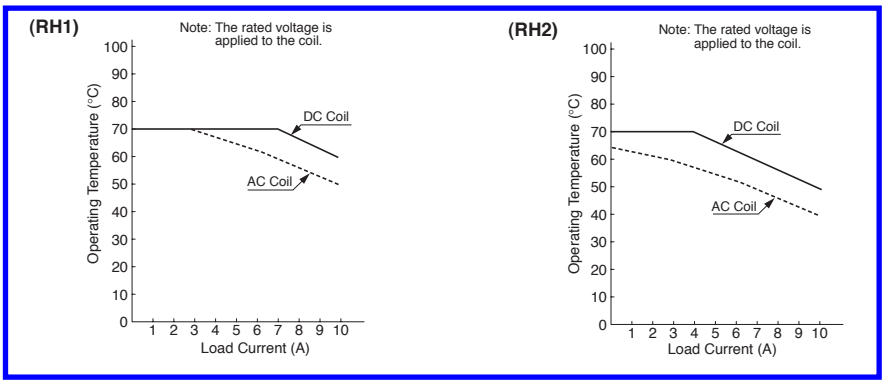




Maximum Switching Capacity



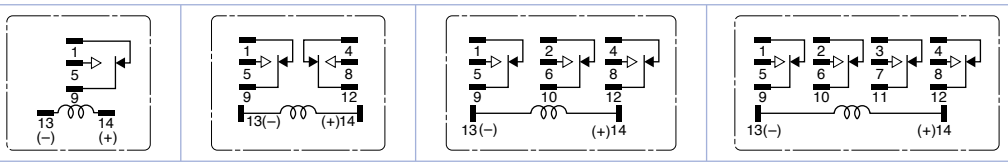
Continuous Load Current vs. Operating Temperature Curve (Basic Type, With Check Button, and Top Bracket Mounting Type)



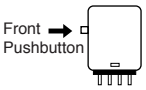
Internal Connection (View from Bottom)

Basic Type

SPDT | DPDT | 3PDT | 4PDT

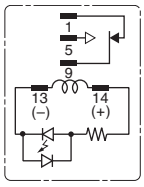
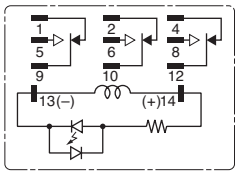
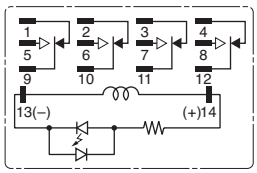
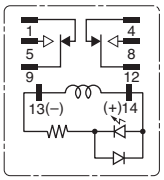
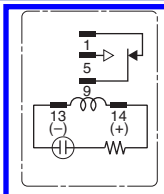
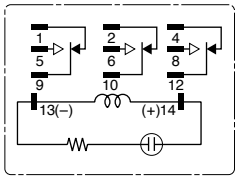
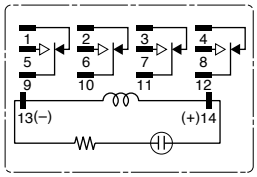
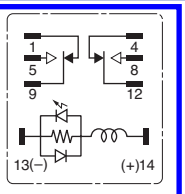


With Check Button



Contacts can be operated by pressing the check button.

With Indicator (-L type)

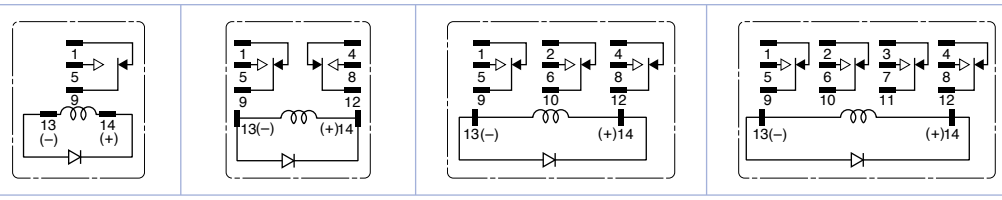
	SPDT	3PDT	4PDT		DPDT
Below 100V AC/DC				Below 24V AC/DC	
100V AC/DC and over				24V AC/DC and over	

When the relay is energized, the indicator goes on.

- Relay coils less than 100V DC do not contain a protection diode (except DPDT).
- Relay coils below 100V use LED indicator, coils above 100V use neon lamp indicator.

With Diode (-D type)

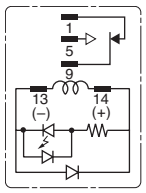
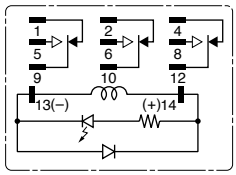
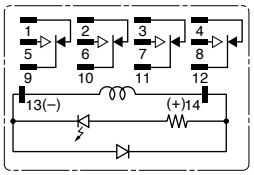
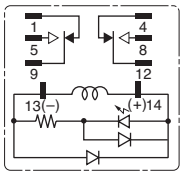
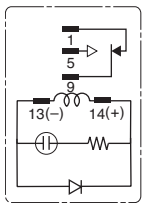
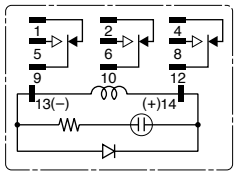
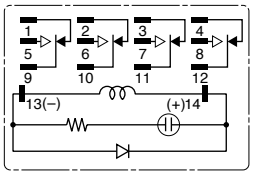
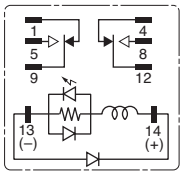
SPDT | DPDT | 3PDT | 4PDT



Contains a diode to absorb the back emf generated when the coil is de-energized. The release time is slightly longer. Available for DC coil only.

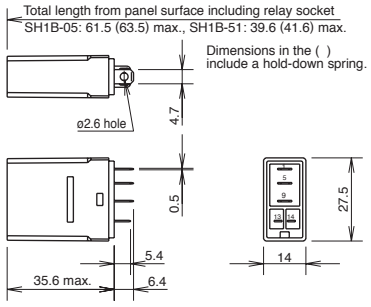
- Diode Characteristics
  Reverse withstand voltage: 1,000V
  Forward current: 1A

With Indicator LED & Diode (-LD type)

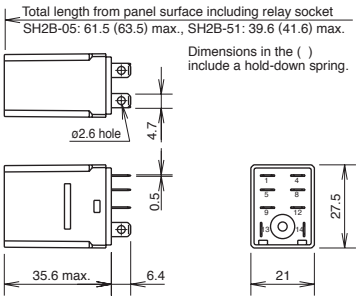
	SPDT	3PDT	4PDT		DPDT	
Below 100V DC				Below 24V AC/DC		Contains an LED indicator and a surge absorber, and has the same height as the basic type.
100V DC and over				24V AC/DC and over		

Dimensions (mm)

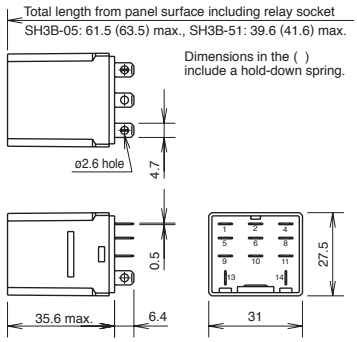
RH1B-U/RH1B-UL/RH1B-UD/RH1B-ULD



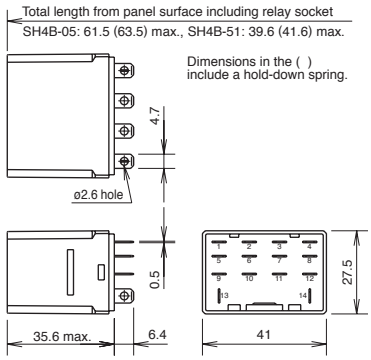
RH2B-U/RH2B-UL/RH2B-UD/RH2B-ULD



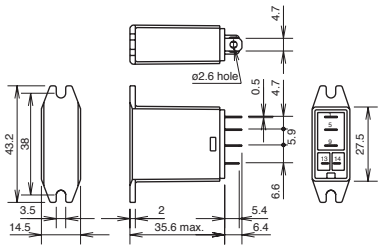
RH3B-U/RH3B-UL/RH3B-D/RH3B-LD



RH4B-U/RH4B-UL/RH4B-UD/RH4B-LD



RH1B-UT



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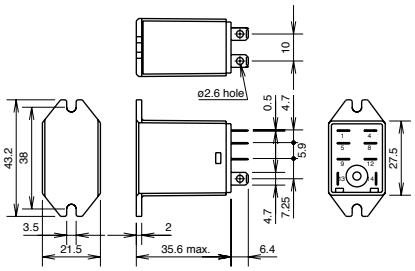

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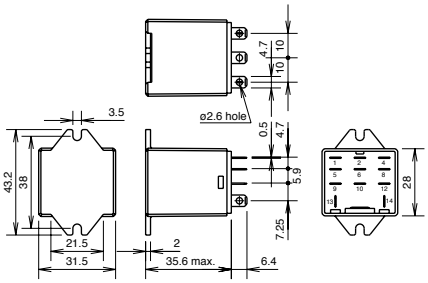
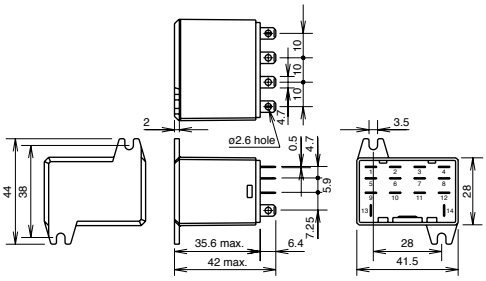
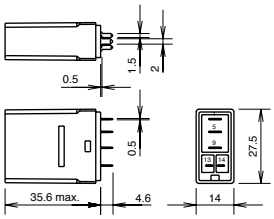


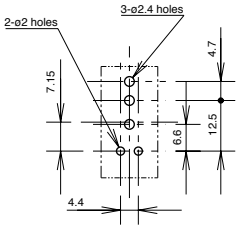
RH4B-UT



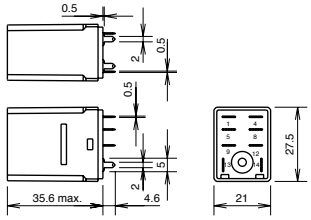
Dimensions con't (mm)

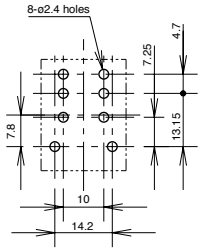
RH1V2-U/RH1V2-UD



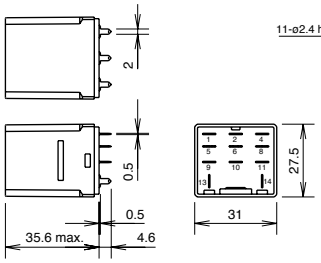


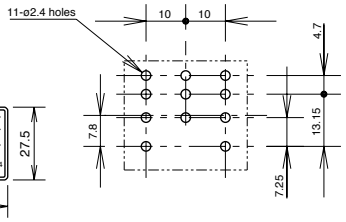
RH2V2-U/RH2V2-UL/RH2V2-UD





RH3V2-U/RH3V2-UL/RH3V2-D





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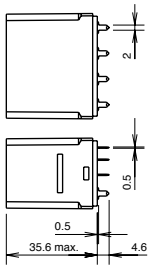
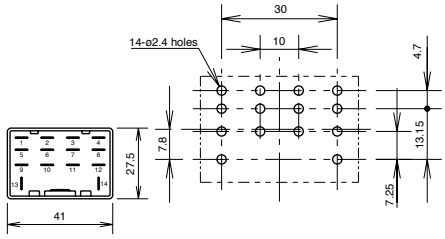
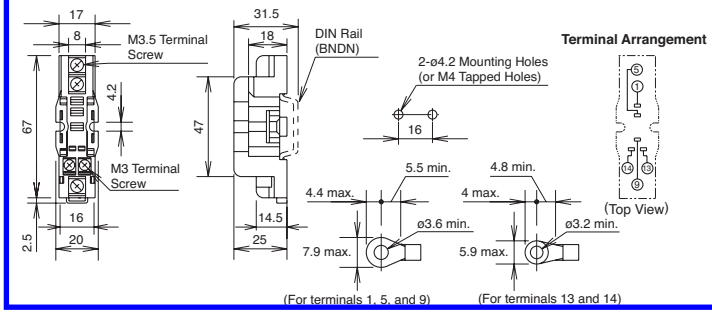


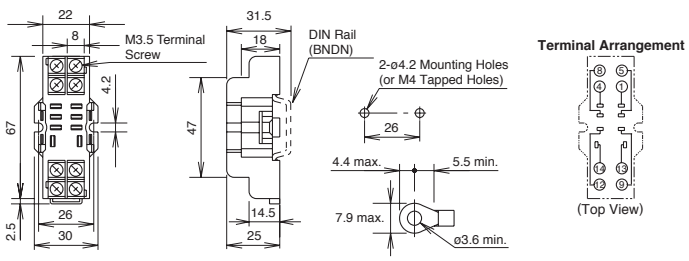


Standard DIN Rail Mount Sockets

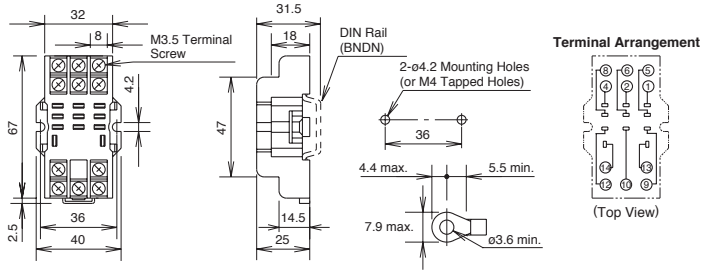
SH1B-05



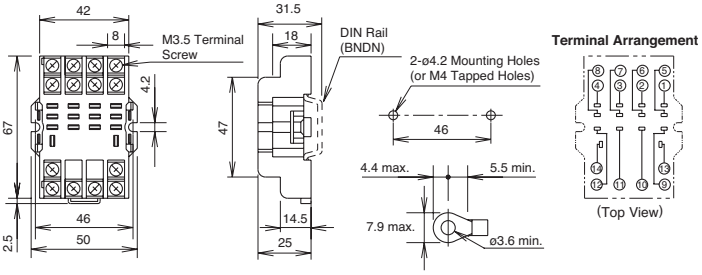
SH2B-05



SH3B-05



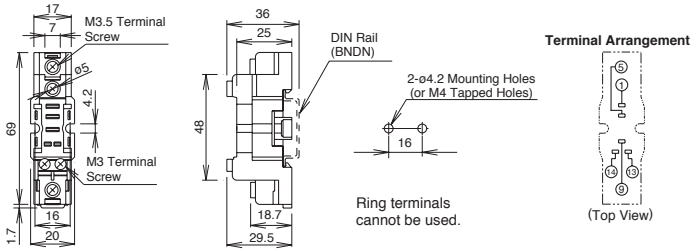
SH4B-05



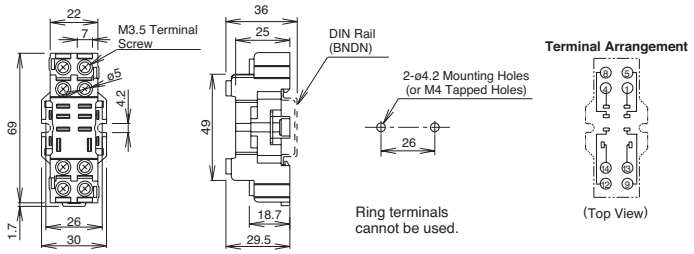
Dimensions con't (mm)

Finger-safe DIN Rail Mount Sockets

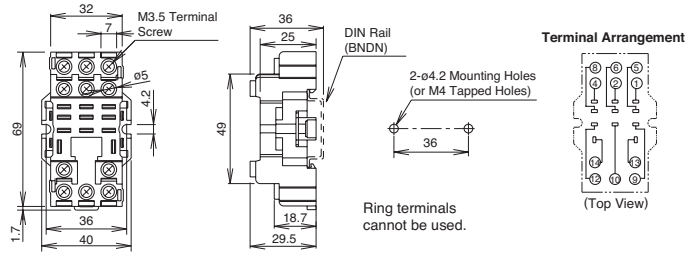
SH1B-05C



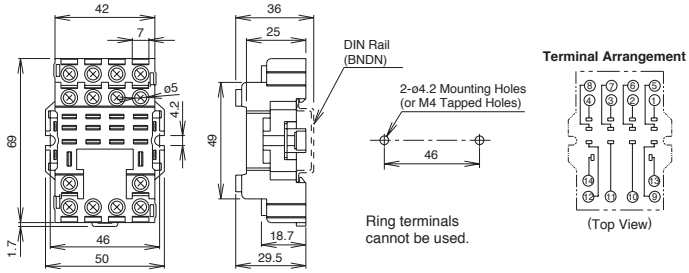
SH2B-05C



SH3B-05C

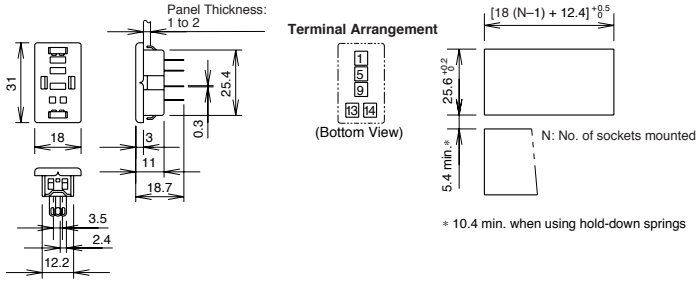


SH4B-05C



Through Panel Mount Socket

SH1B-51



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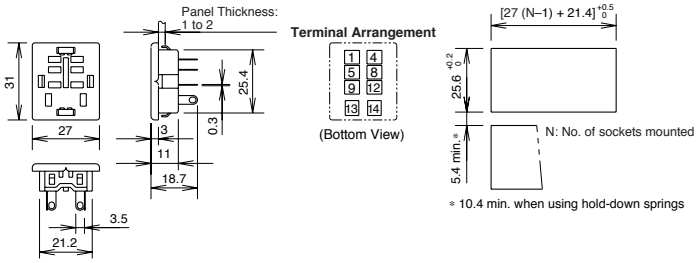

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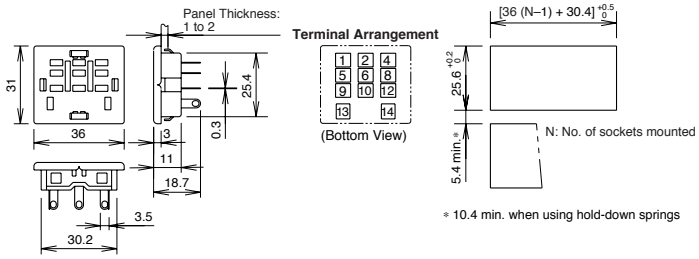
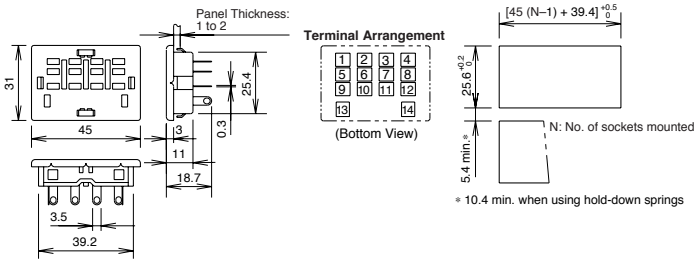


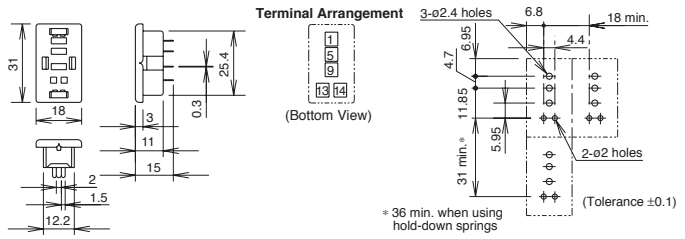
SH4B-51



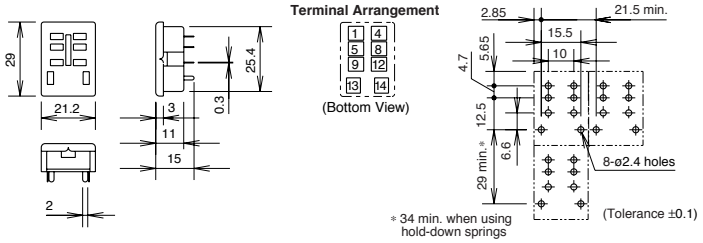
Dimensions con't (mm)

PCB Mount Sockets

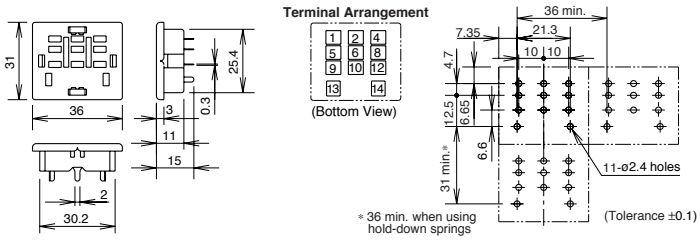
SH1B-62



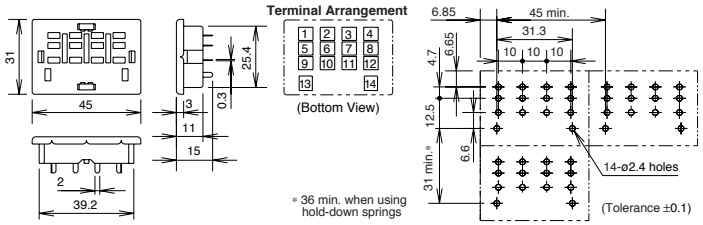
SH2B-62



SH3B-62

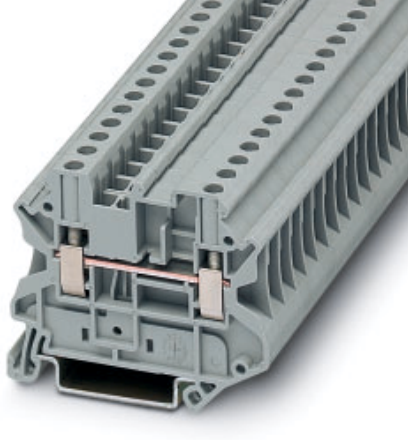


SH4B-62



Feed-Through Terminal Block

UT 4-MTD



(IEC) [mm²]	rigid solid	flexible stranded	AWG	I [A]	U [V]
IEC 60 947-7-1	0.14-6	0.14-4	26-10	41	800

Technical data

			Type		Order No.	Pcs. Pkt.
Feed-Through terminal block, for mounting on ⊔	gray blue	terminal width 6.2	**UT 4-MTD** **UT 4-MTD BU**		**30 46 18 4** **30 46 19 7**	**50** **50**
End cover	gray		**D-UT 2,5/4-TWIN**		**30 47 14 1**	**50**
Plug-in bridge, for cross-connections in the terminal center		2-pos. 3-pos. 4-pos. 5-pos. 10-pos. 20-pos.	**FBS 2-6** **FBS 3-6** **FBS 4-6** **FBS 5-6** **FBS 10-6** **FBS 20-6**	$I_{max.}$ 32 A 32 A 32 A 32 A 32 A 32 A	**30 30 33 6** **30 30 24 2** **30 30 25 5** **30 30 34 9** **30 30 27 1** **30 30 36 5**	**50** **50** **50** **50** **10** **10**
Adapter bridge, for connecting an UT 10 to UT 4 or UT 2,5			**RB UT 10-(2,5/4)**		**30 47 06 0**	**50**
Test adapter, for 4-mm-∅-test connectors PS and 4-mm-∅-safty test connectors, making contact in the bridge shaft			**PAI 4**		**30 30 92 5**	**10**
2.3-∅-mm test connector, consisting of a metal part and a red insulating sleeve			**MPS-IH RD**		**02 01 67 6**	**10**
Modular test plug, see CLIPLINE catalog			**PS-6**		**30 30 99 6**	**10**
Screwdriver,			**SZS 0,6 x 3,5**		**12 05 05 3**	**10**
Zack strip, flat, for labeling in the center and outer marker grooves	white		**ZBF 6:UNBEDRUCKT**		**08 08 71 0**	**10**
Zack strip, 10-section, for labeling the marker grooves	white		**ZB 6:UNBEDRUCKT**		**10 51 00 3**	**10**

Dimensions		
Width / length / cover width	[mm]	6.2 / 56.8 / 2.2
Height (NS 35/7.5 / NS 35/15)	[mm]	47.5 / 55.0
Technical data in accordance with IEC/ DIN VDE		
Maximum load current / cross section	[A] / [mm²]	41 / 6
Rated surge voltage / contamination class	[kV] / –	8 / 3
Surge voltage category / insulation material group	– / –	III / I
Connection capacity		
Stranded with ferrule with plastic sleeve	[mm²]	0.25 - 4
Stranded with ferrule without plastic sleeve	[mm²]	0.25 - 4
Multi-conductor connection (2 cond. with same cross section)		
Solid / Stranded	[mm²]	0.14 - 1.5 / 0.14 - 1.5
Stranded with ferrule without plastic sleeve	[mm²]	0.25 - 1.5
Stranded with TWIN ferrule with plastic sleeve	[mm²]	0.5 - 2.5
Stripping length	[mm]	9
Internal cylindrical gauge (IEC 60 947-1)		A4
Thread		M 3
Torque	[Nm]	0.6 - 0.8
Insulating material		PA
Inflammability class in acc. with UL 94		V0
Approval data (UL and CSA/CUL)		
Nom voltage / nom current / conduc. sizes	UL: [V] / [A] / AWG	600 / 30[1]) / 26-10
	CSA/CUL: [V] / [A] / AWG	600 / 30[1]) / 26-10

[1]) Factory wiring 40 A.

