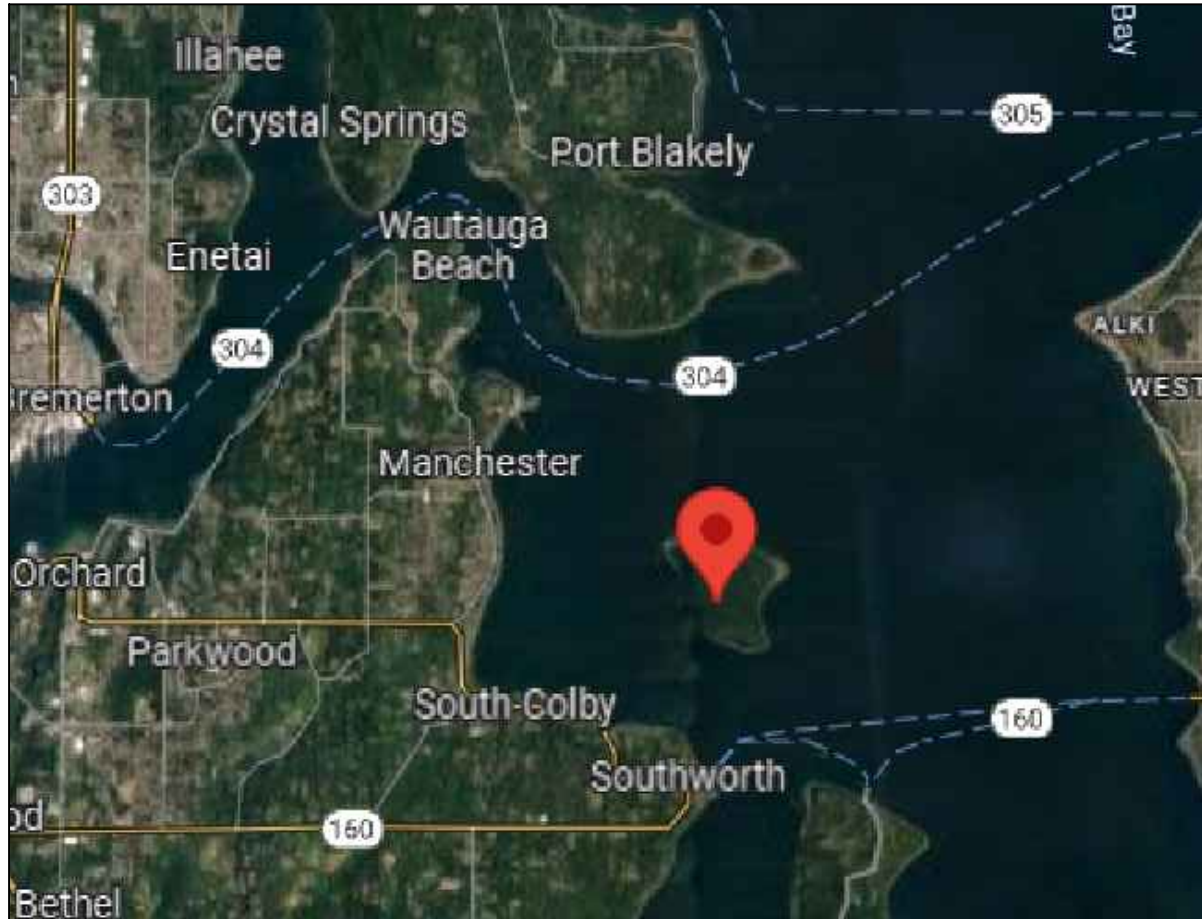




PROJECT NAME

SITE ADDRESS

PROJECT NO.: 1122163

This is a sample submittal for reference purposes. Part #'s, sizes, cabinet layout may change per customer specifications, and needs.

WORK ORDER #: WO-20**

WAPITI / 3R VALVE CONTACT INFORMATION:

UL CERTIFICATION #: E495685

PATENT#: 18/061, 658

Klarquist Ref. #: 10184-104051-03

ENGINEER

WAPITI CONSULTING
2207 W. DAKOTA AVE.
HAYDEN, ID 83835
CONTACT: MATT JOHNSON, P.E.

(208) 651-1120

3R VALVE

29299 MADISON RD
ECHO, OR 97826

(541) 376-8107

PROJECT CONTACT INFORMATION:

COMPANY NAME

ADDRESS
WADDELL, AZ 85355
FAX: (---) --- - ----

PHONE: (---) *** - ****

ENGINEER/ ARCHITECT

NAME
ADDRESS
CONTACT: TBD

PHONE: (602) 957-1155

CONTRACTOR

T.B.D.
--
--

(TBD)



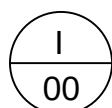
2207 W. DAKOTA | Hayden, ID 83835
www.wapiti-consulting.com
(208) 651-1120

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NO.	DATE	REVISION	BY
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SAMPLE
SITE NAME
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MPJ	MPJ
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WO-20**	NEK
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DWG NO	
I-00	
SHEET NO	
1 OF 21	



COVER PAGE: SITE NAME INJECTION WELL

NO SCALE

WHITE CLAW SHEET INDEX	
PAGE	PAGE REFERENCE
I-00	COVER SHEET
M-01	3R VALVE ELEVATION
E-00	ELECTRICAL LEGEND
E-01	ELECTRICAL BILL OF MATERIALS (B.O.M.)
E-01 (B)	(B.O.M.) -CONTINUED-
E-01 (C)	(B.O.M.) -CONTINUED-
E-02	SKID ELEVATION
E-03	CONTROL PANEL LAYOUT
E-04	PLC & TERMINAL BLOCK LAYOUT
E-04 (B)	PLC & TERMINAL BLOCK LAYOUT -CONTINUED-
E-04 (C)	PLC & TERMINAL BLOCK LAYOUT -CONTINUED-
E-05	120VAC POWER WIRING DIAGRAM
E-06	120VAC FUSE BLOCK DIAGRAM
E-07	24VDC POWER WIRING DIAGRAM
E-08	SLOT 2: ANALOG INPUT WIRING DIAGRAM
E-09	SLOT 3: 120VAC DISCRETE INPUT WIRING DIAGRAM
E-10	SLOT 4: 120VAC DISCRETE OUTPUT WIRING DIAGRAM

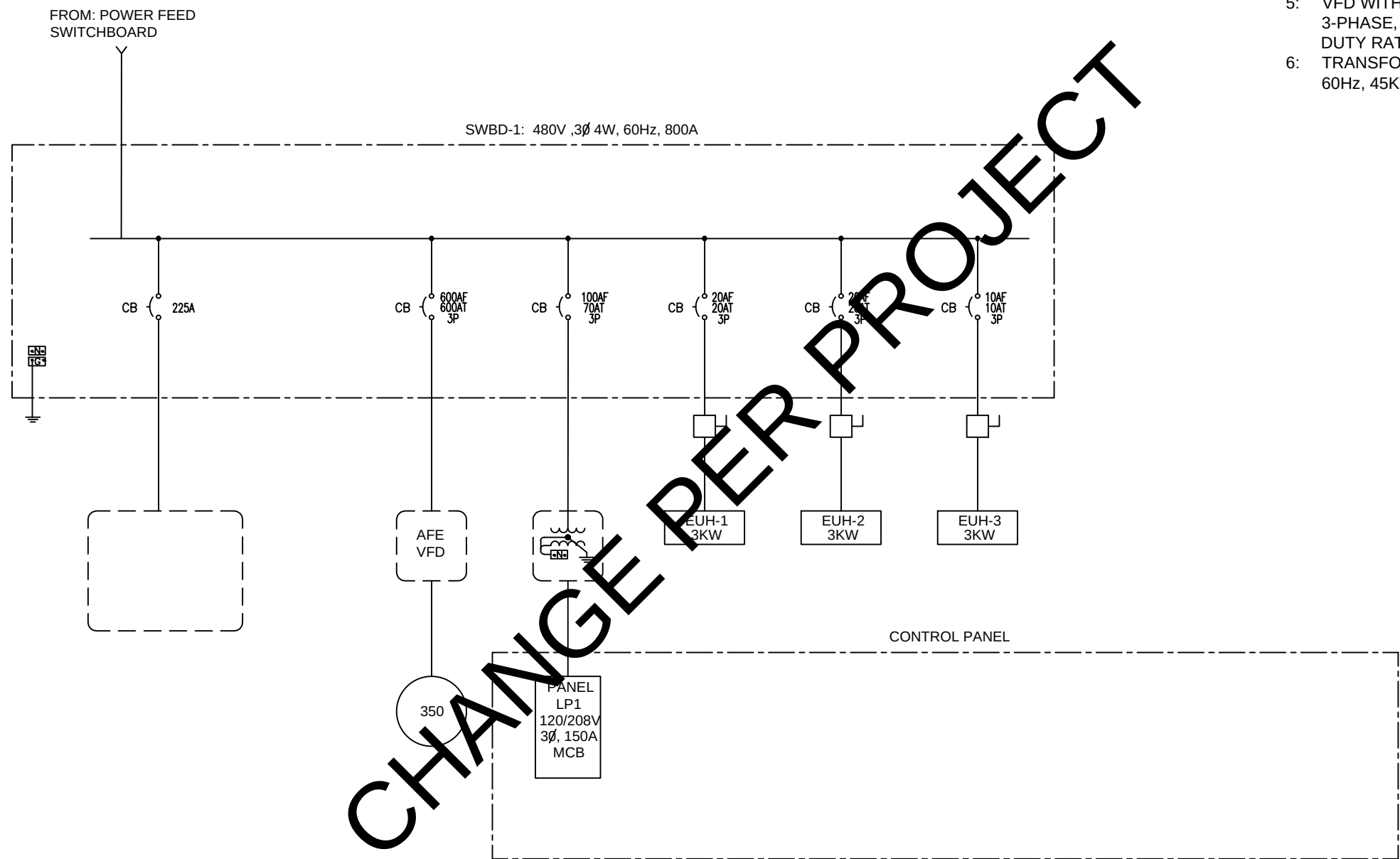


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SCALE		DATE			
NO SCALE		11/04/2022			
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INDEX					
SHEET NO					
2 OF 21					

- NOTES:
- 1: UTILITY TRANSFORMER
 - 2: MAIN SERVICE DISSCONNECT
480V, 3Ø, 60Hz 800A
 - 3: AUTOMATIC TRANSFER SWITCH
480V, 3-PHASE, 3-POLE, 60Hz, 800A RATED
W/ PROGRAMMABLE TRANSITION CONTROL
 - 4: GENERATOR 400KW, 480V, 3Ø, 4W, 60Hz
 - 5: VFD WITH ACTIVE FRONT END. 480V,
3-PHASE, 3-WIRE, 60Hz, 350HP, HEAVY
DUTY RATED.
 - 6: TRANSFORMER 480V-208Y/120V, 3-PHASE,
60Hz, 45KVA



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ONE LINE DIAGRAM			
ENGINEER	MPJ	CHECKED BY	MPJ
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SCALE	NO SCALE	DATE	11/04/2022
DWG NO			
E-00			
SHEET NO			
-- OF 21			

WAPITI CONSULTING ELECTRICAL LEGEND

SYMBOL		DESCRIPTION		SYMBOL		DESCRIPTION		ABBREVIATIONS		REFERENCE SYMBOLS																																																																													
		FLUORESCENT LUMINAIRE, RECESSED, SEE LUMINAIRE SCHEDULE FOR DETAILS (TYP) F1 = TYPE, PER LUMINAIRE SCHEDULE (TYP) 2 = CIRCUITING (TYP) a = SWITCHING (TYP) D = DIMMER BALLAST (TYP)				CONDUIT EXPOSED		A.AMP - AMPERE AL - ALARM AC - AIR COMPRESSOR AF - AMPERE FRAME AFF - ABOVE FINISHED FLOOR AFG - ABOVE FINISHED GRADE AFS - AMPERE FUSE AI - ANALOG INPUT POINT (PLC) AIC - AMPS INTERRUPTING CAPACITY AIL - AMBER INDICATING LIGHT ALT - ALTERNATOR AO - ANALOG OUTPUT POINT (PLC) AS - AMPERE SWITCH AT - AMPERE TRIP ATS - AUTOMATIC TRANSFER SWITCH BC - BATTERY CHARGER BH - BLOCK HEATER BIL - BLUE INDICATING LIGHT BP - BYPASS CONTACTOR C - CONDUIT (GRS) CB - CIRCUIT BREAKER CGD - COMBUSTIBLE GAS DETECTOR CP - CONTROL PANEL CPT - CONTROL POWER XFMR CT - CURRENT TRANSFORMER CTL - CONTROL CV - CHECK VALVE DB - DIRECT BURIED DE - DOUBLE END D.E - DEAD END DF - DEMAND DI - AC DIGITAL INPUT POINT (PLC) DO - AC DIGITAL OUTPUT POINT (PLC) EF - EXHAUST FAN ESD - EMERGENCY SHUTDOWN ESS - EMERGENCY STOP SWITCH EXIST - EXISTING GFI - GROUND FAULT INTERRUPT GND - GROUND GIL - GREEN INDICATING LIGHT GRS - GALVANIZED RIGID STEEL H - HOT, HIGH HH - HAND HOLE HMI - HUMAN MACHINE INTERFACE HOA - HAND-OFF-AUTO HS - HAND SWITCH HTR - HEATER I - INTRUSION SWITCH IC - ISOLATION CONTACTOR ISR - INTRINSICALLY SAFE RELAY KS - KEY SWITCH KVARH - KILOVAR HOUR KWH - KILOWATT HOUR L - LOW LCP - LOCAL CONTROL PANEL LS - LIMIT SWITCH N - NEUTRAL MCC - MOTOR CONTROL CENTER MCP - MAIN CONTROL PANEL MESR - MASTER EMERGENCY STOP RELAY MFR - MANUFACTURER MOV - MOTOR OPERATED VALVE MTR - MOTOR OFE - OWNER FURNISHED EQUIPMENT OIT - OPERATOR INTERFACE TERMINAL ORD - OXIDATION REDUCTION POTENTIAL P - PILOT LIGHT PBL - PUSH BUTTON - LIGHTED PB - PUSH BUTTON PFR - PHASE FAILURE RELAY PS - PRESSURE SWITCH PT - POTENTIAL TRANSFORMER PTZ - PAN, TILT, ZOOM PVC - POLY VINYL CHLORIDE (CONDUIT) PWR - POWER RHP - RADIANT HEAT PANEL RIL - RED INDICATING LIGHT RR - REMOTE RACK RTM - RUN TIME METER SA - SURGE ARRESTOR SIG - SIGNAL SPC - SHIELDED POWER CABLE SSOL - SOLID STATE OVERLOAD RELAY SS - SOLID STATE OR STAINLESS STEEL SV - SOLENOID VALVE STP - SHIELDED TWISTED PAIR STT - SHIELDED TWISTED THREE CONDUCTOR (TRIAD) T - THERMOSTAT TC - THERMOCOUPLE TDOE - TIME DELAY ON ENERGIZATION TDOD - TIME DELAY ON DE-ENERGIZATION TR - TRIP RELAY TNI - TELEPHONE NETWORK INTERFACE TVSS - TRANSIENT VOLTAGE SURGE SUPPRESSOR UH - UNIT HEATER UTP - UNSHIELDED TWISTED PAIR VFD - VARIABLE FREQUENCY DRIVE WL - WHITE INDICATING LIGHT WP - WEATHER PROOF WS - TORQUE SWITCH PROOF XFMR - TRANSFORMER XP - EXPLOSION PROOF		GROUND ROD IN GROUND ROD BOX		TRANSFORMER, PLAN VIEW SHOWN TO SCALE		CURRENT TRANSFORMER, NUMBER INDICATES NUMBER OF C.T.'S. PLAN VIEW SHOWN TO SCALE		MOTOR, NUMBER INDICATES HORSEPOWER		OVERTEMPERATURE CUTOUT		LOCAL EQUIPMENT CONTROL PANEL - MCP, LCP, FACP		SOLENOID VALVE		MAGNETIC MOTOR STARTER (SS-SOLID STATE)		MAGNETIC MOTOR STARTER W/ DISCONNECT		FULL VOLTAGE STARTER/NEMA SIZE MS = MOTOR STARTER CONTACT BP = BYPASS CONTACTOR IC = ISOLATION CONTACTOR		MAINTAINED ON/OFF SWITCH		DISCONNECT SWITCH, NON FUSED (60A) INDICATES AMPERAGE RATING		DISCONNECT SWITCH, FUSED 200 = SWITCH RATING, 100 = FUSE RATING		TIME DELAYED CONTACTS (TIME DELAY TO OPEN) (TIME DELAY TO CLOSE)		INDICATING LIGHT: A = AMBER G = GREEN W = WHITE B = BLUE R = RED		PUSH TO TEST INDICATING LIGHT TRANSFORMER TYPE LIGHTED PUSHBUTTON		SELECTOR SWITCH: HOR = HAND/OFF/REMOTE AS = AMP SWITCH HOA = HAND/OFF/AUTO VS = VOLT SWITCH ROL = RMOTE/OFF/LOCAL RO = RUN/OFF		EV=ELECTRICAL VAULT, PV=POWER VAULT SV=SIGNAL VAULT		HAND SWITCH		PUSHBUTTON SWITCH. MOMENTARY ON		EMERGENCY STOP SWITCH (PUSH/PULL)		PRESSURE SWITCH. NORMALLY CLOSED		FLOW SWITCH. NORMALLY CLOSED		LIMIT SWITCH, NORMALLY CLOSED		LEVEL SWITCH, CLOSSES ON RISING LEVEL		TS-TEMP. SWITCH, (SEE DWG. FOR OPERATION) TC-THERMOCOUPLE, T-THERMOSTAT		POTENTIOMETER		LEVEL (T=TRANSMITTER, E=ELEMENT, S=SWITCH)		PRESSURE TRANSMITTER		SPEED INDICATOR		FLOW TRANSMITTER		DOOR SECURITY SWITCH		TORQUE SWITCH		VIBRATION SENSOR		CONTROL STATION, SINGLE OR MULTIPLE SWITCHES		MOISTURE SENSOR		HEATER		RESISTANCE TEMPERATURE DEVICE		UNIT HEATER	
		FLUORESCENT LUMINAIRE, RECESSED, WITH EMERGENCY BATTERY PACK				CONDUIT UNDER FLOOR OR UNDERGROUND				UTILITY CONDUIT WIRE TAG, SEE SCHEDULE				POWER FEEDER CONDUIT & WIRE TAG, SEE SCHEDULE				POWER & CONTROL CONDUIT & WIRE TAG, SEE SCHEDULE				CONTROL CONDUIT & WIRE TAG, SEE SCHEDULE				SIGNAL CONDUIT & WIRE TAG, SEE SCHEDULE				TELEPHONE CONDUIT & WIRE TAG				GROUND ELECTRODE SYSTEM				SPARE CONDUIT				LETTER INDICATES CONTINUATION OF CONDUIT XXX. THE LETTER "N" SIGNIFIES MULTIPLE CONDUIT CONTINUATIONS.				SHEET KEYED NOTE				WIRING DIAGRAM DETAIL LOCATION				ADDENDUM NUMBER																																	
		FLUORESCENT LUMINAIRE, SURFACE MOUNTED ON CEILING, OR SUSPENDED, WITH EMERGENCY BATTERY PACK				UNDERGROUND PRIMARY POWER				POWER FEEDER CONDUIT & WIRE TAG, SEE SCHEDULE				POWER & CONTROL CONDUIT & WIRE TAG, SEE SCHEDULE				CONTROL CONDUIT & WIRE TAG, SEE SCHEDULE				SIGNAL CONDUIT & WIRE TAG, SEE SCHEDULE				TELEPHONE CONDUIT & WIRE TAG				GROUND ELECTRODE SYSTEM				SPARE CONDUIT				LETTER INDICATES CONTINUATION OF CONDUIT XXX. THE LETTER "N" SIGNIFIES MULTIPLE CONDUIT CONTINUATIONS.				SHEET KEYED NOTE				WIRING DIAGRAM DETAIL LOCATION				ADDENDUM NUMBER																																					
		FLUORESCENT STRIP LUMINAIRE, SURFACE MOUNTED				CONDUIT FLEXIBLE				UTILITY CONDUIT WIRE TAG, SEE SCHEDULE				POWER FEEDER CONDUIT & WIRE TAG, SEE SCHEDULE				POWER & CONTROL CONDUIT & WIRE TAG, SEE SCHEDULE				CONTROL CONDUIT & WIRE TAG, SEE SCHEDULE				SIGNAL CONDUIT & WIRE TAG, SEE SCHEDULE				TELEPHONE CONDUIT & WIRE TAG				GROUND ELECTRODE SYSTEM				SPARE CONDUIT				LETTER INDICATES CONTINUATION OF CONDUIT XXX. THE LETTER "N" SIGNIFIES MULTIPLE CONDUIT CONTINUATIONS.				SHEET KEYED NOTE				WIRING DIAGRAM DETAIL LOCATION				ADDENDUM NUMBER																																	
		FLUORESCENT STRIP LUMINAIRE, SURFACE MOUNTED WITH EMERGENCY BATTERY PACK				HEAT TAPE ON PIPING				UTILITY CONDUIT WIRE TAG, SEE SCHEDULE				POWER FEEDER CONDUIT & WIRE TAG, SEE SCHEDULE				POWER & CONTROL CONDUIT & WIRE TAG, SEE SCHEDULE				CONTROL CONDUIT & WIRE TAG, SEE SCHEDULE				SIGNAL CONDUIT & WIRE TAG, SEE SCHEDULE				TELEPHONE CONDUIT & WIRE TAG				GROUND ELECTRODE SYSTEM				SPARE CONDUIT				LETTER INDICATES CONTINUATION OF CONDUIT XXX. THE LETTER "N" SIGNIFIES MULTIPLE CONDUIT CONTINUATIONS.				SHEET KEYED NOTE				WIRING DIAGRAM DETAIL LOCATION				ADDENDUM NUMBER																																	
		METAL HALIDE DIRECTIONAL FLOOD, STANCHION MOUNTED				CONDUIT TURNED UP OR TOWARD				UTILITY CONDUIT WIRE TAG, SEE SCHEDULE				POWER FEEDER CONDUIT & WIRE TAG, SEE SCHEDULE				POWER & CONTROL CONDUIT & WIRE TAG, SEE SCHEDULE				CONTROL CONDUIT & WIRE TAG, SEE SCHEDULE				SIGNAL CONDUIT & WIRE TAG, SEE SCHEDULE				TELEPHONE CONDUIT & WIRE TAG				GROUND ELECTRODE SYSTEM				SPARE CONDUIT				LETTER INDICATES CONTINUATION OF CONDUIT XXX. THE LETTER "N" SIGNIFIES MULTIPLE CONDUIT CONTINUATIONS.				SHEET KEYED NOTE				WIRING DIAGRAM DETAIL LOCATION				ADDENDUM NUMBER																																	
		VANITY FIXTURE				CONDUIT TURNED DOWN OR AWAY				UTILITY CONDUIT WIRE TAG, SEE SCHEDULE				POWER FEEDER CONDUIT & WIRE TAG, SEE SCHEDULE				POWER & CONTROL CONDUIT & WIRE TAG, SEE SCHEDULE				CONTROL CONDUIT & WIRE TAG, SEE SCHEDULE				SIGNAL CONDUIT & WIRE TAG, SEE SCHEDULE				TELEPHONE CONDUIT & WIRE TAG				GROUND ELECTRODE SYSTEM				SPARE CONDUIT				LETTER INDICATES CONTINUATION OF CONDUIT XXX. THE LETTER "N" SIGNIFIES MULTIPLE CONDUIT CONTINUATIONS.				SHEET KEYED NOTE				WIRING DIAGRAM DETAIL LOCATION				ADDENDUM NUMBER																																	
		FLUORESCENT LUMINAIRE, WALL MOUNTED				CONDUIT CAPPED				UTILITY CONDUIT WIRE TAG, SEE SCHEDULE				POWER FEEDER CONDUIT & WIRE TAG, SEE SCHEDULE				POWER & CONTROL CONDUIT & WIRE TAG, SEE SCHEDULE				CONTROL CONDUIT & WIRE TAG, SEE SCHEDULE				SIGNAL CONDUIT & WIRE TAG, SEE SCHEDULE				TELEPHONE CONDUIT & WIRE TAG				GROUND ELECTRODE SYSTEM				SPARE CONDUIT				LETTER INDICATES CONTINUATION OF CONDUIT XXX. THE LETTER "N" SIGNIFIES MULTIPLE CONDUIT CONTINUATIONS.				SHEET KEYED NOTE				WIRING DIAGRAM DETAIL LOCATION				ADDENDUM NUMBER																																	
		FLUORESCENT LUMINAIRE, WALL MOUNTED WITH EMERGENCY BATTERY PACK				CONDUIT SEALS. CLASS 1. DIV.1 EXPLOSION PROOF				UTILITY CONDUIT WIRE TAG, SEE SCHEDULE				POWER FEEDER CONDUIT & WIRE TAG, SEE SCHEDULE				POWER & CONTROL CONDUIT & WIRE TAG, SEE SCHEDULE				CONTROL CONDUIT & WIRE TAG, SEE SCHEDULE				SIGNAL CONDUIT & WIRE TAG, SEE SCHEDULE				TELEPHONE CONDUIT & WIRE TAG				GROUND ELECTRODE SYSTEM				SPARE CONDUIT				LETTER INDICATES CONTINUATION OF CONDUIT XXX. THE LETTER "N" SIGNIFIES MULTIPLE CONDUIT CONTINUATIONS.				SHEET KEYED NOTE				WIRING DIAGRAM DETAIL LOCATION				ADDENDUM NUMBER																																	
		INCANDESCENT, COMPACT FLUORESCENT, OR H.I.D. LIGHTING FIXTURE, CEILING MOUNTED OR SUSPENDED				CONDUIT HOME RUN - SEE SCHEDULE				UTILITY CONDUIT WIRE TAG, SEE SCHEDULE				POWER FEEDER CONDUIT & WIRE TAG, SEE SCHEDULE				POWER & CONTROL CONDUIT & WIRE TAG, SEE SCHEDULE				CONTROL CONDUIT & WIRE TAG, SEE SCHEDULE				SIGNAL CONDUIT & WIRE TAG, SEE SCHEDULE				TELEPHONE CONDUIT & WIRE TAG				GROUND ELECTRODE SYSTEM				SPARE CONDUIT				LETTER INDICATES CONTINUATION OF CONDUIT XXX. THE LETTER "N" SIGNIFIES MULTIPLE CONDUIT CONTINUATIONS.				SHEET KEYED NOTE				WIRING DIAGRAM DETAIL LOCATION				ADDENDUM NUMBER																																	
		INCANDESCENT, COMPACT FLUORESCENT, OR H.I.D. LIGHTING FIXTURE ON EMERGENCY CIRCUIT, CEILING MOUNTED OR SUSPENDED				HANDHOLE WITH DESIGNATION				UTILITY CONDUIT WIRE TAG, SEE SCHEDULE				POWER FEEDER CONDUIT & WIRE TAG, SEE SCHEDULE				POWER & CONTROL CONDUIT & WIRE TAG, SEE SCHEDULE				CONTROL CONDUIT & WIRE TAG, SEE SCHEDULE				SIGNAL CONDUIT & WIRE TAG, SEE SCHEDULE				TELEPHONE CONDUIT & WIRE TAG				GROUND ELECTRODE SYSTEM				SPARE CONDUIT				LETTER INDICATES CONTINUATION OF CONDUIT XXX. THE LETTER "N" SIGNIFIES MULTIPLE CONDUIT CONTINUATIONS.				SHEET KEYED NOTE				WIRING DIAGRAM DETAIL LOCATION				ADDENDUM NUMBER																																	
		EMERGENCY WALL PACK				VAULT WITH DESIGNATION				UTILITY CONDUIT WIRE TAG, SEE SCHEDULE				POWER FEEDER CONDUIT & WIRE TAG, SEE SCHEDULE				POWER & CONTROL CONDUIT & WIRE TAG, SEE SCHEDULE				CONTROL CONDUIT & WIRE TAG, SEE SCHEDULE				SIGNAL CONDUIT & WIRE TAG, SEE SCHEDULE				TELEPHONE CONDUIT & WIRE TAG				GROUND ELECTRODE SYSTEM				SPARE CONDUIT				LETTER INDICATES CONTINUATION OF CONDUIT XXX. THE LETTER "N" SIGNIFIES MULTIPLE CONDUIT CONTINUATIONS.				SHEET KEYED NOTE				WIRING DIAGRAM DETAIL LOCATION				ADDENDUM NUMBER																																	
		H.I.D. LIGHTING FIXTURE, POLE MOUNTED				JUNCTION BOX				UTILITY CONDUIT WIRE TAG, SEE SCHEDULE				POWER FEEDER CONDUIT & WIRE TAG, SEE SCHEDULE				POWER & CONTROL CONDUIT & WIRE TAG, SEE SCHEDULE				CONTROL CONDUIT & WIRE TAG, SEE SCHEDULE				SIGNAL CONDUIT & WIRE TAG, SEE SCHEDULE				TELEPHONE CONDUIT & WIRE TAG				GROUND ELECTRODE SYSTEM				SPARE CONDUIT				LETTER INDICATES CONTINUATION OF CONDUIT XXX. THE LETTER "N" SIGNIFIES MULTIPLE CONDUIT CONTINUATIONS.				SHEET KEYED NOTE				WIRING DIAGRAM DETAIL LOCATION				ADDENDUM NUMBER																																	
		H.I.D. LUMINAIRE, POLE MOUNTED				Circuit breaker				UTILITY CONDUIT WIRE TAG, SEE SCHEDULE				POWER FEEDER CONDUIT & WIRE TAG, SEE SCHEDULE				POWER & CONTROL CONDUIT & WIRE TAG, SEE SCHEDULE				CONTROL CONDUIT & WIRE TAG, SEE SCHEDULE				SIGNAL CONDUIT & WIRE TAG, SEE SCHEDULE				TELEPHONE CONDUIT & WIRE TAG				GROUND ELECTRODE SYSTEM				SPARE CONDUIT				LETTER INDICATES CONTINUATION OF CONDUIT XXX. THE LETTER "N" SIGNIFIES MULTIPLE CONDUIT CONTINUATIONS.				SHEET KEYED NOTE				WIRING DIAGRAM DETAIL LOCATION				ADDENDUM NUMBER																																	
		METAL HALIDE LENSED DOWN LIGHT, RECESSED				FUSE				UTILITY CONDUIT WIRE TAG, SEE SCHEDULE				POWER FEEDER CONDUIT & WIRE TAG, SEE SCHEDULE				POWER & CONTROL CONDUIT & WIRE TAG, SEE SCHEDULE				CONTROL CONDUIT & WIRE TAG, SEE SCHEDULE				SIGNAL CONDUIT & WIRE TAG, SEE SCHEDULE				TELEPHONE CONDUIT & WIRE TAG				GROUND ELECTRODE SYSTEM				SPARE CONDUIT				LETTER INDICATES CONTINUATION OF CONDUIT XXX. THE LETTER "N" SIGNIFIES MULTIPLE CONDUIT CONTINUATIONS.				SHEET KEYED NOTE				WIRING DIAGRAM DETAIL LOCATION				ADDENDUM NUMBER																																	
		COMPACT FLUORESCENT LUMINAIRE, RECESSED				AMMETER (WHM-WATT HOUR METER)				UTILITY CONDUIT WIRE TAG, SEE SCHEDULE				POWER FEEDER CONDUIT & WIRE TAG, SEE SCHEDULE				POWER & CONTROL CONDUIT & WIRE TAG, SEE SCHEDULE				CONTROL CONDUIT & WIRE TAG, SEE SCHEDULE				SIGNAL CONDUIT & WIRE TAG, SEE SCHEDULE				TELEPHONE CONDUIT & WIRE TAG				GROUND ELECTRODE SYSTEM				SPARE CONDUIT				LETTER INDICATES CONTINUATION OF CONDUIT XXX. THE LETTER "N" SIGNIFIES MULTIPLE CONDUIT CONTINUATIONS.				SHEET KEYED NOTE				WIRING DIAGRAM DETAIL LOCATION				ADDENDUM NUMBER																																	
		COMPACT FLUORESCENT LUMINAIRE, RECESSED, WITH EMERGENCY BATTERY PACK				VOLTMETER				UTILITY CONDUIT WIRE TAG, SEE SCHEDULE				POWER FEEDER CONDUIT & WIRE TAG, SEE SCHEDULE				POWER & CONTROL CONDUIT & WIRE TAG, SEE SCHEDULE				CONTROL CONDUIT & WIRE TAG, SEE SCHEDULE				SIGNAL CONDUIT & WIRE TAG, SEE SCHEDULE				TELEPHONE CONDUIT & WIRE TAG				GROUND ELECTRODE SYSTEM				SPARE CONDUIT				LETTER INDICATES CONTINUATION OF CONDUIT XXX. THE LETTER "N" SIGNIFIES MULTIPLE CONDUIT CONTINUATIONS.				SHEET KEYED NOTE				WIRING DIAGRAM DETAIL LOCATION				ADDENDUM NUMBER																																	
		LIGHTED EXIT SIGN, BACK OR END MOUNTED. SHADED AREA INDICATES FACE. ARROW INDICATES DIRECTIONAL ARROW.				METER & SWITCH: A = AMP, V = VOLT				UTILITY CONDUIT WIRE TAG, SEE SCHEDULE				POWER FEEDER CONDUIT & WIRE TAG, SEE SCHEDULE				POWER & CONTROL CONDUIT & WIRE TAG, SEE SCHEDULE				CONTROL CONDUIT & WIRE TAG, SEE SCHEDULE				SIGNAL CONDUIT & WIRE TAG, SEE SCHEDULE				TELEPHONE CONDUIT & WIRE TAG				GROUND ELECTRODE SYSTEM				SPARE CONDUIT				LETTER INDICATES CONTINUATION OF CONDUIT XXX. THE LETTER "N" SIGNIFIES MULTIPLE CONDUIT CONTINUATIONS.				SHEET KEYED NOTE				WIRING DIAGRAM DETAIL LOCATION				ADDENDUM NUMBER																																	
		INCANDESCENT, COMPACT FLUORESCENT OR H.I.D. LUMINAIRE, WALL MOUNTED				CONTROL RELAY				UTILITY CONDUIT WIRE TAG, SEE SCHEDULE				POWER FEEDER CONDUIT & WIRE TAG, SEE SCHEDULE				POWER & CONTROL CONDUIT & WIRE TAG, SEE SCHEDULE				CONTROL CONDUIT & WIRE TAG, SEE SCHEDULE				SIGNAL CONDUIT & WIRE TAG, SEE SCHEDULE				TELEPHONE CONDUIT & WIRE TAG				GROUND ELECTRODE SYSTEM				SPARE CONDUIT				LETTER INDICATES CONTINUATION OF CONDUIT XXX. THE LETTER "N" SIGNIFIES MULTIPLE CONDUIT CONTINUATIONS.				SHEET KEYED NOTE				WIRING DIAGRAM DETAIL LOCATION				ADDENDUM NUMBER																																	
		SPECIAL PURPOSE RECEPTACLE - AS NOTED				RUN TIME METER				UTILITY CONDUIT WIRE TAG, SEE SCHEDULE				POWER FEEDER CONDUIT & WIRE TAG, SEE SCHEDULE				POWER & CONTROL CONDUIT & WIRE TAG, SEE SCHEDULE				CONTROL CONDUIT & WIRE TAG, SEE SCHEDULE																																																																	

WHITE CLAW BILL OF MATERIALS						
ITEM #	SPECIFICATION SECTION	TAG ID	QUANTITY	DESCRIPTION	MANUFACTURE	PART #
1		N/A	AS NEEDED	WIRE DUCTING	PANDUIT	F2X2LG6
2		N/A	AS NEEDED	WIRE DUCTING COVER	PANDUIT	C2LG6F
3		N/A	1	MAIN CIRCUIT BREAKER	ALLEN BRADLEY	140G-G2C3-C30
4		N/A	1	MAIN CIRCUIT BREAKER DISCONNECT	ALLEN BRADLEY	140G-G-FCXB03
5		N/A	1	EZ PLATE MOUNTING	ALLEN BRADLEY	140G-G-EZ
6		N/A	1	UPS (PER CUSTOMER APPROVAL)	SOLA	T.B.D.
7		N/A	2	TIME DELAY RELAY	ALLEN BRADLEY	700FSM6UU23
8		N/A	1	E100 MOTOR OVERLOAD	ALLEN BRADLEY	193-1EFEB
9		N/A	1	E100 ADAPTER FRAME	ALLEN BRADLEY	193-1EPB
10		N/A	1	MOTOR STARTER	ALLEN BRADLEY	CAT 156C3P20NCB
11		N/A	8	GREEN / YELLOW GRND TERM BLOCK	ALLEN BRADLEY	1492-JG4
12		N/A	10	UPS NEUTRAL TERM BLOCK (WHITE)	ALLEN BRADLEY	1492-J4W
13		N/A	5	24V COM TERM BLOCK (WHITE)	ALLEN BRADLEY	1492-J4W
14		N/A	5	24V FUSE BLOCK TERMINAL	ALLEN BRADLEY	1492-WFB424
15		N/A	AS NEEDED	120V FUSE BLOCK TERMINAL	ALLEN BRADLEY	1492-WFB4250
16		N/A	10	DUAL LEVEL ANALOG TERM BLOCK	ALLEN BRADLEY	1492-JD3-P
17		N/A	AS NEEDED	END ANCHOR	ALLEN BRADLEY	1492-EAJ35
18			1	DIN RAIL RECEPTACLE	ALLEN BRADLEY	1492-REC15G
19		N/A	6	GENERAL PURPOSE RELAY BASE	ALLEN BRADLEY	700-HN222
20		N/A	6	GENERAL PURPOSE RELAY BASE	ALLEN BRADLEY	700-HN100
21		N/A	6	GENERAL PURPOSE RELAY	ALLEN BRADLEY	700-HA32A1
22		N/A	4	POWER FEED CLS2 POWER SUPPLY	ALLEN BRADLEY	1694-PM233-CL2
23						
24		N/A	1	24VDC CLASS 1 POWER SUPPLY	ALLEN BRADLEY	1606-XLE
25		N/A	1	ETHERNET SWITCH	STRATIX	1783-LMS5
26		N/A	AS NEEDED	DIN RAIL	ALLEN BRADLEY	1492-DR9
27		N/A	1	SC SURGE PROTECTOR (SPD DRDC)	TRANSTECTOR	1101-69-DRDC 12
28		N/A	1	TVSS SURGE PROTECTOR	ALLEN BRADLEY	4983-DH120-25
29		N/A	1	20A / 2 POLE CIRCUIT BREAKER	ALLEN BRADLEY	1489-M1C200
30		N/A	1	15A / 1 POLE CIRCUIT BREAKER	ALLEN BRADLEY	1489-M1C150
31		N/A	6	5A / 1 POLE CIRCUIT BREAKER	ALLEN BRADLEY	1489-M1C050
32		N/A	1	120VAC DISCRETE OUTPUT	ALLEN BRADLEY	1769-0A8
33		N/A	1	120VAC DISCRETE INPUT	ALLEN BRADLEY	1769-IA16
34		N/A	2	ANALOG INPUT	ALLEN BRADLEY	1769-IF8
35		N/A	1	PLC POWER SUPPLY	ALLEN BRADLEY	1769-PA4
36		N/A	1	PLC ENDCAP (RIGHT)	ALLEN BRADLEY	1769-ECR
37		N/A	1	PLC	COMPACT LOGIX	1769-L30ER
39		N/A	1	24VDC TERM BLOCK (BLUE)	ALLEN BRADLEY	NOT USED
40		N/A	2	24VDC RELAY	ALLEN BRADLEY	NOT USED