Fuse Terminal Block
UT 4-HESI (5 x 20)
UT 4-HESILED... (5 x 20)

(IEC) [mm²]	rigid solid	flexible stranded	AWG	I [A]	U [V]
IEC 60 947-7-3	0.14-6	0.14-4	26-10	6.3	1)

1) See table (The current is determined by the fuse used, the voltage by the light indicator).

Technical data

		Light indicator: Voltage [V AC/DC]	Current [mA]
Fuse terminal block, for mounting on ⊔	black	terminal width 6.2	
Fuse terminal block[2]**),** as above, however with light indicator	black	12 - 30	1 - 2,5
	black	30 - 60	0,8 - 2,0
	black	110 - 250	0,5 - 2,5
End cover			
Plug-in bridge, for cross-connections in the terminal center		2-pos. 3-pos. 4-pos. 5-pos. 10-pos. 20-pos.	
Screwdriver,			
Zack strip, flat, for labeling in the center marker grooves	white		
Zack strip, 10-section, for labeling the outer marker grooves	white		

Dimensions	
Width / length	[mm]
Height (NS 35/7.5 / NS 35/15)	[mm]
Technical data in accordance with IEC/ DIN VDE	
Maximum load current / cross section	[A] / [mm²]
Rated surge voltage / contamination class	[kV] / –
Surge voltage category / insulation material group	– / –
Connection capacity	
Stranded with ferrule with plastic sleeve	[mm²]
Stranded with ferrule without plastic sleeve	[mm²]
Multi-conductor connection (2 cond. with same cross section)	
Solid / Stranded	[mm²]
Stranded with ferrule without plastic sleeve	[mm²]
Stranded with TWIN ferrule with plastic sleeve	[mm²]
Stripping length	[mm]
Internal cylindrical gauge (IEC 60 947-1)	
Thread	
Torque	[Nm]
Insulating material	
Inflammability class in acc. with UL 94	
Approval data (UL and CSA/CUL)	
Nom voltage / nom current / conduc. sizes	UL: [V] / [A] / AWG
	CSA/CUL: [V] / [A] / AWG

Type		Order No.	Pcs. Pkt.
UT 4-HESI (5 x 20)		**30 46 03 2**	**50**
UT 4-HESILED 24 (5 x 20)		**30 46 09 0**	**50**
UT 4-HESILED 60 (5 x 20)		**30 46 12 6**	**50**
UT 4-HESILA 250 (5 x 20)		**30 46 10 0**	**50**
Closed housing, no end cover required			
FBS 2-6	$I_{max.}$ 32 A	**30 30 33 6**	**50**
FBS 3-6	32 A	**30 30 24 2**	**50**
FBS 4-6	32 A	**30 30 25 5**	**50**
FBS 5-6	32 A	**30 30 34 9**	**50**
FBS 10-6	32 A	**30 30 27 1**	**10**
FBS 20-6	32 A	**30 30 36 5**	**10**
SZS 0,6 x 3,5		**12 05 05 3**	**10**
ZB 5:UNBEDRUCKT		**10 50 00 4**	**10**
ZB 6:UNBEDRUCKT		**10 51 00 3**	**10**

6.2 / 56.8
73.0 / 80.5
6.3 / 6
4 / 3
III / I
0.25 - 4
0.25 - 4
0.14 - 1.5 / 0.14 - 1.5
0.25 - 1.5
0.5 - 2.5
9
A4
M 3
0.6 - 0.8
PA
V0
600 / 6.3 / 26-10
600 / 6.3 / 26-10

2) If the fuse is defective, the downstream circuit is not off load.

Max. power dissipation at 23°C (based on DIN EN 60 947-7-3:2003-07)

When selecting cartridge fuse inserts, please ensure that the maximum power dissipation specified below is not exceeded. Details can be obtained from the fuse suppliers.

Terminal block type	U	Surge voltage protection		Short-circuit protection only	
	[V]	Single[3])	Interconnected[3])	Single[3])	Interconnected[3])
UT 4-HESI (5 x 20)	250	2.5 W	1.6 W	4.0 W	2.5 W

Attention:
The cartridge fuse holders should be selected according to the maximum power dissipation (self-heating) of the cartridge fuse inserts. The thermal conditions in closed fuse holders should be checked according to the application and installation.

Higher ambient temperatures
are an additional strain on fuse inserts. In applications of this kind, the shift of the rated current should be taken into consideration accordingly.

Extract from the online catalog

CLIPFIX 35

Order No.: 3022218

http://eshop.phoenixcontact.de/phoenix/treeViewClick.do?UID=3022218

Snap-on end bracket, for 35 mm NS 35/7.5 or NS 35/15 DIN rail, can be fitted with Zack strip ZB 8 and ZB 8/27, terminal strip marker KLM 2 and KLM, width: 9.5 mm, color: gray

Commercial data	
GTIN (EAN)	4 017918 156541
sales group	B220
Pack	50 pcs.
Customs tariff	39269097
Catalog page information	Page 344 (CL2-2011)

Product notes

WEEE/RoHS-compliant since: 01/01/2003

http://www.download.phoenixcontact.com
Please note that the data given here has been taken from the online catalog. For comprehensive information and data, please refer to the user documentation. The General Terms and Conditions of Use apply to Internet downloads.

Technical data

General data

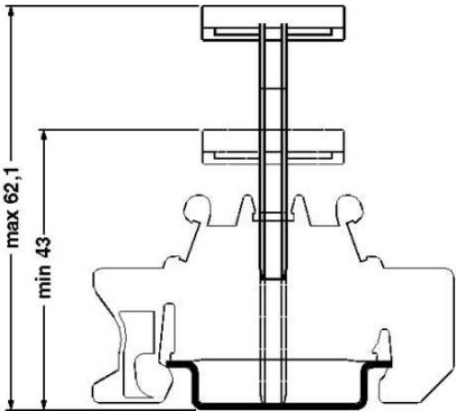
Length	57 mm
Width	9.5 mm
Material	PA
Color	gray

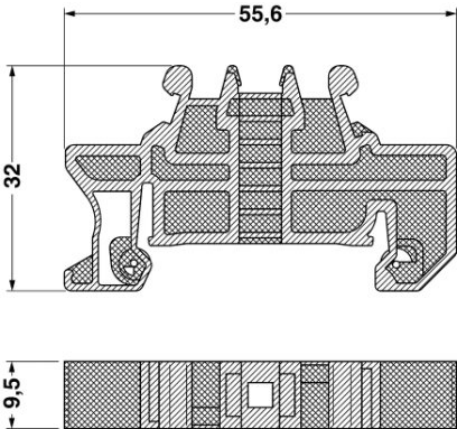
Accessories

Item	Designation	Description
Assembly		
0801762	NS 35/ 7,5 CU UNPERF 2000MM	DIN rail, material: Copper, unperforated, height 7.5 mm, width 35 mm, length: 2 m
0801733	NS 35/ 7,5 PERF 2000MM	DIN rail, material: steel galvanized and passivated with a thick layer, perforated, height 7.5 mm, width 35 mm, length: 2000 mm
0801681	NS 35/ 7,5 UNPERF 2000MM	DIN rail, material: Steel, unperforated, height 7.5 mm, width 35 mm, length: 2 m
1201756	NS 35/15 AL UNPERF 2000MM	DIN rail, deep drawn, high profile, unperforated, 1.5 mm thick, material: aluminum, height 15 mm, width 35 mm, length 2000 mm
1201895	NS 35/15 CU UNPERF 2000MM	DIN rail, material: Copper, unperforated, 1.5 mm thick, height 15 mm, width 35 mm, length: 2 m
1201730	NS 35/15 PERF 2000MM	DIN rail, material: steel galvanized and passivated with a thick layer, perforated, height 15 mm, width 35 mm, length: 2000 mm
1201714	NS 35/15 UNPERF 2000MM	DIN rail, material: Steel, unperforated, height 15 mm, width 35 mm, length: 2 m
1201798	NS 35/15-2,3 UNPERF 2000MM	DIN rail, material: Steel, unperforated, 2.3 mm thick, height 15 mm, width 35 mm, length: 2 m
Marking		
0807575	KLM 2	Terminal strip markers, adjustable height, for end bracket CLIPFIX 35, labeling with SS-ZB or with two ZB 10 labels, lettering field size: 20 x 8 mm
1007235	SBS 8:UNBEDRUCKT	Marker cards for modular terminal blocks, color: white
1050512	ZB 8:SO/CMS	Zack strip, 10-section, divisible, special printing, marking according to customer requirements

Diagrams/Drawings

Dimensioned drawing






BROWNS HILL
ENGINEERING & CONTROLS

Extract from the online catalog

NS 35/ 7,5 PERF 2000MM

Order No.: 0801733

http://eshop.phoenixcontact.de/phoenix/treeViewClick.do?UID=0801733

DIN rail, material: Steel, perforated, height 7.5 mm, width 35 mm, length: 2 m

Commercial data	
EAN	4017918006686
Pack	1 Meter
Customs tariff	72166190
Weight/Piece	0.32 KG
Catalog page information	Page 505 (CL-2007)

Product notes

WEEE/RoHS-compliant since: 02/01/2006

http://www.download.phoenixcontact.com
Please note that the data given here has been taken from the online catalog. For comprehensive information and data, please refer to the user documentation. The General Terms and Conditions of Use apply to Internet downloads.

Technical data

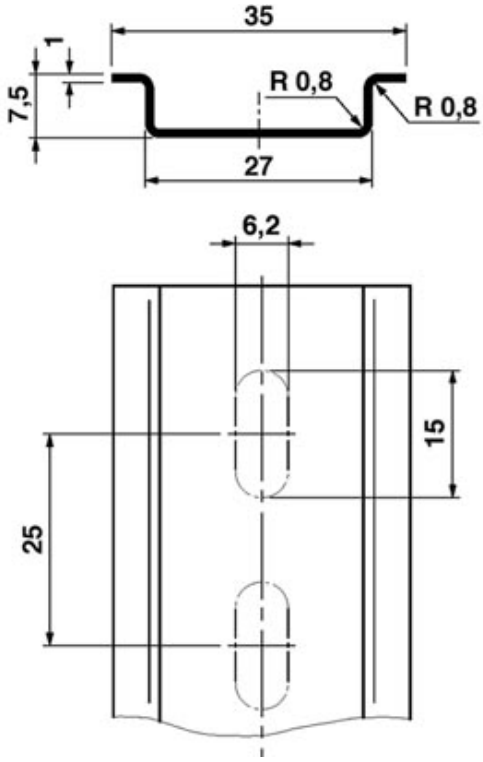
General data

Height	7.5 mm
Length	2000 mm
Width	35 mm
Material	Steel
Color	silver

Test standard	In acc. with EN 60715: 2001

Drawings

Dimensioned drawing



PS5R Slim Line Series
Switching Power Supplies

Key features of the PS5R Slim Line series include:

- Lightweight and compact in size
- Wide power range: 10W-240W
- Universal input:
  10W to 90W: 85-264V AC/100-370V DC
  120W and 240W: 85-264V AC/100-350V DC
- Power Factor Correction for 60W to 240W (EN61000-3-2)
- Meets SEMI F47 Sag Immunity (120W & 240W only)
- Approved for Class 1, Div. 2 Hazardous Locations
- Overcurrent protection, auto-reset
- Overvoltage protection, shut down
- Spring-up screw terminal type, IP20
- DIN rail or panel surface mount
- Approvals:
  CE Marked
  TÜV
  c-UL, UL508
  UL1310 (PS5R-SB, -SC, -SD)

File #E234997

(SEMI F47 120W & 240W only)

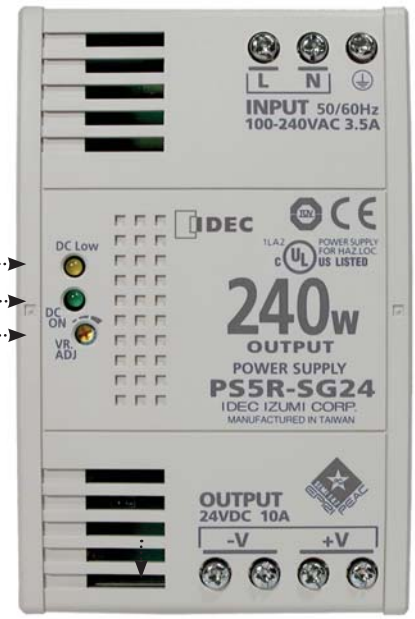
UL1604 (Hazardous locations)
EN50178:1997
LVD: EN60950:2000
EMC: Directive EN61204-3:2000 (EMI: Class B, EMS: Industrial)

Designed with Accessibility & Convenience in Mind!

DC Low Indicator (15W, 120W & 240W Slim Line Only)
The indicator turns on when the output voltage drops below 80% of the rated value. This assists in troubleshooting power supply problems.

DC ON Indicator
The indicator turns on when the unit is powered up. This is a convenient way to know when the power supply is receiving power.

Output Voltage Adjustment
The output voltage can be easily adjusted within ± 10% of the rated voltage.



Universal Input Power
The applied input power has a range of 85-264V AC (100-350V DC) without the use of jumpers or slide switches. This makes IDEC power supplies suitable for use anywhere in the world.

Long Life Expectancy
IDEC power supplies are very reliable, with a life expectancy of 70,000 hrs. (minimum) or longer, depending on usage. Power factor correction has also been included to minimize harmonic distortion, resulting in a longer operating life and increased reliability.

Output Channel
With very low output ripples of less than 1% peak to peak, the 120W and 240W power supplies are some of the best in the industry. The output comes with overload protection that avoids damaging the power supply and the spring-up, fingersafe, screw terminals add a level of safety and ease for the user. The 240W power supply also has the convenience of two output terminals.

Fingersafe, Spring-up Screw Terminals
Don't worry about losing screws or getting an inadvertent shock from a terminal. The terminals are captive spring-up screws, which makes using them as easy as pushing a screw down and tightening it. They are shock and vibration resistant, and work with ring lugs, fork connectors or stripped wire connections. The terminals are rated IP20 (when tightened) meaning they are recessed to keep fingers and objects from touching the input contacts.

Top View

Ventilation Grill
Provides cooling for the power supply and prevents small objects from falling into the power supply circuitry.

Part Numbers

Item	Watts	Rated Voltage	Rated Current	Part Number
	10	5V DC	2.0A	PS5R-SB05
	15	12V DC	1.2A	PS5R-SB12
		24V DC	0.65A	PS5R-SB24
	30	12V DC	2.5A	PS5R-SC12
		24V DC	1.3A	PS5R-SC24
	60	24V DC	2.5A	PS5R-SD24

Item	Watts	Rated Voltage	Rated Current	Part Number
	90	24V DC	3.75A	PS5R-SE24
	120	24V DC	5A	PS5R-SF24
	240	24V DC	10A	PS5R-SG24

Accessories

Appearance	Description	Part Number
	Panel Mounting Bracket for PS5R-SB	PS9Z-5R1B
	Panel Mounting Bracket for PS5R-SB (flat side mounting)	PS9Z-5R2B
	Panel Mounting Bracket for PS5R-SC and PS5R-SD	PS9Z-5R1C
	Panel Mounting Bracket for PS5R-SE	PS9Z-5R1E
	Panel Mounting Bracket for PS5R-SF & PS5R-SG	PS9Z-5R1G
	DIN rail (1000mm)	BNDN1000
	DIN rail end clip	BNL5

Specifications

Part Numbers		**5V DC output**	**PS5R-SB05**	–	–	–	–	–
		12V DC output	**PS5R-SB12**	**PS5R-SC12**	–	–	–	–
		24V DC output	**PS5R-SB24**	**PS5R-SC24**	**PS5R-SD24**	**PS5R-SE24**	**PS5R-SF24**	**PS5R-SG24**
Output Capacity			15W (5V Model is 10W)	30W	60W	90W	120W	240W
Input	**Input Voltage (single-phase, 2-wire)**		85 to 264V AC, 100 to 370V DC				85 to 264V AC, 100 to 350V DC	
	Input Current (maximum)	100VAC	0.45A	0.9A	1.7A	2.3A	1.8A	3.5A
		200VAC	0.3A	0.6A	1.0A	1.4A	1.0A	1.7A
	Internal Fuse Rating		2A	3.15A		4A		6.3A
	Inrush Current (cold start)		50A maximum (at 200V AC)					
	Leakage Current (at no load)		132V AC: 0.38 mA maximum 264V AC: 0.75 mA maximum	0.75mA maximum			1mA maximum	
	Typical Efficiency	5V DC	69%	–	–	–	–	–
		12V DC	75%	78%	–	–	–	–
		24V DC	79%	80%	83%	82%	84%	
Output	**Output Current Ratings**	5V DC	2.0A	–	–	–	–	–
		12V DC	1.2A	2.5A	–	–	–	–
		24V DC	0.65A	1.3A	2.5A	3.75A	5A	10A
	Voltage Adjustment		±10% (V. ADJ control on front)					
	Output Holding Time		20ms minimum (at rated input and output)					
	Starting Time		200ms maximum	–	–	–	650ms maximum	500ms maximum
	Rise Time		100ms maximum (at rated input and output)				200ms maximum	
	Line Regulation		0.4% maximum					
	Load Regulation		1.5% maximum					0.8% max
	Temperature Regulation		0.05% degree C maximum					
	Ripple Voltage		2% peak to peak maximum (including noise)				1% peak to peak maximum (including noise)	
	Overcurrent Protection		105% or more, auto reset			105 to 130%, auto reset	103 to 110%, auto reset	
	Overvoltage Protection		120% min. SHUTDOWN					
	Operation Indicator		LED (green)					
	Voltage Low Indication		LED (amber)	–	–	–	LED (amber)	
Dielectric Strength			Between Input and Ground: 2000 V AC, 1 minute Between input and output: 3000V AC, 1 minute; Between output and ground: 500V AC, 1 minute.					
Insulation Resistance			Between Input & Output Terminals: 100 MΩ Min					
Operating Temperature			–10 to +65°C (14 to 149°F)	-10 to 60°C (14 to 140°F)				
Storage Temperature			-25 to 75°C (-13 to +167°F)					
Operating Humidity			20 to 90% relative humidity (no condensation)					
Vibration Resistance			Frequency 10 to 55Hz, Amplitude 0.375mm					
Shock Resistance			300m/s^2 (30G) 3 times each in 6 axes					
Approvals			EMC: EN61204-3 (EMI: Class B, EMS: Industrial), c-UL (CSA 22.2 No. 14), UL1604, UL508, LVD: EN60950, EN50178					
			UL1310 Class 2, c-UL (CSA 22.2 No. 213 and 223)			–	SEMI F47	
Harmonic Directive			N/A			EN61000-3-2 A14 class A		
Weight (approx.)			160g	250g	285g	440g	630g	1000g
Terminal Screw			M3.5 slotted-Phillips head screw (screw terminal type)					
IP protection			IP20 fingersafe					
Dimensions H x W x D (mm)			90 x 22.5 x 95	95 x 36 x 108		115 x 46 x 121	115 x 50 x 129	125 x 80 x 149.5
Dimensions H x W x D (inches)			3.54 x 0.89 x 3.74	3.74 x 1.42 x 4.25		4.53 x 1.81 x 4.76	4.53 x 1.97 x 5.08	4.92 x 3.15 x 5.89

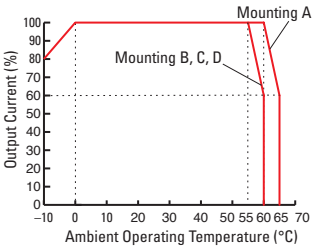
1. For dimensions, see page 111.

Temperature Derating Curves

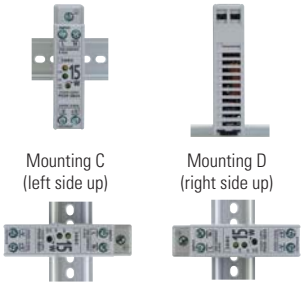
All IDEC Slim Line power supplies are listed to UL508, which allows operation at 100% capacity inside a panel. This eliminates the need to use oversize power supplies or utilize two power supplies derated at 50% of their rated output.

The charts below show that the PS5R Slim 10W (at 60°C) and 15W (at 60°C), 30W/60W/90W (at 55°C), 120W (at 40°C), and 240W (at 45°C) meet the elevated, ambient operating temperature required by UL508 and EN60950 standards to operate at an output current of 100%. The output current starts to derate beyond the required temperature.

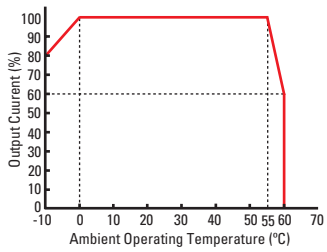
PS5R-SB



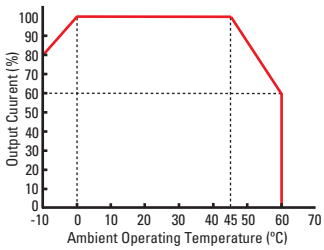
Dearting curve for PS5R-SB varies depending on mounting method (see right).



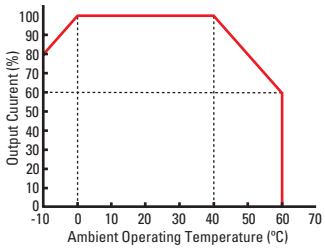
PS5R-SC



PS5R-SG

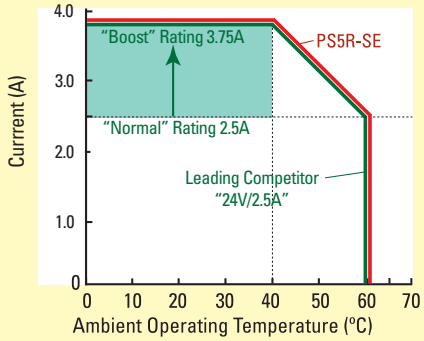


PS5R-SD, -SE, -SF



PS5R-SE 90W/3.75A/24V DC versus a Leading Competitor

Standard derating curve (operating temperature vs. output current)

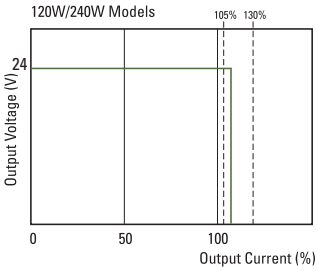


Don't Believe the Hype

Other companies use slick marketing to sell you 60W power supplies with a "BOOST," but what they don't tell you is that these are merely 90W power supplies that have been renamed to fool you into thinking they have a unique feature. IDEC 90W power supplies are just what they claim, 90W power supplies. The truth is IDEC led the market by incorporating UL508 DIN rail mount power supplies as a standard product. Don't let the other guys pull a fast one on you by claiming to provide features that just aren't true, or even possible. See what IDEC has to offer, no strings attached.

Overload Protection

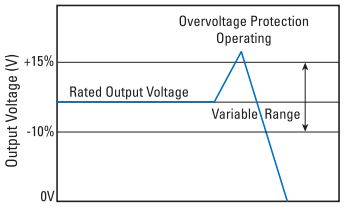
Overload protection prevents the power supply from being damaged when an overload occurs. There are two kinds of protection.



Overcurrent Protection
PS5R-SF, -SG

Overcurrent Protection

When the output current exceeds 105% of the rated current, overload protection is triggered, and the output voltage starts decreasing. When the output current returns within the rated range, the overload protection function is automatically cleared.

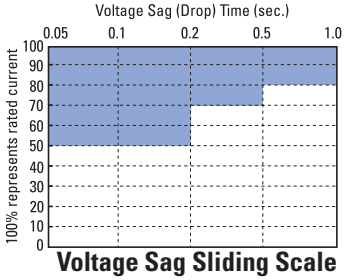


Overvoltage Protection

Overvoltage Protection

When the output voltage of the power supply rises to 120% or more of the rated value, the output will shut off. To restore power, only manual reset is available which is an advantage in troubleshooting.