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1	--	SUBMITTAL	NK
NO.	DATE	REVISION	BY
DWG TITLE			
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BILL OF MATERIALS			
ENGINEER	MFJ	CHECKED BY	MFJ
JOB NO	WO-20**	DRAWN BY	NEK
SCALE	NO SCALE	DATE	11/04/2022
DWG NO			
E-01			
SHEET NO			
6 OF 21			

HARDWARE / MECHANICAL SCHEDULE						
ITEM #	SPECIFICATION SECTION	TAG ID	QUANTITY	DESCRIPTION	MANUFACTURE	PART #
41		N/A	1	4X STAINLESS CABINET (48" x 36")	NEMA ENCLOSURES	CSD302410SS
42		N/A	1	BACK PANEL (45" x 32") PAINTED WHITE	NEMA ENCLOSURES	CP3020
43		N/A	1	2 POSITION SELECTOR SWITCH	ALLEN BRADLEY	800T-H2A
44		N/A	1	3 POSITION SELECTOR SWITCH	ALLEN BRADLEY	800T-J2A
45		N/A	1	DIN RAIL RECEPTACLE	ALLEN BRADLEY	1492-REC15G
46		N/A	1	7" HMI (SIZE MAY VARY PER CUSTOMER SPECIFICATIONS)	REDLION	CR30000700000420
47		N/A	1	DATA ACCESS PORT	PANDUIT	DAP4BC-G05O
48		N/A	AS NEEDED	16 AWG MTW (GREEN)	ATLAS	MTW16GN10
49		N/A	AS NEEDED	TWISTED SHIELDED PAIR 18AWG	BELDEN	2AS-1601POS
50		N/A	AS NEEDED	CAT 5E	SOUTHWIRE	CAT 5E
51		N/A	AS NEEDED	FSDX WIRE FERRULE	PANDUIT	FSDXL
52		N/A	AS NEEDED	HEAT SHRINK RING TERMINATION	PANDUIT	PH-R
53		N/A	1	CT-(1) N.O. CONTACT	DWYER	MCS-111050
54		N/A	1	CONTROL PANEL LIGHT	TENTAIR	LED1M35
55		N/A	AS NEEDED	TERMINAL BLOCKS-GREY	ALLEN BRADLEY	1492-J4
56		N/A	1	30mm H.O.A. SELECTOR SWITCH PLACARD	BRADY B30 SERIES	B30EP172593WT
57		N/A	1	30mm OPEN / CLOSE PLACARD	BRADY B30 SERIES	B30EP170593WT
58		N/A	1	UL 508A STICKER	UL	N/A
59		N/A	2	3R VALVE LOGO STICKER	MULE STICKER	N/A
60		N/A	AS NEEDED	PANEL IDENTIFICATION PLACARD	BRADY B30 SERIES	B30EP172593WT
61		N/A	1	GRACE PORT IDENTIFICATION PLACARD	BRADY B30 SERIES	B30EP171593WT
62		N/A	AS NEEDED	TERMINAL BLOCK IDENTIFICATION	ALLEN BRADLEY	1492-MT
63		N/A	AS NEEDED	FUSE BLOCK IDENTIFCATION	ALLEN BRADLEY	1492-MT
64		N/A	AS NEEDED	WIRE LABELS - HEAT SHRINK	BRADY B30 SERIES	PS2502WTSC
65		N/A	AS NEEDED	UNI-STRUT	EATON B-LINE	B22S-120GRN
66		N/A	3	CGB GRIPS	EATON	
67		N/A	4'	1/2" LIQUID TIGHT METALLIC FLEX	THOMAS & BELTS	
68		N/A	4	1/2" LIQUID TIGHT METALLIC FLEX STRAIGHT FITTINGS	THOMAS & BELTS	
69		N/A	4	1/2" LIQUID TIGHT METALLIC FLEX 90DEG. FITTINGS	THOMAS & BELTS	
70		N/A	2	1/2" GROUND BUSHINGS	RIGID / EATON	
71		N/A	(1) 100 PER BAG	1/2"- 8/32" PANHEAD SS SCREWS	FASTENAL	PPHMS.MS.PPH.SS
72		N/A	AS NEEDED	SPIRAL WIRE WRAP .375" (9.5mm)	PANDUIT	T38F-C
73		N/A	AS NEEDED	SPIRAL WIRE WRAP .5" (12.7mm)	PANDUIT	T50F-C
74		N/A	1	3R 10" PIPE	PASCO MACHINE	
75		N/A	1	3R VALVE 10" C-BORED PISTON GLAND	PASCO MACHINE	
76		N/A	1	3R VALVE 10" C-BORED PISTON RING	PASCO MACHINE	
77		N/A	1	3R VALVE 10" PISTON GLAND	PASCO MACHINE	
78		N/A	1	3R VALVE 10" PISTON CUP SEAL	PASCO MACHINE	
79		N/A	1	3R VALVE 10" RING	PASCO MACHINE	



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1	--	SUBMITTAL	NK
NO.	DATE	REVISION	BY
DWG TITLE			
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BILL OF MATERIALS			
ENGINEER	MPJ	CHECKED BY	MPJ
JOB NO	WO-20**	DRAWN BY	NEK
SCALE	NO SCALE	DATE	11/04/2022
DWG NO			
E-01 (B)			
SHEET NO			
7 OF 21			

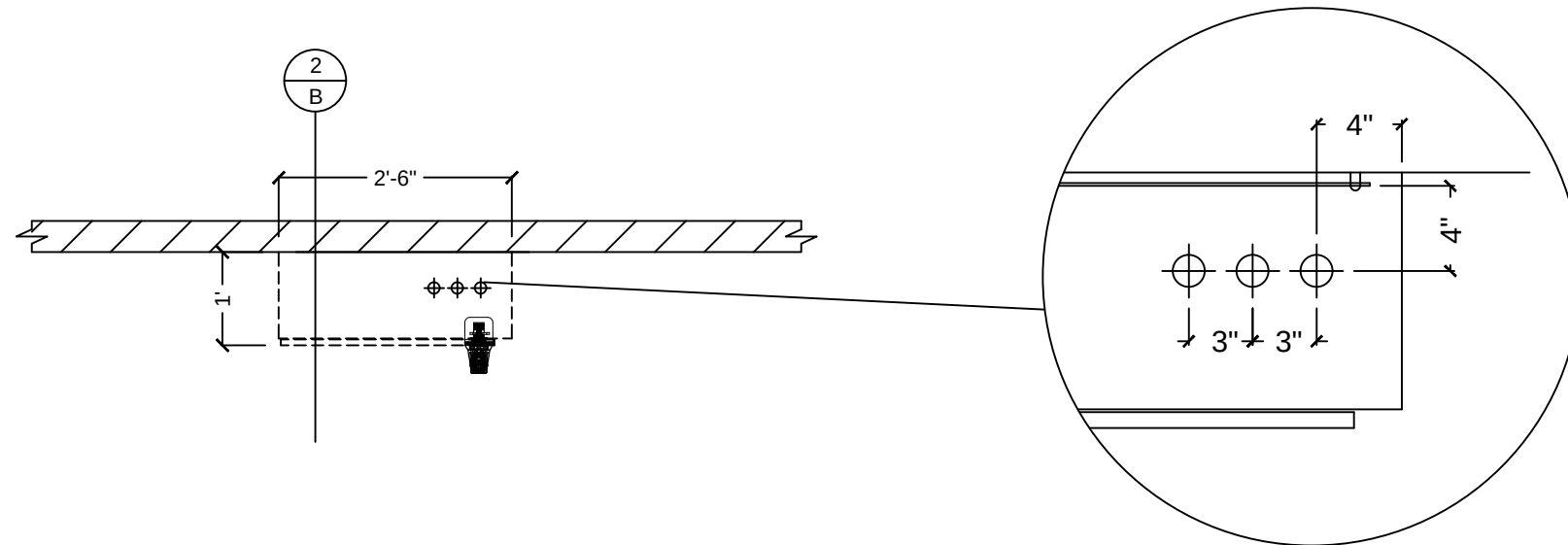
HARDWARE / MECHANICAL SCHEDULE - CONTINUED -						
ITEM #	SPECIFICATION SECTION	TAG ID	QUANTITY	DESCRIPTION	MANUFACTURE	PART #
80		N/A	1	3RVALVE 10" UHMW VALVE	PASCO MACHINE	
81		N/A	1	3R VALVE 10" VALVE ASSEMBLY	PASCO MACHINE	
82		N/A	265 lf	3/8" HYDRAULIC HOSE - RED - DOWN HOLE	DIEBOLT	
83		N/A	40 lf	3/8" HYDRAULIC HOSE - RED - HORIZONTAL	DIEBOLT	
84		N/A	265 lf	3/8" HYDRAULIC HOSE - WHITE - DOWN HOLE	DIEBOLT	
85		N/A	40 lf	3/8" HYDRAULIC HOSE - WHITE - HORIZONTAL	DIEBOLT	
86		N/A	8	SS FEMALE JIC #8 FITTINGS	DIEBOLT	
87		N/A	4	3/8" HYDRAULIC FITTINGS (MALE)	DIXON	3HF3-S
88		N/A	4	3/8" HYDRAULIC FITTINGS (FEMALE)	DIXON	3HF3-S
89		N/A	AS NEEDED	A / W 68 FOOD GRADE OIL	CLARION	2147483647
90		N/A	1	SOLENOID / DIRECTIONAL CONTROL VALVE	HYVAIR	DO3S-2C-115A-35
91		N/A	1	HYDRAULIC MOTOR / RESERVOIR	BAILEY HYDRAULICS	APB1H08A0S10H-21
92		N/A	2	HYDRAULIC CYLINDER	HERCULES HYD.	
93		N/A	1	LINEAR POTETIOMETER	P3 AMERICA	SERIES RC35
94			1	A/C UNIT	TBD	TBD
95						
96		N/A	1	DISCONNECT SWITCH KIT W/ HARDWARE	ALLEN BRADLEY	TBD
97		N/A	1	3R VALVE 1HP HYDRAULIC MOTOR	CHIEF	APB1HO8A0S10H-30
98		N/A	2	0-3000 PSI STAINLESS STEEL PRESSURE GAUGE	DYN. FLUID COMP.	PDSS-2-P-210-A-001
99		N/A	1	0-2500 PSI PRESSURE TRANSMITTER	VALUELINE	0212.16203.021303.13
100				WIRES		
101		N/A	AS NEEDED	16 AWG MTW (BLUE)	ATLAS	MTW16BL10
102		N/A	AS NEEDED	16 AWG MTW (WHITE)	ATLAS	MTW16WH10
103		N/A	AS NEEDED	16 AWG MTW (RED)	ATLAS	MTW16RD10
104		N/A	AS NEEDED	16 AWG MTW (ORANGE)	ATLAS	MTW16OR10
105		N/A	AS NEEDED	16 AWG MTW (WHT/BLU)	ATLAS	MTW16WB
106		N/A	AS NEEDED	12 AWG MTW (BLACK)	ATLAS	MTW12BK
107		N/A	AS NEEDED	12 AWG MTW (WHITE)	ATLAS	MTW12WH
108		N/A	AS NEEDED	12 AWG MTW (GREEN)	ATLAS	MTW12GN
109		N/A	AS NEEDED	10 AWG MTW (BLACK)	ATLAS	MTW10BK
110		N/A	AS NEEDED	10 AWG MTW (WHITE)	ATLAS	MTW10WH
111		N/A	AS NEEDED	10 AWG MTW (GREEN)	ATLAS	MTW10GN
112		N/A	2	RTE SERIES	IDEC	RTEP1AF20
113		N/A	AS NEEDED	RTE SERIES RETAINER CLIPS	IDEC	SFA202



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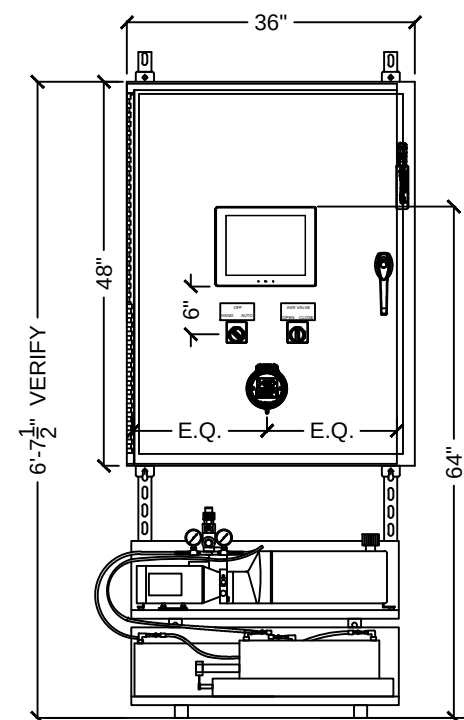
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1	--	SUBMITTAL	NK
NO.	DATE	REVISION	BY
DWG TITLE			
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BILL OF MATERIALS			
ENGINEER	MPJ	CHECKED BY	MPJ
JOB NO	WO-20**	DRAWN BY	NEK
SCALE	NO SCALE	DATE	11/04/2022
DWG NO			
E-01 (C)			
SHEET NO			
8 OF 21			

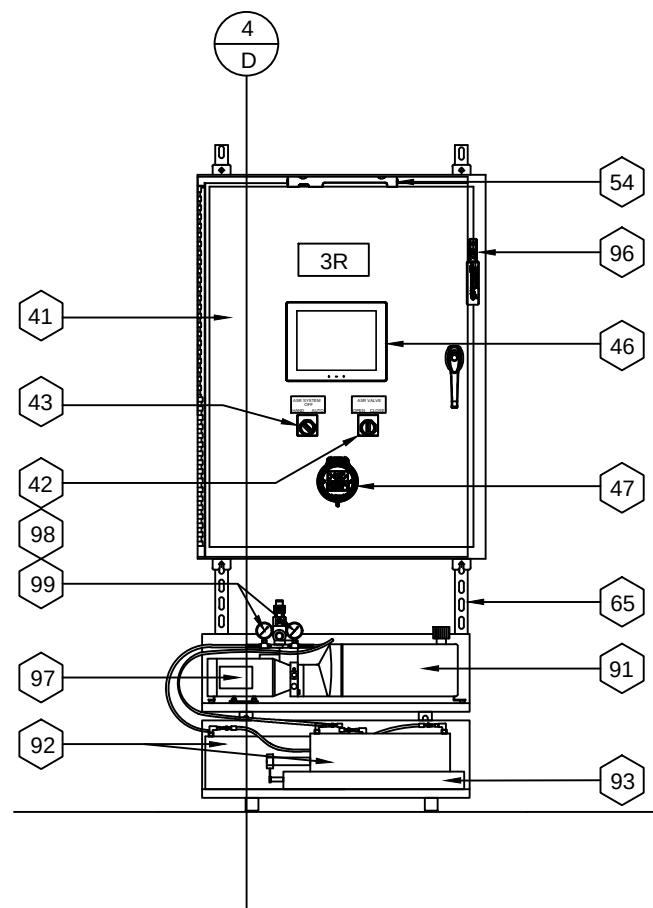


1 PLAN VIEW: SKID ENCLOSURE
1/2" = 1'

INDOOR APPLICATION



2 ELEVATION: SKID ENCLOSURE
1/2" = 1'



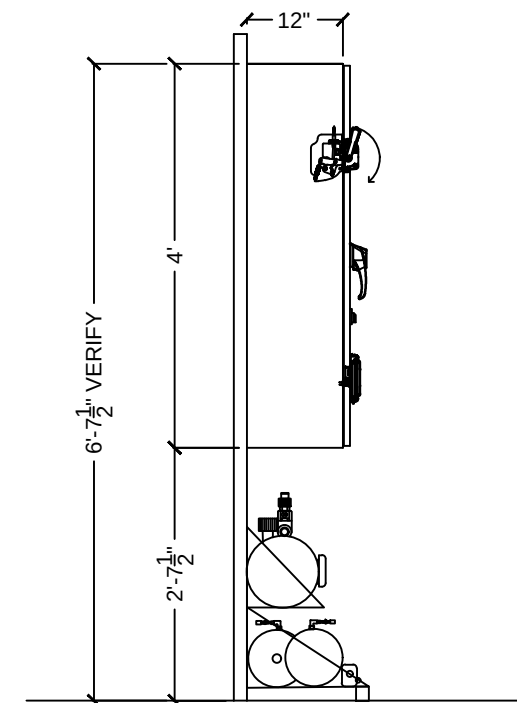
3 CALL OUT: SKID ENCLOSURE
1/2" = 1'

NOTES:

- * HARDWARE & PART CALL OUTS FOUND ON BILL OF MATERIALS (BOM) SCHEDULE.

CALL OUT DESCRIPTION:

- 41: ENCLOSURE PANEL
- 42: 2 POSITION SWITCH (OPEN/CLOSE)
- 43: 3 POSITION SWITCH (H.O.A.)
- 46: HMI
- 47: DATA ACCESS PORT
- 54: MOTION SENSOR LED LIGHT
- 65: UNISTRUT
- 91: HYDRAULIC FLUID RESERVOIR
- 92: HYDRAULIC CYLINDERS (OPEN/CLOSE)
- 93: LINEAR POTENTIOMETER
- 96: DISCONNECT SWITCH
- 97: 1HP, 120V/10 HYDRAULIC MOTOR
- 98: PRESSURE GAUGE
- 99: PRESSURE TRANSMITTER



4 SECTION: SKID ENCLOSURE
1/2" = 1'

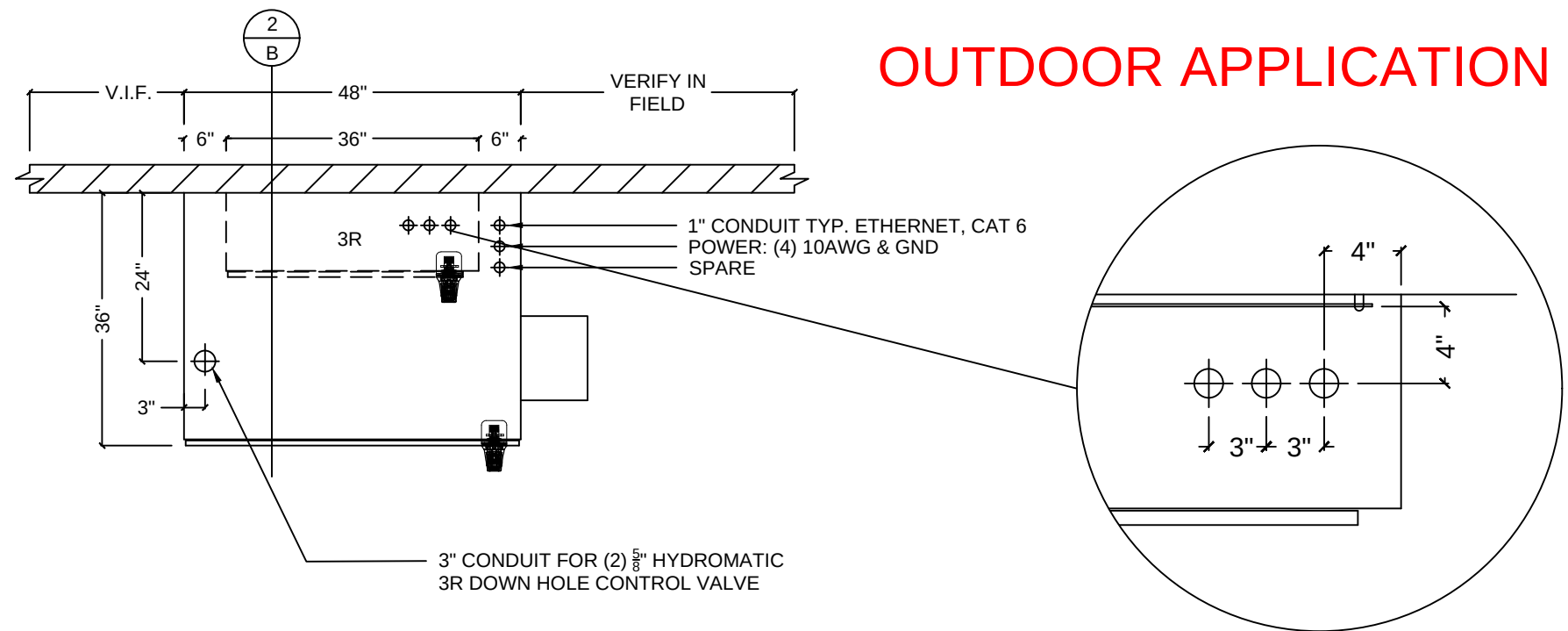


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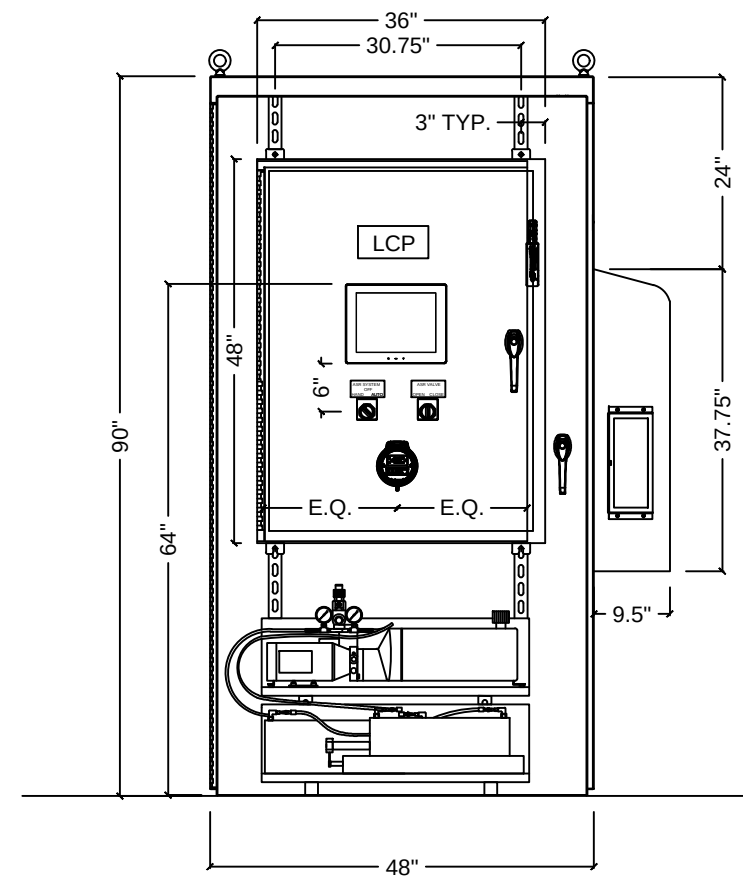
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NO.	DATE	REVISION	BY
2	12/5/22	REVISED	NK
1	--	SUBMITTAL	NK
ENCLOSURE ELEVATION			
ENGINEER	MPJ	CHECKED BY	MPJ
JOB NO	WO-2056	DRAWN BY	NEK
SCALE	1/2"=1'	DATE	07/25/2022
DWG NO	E-02		
SHEET NO	9 OF 21		

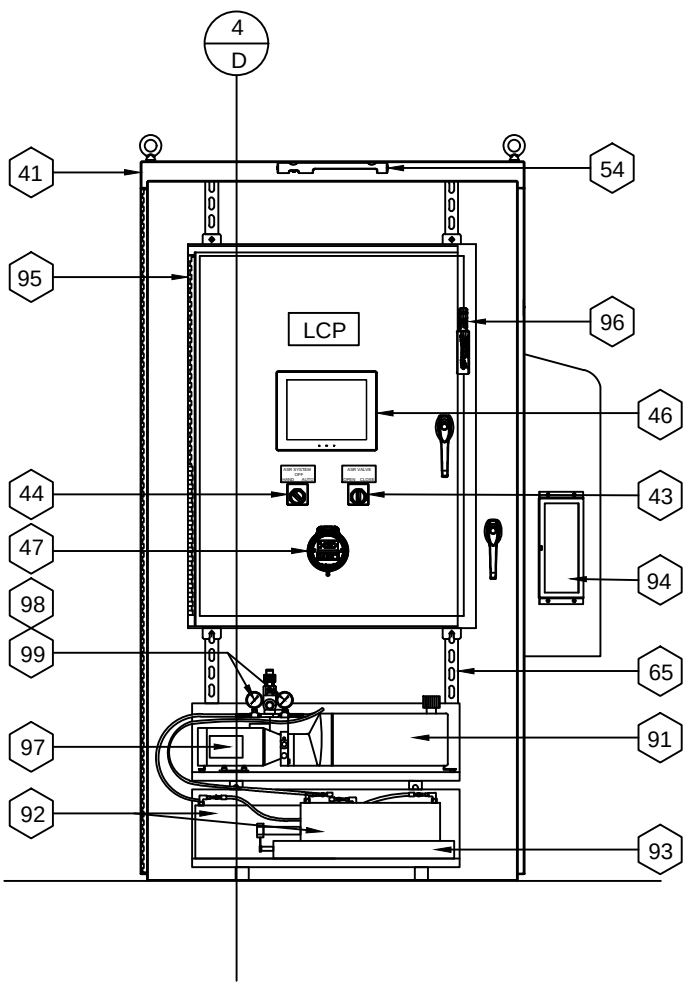
OUTDOOR APPLICATION



1 PLAN VIEW: SKID ENCLOSURE
1/2" = 1'



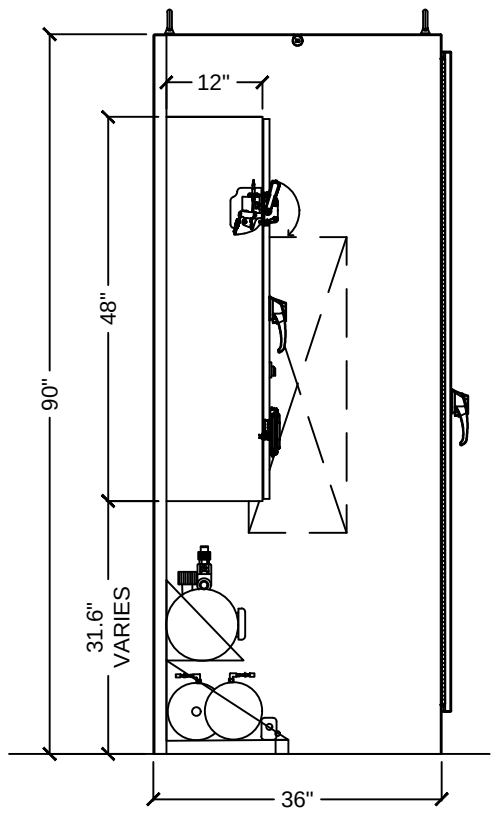
2 ELEVATION: SKID ENCLOSURE
1/2" = 1'



3 CALL OUT: SKID ENCLOSURE
1/2" = 1'

- NOTES:
- * HARDWARE & PARTS CALL OUTS FOUND ON BILL OF MATERIALS (BOM) SCHEDULE.
 - * A 12"x12" PRINT POCKET SHALL BE PROVIDED ON INNER SECTION OF CABINET DOOR
 - * INDOOR & OUTDOOR NAME PLATES TO BE FURNISHED.
 - * PLEASE VERIFY WHICH SIDE A/C UNIT SHALL BE INSTALLED ON. (LEFT/RIGHT)

- CALL OUT DESCRIPTION:
- 41: OUTER ENCLOSURE
 - 43: 2 POSITION SWITCH (OPEN/CLOSE)
 - 44: 3 POSITION SWITCH (H.O.A.)
 - 46: HMI
 - 47: GRACE PORT
 - 54: MOTION SENSOR LED LIGHT
 - 65: UNISTRUT
 - 91: HYDRAULIC FLUID RESERVOIR
 - 92: HYDRAULIC CYLINDERS (OPEN/CLOSE)
 - 93: LINEAR POTENTIOMETER
 - 94: A/C UNIT
 - 95: INNER ENCLOSURE
 - 96: DISCONNECT SWITCH
 - 97: 1HP, 120V/10 HYDRAULIC MOTOR
 - 98: PRESSURE GAUGE
 - 99: PRESSURE TRANSMITTER

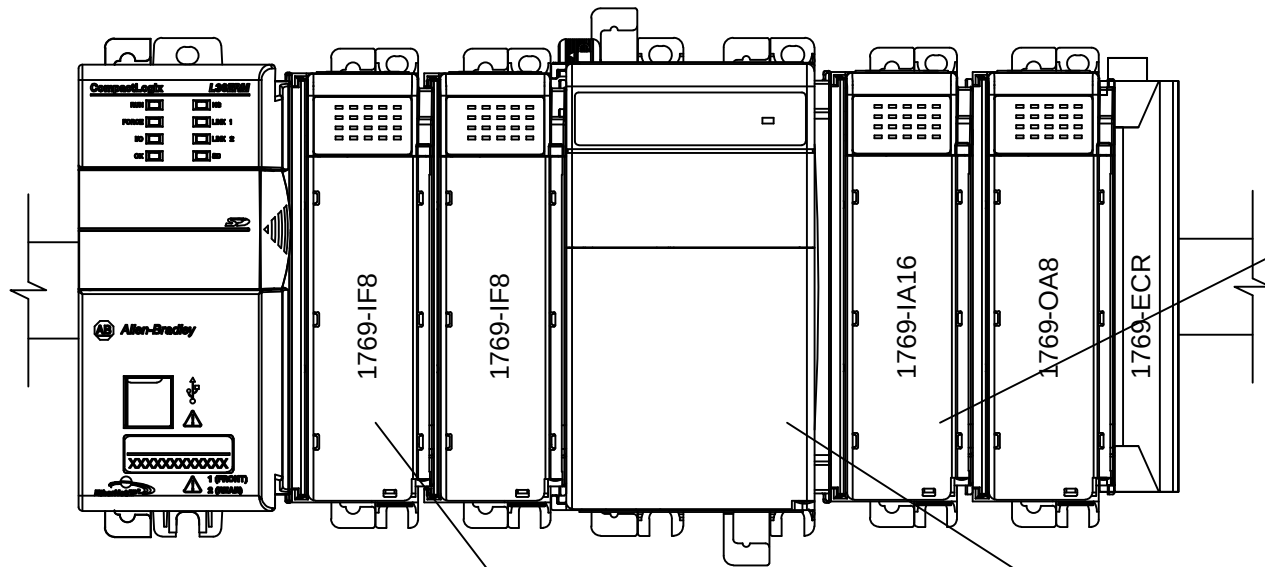


4 SECTION: SKID ENCLOSURE
1/2" = 1'



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1	---	SUBMITTAL	NK
NO.	DATE	REVISION	BY
ENCLOSURE ELEVATION			
ENGINEER	MPJ	CHECKED BY	MPJ
JOB NO	WO-20**	DRAWN BY	NEK
SCALE	1/2"=1'	DATE	11/04/2022
DWG NO	E-02		
SHEET NO	9 OF 21		



E 04 PLC LAYOUT
NO SCALE

1769-OA8: DISCRETE OUTPUTS

	VAC 1
OUT 0	041201
OUT 1	051201
OUT 2	051301
OUT 3	051401
VAC 2	051501
OUT 4	041301
OUT 5	051701
OUT 6	051801
OUT 7	0520001

1769-IF8: ANALOG INPUTS

V/in 0-	Vin 0+
--	lin 0+
ANLG	--
COM	Vin 1+
V/in 1-	--
--	lin 1+
ANLG	021102
COM	Vin 2+
V/in 2-	--
--	lin 2+
ANLG	021202
COM	Vin 3+
V/in 3-	--
--	lin 3+
ANLG	021303
COM	NC
NC	

TO: COM

V/in 4-	Vin 4+
--	lin 4+
ANLG	021403
COM	Vin 5+
V/in 5-	--
--	lin 5+
ANLG	021503
COM	Vin 6+
V/in 6-	--
--	lin 6+
ANLG	021603
COM	Vin 7+
V/in 7-	--
--	lin 7+
ANLG	021703
COM	NC
NC	

TO: COM

1769-IA16: 120VAC INPUTS

IN 1	IN 0
031202	031102
IN 3	IN 2
031402	031302
IN 5	IN 4
031602	031502
IN 7	IN 6
031802	031702
IN 9	IN 8
032002	031902
IN 11	IN 10
0320202	0320102
IN 13	IN 12
0320402	0320302
IN 15	IN 14
0320602	0320502
AC COM	AC COM

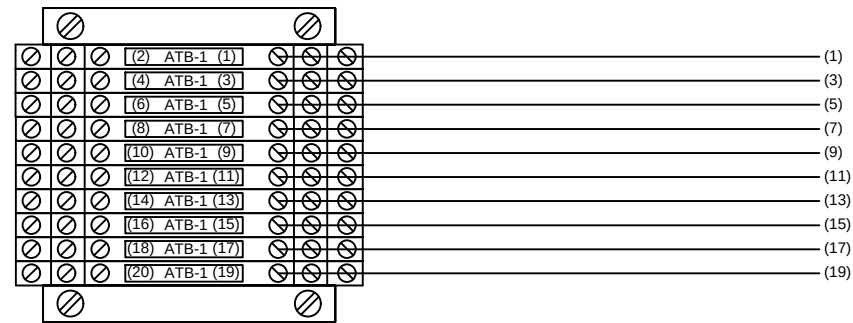
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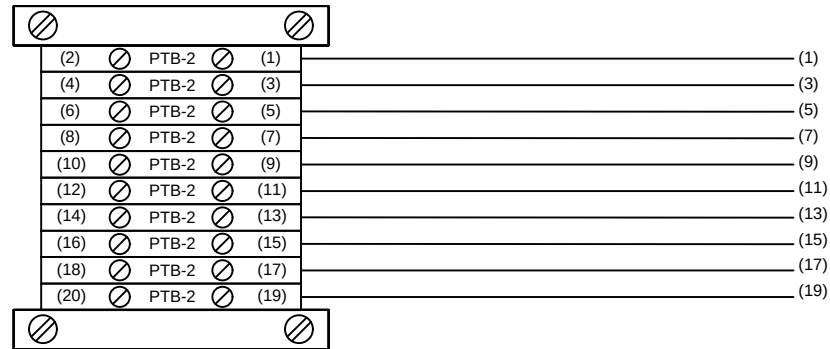
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1	--	SUBMITTAL	NK
NO.	DATE	REVISION	BY
DWG TITLE			
PLC LAYOUT			
ENGINEER	MPJ	CHECKED BY	MPJ
JOB NO	WO-20**	DRAWN BY	NEK
SCALE	NO SCALE	DATE	11/04/2022
DWG NO			
E-04			
SHEET NO			
11 OF 21			



E
--
ATB-1: ANALOG TERM BLOCK DETAILS
NO SCALE

ATB-1 TERMINAL BLOCK SCHEDULE		
ATB-1 #	WIRE #	DESCRIPTION
(1)	021401	PRESSURE (FROM CUSTOMER)
(3)	021501	FLOW (FROM CUSTOMER)
(5)	021601	LEVEL (FROM CUSTOMER)
(7)	021701	SPARE
(9)	021801	SPARE
(11)	021901	SPARE
(13)	021401	SPARE
(15)	021401	SPARE
(17)	021401	SPARE
(19)	021401	SPARE



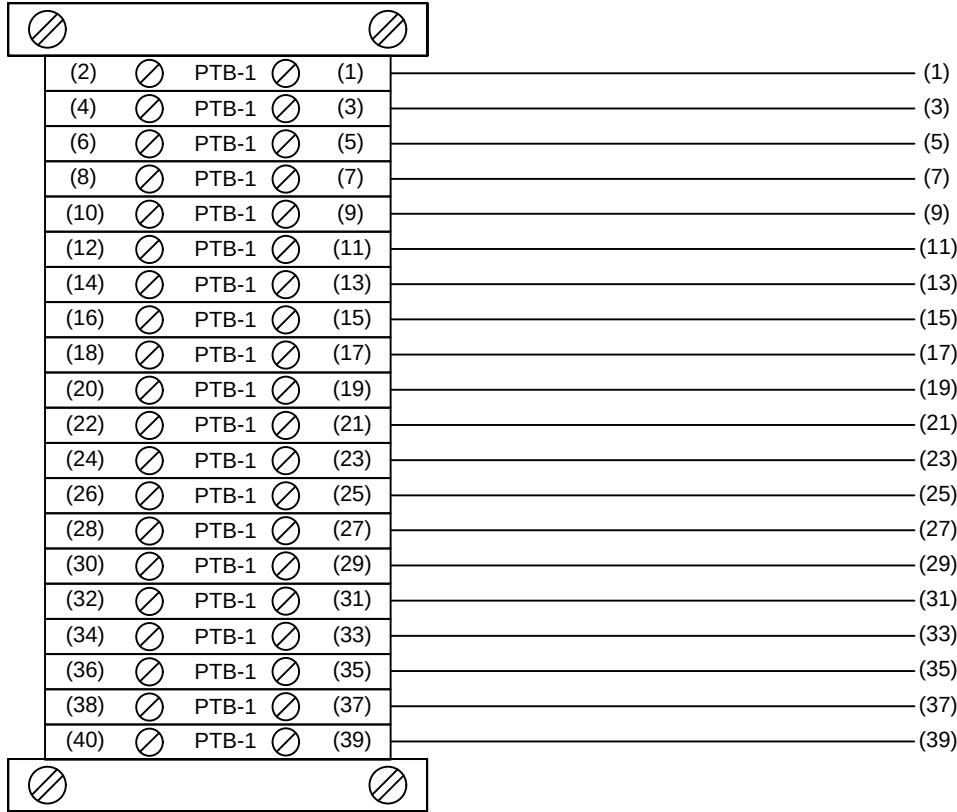
E
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PTB-2: +24VDC (BLUE)
NO SCALE

PTB-2 TERMINAL BLOCK SCHEDULE		
PTB-2 #	WIRE #	DESCRIPTION
(1)	021102	HYDRAULIC OPEN PRESSURE
(3)	021202	HYDRAULIC CLOSE PRESSURE
(5)	021303	3R FEEDBACK
(7)	021403	PRESSURE
(9)	021503	FLOW
(11)	021603	LEVEL
(13)	021703	SPARE
(15)	SPARE	SPARE
(17)	SPARE	SPARE
(19)	SPARE	SPARE



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1	--	SUBMITTAL	NK
NO.	DATE	REVISION	BY
DWG TITLE			
FUSE BLOCK DIAGRAM			
ENGINEER	CHECKED BY		
MPJ	MPJ		
JOB NO	DRAWN BY		
WO-20**	NEK		
SCALE	DATE		
NO SCALE	11/04/2022		
DWG NO			
E-04 (B)			
SHEET NO			
12 OF 21			



E
-- PTB-1: 120VAC POWER TERMINAL BLOCK
NO SCALE

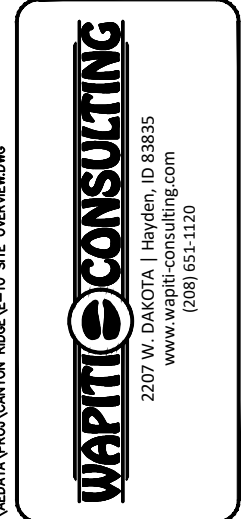
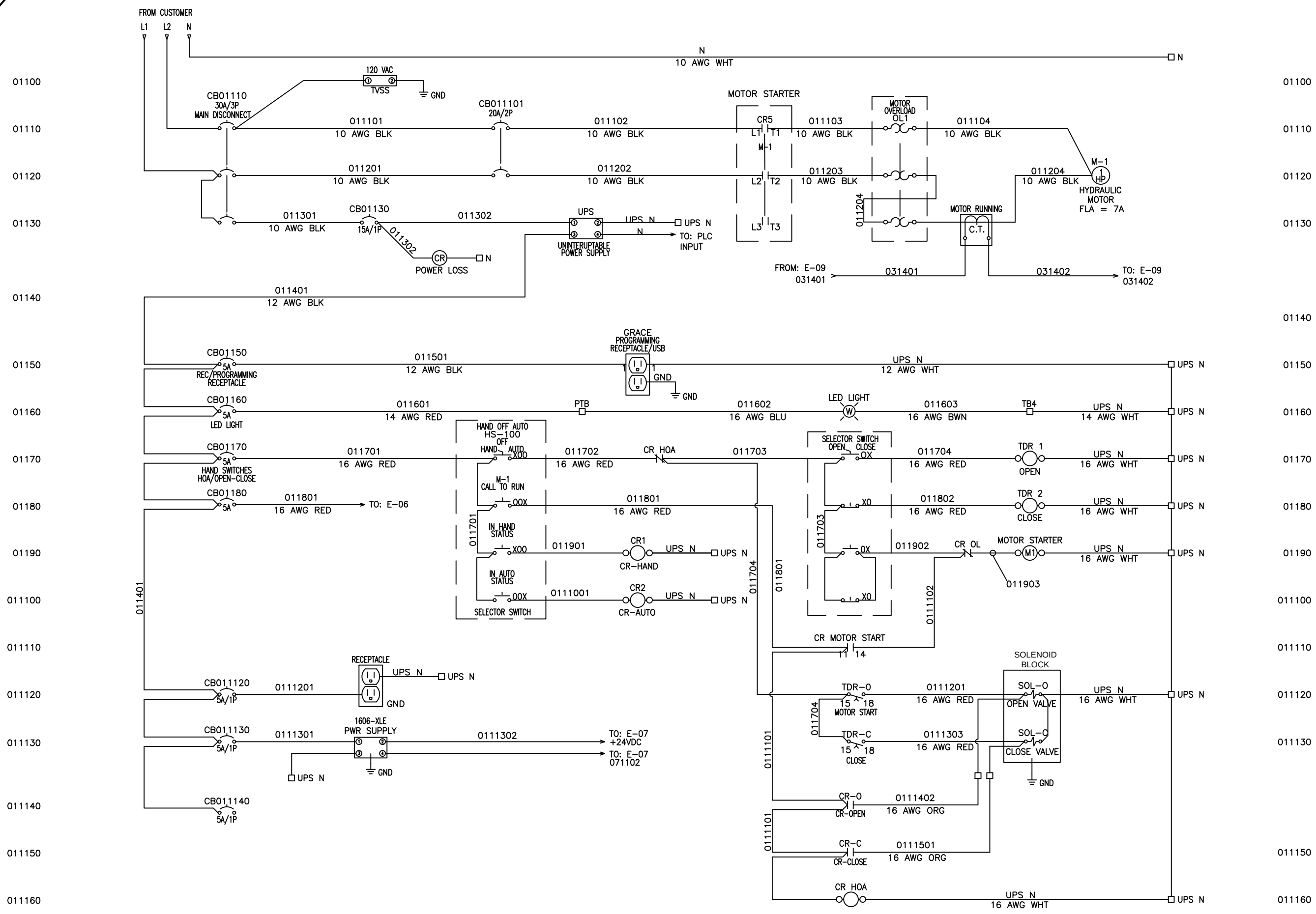
PTB-1 TERMINAL BLOCK SCHEDULE		
PTB-1 #	WIRE #	DESCRIPTION
(1)	031101	CR-HAND
(3)	031201	CR-AUTO
(5)	031301	CR-OVERLOAD
(7)	031401	C.T. (MOTOR RUNNING)
(9)	031501	C.R. CALL TO INJECT
(11)	031601	CR POWER LOSS
(13)	031701	TVSS
(15)	031801	SPARE
(17)	031901	SPARE
(19)	032001	SPARE
(21)	0320101	SPARE
(23)	0320201	SPARE
(25)	0320301	SPARE
(27)	0320401	SPARE
(29)	0320501	SPARE
(31)	0320601	SPARE
(33)	SPARE	SPARE
(35)	SPARE	SPARE
(37)	SPARE	SPARE
(39)	SPARE	SPARE



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1	--	SUBMITTAL	NK
NO.	DATE	REVISION	BY
DWG TITLE			
120VAC TERM. BLOCK DETAILS			
ENGINEER	MPJ	CHECKED BY	MPJ
JOB NO	WO-20**	DRAWN BY	NEK
SCALE	NO SCALE	DATE	11/04/2022
DWG NO	E-04 (C)		
SHEET NO	13 OF 21		



1	---	SUBMITTAL	NK
NO.	DATE	REVISION	BY
DWG TITLE			
120 VAC CONTROL POWER DIAGRAM			
ENGINEER	MPJ	CHECKED BY	MPJ
JOB NO	WO-20**	DRAWN BY	NEK
SCALE	NO SCALE	DATE	11/04/2022
DWG NO	E-05		
SHEET NO	14 OF 21		

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04110
04120
04130
04140
04150
04160
04170
04180
04190
042000

011801
FROM E-05
CB01180

011801

FU11

041101

120VAC
E-09
TB1

FU12

041201

TO: E-10
041201 (VAC/VDC1)

FU13

041301

TO: E-10
041301 (VAC/VDC2)

FU14

SPARE

FU15

SPARE

FU16

SPARE

FU17

SPARE

FU18

SPARE

FU19

SPARE

FU20

SPARE

04110
04120
04130
04140
04150
04160
04170
04180
04190
042000

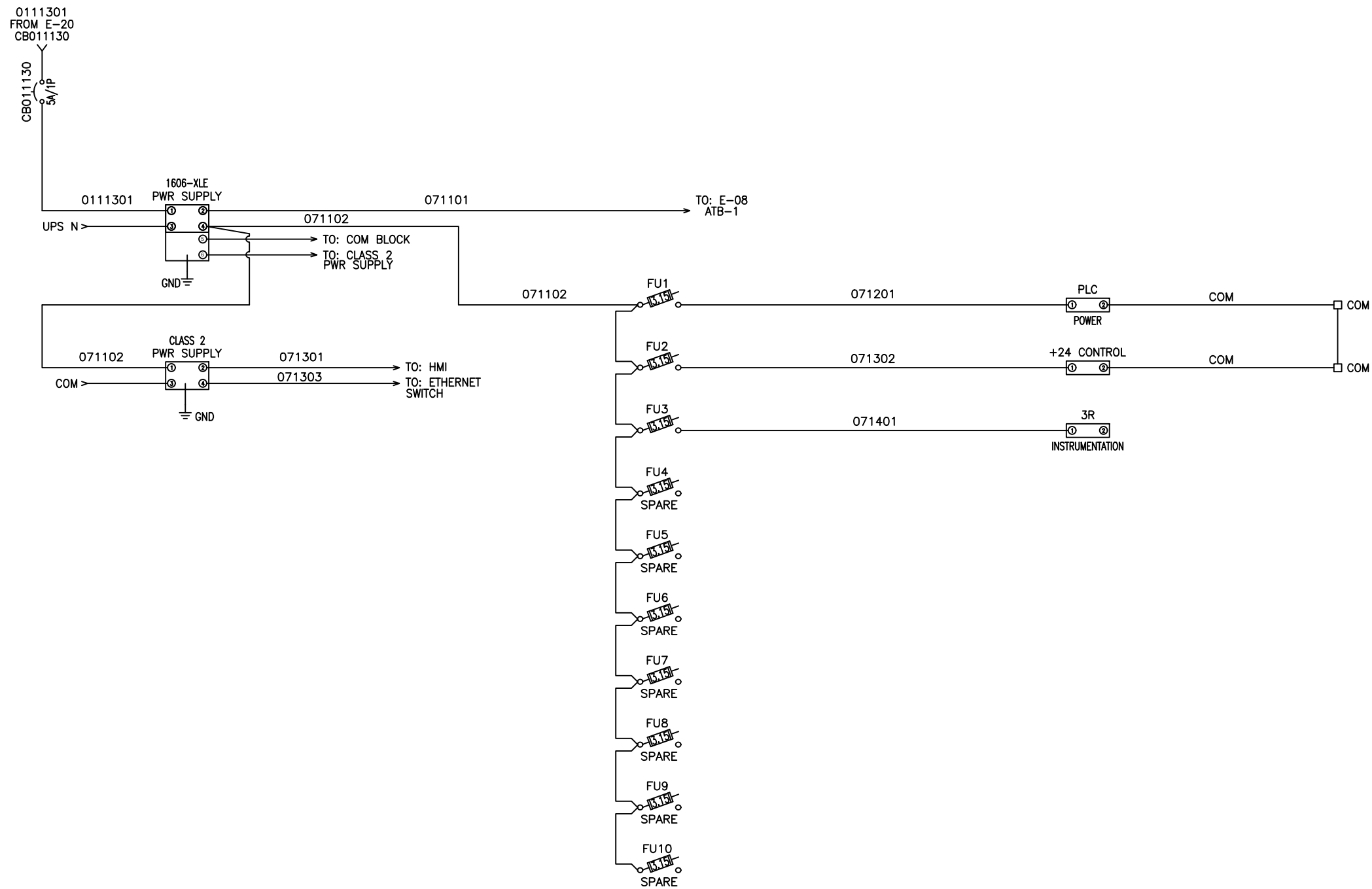
E 120VAC FUSE BLOCK DIAGRAM
05 NO SCALE



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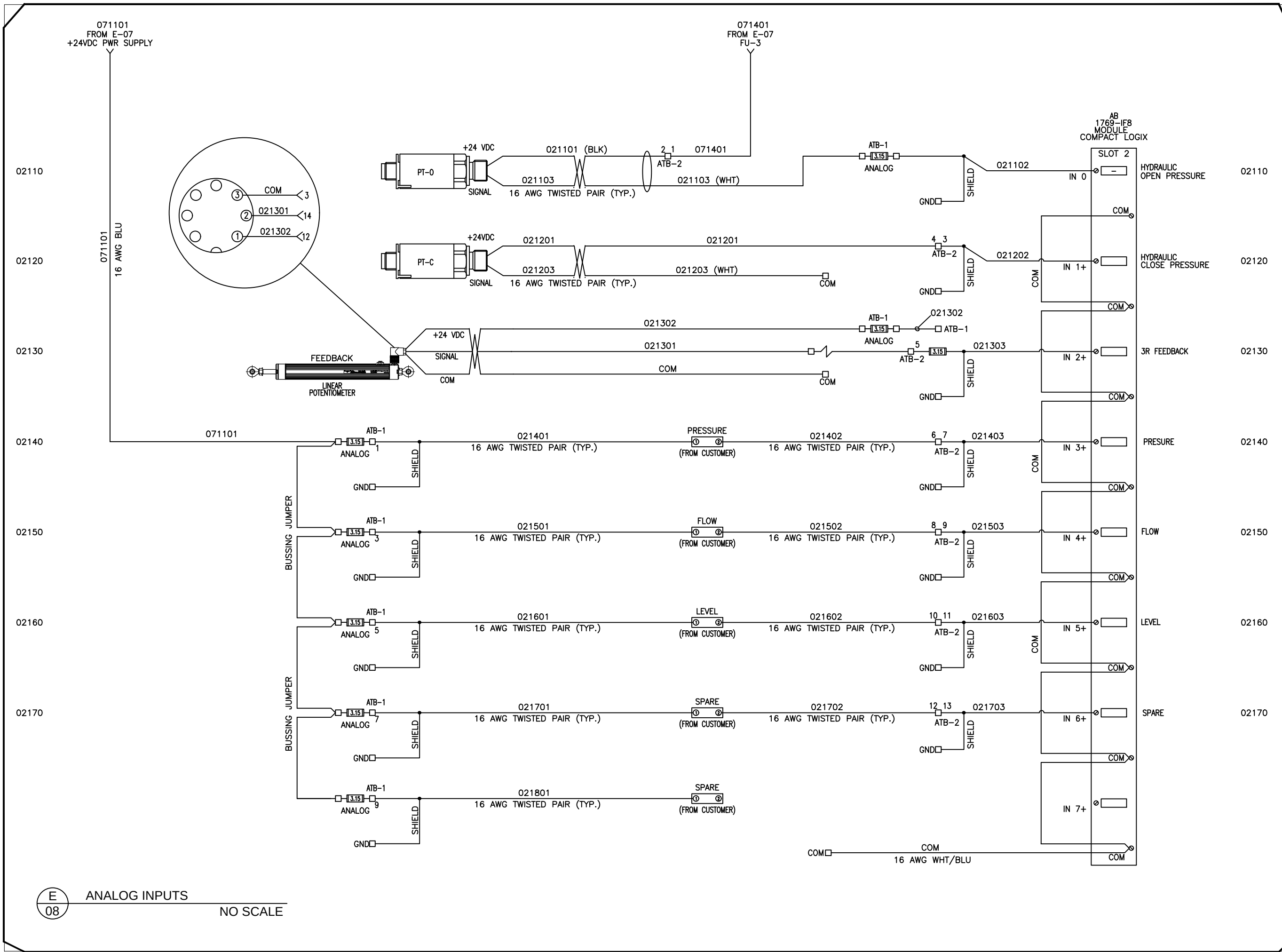
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NO.	DATE	REVISION			BY
DWG TITLE					



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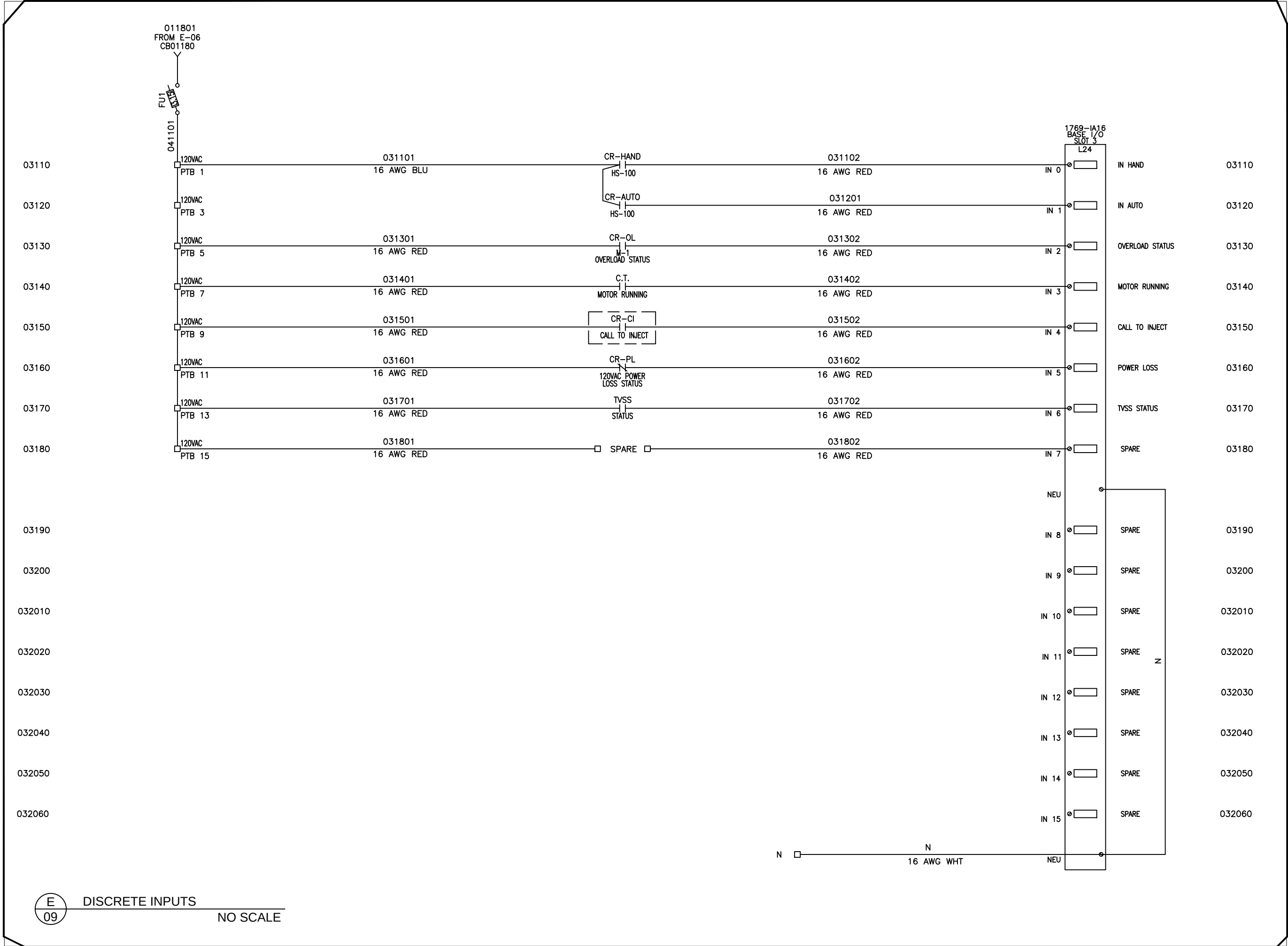
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NO.	DATE	REVISION	BY
DWG TITLE			
+24VDC CONTROL POWER DIAGRAM			
ENGINEER	MPJ	CHECKED BY	MPJ
JOB NO	WO-20**	DRAWN BY	NEK
SCALE	NO SCALE	DATE	11/07/2022
DWG NO			
E-07			
SHEET NO			
16 OF 21			



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1	--	SUBMITTAL	NK
NO.	DATE	REVISION	BY
Dwg Title			
ANALOG INPUTS WIRING DIAGRAM			
ENGINEER	MPJ	CHECKED BY	MPJ
JOB NO	WO-20**	DRAWN BY	NEK
SCALE	NO SCALE	DATE	11/07/2022
Dwg No			
E-08			
SHEET NO			
17 OF 21			

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E
09

DISCRETE INPUTS

NO SCALE



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NO.	DATE	REVISION	BY
1	--	SUBMITTAL	NK

DISCRETE INPUTS
WIRING
DIAGRAM

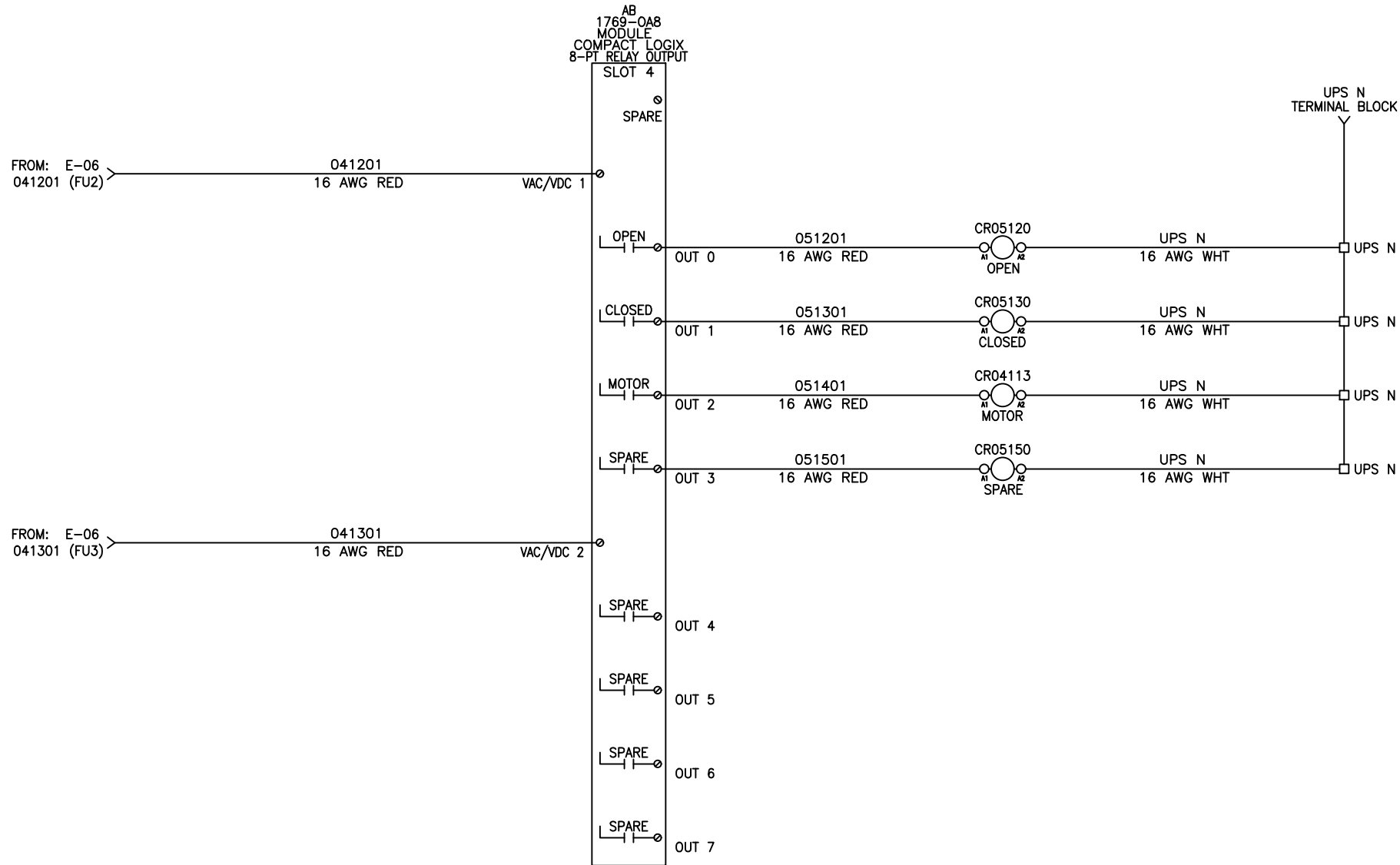
ENGINEER
JOB NO
SCALE

CHECKED BY
DRAWN BY
DATE

DWG NO
E-09

SHEET NO
18 OF 21

05110
05120
05130
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05110
05120
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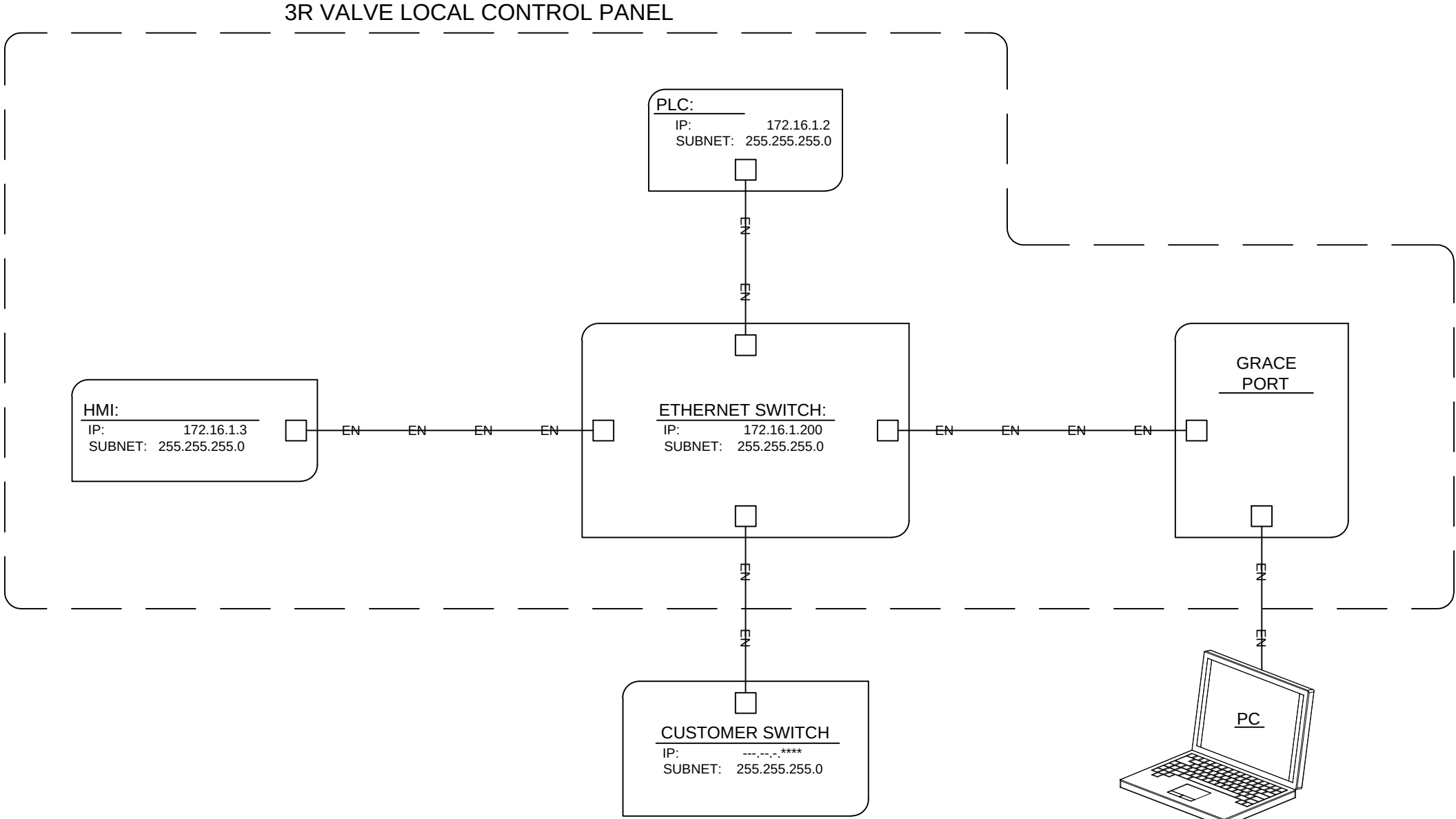
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1	--	SUBMITTAL	NK
NO.	DATE	REVISION	BY
DWG TITLE			
120V AC DISCRETE OUTPUTS DIAGRAM			
ENGINEER	MPJ	CHECKED BY	MPJ
JOB NO	WO-20**	DRAWN BY	NEK
SCALE	NO SCALE	DATE	11/07/2022
DWG NO	E-10		
SHEET NO	19 OF 21		

LEGEND

—EN—EN—EN—

ETHERNET CABLE



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1	--	SUBMITTAL		NK	
NO.	DATE	REVISION		BY	
DWG TITLE					
--					
--					
COMMUNICATION					
DIAGRAM					
ENGINEER		CHECKED BY			
MPJ		MPJ			
JOB NO		DRAWN BY			
WO-20**		NEK			
SCALE		DATE			
NO SCALE		11/07/2022			
DWG NO					
E-11					
SHEET NO					
20 OF 21					

Estimate of Head Loss Through 3R Valve

Step 1. Column Size	<u>10.000</u>	inches	(Inside Diameter of Column, D1)		
Step 2. Gland Size	<u>6.500</u>	inches	(Inside Diameter of Gland, D2)	Ratio D2/D1	<u>0.65</u>
Step 3. Body Size	<u>7.750</u>	inches	(Inside Diameter of Body, D3)	Ratio D2/D3	<u>0.84</u>
Step 4. UHMW Size	<u>8.000</u>	inches	(Inside Diameter of UHMW, D4)	Ratio D2/D4	<u>0.81</u>
Step 5. Total Gland Length	<u>30.00</u>	inches	(Length of Glands)	Ratio D4/D3	<u>1.03</u>
Step 6. Shaft Size	<u>2</u>	inches	(Outside Diameter of Shaft)		

Entrance "K" Factor (D2/D1)	<u>0.29</u>	Exit "K" Factor (D2/D4)	<u>0.12</u>
Entrance "K" Factor (D2/D3)	<u>0.15</u>	Exit "K" Factor (D4/D3)	<u>0.00</u>
		Exit "K" Factor (D2/D1)	<u>0.33</u>

Step 7. Flow Rate 1,500 gpm

Column Cross-Sectional Area	<u>75.40</u>	sq.in.	Column Velocity	<u>6.38</u>	fps
Gland Cross-Sectional Area	<u>30.04</u>	sq.in.	Gland Velocity	<u>16.02</u>	fps
Body Cross-Sectional Area	<u>44.03</u>	sq.in.	Body Velocity	<u>10.93</u>	fps
UHMW Cross-Sectional Area	<u>47.12</u>	sq.in.	UHMW Velocity	<u>10.21</u>	fps

Entrance Head Loss from Column into Top Gland	<u>1.15</u>	feet
Exit Head Loss from Top Gland into UHMW	<u>0.47</u>	feet
Exit Head Loss from UHMW into Body	<u>0.00</u>	feet
Gland Head Loss	<u>0.29</u>	feet

Absolute Surface Roughness ϵ = 0.0018 inches

Exit Head Loss from the Valve _____ feet

Total Head Loss 1.90 feet

Step 8. Correction Factor 1.15

Adjusted Head Loss 2.19 feet



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1	--	SUBMITTAL	NK
NO.	DATE	REVISION	BY
DWG TITLE			
--			
HEAD LOSS SCHEDULE			
ENGINEER	MPJ	CHECKED BY	MPJ
JOB NO	WO-20**	DRAWN BY	NEK
SCALE	NO SCALE	DATE	11/07/2022
DWG NO			
E-12			
SHEET NO			
21 OF 21			



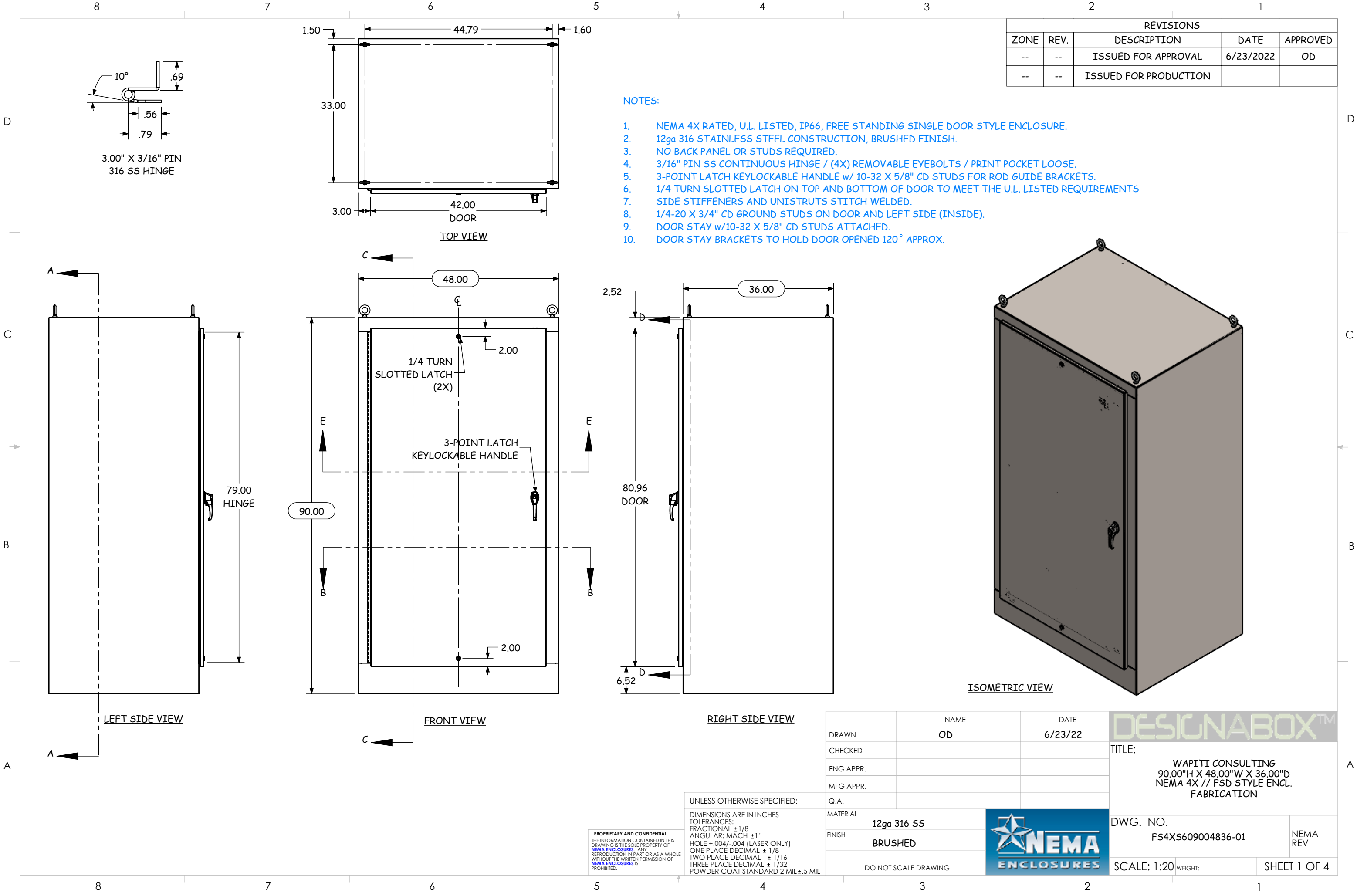
Parts & Spec sheets may
change per Project design.