SEMI-F47 Approved



Voltage Sag Sliding Scale
PS5R-SF, -SG

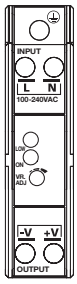
The SEMI F47 (Semiconductor Processing Equipment Voltage Sag Immunity) defines the minimum voltage sag ride-through requirements for semiconductor processing, automated test equipment, and other equipment. It requires that the equipment be able to tolerate voltage sags on an AC power line without interrupting operations. This avoids the loss of production and money.

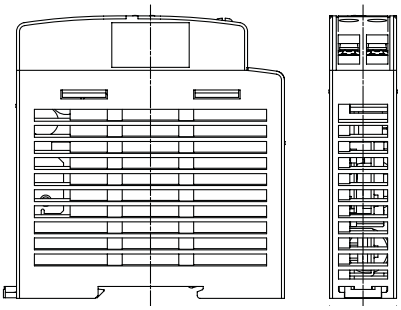
The graph shows how the equipment must tolerate sags to 50% for 200ms, sags to 70% for up to 0.5 seconds, and sags to 80% for up to 1 second.

Dimensions and Terminal Markings

PS5R-SB

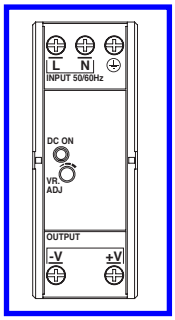
Height 90mm
Width 22.5mm
Depth 95mm

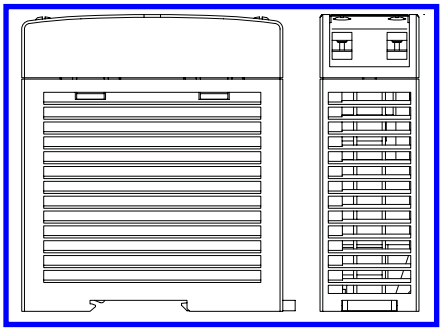




PS5R-SC
PS5R-SD

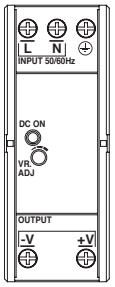
Height 95.0mm
Width 36.0mm
Depth 108.0mm

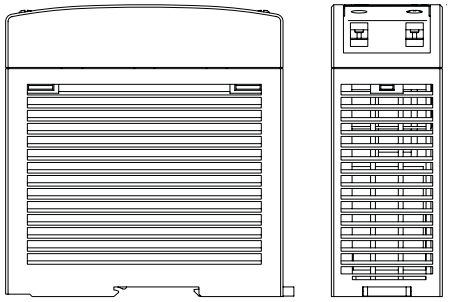




PS5R-SE

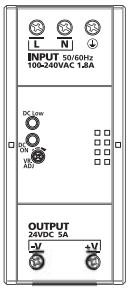
Height 115.0mm
Width 46.0mm
Depth 121.0mm

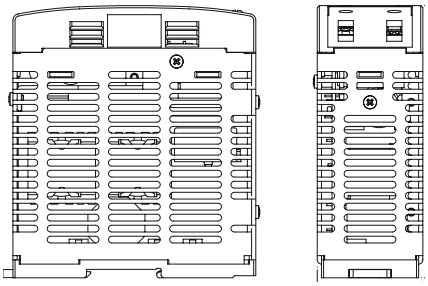




PS5R-SF

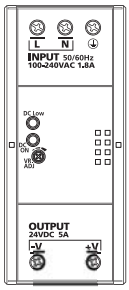
Height 115.0mm
Width 50.0mm
Depth 129.0mm

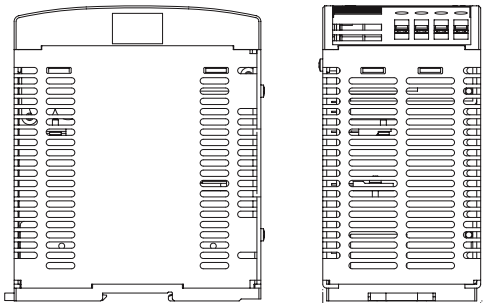




PS5R-SG

Height 125.0 mm
Width 80.0 mm
Depth 149.5 mm



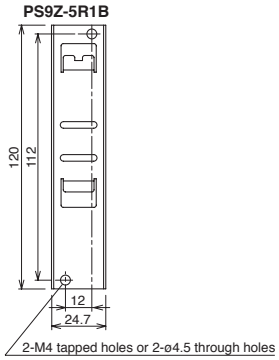


Front Panel (terminals)

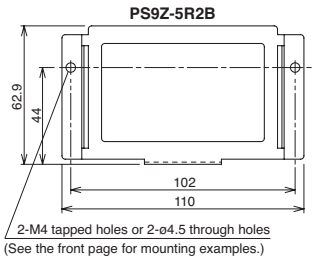
Markings	Name	Description
V. ADJ	Voltage adjustment	Adjusts within ±10%; turn clockwise to increase output voltage.
DC ON	Operation indicator	Green LED is lit when output voltage is on.
DC Low	Output indicator	Amber LED is lit when output voltage drops below 80% of rated voltage.
+V, –V	DC output terminals	+V: Positive output Terminal –V: Negative output terminal
⏚	Frame ground	Ground this terminal to reduce high-frequency noise caused by switching power supply.
L, N	Input terminals	Accept a wide range of voltages and frequencies (no polarity at DC input).

Mounting Bracket Dimensions (mm)

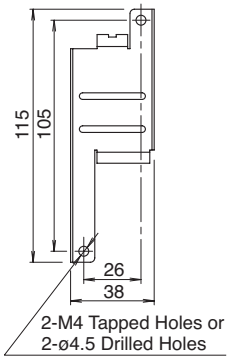
PS9Z-5R1B (for PS5R-SB)



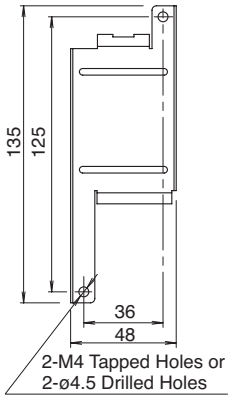
PS9Z-5R2B (for PS5R-SB)



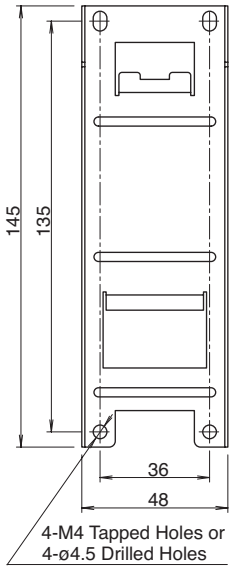
PS9Z-5R1C (for PS5R-SC & PS5R-SD)



PS9Z-5R1E (for PS5R-SE)



PS9Z-5R1G (for PS5R-SF & PS5R-SG)



HIRSCHMANN
A BELDEN BRAND

Product information
RSB switches 8-9 ports, with 1-2 fiber ports - RSB20-0800M2M2SAABEH

Industrial Ethernet:Compact configurable managed switches:Basic switches (RSB):RSB switches 8-9 ports, with 1-2 fiber ports

http://e-catalog.beldensolutions.com/link/57078-24455-49854-84128-85762/en/RSB20-0800M2M2SAABEH/uistate

Name	RSB switches 8-9 ports, with 1-2 fiber ports
	
	Ethernet/Fast Ethernet-Switch acc. to IEEE 802.3, compact, managed, Industrial switch for DIN Rail, Store-and-Forward-Switching, fanless design
Delivery informations	
Availability	available
Product description	
Description	Ethernet/Fast Ethernet-Switch acc. to IEEE 802.3, compact, managed, Industrial switch for DIN Rail, Store-and-Forward-Switching, fanless design
Port type and quantity	8 ports in total; 1. uplink: 100BASE-FX, MM-SC; 2. uplink: 100BASE-FX, MM-SC; 6 x standard 10/100 BASE TX, RJ45
Type	RSB20-0800M2M2SAABEH
Order No.	942 014-018
More Interfaces	
Power supply/signaling contact	1 x plug-in terminal block, 6-pin
V.24 interface	1 x RJ11 socket
Network size - length of cable	
Multimode fiber (MM) 50/125 µm	0-5000 m, 8 dB link budget at 1300 nm, A=1 d/km, 3 dB reserve, B=800 MHz x km
Multimode fiber (MM) 62.5/125 µm	0-4000 m, 11 dB link budget at 1300 nm, A=1 dB/km, 3 dB reserve, B=500 MHz x km
Network size - cascadibility	
Line - / star topology	any
Ring structure (HIPER-Ring) quantity switches	50 (reconfiguration time < 0.3 sec.)
Power requirements	
Operating voltage	24 V DC (18-32 V)
Current consumption at 24 V DC	315 mA
Power output in Btu (IT) h	26.2
Software	
Management	Serial interface, web-interface, SNMP V1/V2, HiVision file transfer SW HTTP/TFTP
Diagnostics	LEDs, Log-File, signal contact, RMON (statistic, history, alarms, events), port mirroring, topology discovery 802.1AB
Configuration	Comand Line Interface (CLI), BootP, DHCP, DHCP Option 82, HIDiscovery, auto-configurationadapter (ACA11)
Security	SNMP V3 (no encryption)
Redundancy functions	HIPER-Ring (client and server), MRP (client and server), RSTP - IEEE802.1D-2004
Filter	QoS 4 classes, port priorisation (IEEE 802.1D/p), multicast IGMP (Snooping and Querier, Fast Aging
Industrial Profiles	EtherNet/IP and PROFINET compatibel
Time synchronisation	SNTP Client and Server, IEEE 1588 client
Flow control	n/a
Presettings	Standard
Ambient conditions	
Operating temperature	0 °C - 60 °C
Storage/transport temperature	-40 °C - 70 °C
Relative humidity (non-condensing)	10 % - 95 %
MTBF	n/a
Protective paint on PCB	No
Mechanical construction	
Dimensions (W x H x D)	71 mm x 131 mm x 111 mm
Mounting	DIN Rail
Weight	400 gram
Protection class	IP20

Industrial Ethernet:Compact configurable managed switches:Basic switches (RSB):RSB switches 8-9 ports, with 1-2 fiber ports http://e-catalog.beldensolutions.com/link/57078-24455-49854-84128-85762/en/RSB20-0800M2M2SAABEH/uistate	
Mechanical stability	
IEC 60068-2-27 shock	15 g, 11 ms duration, 18 shocks
IEC 60068-2-6 vibration	1 mm, 2 Hz-13.2 Hz, 90 min.; 0.7 g, 13.2 Hz-100 Hz, 90 min.; 3.5 mm, 3 Hz-9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz-150 Hz, 10 cycles, 1 octave/min.
EMC interference immunity	
EN 61000-4-2 electrostatic discharge (ESD)	6 kV contact discharge, 8 kV air discharge
EN 61000-4-3 electromagnetic field	10 V/m (80-1000 MHz)
EN 61000-4-4 fast transients (burst)	2 kV power line, 1 kV data line
EN 61000-4-5 surge voltage	power line: 2 kV (line/earth), 1 kV (line/line), 1 kV data line
EN 61000-4-6 conducted immunity	3 V (10 kHz-150 kHz), 10 V (150 kHz-80 MHz)
EN 61000-4-16 mains frequency voltage	n/a
EMC emitted immunity	
FCC CFR47 Part 15	FCC 47 CFR Part 15 Class A
EN 55022	EN 55022 Class A
Approvals	
Safety of industrial control equipment	cUL 508 (pending)
Hazardous locations	cUL 1604 Class1 Div 2 (pending)
Shipbuilding	n/a
Railway norm	n/a
Substation	n/a
Transportation	n/a
Scope of delivery and accessories	
Scope of delivery	Device, terminal block, operating manual

For more information please contact:
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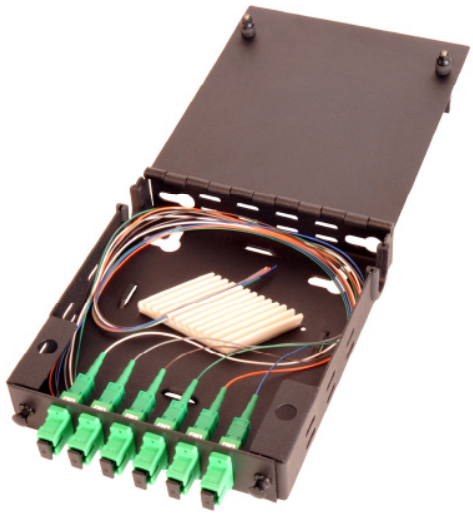
Stuttgarter Strasse 45-51
72654 Neckartenzlingen
Germany
Phone: +49 7127/14-1809
E-Mail: inet-sales@belden.com

Tii WM1PBF

Wall Mount Patch & Splice Fiber Enclosure

- Accomodates Up to 12 Fiber Ports
- Compact, Craft-Friendly Design
- Available with Various Fiber Termination Connectors
- Multiple Pigtail Options Available
- LGX® Compatible, 1 Plate Capacity
- Used in Telecom Closets and Remote Distribution Terminals



Tii WM1PBF

Compact wall mount fiber distribution unit designed to support patching and splicing in one unit. The enclosure has an integrated splice chip, 1 adapter panel, and accomodates a wide variety of fiber termination connector types.

KEY PRODUCT BENEFITS

- Available with factory loaded adapter plate, splice chip and pigtail
- Suitable for loose tube, tight buffer and ribbon cable
- Cable entry tie down points
- Hinged top cover
- Accepts one LGX® compatible adapter plate
- Made in USA

tii network technologies

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Ijamsville, MD 21754
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F. 301-874-4690
fibersales@tiinettech.com

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T. 631. 789.5000
Toll Free 888.844.4720
F. 631. 789.5063
sales@tiinettech.com

Tii WM1PBF

SPECIFICATIONS

Property	Value
Adapter Plates	1
Splice Trays	12 position splice chip
Dimensions	1.6"H x 5.5"W x 6.3"D
Packaging	3"H x 12"W x 12"D
Weight	5 lbs empty, 6 lbs loaded
Material	18 GA Steel, Black powder coat

ORDERING INFORMATION

Model Number Matrix

Tii WM1PBF	-XXX	-X	-XX	-X
	Fiber Ports	**Fiber Type**	**Adapter**	**Pigtails & Splice Trays**
	006	R = Singlemode	FC - FC	N = None
	008	K = MM62.5 OM1	FA - FC APC	9 = 900um
	012	C = MM50 OM2	LC - LC	
		S = MM50 OM3	SC - SC	
			SA - SC APC	
			ST - ST	

Model #	Description
WM1PBF	Mini wallmount empty 1 adapter plate capacity
LG1-xxxxxx-B	LG1 series adapter plates in black (See LG1 product guide)

Patch Cords

Fiber Optic Cable Assemblies

- Full line of high quality single mode and multimode fiber optic cable assemblies
- All cables are 100% tested for insertion loss and back reflection
- Test results come with each cable
- Insertion loss <0.2dB (single mode) <0.3dB (multimode)
- Typical back reflection <-55dB
- Available in industry standard lengths in meters

GB SC2 - D 2 - 03

Connector to Connector Configurations

FC2	FC to FC
FCC	FC to SC
FCT	FC to ST
LC2	LC to LC
LCC	LC to SC
LCT	LC to ST
MF2	MTRJ Female to MTRJ Female
MFC	MTRJ Female to SC
MFL	MTRJ Female to LC
MFT	MTRJ Female to ST
MM2	MTRJ Male to MTRJ Male
MMC	MTRJ Male to SC
MMF	MTRJ Male to MTRJ Female
MMT	MTRJ Male to ST
SC2	SC to SC
ST2	ST to ST
STC	ST to SC

Length

01 - 1 Meter	08 - 8 Meter
02 - 2 Meter	09 - 9 Meter
03 - 3 Meter	10 - 10 Meter
04 - 4 Meter	15 - 15 Meter
05 - 5 Meter	20 - 20 Meter
06 - 6 Meter	25 - 25 Meter
07 - 7 Meter	30 - 30 Meter

Fiber

1 - Single Mode 9/125 (Yellow Jacket)
2 - Multi Mode 62.5/125 (Orange Jacket)
3 - Multi Mode (Only) 50/125 (Blue Jacket)

Cable Type

S - Simplex
D - Duplex

Ordering Example

GBSC2-D2-03

SC to SC duplex 62.5/125 microns multimode - 3 Meters


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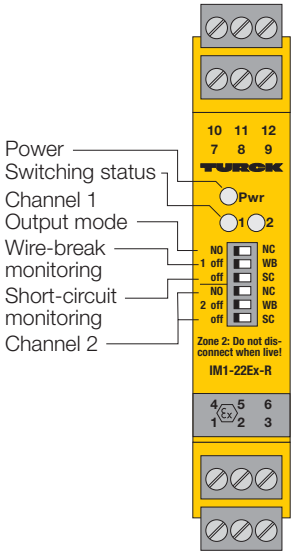


Isolating Switching Amplifier IM1-22Ex-R 2-channel

- **2-channel isolating switching amplifier with removable terminal blocks**
- **Intrinsically safe input circuits EEx ia**
- **Area of application according to ATEX: II (1) GD, II 3 G**
- **Approved for installation in zone 2, however the device must be installed in a housing which complies with the requirements of EN 60079-15 with a minimum protection degree of IP54**
- **Functional safety up to SIL 2 (acc. to EN 61508)**
- **Galvanic isolation between input circuits, output circuits and supply voltage**
- **Input circuit monitoring for wire-break and short-circuit (can be disabled)**
- **2 relay outputs, each with one NO contact**
- **Selectable NO/NC output function**
- **Universal supply voltage (20...250 VAC/20...125 VDC)**

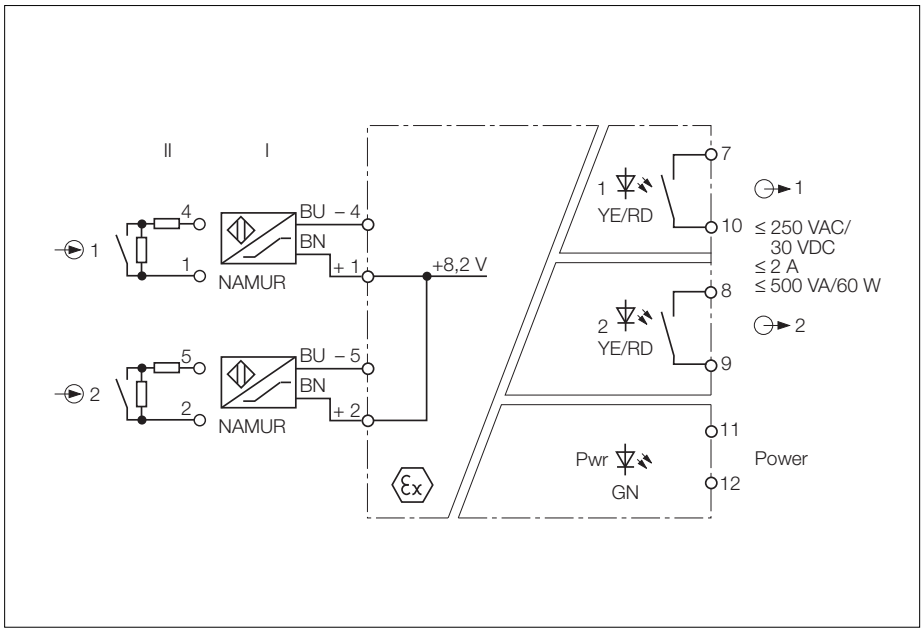
The isolating switching amplifier type IM1-22Ex-R is a dual channel device featuring intrinsically safe input circuits. It can be connected to sensors according to EN 60947-5-6 (NAMUR), variable resistors or potential-free contacts.

The output circuits feature one relay with one NO contact each.

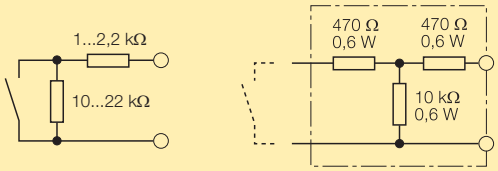
Six front panel programming switches select the output function of each channel (normally open mode = NO/or normally closed mode = NC) and enable separate activation and de-activation of wire-break (WB) and short-circuit (SC) monitoring of each channel.

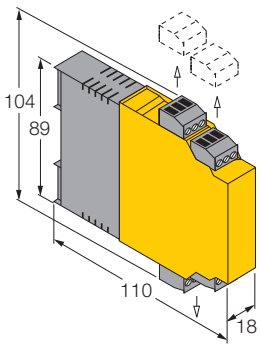
When using mechanical contacts as the input device, wire-break and short-circuit monitoring must be disabled or shunt resistors must be connected to the contacts (II). (See next page for contact configuration).

The green LED on the front cover indicates that the device is powered. The two dual colour LEDs indicate the switching status (yellow) as well as fault conditions (red). When the input circuit monitoring feature is activated, red illuminates to indicate a fault in the input circuit and the respective output relay is de-energised.



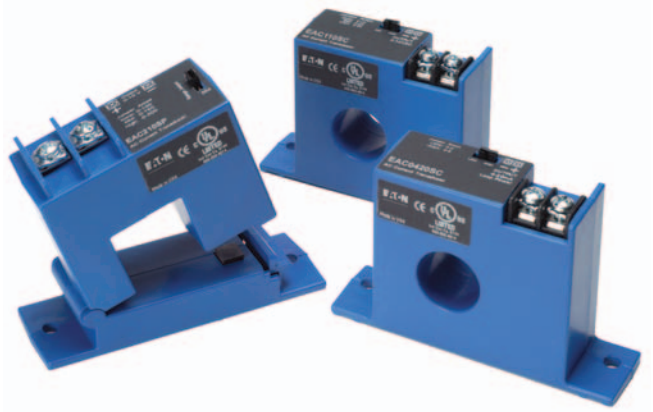
Isolating switching amplifier IM1-22Ex-R

Type	IM1-22Ex-R
Ident-no.	7541231
Supply voltage U_B	20...250 VAC/20...125 VDC
Line frequency (AC)	40...70 Hz
Power/current consumption	≤ 3 W
Galvanic isolation	between input circuit, output circuits and supply voltage for 250 V_{rms} test voltage 2.5 kV_{rms}
Input circuits	according to EN 60947-5-6 (NAMUR), intrinsically safe according to EN 50020
Operating characteristics	
– Voltage	8,2 V
– Current	8,2 mA
Switching threshold	1.55 mA
Hysteresis	typ. 0.2 mA
Wire-break threshold	≤ 0.1 mA
Short-circuit threshold	≥ 6 mA
Contact configuration Of mechanical switches with active input circuit monitoring function	 resistor module WM1, ident-no. 0912101
Output circuits	2 relay outputs with 1 NO contact each
Switching voltage	≤ 250 VAC/120 VDC
Switching current per output	≤ 2 A
Switching capacity per output	≤ 500 VA/60 W
Switching frequency	≤ 10 Hz
Contact material	silver-alloy + 3 µm Au
Ex-Approval acc. to certificate of conformity	TÜV 04 ATEX 2553 / TÜV 06 ATEX 552968 X
Maximum nominal values	
– No load voltage U_0	≤ 9.6 V
– Short-circuit current I_0	≤ 11 mA
– Power P_0	≤ 26 mW
Maximum external inductances/capacitances	
– [EEx ia] IIC	1 mH/1.1 µF / 5 mH/0.83 µF / 10 mH/0.74 µF
– [EEx ia] IIB	2 mH/5,2 µF / 10 mH/3,8 µF / 20 mH/3,4 µF
– Ex nL IIC	1 mH/1,9 µF / 5 mH/1,4 µF / 10 mH/1,2 µF
– Ex nL IIB	1 mH/11 µF / 5 mH/7,5 µF / 10 mH/6,6 µF
Marking of devices	⟨Ex⟩ II (1) GD [EEx ia] IIC II 3 G Ex nA nC [nL] IIC/IIB T4
LED indications	
– Power	green
– Switching status/Fault indication	2 x yellow/red (dual colour LED)
Terminal housing	12-pole, 18 mm wide, Polycarbonate/ABS, flammability class V-0 per UL 94
Mounting	snap-on clamps for top-hat rail (DIN 50022) or screw terminals for panel mounting
Connection	removeable terminal blocks, reverse-polarity protected, screw connection, self-lifting
Connection profile	≤ 1 x 2.5 mm^2, 2 x 1.5 mm^2 or 2 x 1.0 mm^2 with wire sleeves
Degree of protection (IEC 60529/EN 60529)	IP20
Operating temperature	-25…+70 °C



Hans Turck GmbH & Co.KG • D–45466 Mülheim/Ruhr • Tel. 0208/4952-0 • Fax 0208/4952-264 • E-Mail: more@turck.com • www.turck.com

EAC Series CurrentWatch Current Sensors



Contents

EAC Series CurrentWatch Current Sensors

Product Description

The CurrentWatch™ EAC Series from Eaton's electrical sector combines a current transformer and signal conditioner into a single package. The EAC Series has jumper-selected current input ranges and industry standard outputs: 4–20 mA, 0–5 Vdc or 0–10 Vdc. This family of sensors is designed for application on "linear" or sinu-soidal AC loads. Available in split-core or solid-core housings.