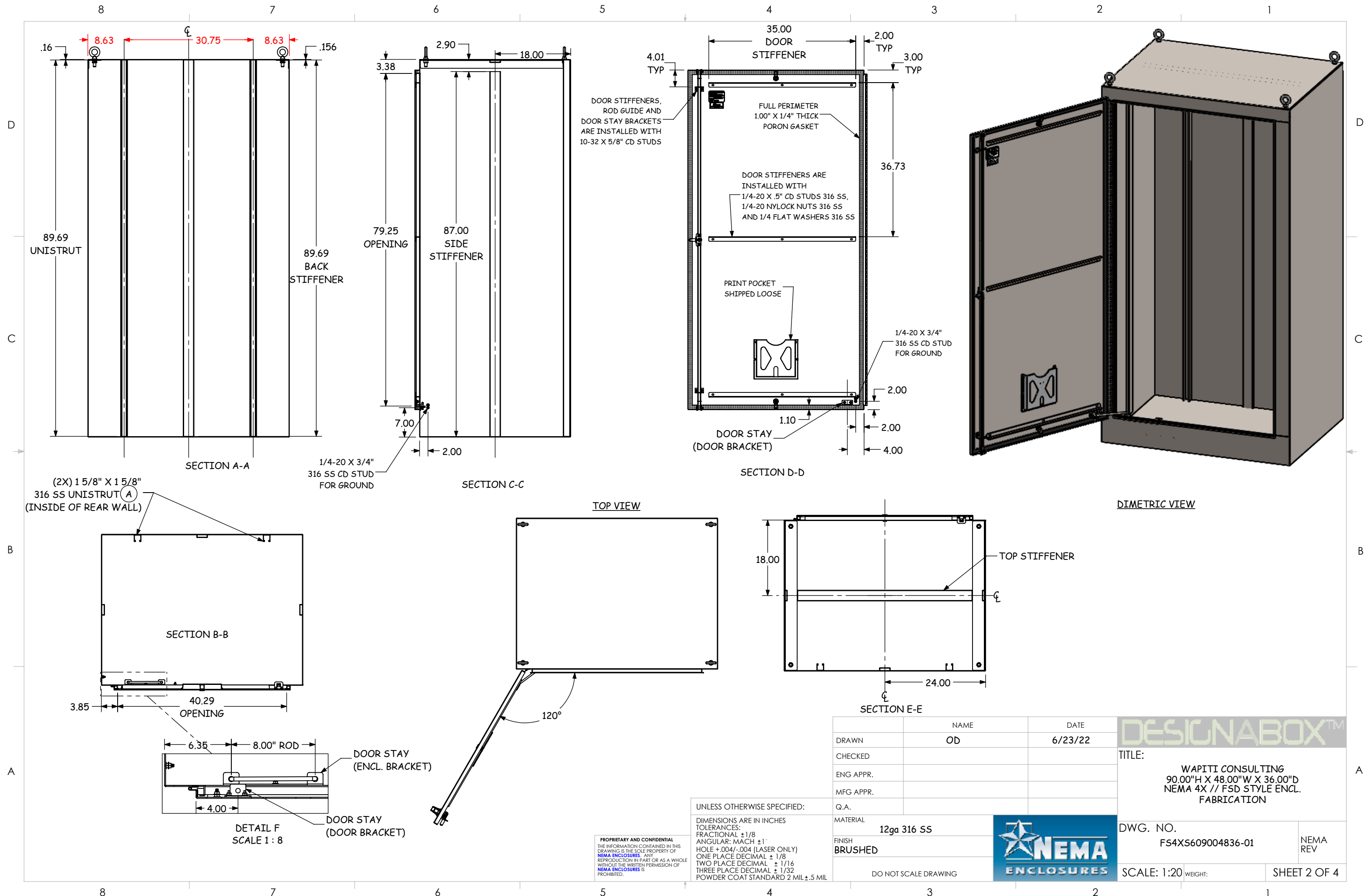
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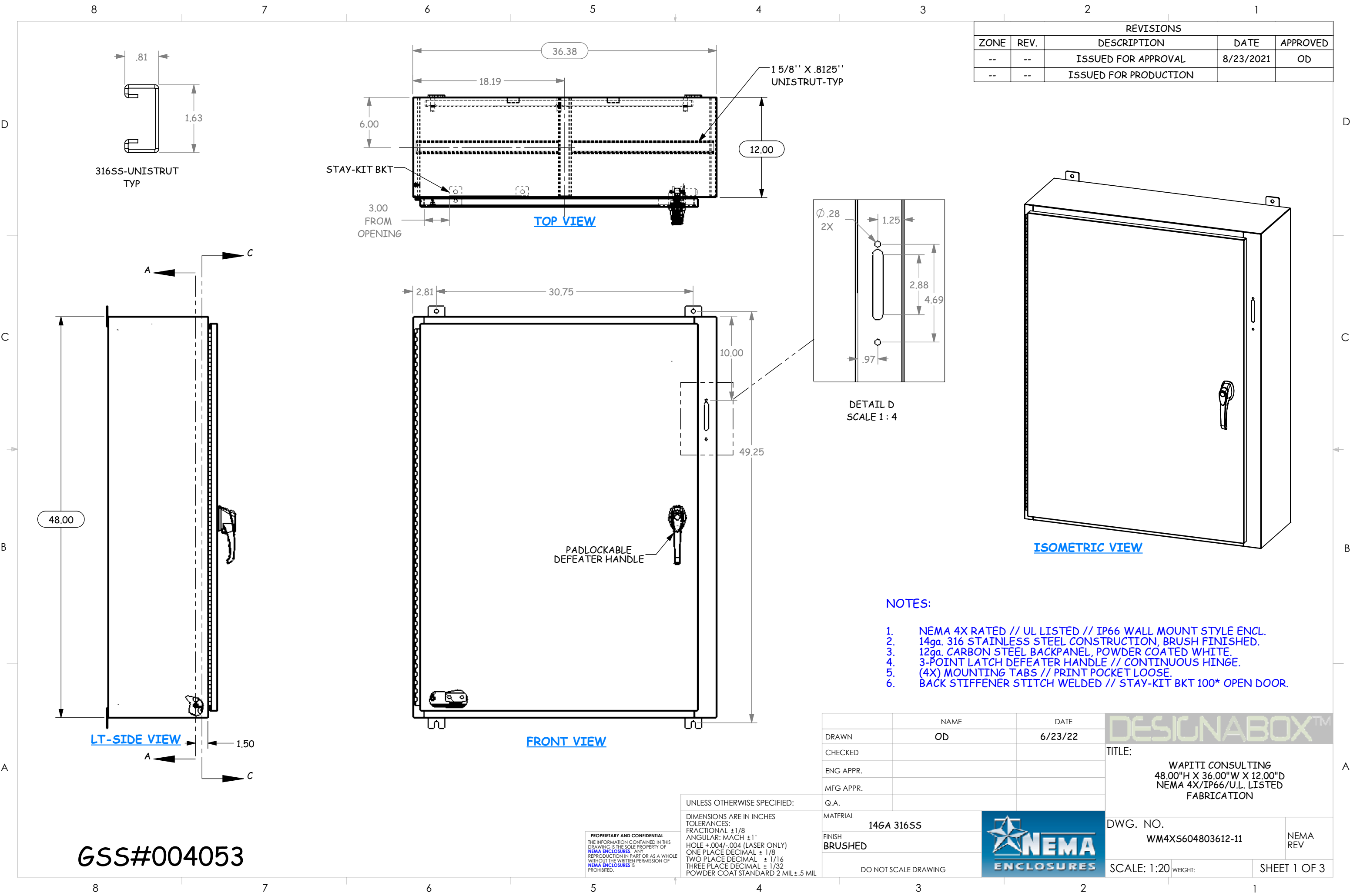
Enclosure Panel

Part #'s may change per
requirements for project.









REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
--	--	ISSUED FOR APPROVAL	8/23/2021	OD
--	--	ISSUED FOR PRODUCTION		

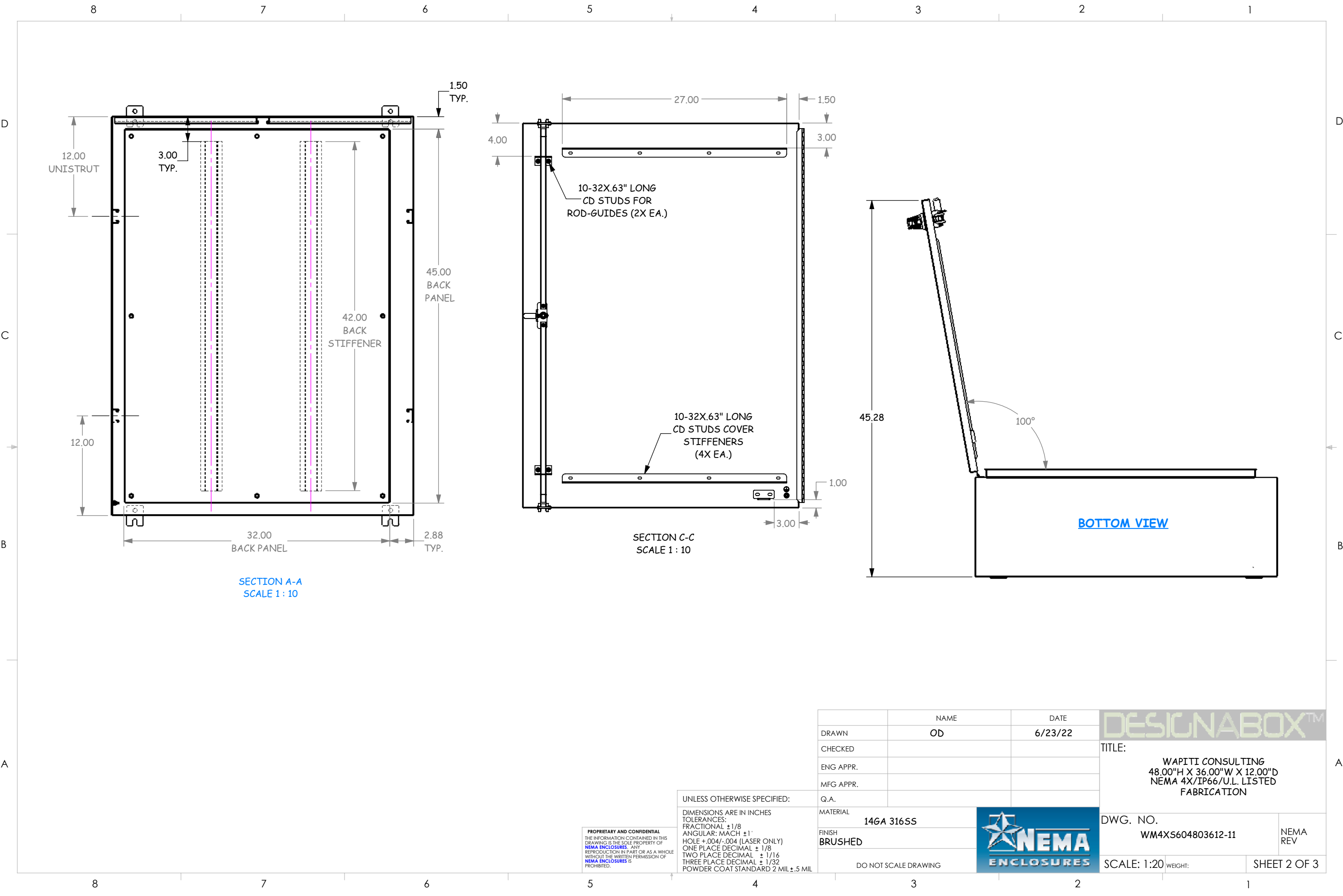
- NOTES:
- NEMA 4X RATED // UL LISTED // IP66 WALL MOUNT STYLE ENCL.
 - 14ga. 316 STAINLESS STEEL CONSTRUCTION, BRUSH FINISHED.
 - 12ga. CARBON STEEL BACKPANEL, POWDER COATED WHITE.
 - 3-POINT LATCH DEFEATER HANDLE // CONTINUOUS HINGE.
 - (4X) MOUNTING TABS // PRINT POCKET LOOSE.
 - BACK STIFFENER STITCH WELDED // STAY-KIT BKT 100* OPEN DOOR.

		NAME		DATE		DESIGNABOX™ TITLE: WAPITI CONSULTING 48.00"H X 36.00"W X 12.00"D NEMA 4X/IP66/U.L. LISTED FABRICATION					
DRAWN		OD		6/23/22							
CHECKED											
ENG APPR.											
MFG APPR.											
Q.A.											
MATERIAL		14GA 316SS				DWG. NO.					
FINISH		BRUSHED				WM4XS604803612-11		NEMA REV			
DO NOT SCALE DRAWING						SCALE: 1:20		WEIGHT:		SHEET 1 OF 3	

GSS#004053

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UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL: ±1/8
ANGULAR: MACH ±1°
HOLE +.004/-0.004 (LASER ONLY)
ONE PLACE DECIMAL ±1/16
TWO PLACE DECIMAL ±1/32
THREE PLACE DECIMAL ±.001
POWDER COAT STANDARD 2 MIL ±.5 MIL



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UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL $\pm 1/8$
ANGULAR: MACH $\pm 1^\circ$
HOLE $+ .004 / - .004$ (LASER ONLY)
ONE PLACE DECIMAL $\pm 1/8$
TWO PLACE DECIMAL $\pm 1/16$
THREE PLACE DECIMAL $\pm 1/32$
POWDER COAT STANDARD 2 MIL $\pm .5$ MIL

	NAME	DATE	DESIGNABOX™ TITLE: WAPITI CONSULTING 48.00"H X 36.00"W X 12.00"D NEMA 4X/IP66/U.L. LISTED FABRICATION	
DRAWN	OD	6/23/22		
CHECKED				
ENG APPR.				
MFG APPR.				
Q.A.			DWG. NO. WM4XS604803612-11 NEMA REV	
MATERIAL	14GA 316SS			
FINISH	BRUSHED		SCALE: 1:20 WEIGHT: SHEET 2 OF 3	
	DO NOT SCALE DRAWING			



Bulletin 140G 3P Flange Cable Operator



Simplified Selection, Faster Installation and Improved Access

Features and Benefits

Space Savings

- Cable can be easily routed under most enclosure flanges
- Reduces overall footprint and increases usable panel space

Terminal Access

- Ability to install 140G-*TH3H line and load terminal covers without disassembly
- Compatible with all terminal lug options including extended and spreader options

Flexible Cable

- Reduced bend radius for shallow enclosures
- Mechanism and cable are factory tuned
- Easier assembly/installation

The new Bulletin 140G Flange Cable Operator improves panel space efficiency while simplifying selection and installation.



Flange Cable Operator

The new Bulletin 140G Flange Cable Operator improves panel space efficiency by using a more flexible cable that can fit under the flange and a smaller bail mechanism that takes less space below the circuit breaker. The new mechanism also improves access to the circuit breaker terminals, without disassembly. This enables installation of line- and load-side terminal covers and all lug options, including extended and spreader lugs.

Optional EZ Plate

The optional "EZ Plate" minimizes installation steps by allowing preassembly of the circuit breaker actuation mechanism prior to mounting into control panel and simplifies mounting by providing greater visibility of fastener locations.



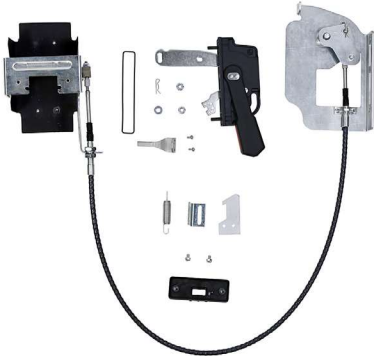
LISTEN.
THINK.
SOLVE.

Catalog Explanation

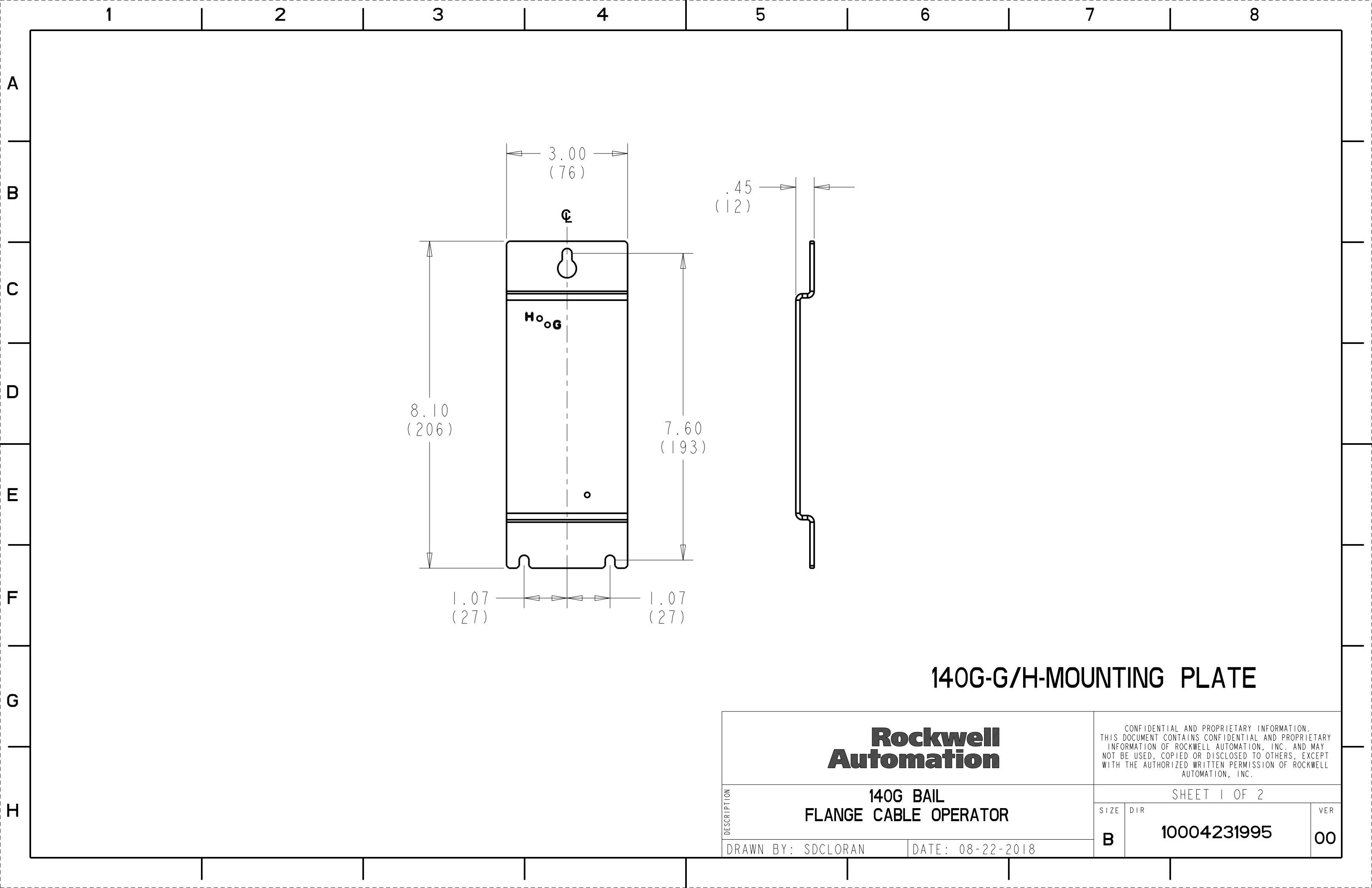
Flange-mounted Cable Operator – 3 Pole only

140G		-	G		-	F		CX		B		04	
Bulletin Number		Frame / Rating		Flange		Handle Type		Bail		Cable Length			
Code	Description	Code	Description	Code	Description	Code	Description	Code	Description	Code	Description		
140G	Global Molded Case Circuit Breaker	G	125A	F	Flange Cable	CX	Non-metalic (plastic)	B	Bail	03	3 ft. [0.91 m]		
		H	125A			MX	Painted Metal			04	4 ft. [1.3 m]		
		I	225A							06	6 ft. [1.9 m]		
		J	250A			CS	Stainless Steel			10	10 ft. [3.0 m]		
		K	400A										

Product Selection

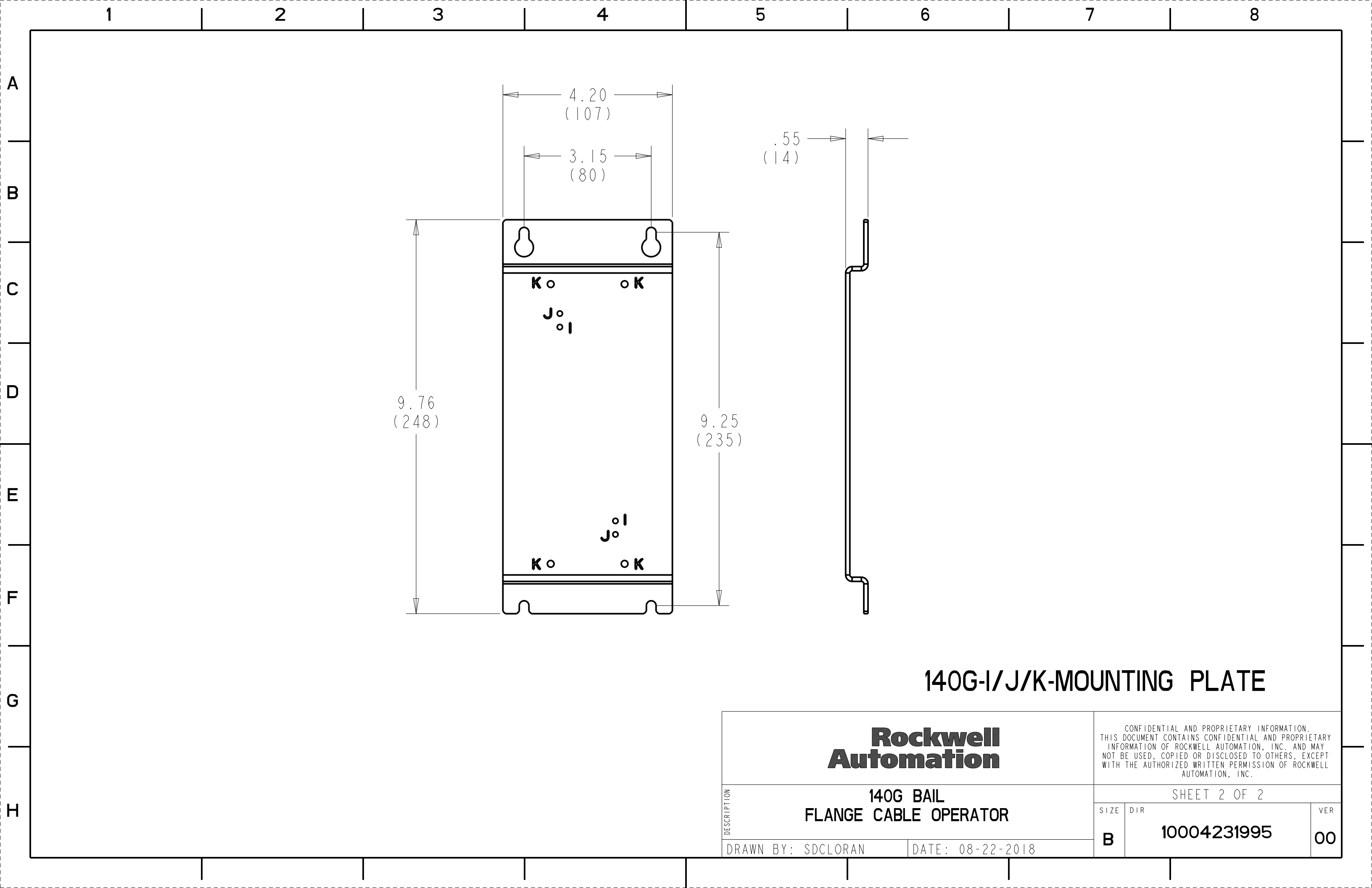
Description	Frame Size	Handle Type	Cable Length	Catalog Number	Cable Length	Catalog Number
• For use with NEMA-Style Flange Enclosures • Includes Handle, Bail Mechanism, Cable & Assembly Hardware • Pre-assembled for ease of installation  Complete Kit	G	Non-metallic Handle, Type 1/3/3R/12/4/4X	3 ft. [0.91 m]	140G-G-FCXB03	6 ft. [1.9 m]	140G-G-FCXB06
			4 ft. [1.3 m]	140G-G-FCXB04	10 ft. [3.0 m]	140G-G-FCXB10
		Painted Metal Handle, Type 1/3/3R/12/4/4X	3 ft. [0.91 m]	140G-G-FMXB03	6 ft. [1.9 m]	140G-G-FMXB06
			4 ft. [1.3 m]	140G-G-FMXB04	10 ft. [3.0 m]	140G-G-FMXB10
		Stainless Steel Handle, Type 4/4X	3 ft. [0.91 m]	140G-G-FCSB03	6 ft. [1.9 m]	140G-G-FCSB06
			4 ft. [1.3 m]	140G-G-FCSB04	10 ft. [3.0 m]	140G-G-FCSB10
	H	Non-metallic Handle, Type 1/3/3R/12/4/4X	3 ft. [0.91 m]	140G-H-FCXB03	6 ft. [1.9 m]	140G-H-FCXB06
			4 ft. [1.3 m]	140G-H-FCXB04	10 ft. [3.0 m]	140G-H-FCXB10
		Painted Metal Handle, Type 1/3/3R/12/4/4X	3 ft. [0.91 m]	140G-H-FMXB03	6 ft. [1.9 m]	140G-H-FMXB06
			4 ft. [1.3 m]	140G-H-FMXB04	10 ft. [3.0 m]	140G-H-FMXB10
		Stainless Steel Handle, Type 4/4X	3 ft. [0.91 m]	140G-H-FCSB03	6 ft. [1.9 m]	140G-H-FCSB06
			4 ft. [1.3 m]	140G-H-FCSB04	10 ft. [3.0 m]	140G-H-FCSB10
	I	Non-metallic Handle, Type 1/3/3R/12/4/4X	3 ft. [0.91 m]	140G-I-FCXB03	6 ft. [1.9 m]	140G-I-FCXB06
			4 ft. [1.3 m]	140G-I-FCXB04	10 ft. [3.0 m]	140G-I-FCXB10
		Painted Metal Handle, Type 1/3/3R/12/4/4X	3 ft. [0.91 m]	140G-I-FMXB03	6 ft. [1.9 m]	140G-I-FMXB06
			4 ft. [1.3 m]	140G-I-FMXB04	10 ft. [3.0 m]	140G-I-FMXB10
		Stainless Steel Handle, Type 4/4X	3 ft. [0.91 m]	140G-I-FCSB03	6 ft. [1.9 m]	140G-I-FCSB06
			4 ft. [1.3 m]	140G-I-FCSB04	10 ft. [3.0 m]	140G-I-FCSB10
	J	Non-metallic Handle, Type 1/3/3R/12/4/4X	3 ft. [0.91 m]	140G-J-FCXB03	6 ft. [1.9 m]	140G-J-FCXB06
			4 ft. [1.3 m]	140G-J-FCXB04	10 ft. [3.0 m]	140G-J-FCXB10
		Painted Metal Handle, Type 1/3/3R/12/4/4X	3 ft. [0.91 m]	140G-J-FMXB03	6 ft. [1.9 m]	140G-J-FMXB06
			4 ft. [1.3 m]	140G-J-FMXB04	10 ft. [3.0 m]	140G-J-FMXB10
		Stainless Steel Handle, Type 4/4X	3 ft. [0.91 m]	140G-J-FCSB03	6 ft. [1.9 m]	140G-J-FCSB06
			4 ft. [1.3 m]	140G-J-FCSB04	10 ft. [3.0 m]	140G-J-FCSB10
	K	Non-metallic Handle, Type 1/3/3R/12/4/4X	3 ft. [0.91 m]	140G-K-FCXB03	6 ft. [1.9 m]	140G-K-FCXB06
			4 ft. [1.3 m]	140G-K-FCXB04	10 ft. [3.0 m]	140G-K-FCXB10
		Painted Metal Handle, Type 1/3/3R/12/4/4X	3 ft. [0.91 m]	140G-K-FMXB03	6 ft. [1.9 m]	140G-K-FMXB06
			4 ft. [1.3 m]	140G-K-FMXB04	10 ft. [3.0 m]	140G-K-FMXB06
		Stainless Steel Handle, Type 4/4X	3 ft. [0.91 m]	140G-K-FCSB03	6 ft. [1.9 m]	140G-K-FCSB06
			4 ft. [1.3 m]	140G-K-FCSB04	10 ft. [3.0 m]	140G-K-FCSB06

Description	Frame Size	Catalog Number
EZ Plate - eliminates precision drilling and tapping for MCCB mounting screws. Kit includes plate with mounting fasteners	G & H	140G-G-EZ
	I, J & K	140G-J-EZ



140G-G/H-MOUNTING PLATE

DESCRIPTION		Rockwell Automation			CONFIDENTIAL AND PROPRIETARY INFORMATION. THIS DOCUMENT CONTAINS CONFIDENTIAL AND PROPRIETARY INFORMATION OF ROCKWELL AUTOMATION, INC. AND MAY NOT BE USED, COPIED OR DISCLOSED TO OTHERS, EXCEPT WITH THE AUTHORIZED WRITTEN PERMISSION OF ROCKWELL AUTOMATION, INC.		
		140G BAIL FLANGE CABLE OPERATOR			SHEET 1 OF 2		
		DRAWN BY: SDCLORAN			SIZE	DIR	VER
		DATE: 08-22-2018			B	10004231995	00



140G-I/J/K-MOUNTING PLATE

DESCRIPTION		Rockwell Automation			CONFIDENTIAL AND PROPRIETARY INFORMATION. THIS DOCUMENT CONTAINS CONFIDENTIAL AND PROPRIETARY INFORMATION OF ROCKWELL AUTOMATION, INC. AND MAY NOT BE USED, COPIED OR DISCLOSED TO OTHERS, EXCEPT WITH THE AUTHORIZED WRITTEN PERMISSION OF ROCKWELL AUTOMATION, INC.		
		140G BAIL FLANGE CABLE OPERATOR			SHEET 2 OF 2		
		DRAWN BY: SDCLORAN			SIZE	DIR	VER
		DATE: 08-22-2018			B	10004231995	00

Accessories- 700-HK Relays

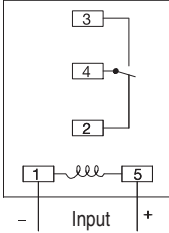
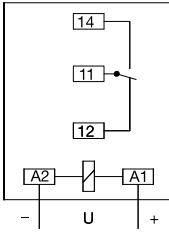
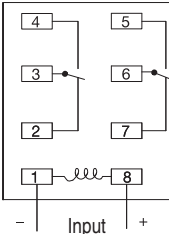
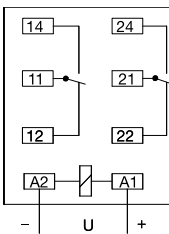
Photo	Description	Pkg. Qty.	Cat. No.
	Screw Terminal Socket — Panel or DIN Rail Mounting 5-blade miniature socket with 10 A rating for use with 1-pole, 700-HK relays. Accepts forked lug conductors. Socket includes a retainer clip.	10	700-HN121
	Screw Terminal Socket — Panel or DIN Rail Mounting 5-blade miniature socket with 16 A rating for use with 1-pole, 700-HK relays. Retainer clips are packaged separately with socket. Guarded terminal construction and compatible with optional plug-in module accessories.	10	700-HN221
	Spring Clamp Terminal Socket — Panel or DIN Rail Mounting 5-blade miniature socket for use with 1-pole, 700-HK relays.	10	700-HN223
	Screw Terminal Socket — Panel or DIN Rail Mounting 8-blade miniature socket with 5 A rating for use with 2-pole, 700-HK relays. Accepts forked lug conductors. This socket includes a retainer clip.	10	700-HN122
	Screw Terminal Socket — Panel or DIN Rail Mounting 8-blade miniature socket with 8 A rating for use with 2-pole, 700-HK relays. Retainer clips are packaged separately with socket. Guarded terminal construction and compatible with optional plug-in module accessories.	10	700-HN222
	Spring Clamp Terminal Socket — Panel or DIN Rail Mounting 8-blade miniature socket for use with 2-pole 700-HK relays.	10	700-HN224
	Flange Mount Adapter Used for panel-mounting bulletin 700-HK relays. Order must be for 10 adapters or multiples of 10.	10	700-HN226
	35 mm Rail Mount Adapter Mounts bulletin 700-HK relays to a 35 mm rail. Order must be for 10 adapters or multiples of 10.	10	700-HN227
	Socket Retainer Clip and Ejection Lever For use with 700-HN22, -HN222, -HN223, and -HN224 sockets. Orders must be for 10 clips or multiples of 10.	10	700-HN229

8A Control Relay

700-HK Slim Line Relay

- 8 A/16 A contact ratings
- DPDT/SPDT
- Plug-in blade-style terminals (2.5 x 0.5 mm)
- Retainer clip with sockets
- Options: LED, push-to-test and manual override, socket-mounted surge suppressor module, or timer module
- Standard ON/OFF flag indicator
- Relay faceplate accepts optional Bulletin 1492 snap-in markers
- Choice of standard silver/nickel contacts or silver/nickel with gold plated contacts
- Maximum duty version available



Photo	Description	Contact Rating	Wiring Diagrams		Coil Voltage	Cat. No. ⁽¹⁾
			U.S./Canada	International		
	SPDT 1-Pole 1 Form C AgNi Contacts	16 A			6V AC	700-HK36A06
					12V AC	700-HK36A12
					24V AC	700-HK36A24
					120V AC	700-HK36A1
					240V AC	700-HK36A2
					6V DC	700-HK36Z06
					12V DC	700-HK36Z12
					24V DC	700-HK36Z24
					48V DC	700-HK36Z48
	Socket		700-HN121, 700-HN221, 700-HN223	700-HN121, 700-HN221, 700-HN223	110V DC	700-HK36Z1
	DPDT 2-Pole 2 Form C AgNi Contacts	8 A			6V AC	700-HK32A06
					12V AC	700-HK32A12
					24V AC	700-HK32A24
					120V AC	700-HK32A1
					240V AC	700-HK32A2
					6V DC	700-HK32Z06
					12V DC	700-HK32Z12
					24V DC	700-HK32Z24
					48V DC	700-HK32Z48
	Socket		700-HN122, 700-HN222, 700-HN224	700-HN122, 700-HN222, 700-HN224	110V DC	700-HK32Z1

(1) Options

Pilot Light: Add suffix (-4) to the selected 700-HK Relay catalog number except for the 240V AC units, add (-4L).

Manual Operator and LED: Add suffix (-3-4) to the selected 700-HK Relay catalog number, except for the 240V AC units, add (-3-4L).

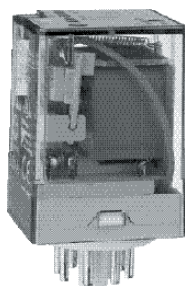
AgNi Contact with Gold plating: Replace "3" with "X" on catalog number. For example, if catalog number 700-HK36A1 is required with gold plating, the new catalog number is 700-HKX6A1.

For high inductive, Tungsten, or Capacitive load applications, replace the "3" with a "M" in the catalog number. Only available in a SPDT configuration and with 24V DC, 120V AC, or 240V AC coil voltages.

Accessories

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

General Purpose Relay Socket



Bulletin 700-HA — Tube Base Relay

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

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Product Selection

Bulletin 700-HA Tube Base Relay with PIN Terminals (Single Contact) — Mechanical ON/OFF Indicator included*

	Description	Contact Rating	Wiring Diagrams		Coil Voltage	Cat. No.*†§
			U.S./Canada	International		
	DPDT 2-pole 2 Form C Single AgNi Contact	10 A B300			6V AC	700-HA32A06
					12V AC	700-HA32A12
					24V AC	700-HA32A24
					120V AC	700-HA32A1
					240V AC	700-HA32A2
					277V AC	700-HA32A27 ➤
					6V DC	700-HA32Z06
					12V DC	700-HA32Z12
					24V DC	700-HA32Z24
					36V DC	700-HA32Z36
					48V DC	700-HA32Z48
					60V DC	700-HA32Z60
					80V DC	700-HA32Z80
					110V DC	700-HA32Z1
					125V DC	700-HA32Z01
					140V DC	700-HA32Z3
					220V DC	700-HA32Z2 ➤
	3PDT 3-pole 3 Form C Single AgNi Contact	10 A B300			6V AC	700-HA33A06
					12V AC	700-HA33A12
					24V AC	700-HA33A24
					120V AC	700-HA33A1
					240V AC	700-HA33A2
					6V DC	700-HA33Z06
					12V DC	700-HA33Z12
					24V DC	700-HA33Z24
					48V DC	700-HA33Z48
					60V DC	700-HA33Z60
					80V DC	700-HA33Z80
					110V DC	700-HA33Z1
					125V DC	700-HA33Z01
					140V DC	700-HA33Z3
					220V DC	700-HA33Z2 ➤

* For Time Module and Surge Suppressor Module, see page 9-12.

‡ LED Option: Add suffix (-4) to the selected Bulletin 700-HA Relay Cat. No., except for the 240V AC Units, add (-4L).

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

§ Push-to-test and Manual Override option: Add suffix (-3) to the selected Bulletin 700-HA relay.

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

Solid-State Contactors
Available from 20...85 A

Advantages

- Compact solid-state design
 - High resistance to shock/vibration, contamination, and mechanical wear
 - Built-in varistor protection for a greater degree of over-voltage protection
 - Zero cross switching to help reduce EMC emissions
 - LED status indication provides visual verification of operating status
- Flexible configuration options
 - 1, 2, or 3-phase capable
 - Wide range of AC, DC, and analog control input options
- Optimized to help reduce electrical costs and needs
 - Low electrical and acoustical noise
 - Low input power
 - Operational current up to 85 A (AC-1), 65 A (AC-3)
 - Line voltage ratings up to 600V
 - UL/cUL as a motor controller
 - IEC AC51/AC53 resistive/inductive rated

Solid-state contactors are ideal for high duty cycle applications.



156-C1P20NAD single-phase



156-C3P30NCD three-phase

Overview

If your application demands low maintenance, fast switching, or operation in harsh environmental conditions, consider a solid-state control solution. The Allen-Bradley® Bulletin 156 line of solid-state contactors from Rockwell Automation complements our existing line of Bulletin 700 solid-state relays to provide you with a complete line of solid-state solutions. Designed without moving parts or contacts that can wear out, solid-state solutions can help reduce or eliminate the cost associated with maintenance, part replacement, and downtime.

Flexible in configuration and design, these devices can be panel or DIN Rail mounted complete with the integrated heatsink and do not require additional components or assembly. Microprocessor and PLC compatible, the solid-state contactors can be used in applications that range from heaters to small motors and valves.

Solid-state contactors are also an ideal replacement for mercury wetted relays and contactors. Mercury type relays introduce environmental complications that may lead to additional problems and expenses. A solid-state contactor can help eliminate these issues, while delivering the same type of performance at a lower total cost.

LISTEN.
THINK.
SOLVE.

Product Selection

Solid-State Power Contactors

Single-Phase

Current Rating @ 40 C	Control Voltage	Rated Power @ 40C						Operational voltage < 240 V AC	Operational Voltage < 600 V AC
			115	230	400	480	600		
20	20 - 275 V AC 24 - 190 V DC	Hp	1/3	1	2	3	3	156-C1P20NAB	156-C1P20NCB
	5 to 32 volts DC	kW	0.18	0.37	0.75	1.1	1.5	156-C1P20NAD	156-C1P20NCD
25	20 - 275 V AC 24 - 190 V DC	Hp	1/3	1	2	3	3	156-C1P25NAB	156-C1P25NCB
	5 to 32 volts DC	kW	0.18	0.37	0.75	1.1	1.5	156-C1P25NAD	156-C1P25NCD
43	20 - 275 V AC 24 - 190 V DC	Hp	1-1/2	3	5	7-1/2	10	-	156-C1P43NCB
	5 to 32 volts DC	kW	0.6	1.5	2.2	3.7	4.0	-	156-C1P43NCD
65	20 - 275 V AC 24 - 190 V DC	Hp	2	5	7-1/2	10	15	-	156-C1P65NCB
	5 to 32 volts DC	kW	0.75	1.5	4.0	4.0	5.5	-	156-C1P65NCD
85	20 - 275 V AC 24 - 190 V DC	Hp	2	5	7-1/2	10	15	-	156-C1P85NCB
	5 to 32 volts DC	kW	0.75	1.5	4.0	4.0	5.5	-	156-C1P85NCD

Dual-Phase

Current Rating @ 40 C	Control Voltage	Rated Power @ 40C						Operational voltage < 240 V AC	Operational Voltage < 600 V AC
			115	230	400	480	600		
25	20 - 275 V AC 24 - 190 V DC	Hp	1-1/2	3	5	7-1/2	10	-	156-C2P25NCB
	5 to 32 volts DC	kW	1.1	3.0	5.5	5.5	9.0	-	156-C2P25NCD
40	20 - 275 V AC 24 - 190 V DC	Hp	3	5	10	10	15	-	156-C2P40NCB
	5 to 32 volts DC	kW	1.5	4.0	7.5	9.0	11.0	-	156-C2P40NCD
75	20 - 275 V AC 24 - 190 V DC	Hp	5	10	15	20	25	-	156-C2P75NCBA
	5 to 32 volts DC	kW	3.0	7.5	11.0	15.0	22.0	-	156-C2P75NCDA

Three-Phase

Current Rating @ 40 C	Control Voltage	Rated Power @ 40C						Operational voltage < 240 V AC	Operational Voltage < 600 V AC
			115	230	400	480	600		
20	20 - 275 V AC 24 - 190 V DC	Hp	1	3	5	7-1/2	10	156-C3P20NAB	156-C3P20NCB
	5 to 32 volts DC	kW	0.8	2.2	4.0	5.5	7.5	156-C3P20NAD	156-C3P20NCD
25	20 - 275 V AC 24 - 190 V DC	Hp	2	3	7-1/2	10	10	-	156-C3P25NCB
	5 to 32 volts DC	kW	1.1	2.2	4.0	5.5	7.5	-	156-C3P25NCD
30	20 - 275 V AC 24 - 190 V DC	Hp	2	5	10	10	15	-	156-C3P30NCB
	5 to 32 volts DC	kW	1.5	3.0	5.5	7.5	11.0	-	156-C3P30NCD
40	20 - 275 V AC 24 - 190 V DC	Hp	2	5	10	10	15	-	156-C3P40NCBA
	5 to 32 volts DC	kW	1.4	4.0	7.5	9.0	11.0	-	156-C3P40NCDD
65	20 - 275 V AC 24 - 190 V DC	Hp	3	10	15	20	25	-	156-C3P65NCBA
	5 to 32 volts DC	kW	3.0	5.5	11.0	15.0	20.0	-	156-C3P65NCDA

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**Bulletin 1606 — Power Supplies****

- Quick mounting and connecting, innovative DIN-Rail mount, smallest in class
- UL Listed NEC Class 2; Class 1, Div. 2; Semi F47; ODVA Approved
- Low inrush current limiting
- PFC Active or Passive
- Wide range input; auto select input
- Superior overload design (continuous current, no hiccup)
- NEC Class 2 'Limited Power' options
- Selectable operating mode (single/parallel)
- Superior efficiency and temperature rating

Special Modules

- Brownout buffer, DC to DC converter, N+1 redundancy, DC UPS

Standards Compliance

- World-wide Certifications
- NEC Class 2
- Class 1 Div. 2 (T3A)
- cULus, CE, C-Tick, ATEX
- SEMI F47 Compatible
- ABS/GL/RINA (Marine)

Certifications**Table of Contents**

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* Not all features apply to all power supplies; see individual power supply descriptions for specifics

** A more detailed list of performance specifications can be found at the Allen-Bradley web site
http://www.ab.com/industrialcontrols/products/power_supplies/index.html

How to Select a Bulletin 1606 Power Supply

The Bulletin 1606 line of Power Supplies is designed with "reserve power" thereby eliminating the need to oversize your power supply to start high inrush loads.

Steps to size a Power Supply

1. Determine the "Average" continuous current of the load and the typical inrush current.
2. Select a power supply where the rated load is at/or below the current of the device and the Peak Current is less than the short-circuit rating of the power supply.

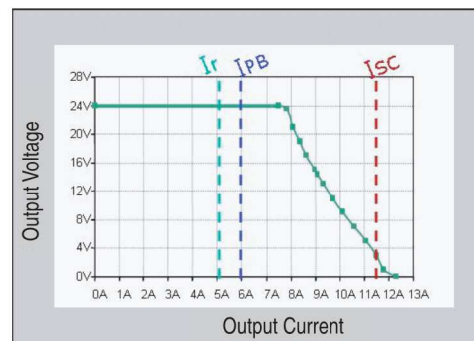
Notes:

- ReservePower will deliver up to 25% additional current continuously.
- PowerBoost will deliver 150% of rated current for up to 5 s.

Example:

Application: Single Phase 120V input, 24V output, 5 A continuous current with 7.5 A inrush current

Solution: 1606-XLS120E

Output Characteristic for XLS120E (5 A) Power Supply

I_{RATED} : 5 A
 $I_{\text{SHORT CIRCUIT}}$: >9 A
 $I_{\text{POWER BOOST}}$: 7.5 A

8

Cat. No.	I_{RATED} [A]	$I_{\text{SHORT CIRCUIT}}$ (25 °C) [A]	$I_{\text{POWER BOOST OR RESERVEPOWER}}$ [A]
1606-XLS80E	3.3	5.2	5.4§
1606-XLS120E	5	9	7.5§
1606-XLS240E	10	21	15§
1606-XLS480E	20	30	30§
1606-XLS480E-3	20	29	30§
1606-XLSDNET4	3.8	4	—
1606-XLSDNET8	8	7	—
1606-XLE80E	3.3	5.5	3.6
1606-XLE120E	5	11	6
1606-XLE240E	10	16	12

§ Products with ReservePower.

⚡ Short circuit current values are temperature dependent for the selected product; i.e., the higher the ambient temperature, the lower the short circuit current.

➤ Hiccup Overload design.

Quick Guide

Bulletin 1606-(number from table) ⌘ Power Supply Quick Guide

	15...40 W	50 W	60 W	72...80 W	90...100 W	120 W	180 W	240 W	480 W	720 W	960 W
5...5.5V	XLP15A XLP25A	—	—	—	—	—	—	—	—	—	—
10...12V	XLP30B	—	—	—	—	—	—	—	—	—	—
12...15V 1-Ph	XLP15B	XLP50B	XLP60BQ XLP60BQT	—	XLP90B	—	XL180B	—	—	—	—
12...15 V 3-Ph	—	—	—	—	XLE96B	—	—	—	—	—	—
(+/-)12 and 15V	XLP36C	—	—	—	—	—	—	—	—	—	—
24...28V 1-Ph	XLP15E XLP30E XLP30EQ	XLP50E XLP50EZ	XL60D XLP60EQ XLP60EQT	XLS80E XLE80E XLP72E	XLP95E XLP100E	XLS120E XLS120EA XLE120E XLE120EC XLE120EE XLE120EN	—	XLS240E XLS240EC XLE240E XLE240EP XLE240EE XLE240EN	XLS480E XLS480EA XLS480EC XLS480EE	—	XLS960EE
24...28V 2-Ph/3-Ph	—	—	—	—	XLP90E-2 XLP100E-2	XLE120E-2	—	XL240E-3C XLE240E-3	XLS480E-3 XLS480E-3C	XL720E-3	XLE960DX-3N XLS960E-3
36...43V	—	—	—	—	—	—	—	—	XLS480G-3	—	—
48...56V 1-Ph	—	XLP50F	—	—	XLP100F	—	—	XLE240F	XLS480F	—	XLS960FE
48...56V 3-Ph	—	—	—	—	—	—	—	XLE240F-3	XLS480F-3	—	XLE960MX-3N XLS960F-3
24V Redundant	—	—	XL60DR	—	—	XL120DR	—	XL240DR	—	—	—
DeviceNet	—	—	—	XLEDNET3	XLSDNET4	—	—	XLSDNET8	—	—	—

⌘ Example: For a 24...28 Volt, 3-Phase, 120 Watt power supply, the **Cat. No.** would be **1606-XL120E-3**.

Special Applications

Bulletin Number	NEC Class 2	ABS/GL Marine	Hazardeous Location Rating, Class 1 Div 2	ODVA Requirements	Conformal Coating	ATEX
1606-XLE	XLE80E	All XLE Power Supplies	All XLE Power Supplies	XLEDNET3	XLE120EC	—
1606-XLP	XLP15A XLP15B XLP15E XLP25A XLP30B XLP30E XLP36C XLP50B XLP50E XLP50EZ XLP50F XLP72E XLP90B XLP90E-2 XLP95E	XLP15A XLP15B XLP15E XLP25A XLP30E XLP36C XLP50E XLP50EZ XLP72E XLP90B XLP100E XLP100F XLPRED	XLP15A XLP15B XLP15E XLP25A XLP30B XLP30E XLP50B XLP50E XLP50EZ XLP72E XLP90B XLP95E XLP100E XLPRED	—	—	—
1606-XLS	XLSDNET4	ALL XLS Power Supplies	All XLS Power Supplies*	XLSDNET4 XLSDNET8	XLS240EC XLS480E-C XLS480E-3C	XLS120EA XLS240EA XLS480EA

* Cat. No. 1606-XLS240K does not have Hazardeous Location Rating.

Three-Phase

Input Voltage	Output Power [W]	Output Voltage	Output Current [A]	Input Circuit Protection	Steady State Input Current 400...480 [V AC]	Parallel Operation	DC OK Relay	Cat. No.
380...480V AC, 600V DC	480	24...28	20	6 A Slow Blow Fuse or Cat. No. 1489-A3C060	3 x 0.65	Yes	✓	1606-XLS480E-3
380...480V AC, 600V DC	480	24...28	20			Yes	✓	➤ 1606-XLS480E-3C
360...900V DC	480	24...28	20		3 x 0.85	Yes	✓	1606-XLS480E-D
380...480V AC, 600V DC	480	48...56	10		3 x 0.65	Yes	✓	1606-XLS480F-3
380...480V AC, 600V DC	480	36...42	13.3			Yes	✓	1606-XLS480G-3
380...480V AC, 600V DC	960	24...28	40		3 x 1.35	Yes	✓	1606-XLS960E-3
380...480V AC, 600V DC	960	48...54	20			Yes	✓	1606-XLS960F-3

1606-XLE Essential — Single-Phase

Input Voltage	Output Power [W]	Output Voltage	Output Current [A]	Input Circuit Protection	Steady State Input Current 120/230 [V AC]	Parallel Operation+	DC OK Relay	Cat. No.
100...120/200...240V AC	80	24...28	3.3	10 A Slow Blow Fuse or Cat. No. 1489-A1C100/20♣	1.5/0.68	No	—	1606-XLE80E
100...120/200...240V AC	120	24...28	5		2.34/1.23	No	—	1606-XLE120E
100...120/200...240V AC		24...28	5		2.34/1.23	No	—	➤ 1606-XLE120EC
90...132V AC		24...28	5		1.23/—	No	—	1606-XLE120EN
180...264V AC	240	24...28	5		—/1.17	No	—	1606-XLE120EE
100...120/200...240V AC		24...28	10		4.34/2.23	No	—	1606-XLE240E
90...132V AC		24...28	10		3.73/—	Yes	—	1606-XLE240EN
180...264V AC		24...28	10		—/2.20	No	—	1606-XLE240EE
100...120/200...240V AC		24...28	10		4.34/2.00	No	—	1606-XLE240EP
100...120/200...240V AC		48...52	5		4.34/2.23	No	—	1606-XLE240F

1606-XLE Essential — Three-Phase

Input Voltage	Output Power [W]	Output Voltage	Output Current [A]	Input Circuit Protection	Steady State Input Current 400...480 [V AC]	Parallel Operation+	DC OK Relay	Cat. No.
380...480V AC, 600V DC	96	12...15	8	6 A Slow Blow Fuse or Cat. No. 1489-A3C060	2 x 0.56	No	—	1606-XLE96B-2
380...480V AC, 600V DC	120	24...28	5		3 x 0.60			1606-XLE120E-2
380...480V AC, 600V DC	240	24...28	10		0.68			1606-XLE240E-3
380...480V AC, 600V DC	240	48...56	5		3 x 0.60			1606-XLE240F-3
480V AC	960	24	40		3 x 1.40			1606-XLE960DX-3N
480V AC	960	48	20		3 x 1.40			1606-XLE960MX-3N

♣ Unit has internal (not accessible/replaceable) input fuse. Additional protection is not required if used on branch circuits ≤ UL test levels.

‡ Single/parallel operation (inclined characteristic) selectable (jumper). Consult local codes and regulations for installation.

⬆ Parallel use for 1 + 1 redundancy only.

➤ The **C** suffix in the Cat. No. indicates that the product has **conformal coating**.

Bulletin 1606-XLS

	1606-XLS960EE	1606-XLS960E-3	1606-XLS960F-3
Output Volts/Watts	24...28V/960 W	24...28V/960 W	24...28V/960 W
Input Voltage (47...63 Hz)	200...240V AC, 220...300V DC	380...480 V AC	200...240V AC, 220...300V DC
Operational Range	170...264V AC, 176...375V DC	380...480V AC, 600V DC	170...264V AC, 176...375V DC
Hold-up Time	32 ms	20 ms	20 ms
Rated Input Current	4.6 A	1.65 A	1.65 A
Efficiency	typ. 94.6%	typ. 95.2%	typ. 95.4%
Output Voltage	24...28V	24...28V	48...54V
Rated Output Current	40 A (@ 24V) 34 A (@ 28V)	40 A (@ 24V) 34.3 A (@ 28V)	20 A (@ 48V) 17.8 A (@ 54V)
ReservePower (typ. 4 s)	60 A (@ 24V) 51 A (@ 28V)	60 A (@ 24V) 51 A (@ 28V)	30 A (@ 48V) 26.7 A (@ 54V)
Ripple/Noise	<100 mV _{pp}	<100 mV _{pp}	<100 mV _{pp}
Operating Temperature Range (T _{amb})	-25 °C...+70 °C		
Non-Operating Temperature Range	-40 °C...+85 °C		
Dimensions (W x H x D)	125 x 124 x 127 mm	110 x 124 x 127 mm	125 x 124 x 127 mm
Weight	1800 g	1500 g	1800 g
Certifications/Standards*	1, 2, 3, 4, 5, 6, 7, 9		
Special Features	Class 1, Div. 2, ABS/GL/RINA (Marine)		

* 1) = CE, 2) = UL 508 (cULus LISTED), 3) = UL 1950 (cURus), 4) = CSA C22.2, No. 60950, 5) Safety standards = IEC/EN 60950, EN 50178, 6) EMC standards = EN 55011 (Class B), EN 55022 (Class B), EN 61000-6-2, 7) EMC standards = EN 61000-3-2 (A14), EN 50081-1, 9) ABS/GL/RINA (Marine)

♣ MTBF determined by Siemens norm SN 29500 at full load current and 40 °C

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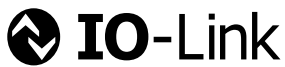
	1606-XLE80E	1606-XLE120E 1606-XLE120EC	1606-XLE120EE	1606-XLE120EN	1606-XLE240E	1606-XLE240EE	1606-XLE240EN	1606-XLE240EP	1606-XLE240F
Output Volts/Watts	24V...28V/ 80 W	24V...28V/ 120 W	24V...28V/ 120 W	24V...28V/ 120 W	24V...28V/ 240 W	24V...28V/ 240 W	24V...28V/ 240 W	24V...28V/ 240 W	48V...52V/ 240 W
Input Voltage (47...63 Hz) [V AC]	100...120/ 200...240	100...120/ 200...240	200...240	100...120	100...120/ 200...240	200...240	100...120	100...120/200...240	
Operational Range [V AC]	90...132/ 180...264	90...132	180...264	90...132	90...132/ 180...264	180...264	90...132	90...132/180...264	
Hold-up Time	>60 ms (120V) >244 ms (240V)	>80 ms (120V) >78 ms (240V)	>80 ms (120V)	>78 ms (240V)	>46 ms (120V) >42 ms (240V)	>45 ms (240V)	>46 ms (120V)	>46ms (120V) >42ms (240V)	>46ms (120V) >42ms (240V)
Rated Input Current	1.24 A (100V AC) 0.68 A (240V AC)	2.6 A (100V AC) 1.3 A (240V AC)	2.6 A	1.4 A	5 A (100V AC) 2.5 A (240V AC)	2.7 A	5 A	<5.0 A (115V)/ <2.3 A (230V)	<1.3 A (115V)/ <0.7 A (230V)
Efficiency	typ. 90%	typ. 90%	typ. 90%	typ. 90.2%	typ. 91%	typ. 91.6 %	typ. 90.8 %	typ. 91%	typ. 92%
Output Voltage	24...28V								48...52V
Rated Output Current	3.3 A @ 24V 2.9 A @ 28V	5 A @ 24V 4.3 A @ 28V	5 A @ 24V	5 A @ 24V	10 A @ 24V 8.6 A @ 28V	10 A @ 24V	10 A @ 24V	10 A	5 A @ 48V 4.6 A @ 52V
Ripple/Noise	<50 mV _{pp}								
Operating Temperature Range (T _{amb})	-25...+70 °C, >60 °C with derating								
Non-Operating Temperature Range	-40...+85 °C								
MTBF♣	>700 000 hours								
Dimensions (W x H x D)	32 x 124 x 102 mm	32 x 124 x 117 mm			60 x 124 x 117 mm				
Weight	430 g	500 g	500 g	500 g	700 g	700 g	700 g	800 g	700 g
Certifications/Standards*	1, 2, 3, 4, 5, 6, 7, 9								
Special Features	NEC Class 2	—							

* 1) = CE, 2) = UL 508 (cULus LISTED), 3) = UL 1950 (cURus), 4) = CSA C22.2, No. 60950, 5) Safety standards = IEC/EN 60950, EN 50178, 6) EMC standards = EN 55011 (Class B), EN 55022 (Class B), EN 61000-6-2, 7) EMC standards = EN 61000-3-2 (A14), EN 50081-1, 9) ABS/GL/RINA (Marine)

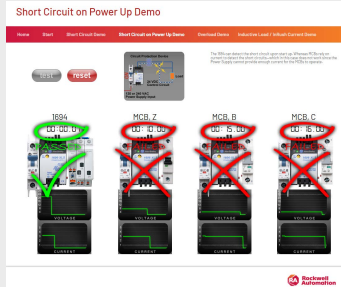
♣ MTBF determined by Siemens norm SN 29500 at full load current and 40 °C.

⌘ Indicates conformal coating.

Bulletin 1694 Modular Electronic Circuit Protectors



Class 2 Power Supply



To learn more about electronic circuit protection and compare the actual trip times of 1694 electronic circuit protection with equivalent thermo-magnetic circuit breakers under a variety of conditions, see our online demonstration at ab.rockwellautomation.com/Circuit-and-Load-Protection/1694-Electronic-Circuit-Protection-Module



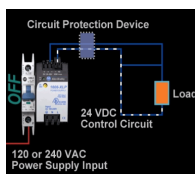
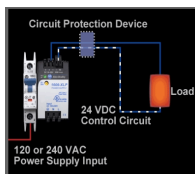
The next generation Bulletin 1694 Modular Electronic Circuit Protection products are designed to provide an excellent solution to the challenges of protecting 24V DC control circuits. The option to add IO-Link communications can add extensive information about the status of your control circuits and enable early detection of developing faults.

The option of adding IO-Link to this systems means you can now monitor current and voltage levels on any circuit protected by the system. You can trigger a threshold warning at any level you chose, and reset a tripped module remotely, through your control system.

Because of the characteristics of the switch mode power supplies that energize these systems, there are unique challenges to using thermomagnetic circuit breakers. Since the power supply is constrained as to its capacity to provide current, overloads can result in voltage drops and overcurrent conditions that don't trip a traditional circuit breaker before equipment is damaged or wiring overheats.

There are two situations where the limitations of traditional thermomagnetic circuit protection are more likely to occur:

- 1) **A condition where the circuit is experiencing an overload of between 100 and 130 percent of the circuit breaker's current**
In this situation, it often takes an extended amount of time before the breaker trips. Meanwhile, wiring can overheat and equipment can be damaged due to overcurrent.
- 2) **When the circuit is shorted at power-up** Thermal-magnetic circuit breakers are effective at tripping when a circuit is shorted while under power. However, if the short is present before power is applied, it can take several minutes for the circuit breaker to trip – again because of the limitation of the power supplied to supply current.

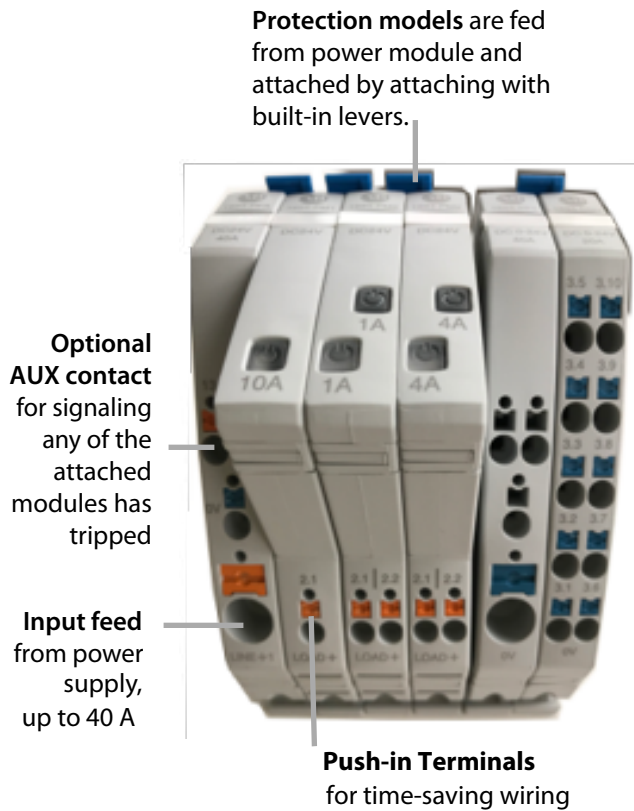


Another limitation of thermal-magnetic circuit breakers occurs with capacitive or inductive loads. In these cases, normal current inrush can cause nuisance tripping when these devices are energized.

The Bulletin 1694 Electronic Circuit Protection system solves these problems. It has a tripping threshold of 105 percent of the rated current, at which point it trips in three seconds. A traditional circuit breaker can take well over ten minutes to trip at up to 120 percent overload.

This is a modular system, which enables you to configure protection to match your application needs.

1694 Modular Electronic Circuit Protection Features



Power feed modules

- Take power in (up to 40 A) from the 24V DC power supply and distribute it to attached protection modules
- Left-feed (standard) / center- and right-feed option

Protection modules

- One channel or two channels in the same compact (12.5 mm width) housing
- Current rating from 1 A...10 A fix current
- Available in Class 2 (1 A...4 A)

Distribution modules

- Plus and GND distribution for connecting multiple loads per channel

Multicolor LED Options



Green LED Indicator

- Loads are connected



Green / Amber Blinking LED Indicator

- 90% load warning of nominal current is reached. In case given $I_{\text{Nominal}} = 1 \text{ A}$
- Load is still connected—this is a warning



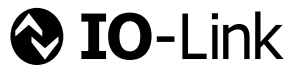
Not Illuminated LED Indicator

- Manually switched off by built-in micro switch (built-in in LED)
- Individual load on 1 A channel is disconnected



Red LED Indicator

- Device has tripped due to overload or short circuit
- Individual load at 1 A channel is disconnected
- Tripping on one channel does not affect remaining loads in assembly



With over 16 million nodes deployed world-wide, IO-Link is a bi-directional, point-to-point network. By selecting IO-Link enabled power feed and protection modules, you can connect to any IO-Link master via unshielded three-conductor wiring, and feed circuit voltage and current information into your control system and network.



Preventive maintenance

Real-time voltage and current monitoring allow for trend analysis. Trip counter enables predictability. These features help enhance machine dependability.

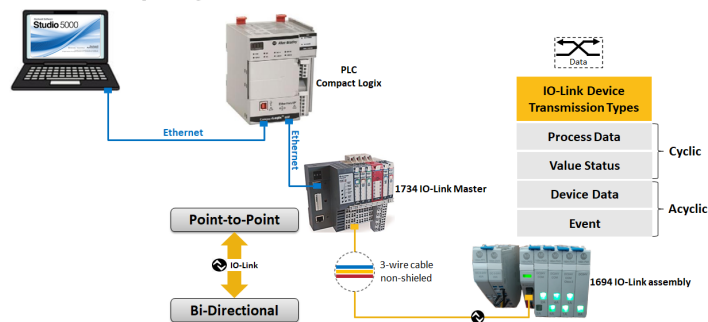
Adjustability

Adjustable current protection module can be used in standard, non-communicating and IO-Link assemblies. The current threshold can be set via IO-Link or manually (on the device). There is no dial or potentiometer on the module. This reduces the risk of unwanted manipulation and is tamper-proof.

Communication

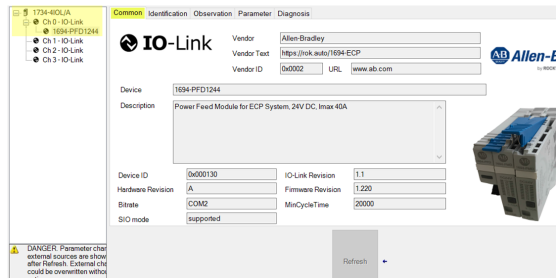
The protection modules allow for remote reset via IO-Link. IO-Link communication is widely spread, over 16 Million nodes (data source: io-link.com), and accepted in the field.

1694 – Sample System IO-Link



IO-Link enabled ECP modules can be used with any IO-Link Master, control system and software.

1694 – IO-Link Common Tab



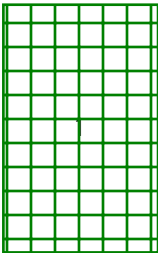
Programming and set-up is integrated into the Studio 5000 Logix Designer® programming environment

Product Selection

Power Feed Modules

Mounting Position	Supply Voltage	Max Current	Aux Contact	Pkg. Qty.	Cat. No.
Left	24V DC	40 A	No	1	1694-PF1244
	24V DC	40 A	Yes	1	1694-PFA1244
	0V Ground	40 A	No	1	1694-PF1G4
Middle	24V DC	40 A Line Separated	No	1	1694-PF2L4S
Middle or Right	24V DC	40 A Line Connected	No	1	1694-PF3L4C
	0V Ground	40 A	No	1	1694-PF3G4

Protection Modules

Number of Channels	Fixed or Adjustable Current	Current	Class 2	Pkg. Qty.	Cat. No.
	Fixed	1 A	—	4	1694-PM11
		—	Yes	4	1694-PM11-CL2
		2 A	—	4	1694-PM12
		—	Yes	4	1694-PM12-CL2
		3 A	—	4	1694-PM13
		—	Yes	4	1694-PM13-CL2
		4 A	—	4	1694-PM14
		—	Yes	4	1694-PM14-CL2
		6 A	—	4	1694-PM16
		8 A	—	4	1694-PM18
2		10 A	—	4	1694-PM110
		1 A	—	4	1694-PM211
		—	Yes	4	1694-PM211-CL2
		2 A	—	4	1694-PM222
		—	Yes	4	1694-PM222-CL2
		3 A	—	4	1694-PM233
		—	Yes	4	1694-PM233-CL2
		4 A	—	4	1694-PM244
		—	Yes	4	1694-PM244-CL2
		6 A	—	4	1694-PM266

Distribution Modules

Description	Pkg. Qty.	Cat. No.
10 Terminals, 1xLINE, 9xLOAD, I _{max} 20A	1	1694-DM1L2
10 Terminals, 2xLINE, 4xLOAD, I _{max} 20A	1	1694-DM2L2
10 Terminals, Ground, I _{max} 20A	1	1694-DM3G2



Power Feed Module +24V DC (Line)

Mounting Position	Supply Voltage	Max Current	Aux Contact	Pkg. Qty.	Cat. No.
Left	24V DC	40 A	No	1	1694-PFD1244

Protection Modules

Number of Channels	Fixed or Adjustable Current	Current	Class 2	Pkg. Qty.	Cat. No.
1	Fixed	8 A	—	4	1694-PMD18
		10 A	—	4	1694-PMD110
1 A		—	4	1694-PMD211	
		Yes	4	1694-PMD211-CL2	
2 A		—	4	1694-PMD222	
		Yes	4	1694-PMD222-CL2	
3 A		—	4	1694-PMD233	
		Yes	4	1694-PMD233-CL2	
4 A		—	4	1694-PMD244	
		Yes	4	1694-PMD244-CL2	
6 A		—	4	1694-PMD266	
2	Adjustable	1...10 A	—	4	1694-PMD2A10

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Cat. No. 140G-G6C3-D12

Bulletin 140G Molded Case Circuit Breakers

- 10..3000 A current range
- 3- & 4-pole devices
- Space-saving dimensions
- Thermal/Magnetic protection: 15..800 A
- Electronic protection: 10..3000 A
- Approved for global application: UL, CSA, CCC, and IEC performance interrupting/breaking capacity
- Wide range of mounting options
- Extensive range of factory- or field-installed accessories

The Bulletin 140G family of Molded Case Circuit Breakers (MCCBs) offers a wide range of features include thermal/magnetic and electronic protection devices, high interrupting/breaking capacities and a complete line of factory and field installed accessories. The Bulletin 140G MCCBs are ideal for use in line protection of control panels.

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Standards Compliance

IEC 60947-2
UL489
CSA22.2, No. 5

Certifications

CE Marked
CCC
CSA Certified
UL Listed



G-Frame



H-Frame



I-Frame



J-Frame



K-Frame



M-Frame



N-, NS-Frame



R-Frame

Allen-Bradley 140G-G2C3-C15

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



Interrupting Rating/Breaking Capacity — Thermal-Magnetic Circuit Breakers

Interrupting Rating (50/60 Hz), UL 489/CSA C22.2-5, No. 5-02 [kA]			Breaking Capacity (50/60 Hz), IEC 60947-2 I_{cu} [kA]/ I_{cs} %								Breaking Capacity (DC), IEC 60947-2				Interrupting Code†
240V	480V	600Y/ 347V	220V ★		415V		440V ★		690V		250V DC (2- pole in series)		500V DC (3- pole in series)		
			I_{cu} [kA]	I_{cs} [% I_{cu}]	I_{cu} [kA]	I_{cs} [% I_{cu}]	I_{cu} [kA]	I_{cs} [% I_{cu}]	I_{cu} [kA]	I_{cs} [% I_{cu}]	I_{cu} [kA]	I_{cs} [% I_{cu}]	I_{cu} [kA]	I_{cs} [% I_{cu}]	
			50	25	10	65	75	36	100	36	50	6	75	36	
65	35	14	85	75	50	75	50	50	8	50	50	100	50	100	G3
100	65	25	100	75	70	50	65	50	10	50	70	75	70	75	G6

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

† See table below for Cat. No. selection

Thermal-Magnetic, Fixed Thermal-Fixed Magnetic

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

★ IEC only.