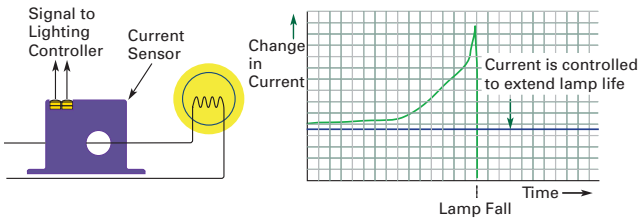
For typical applications of the CurrentWatch EAC Series, see listing on this page.

Application Description

Typical Applications

- **Automation Equipment**—Analog current reading for remote monitoring and software alarms
- **Data Loggers**—Self-powered sensor helps conserve data logger batteries
- **Panel Meters**—Simple connection displays power consumption

Example Application—
Preventative Maintenance of a Critical Lighting System



Features

- **Highly Accurate**—Factory matched and calibrated single-piece sensor is more accurate than traditional two-piece, field-installed solutions
- **Average Responding**—"Average Responding" algorithm gives an RMS output on pure sine waves, perfect for constant speed (linear) loads
- **Jumper Selectable Ranges**—The ability to change input ranges reduces inventory and eliminates zero and span
- **Isolation**—Output is magnetically isolated from the input for safety and elimination of insertion loss (voltage drop)
- **UL, cUL and CE Approved**—Accepted worldwide

For the most current information on this product, visit our Web site: www.eaton.com

For Customer Service in the U.S. call 1-877-ETN CARE (386-2273), in Canada call 1-800-268-3578.
For Application Assistance in the U.S. and Canada call 1-800-426-9184.

Standards and Certifications ①

- UL Listed
- cUL Listed
- CE Certified
- UL 508 Industrial Control Equipment (USA and Canada)

Listed Listed

DANGER

THIS SENSOR IS NOT A SAFETY DEVICE AND IS NOT INTENDED TO BE USED AS A SAFETY DEVICE. This sensor is designed only to detect and read certain data in an electronic manner and perform no use apart from that, specifically no safety-related use. This sensor product does not include self-checking redundant circuitry, and the failure of this sensor product could cause either an energized or de-energized output condition, which could result in death, serious bodily injury, or property damage.

Product Selection

EAC Series CurrentWatch Current Sensors

Top Terminal Current Sensors

	Power Supply	Aperture Size	Output Signal	Current Range	Catalog Number
Solid-Core Housing	**Solid-Core Housings**				
	Self-powered (no external power needed)	0.74 in (19 mm)	0–5 Vdc	10, 20 or 50A	**EAC105SC**
				100, 150 or 200A	**EAC205SC**
			0–10 Vdc	10, 20 or 50A	**EAC110SC**
				100, 150 or 200A	**EAC210SC**
	24 Vdc loop-powered		4–20 mA	2 or 5A	**EAC0420SC**
				10, 20 or 50A	**EAC1420SC**
				100, 150 or 200A	**EAC2420SC**
Split-Core Housing	**Split-Core Housings—Self-Powered and 24 Vdc**				
	Self-powered (no external power needed)	0.85 in (21.6 mm)	0–5 Vdc	10, 20 or 50A	**EAC105SP**
				100, 150 or 200A	**EAC205SP**
			0–10 Vdc	10, 20 or 50A	**EAC110SP**
				100, 150 or 200A	**EAC210SP**
	24 Vdc loop-powered		4–20 mA	2 or 5A	**EAC0420SP**
				10, 20 or 50A	**EAC1420SP**
				100, 150 or 200A	**EAC2420SP**
Split-Core Housing	**Split-Core Housings—120 Vac and 24 Vac/Vdc**				
	120 Vac	0.85 in (21.6 mm)	4–20 mA	2 or 5A	**EACP0420120SP** ②
				10, 20 or 50A	**EACP1420120SP** ②
				100, 150 or 200A	**EACP2420120SP** ②
	24 Vac/Vdc		4–20 mA	2 or 5A	**EACP042024USP** ②
				10, 20 or 50A	**EACP142024USP** ②
				100, 150 or 200A	**EACP242024USP** ②

Notes

① EACP models not listed.
② Not UL listed.

Accessories

DIN Rail Mounting Kit

EAC Series CurrentWatch Current Sensors

Description	Catalog Number
DIN rail mounting kit ①	**EDINKIT**

Technical Data and Specifications

EAC Series CurrentWatch Current Sensors

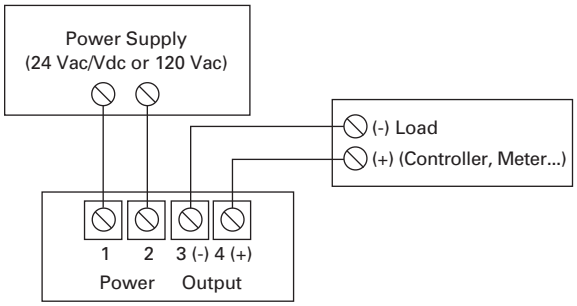
Description	Models with 0–5 Vdc Output Specification	Models with 0–10 Vdc Output Specification	Models with 4–20 mA Output Specification	EACP Series Only Specification
Power supply	Self-powered—no power supply needed	Self-powered—no power supply needed	12–40 Vdc loop-powered	Models ending -0SP: 120 Vac Models ending -USP: 24 Vac/Vdc (40V maximum)
Output signal	0–5 Vdc	0–10 Vdc	4–20 mA	4–20 mA
Output limit	8.2 Vdc	15 Vdc	23 mA	22.4 mA
Accuracy	1.0% FS	1.0% FS	1.0% FS	1% FS
Response time	100 ms	100 ms	300 ms	100 ms
Frequency range	50–60 Hz	50–60 Hz	20–100 Hz	40–100 Hz
Loading	1 mohm minimum rated accuracy 100 kohms, add 1.3% error	1 mohm minimum rated accuracy 100 kohms, add 1.3% error	See power supply above	50 kohms minimum 500 kohms maximum
Isolation voltage	UL listed to 1,270 Vac (tested to 5kV)	UL listed to 1,270 Vac (tested to 5kV)	UL listed to 1,270 Vac (tested to 5kV)	UL listed to 1,270 Vac (tested to 5kV)
Input ranges	Field selectable ranges from 0–200A ③	Field selectable ranges from 0–200A ③	Field selectable ranges from 0–200A ③	0–200A jumper selectable
Sensing aperture	Solid-core: 0.74 in (19 mm) dia. Split-core: 0.85 in (21.6 mm) sq.	Solid-core: 0.74 in (19 mm) dia. Split-core: 0.85 in (21.6 mm) sq.	Solid-core: 0.74 in (19 mm) dia. Split-core: 0.85 in (21.6 mm) sq.	0.85 in (21.6 mm)
Housing	UL94 V0 flammability rated	UL94 V0 flammability rated	UL94 V0 flammability rated	UL94 V0 flammability rated
Environmental	Operating temperature: –4° to 122°F (–20° to 50°C) Humidity: 0–95% RH, non-condensing	Operating temperature: –4° to 122°F (–20° to 50°C) Humidity: 0–95% RH, non-condensing	Operating temperature: –4° to 122°F (–20° to 50°C) Humidity: 0–95% RH, non-condensing	Operating temperature: –4° to 122°F (–20° to 50°C) Humidity: 0–95% RH, non-condensing

Notes

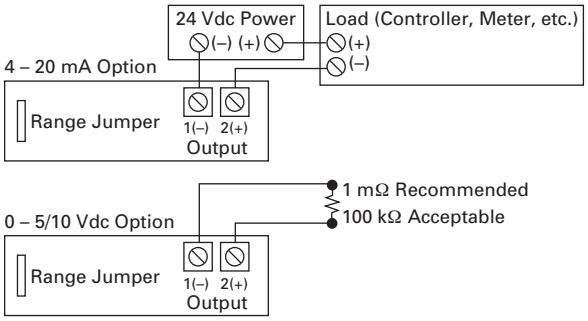
① Sensor pictured for reference and not included in kit.
② Does not apply to EACP series.
③ Additional custom ranges available from factory.

Wiring Diagrams

EACP Models



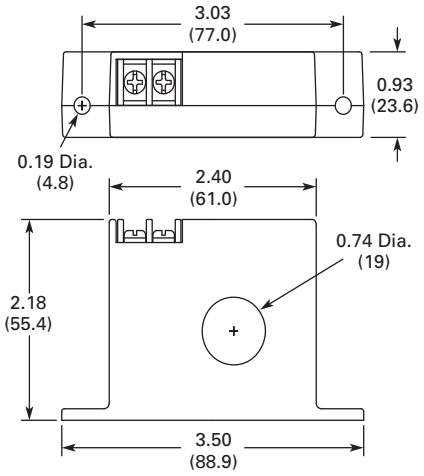
All Other Models ①



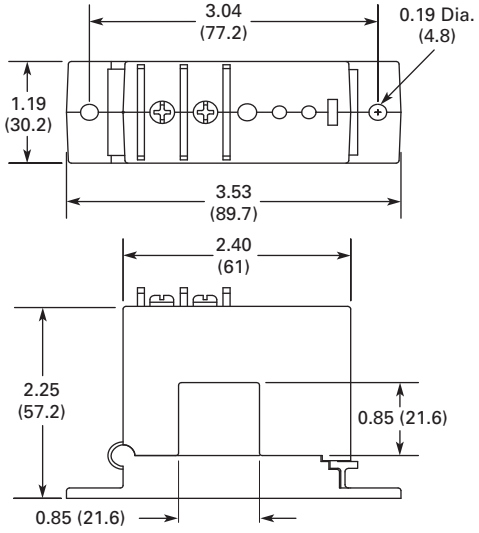
Dimensions

Approximate Dimensions in Inches (mm)

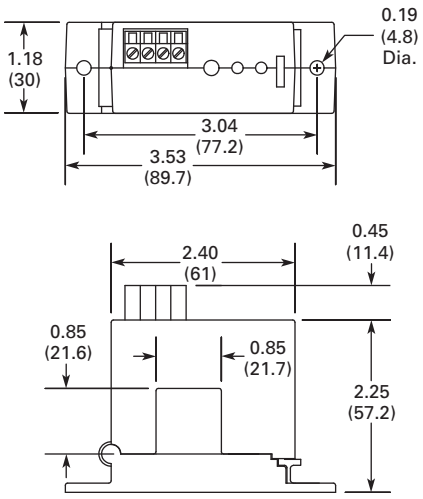
Solid-Core Housing



All Other Models



EACP Series



Note

① Pressure plate screw terminals. 12–22 AWG solid or stranded. Field adjustable setpoint.

Section 4:

PLC Equipment

BROWNS HILL
ENGINEERING & CONTROLS


BROWNS HILL
ENGINEERING & CONTROLS

CompactLogix Selection Guide

Allen-Bradley • Rockwell Software

Rockwell Automation

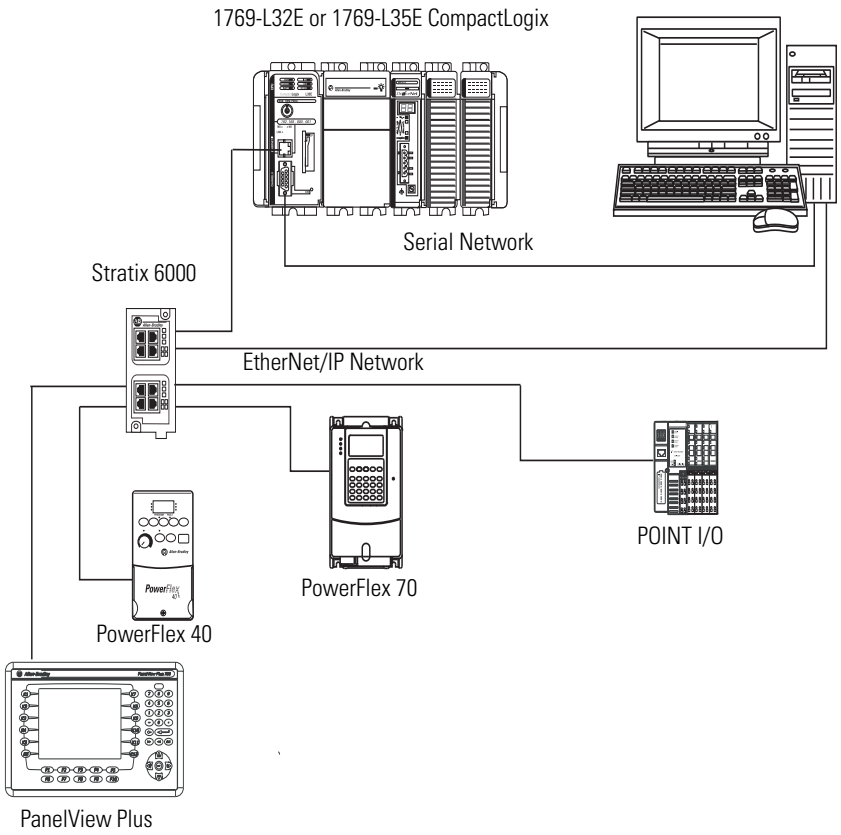
Logix Controllers Comparison

Characteristic	**1756 ControlLogix**	**1756 GuardLogix**	**1768 CompactLogix**	**1768 Compact GuardLogix**	**1769-L3*x* CompactLogix**	**1769-L23*x* CompactLogix**	**1789 SoftLogix5800**
Controller tasks: • Continuous • Periodic • Event	• 32 tasks • 100 programs/task • Event tasks: all event triggers	• 32 tasks • 100 programs/task • Event tasks: all event triggers	• 16 tasks • Event tasks: consumed tag, EVENT instruction, axis, and motion event triggers	• 16 tasks • Event tasks: consumed tag, EVENT instruction, axis, and motion event triggers	• 1769-L35*x*: 8 tasks • 1769-L32*x*: 6 tasks • 1769-L31: 4 tasks • Event tasks: consumed tag and EVENT instruction triggers	• 3 tasks • 16 programs/task • Event tasks: consumed tag and EVENT instruction triggers	• 32 tasks • 100 programs/task • Event tasks: all event triggers, plus outbound and Windows events
User memory	1756-L61: 2 MB 1756-L62: 4 MB 1756-L63: 8 MB 1756-L64: 16 MB 1756-L65: 32 MB	1756-L61S: 2 MB Standard 1 MB Safety 1756-L62S: 4 MB Standard 1 MB Safety 1756-L63S: 8 MB Standard 3.75 MB Safety	1768-L43: 2 MB 1768-L45: 3 MB	1768-L43S: 2 MB Standard 0.5 MB Safety 1768-L45S: 3 MB Standard 1 MB Safety	1769-L31: 512 KB 1769-L32*x*: 750 KB 1769-L35*x*: 1.5 MB	512 KB	1789-L10: 2 MB; 1 controller; no motion 1789-L30: 64 MB; 3 controllers 1789-L60: 64 MB; 6 controllers
Nonvolatile user memory	CompactFlash	CompactFlash	CompactFlash	CompactFlash	CompactFlash	None	None
Built-in communication ports	1 port RS-232 serial	1 port RS-232 serial	1 port RS-232 serial	1 port RS-232 serial	• 1769-L31: 2 RS-232 ports • 1769-L32C, 1769-L35CR: 1 ControlNet port and 1 RS-232 serial port • 1769-L32E, 1769-L35E: 1 EtherNet/IP port and 1 RS-232 serial port	• 1769-L23E-QB1B: 1 EtherNet/IP port and 1 RS-232 serial port • 1769-L23E-QBFC1B: 1 EtherNet/IP port and 1 RS-232 serial port • 1769-L23-QBFC1B: 2 RS-232 serial ports	Depends on personal computer
Communication options	• EtherNet/IP • ControlNet • DeviceNet • Data Highway Plus • Remote I/O • SynchLink	• EtherNet/IP (standard and safety) • ControlNet (standard and safety) • DeviceNet (standard and safety) • Data Highway Plus • Remote I/O • SynchLink	• EtherNet/IP • ControlNet • DeviceNet	• EtherNet/IP (standard and safety) • ControlNet (standard and safety) • DeviceNet (standard)	• EtherNet/IP • ControlNet • DeviceNet	• EtherNet/IP • DeviceNet	• EtherNet/IP • ControlNet • DeviceNet
Serial port communication	• ASCII • DF1 full/half-duplex • DF1 radio modem • DH-485 • Modbus via logic	• ASCII • DF1 full/half-duplex • DF1 radio modem • DH-485 • Modbus via logic	• ASCII • DF1 full/half-duplex • DF1 radio modem • DH-485 • Modbus via logic	• ASCII • DF1 full/half-duplex • DF1 radio modem • DH-485 • Modbus via logic	• ASCII • DF1 full/half-duplex • DF1 radio modem • DH-485 • Modbus via logic	• ASCII • DF1 full/half-duplex • DF1 radio modem • DH-485 • Modbus via logic	• ASCII • DF1 full/half-duplex • DH-485 • Modbus via logic
Controller connections	250	250	250	250	100	100	250
Network connections	Per network module: • 100 ControlNet (CN2/A) • 40 ControlNet (CNB) • 256 EtherNet/IP; 128 TCP (EN2*x*) • 128 EtherNet/IP; 64 TCP (ENBT)	Per network module: • 100 ControlNet (CN2/A) • 40 ControlNet (CNB) • 256 EtherNet/IP; 128 TCP (EN2*x*) • 128 EtherNet/IP; 64 TCP (ENBT)	Per network module: • 48 ControlNet • 128 EtherNet/IP; 64 TCP	Per network module: • 48 ControlNet • 128 EtherNet/IP; 64 TCP	Per controller: • 32 ControlNet • 32 EtherNet/IP; 32 TCP	Per controller: • 32 EtherNet/IP; 8 TCP	Per network module: • 48 ControlNet • 128 EtherNet/IP; 64 TCP
Controller redundancy	Full support	None	Backup via DeviceNet	Backup via DeviceNet	Backup via DeviceNet	Backup via DeviceNet	N/A
Simple motion	• Stepper • Servo via DeviceNet • Analog or networked AC drive	• Stepper • Servo via DeviceNet • Analog or networked AC drive	• Stepper • Servo via DeviceNet • Analog or networked AC drive	• Stepper • Servo via DeviceNet • Analog or networked AC drive	• Stepper • Servo via DeviceNet • Analog or networked AC drive	• Stepper • Servo via DeviceNet • Analog or networked AC drive	• Stepper • Servo via DeviceNet • Analog or networked AC drive
Integrated motion	SERCOS interface Analog options: • Encoder input • LDT input • SSI input	SERCOS interface Analog options: • Encoder input • LDT input • SSI input	SERCOS interface	SERCOS interface	N/A	N/A	SERCOS interface Analog encoder input
Programming languages	• Relay ladder • Structured text • Function block • Sequential function chart	• Standard task: all languages • Safety task: relay ladder, safety application instructions	• Relay ladder • Structured text • Function block • Sequential function chart	• Standard task: all languages • Safety task: relay ladder, safety application instructions	• Relay ladder • Structured text • Function block • Sequential function chart	• Relay ladder • Structured text • Function block • Sequential function chart	• Relay ladder • Structured text • Function block • Sequential function chart • External routines (developed in C/C++)

Example Configuration - 1769-L3*x* CompactLogix System

The 1769-L3*x* CompactLogix system provides a Logix solution for low-end to medium applications. Typically, these applications are machine-level control applications that require limited I/O quantities and limited communication capabilities. The 1769-L31 controller offers two serial ports. The 1769-L32C and 1769-L35CR controllers offer an integrated ControlNet port. The 1769-L32E and 1769-L35E controllers offer an integrated EtherNet/IP port.

1769-L32E, 1769-L35E Controller with an EtherNet/IP Network

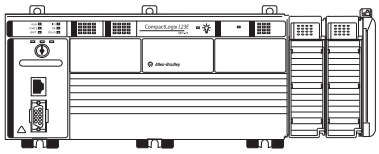


CompactLogix Controllers

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

For detailed specifications, see CompactLogix Controllers Specifications, publication 1769-TD005.

	1769-L23*x* Controllers	**1769-L3*x* Controllers**	**1768-L4*x* Controllers**	**1768-L4*x*S Controllers**
Controller application	Small applications Embedded I/O modules	General purpose	Integrated motion	Integrated safety Integrated motion
Controller tasks	• 3 tasks • 16 programs/task • Only 1 continuous • Event tasks: consumed tag and EVENT instruction triggers	• ~~1769-L35*x*: 8 tasks~~ • 1769-L32*x*: 6 tasks • ~~1769-L31: 4 tasks~~ • Only 1 continuous • Event tasks: consumed tag and EVENT instruction triggers	• 16 tasks (only 1 continuous) • Event tasks: consumed tag, EVENT instruction, axis, and motion event triggers	• 16 tasks (only 1 continuous) • Event tasks: consumed tag, EVENT instruction, axis, and motion event triggers
User memory	512 KB	1769-L31: 512 KB 1769-L32*x*: 750 KB 1769-L35*x*: 1.5 MB	1768-L43: 2 MB 1768-L45: 3 MB	1768-L43S: 2 MB standard 0.5 MB safety 1768-L45S: 3 MB standard 1 MB safety
Built-in communication ports	• 1769-L23E-QB1B: 1 EtherNet/IP port and 1 RS-232 serial port • 1769-L23E-QBFC1B: 1 EtherNet/IP port and 1 RS-232 serial port • 1769-L23-QBFC1B: 2 RS-232 serial ports	• 1769-L31: 2 RS-232 ports (one DF1 only, other DF1 or ASCII) • 1769-L32C, 1769-L35CR: 1 ControlNet port and 1 RS-232 serial port (DF1 or ASCII) • 1769-L32E, 1769-L35E: 1 EtherNet/IP port and 1 RS-232 serial port (DF1 or ASCII)	• 1 port RS- 232 serial (DF1 or ASCII)	• 1 port RS- 232 serial (DF1 or ASCII)
Communication options	• EtherNet/IP • DeviceNet	• EtherNet/IP • ControlNet • DeviceNet	• EtherNet/IP • ControlNet • DeviceNet	• EtherNet/IP (standard and safety) • ControlNet (standard and safety) • DeviceNet (standard)

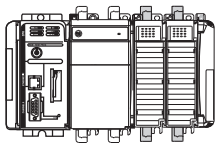


1769 Packaged CompactLogix Controllers with Embedded I/O

The 1769-L23*x* controller comes with:

- a built-in power supply.
- either two serial ports or one serial and one EtherNet/IP port.
- a combination of embedded digital, analog, and high-speed counter I/O.
- a 1769-ECR right-end cap.

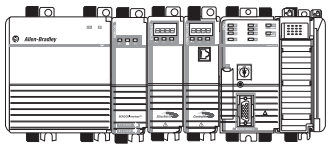
Characteristic	1769-L23-QBFC1B	1769-L23E-QB1B	1769-L23E-QBFC1B
Available user memory	512 KB	512 KB	512 KB
CompactFlash card	None	None	None
Communication ports	2 RS-232 ports (isolated DF1 or ASCII; nonisolated DF1 only)	1 EtherNet/IP port 1 RS-232 serial port (DF1 or ASCII)	1 EtherNet/IP port 1 RS-232 serial port (DF1 or ASCII)
Embedded I/O	• 16 DC inputs • 16 DC outputs • 4 analog inputs • 2 analog outputs • 4 high-speed counters	• 16 DC inputs • 16 DC outputs	• 16 DC inputs • 16 DC outputs • 4 analog inputs • 2 analog outputs • 4 high-speed counters
Module expansion capacity	Up to two additional 1769 modules	Up to three additional 1769 modules	Up to two additional 1769 modules
Embedded power supply	24V DC	24V DC	24V DC



1769 Modular CompactLogix Controllers

In a 1769-L3*x* controller system, the 1769 I/O modules can be placed to the left and the right of the power supply. As many as eight modules can be placed on each side of the power supply.