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

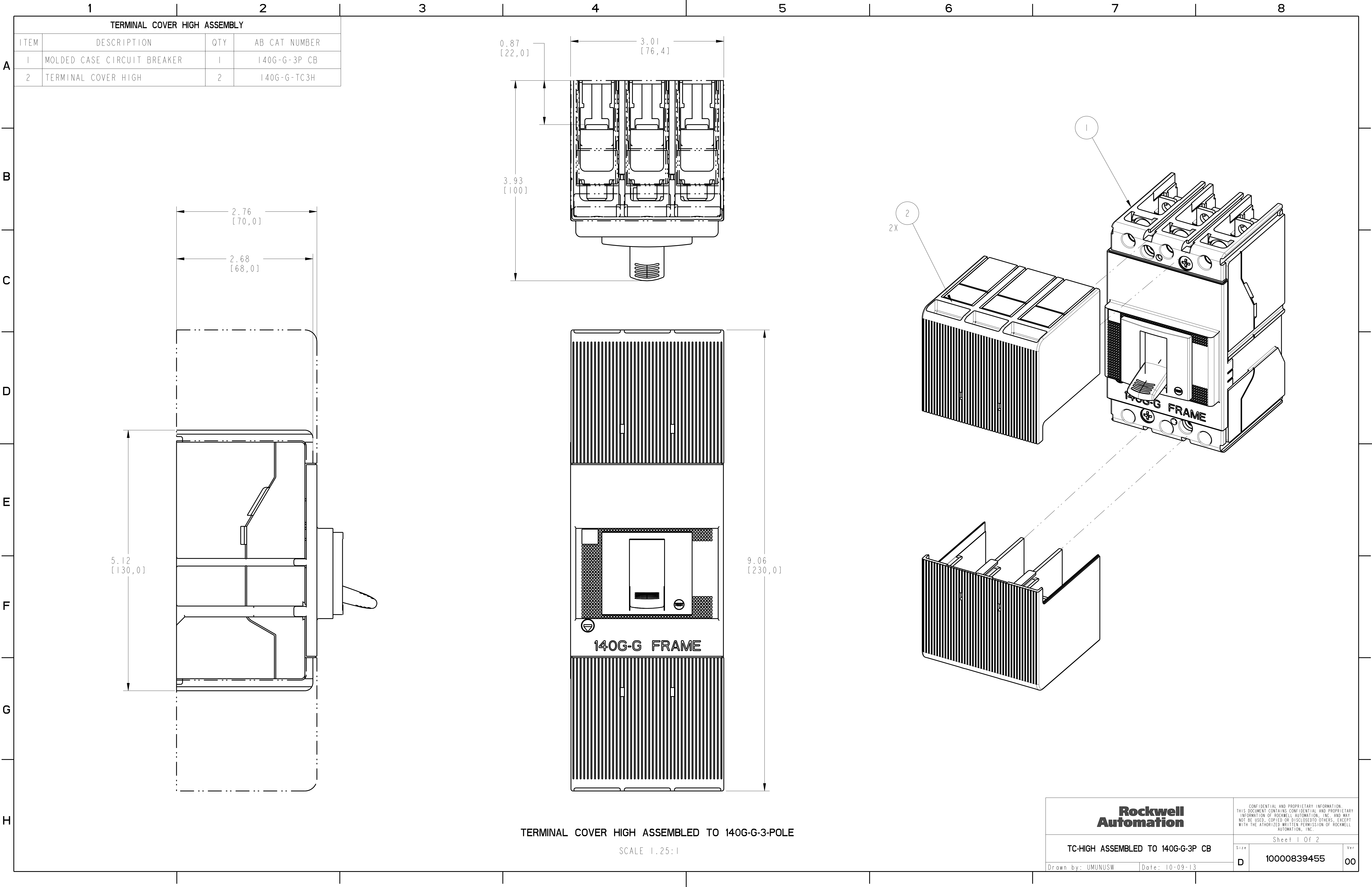
Molded Case Switch — UL489§

Rated Current I_n [A]	Magnetic Trip [A] I_m	Cat. No.	
		3 Poles	4 Poles
125	1250	140G-G6S3-D12	140G-G6S4-D12

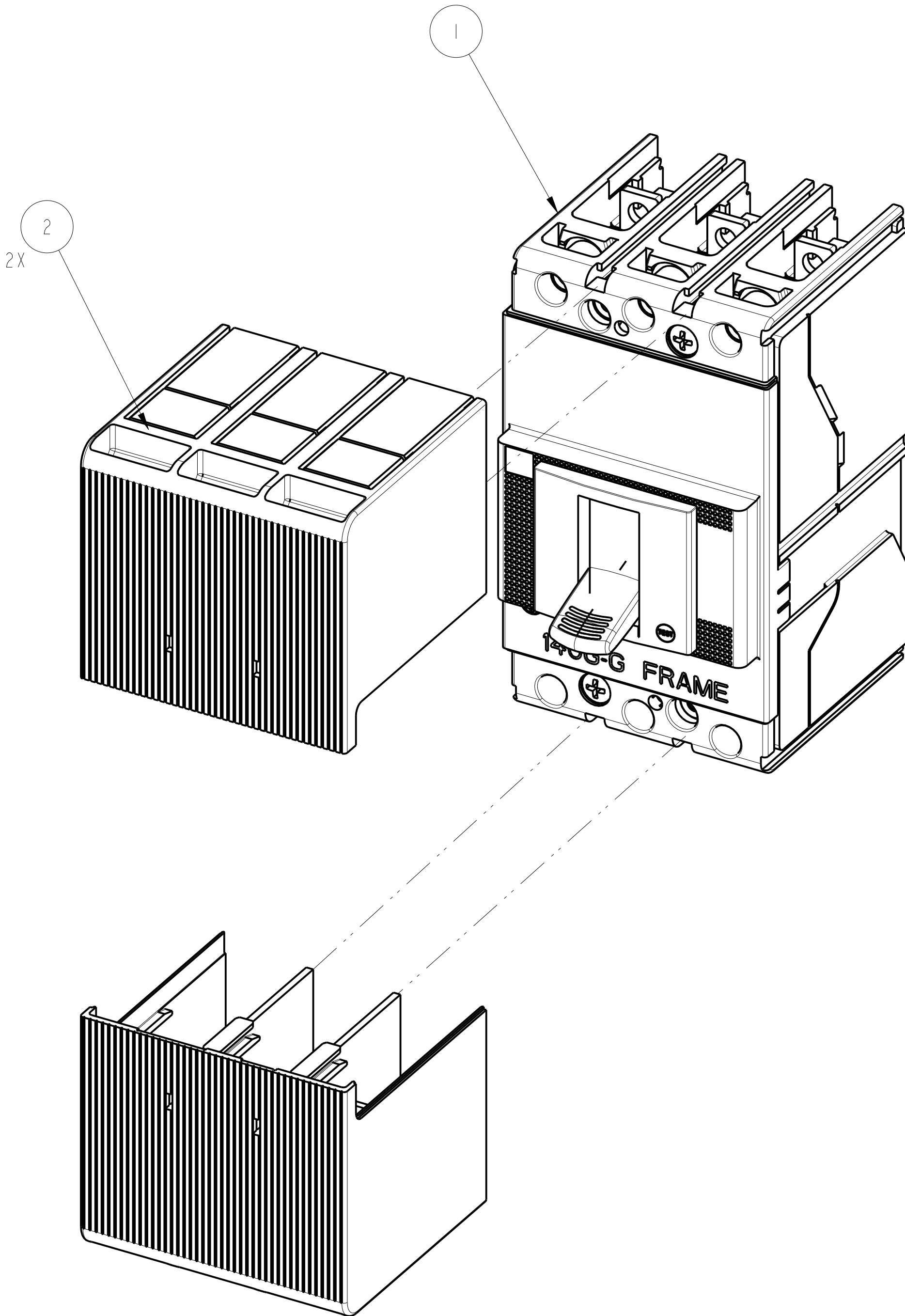
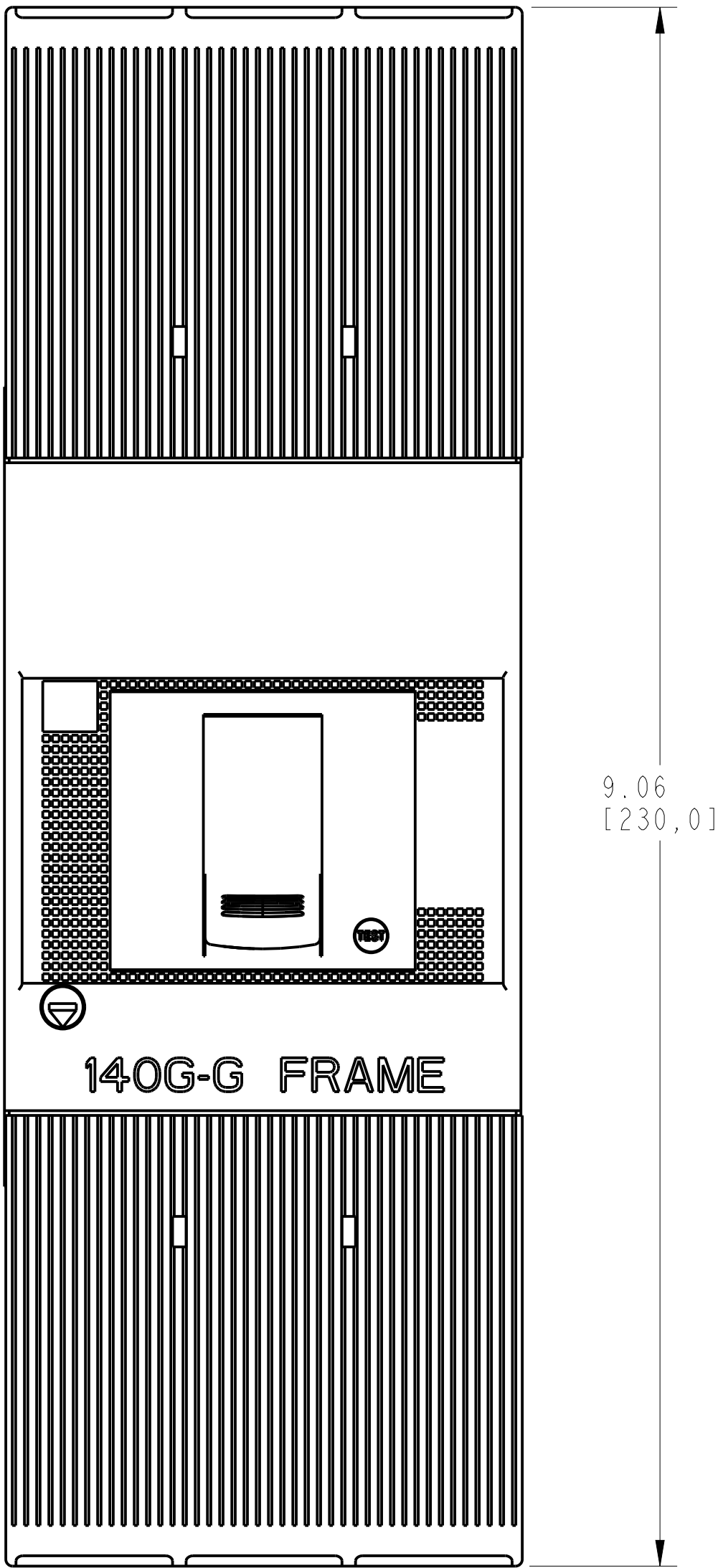
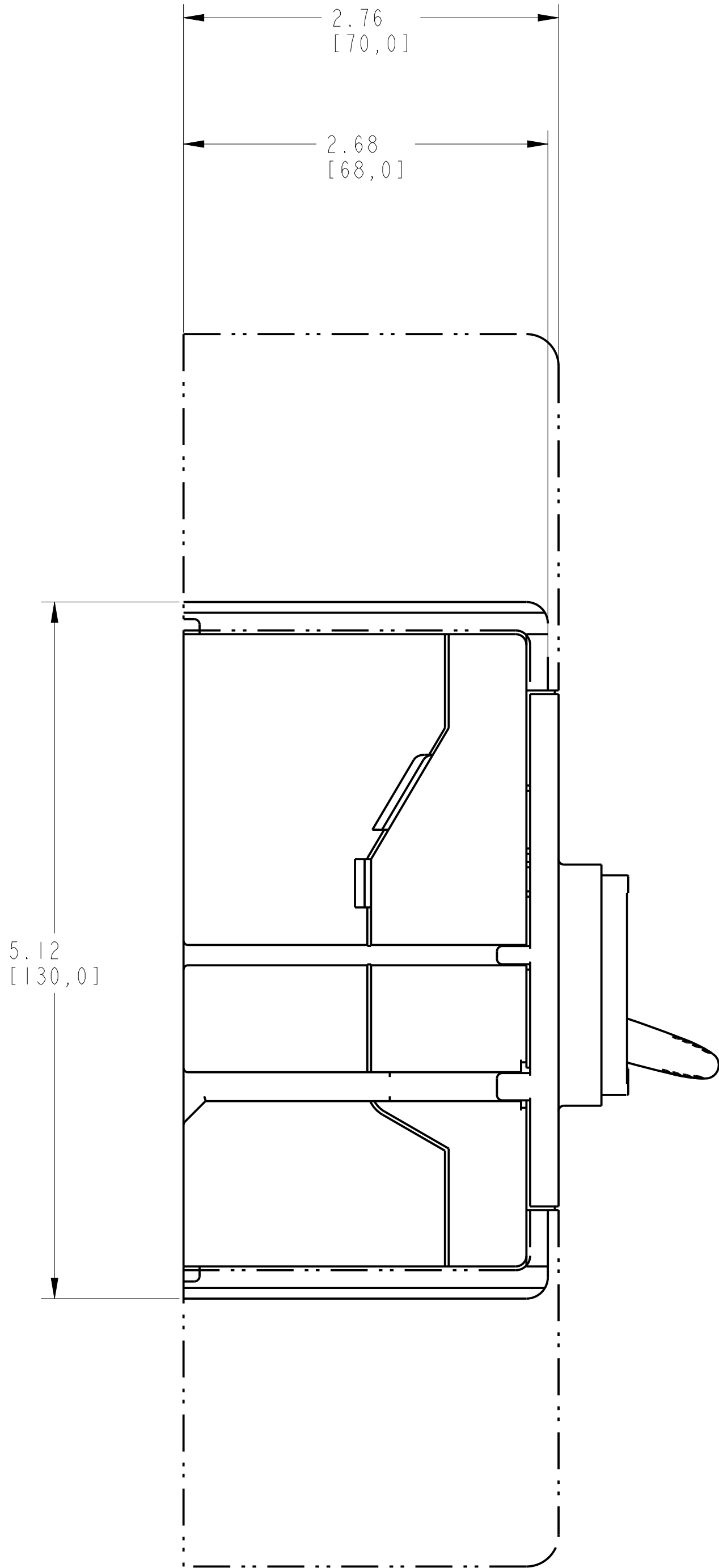
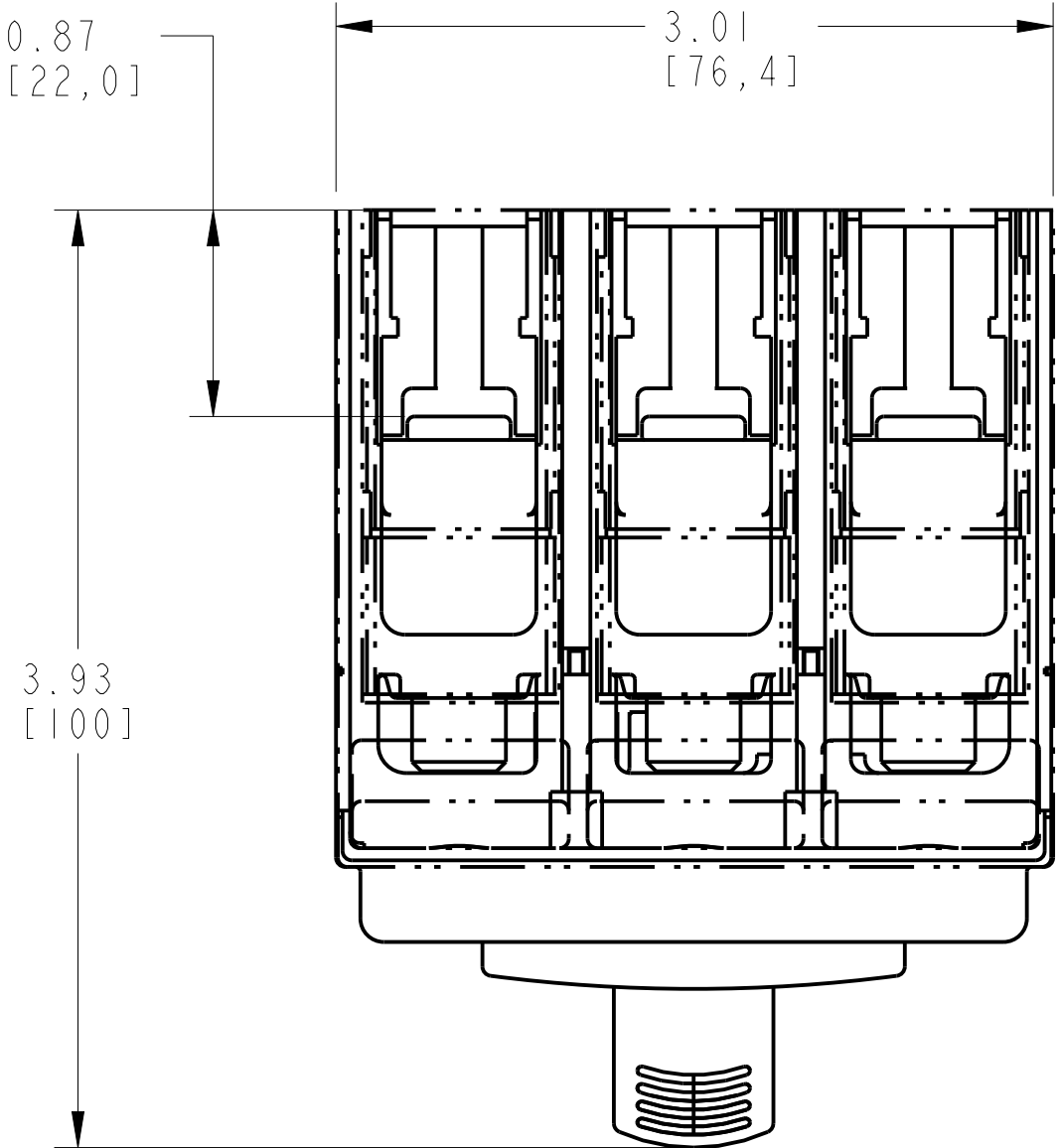
§ Does not provide overcurrent protection; may open above 1250 A.



Cat. No. 140G-G6C3-D12



TERMINAL COVER HIGH ASSEMBLY			
ITEM	DESCRIPTION	QTY	AB CAT NUMBER
1	MOLDED CASE CIRCUIT BREAKER	1	140G-G-3P CB
2	TERMINAL COVER HIGH	2	140G-G-TC3H



TERMINAL COVER HIGH ASSEMBLED TO 140G-G-3-POLE

SCALE 1.25:1

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TC-HIGH ASSEMBLED TO 140G-G-3P CB

Sheet 1 Of 2

Drawn by: UMUNUSW

Date: 10-09-13

Size
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Ver
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1769-IA16

Compact 120V AC input module

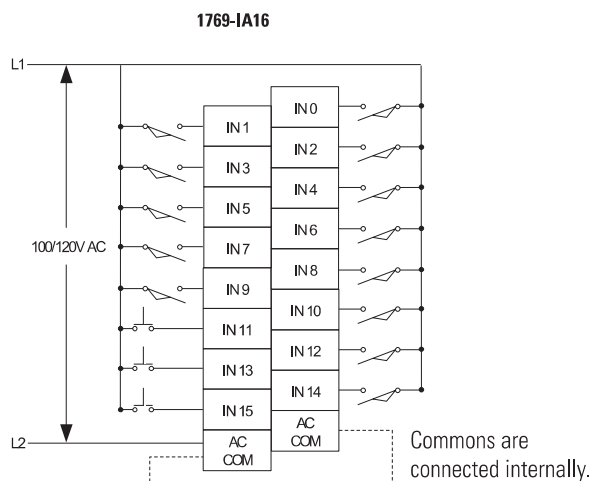


Table 4 - Technical Specifications - 1769-IA16

Attribute	1769-IA16
Inputs	16 (16 points/group, internally connected commons)
Voltage category	100/120V AC
Operating voltage range	79...132V AC, 47...63 Hz
Input delay, on	20 ms
Input delay, off	20 ms
Current draw @ 5.1V	115 mA
Heat dissipation, max	3.30 W
Off-state voltage, max	20V AC
Off-state current, max	2.5 mA
On-state voltage, min	79V AC
On-state current, min	5 mA @ 74V AC
On-state current, max	12 mA @ 120V AC
Inrush current, max ⁽¹⁾	250 mA
Input impedance, max	12 k Ω @ 50 Hz 10 k Ω @ 60 Hz
Isolation voltage	Verified by one of the following dielectric tests: 1517V AC for 1 s or 2145V DC for 1 s, input point to bus 132V AC working voltage (IEC Class 2 reinforced insulation)
Weight, approx	280 g (0.61 lb)
Dimensions (HxWxD), approx	118 x 35 x 87 mm (4.65 x 1.38 x 3.43 in.) Height with mounting tabs 138 mm (5.43 in.)
Slot width	1
Module location	DIN rail or panel mount

Table 4 - Technical Specifications - 1769-IA16

Attribute	1769-IA16
Power supply	1769-PA2, 1769-PB2, 1769-PA4, 1769-PB4
Power supply distance rating	8 modules
Terminal screw torque	0.68 N•m (6 lb•in)
Retaining screw torque	0.46 N•m (4.1 lb•in)
Wire size	(22...14 AWG) solid (22...16 AWG) stranded
Wire type	Cu-90 °C (194 °F)
IEC input compatibility	Type 1+
Replacement terminal block	1769-RTBN18 (1 per kit)
Replacement door label	1769-RL1 (2 per kit)
Replacement door	1769-RD (2 per kit)
Vendor ID code	1
Product type code	7
Product code	82
Enclosure type rating	None (open-style)

- (1) A current limiting resistor can be used to limit inrush current; however, the operating characteristics of the AC input circuit will be affected. If a 6.8 k Ω (2.5 W minimum) resistor is placed in series with the input, the inrush current is reduced to 35 mA. In this configuration, the minimum on-state voltage increases to 92V AC. Before adding the resistor in a hazardous environment, be sure to consider the operating temperature of the resistor and the temperature limits of the environment. The operating temperature of the resistor must remain below the temperature limit of the environment.

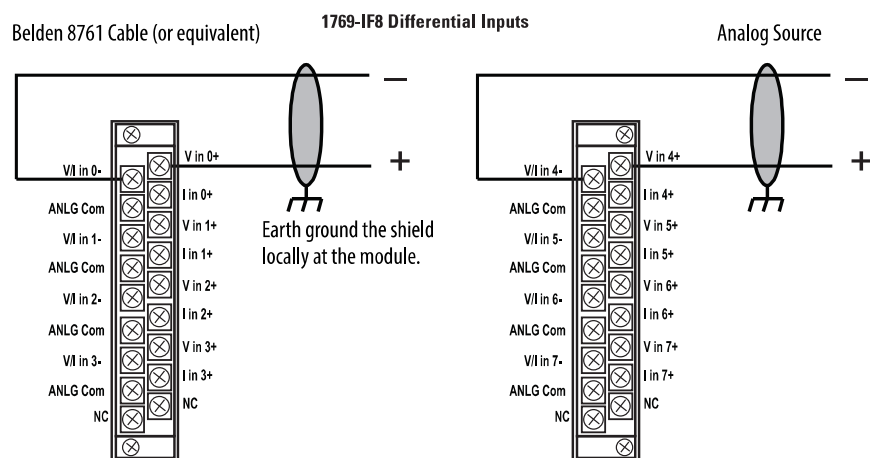
Table 5 - Certifications - 1769-IA16

Certification ⁽¹⁾	1769-IA16
c-UL	C-UL certified (under CSA C22.2 No. 142) UL 508 listed Class I, Division 2 Group A,B,C,D Hazardous Locations (UL 1604, C-UL under CSA C22.2 No. 213)
CE	CE compliant for all applicable directives
C-Tick	Australian Radiocommunications Act, compliant with: AS/NZS CISPR 11; Industrial Enclosure

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

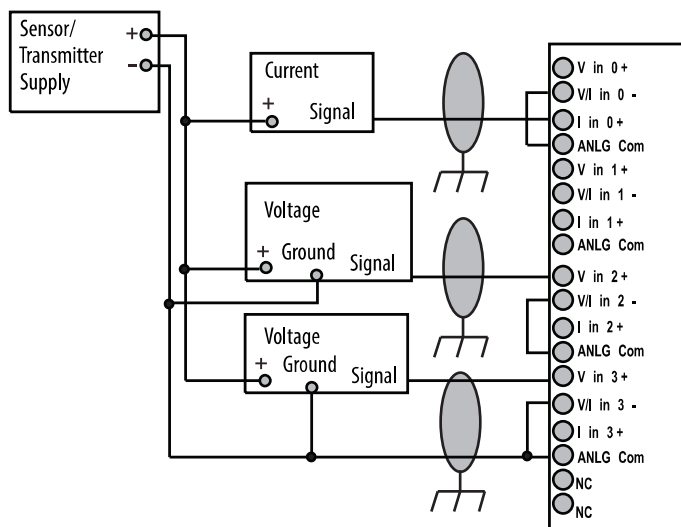
1769-IF8

Compact voltage/current analog input module



1769-IF8 Single-ended Sensor/Transmitter Inputs

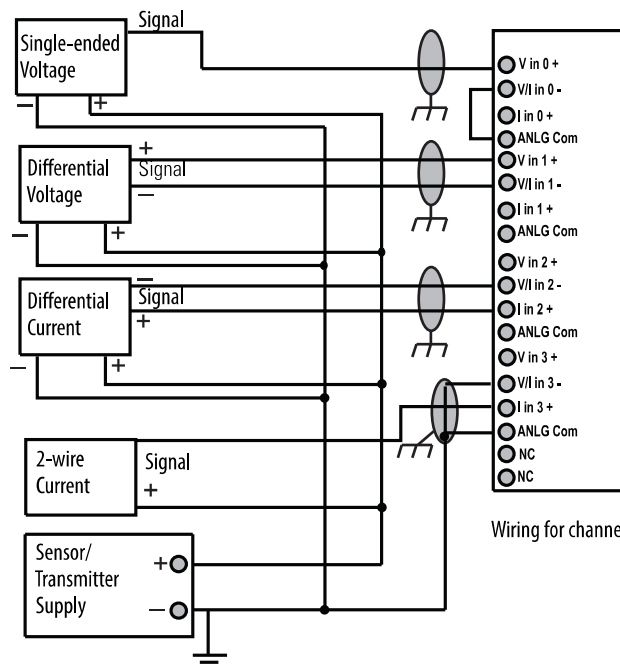
The sensor power supply must be rated Class 2.



Wiring for channels 4...7 are identical.

1769-IF8 Mixed Transmitter Inputs

The sensor power supply must be rated Class 2.



Wiring for channels 4-7 are identical.

Technical Specifications - 1769-IF8

Attribute	1769-IF8
Inputs	8 differential or single-ended
Input range	$\pm 10\text{V}$ $0 \dots 10\text{V}$ $0 \dots 5\text{V}$ $1 \dots 5\text{V}$ $0 \dots 20 \text{ mA}$ $4 \dots 20 \text{ mA}$
Full scale range ⁽¹⁾	$\pm 10.5\text{V}$ $-0.5 \dots 10.5\text{V}$ $-0.5 \dots 5.25\text{V}$ $0.5 \dots 5.25\text{V}$ $0 \dots 21 \text{ mA}$ $3.2 \dots 21 \text{ mA}$
Current draw @ 5.1V	120 mA
Current draw @ 24V	70 mA
Converter type	Delta Sigma
Heat dissipation, max	3.24 W
Resolution ⁽²⁾	16 bits (unipolar) 15 bits plus sign (bipolar)
Rated working voltage ⁽³⁾	30V AC/30V DC
Common mode voltage range ⁽⁴⁾	$\pm 10\text{V}$ DC max per channel
Common mode rejection	> 60 dB @ 50 and 60 Hz with the 10 Hz filter selected
Normal mode rejection ratio	-50 dB @ 50 and 60 Hz with the 10 Hz filter selected

Technical Specifications - 1769-IF8

Attribute	1769-IF8
Input impedance	Voltage: 220 k Ω Current: 250 Ω
Accuracy ⁽⁵⁾	Voltage: $\pm 0.2\%$ full scale @ 25 °C (77 °F) Current: $\pm 0.35\%$ full scale @ 25 °C (77 °F)
Accuracy drift with temperature	Voltage: $\pm 0.003\%$ per °C Current: $\pm 0.0045\%$ per °C
Nonlinearity	$\pm 0.03\%$
Repeatability ⁽⁶⁾	$\pm 0.03\%$
Module error	Voltage: $\pm 0.3\%$ Current: $\pm 0.5\%$
Overload at input terminals, max ⁽⁷⁾	Voltage: $\pm 30\text{V}$ DC continuous, 0.1 mA Current: $\pm 32\text{ mA}$ continuous, $\pm 7.6\text{V}$ DC
Isolation voltage	500V AC or 710V DC for 1 minute (qualification test), group to bus 30V AC/30V DC working voltage (IEC Class 2 reinforced insulation)
Weight, approx	450 g (0.99 lb)
Dimensions (HxWxD), approx	118 x 52.5 x 87 mm (4.65 x 2.07 x 3.43 in.) Height with mounting tabs 138 mm (5.43 in.)
Slot width	1.5
Module location	DIN rail or panel mount
Power supply	1769-PA2, 1769-PB2, 1769-PA4, 1769-PB4
Power supply distance rating	8 modules
Terminal screw torque	0.68 N•m (6 lb•in)
Retaining screw torque	0.46 N•m (4.1 lb•in)
Wire size	(22...14 AWG) solid (22...16 AWG) stranded
Wire type	Cu-90 °C (194 °F)
Replacement terminal block	1769-RTBN18 (1 per kit)
Replacement door label	1769-RL2 series B (2 per kit)
Replacement door	1769-RD (2 per kit)
Vendor ID code	1
Product type code	10
Product code	38
Enclosure type rating	None (open-style)

- (1) The over- or under-range flag will come on when the normal operating range (over/under) is exceeded. The module will continue to convert the analog input up to the maximum full scale range. The flag automatically resets when within the normal operating range.
- (2) Resolution is dependent upon your filter selection. The maximum resolution is achieved with either the 50 or 60\ Hz filter selected.
- (3) Rated working voltage is the maximum continuous voltage that can be applied at the input terminal, including the input signal and the value that floats above ground potential (for example, 10V DC input signal and 20V DC potential above ground).
- (4) For proper operation, both the plus and minus input terminals must be within $\pm 10\text{V}$ DC of analog common.
- (5) Includes offset, gain, nonlinearity, and repeatability error terms.
- (6) Repeatability is the ability of the input module to register the same reading in successive measurements for the same input signal.
- (7) Damage may occur to the input circuit if this value is exceeded.

CompactLogix Power Supplies Specifications

1768 CompactLogix Power Supplies Catalog Numbers 1768-PA3, 1768-PB3

1769 Compact I/O Power Supplies Catalog Numbers 1769-PA2, 1769-PB2, 1769-PA4, 1769-PB4

Topic	Page
1768 CompactLogix Power Supplies	3
1769 Compact I/O Power Supplies	7

Environmental Specifications - 1768 and 1769 Power Supplies

Attribute	1768-PA3, 1769-PB3 1769-PA2, 1769-PB2, 1769-PA4, 1769-PB4
Temperature, operating IEC 60068-2-1 (Test Ad, Operating Cold), IEC 60068-2-2 (Test Bd, Operating Dry Heat), IEC 60068-2-14 (Test Nb, Operating Thermal Shock)	0...60 °C (32...140 °F)
Temperature, storage IEC 60068-2-1 (Test Ab, Unpackaged Nonoperating Cold), IEC 60068-2-2 (Test Bb, Unpackaged Nonoperating Dry Heat), IEC 60068-2-14 (Test Na, Unpackaged Nonoperating Thermal Shock)	-40...85 °C (-40...185 °F)
Relative humidity IEC 60068-2-30 (Test Db, Unpackaged Nonoperating Damp Heat)	5...95% noncondensing
Vibration IEC 60068-2-6 (Test Fc, Operating)	5 g @ 10...500 Hz
Shock, operating IEC 60068-2-27 (Test Ea, Unpackaged Shock)	30 g
Shock, nonoperating IEC 60068-2-27 (Test Ea, Unpackaged Shock)	50 g

Important User Information

Solid state equipment has operational characteristics differing from those of electromechanical equipment. Safety Guidelines for the Application, Installation and Maintenance of Solid State Controls (publication [SGL-1.1](#) available from your local Rockwell Automation sales office or online at <http://www.rockwellautomation.com/literature/>) describes some important differences between solid state equipment and hard-wired electromechanical devices. Because of this difference, and also because of the wide variety of uses for solid state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

In no event will Rockwell Automation, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc. cannot assume responsibility or liability for actual use based on the examples and diagrams.

No patent liability is assumed by Rockwell Automation, Inc. with respect to use of information, circuits, equipment, or software described in this manual.

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Throughout this manual, when necessary, we use notes to make you aware of safety considerations.

WARNING



Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.

IMPORTANT

Identifies information that is critical for successful application and understanding of the product.

ATTENTION



Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you identify a hazard, avoid a hazard, and recognize the consequence

SHOCK HAZARD



Labels may be on or inside the equipment, for example, a drive or motor, to alert people that dangerous voltage may be present.

BURN HAZARD



Labels may be on or inside the equipment, for example, a drive or motor, to alert people that surfaces may reach dangerous temperatures.

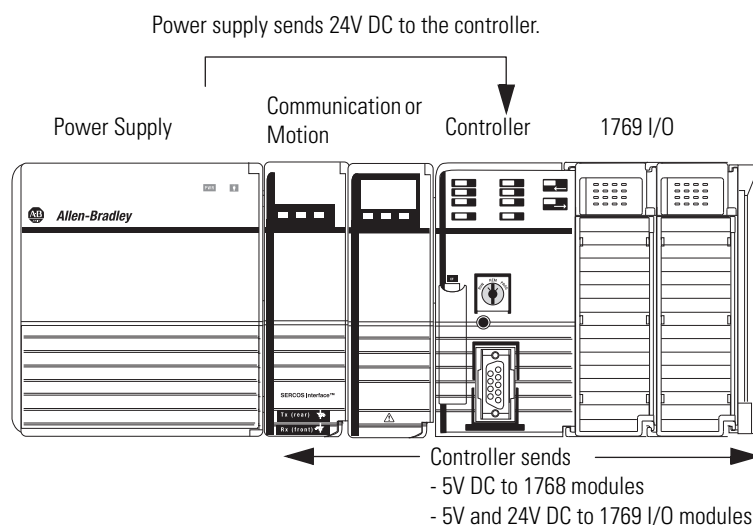
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1768 CompactLogix Power Supplies

The 1768 backplane requires one 1768 power supply. The power supply is a dual input supply that operates in multiple ranges. The power supply also offers a 24V dc external power source. The power supply sends 24V dc to the controller in slot 0.

- The controller converts the 24V dc to 5V dc and 24V dc and distributes it as needed.
 - 5V and 24V power to 1769 I/O modules on the right side of the controller
 - 24V power to 1768 modules on the left side of the controller



The 1768 modules do not have a distance rating to the 1768 power supply. For the 1769 I/O modules in the 1768 system, the distance rating is from the controller and not the 1768 power supply.

Technical Specifications - 1768 CompactLogix Power Supplies

Attribute	1768-PA3	1768-PB3
Input voltage range	85...265V AC 108...132V DC	16.8...31.2V DC
Input voltage, nom	120V/220V AC	24V DC
Input frequency range	47...63 Hz	DC
Input power, max	120VA/120 W	112 W
Output power, max	90 W 24V DC to backplane: 3.5 24V DC to user-accessible terminal block: 0.25 A	
Output power, min	6 W 24V DC to backplane: 0.25 A 24V DC to user-accessible terminal block: 0.0 A	
Power dissipation	30 W	22 W
Inrush current, max	50 A @ 85...132V AC 80 A @ 195...265V AC	50 A @ 16.8...31.2V DC ⁽¹⁾

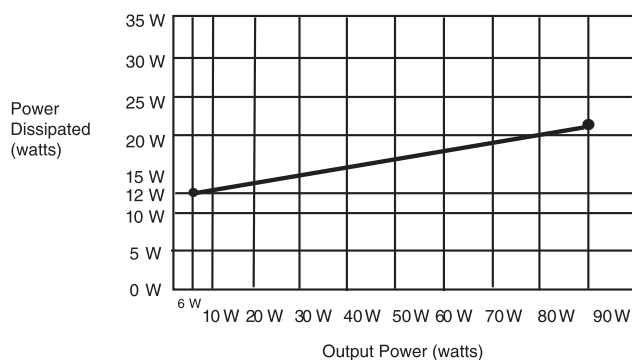
Certifications - 1768 CompactLogix Power Supplies

Certification ⁽¹⁾	1768-PA3, 1768-PB3
c-UL-us	UL Listed Industrial Control Equipment, certified for US and Canada. See UL File E65584. UL Listed for Class I, Division 2 Group A,B,C,D Hazardous Locations, certified for U.S. and Canada. See UL File E194810.
CE	European Union 89/336 EEC EMC Directive, compliant with: • EN 50082-2; Industrial Immunity • EN 61326-1; Meas./Control/Lab., Industrial Requirements • EN 61000-6-2; Industrial Immunity • EN 61000-6-4; Industrial Emissions • EN 61131-2; Programmable Controllers (Clause 8, Zone A & B) European Union 73/23/EEC LVD Directive, compliant with: • EN 1010-1; Meas./Control/Lab
C-Tick	Australian Radiocommunications Act, compliant with: AS/NZS CISPR 11; Industrial Emissions

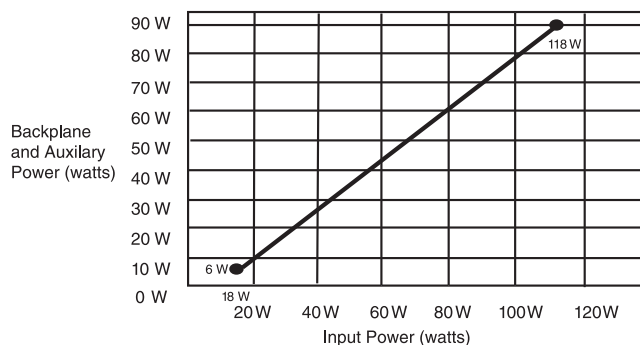
⁽¹⁾ When marked. See the Product Certification link at <http://www.ab.com> for Declarations of Conformity, Certificates, and other certification details.

Power Requirements and Transformer Sizing - 1768 CompactLogix Power Supplies

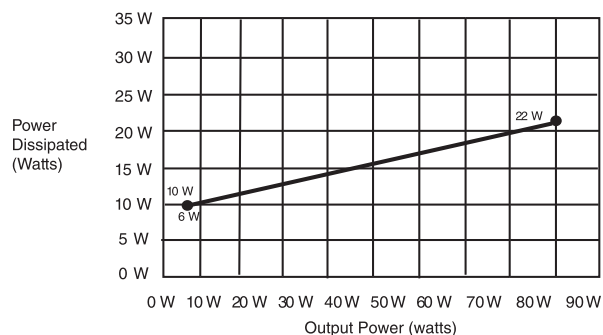
1768-PA3 Power Dissipation



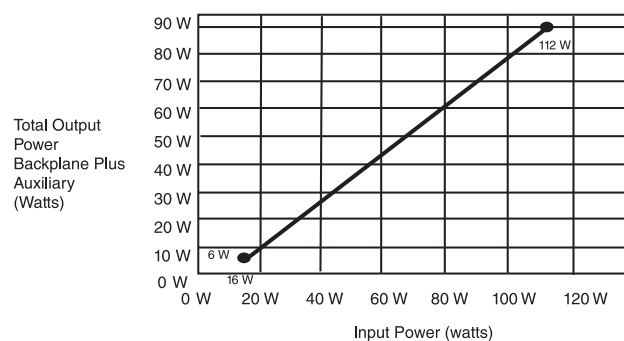
1768-PA3 Input Power Requirements



1768-PB3 Power Dissipation



1768-PB3 Input Power Requirements



1769 Compact I/O Power Supplies

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

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

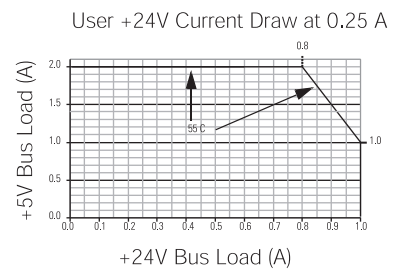
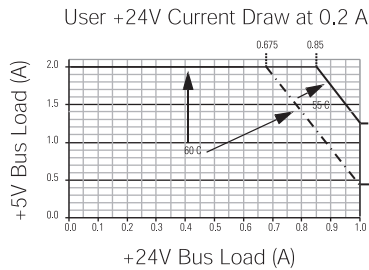
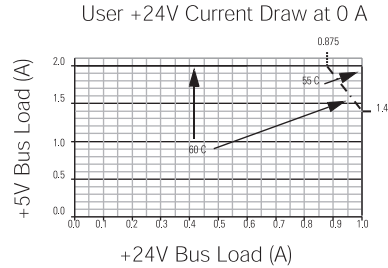
Technical Specifications - 1769 Compact I/O Power Supplies

Attribute	1769-PA2	1769-PB2	1769-PA4	1769-PB4
Input voltage range	85...265V AC	19.2...31.2V DC	85...265V AC or 170...265V AC, switch selectable	19.2...31.2V DC
Input voltage, nom	120V/220V AC	24V DC	120V/220V AC	24V DC
Power consumption	100 VA @ 120V AC 130 VA @ 240V AC	50 VA @ 24V DC	200 VA @ 120V AC 240 VA @ 240V AC	100 VA @ 24V DC
Power dissipation	8 W @ 60° C (140° F)	7.5 W @ 60° C (140° F)	18 W @ 60° C (140° F)	14.5 W @ 60° C (140° F)
Current capacity @ 5V	2.0 A	2.0 A	4.0 A	4.0 A
Current capacity @ 24V	0.8 A	0.8 A	2.0 A	2.0 A
Inrush current, max	25 A @ 132V AC	30 A @ 31.2V DC	25 A @ 132V AC	30 A @ 31.2V DC
Isolation voltage	265V (continuous), reinforced insulation type (IEC Class 1 grounding required) Routine tested @ 2596V DC for 1 s, AC power input to system and AC power input to 24V DC user power	75V (continuous), reinforced insulation type (IEC Class 1 grounding required) Routine tested at 1697V DC for 1 s, DC power input to system	265V (continuous), reinforced insulation type (IEC Class 1 grounding required) Routine tested at 2596V DC for 1 s, AC power input to system	75V (continuous), reinforced insulation type (IEC Class 1 grounding required) Routine tested at 1697V DC for 1 s, DC power input to system
Fuse type	Wickmann 19195-3.15A Littelfuse 02183.15MXP	Wickmann 19193-6.3A Littelfuse 021706.3MXP	Wickmann 19195-3.15A Littelfuse 02183.15MXP	Wickmann 19193-6.3A Littelfuse 021706.3MXP
Weight, approx.	525 g (1.16 lb)		630 g (1.39 lb)	
Dimensions (HxWxD), approx.	118 x 70 x 87 mm (4.65 x 2.76 x 3.43 in.)			
Module location	DIN rail or panel mount			
Mounting screw torque	1.16 N•m (10 lb•in) - use M4 or #8 screws			
Power supply distance rating	8 8 I/O modules can be connected on either side of the power supply for a maximum of 16 modules			
Wire category ⁽¹⁾	1 - on power ports	2 - on power ports	1 - on power ports	2 - on power ports
Wire size	14 AWG (2.5 mm²) solid copper wire rated at 90 °C (194 °F) or greater, 1.2 mm (3/64 in.) insulation max			
North American temperature code	T3C			
IEC temperature code	—	T4	—	T4
Enclosure type rating	None (open-style)			

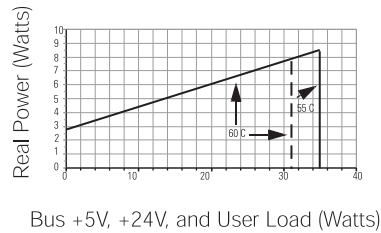
⁽¹⁾ Use this conductor category information for planning conductor routing as described in the system level installation manual. See the Industrial Automation Wiring and Grounding Guidelines, publication [1770-4.1](#).

Power Requirements and Transformer Sizing - 1769 CompactLogix Power Supplies

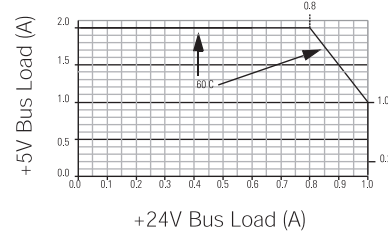
1769-PA2 Output Derating



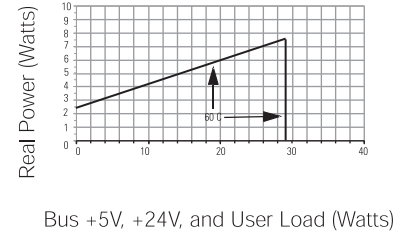
1769-PA2 Power Dissipation



1769-PB2 Output Derating

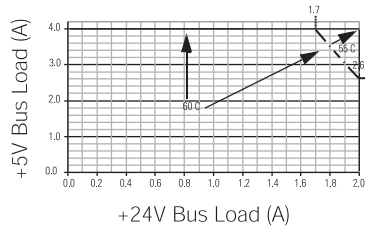


1769-PB2 Power Dissipation



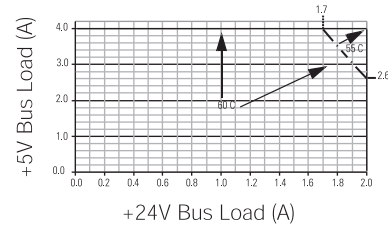
1769-PA4 Output Derating

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

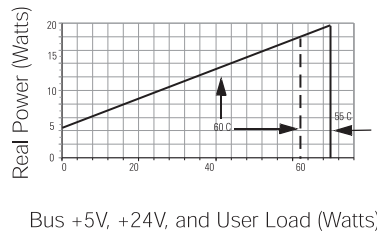


1769-PB4 Output Derating

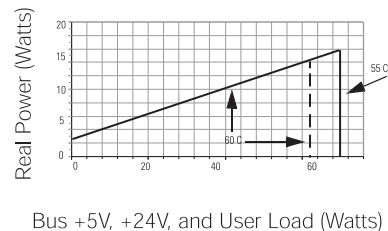
Total Output: 68 W @ 55 °C (131 °F) or below
61 W @ 60 °C (140 °F) or below



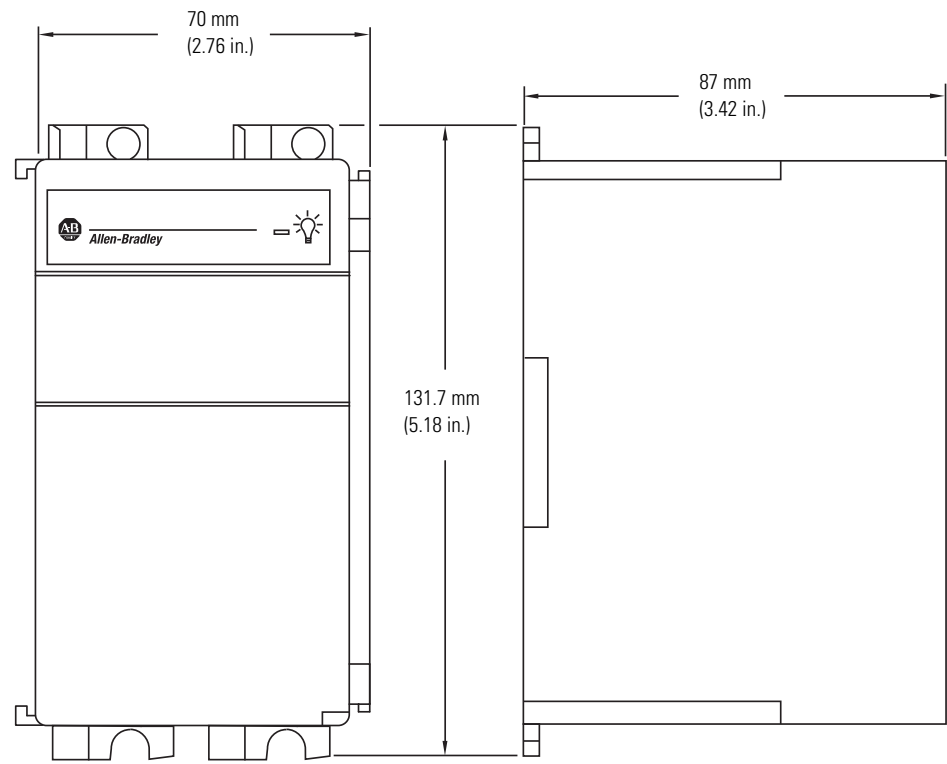
1769-PA4 Power Dissipation



1769-PB4 Power Dissipation



Mounting Dimensions - 1769 CompactLogix Power Supplies



Stratix 2500 Lightly Managed Switch

Configurable, Compact Industrial Switch for Less Complex Applications

The Stratix® 2500 Lightly Managed Switch enables network connectivity in applications where traditional unmanaged switches lack the ability to provide network resiliency, diagnostics and security, allowing you to achieve higher productivity and network reliability.

The Stratix 2500 is offered in 5 and 8 10/100 Mbps fast Ethernet copper port versions in a compact design. Its consistent delivery and prioritization of traffic, on a per-port basis, helps ensure that the critical traffic is delivered end to end with priority.

It can be installed in the network in two ways. By using the default, “out-of-the-box” installation, you can prioritize network traffic and commission the device faster. Configuring the switch allows you to enable security, resiliency and bandwidth optimization features needed for today’s industrial networks.



Features and Benefits

Premier Integration into the Integrated Architecture® System

- Add-on Profile for configuration via Studio 5000 Logix Designer® design environment and FactoryTalk® View Faceplate for diagnostics

Reduced Total Cost of Ownership:

- VLANs allow for logical segmentation in a single switch, which reduces total number of switches needed

Improve network resiliency:

- STP helps detect network loops and prevents them before the network stops
- IGMP enables multicast for data traffic control

Increase network security

- Port security allows users to disable ports, or control end device connectivity based on MAC address
- SSH and HTTPS provide secure connectivity

Minimized downtime

- SNMPv3 and Syslog monitor network-attached devices to uncover errors and decrease downtime
- Diagnostic information and alarm relay provide actionable information to resolve issues faster

LISTEN.
THINK.
SOLVE.®

Stratix 2500 Lightly Managed Switch Reference Chart

	Stratix 2000 Unmanaged Switch	Stratix 2500 Lightly Managed Switch
Ports	4...16	5, 8
Fiber Ports (Maximum)	2	0
Gig Ports (Maximum)	6	0
Redundant Power Inputs	✓	-
STP, RSTP, MSTP Resiliency Protocols	-	✓
EtherChannel (Link Aggregation)	-	✓
MAC ID Port Security, Crypto (SSH, SNMP), HTTPS Access	-	✓
Port Thresholds (Storm Control)	-	✓
Port Mirroring	-	✓
CIP Interface (Studio 5000 AOP and Faceplate)	-	✓
VLANS	-	✓

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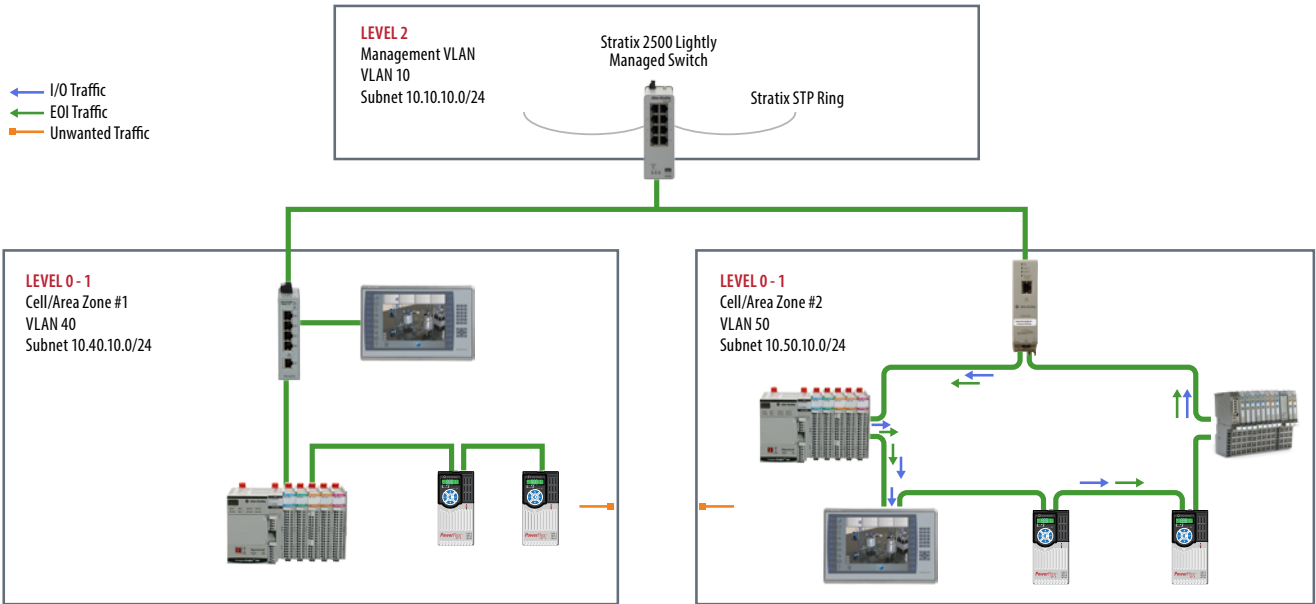
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Publication ENET-PP014A-EN-P – May 2017

Stratix 2500 Lightly Managed Switch Application

When configured, the Stratix 2500 lightly managed switch exceeds the capabilities of an unmanaged switch by providing loop detection and prevention capability via STP, monitoring and optimizing traffic flow, and providing diagnostic information to help minimize downtime. It also supports VLANs for logical segmentation, thereby helping reduce total cost of ownership. As seen in the drawing below, using VLANs separates the traffic within the Cell/Area zones and keeps unwanted traffic contained and reduces the risk of packet storms that can bring down your network. The Stratix 2500 lightly managed switch can support up to 64 VLANs.



Dimensions are not intended to be used for manufacturing purposes.
Note: Height dimension is measured from top of rail to top of terminal block.

Specifications

Approvals	1492-WFB4			1492-WFB424			1492-WFB4250		
	UL	CSA	IEC	UL	CSA	IEC	UL	CSA	IEC
Voltage Rating	300V AC/DC	300V AC/DC	500V AC/DC	300V AC/DC	300V AC/DC	500V AC/DC	300V AC/DC	300V AC/DC	500V AC/DC
Maximum Current	15 A	15 A	5 A ❶	15 A	15 A	15 A ❶	15 A	15 A	5 A ❶
Wire Range (Rated Cross Section)	#22... #12 AWG	#22... #12 AWG	0.5... 4 mm²	#22... #12 AWG	#22... #12 AWG	0.5... 4 mm²	#22... #12 AWG	#22... #12 AWG	0.5... 4 mm²
Indicator Type	Non-Indicating			LED			Neon		
Leakage Current	—			2mA @ 24V			1mA @ 264V		
Working Voltage	Per Fuse Rating			10-57V AC/DC			85-264V AC		
Fuse Size (Not Supplied)	5 x 20 mm			5 x 20 mm			5 x 20 mm		
Wire Strip Length	0.31" (8 mm)			0.31" (8 mm)			0.31" (8 mm)		
Recommended Tightening Torque	5.0...5.6 lb-in. (0.6 Nm)			5.0...5.6 lb-in. (0.6 Nm)			5.0...5.6 lb-in. (0.6 Nm)		
Density	38 pcs./ft (125/m)			38 pcs./ft (125/m)			38 pcs./ft (125/m)		
Insulation Temperature Range	-40...+195°F (-40...+90°C)			-40...+195°F (-40...+90°C)			-40...+195°F (-40...+90°C)		
Terminal Blocks	Cat. No.		Pcs./Pkg.	Cat. No.		Pcs./Pkg.	Cat. No.		Pcs./Pkg.
	1492-WFB4		50	1492-WFB424		50	1492-WFB4250		50
Accessories (page 185)	Cat. No.		Pcs./Pkg.	Cat. No.		Pcs./Pkg.	Cat. No.		Pcs./Pkg.
	199-DR1		5	199-DR1		5	199-DR1		5
1 m Symmetrical DIN (Steel)	1492-DR5		5	1492-DR5		5	1492-DR5		5
1 m Symmetrical DIN (Aluminum)	1492-DR6		2	1492-DR6		2	1492-DR6		2
1 m Hi-Rise Sym. DIN (Aluminum)	1492-DR7		2	1492-DR7		2	1492-DR7		2
1 m Angled Hi-Rise Sym. DIN (Steel)	Not Required		—	Not Required		—	Not Required		—
End Barrier	1492-EA35		50	1492-EA35		50	1492-EA35		50
End Anchors: DIN Rail — Normal Duty	1492-EAH35		10	1492-EAH35		10	1492-EAH35		10
DIN Rail — Heavy Duty	1492-SJFB8-10		10	1492-SJFB8-10		10	1492-SJFB8-10		10
Jumpers: Side Jumper — 10-pole Insulated	1492-PPSL3		50	1492-PPSL3		50	1492-PPSL3		50
Other Accessories: Partition Plate	1492-GM35		10	1492-GM35		10	1492-GM35		10
Group Marking Carrier	1492-SM8X12		5	1492-SM8X12		5	1492-SM8X12		5
Marking Systems: Snap-in Marker Card — For Base Block	1492-SM6X9		5	1492-SM6X9		5	1492-SM6X9		5
For Handle	1492-MP ❷		10	1492-MP ❷		10	1492-MP ❷		10
Individual Marker Tabs (single char.)									

❶ IEC standards for 5 x 20 mm fuses do not include ratings above 6.3 A.

Dimensions are not intended to be used for manufacturing purposes.
Note: Height dimension is measured from top of rail to top of terminal block.

Specifications

Certifications

Voltage Rating

Maximum Current

Wire Range (Rated Cross Section)

Wire Strip Length

Recommended Tightening Torque

Density

Housing Temperature Range

Short-Circuit Current Rating

Terminal Blocks

Color:

Grey

Red

Accessories

Mounting Rails:

1 m Symmetrical DIN (Steel)

1 m Symmetrical DIN (Aluminum)

1 m Hi-Rise Sym. DIN (Aluminum)

1 m Angled Hi-Rise Sym. DIN (Steel)

End Barriers

End Anchors and Retainers:

Screwless End Retainer

DIN Rail — Normal Duty

DIN Rail — Heavy Duty

Jumpers* ‡:

Center Jumper — 50-Pole

Center Jumper — 10-Pole

Center Jumper — 9-Pole

Center Jumper — 8-Pole

Center Jumper — 7-Pole

Center Jumper — 6-Pole

Center Jumper — 5-Pole

Center Jumper — 4-Pole

Center Jumper — 3-Pole

Center Jumper — 2-Pole

Screw Type Jumper Notching Tool

Other Accessories:

Partition Plate

Test Plug

Disconnect Plug

Component Plug

Fuse Plug

Without Blown Fuse Indicator

10...36V Blown Fuse Indicator

35...70V Blown Fuse Indicator

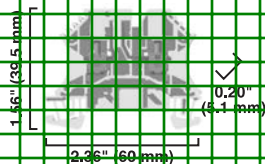
60...150V Blown Fuse Indicator

140...250V Blown Fuse Indicator

Marking Systems:

Snap-in marker cards

Snap-in marker cards

1492-J3P

Selectable component plug-in terminal block

UL	CSA	IEC
600V	300V	500V
AC/DC	AC/DC	AC/DC
20 A	10 A	24 A

#30...12 AWG 2.5 mm²

0.39 in. (10 mm)

4.4 lb•in (0.5 N•m)

59 pcs/ft (196 pcs/m)

-50...+248 °F (-50...+120 °C)

See page 12-42

Cat. No.**Pkg Qty.**

1492-J3P

100

1492-J3P-RE

100

Cat. No.**Pkg Qty.**

1492-J3P

100

1492-J3P-RE

100

1492-J3P-RE

100

1492-J3P-RE

100

1492-J3P-RE

100

1492-J3P-RE

100

1492-J3P-RE

100

1492-J3P-RE

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1492-J3P-RE

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1492-J3P-RE

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1492-J3P-RE

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1492-J3P-RE

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1492-J3P-RE

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1492-J3P-RE

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1492-J3P-RE

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1492-J3P-RE

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1492-J3P-RE

100

1492-J3P-RE

100

1492-J3P-RE

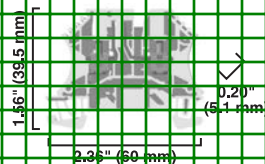
100

1492-J3P-RE

100

1492-J3P-RE

100

1492-J3PTP

Selectable component plug-in terminal block with test plug socket

UL	CSA	IEC
300V	300V	500V
AC/DC	AC/DC	AC/DC
20 A	10 A	24 A

#30...12 AWG 2.5 mm²

0.39 in. (10 mm)

4.4 lb•in (0.5 N•m)

59 pcs/ft (196 pcs/m)

-50...+248 °F (-50...+120 °C)

See page 12-42

Cat. No.**Pkg Qty.**

1492-J3PTP

100

1492-J3PTP

100

Cat. No.**Pkg Qty.**

1492-J3PTP

100

1492-J3PTP

100

1492-J3PTP

100

1492-J3PTP

100

1492-J3PTP

100

1492-J3PTP

100

1492-J3PTP

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1492-J3PTP

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1492-J3PTP

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1492-J3PTP

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1492-J3PTP

100

1492-J3PTP

100

1492-J3PTP

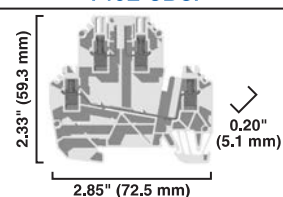
100

1492-J3PTP

100

1492-J3PTP

100

1492-JD3P

Two Circuit selectable component plug-in terminal block

UL	CSA	IEC
300V	300V	500V
AC/DC	AC/DC	AC/DC
20 A	10 A	24 A

#24...12 AWG #30...12 AWG 2.5 mm²

0.31 in. (8 mm)

4.4 lb•in (0.5 N•m)

59 pcs/ft (196 pcs/m)

-58...+248 °F (-50...+120 °C)

Cat. No.**Pkg Qty.**

1492-JD3P

50

Cat. No.**Pkg Qty.**

1492-JD3P

50

1492-JD3P

50

1492-JD3P

50

1492-JD3P

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1492-JD3P

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1492-JD3P

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1492-JD3P

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1492-JD3P

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1492-JD3P

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1492-JD3P

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1492-JD3P

50

1492-JD3P

50

1492-JD3P

50

1492-JD3P

50

* Cat. nos. 1492-J3P and J3PTP use screwless center jumpers. Cat. No. 1492-JD3P uses a screw-type center jumper.

Screw Connection Terminal Blocks

Short-Circuit Current Ratings

Fuse Ratings

Cat. No.	Wire Range Cu [AWG]		Overcurrent Protection Fuse Required Class/Max. Current Rating [A]						Maximum Voltage [V]	SCCR, RMS SYM [A]
	Line	Load	J	T	RK1	RK5	G	CC		
1492-J3										
1492-J3P										
1492-JL3SS										
1492-JD3	14...12	14...12	30	30			30	30	600	100,000
1492-JD3C										
1492-JG3TW										
1492-JDG3C										
1492-JG3										
1492-J3F										
1492-J3FTW										
1492-JG3										
1492-JDG3										
1492-JKD3										
1492-JL3FB										
1492-JD3F										
1492-JDG3FB										
1492-JD3PSSSTP	14...12	14...12	30	30	—	—	30	30	300	100,000
1492-JD3PTP										
1492-JDG3P										
1492-JDG3FSS										
1492-JDG3PSSSTP										
1492-JDG3FTP										
1492-JDG3										
1492-JD3PSS										
1492-JD3P										
1492-J4										
1492-JG4										
1492-JKD4										
1492-J4TW										
1492-J4C										
1492-JG4TW										
1492-JG4Q	14...10	14...10	60	60	30	—	60	30	600	100,000
1492-JKD4TW										
1492-JKD4Q										
1492-JKD4TP										
1492-JD4C										
1492-JD4										
1492-JKD4CTE										
1492-JKD4TWTE										
1492-JSD4										
1492-JKD4	14...10	14...10	60	60	30	—	60	30	300	100,000
1492-J4CTB										
1492-J6	14...8	14...8	100	100	60	30	60	30	600	100,000
1492-JG6										
1492-J10	14...6	14...6	100	100	60	30	60	30	600	100,000
1492-JG10										
1492-J16	14...4	14...4	100	100	60	30	60	30	600	100,000
1492-JG16										
1492-J16ND										
1492-J35	12...1/0	12...1/0	200	200	100	30	60	30	600	100,000
1492-JG35										
1492-J50	6...1/0	6...1/0	200	200	100	30	60	30	600	100,000
1492-JG50										
1492-J70	1/0...3/0	1/0...3/0	400	400	200	100	60	30	600	100,000
1492-JG70										
1492-J120	4...4/0	4...4/0	400	400	200	100	60	30	600	100,000
1492-JG120										

Screw Connection Terminal Blocks

Short-Circuit Current Ratings — Overcurrent Ratings

Cat. No.	Wire Range Cu [AWG] (Line and Load)	Overcurrent Protection Device Required	Max. Current [A]	SCCR, RMS Sym A 480Y/277V	SCCR, RMS Sym. A 300V+
1492-J3TW	14...12	140M-D8E-__	16	65,000	30,000
1492-JC3		140M-C2E-B10		65,000	30,000
1492-JDC3		140M-C2E-B16		65,000	30,000
1492-J3F		140M-C2E-B25		65,000	30,000
1492-JD3F		140M-C2E-B40		65,000	25,000
1492-JKD3		140M-C2E-B63		65,000	*
1492-JD3FB		140M-C2E-A__		65,000	30,000
1492-JD3FB		140M-C2E-C10		65,000	*
1492-JD3PSSTP		140MC2E-C16		30,000	*
1492-JD3PTP					
1492-JEG3P					
1492-JDG3FSS					
1492-JDG3PSSTP					
1492-JDG3PTP					
1492-JDG3					
1492-JD3P					
1492-JD3PSS					
1492-JKD4	14...10	140M-H8E-__	32	65,000	30,000
1492-JSD4		140M-D8E-C10		65,000	30,000
1492-JSD4		140M-D8E-C16		65,000	30,000
1492-J4CTB		140M-D8E-C20		65,000	*
		140M-D8E-C25		30,000	*
		140M-D8E-B__		65,000	30,000
		140M-C2E-B10		65,000	30,000
		140M-C2E-B16		65,000	30,000
		140M-C2E-B25		65,000	30,000
		140M-C2E-B40		65,000	25,000
		140M-C2E-B63		65,000	*
		140M-C2E-C10		65,000	*
		140M-C2E-C16		30,000	*
		140M-C2E-A__		65,000	30,000

Cat. No.	Wire Range Cu [AWG] (Line and Load)	Overcurrent Protection Device Required	Max. Current [A]	SCCR, RMS Sym A 480V+	SCCR, RMS Sym. A 600Y 347V+
1492-J10	14...10	140M-H8E-__	50	50,000	30,000
1492-JG10					
1492-J16	14...4	140M-H8E-__	100	30,000	30,000
1492-JG16					
1492-J16ND	12...2	140M-H8E-__	100	30,000	30,000
1492-JG35					
1492-J50	2...1/0	140M-H8E-__	150	65,000	30,000
1492-JG50					

Cat. No.	Wire Range Cu [AWG] (Line and Load)	Overcurrent Protection Device Required	Max. Current [A]	SCCR, RMS Sym A 480V+	SCCR, RMS Sym. A 600V+
1492-J70	4...1/0	140U-J0X3	175	65,000	*
	1/0	140U-J0X3		*	30,000
1492-J120	2...3/0	140U-J0X3	228	65,000	30,000

* Bulletin 140M does not have ratings at this voltage.

+ Voltage terminal block was tested at for respective SCCR

Mounting Rails

Cat. No.	Description	Pkg Qty.	Dimensions*
199-DR1	Symmetrical Rail 35 mm x 7.5 mm 3.28 ft (1 m) long Zinc-Plated Clear Chromated Steel EN60715	10	
199-DR2	Same as Cat. No. 199-DR1 but length = 2 m	20	#10-22 or M6 Recommended Maximum Mounting Screw Size
199-DR4	Heavy Duty Symmetrical Rail 35 mm x 15 mm 3.28 ft (1 m) long Zinc-Plated Clear Chromated Steel EN60715	5	
1492-DR3	Mini 15 mm x 5.5 mm Rail 3.28 ft (1 m) long Zinc-Plated Clear Chromated Steel EN60715	5	
1492-DR5	Symmetrical Rail 35 mm x 7.5 mm 3.28 ft (1 m) long Copper-Free Aluminum EN60715 For Bul. 1492 Terminal Blocks Only	10	
1492-DR6	Symmetrical Rail 35 mm x 7.5 mm 2.26 in. (57.4 mm) high 3.28 ft (1 m) long Copper-Free Aluminum For Bul. 1492 Terminal Blocks Only	2	
1492-DR7	Symmetrical Rail 35 mm x 7.5 mm 2.80 in. (71.0 mm) high 3.28 ft (1 m) long Angled 30° Zinc-Plated Chromated Steel	2	
1492-DR8	Symmetrical Rail 35 mm x 15 mm 3.28 ft (1 m) long Copper EN60715	5	
1492-DR9	Symmetrical Rail 35 mm x 15 mm 3.28 ft (1 m) long Zinc-Plated Clear Chromated Steel EN60715	5	

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

Screw Connection Terminal Blocks

Standard Feed-Through Blocks

GROUND TERMINAL BLOCK

Dimensions are not intended to be used for manufacturing purposes.
Note: Height dimension is measured from top of rail to top of terminal block.

	1492-J3				1492-J4				1492-J6			
Specifications	<i>Feed-through terminal block</i>				<i>Feed-through terminal block</i>				<i>Feed-through terminal block</i>			
Certifications		CSA	IEC	ATEX		CSA	IEC	ATEX		CSA	IEC	ATEX
Voltage Rating	600V AC/DC				600V AC/DC				600V AC/DC			
Maximum Current	25 A	20 A	24 A	21 A	35 A	25 A	32 A	28 A	50 A	41 A	36 A	36 A
Wire Range (Rated Cross Section)	#22...12 AWG	#26...12 AWG	2.5 mm ²	(#20...14 AWG)	#22...10 AWG	#26...10 AWG	4 mm ²	4 mm ² (#20...12 AWG)	#22...10 AWG	6 mm ²	6 mm ² (#20...10 AWG)	6 mm ² (#20...10 AWG)
Wire Strip Length	0.39 in. (10 mm)				0.39 in. (10 mm)				0.41 in. (12 mm)			
Recommended Tightening Torque	4.5...7.1 lb•in (0.5...0.8 N•m)				9.0 lb•in (1.0 N•m)				14.2 lb•in (1.6 N•m)			
Density	59 pcs/ft (196 pcs/m)				49 pcs/ft (163 pcs/m)				37 pcs/ft (123 pcs/m)			
Housing Temperature Range	-58...+248 °F (-50...+120 °C)				-58...+248 °F (-50...+120 °C)				-58...+248 °F (-50...+120 °C)			
Short-Circuit Current Rating					See page 12-42							
Terminal Blocks		Cat. No.		Pkg Qty.		Cat. No.		Pkg Qty.		Cat. No.		Pkg Qty.
Color:	Grey	1492-J3		100		1492-J4		100		1492-J6		100
	Red	1492-J3-RE		100		1492-J4-RE		100		1492-J6-RE		100
	Blue	1492-J3-B		100		1492-J4-B		100		1492-J6-B		100
	Black	1492-J3-BL		100		1492-J4-BL		100		1492-J6-BL		100
	Green	1492-J3-G		100		1492-J4-G		100		1492-J6-G		100
	Yellow	1492-J3-Y		100		1492-J4-Y		100		1492-J6-Y		100
	Orange	1492-J3-OR		100		1492-J4-OR		100		1492-J6-OR		100
	Brown	1492-J3-BR		100		1492-J4-BR		100		1492-J6-BR		100
	White	1492-J3-W		100		1492-J4-W		100		1492-J6-W		100
	Violet	1492-J3-V		100		1492-J4-V		100				
Mounting Rails:												
1 m Symmetrical DIN (Steel)		199-DR1		10		199-DR1		10		199-DR1		10
1 m Symmetrical DIN (Aluminum)		1492-DR5		10		1492-DR5		10		1492-DR5		10
1 m Hi-Rise Sym. DIN (Aluminum)		1492-DR6		2		1492-DR6		2		1492-DR6		2
1 m Angled Hi-Rise Sym. DIN (Steel)		1492-DR7		2		1492-DR7		2		1492-DR7		2
End Barriers	Grey	1492-EBJ3		50		1492-EBJ3		50		1492-EBJ3		50
	Blue	1492-EBJ3-B		50		1492-EBJ3-B		50		1492-EBJ3-B		50
	Yellow	1492-EBJ3-Y		50		1492-EBJ3-Y		50		1492-EBJ3-Y		50
End Anchors and Retainers:												
DIN Rail — Normal Duty		1492-EAJ35		100		1492-EAJ35		100		1492-EAJ35		100
DIN Rail — Heavy Duty		1492-EAHJ35		50		1492-EAHJ35		50		1492-EAHJ35		50
Screwless End Retainer		1492-ERL35		20		1492-ERL35		20		1492-ERL35		20
Jumpers:*												
Screw Center Jumper — 10-pole		1492-CJJ5-10		20		1492-CJJ6-10		20		1492-CJJ8-10		20
Screw Center Jumper — 4-pole		1492-CJJ5-4		50		1492-CJJ6-4		50		1492-CJJ8-4		50
Screw Center Jumper — 3-pole		1492-CJJ5-3		50		1492-CJJ6-3		50		1492-CJJ8-3		50
Screw Center Jumper — 2-pole		1492-CJJ5-2		50		1492-CJJ6-2		50		1492-CJJ8-2		50
Plug-in Center Jumper — 50-Pole		1492-CJLJ5-50		10		1492-CJLJ6-41 (#11-pole)		10				
Plug-in Center Jumper — 10-Pole		1492-CJLJ5-10		20		1492-CJLJ6-10		20				
Plug-in Center Jumper — 9-Pole		1492-CJLJ5-9		20								
Plug-in Center Jumper — 8-Pole		1492-CJLJ5-8		20								
Plug-in Center Jumper — 7-Pole		1492-CJLJ5-7		20								
Plug-in Center Jumper — 6-Pole		1492-CJLJ5-6		20								
Plug-in Center Jumper — 5-Pole		1492-CJLJ5-5		20								
Plug-in Center Jumper — 4-Pole		1492-CJLJ5-4		50		1492-CJLJ6-4		60				
Plug-in Center Jumper — 3-Pole		1492-CJLJ5-3		50		1492-CJLJ6-3		60				
Plug-in Center Jumper — 2-Pole		1492-CJLJ5-2		50		1492-CJLJ6-2		60				
Insulated Side Jumper — 24-Pole		1492-SJ5B-24		50								
Insulated Side Jumper — 10-Pole		1492-SJ5B-10		50								
Screw Type Jumper Notching Tool		1492-T1		1		1492-T1		1		1492-T1		1
Other Accessories:												
Partition Plate		1492-EBJ10		20		1492-EBJ10		20		1492-EBJ10		20
Test Plug Socket		1492-TFS23		20		1492-TFS23L		50		1492-TFS23L		50
Test Plug		1492-TP23		20		1492-TP23		20		1492-TP23		20
Test Plug (Stackable)		1492-TPJ5		25		1492-TPJ5		25				
Electrical Warning Plate		1492-EWPJ5		25		1492-EWPJ5		25		1492-EWPJ8		50
Marking Systems:		1492-M5X12 (144/card)		5		1492-M6X12 (120/card)		5		1492-M8X12 (84/card)		5
Snap-in Marker Cards		1492-M5X5 (200/card)		5		1492-M6X5 (200/card)		5		1492-M8X5 (160/card)		5

* Use of center jumpers may affect spacings, requiring derating of terminal blocks. See page 12-83 for details.

Screw Connection Terminal Blocks

Short-Circuit Current Ratings

Fuse Ratings

Cat. No.	Wire Range Cu [AWG]		Overcurrent Protection Fuse Required Class/Max. Current Rating [A]						Maximum Voltage [V]	SCCR, RMS SYM [A]
	Line	Load	J	T	RK1	RK5	G	CC		
1492-J3										
1492-J3P										
1492-JD3SS										
1492-JD3	14...12	14...12	30	30			30	30	600	100,000
1492-JD3C										
1492-JG3TW										
1492-JD3C										
1492-JG3										
1492-J3F										
1492-J3FW										
1492-JD3										
1492-JD3C										
1492-JKD3										
1492-JD3FB										
1492-JD3F										
1492-JD3FB										
1492-JD3SSSTP	14...12	14...12	30	30	—	—	30	30	300	100,000
1492-JD3PTP										
1492-JD3P										
1492-JD3PSS										
1492-JD3PSSSTP										
1492-JD3PPTP										
1492-JD3S										
1492-JD3PSS										
1492-JD3F										
1492-J4										
1492-JG4										
1492-JKD4										
1492-J4TW										
1492-J4C										
1492-JC4TW										
1492-JG4Q	14...10	14...10	60	60	30	—	60	30	600	100,000
1492-JKD4TW										
1492-JKD4Q										
1492-JKD4TP										
1492-JD4C										
1492-JD4										
1492-JKD4CTE										
1492-JKD4TWTP										
1492-JSD4										
1492-JKD4	14...10	14...10	60	60	30	—	60	30	300	100,000
1492-J4CTB										
1492-J6										
1492-JG6	14...8	14...8	100	100	60	30	60	30	600	100,000
1492-J10										
1492-JG10	14...6	14...6	100	100	60	30	60	30	600	100,000
1492-J16										
1492-JG16	14...4	14...4	100	100	60	30	60	30	600	100,000
1492-J16ND										
1492-J35										
1492-JG35	12...1/0	12...1/0	200	200	100	30	60	30	600	100,000
1492-J50										
1492-JG50	6...1/0	6...1/0	200	200	100	30	60	30	600	100,000
1492-J70										
1492-JG70	1/0...3/0	1/0...3/0	400	400	200	100	60	30	600	100,000
1492-J120										
1492-JG120	4...4/0	4...4/0	400	400	200	100	60	30	600	100,000

Screw Connection Terminal Blocks

Short-Circuit Current Ratings — Overcurrent Ratings

Overcurrent Ratings

Cat. No.	Wire Range Cu [AWG] (Line and Load)	Overcurrent Protection Device Required	Max. Current [A]	SCCR, RMS Sym A 480Y/277V	SCCR, RMS Sym. A 600Y/347V
1492-J3		140M-D8E		65,000	30,000
1492-JG3TW		140M-C2E-B10		65,000	30,000
1492-J3P		140M-C2E-B16		65,000	30,000
1492-J3		140M-C2E-B25		65,000	30,000
1492-JD3	14...2	140M-C2E-B40	16	65,000	25,000
1492-JD3C		140M-C2E-B63		65,000	*
1492-JD3SS		140M-C2E-A		65,000	30,000
1492-JDG3C		140M-C2E-C10		65,000	*
1492-JG3		140M-C2E-C16		30,000	*
1492-J4		140M-E8E		65,000	30,000
1492-JG4		140M-D8E-C10		65,000	30,000
1492-J4TW		140M-D8E-C16		65,000	30,000
1492-J4Q		140M-D8E-C20		65,000	*
1492-JG4TW		140M-D8E-C25		30,000	*
1492-JG4C		140M-D8E-B		65,000	30,000
1492-JKD4TW	14...0	140M-C2E-B10	32	65,000	30,000
1492-JKD4Q		140M-C2E-B16		65,000	30,000
1492-JKD4TP		140M-C2E-B25		65,000	30,000
1492-JD4C		140M-C2E-B40		65,000	25,000
1492-JD4		140M-C2E-B63		65,000	*
1492-JKD4QTP		140M-C2E-C10		65,000	*
1492-JKD4TWTP		140M-C2E-C16		30,000	*
		140M-C2E-A		65,000	30,000
1492-J6		140M-F8E		65,000	30,000
1492-JG6		140M-D8E-C10		65,000	30,000
		140M-D8E-C16		65,000	30,000
		140M-D8E-C20		65,000	*
		140M-D8E-C25		30,000	*
		140M-D8E-B		65,000	30,000
	14...8	140M-C2E-B10	32	65,000	30,000
		140M-C2E-B16		65,000	30,000
		140M-C2E-B25		65,000	30,000
		140M-C2E-B40		65,000	25,000
		140M-C2E-B63		65,000	*
		140M-C2E-C10		65,000	*
		140M-C2E-C16		30,000	*
		140M-C2E-A		65,000	30,000

* Bulletin 140M does not have ratings at this voltage.