Characteristic	1769-L31	1769-L32C	1769-L32E	1769-L35CR	1769-L35E
Available user memory	512 KB	750 KB	750 KB	1.5 MB	1.5 MB
CompactFlash card	• 1784-CF64 • 1784-CF128	• 1784-CF64 • 1784-CF128	• 1784-CF64 • 1784-CF128	• 1784-CF64 • 1784-CF128	• 1784-CF64 • 1784-CF128
Communication ports	2 RS-232 ports (isolated DF1 or ASCII; non-isolated DF1 only)	1 ControlNet port 1 RS-232 port (DF1 or ASCII)	1 EtherNet/IP port 1 RS-232 port (DF1 or ASCII)	1 ControlNet port 1 RS-232 port (DF1 or ASCII)	1 EtherNet/IP port 1 RS-232 port (DF1 or ASCII)
Module expansion capacity	16 1769 modules	16 1769 modules	16 1769 modules	30 1769 modules	30 1769 modules
Power supply distance rating	4 modules	4 modules	4 modules	4 modules	4 modules



1768 CompactLogix Controllers

The 1768-L4*x* controller combines both a 1768 backplane and a 1769 backplane. The 1768 backplane supports the 1768 controller, the 1768 power supply, and a maximum of four 1768 modules. The 1769 backplane supports 1769 modules.

Characteristic	1768-L43	1768-L43S	1768-L45	1768-L45S
Available user memory	2 MB	2 MB standard 0.5 MB safety	3 MB	3 MB standard 1 MB safety
CompactFlash card	• 1784-CF64 • 1784-CF128		• 1784-CF64 • 1784-CF128	
Communication options	• EtherNet/IP (standard and safety) • ControlNet (standard and safety) • DeviceNet (standard)		• EtherNet/IP (standard and safety) • ControlNet (standard and safety) • DeviceNet (standard)	
Serial communication port	1 RS-232 port		1 RS-232 port	
Module expansion capacity	• 2 1768 modules • 16 1769 modules		• 4 1768 modules • 30 1769 modules	
Power supply distance rating	—		—	
Programming languages	• Relay ladder • Structured text • Function block • Sequential function chart	• Standard task: all languages • Safety task: relay ladder, safety application instructions	• Relay ladder • Structured text • Function block • Sequential function chart	• Standard task: all languages • Safety task: relay ladder, safety application instructions

1784 Industrial CompactFlash Cards

CompactFlash cards offer nonvolatile memory (flash) to permanently store a user program and tag data. You install the 1784 CompactFlash card in a socket on the controller. You can manually trigger the controller to save to or load from nonvolatile memory or configure the controller to load from nonvolatile memory on powerup.

The CompactFlash card offers nonvolatile memory (flash) to permanently store a user program and tag data on a controller. The 1769-L3x and 1768-L4x controllers support a CompactFlash card.

Attribute	1784-CF64	1784-CF128
Memory	64 MB	28 MB
Weight, approx.	14.2 g (0.5 oz)	

CompactLogix Communication Modules

You can configure your system for information exchange between a range of devices and computing platforms and operating systems. Select a CompactLogix controller with integrated communication or the appropriate communication device for the networks that meet your needs.

Networks

Application	Network	1769-L23*x* Controller	1769-L3*x* Controller	1768-L4*x*, 1768-L4*x*S Controller
• Plant management (material handling) • Configuration, data collection, and control on a single, high-speed network • Time-critical applications with no established schedule • Inclusion of commercial technologies (such as video over IP) • Internet/Intranet connection	EtherNet/IP network	• 1769-L23E-QB1B controller • 1769-L23E-QBFC1B controller	• 1769-L32E controller • 1769-L35E controller	• 1768-ENBT bridge • 1768-EWEB web server
• High-speed transfer of time-critical data between controllers and I/O devices • Deterministic and repeatable data delivery • Media redundancy • Intrinsic safety • Redundant controller systems	ControlNet network	Not available	• 1769-L32C controller (nonredundant media) • 1769-L35CR controller (redundant media)	• 1768-CNB bridge (nonredundant media) • 1768-CNBR bridge (redundant media)
• Connections of low-level devices directly to plant floor controllers, without interfacing them through I/O modules • Data sent as needed • More diagnostics for improved data collection and fault detection • Less wiring and reduced start-up time than a traditional, hard-wired system	DeviceNet network	• 1769-SDN scanner • 1769-ADN adapter		
• Modems • Supervisory control and data acquisition (SCADA)	Serial network	• Built-in serial port on the controller • 1769-ASCII module		
Connections to existing DH-485 networks	DH-485 network	Built-in serial port with a 1761-NET-AIC linking device		

For detailed specifications, see:

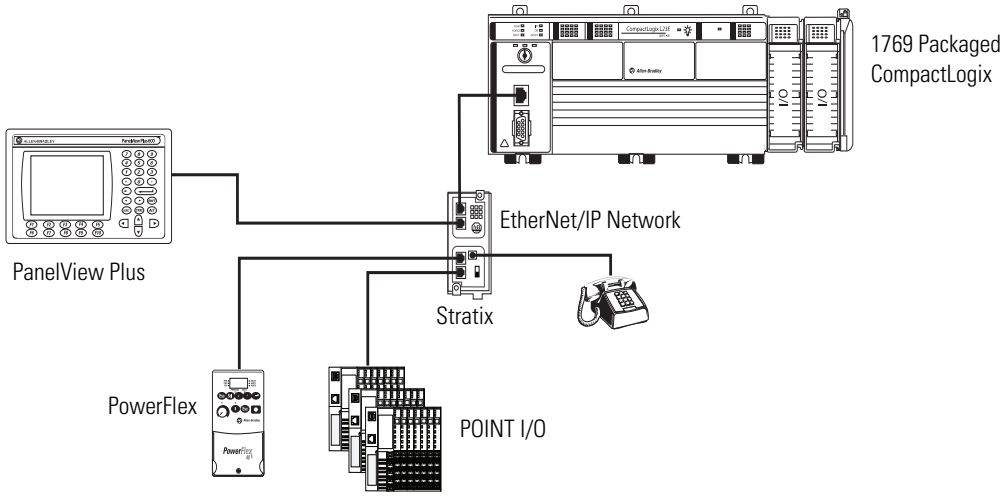
- CompactLogix Controllers Specifications, publication 1769-TD005.
- CompactLogix Communication Modules Specifications, publication 1769-TD007.

EtherNet/IP Communication Modules

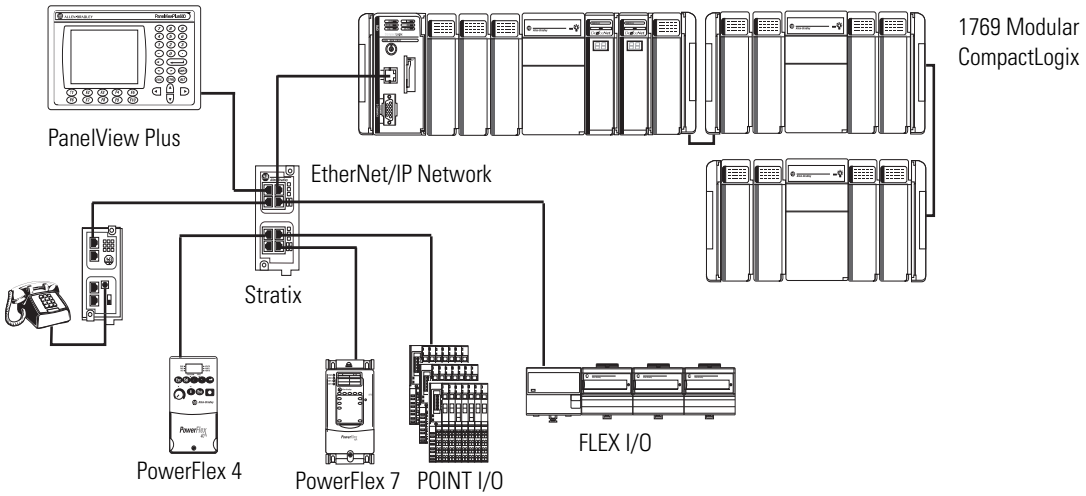
The Ethernet Industrial network protocol (EtherNet/IP) is an open industrial-networking standard that supports both real-time I/O messaging and message exchange. The EtherNet/IP network uses off-the-shelf Ethernet communication chips and physical media.

Cat. No.	Description	Communication Rate	Logix Connections	TCP/IP Connections
1769-L23E-QB1B 1769-L23E-QBFC1B	1769 packaged CompactLogix controller with integrated EtherNet/IP port	10/100 Mbps	32	8
1769-L32E 1769-L35E	1769 modular CompactLogix controller with integrated EtherNet/IP port	10/100 Mbps	32	32
1768-ENBT	1768 EtherNet/IP communication bridge module	10/100 Mbps	128	64
1768-EWEB	1768 Ethernet web server module	10/100 Mbps	128	64

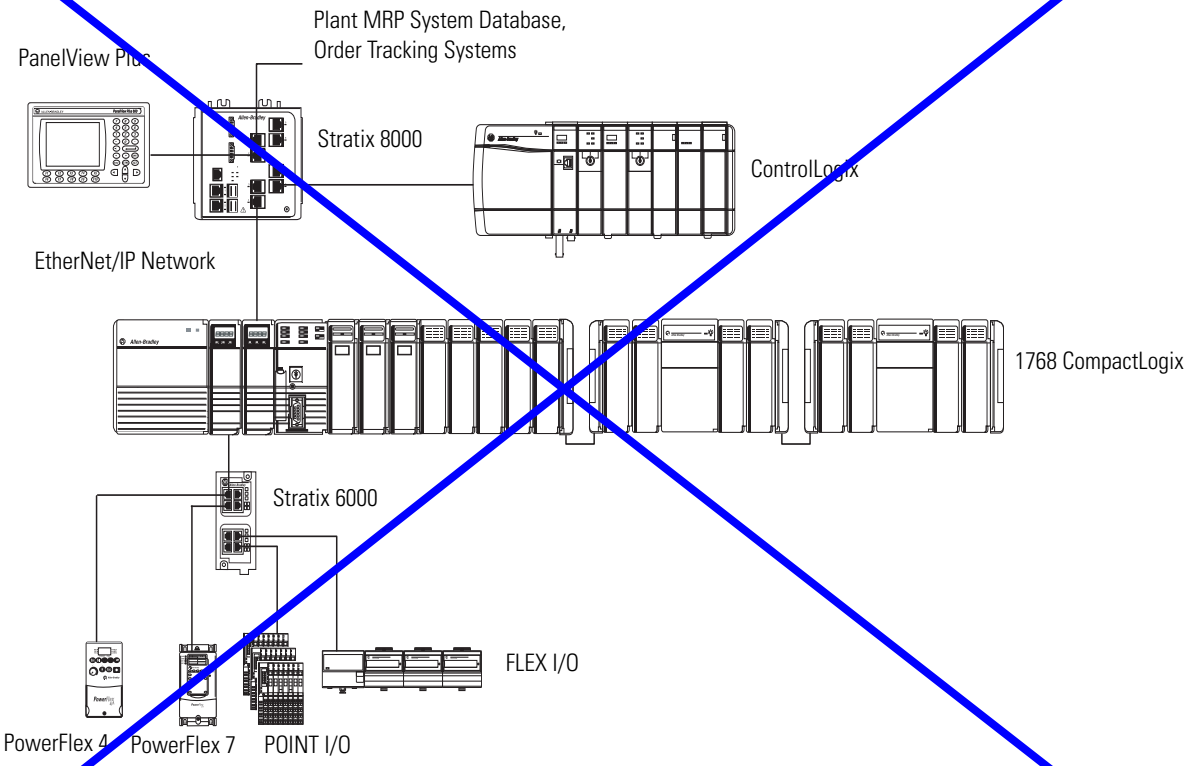
EtherNet/IP Example Configuration - 1769-L23E-QB1B, 1769-L23E-QBFC1B Controllers



EtherNet/IP Example Configuration - 1769-L32E, 1769-L35E Controllers



EtherNet/IP Example Configuration - 1768-L43, 1768-L45 Controllers



Accessories - EtherNet/IP Network

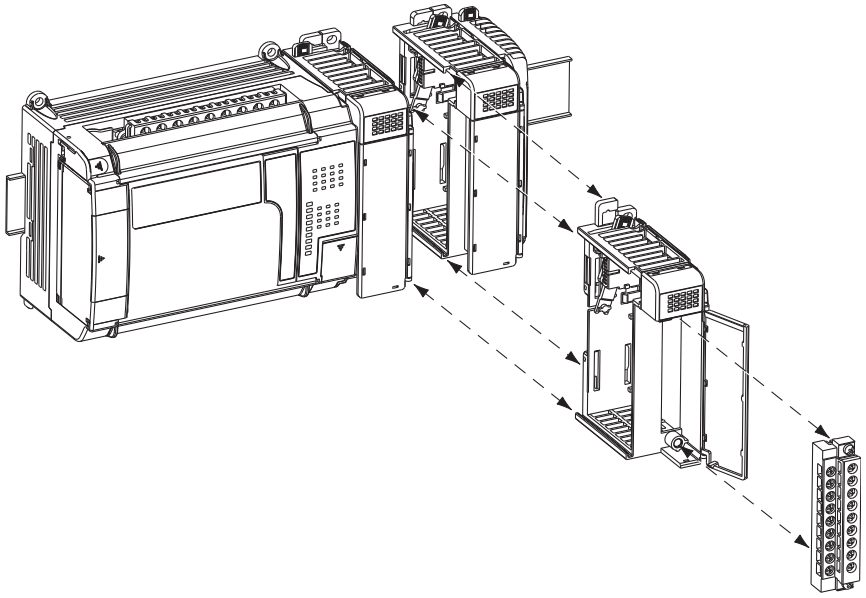
Cat. No.	Description	Specifications
1585J-M8PBJM-*x*	Ethernet RJ45 patchcord *x* = 2 (2 m), 5 (5 m), or 10 (10 m)	8-conductor, teal riser PVC cable (flex rated cable also available)
1585J-M8CC-H	RJ45 insulation displacement connector (IDC)	0.128...0.325 mm^2 (26…22 AWG), Cat. 6, IDC, no tool required
1585J-M8CC-C	RJ45 crimp connector with boot, qty = 50 pieces	0.128...0.205 mm^2 (26…24 AWG, Cat. 5e, requires crimp tool for assembly
1585A-JCRIMP	Crimp tool	—
9300-RADES	Remote access dial-in kit	56 Kbps modem connection to devices on an Ethernet network, includes the following: • Pre-configured modem • Communication module • DIN rail mounting hardware • Associated cables

Compact I/O Modules

The 1769 Compact I/O modules can be used with a CompactLogix controller, as well as for expansion I/O in a MicroLogix 1500 controller assembly or in an assembly with a 1769-ADN DeviceNet adapter module. Unless connected to a MicroLogix 1500 base, each bank of I/O modules must include its own power supply.

Install the I/O modules on a panel with two mounting screws or on a DIN rail. The modules mechanically lock together by means of a tongue-and-groove design and have an integrated communication bus that is connected from module to module by a moveable bus connector.

Each I/O module includes a built-in removable terminal block with finger-safe cover for connections to I/O sensors and actuators. The terminal block is behind a door at the front of the module. I/O wiring can be routed from beneath the module to the I/O terminals.



- Once the modules are locked together, the system becomes a rugged assembly.
- Upper and lower tongue-and-groove slots guide the module during installation and secure the module within the system.
- Removable terminal blocks help ease the wiring task.
- Self-lifting, field-wire pressure plates cut installation time.
- The patented bus connector with locking function enables reliable module and system communication.
- A color bar is provided on the front of the module.
- Digital and field circuits are optically isolated.

For detailed specifications, see 1769 Compact I/O Modules Specifications, publication 1769-TD006.

Power Supply Distance Ratings

Check each module's specification table for the power supply distance rating. This indicates how many slot positions the module can be from the power supply.

AC Digital Modules

Cat. No.	Inputs/Outputs	Voltage Category	Operating Voltage Range	Backplane Current	Power Supply Distance Rating
1769-IA8I	8 inputs, individually isolated	100/120V AC	79…132V AC, 47…63 Hz	90 mA @ 5.1V(1)	8
1769-IA16	16 inputs	100/120V AC	79…132V AC, 47…63 Hz	115 mA @ 5.1V	8
1769-IM12	12 inputs	200/240V AC	159…265V AC, 47…63 Hz	100 mA @ 5.1V	8
1769-OA8	8 outputs	100/240V AC	85…265V AC 47…63 Hz	145 mA @ 5.1V	8
1769-OA16	16 outputs	100/240V AC	85…265V AC 47…63 Hz	225 mA @ 5.1V	8

(1) Maximum is 190 mA.

DC Digital Modules

Cat. No.	Inputs/Outputs	Voltage Category	Operating Voltage Range	Backplane Current	Power Supply Distance Rating
1769-IG16	16 inputs	5V DC TTL	4.5...5.5V DC	120 mA @ 5.1V	8
1769-IQ16	16 inputs	24V DC sink/source	10...30V DC @ 30 °C (86 °F) 10...26.4V DC @ 60 °C (140 °F)	115 mA @ 5.1V	8
1769-IQ16F	16 inputs, high-speed	24V DC sink/source	10...30V DC @ 30 °C (86 °F) 10...26.4V DC @ 60 °C (140 °F)	100 mA @ 5.1V	8
1769-IQ32	32 inputs	24V DC sink/source	10...30V DC @ 30 °C (86 °F) 10...26.4V DC @ 60 °C (140 °F)	170 mA @ 5.1V	8
1769-IQ32T	32 inputs	24V DC sink/source	20.4...26.4V DC @ 60 °C (140 °F)	170 mA @ 5.1V	8
1769-IQ6XOW4	6 inputs 4 outputs	24V DC sink/source input AC/DC normally open relay contact outputs	10...30V DC @ 30 °C (86 °F) 10...26.4V DC @ 60 °C (140 °F)	105 mA @ 5.1V 50 mA @ 24V	8
1769-OB8	8 outputs	24V DC source	20.4...26.4V DC	145 mA @ 5.1V	8

Cat. No.	Inputs/Outputs	Voltage Category	Operating Voltage Range	Backplane Current	Power Supply Distance Rating
1769-OB16	16 outputs	24V DC source	20.4...26.4V DC	200 mA @ 5.1V	8
1769-OB16P	16 outputs, protected	24V DC source	20.4...26.4V DC	160 mA @ 5.1V	8
1769-OB32	32 outputs	24V DC source	20.4...26.4V DC	300 mA @ 5.1V	6
1769-OB32T	32 outputs	24V DC source	10.2...26.4V DC	220 mA @ 5.1V	8
1769-OG16	16 outputs	5V DC TTL	4.5...5.5V DC	200 mA @ 5.1V	8
1769-OV16	16 outputs	24V DC sink	20.4...26.4V DC	200 mA @ 5.1V	8
1769-OV32T	32 outputs	24V DC sink	10.2...26.4V DC	300 mA @ 5.1V	8

Contact Output Modules

Cat. No.	Inputs/Outputs	Operating Voltage Range	Backplane Current	Power Supply Distance Rating
1769-OW8	8 outputs	5...265V AC 5...125V DC	125 mA @ 5.1V 100 mA @ 24V	8
1769-OW8I	8 outputs, individually isolated	5...265V AC 5...125V DC	125 mA @ 5.1V 100 mA @ 24V	8
1769-OW16	16 outputs	5...265V AC 5...125V DC	205 mA @ 5.1V 180 mA @ 24V	8

Analog Modules

Cat. No.	Inputs/Outputs	Range	Resolution	Backplane Current	Power Supply Distance Rating
1769-IF4	4 inputs, differential or single-ended	±10V, 0...10V, 0...5V, 1...5V 0…20 mA, 4...20 mA	14 bits (unipolar) 14 bits plus sign (bipolar)	120 mA @ 5.1V 60 mA @ 24V	8
1769-IF4I	4 inputs, differential or single-ended, individually isolated	±10V, 0...10V, 0...5V, 1...5V 0…20 mA, 4...20 mA	16 bits (unipolar) 15 bits plus sign (bipolar)	145 mA @ 5.1V 125 mA @ 24V	8
1769-IF8	8 inputs, differential or single-ended	±10V, 0...10V, 0...5V, 1...5V 0…20 mA, 4...20 mA	16 bits (unipolar) 15 bits plus sign (bipolar)	120 mA @ 5.1V 70 mA @ 24V	8
1769-IF16C	16 inputs, single-ended	0…20 mA, 4...20 mA	16 bits (unipolar) 15 bits plus sign (bipolar)	190 mA @ 5.1V 70 mA @ 24V	8

Cat. No.	Inputs/Outputs	Range	Resolution	Backplane Current	Power Supply Distance Rating
1769-IF16V	16 inputs, differential	±10V, 0...10V, 0...5V, 1...5V	16 bits (unipolar) 15 bits plus sign (bipolar)	190 mA @ 5.1V 70 mA @ 24V	8
1769-IF4XOF2	4 differential or single-ended inputs 2 single-ended outputs	0...10V 0…20 mA	Input: 8 bits plus sign Output: 8 bits plus sign	120 mA @ 5.1V 160 mA @ 24V	8
1769-IF4FXOF2F	4 fast differential or single-ended inputs 2 fast single-ended outputs	±10V, 0...10V, 0...5V, 1...5V 0…20 mA, 4...20 mA	Input: 14 bits (unipolar) 14 bits plus sign (bipolar) Output: 13 bits (unipolar) 13 bits plus sign (bipolar)	220 mA @ 5.1V 120 mA @ 24V	8
1769-OF2	2 outputs, single-ended	±10V, 0...10V, 0...5V, 1...5V 0…20 mA, 4...20 mA	14 bits (unipolar) 14 bits plus sign (bipolar)	120 mA @ 5.1V 120 mA @ 24V	8
1769-OF4	4 outputs, single-ended	±10V, 0...10V, 0...5V, 1...5V 0…20 mA, 4...20 mA	15 bits plus sign unipolar and bipolar	120 mA @ 5.1V 170 mA @ 24V	8
1769-OF4CI	4 outputs, differential, individually isolated	0…20 mA 4...20 mA	16 bits (unipolar)	140 mA @ 5.1V 145 mA @ 24V	8
1769-OF4VI	4 outputs, differential, individually isolated	±10V 0...10V 0...5V 1...5V	15 bits plus sign (bipolar)	145 mA @ 5.1V 75 mA @ 24V	8
1769-OF8C	8 outputs, single-ended	0…20 mA 4...20 mA	16 bits (unipolar)	140 mA @ 5.1V 145 mA @ 24V	8
1769-OF8V	8 outputs, single-ended	±10V 0...10V 0...5V 1...5V	16 bits plus sign (bipolar)	145 mA @ 5.1V 125 mA @ 24V	8


BROWNS HILL
ENGINEERING & CONTROLS

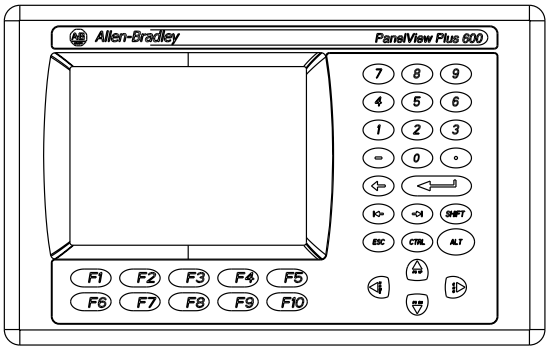
PanelView Plus Specifications

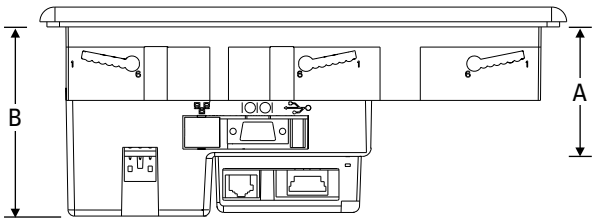
	PanelView Plus 400	PanelView Plus 600 Grayscale	PanelView Plus 600 Color		PanelView Plus 700	PanelView Plus 1000	PanelView Plus 1250	PanelView Plus 1500
								
D I S P L A Y								
Type	Monochrome Passive Matrix, Film Compensated Super-Twist Nematic (FSTN)		Color Active Matrix Thin Film Transistor (TFT)		Color Active Matrix Thin Film Transistor (TFT)			
Size	78 x 59 mm (3.7 in)	111 x 84 mm (5.5 in)	111 x 84 mm (5.5 in)		132 x 99 mm (6.5 in)	211 x 158 mm (10.4 in)	246 x 184 mm (12.1 in)	304 x 228 mm (15.1 in)
Resolution	320 x 240, 32 level grayscale		320 x 240, 18 bit color graphics		640 x 480, 18-bit color graphics		800 x 600, 18-bit color graphics	1024 x 768, 18-bit color graphics
Replaceable Backlight	No				Field Replaceable Backlight			No
Operator Input	Keypad	Keypad, Analog Touch Screen, or Combination			Keypad, Analog Touch Screen, or Combination			
Function Keys	8 Function Keys, F1-F8	10 Function Keys, F1-F10	10 Function Keys, F1-F10		22 Function Keys, F1-F10 & K1-K12	32 Function Keys, F1-F16 & K1-K16	40 Function Keys, F1-F20 & K1-K20	40 Function Keys, F1-F20 & K1-K20
Real time Clock	Battery-backed time clock timestamps critical data. Accuracy +/-2 minutes per month				Battery-backed clock timestamps critical data			
Memory Options Available Flash/RAM	Standard 32 MB/64 MB, Not Expandable				Standard: 32 MB/64 MB; Extended: 128 MB/128 MB (for full color bitmaps or recording data); Standard: Approx. 13 MB flash; Extended: 115 MB flash available for application storage			
E L E C T R I C A L								
Communication Port	RS-232 and (1) USB Only or Ethernet, RS-232, (1) USB, plus optional DH-485, DH+, or Remote I/O modules				Ethernet, RS-232, 2 USB plus optional DH +/DH-485/Remote I/O or ControlNet Modules			
Power Requirements	18-30 Vdc or 85-264 Vac @ 47-63 Hz				18-32 Vdc			
Power Consumption	DC Power: 25 Watts max. (1.0A @ 24 Vdc) AC Power: 60 VA max.				70 Watts max (2.9A@24 Vdc)			
Programming	RSView Studio for Machine Edition or RSView Studio Enterprise Series				RSView Studio for Machine Edition or RSView Studio Enterprise Series			
E N V I R O N M E N T A L								
Operating Temperature	0 - 55°C (32 - 131°F)				0 – 55°C (32 – 131°F)			
Storage Temperature	-25 – 70°C (-13 – 158°F)				-25 - 70°C (-13 - 158°F)			
Humidity	5 - 95%, noncondensing @ 0 - 55°C				5 – 95%, noncondensing @ 0 – 55°C			
Ratings	NEMA 12, 13, 4X[1], IP54, IP65				NEMA 12, 13, 4x[1], IP54, IP65			
Certifications	cUL certified; UL listed; Class 1, Div 2, Groups A, B, C, D; Class 2, Div 2, Groups F, G; Class 3, Div 1; CE marked; C-Tick				cUL certified; UL listed; Class 1, Div 2, Groups A, B, C, D; Class 2, Div 2, Groups F, G; Class 3, Div 1; CE marked; C-Tick			
M E C H A N I C A L								
Weight Keypad or Keypad/Touch	.562kg(1.24 lb)	.930kg (2.05 lb)	.930kg (2.05 lb)		1.9 kg (4.2 lb.)	2.9 kg (6.3 lb.)	3.4 kg (7.6 lb.)	4.6 kg (10 lb.)
Weight Touch Only	N/A	.789kg (1.74 lb)	.789kg (1.74 lb)		1.7kg (3.8 lb.)	2.6 kg (5.7 lb.)	3.2 kg (7.1 lb.)	4.2 kg (9.3 lb.)
Dimensions Overall (H x W x D)	Keypad: 152x185x90 mm (6.0x7.28x3.54 in)	Keypad or Keypad/Touch: 167x266x98 mm (6.58x10.47x3.86 in) Touch Only: 152x185x98 mm (6.0x7.28x3.86 in)			Keypad or keypad/touch: 193 x 290 x 55 mm (7.58 x 11.4 x 2.18 in) Touch only: 179 x 246 x 55 mm (7.04 x 9.68 x 2.18 in)	Keypad or keypad/touch: 248 x 399 x 55 mm (9.77 x 15.72 x 2.18 in) Touch only: 248 x 329 x 55 mm (9.77 x 12.97 x 2.18 in)	Keypad or keypad/touch: 282 x 416 x 55 mm (11.12 x 16.36 x 2.18 in) Touch only: 282 x 363 x 55 mm (11.12 x 14.3 x 2.18 in)	Keypad or keypad/touch: 330 x 469 x 65 mm (12.97 x 18.46 x 2.55 in) Touch only: 330 x 416 x 65 mm (12.97 x 16.37 x 2.55 in)
Cutout Dimensions	Keypad: 123x156 mm (4.86x6.15 in)	Keypad or Keypad/Touch: 142x241 mm (5.61x9.50 in) Touch Only: 123x156 mm (4.86x6.15 in)			Keypad or keypad/touch: 167 x 264 mm (6.57 x 10.39 in) Touch only: 154 x 220 mm (6.08 x 8.67 in)	Keypad or keypad/touch: 224 x 375 mm (8.8 x 14.75 in) Touch only: 224 x 305 mm (8.8 x 12 in)	Keypad or keypad/touch: 257 x 390 mm (10.11 x 15.35 in) Touch only: 257 x 338 mm (10.11 x 13.29 in)	Keypad or keypad/touch: 305 x 419 mm (12 x 16.5 in) Touch only: 305 x 391 mm (12 x 15.4 in)

[1] check for availability of outdoor rating

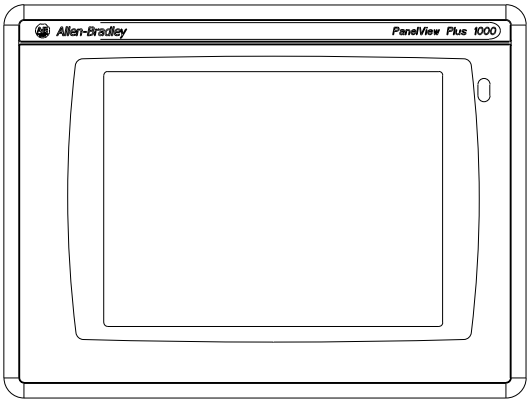
PanelView Plus Dimensions

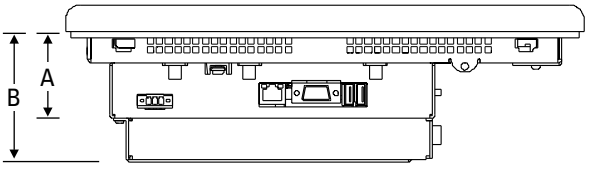
Typical PanelView Plus 400-600





Typical PanelView Plus 700-1500





PanelView Plus	Width	Height	Depth A	Depth B	Cutout width	Cutout height
400 Keypad	185 mm (7.28 in)	152 mm (6.00 in)	60 mm (2.35 in)	90 mm (3.53 in)	156 mm (6.15 in)	123 mm (4.86 in)
600 Keypad or Keypad/Touch	266 mm (10.47 in)	167 mm (6.58 in)	68 mm (2.68 in)	98 mm (3.86 in)	241 mm (9.50 in)	142 mm (5.61 in)
600 Touch	185 mm (7.28 in)	152 mm (6.00 in)	68 mm (2.68 in)	98 mm (3.86 in)	156 mm (6.15 in)	123 mm (4.86 in)
700 Keypad or Keypad/Touch	290 mm (11.40 in)	193 mm (7.58 in)	55 mm (2.17 in) display to logic module	83 mm (3.27 in) display to comm modules	264 mm (10.39 in)	167 mm (6.59 in)
700 Touch	246 mm (9.68 in)	179 mm (7.04 in)	55 mm (2.17 in) display to logic module	83 mm (3.27 in) display to comm modules	220 mm (8.67 in)	154 mm (6.08 in)
1000 Keypad or Keypad/Touch	399 mm (15.72 in)	248 mm (9.77 in)	55 mm (2.17 in) display to logic module	83 mm (3.27 in) display to comm modules	375 mm (14.75 in)	224 mm (8.8 in)
1000 Touch	329 mm (12.97 in)	248 mm (9.77 in)	55 mm (2.17 in) display to logic module	83 mm (3.27 in) display to comm modules	305 mm (12.00 in)	224 mm (8.8 in)
1250 Keypad or Keypad/Touch	416 mm (16.36 in)	282 mm (11.12 in)	55 mm (2.17 in) display to logic module	83 mm (3.27 in) display to comm modules	390 mm (15.35 in)	257 mm (10.11 in)
1250 Touch	363 mm (14.30 in)	282 mm (11.12 in)	55 mm (2.17 in) display to logic module	83 mm (3.27 in) display to comm modules	338 mm (13.29 in)	257 mm (10.11 in)
1500 Keypad or Keypad/Touch	469 mm (18.46 in)	330 mm (12.97 in)	65 mm (2.55 in) display to logic module	93 mm (3.65 in) display to comm module	419 mm (16.50 in)	305 mm (12.00 in)
1500 Touch	416 mm (16.37 in)	330 mm (12.97 in)	65 mm (2.55 in) display to logic module	93 mm (3.65 in) display to comm module	391 mm (15.40 in)	305 mm (12.00 in)

CONTROL DESCRIPTIONS

PART 1 - GENERAL PROGRAMMING REQUIREMENTS

1.01 PLC PROGRAMMING

A. Runtime Calculation
   1. Runtime shall be accumulated anytime the motor run status indicates the motor is running
      a. Regardless of HOA position status
   2. Runtime shall be calculated in tenths of hours
   3. Runtime shall automatically reset to zero to prevent register overflow or unstable PLC operation
   4. Minimum accumulated Runtime before reset shall be at least 30,000 hours

B. Start Counter Calculation
   1. Start Counter shall be incremented everytime the motor run status indicates the motor has started
      a. Regardless of HOA position status
   2. Start Counter shall automatically reset to zero to prevent register overflow or unstable PLC operation
   3. Minimum accumulated Start Count before reset shall be at least 30,000 starts

C. Analog Signal Scaling
   1. All Analog Signals shall be scaled in Engineering Units
   2. All calculations that utilize Analog Signals shall use the scaled value

D. Alarm Calculations
   1. All Alarms shall be calculated using a Proofing Timer
      a. The Timer duration shall be approriate for the alarm condition
   2. All Alarms Shall Be Latched
      a. The Operator will be required to Reset the Alarm on the HMI after the Alarm Condition has been Cleared
      b. Clearing the Alarm Latch shall not Reset the Proofing Timer
   3. Discrete Alarm Inputs shall be connected directly to the Proofing Timer
   4. Analog Alarm Inputs shall be compared to an Operator Enterable Alarm Setpoint
      a. The Alarm Setpoint shall be in the same units as the Scaled Analog Signal
      b. The proofing timer shall be activated when the scaled Analog value exceeds the Alarm Setpoint

E. Flowrate and Flow Total Calculations
   1. The flowrate shall be scaled in GPM
   2. The flowrate shall be Totalized in KGal with one decimal point.
   3. Two types of Flow Totals shall be calculated
      a. Continuous Running Flow Total
      b. 24 Hour Flow Total
   4. Flow Total Reset Function
      a. Any Totalized Flow shall automatically reset to prevent register overflow or unstable PLC operation
      b. Minimum accumulated flow total for the Running Flow Total shall be at least 1,000,000 KGal before automatic reset
      c. The 24 Hour Flow Total shall reset once a day at an Operator Enterable Time of Day

F. Program Documentation
   1. Documentation for all PLC programs shall include comments, tag/register descriptions, or any other programming tags. All PLC programs shall be documented with comments

provided for each subroutine, function and/or section. Use of abbreviations in comments and subroutine/section titles should be avoided. At the completion of the project, copies of programming, I/O list, memory map and communications map shall be provided in both printed and electronic format.

1.02 HUMAN MACHINE INTERFACE (HMI) PROGRAMMING

A. HMI Screen Layout and Navigation
   1. The HMI shall have, as a minimum, the following screens:
      a. Overview Screen to display entire process along with brief status and alarm conditions. This shall include graphical and digital displays of key parameters such as run status, alarm condition and flowrate for each system.
      b. One Screen showing complete status and alarms for each system.
      c. One dedicated Setpoint screen for each System.
      d. Trend Screen displaying analog trends for each system for 24 hour period, adjustable.
      e. One Screen for Autodialer status and control, as required.
         (1) One Screen for Communications status and control, as required.
      f. One Screen to Display Summary of Active Alarms.
      g. One Screen to Display Alarm Log
      h. A minimum of One Screen to Display Flow Totals
      i. Screen Navigation shall be as follows:
         (1) Each screen shall display a Title at the top of the screen describing the contents of the screen and the Time/Date shall be shown on the all screens in the same location.
         (2) From the Overview Screen, clicking on any portion of the system shall bring up the Status Screen for that portion of the system. In addition, there shall be a button to navigate to the Alarm Summary Screen and a button to navigate to the Menu Screen.
   2. On every screen, except for the Overview and Menu Screens, there shall be a button to navigate to the Overview and Menu Screens. These shall be the only navigation capability on these screens. The Overview and Menu Screen navigation buttons shall be in the same location on every screen

B. Tag database structure and configuration.
   1. The process control system tag database development shall include the definition of all device, derived and soft tags and the required alarm processing and data logging definitions for each tag.
   2. Tag naming convention.
      a. A tag naming convention shall be established which provides a structured organization to the tag database facilitating tag searches and substitutions during system development and management.
      b. Tag names shall minimally consist of two distinct components. The leading component shall represent the tag equipment number. The trailing component (tag descriptor) shall be an abbreviated description of the associated process variable or the function of the tag. Each component shall be assigned a fixed length depending on the software package specified.

C. Multiple HMIs
   1. The SCADA system will have Multiple HMIs
      a. iFix Terminals located in the Control Room and Remote Sites
      b. Touchscreens located in the PLC LCP
   2. The Operator shall be able to Monitor and Control all Systems from multiple HMIs

a. Any iFix Terminal
b. The Local Touchscreen
(1) Only Screens associated with the Local System will be provided on the Local Touchscreen

D. Analog Signals
1. All Analog Signals shall be Logged and Trended on the HMI in Engineering Units

E. Alarms
1. All Alarms shall be Logged and Displayed on the HMI

F. HMI Control Capability
1. Provide the following HMI Control Capability, as required
a. Manual/Auto System System Operation
b. System Start/Stop Setpoints and Speed Control Setpoints
c. System Runtime Schedule Setpoints
d. Alarm Setpoints and Acknowledgement

G. Graphical Display of Motors
1. All motors shall be displayed on the HMI and have dynamic graphical indication whether they are on or off. The motors shall be green for running and red for off.
2. All motors shall have runtime meter, start counters, and alarm status displayed near the motor's graphical display.
3. Every motor that has PLC control shall have a pop-up screen for each individual motor that is displayed by clicking on the motor's graphical symbol. This pop-up screen shall allow the operator to select manual or automatic operation for the motor. If the motor is controlled from a VFD then the operator shall be able to enter a speed set point for the VFD on the pop-up screen when the motor is in the manual control mode.
4. The control signals for all motors shall be displayed on the HMI. They shall include but not limited to:
a. HOA Switch in Auto
b. Run Indication
c. Overload or Fault Indication
d. Motor fail to start
(1) PLC calling the motor to run but no run signal report for 20 sec while the HOA is in Auto
e. E-stop Status

H. Graphical Display of Environmental Conditions
1. All Environmental signals and alarms associated with a system shall be displayed on a screen specifically designed for that system. They shall include but not limited to:
a. Door Open
b. Ambient Temperature
c. Water on the Floor
d. Hazardous Gas Sensor
e. HVAC Equipment

I. Graphical Display of Autodialer
1. The HMI shall have a screen for display and control of Autodialer alarms. This screen shall identify the alarms on each of the autodialer channels. The screen shall also include the status of each alarm and the ability for the operator to Disable each alarm that is sent to the autodialer.

1.03 COMMUNICATIONS

A. PLC-to-PLC Communications
1. All In-Plant Communications shall be ethernet based

2. All Communications shall be initiated by one designated PLC
    a. The Designated PLC will perform Read or Write Operations, as necessary, to obtain and distribute the required control and monitoring signals

B. HMI Communications
1. In-Plant
    a. The HMI I/O drivers shall be allowed to connect to each PLC
2. Remote Sites
    a. The HMI I/O drivers shall only connect to a single, designated PLC
    b. The Designated PLC will perform Read or Write Operations, as necessary, to obtain and distribute the required control and monitoring signals

PART 2 - HEADWORKS SYSTEM PROGRAMMING REQUIREMENTS

2.01 GRIT SYSTEM

A. Grit System Equipment:
1. Grit Collector: GC-1, GC-2
2. Grit Pump: GP-1, GP-2
3. Grit Classifier: GW-1

B. Graphical Display
1. Provide Graphical Display for each motor per the HMI General Programming Requirements
2. Provide Graphical Display for each motor per the HMI General Programming Requirements

C. Motor Runtime
1. Calculate Runtime for each motor per the PLC General Programming Requirements
2. Display Runtime for each motor per the HMI General Programming Requirements

D. Motor Start Counter
1. Calculate Start Count for each motor per the PLC General Programming Requirements
2. Display Start Count for each motor per the HMI General Programming Requirements

E. Alarms
1. Calculate Alarms for each motor per the PLC General Programming Requirements
2. Log and Display Alarms for each motor per the HMI General Programming Requirements
3. Alarm Conditions are:
    a. Motor Overload or Fault Condition
    b. E-Stop Activated

F. Hazardous Environment Condition Shutdown
1. Hazardous Environment Condition may exist if any Hazardous Gas Alarm is active
    a. Methane Gas Alarm
    b. Sulfide Gas Alarm
    c. Oxygen Gas Alarm
        (1) See Building Environmental Alarms
2. PLC shall command all Equipment to Shutdown in the event of a Hazardous Environment Condition

2.02 SCREENING SYSTEM

A. Screening Equipment:
1. Screens: SC-1, SC-2
2. Screenings Washer/Compactor: SW-1, SW-2

3. Screenings Conveyor: CV-1

B. Graphical Display
   1. Provide Graphical Display for each motor per the HMI General Programming Requirements
   2. Provide Graphical Display for each motor per the HMI General Programming Requirements

C. Motor Runtime
   1. Calculate Runtime for each motor per the PLC General Programming Requirements
   2. Display Runtime for each motor per the HMI General Programming Requirements

D. Motor Start Counter
   1. Calculate Start Count for each motor per the PLC General Programming Requirements
   2. Display Start Count for each motor per the HMI General Programming Requirements

E. Alarms
   1. Calculate Alarms for each motor per the PLC General Programming Requirements
   2. Log and Display Alarms for each motor per the HMI General Programming Requirements
   3. Alarm Conditions are:
      a. General Fault
      b. E-Stop Activated

F. Hazardous Environment Condition Shutdown
   1. Hazardous Environment Condition may exist if any Hazardous Gas Alarm is active
      a. Methane Gas Alarm
      b. Sulfide Gas Alarm
      c. Oxygen Gas Alarm
         (1) See Building Environmental Alarms
   2. PLC shall command all Equipment to Shutdown in the event of a Hazardous Environment Condition

2.03 BUILDING ENVIRONMENTAL MONITORING

A. Building Environmental Monitoring Equipment
   1. High Temperature Alarm
      a. Process Area – Upper Level
      b. Electrical Room
   2. Smoke Alarm
      a. Process Area – Upper Level
      b. Electrical Room
   3. Methane Gas Alarm
      a. Process Area – Upper Level
      b. Process Area – Lower Level
   4. Sulfide Gas Alarm
      a. Process Area – Upper Level
      b. Process Area – Lower Level
   5. Oxygen Gas Alarm
      a. Process Area – Upper Level
      b. Process Area – Lower Level
   6. Water on Floor Alarm
      a. Process Area – Lower Level
   7. Process Area Door Open
   8. Electrical Room Door Open

B. Calculate Alarm for each Discrete Alarm Input per the PLC General Programming Requirements
    1. Excluding Door Switches
C. Log and Display each Alarm per the HMI General Programming Requirements
D. Display Door Switch Position per the HMI General Programming Requirements
E. PLC shall Activate Alarm Light output when an Alarm Condition is Active

2.04 BUILDING ENVIRONMENTAL SYSTEM

A. Headworks Building Environmental Equipment
    1. AHU
    2. Supply Fan
B. Graphical Display
    1. Provide Graphical Display for each motor per the HMI General Programming Requirements
    2. Provide Graphical Display for each motor per the HMI General Programming Requirements
C. Motor Runtime
    1. Calculate Runtime for each motor per the PLC General Programming Requirements
    2. Display Runtime for each motor per the HMI General Programming Requirements
D. Motor Start Counter
    1. Calculate Start Count for each motor per the PLC General Programming Requirements
    2. Display Start Count for each motor per the HMI General Programming Requirements

2.05 FLOWMETER

A. Flowmeter Equipment
    1. Influent Flowmeter
B. Scale Flowrate per PLC General Programming Requirements
C. Totalize Flowrate per PLC General Programming Requirements
D. Display Flowrate and Flow Totals per HMI General Programming Requirements
E. Log and Trend Flowrate per HMI General Programming Requirements

2.06 ANALOG SIGNALS

A. Grit System Equipment Current Draw
    1. Grit System Equipment
        a. Grit Collector: GC-1, GC-2
        b. Grit Pump: GP-1, GP-2
        c. Grit Classifier: GW-1
    2. Scale Current Draw per PLC General Programming Requirements
    3. Display Current Draw per HMI General Programming Requirements
    4. Log and Trend Current Draw per HMI General Programming Requirements
B. Screening System Equipment Current Draw
    1. Screening System Equipment
        a. Screens: SC-1, SC-2
        b. Screenings Washer/Compactor: SW-1, SW-2
        c. Screenings Conveyor: CV-1
    2. Scale Current Draw per PLC General Programming Requirements
    3. Display Current Draw per HMI General Programming Requirements
    4. Log and Trend Current Draw per HMI General Programming Requirements

2.07 AUTOSAMPLER

A. Autosampler Equipment
   1. Influent Autosampler
B. PLC shall send a 4-20 mA Signal to Autosampler
   1. Influent Autosampler
      a. Scale Influent Flowrate signal from Engineering units into 4-20 mA Signal
C. Coordinate Span of 4-20 mA signal with Autosampler Analog Input Scaling

2.08 PLC LCP MONITORING

A. PLC LCP Monitoring Equipment
   1. PLC Utility Power Fail
   2. PLC UPS Power Fail
B. Calculate Alarm for each Discrete Alarm Input per the PLC General Programming Requirements
C. Log and Display each Alarm per the HMI General Programming Requirements

END SECTION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Section 5:

Shop Drawings

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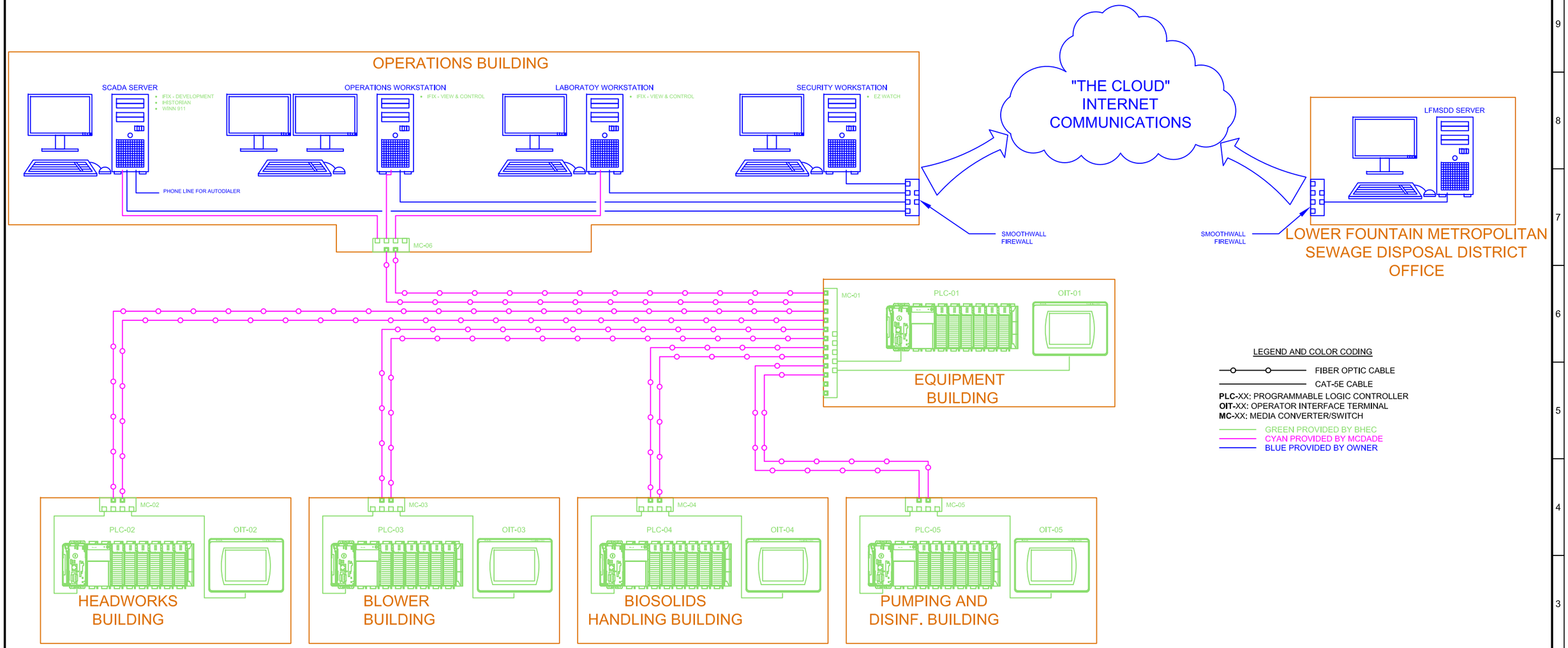

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ADJUST SCALES ACCORDINGLY

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XREF2 ID
XREF3 ID

REVISIONS

REV.	DESCRIPTION	BY	DATE	APP.
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GENERAL CONTRACTOR

WEAVER GENERAL CONSTRUCTION

3679 S. HURON ST. STE 404
ENGLEWOOD, CO 80110
303.789.4111 303.789.4310 FAX

ELECTRICAL CONTRACTOR

McDADE-WOODCOCK

7222 COMMERCE CENTER DR STE. 245
COLORADO SPRINGS, CO 80919
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720.344.7771 720.344.7460 FAX

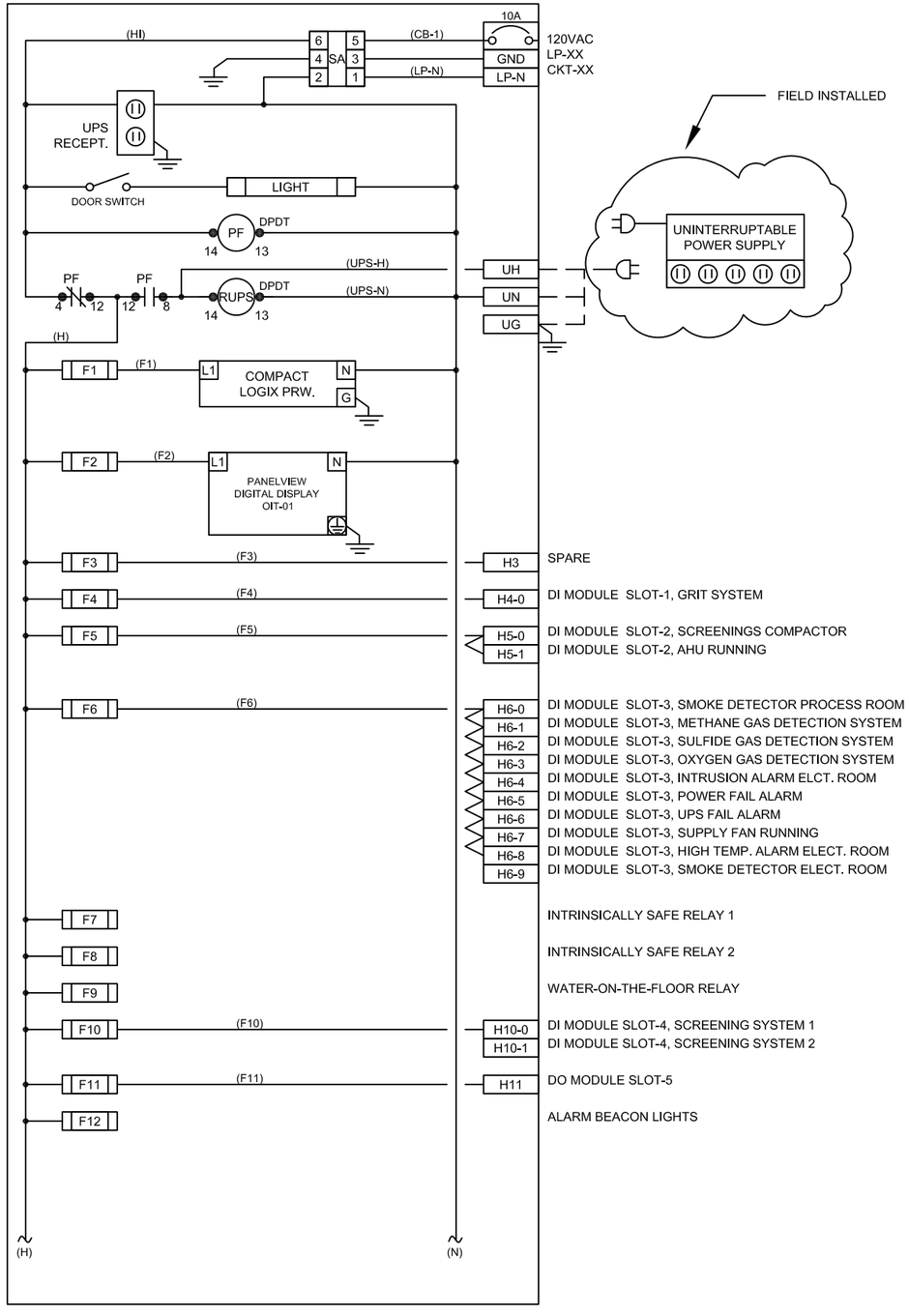
HAROLD D. THOMPSON REGIONAL WATER RECLAMATION FACILITY PHASE 1

NETWORK COMMUNICATIONS
DIAGRAM

DESIGNED BY:	LAA
DRAWN BY:	LAA
APPROVED BY:	TFW
JOB ID:	11-278
DATE:	09/11

02
Y


BROWNS HILL
ENGINEERING & CONTROLS



FUSE ASSIGNMENT		
FUSE	RATING	PART #
F1	GMA-1A	1A
F2	GMA-1A	1A
F3	GMA-1A	1A
F4	GMA-250MA	250mA
F5	GMA-250MA	250mA
F6	GMA-1A	1A
F7	GMA-500MA	500mA
F8	GMA-500MA	500mA
F9	GMA-500MA	500mA
F10	GMA-250MA	250mA
F11	GMA-10A	10A
F12	GMA-500MA	500mA
F13	GMA-1A	1A
F14	GMA-500MA	500mA
F15	GMA-250MA	250mA
F16	GMA-250MA	250mA
F17	GMA-250MA	250mA
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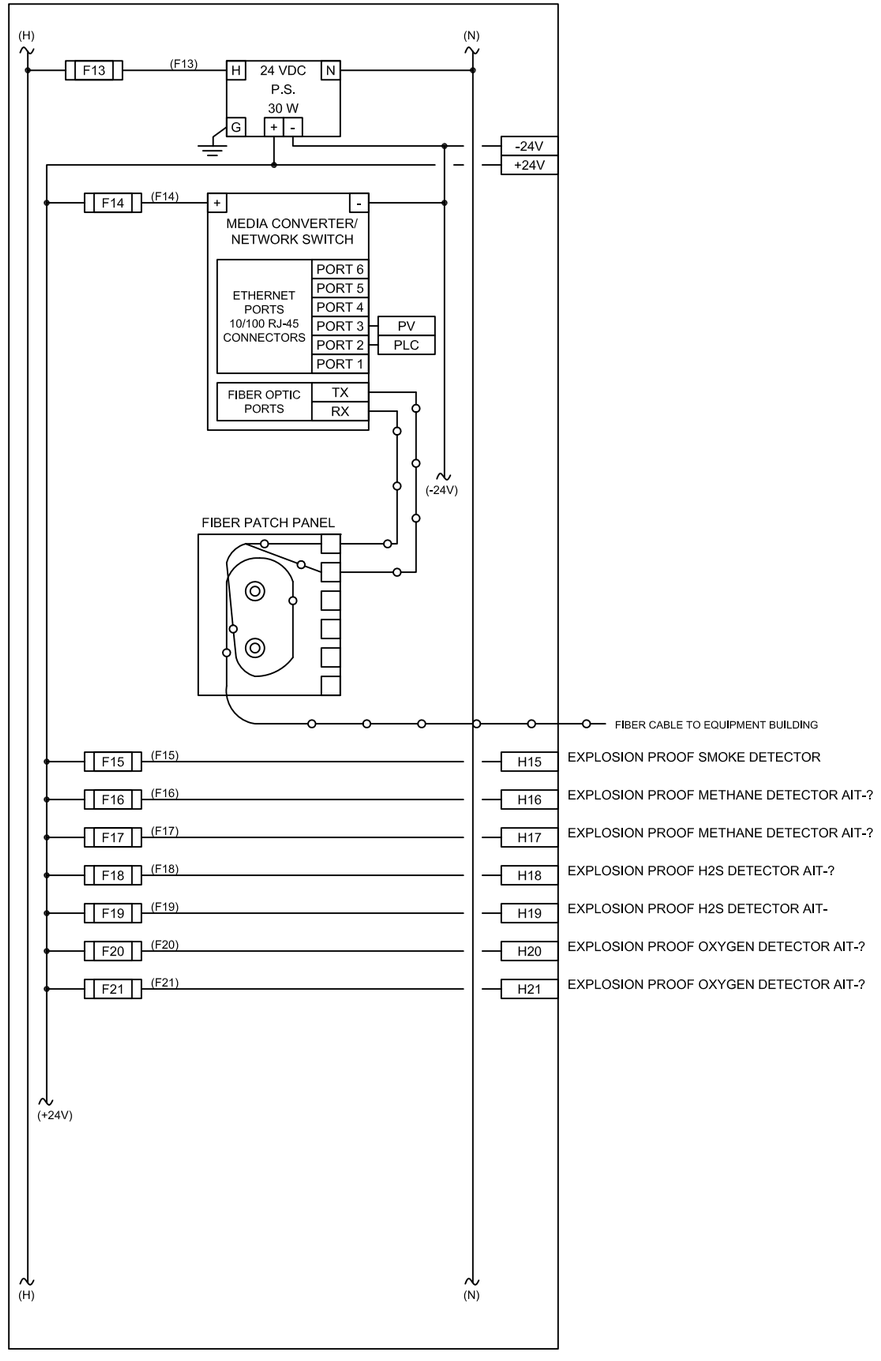
F21	GMA-250MA	250mA



NOTES
ALL TERMINALS WITH THE SAME LABEL ARE JUMPERED TOGETHER
WIRES WITH OUT A LABEL SHALL BE LABELED WITH THE SAME LEGEND AS THE TERMINAL BLOCK
ALL FIELD WIRE SHALL BE COPPER WIRE, AND TORQUE PER MANUFACTURER RECOMMENDATIONS
CONDUIT FITTINGS, HUBS OR ANY OTHER PENETRATIONS SHALL BE APPROVED TO MAINTAIN THE NEMA / TYPE RATING OF THE ENCLOSURE PROVIDED.

1"
IF THIS LINE IS NOT EQUAL TO ONE INCH ADJUST SCALES ACCORDINGLY

XREF1 ID
XREF2 ID
XREF3 ID

REVISIONS				
REV.	DESCRIPTION	BY	DATE	APP.
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HAROLD D. THOMPSON REGIONAL WATER RECLAMATION FACILITY PHASE 1

HEADWORKS PLC
POWER DISTRIBUTION

DESIGNED BY: LAA
DRAWN BY: LAA
APPROVED BY: TFW
JOB ID: 11-278
DATE: 09/11
03
Y


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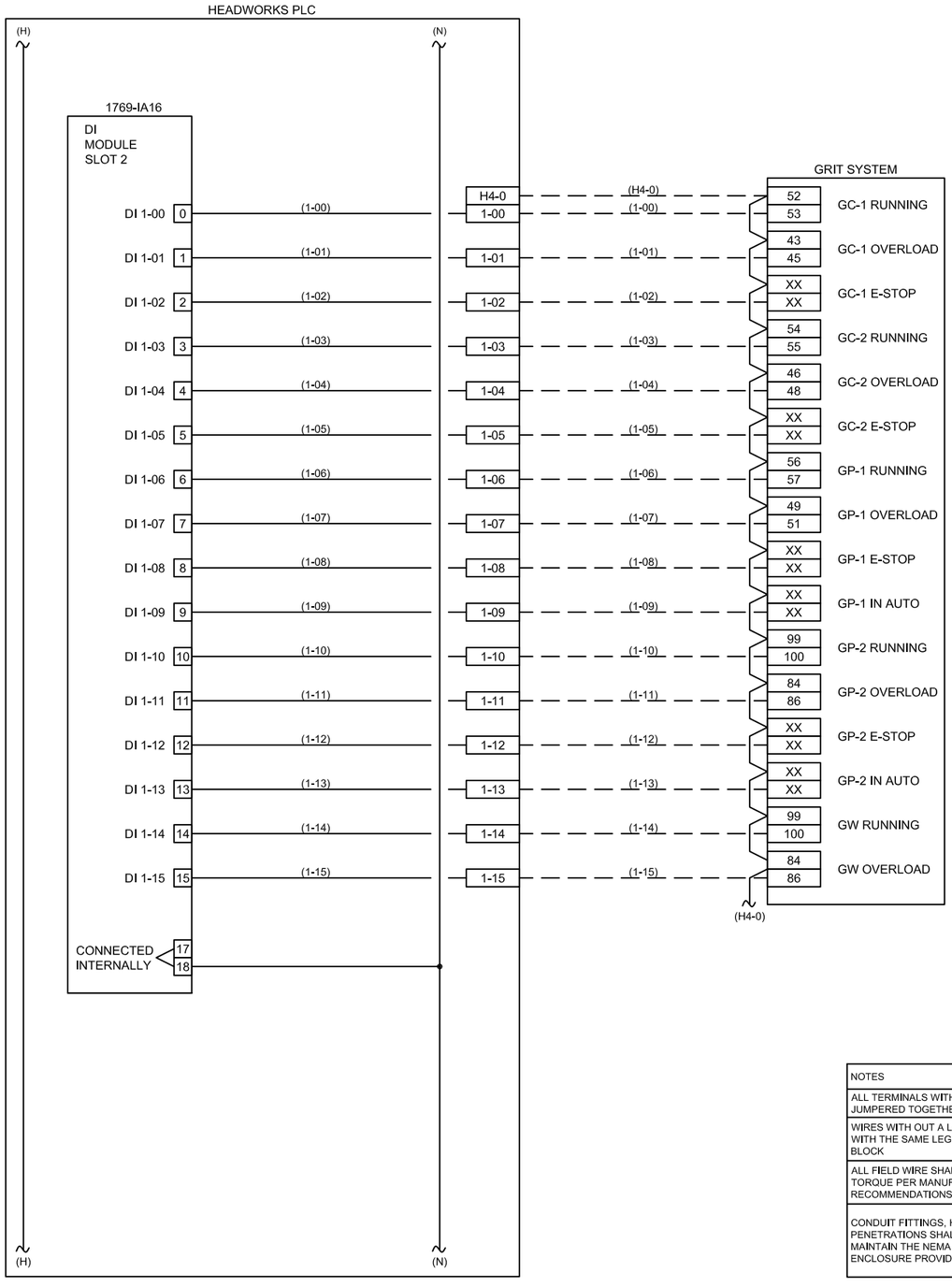

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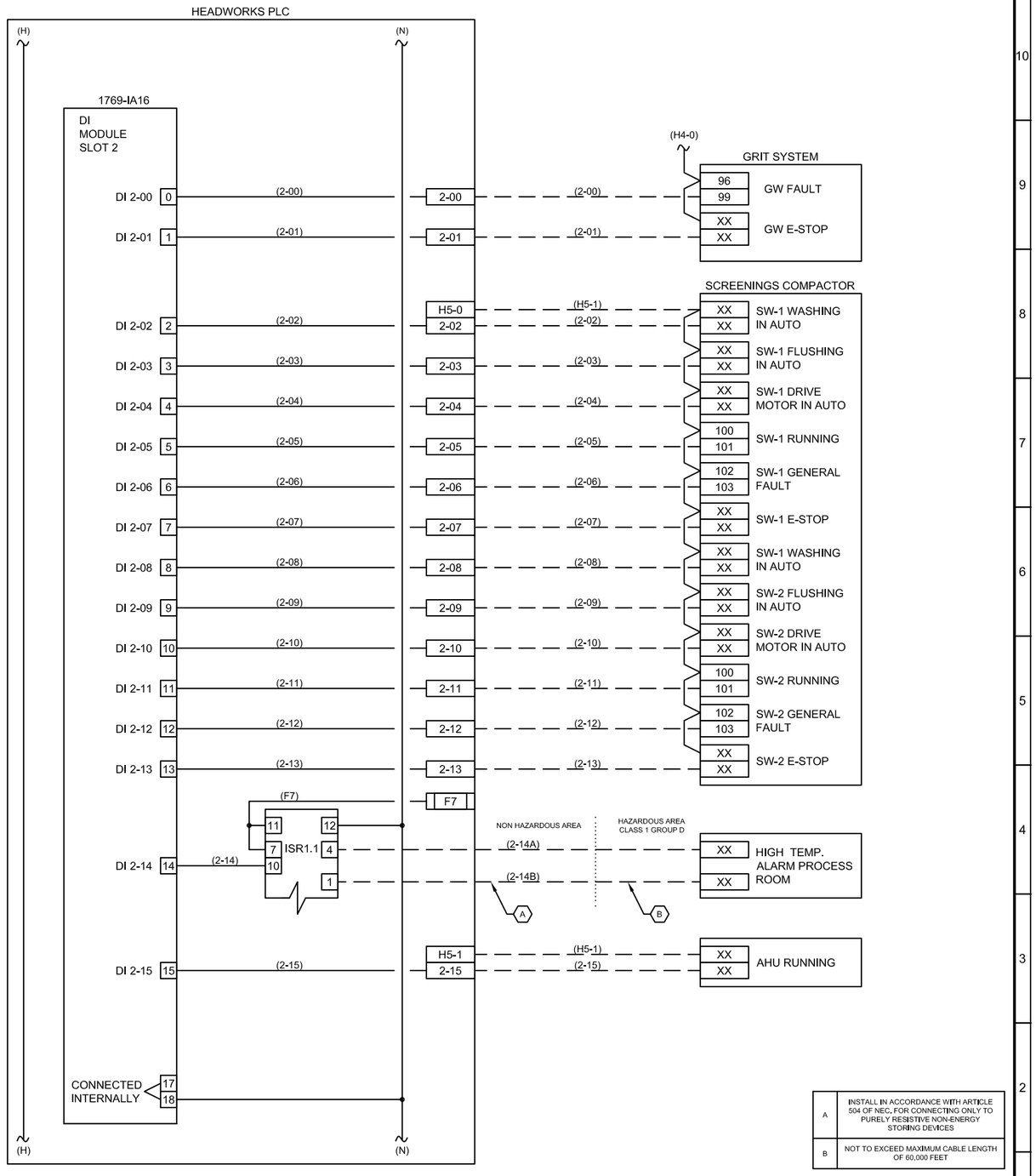
CONDUIT FITTINGS, HUBS OR ANY OTHER PENETRATIONS SHALL BE APPROVED TO MAINTAIN THE NEMA / TYPE RATING OF THE ENCLOSURE PROVIDED.



A	INSTALL IN ACCORDANCE WITH ARTICLE 504 OF NEC. FOR CONNECTING ONLY TO PURELY RESISTIVE NON-ENERGY STORING DEVICES
B	NOT TO EXCEED MAXIMUM CABLE LENGTH OF 60,000 FEET

1" IF THIS LINE IS NOT EQUAL TO ONE INCH ADJUST SCALES ACCORDINGLY

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XREF2 ID
XREF3 ID

REVISIONS

REV.	DESCRIPTION	BY	DATE	APP.
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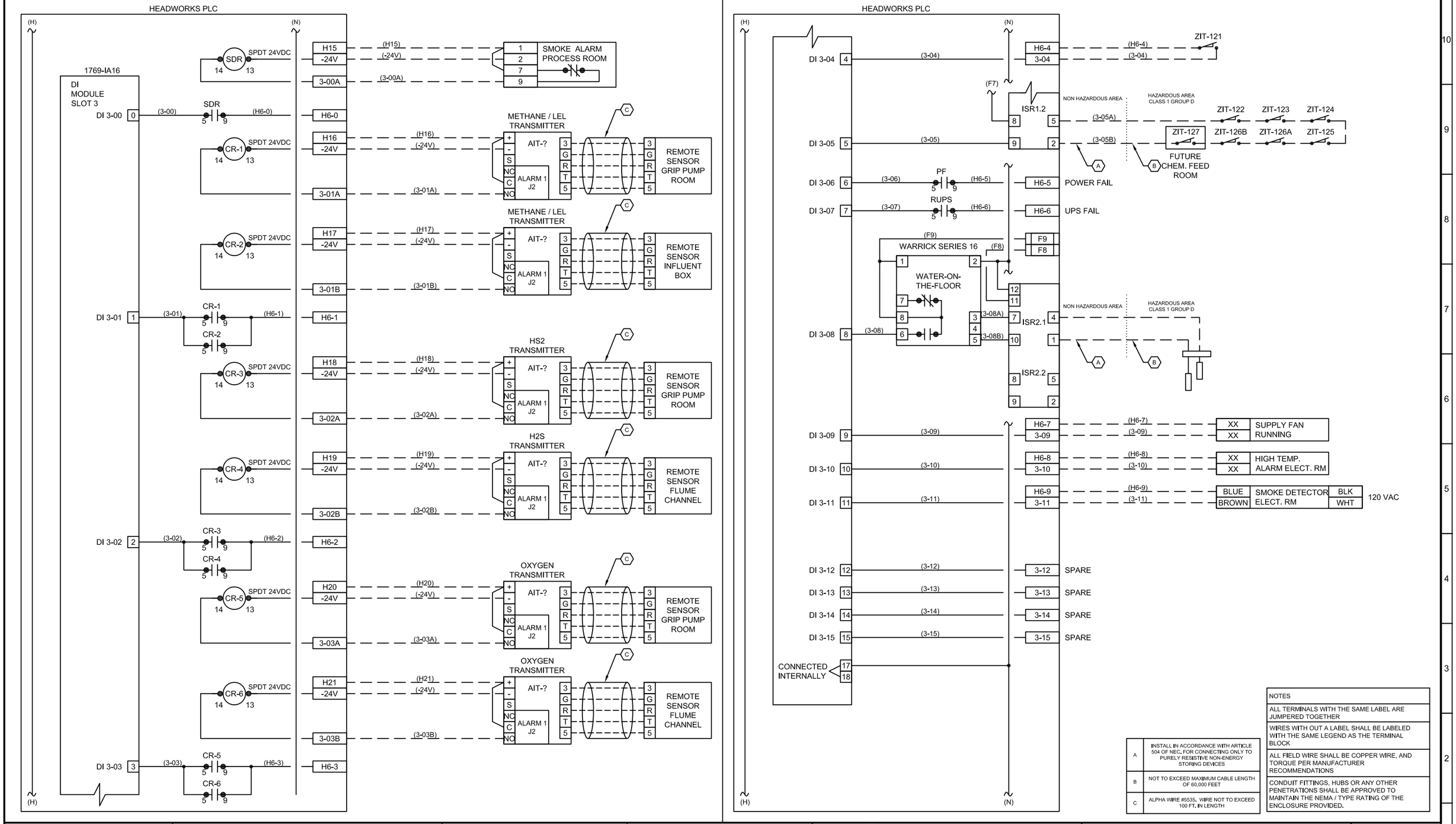
HAROLD D. THOMPSON REGIONAL WATER RECLAMATION FACILITY PHASE 1

HEADWORKS PLC
DIGITAL INPUT CARDS 1 & 2
WIRING DIAGRAM

DESIGNED BY:	LAA
DRAWN BY:	LAA
APPROVED BY:	TFW
JOB ID:	11-278
DATE:	09/11
04	Y


BROWNS HILL
ENGINEERING & CONTROLS



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XREF2 ID
XREF3 ID

REVISIONS				
REV.	DESCRIPTION	BY	DATE	APP.
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GENERAL CONTRACTOR
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3679 S. HURON ST. STE 404
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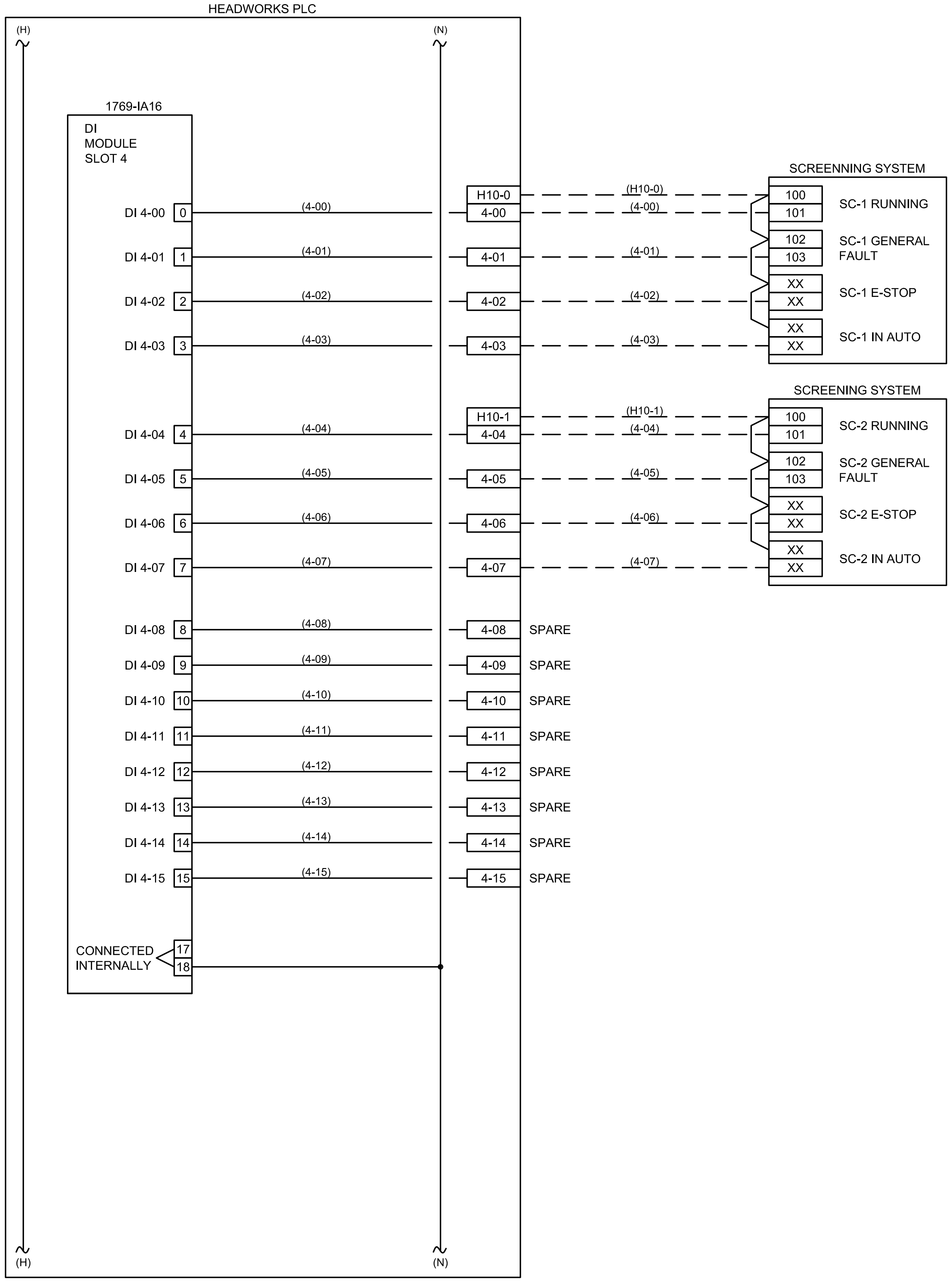
HAROLD D. THOMPSON REGIONAL WATER RECLAMATION FACILITY PHASE 1

HEADWORKS PLC
DIGITAL INPUT CARD 3
WIRING DIAGRAM

DESIGNED BY: LAA
DRAWN BY: LAA
APPROVED BY: TFW
JOB ID: 11-278
DATE: 09/11

05
Y


BROWNS HILL
ENGINEERING & CONTROLS



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IF THIS LINE IS NOT EQUAL TO ONE INCH ADJUST SCALES ACCORDINGLY (1")

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XREF1 ID
XREF2 ID
XREF3 ID

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HAROLD D. THOMPSON REGIONAL WATER RECLAMATION FACILITY PHASE 1

HEADWORKS PLC
DIGITAL INPUT CARD 4
WIRING DIAGRAM

DESIGNED BY: LAA
DRAWN BY: LAA
APPROVED BY: TFW
JOB ID: 11-278
DATE: 09/11

06
Y


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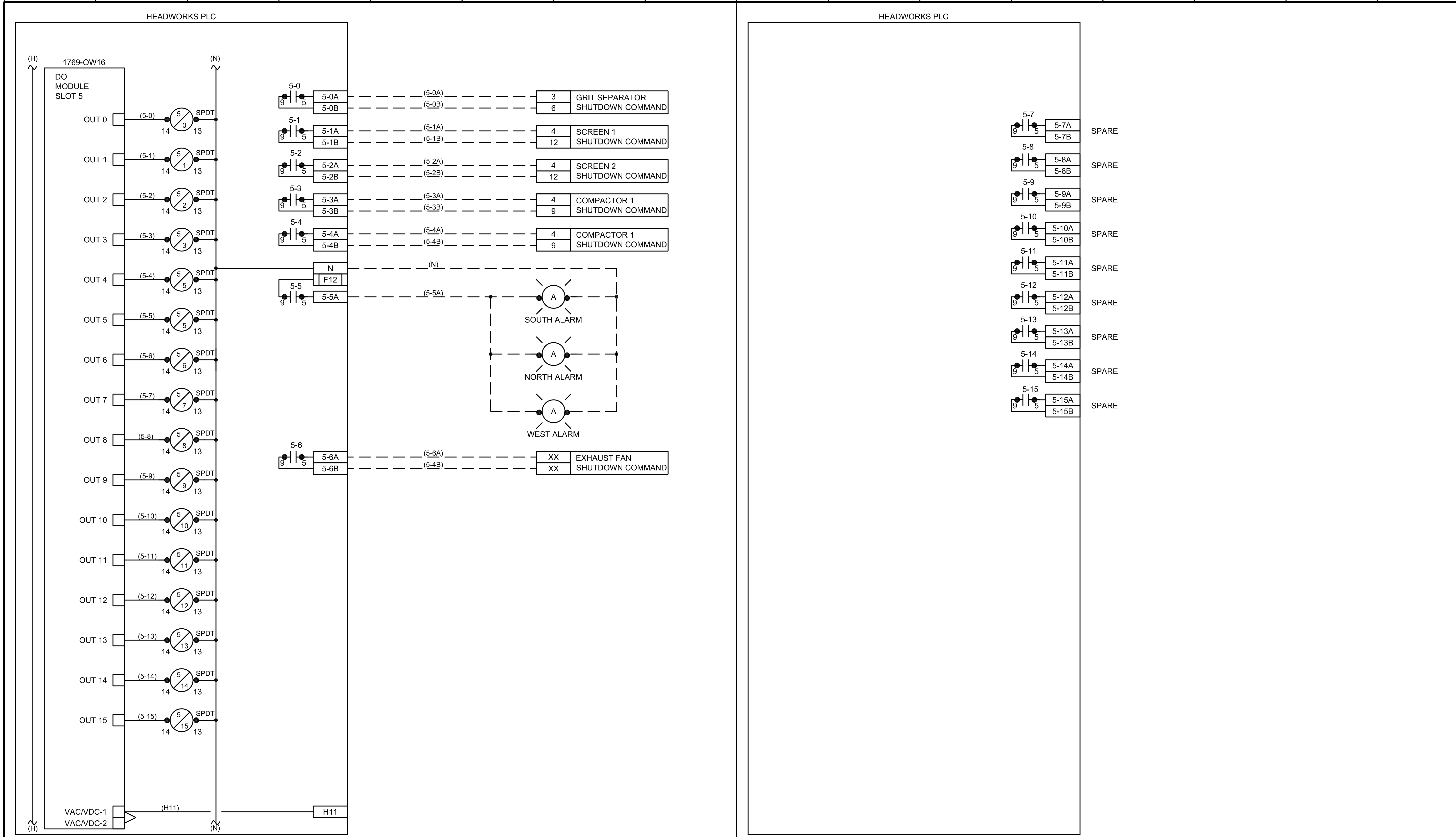

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IF THIS LINE IS NOT EQUAL TO ONE INCH ADJUST SCALES ACCORDINGLY

XREF1 ID
XREF2 ID
XREF3 ID

REVISIONS

REV.	DESCRIPTION	BY	DATE	APP.
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GENERAL CONTRACTOR

WEAVER GENERAL CONSTRUCTION

3679 S. HURON ST. STE 404
ENGLEWOOD, CO 80110
303.789.4111 303.789.4310 FAX

ELECTRICAL CONTRACTOR

McDADE-WOODCOCK

7222 COMMERCE CENTER DR STE. 245
COLORADO SPRINGS, CO 80919
719.264.1236 719.264.1450 FAX

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HAROLD D. THOMPSON REGIONAL WATER RECLAMATION FACILITY PHASE 1

HEADWORKS PLC
DIGITAL OUTPUT CARD 5
WIRING DIAGRAM

DESIGNED BY: LAA
DRAWN BY: LAA
APPROVED BY: TFW
JOB ID: 11-278
DATE: 09/11

07
Y


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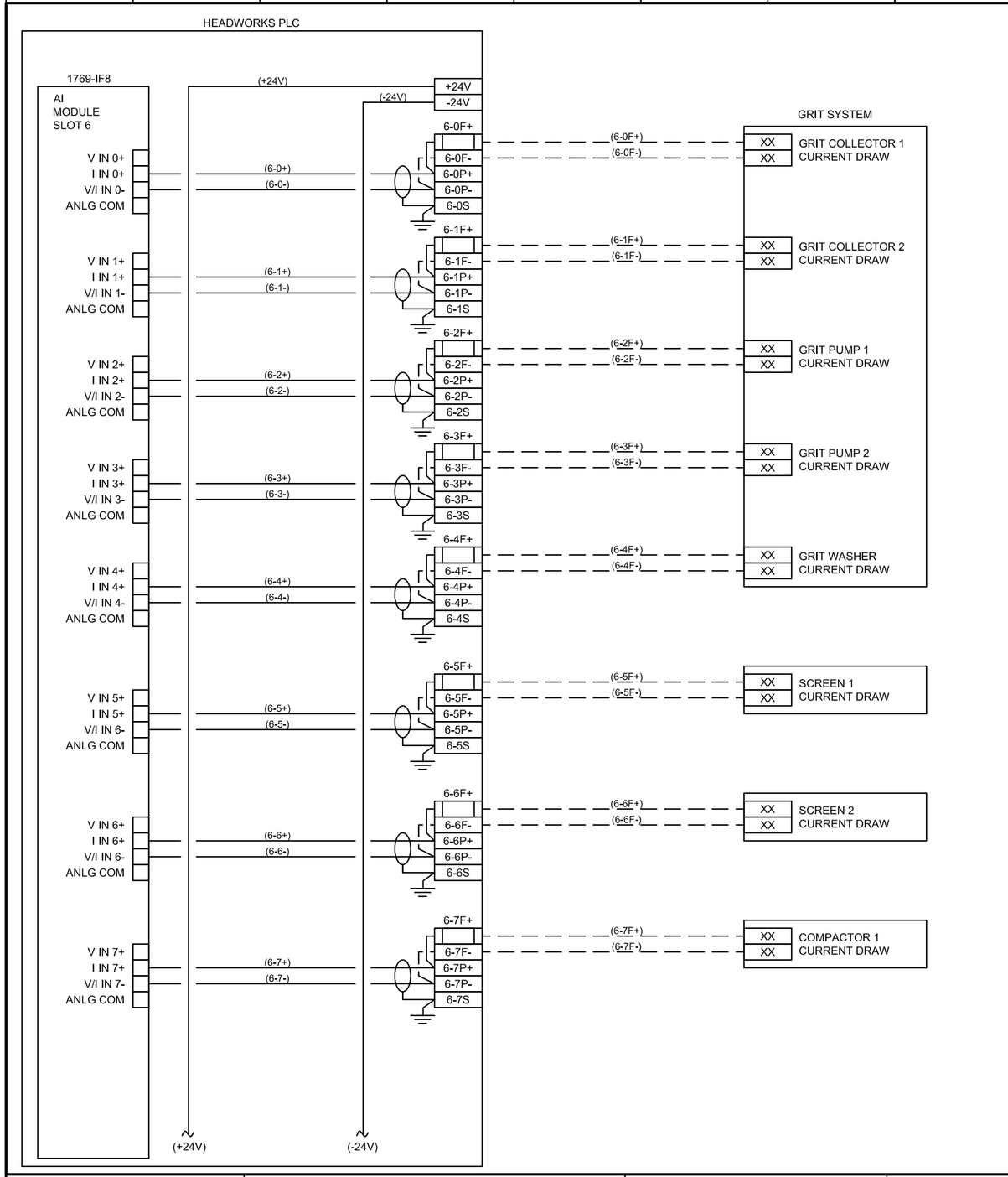
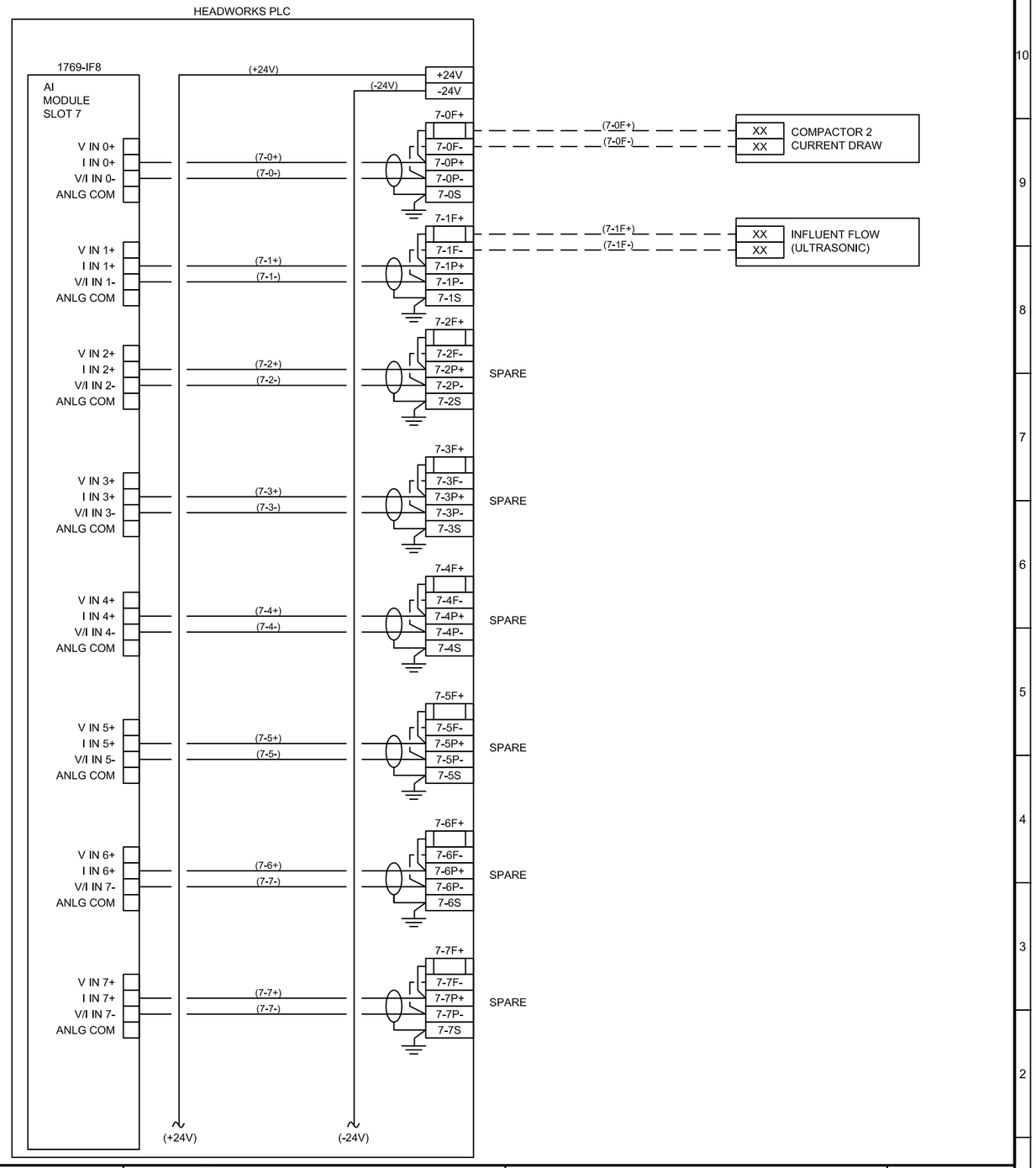
ENGINEERING & CONTROLS





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ENGLEWOOD, CO 80110
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ELECTRICAL CONTRACTOR

McDADE-WOODCOCK

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COLORADO SPRINGS, CO 80919
719.264.1236 719.264.1450 FAX

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ENGINEERING & CONTROLS
720.344.7771 720.344.7460 FAX

HAROLD D. THOMPSON REGIONAL WATER RECLAMATION FACILITY PHASE 1

HEADWORKS PLC
ANALOG INPUT CARDS 6 & 7
WIRING DIAGRAM

DESIGNED BY: LAA
DRAWN BY: LAA
APPROVED BY: TFW
JOB ID: 11-278
DATE: 09/11

08
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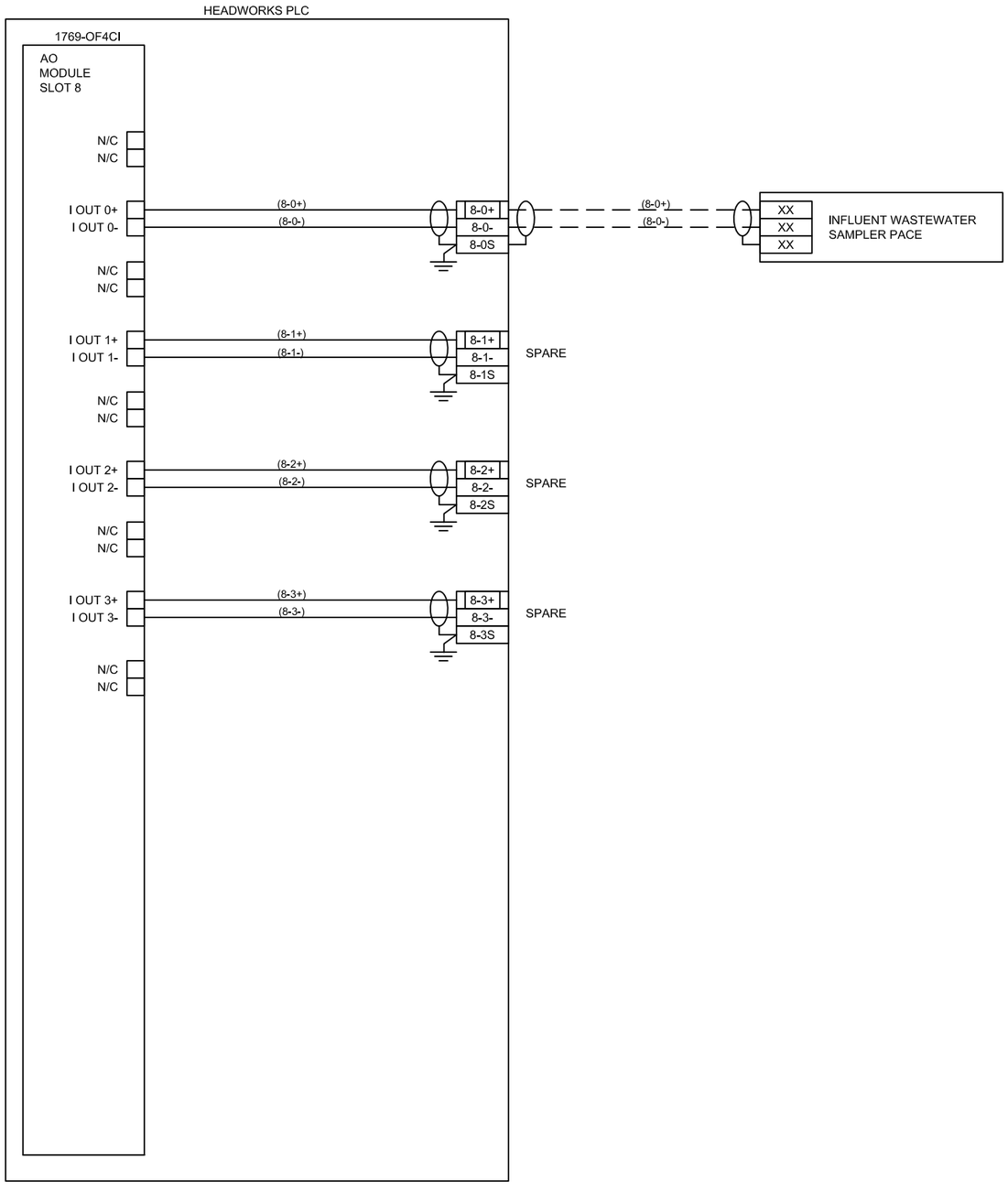
ENGINEERING & CONTROLS



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WEAVER GENERAL CONSTRUCTION

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ENGLEWOOD, CO 80110
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ELECTRICAL CONTRACTOR

McDADE-WOODCOCK

7222 COMMERCE CENTER DR STE. 245
COLORADO SPRINGS, CO 80919
719.264.1236 719.264.1450 FAX

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HAROLD D. THOMPSON REGIONAL WATER RECLAMATION FACILITY PHASE 1

HEADWORKS PLC
ANALOG OOUTPUT CARD 8
WIRING DIAGRAM

DESIGNED BY:	LAA
DRAWN BY:	LAA
APPROVED BY:	TFW
JOB ID:	11-278
DATE:	09/11

09
Y


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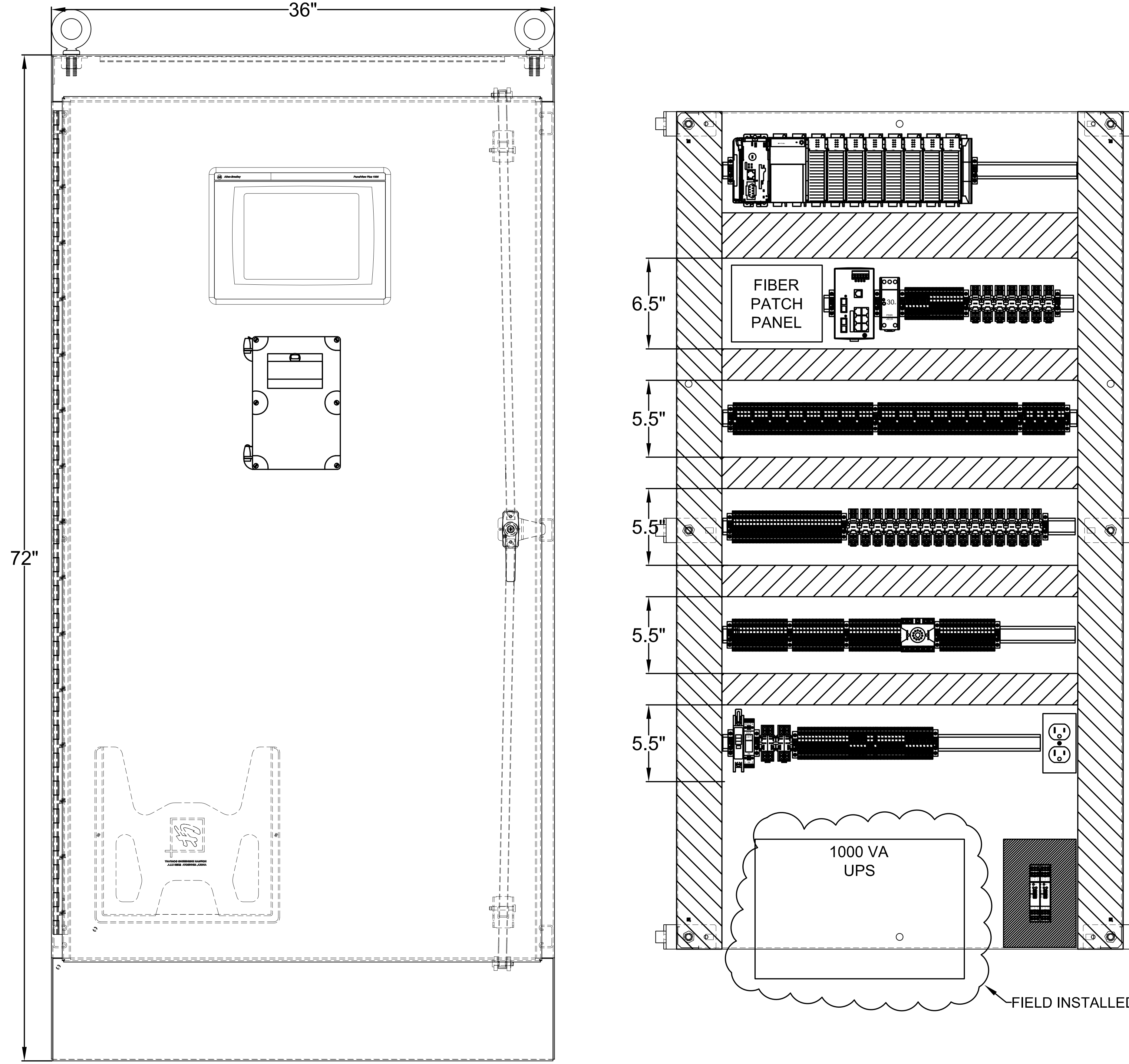

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HAROLD D. THOMPSON REGIONAL WATER RECLAMATION FACILITY PHASE 1

HEADWORKS PLC CONTROL PANEL LAYOUT

DESIGNED BY: LAA
DRAWN BY: LAA
APPROVED BY: TFW
JOB ID: 11-278
DATE: 09/11

10 Y


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