Screw Connection Terminal Blocks

Standard Feed-Through Blocks

GREY TERMINAL BLOCK

Dimensions are not intended to be used for manufacturing purposes.
Note: Height dimension is measured from top of rail to top of terminal block.

Specifications		Feed-through terminal block				Feed-through terminal block				Feed-through terminal block				
Certifications			CSA	IEC	ATEX		CSA	IEC	ATEX		CSA	IEC	ATEX	
Voltage Rating		600V AC/DC		800V AC/DC	550V AC/DC	600V AC/DC		800V AC/DC	690V AC/DC	600V AC/DC		800V AC/DC	550V AC/DC	
Maximum Current		25 A		20 A	24 A	21 A	35 A	25 A	32 A	28 A	50 A		41 A	36 A
Wire Range (Rated Cross Section)		#22...12 AWG		#26...12 AWG	2.5 mm² (#20...14 AWG)	2.5 mm² (#20...14 AWG)	#22...10 AWG	#26...10 AWG	4 mm² (#20...12 AWG)	4 mm² (#20...12 AWG)	#22...8 AWG		6 mm² (#20...14 AWG)	6 mm² (#20...14 AWG)
Wire Strip Length		0.39 in. (10 mm)				0.39 in. (10 mm)				0.47 in. (12 mm)				
Recommended Tightening Torque		4.5...7.1 lb•in (0.5...0.8 N•m)				9.0 lb•in (1.0 N•m)				14.2 lb•in (1.6 N•m)				
Density		59 pcs/ft (196 pcs/m)				49 pcs/ft (163 pcs/m)				37 pcs/ft (123 pcs/m)				
Housing Temperature Range		-58...+248 °F (-50...+120 °C)				-58...+248 °F (-50...+120 °C)				-58...+248 °F (-50...+120 °C)				
Short-Circuit Current Rating						See page 12-42								
Terminal Blocks		Cat. No.			Pkg Qty.	Cat. No.			Pkg Qty.	Cat. No.			Pkg Qty.	
Color:	Grey	1492-J3			100	1492-J4			100	1492-J6			100	
	Red	1492-J3-RE			100	1492-J4-RE			100	1492-J6-RE			100	
	Blue	1492-J3-B			100	1492-J4-B			100	1492-J6-B			100	
	Black	1492-J3-BL			100	1492-J4-BL			100	1492-J6-BL			100	
	Green	1492-J3-G			100	1492-J4-G			100	1492-J6-G			100	
	Yellow	1492-J3-Y			100	1492-J4-Y			100	1492-J6-Y			100	
	Orange	1492-J3-OR			100	1492-J4-OR			100	1492-J6-OR			100	
	Brown	1492-J3-BR			100	1492-J4-BR			100	1492-J6-BR			100	
	White	1492-J3-W			100	1492-J4-W			100	1492-J6-W			100	
	Violet	1492-J3-V			100	1492-J4-V			100	1492-J6-V			100	
Mounting Rails:														
1 m Symmetrical DIN (Steel)		199-DR1			10	199-DR1			10	199-DR1			10	
1 m Symmetrical DIN (Aluminum)		1492-DR5			10	1492-DR5			10	1492-DR5			10	
1 m Hi-Rise Sym. DIN (Aluminum)		1492-DR6			2	1492-DR6			2	1492-DR6			2	
1 m Angled Hi-Rise Sym. DIN (Steel)		1492-DR7			2	1492-DR7			2	1492-DR7			2	
End Barriers														
	Grey	1492-EBJ3			50	1492-EBJ3			50	1492-EBJ3			50	
	Blue	1492-EBJ3-B			50	1492-EBJ3-B			50	1492-EBJ3-B			50	
	Yellow	1492-EBJ3-Y			50	1492-EBJ3-Y			50	1492-EBJ3-Y			50	
End Anchors and Retainers:														
DIN Rail — Normal Duty		1492-EAJ35			100	1492-EAJ35			100	1492-EAJ35			100	
DIN Rail — Heavy Duty		1492-EAHJ35			50	1492-EAHJ35			50	1492-EAHJ35			50	
Screwless End Retainer		1492-ERL35			20	1492-ERL35			20	1492-ERL35			20	
Jumpers:*														
Screw Center Jumper — 10-pole		1492-CJJ5-10			20	1492-CJJ6-10			20	1492-CJJ8-10			20	
Screw Center Jumper — 4-pole		1492-CJJ5-4			50	1492-CJJ6-4			50	1492-CJJ8-4			50	
Screw Center Jumper — 3-pole		1492-CJJ5-3			50	1492-CJJ6-3			50	1492-CJJ8-3			50	
Screw Center Jumper — 2-pole		1492-CJJ5-2			50	1492-CJJ6-2			50	1492-CJJ8-2			50	
Plug-in Center Jumper — 50-Pole		1492-CJLJ5-50			10	1492-CJLJ6-41 (#11-pole)			10	—			—	
Plug-in Center Jumper — 10-Pole		1492-CJLJ5-10			20	1492-CJLJ6-10			20	—			—	
Plug-in Center Jumper — 9-Pole		1492-CJLJ5-9			20	—			—	—			—	
Plug-in Center Jumper — 8-Pole		1492-CJLJ5-8			20	—			—	—			—	
Plug-in Center Jumper — 7-Pole		1492-CJLJ5-7			20	—			—	—			—	
Plug-in Center Jumper — 6-Pole		1492-CJLJ5-6			20	—			—	—			—	
Plug-in Center Jumper — 5-Pole		1492-CJLJ5-5			20	—			—	—			—	
Plug-in Center Jumper — 4-Pole		1492-CJLJ5-4			50	1492-CJLJ6-4			60	—			—	
Plug-in Center Jumper — 3-Pole		1492-CJLJ5-3			50	1492-CJLJ6-3			60	—			—	
Plug-in Center Jumper — 2-Pole		1492-CJLJ5-2			50	1492-CJLJ6-2			60	—			—	
Insulated Side Jumper — 24-Pole		1492-SJ5B-24			50	—			—	—			—	
Insulated Side Jumper — 10-Pole		1492-SJ5B-10			50	—			—	—			—	
Screw Type Jumper Notching Tool		1492-T1			1	1492-T1			1	1492-T1			1	
Other Accessories:														
Partition Plate		1492-EBJ10			20	1492-EBJ10			20	1492-EBJ10			20	
Test Plug Socket		1492-TPS23			20	1492-TPS23L			50	1492-TPS23L			50	
Test Plug		1492-TP23			20	1492-TP23			20	1492-TP23			20	
Test Plug (Stackable)		1492-TPJ5			25	1492-TPJ5			25	—			—	
Electrical Warning Plate		1492-EWPJ5			25	1492-EWPJ5			25	1492-EWPJ8			50	
Marking Systems:														
Snap-in Marker Cards		1492-M5X12 (144/card)			5	1492-M6X12 (120/card)			5	1492-M8X12 (84/card)			5	
		1492-M5X5 (200/card)			5	1492-M6X5 (200/card)			5	1492-M8X5 (160/card)			5	

* Use of center jumpers may affect spacings, requiring derating of terminal blocks. See page 12-83 for details.

Screw Connection Terminal Blocks

Short-Circuit Current Ratings

Fuse Ratings

Cat. No.	Wire Range Cu [AWG]		Overcurrent Protection Fuse Required Class/Max. Current Rating [A]						Maximum Voltage [V]	SCCR, RMS SYM [A]
	Line	Load	J	T	RK1	RK5	G	CC		
1492-J3										
1492-J3P										
1492-JD3SS										
1492-JD3	14...12	14...12	30	30			30	30	600	100,000
1492-JD3C										
1492-JG3TW										
1492-JD3C										
1492-JG3										
1492-J3F										
1492-J3FW										
1492-JD3										
1492-JD3C										
1492-JKD3										
1492-JD3FB										
1492-JD3F										
1492-JD3FB										
1492-JD3SSSTP	14...12	14...12	30	30	—	—	30	30	300	100,000
1492-JD3PTP										
1492-JD3P										
1492-JD3PSS										
1492-JD3PSSSTP										
1492-JD3PPTP										
1492-JD3P										
1492-JD3PSS										
1492-JD3P										
1492-J4										
1492-JG4										
1492-JKD4										
1492-J4TW										
1492-J4C										
1492-JC4TW										
1492-JG4Q	14...10	14...10	60	60	30	—	60	30	600	100,000
1492-JKD4TW										
1492-JKD4Q										
1492-JKD4TP										
1492-JD4C										
1492-JD4										
1492-JKD4CTE										
1492-JKD4TWTP										
1492-JSD4										
1492-JKD4	14...10	14...10	60	60	30	—	60	30	300	100,000
1492-J4CTB										
1492-J6										
1492-JG6	14...8	14...8	100	100	60	30	60	30	600	100,000
1492-J10										
1492-JG10	14...6	14...6	100	100	60	30	60	30	600	100,000
1492-J16										
1492-JG16	14...4	14...4	100	100	60	30	60	30	600	100,000
1492-J16ND										
1492-J35										
1492-JG35	12...1/0	12...1/0	200	200	100	30	60	30	600	100,000
1492-J50										
1492-JG50	6...1/0	6...1/0	200	200	100	30	60	30	600	100,000
1492-J70										
1492-JG70	1/0...3/0	1/0...3/0	400	400	200	100	60	30	600	100,000
1492-J120										
1492-JG120	4...4/0	4...4/0	400	400	200	100	60	30	600	100,000

Screw Connection Terminal Blocks

Short-Circuit Current Ratings — Overcurrent Ratings

Overcurrent Ratings

Cat. No.	Wire Range Cu [AWG] (Line and Load)	Overcurrent Protection Device Required	Max. Current [A]	SCCR, RMS Sym A 480Y/277V	SCCR, RMS Sym. A 600Y/347V
1492-J3	14...2	140M-D8E	16	65,000	30,000
1492-JG3FW		140M-C2E-B10		65,000	30,000
1492-J3P		140M-C2E-B16		65,000	30,000
1492-J3		140M-C2E-B25		65,000	30,000
1492-JD3		140M-C2E-B40		65,000	25,000
1492-JD3C		140M-C2E-B63		65,000	*
1492-JD3SS		140M-C2E-A		65,000	30,000
1492-JDG3C		140M-C2E-C10		65,000	*
1492-JG3		140M-C2E-C16		30,000	*
1492-J4	14...0	140M-F8E-	32	65,000	30,000
1492-JG4		140M-D8E-C10		65,000	30,000
1492-J4FW		140M-D8E-C16		65,000	30,000
1492-J4Q		140M-D8E-C20		65,000	*
1492-JG4TW		140M-D8E-C25		30,000	*
1492-JG4C		140M-D8E-B		65,000	30,000
1492-JKD4TW		140M-C2E-B10		65,000	30,000
1492-JKD4Q		140M-C2E-B16		65,000	30,000
1492-JKD4TP		140M-C2E-B25		65,000	30,000
1492-JD4C		140M-C2E-B40		65,000	25,000
1492-JD4		140M-C2E-B63		65,000	*
1492-JKD4QTP		140M-C2E-C10		65,000	*
1492-JKD4TWTP		140M-C2E-C16		30,000	*
1492-J6		140M-F8E-		65,000	30,000
1492-JG6		140M-D8E-C10		65,000	30,000
		140M-D8E-C16		65,000	30,000
		140M-D8E-C20		65,000	*
		140M-D8E-C25		30,000	*
		140M-D8E-B		65,000	30,000
	14...8	140M-C2E-B10	32	65,000	30,000
		140M-C2E-B16		65,000	30,000
		140M-C2E-B25		65,000	30,000
		140M-C2E-B40		65,000	25,000
		140M-C2E-B63		65,000	*
		140M-C2E-C10		65,000	*
		140M-C2E-C16		30,000	*
		140M-C2E-A		65,000	30,000

* Bulletin 140M does not have ratings at this voltage.

Specifications

Cat. No.		193-ED1_B, 193-EE_B, and 592-EE_T	193-EE_D and 592-EE_C	193-EE_E and 592-EE_D
Main Circuits				
Rated Insulation Voltage U_i		690V AC		
Rated Impulse Strength U_{imp}		6 kV AC		
Rated Operating Voltage U_e		690V AC (IEC) / 600V AC (CSA/UL)		
Terminal Cross-Sections:				
Terminal Type				
Terminal Screw		M5	M5	M8
Flexible-Stranded with Ferrule	Single Conductor Torque	2.5...16 mm ² 2.5 N·m	2.5...16 mm ² 2.5 N·m	4...35 mm ² 24 N·m
	Two Conductor Torque	2.5...10 mm ² ❶ 3.4 N·m	2.5...10 mm ² ❶ 3.4 N·m	4...25 mm ² 4 N·m
Coarse-Stranded / Solid	Single Conductor Torque	2.5...25 mm ² 2.5 N·m	2.5...25 mm ² 2.5 N·m	4...50 mm ² 4 N·m
	Two Conductor Torque	6...16 mm ² ❶ 3.4 N·m	6...16 mm ² ❶ 3.4 N·m	4...35 mm ² 4 N·m
Stranded / Solid	Single Conductor Torque	14...6 AWG 22 lb-in	14...6 AWG 22 lb-in	12...1 AWG 35 lb-in
	Two Conductor Torque	14...6 AWG ❶ 30 lb-in	14...6 AWG ❶ 30 lb-in	6...2 AWG 35 lb-in
Pozidrive Screwdriver Size		2	2	—
Slotted Screwdriver (mm)		1 x 6	1 x 6	—
Hexagon Socket Size (mm)		—	—	4
Control Circuits				
Rated Insulation Voltage U_i		690V AC		
Rated Impulse Strength U_{imp}		6 kV AC		
Rated Operating Voltage U_e		690V AC (IEC) / 600V AC (CSA/UL)		
Rating Designation		B600		
Rated Operating Current I_e		N.O. / N.C.		
AC-15	12...120V	3 / 2		
	220...240V	1.5 / 1.5		
	380...480V	0.75 / 0.75		
	500...600V	0.6 / 0.6		
DC-13, at L/R ≤ 15 ms	24V	1.1 / 1.1		
	110V	0.4 / 0.4		
	220V	0.2 / 0.2		
	440V	0.08 / 0.08		
Thermal Current I_{the}		5 A		
Contact Reliability		17V, 5 mA		
Screw Terminal Cross-Sections:				
Terminal Screw		M3		
Flexible-Stranded with Ferrule	Single Conductor Torque	0.5...2.5 mm ² 0.55 N·m		
	Two Conductor Torque	0.25...1.5 mm ² 0.55 N·m		
Coarse-Stranded / Solid	Single Conductor Torque	0.5...4 mm ² 0.55 N·m		
	Two Conductor Torque	0.2...2.5 mm ² 0.55 N·m		
Stranded / Solid	Single Conductor Torque	24...10 AWG 5 lb-in		
	Two Conductor Torque	24...12 AWG 5 lb-in		
Screwdriver (mm)		#1 Pozidrive / 0.6 x 3.5 slotted		
Cage Clamp Cross-Sections:				
Flexible-Stranded with Ferrule		0.25...1 mm ²		
Coarse-Stranded / Solid		0.2...1.5 mm ²		
Stranded / Solid		24...14 AWG		

❶ For multiple conductor applications, the same style and size of wire must be used.

Bulletin 193 and 592

E1 Plus Solid-State Overload Relays

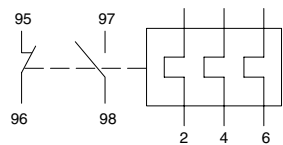
Specifications, Continued/Wiring Schematic

Environmental Ratings		
Ambient Temperature	Storage Operating	-40...85°C (-40...185°F) -20...60°C (-4...140°F)
Humidity	Operating Damp Heat	5...95%, non-condensing per IEC 68-2-3 and IEC 68-2-30
Vibration (per IEC 68-2-6)		3 G
Shock (per IEC 68-2-27)		30 G
Maximum Altitude		2000 m
Pollution Environment		Pollution Degree 3
Degree of Protection		IP20
Protection		
Type of Relay		Ambient Compensated, Time Delay, Phase Loss Sensitive
Nature of Relay		Solid-State
Trip Rating		120% FLA
Trip Class	Type ED Type EE	10 10, 15, 20, 30
Reset Mode	Type ED Type EE	Manual Automatic or Manual
Electromagnetic Compatibility		
Electrostatic Discharge Immunity	Test Level Performance Level	8 kV Air Discharge 6 kV Contact Discharge 1 1 2
RF Immunity	Test Level Performance Level	10 V/m 1 1 2
Electrical Fast Transient/Burst Immunity	Test Level Performance Level	4 kV 1 1 2
Surge Immunity	Test Level Performance Level	2 kV (L-E) 1 kV (L-L) 1 1 2

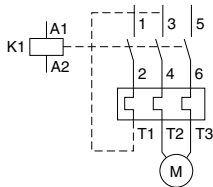
- ❶ Performance Criteria 1 requires the DUT to experience no degradation or loss of performance.
- ❷ Environment 2.

General			
Standards	UL508, CSA C22.2 No. 14, NEMA ICS 2-1993 Part 4, EN 60947-4-1, EN 60947-5-1		
Approvals	CE, CSA, UL, ATEX (pending), C-Tick		
Weight (unpackaged)	kg	0.25	0.25
	Lb	0.55	0.55
			0.52
			1.06

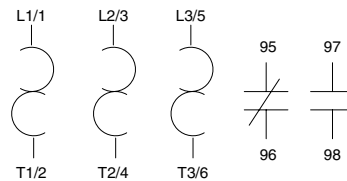
Wiring Schematic



Typical IEC Wiring Schematic



Typical Wiring for 1-Phase Applications



Typical NEMA Wiring Schematic

Wire - Type MTW

Applications

Type MTW conductors are primarily used in control cabinets, in machine tool applications, and in appliance wiring applications. For use in accordance with the National Electrical Code (NEC) and NFPA Standard 79.

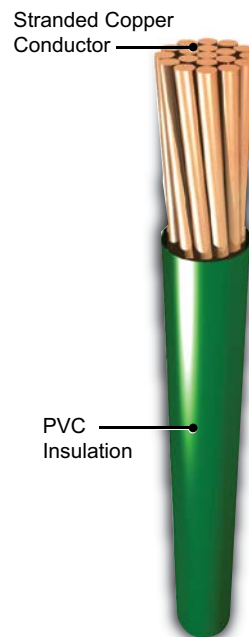
Voltage rating for all applications is 600 volts.

MTW wire is sold in a variety of colors and gauges on 500', 1000' and 2500 foot spools.

Features

- Gauges from 22AWG to 10AWG
- Bare copper conductor
- Color-coded Polyvinyl Chloride (PVC) outer jacket
- Striped version available for some colors and gauges
- Multiple ratings and approvals
- 500ft, 1000ft and 2500ft spools or reels
- available for most gauges & colors
- Made in the USA

Type MTW Wire



Type MTW Wire Specifications												
Size (AWG or kcmil)	Number of Strands	mm2 Equivalent	Insulation Thickness	Overall Outside Diameter		Allowable Ampacities*			Agency Approvals	Temperature Rating per UL1015	Approximate Weight (lbs) 500ft/1000ft/2500ft	Standard Packaging (Spool/Reel)
			(inches)	(inches)	(mm)	60°C (140 °F)	75°C (167 °F)	90°C (194 °F)				
22	7	0.34	0.030	0.092	2.34	3	3	3	UL1230 UL1335 UL1032 UL1015 UL1013	105°C (221°F)	3.9	500ft or 1000ft
20	10	0.50	0.030	0.099	2.51	5	5	5	UL1011 UL1015 UL1230 UL1335 UL1032 CSA TEW or AWM I A/B 2011/65/EU (RoHS 2) UL File No. E51583		4.0	
18	16	0.75	0.030	0.110	2.79	7	7	14	UL1015 UL 758 UL1063 CSA TEW or AWM I A/B ARRA 2009; Section 1605 "Buy American" Compliant UL File No. E156879		4.6 / 26.8	500ft, 1000ft or 2500ft. Some colors not offered in 1000ft and 2500ft reels.
16**	26	1.5	0.030	0.123	3.12	10	10	18			6.5 / 34.4	
14**	19	2.5	0.030	0.132	3.35	20	20	25			9 / 46.8	
12**	19	4	0.030	0.151	3.84	25	25	30			13.2 / 71	500ft
10**	19	6	0.030	0.205	5.21	30	35	40			20.9	
*Note: Allowable ampacity shown above is per the NFPA79 Electrical Standard for Industrial Machinery 2018 Table 12.5.1 Conductor Ampacity Based on Copper Conductors with 60 °C [140 °F], 75 °C [167 °F], and 90 °C [194 °F] Insulation in an Ambient Temperature of 30 °C [86°F]. The above data is approximate and subject to normal manufacturing tolerance.												
Product Color Disclaimer: The product photos shown are representative of our wire colors. The actual wire colors may vary from the images shown. Although our suppliers maintain a high-quality standard, there can be color variation from production. As a result, we cannot guarantee color spools will match up perfectly.												
**Note: Unless specifically permitted elsewhere in NFPA 70 overcurrent protection should not exceed 10 amps 16AWG, 15 amps for 14AWG, 20 amps for 12AWG, and 30 amps for 10AWG.												
To obtain the most current agency approval information, see the Agency Approval Checklist section on the specific part number's web page at www.automationdirect.com												

Please Note: Our prices on wire are closely tied to the market price for copper. This allows us to offer the best savings possible if conditions are favorable; however, it also means that our prices may increase if market conditions warrant.

Wire - Type MTW

Type MTW Wire							
Part Number	Insulation Color	Gauge	Description	Spool/Reel Length	Approx. Weight	Price	
MTW22BK	Black	22AWG	Type MTW wire, bare copper, 7 strands, 600 Volts	500ft	[3.9 lb] [1.76 kg]	\$24.50	
MTW22WH	White					\$24.50	
MTW22RD	Red					\$24.50	
MTW22BL	Blue					\$24.50	
MTW22GN	Green					\$24.50	
MTW22YL	Yellow					\$24.50	
MTW22OR	Orange					\$24.50	
MTW22BN	Brown					\$24.50	
MTW22PL	Purple					\$24.50	
MTW22GY	Gray					\$24.50	
MTW22BW	Blue with White spiral stripe					\$24.50	
MTW22WB	White with Blue spiral stripe					\$24.50	
MTW22WO	White with Orange spiral stripe					\$26.00	
MTW22GYL	Green with Yellow spiral stripe					\$26.00	
MTW20BK	Black	20AWG	Type MTW wire, bare copper, 10 strands, 600 Volts		[4.0 lb] [1.81 kg]	\$31.00	
MTW20WH	White					\$31.00	
MTW20RD	Red					\$31.00	
MTW20BL	Blue					\$31.00	
MTW20GN	Green					\$31.00	
MTW20YL	Yellow					\$31.00	
MTW20OR	Orange					\$31.00	
MTW20BN	Brown					\$31.00	
MTW20PL	Purple					\$31.00	
MTW20GY	Gray					\$31.00	
MTW20BW	Blue with White spiral stripe					\$43.50	
MTW20WB	White with Blue spiral stripe					\$43.50	
MTW20WO	White with Orange spiral stripe					\$43.50	
MTW20GYL	Green with Yellow spiral stripe					\$43.50	
MTW18BK	Black	18AWG	Type MTW wire, bare copper, 16 strands, 600 Volts			[4.6 lb] [2.08 kg]	\$70.00
MTW18WH	White						\$70.00
MTW18RD	Red						\$70.00
MTW18BL	Blue						\$70.00
MTW18GN	Green						\$70.00
MTW18YL	Yellow						\$70.00
MTW18OR	Orange						\$70.00
MTW18BN	Brown						\$70.00
MTW18PL	Purple						\$70.00
MTW18GY	Gray						\$70.00
MTW18BW	Blue with White spiral stripe						\$75.00
MTW18WB	White with Blue spiral stripe						\$75.00
MTW18WO	White with Orange spiral stripe						\$75.00
MTW18GYL	Green with Yellow spiral stripe						\$75.00
MTW16BK	Black	16AWG	Type MTW wire, bare copper, 26 strands, 600 Volts		[6.5 lb] [2.94 kg]		\$74.00
MTW16WH	White						\$74.00
MTW16RD	Red						\$74.00
MTW16BL	Blue						\$74.00
MTW16GN	Green						\$74.00
MTW16YL	Yellow						\$74.00
MTW16OR	Orange						\$74.00
MTW16BN	Brown						\$74.00
MTW16PL	Purple						\$74.00
MTW16GY	Gray						\$74.00
MTW16BW	Blue with White spiral stripe						\$76.00
MTW16WB	White with Blue spiral stripe						\$53.00
MTW16GYL	Green with Yellow spiral stripe						\$76.00

Wire - Type MTW

Type MTW Wire						
Part Number	Insulation Color	Gauge	Description	Spool/Reel Length	Approx. Weight	Price
MTW14BK	Black	14 AWG	Type MTW wire, bare copper, 19 strands, 600 Volts	500ft	[9.0 lb] [4.08 kg]	\$140.00
MTW14WH	White					\$140.00
MTW14RD	Red					\$140.00
MTW14BL	Blue					\$140.00
MTW14GN	Green					\$140.00
MTW14YL	Yellow					\$140.00
MTW14OR	Orange					\$140.00
MTW14BN	Brown					\$140.00
MTW14PL	Purple					\$140.00
MTW14GY	Gray					\$140.00
MTW14BW	Blue with White spiral stripe					\$140.00
MTW14WB	White with Blue spiral stripe					\$140.00
MTW14GYL	Green with Yellow spiral stripe					\$150.00
MTW12BK	Black	12AWG	Type MTW wire, bare copper, 19 strands, 600 Volts	500ft	[13.2 lb] [5.98 kg]	\$192.00
MTW12WH	White					\$192.00
MTW12RD	Red					\$192.00
MTW12BL	Blue					\$192.00
MTW12GN	Green					\$192.00
MTW12YL	Yellow					\$192.00
MTW12OR	Orange					\$192.00
MTW12BN	Brown					\$192.00
MTW12GY	Gray					\$192.00
MTW10BK	Black	10AWG	Type MTW wire, bare copper, 19 strands, 600 Volts	500ft	[20.9 lb] [9.48 kg]	\$291.00
MTW10WH	White					\$291.00
MTW10GN	Green					\$291.00
MTW10YL	Yellow					\$291.00
MTW10OR	Orange					\$291.00
MTW10BN	Brown	22AWG	Type MTW wire, bare copper, 7 strands, 600 Volts	1000ft	[6.8 lb] [3.08kg]	\$44.00
MTW22BK10	Black					\$44.00
MTW22BL10	Blue					\$44.00
MTW22BN10	Brown					\$44.00
MTW22BW10	Blue with White spiral stripe					\$44.00
MTW22GN10	Green					\$44.00
MTW22GYL10	Green with Yellow spiral stripe					\$47.00
MTW22OR10	Orange					\$44.00
MTW22RD10	Red					\$44.00
MTW22WB10	White with Blue spiral stripe					\$44.00
MTW22WH10	White					\$44.00
MTW22YL10	Yellow					\$44.00

Wire - Type MTW

Type MTW Wire						
Part Number	Insulation Color	Gauge	Description	Spool/Reel Length	Approx. Weight	Price
MTW20BK10	Black	20AWG	Type MTW wire, bare copper, 10 strands, 600 Volts	1000ft	[8.3lb] [3.76kg]	\$53.00
MTW20BL10	Blue					\$53.00
MTW20BN10	Brown					\$53.00
MTW20BW10	Blue with White spiral stripe					\$57.00
MTW20GN10	Green					\$53.00
MTW20GYL10	Green with Yellow spiral stripe					\$57.00
MTW20OR10	Orange					\$53.00
MTW20RD10	Red					\$53.00
MTW20WB10	White with Blue spiral stripe					\$57.00
MTW20WH10	White					\$53.00
MTW20YL10	Yellow					\$53.00
MTW18BK10	Black	18AWG	Type MTW wire, bare copper, 16 strands, 600 Volts		[10.6lb] [4.80kg]	\$85.00
MTW18BL10	Blue					\$85.00
MTW18BN10	Brown					\$85.00
MTW18BW10	Blue with White spiral stripe					\$88.00
MTW18GN10	Green					\$85.00
MTW18GYL10	Green with Yellow spiral stripe					\$89.00
MTW18GY10	Gray					\$85.00
MTW18OR10	Orange					\$85.00
MTW18PL10	Purple					\$85.00
MTW18RD10	Red					\$85.00
MTW18WB10	White with Blue spiral stripe					\$89.00
MTW18WH10	White					\$85.00
MTW18YL10	Yellow					\$85.00
MTW16BK10	Black	16AWG	Type MTW wire, bare copper, 26 strands, 600 Volts		[14.6lb] [6.62kg]	\$112.00
MTW16BL10	Blue					\$112.00
MTW16BW10	Blue with White spiral stripe					\$134.00
MTW16GN10	Green					\$112.00
MTW16GYL10	Green with Yellow spiral stripe					\$134.00
MTW16RD10	Red					\$112.00
MTW16WB10	White with Blue spiral stripe					\$134.00
MTW16WH10	White					\$112.00
MTW16YL10	Yellow	14AWG	Type MTW wire, bare copper, 41 strands, 600 Volts		[20.0lb] [9.07kg]	\$112.00
MTW14BK10	Black					\$168.00
MTW14BL10	Blue					\$168.00
MTW14GN10	Green					\$168.00
MTW14GYL10	Green with Yellow spiral stripe					\$178.00
MTW14RD10	Red					\$168.00
MTW14WH10	White	18AWG	Type MTW wire, bare copper, 16 strands, 600 Volts		[26.5lb] [12.02kg]	\$159.00
MTW18BK25	Black			2500ft		\$350.00
MTW18RD25	Red					\$350.00
MTW18BL25	Blue					\$350.00
MTW18BW25	Blue with White spiral stripe					\$365.00

Wire - Type MTW

Type MTW Wire						
Part Number	Insulation Color	Gauge	Description	Spool/Reel Length	Approx. Weight	Price
MTW16BK25	Black	16AWG	Type MTW wire, bare copper, 26 strands, 600 Volts	2500ft	[36.5lb] [16.5kg]	\$251.00
MTW16WH25	White					\$251.00
MTW16RD25	Red					\$251.00
MTW16BL25	Blue					\$251.00
MTW16BW25	Blue with White spiral stripe					\$254.00
MTW14BK25	Black	14AWG	Type MTW wire, bare copper, 41 strands, 600 Volts		[50lb] [22.67kg]	\$665.00
MTW14BN25	Brown					Retired
MTW14BW25	Blue with White spiral stripe					Retired

Gauge Conversion Table

American Wire Gauge Conversion Chart*			
This cross reference shows equivalent nominal values. Actual cross sections may vary.			
AWG	mm2	AWG	mm2
30	0.05	6	16
28	0.08	4	25
26	0.14	2	35
24	0.25	1	50
22	0.34	1/0	55
21	0.38	2/0	70
20	0.50	3/0	95
18	0.75	4/0	120
17	1.00	300MCM	150
16	1.50	350MCM	185
14	2.50	500MCM	240
12	4	600MCM	300
10	6	750MCM	400
8	10	1000MCM	500

*Note: Table shows commercially used equivalent values.

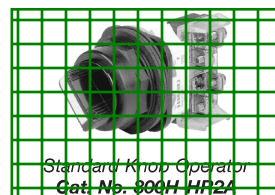
Conductor Ampacity Table

Allowable Ampacity			
AWG	60°C [140°F]	75°C [167°F]	90°C [194°F]
30	—	0.5	0.5
28	—	0.8	0.8
26	—	1	1
24	2	2	2
22	3	3	3
20	5	5	5
18	7	7	14
16**	10	10	18
14**	20	20	25
12**	25	25	30
10**	30	35	40
8	40	50	55
6	55	65	75
4	70	85	95
3	85	100	110
2	95	115	130
1	110	130	150
1/0	125	150	170
2/0	145	175	195
3/0	165	200	225
4/0	195	230	260
250MCM	215	255	290
300MCM	240	285	320
350MCM	260	310	350
400MCM	280	335	380
500MCM	320	380	430
600MCM	355	420	475
700MCM	385	460	520
750MCM	400	475	535
800MCM	410	490	555
900MCM	435	520	585
1000MCM	455	545	615

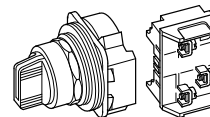
*Note: Allowable ampacity shown above is per NFPA79 Electrical Standard for Industrial Machinery 2018 Table 12.5.1 Conductor Ampacity Based on Copper Conductors with 60°C [140°F], 75°C [167°F], and 90°C [194°F] Insulation in an Ambient Temperature of 30°C [86°F]

**Note: Unless specifically permitted elsewhere in NFPA 70 overcurrent protection should not exceed 10 amps 16AWG, 15 amps for 14AWG, 20 amps for 12AWG, and 30 amps for 10AWG.

2-Position Selector Switch Devices, Non-Illuminated

Standard Knob Operator
Cat. No. 800T-H2AKnob Lever Operator
Cat. No. 800T-H17AStandard Knob Operator
Cat. No. 800H-HR2A

800 T - HA 2 A
a b c d e



a

Protection Rating	
Code	Description
T	Metal, Type 4/13
H	Plastic, Type 4/4X/13

b

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

c

Knob Insert Colors		
800T Type 4/13	Description	800H Type 4/4X/13
Code		Code
H	White	HR
FX	Package of colored inserts	HFX
Metal Wing Lever Colors*		
Code	Color	Code
HA	Red	—
HG	Grey	—

d

Operator Type and Function	
Standard Knob	
Code	Operator Function
2	Maintained
4	Spring return from left§
5	Spring return from right§
Knob Lever*	
Code	Operator Function
17	Maintained
18	Spring return from left§
19	Spring return from right§
Metal Wing Lever*	
Code	Operator Function
11	Maintained
15	Spring return from left§
16	Spring return from right§
Coin Slot*	
Code	Operator Function
6	Maintained
7	Spring return from left§
8	Spring return from right§

e

Contact Block(s)			
Code	Contact Configuration	2-Position	
Blank	No contacts	—	—
Standard			
D1	1 N.O.	O	X
D2	1 N.C.	X	O
A	1 N.O. - 1 N.C.	O	X
B	2 N.O. - 2 N.C.	X	O
		O	X
		X	O
Max Duty (Horsepower Rated)Δ			
D1M	1 N.O.		
D2M	1 N.C.		
PenTUFF (Low Voltage)Δ			
D1V	1 N.O.		
D2V	1 N.C.		
AV	1 N.O. - 1 N.C.		
BV	2 N.O. - 2 N.C.		
Class1, Div. 2			
Logic ReedΔ			
D1R	1 N.O.		
D2R	1 N.C.		
AR	1 N.O. - 1 N.C.		
BR	2 N.O. - 2 N.C.		
Sealed SwitchΔ			
D1P	1 N.O.		
D2P	1 N.C.		
AP	1 N.O. - 1 N.C.		
BP	2 N.O. - 2 N.C.		
Stackable Sealed SwitchΔ			
D1Y	1 N.O.		
D2Y	1 N.C.		
AY	1 N.O. - 1 N.C.		
BY	2 N.O. - 2 N.C.		

‡ One insert of each color (blue, green, orange, red, and yellow).

§ Target tables are reversed from those shown.

* Only available on Bul. 800T, Type 4/13 operators.

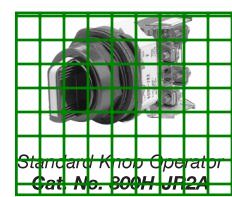
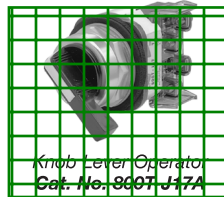
Δ Contact target tables same as those listed for standard contact blocks.

16161 3 Position Selector Switch

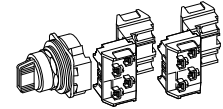
800T/H 30.5 mm Push Buttons

NEMA Push Button Specifications

3-Position Selector Switch Devices, Non-Illuminated



800 T - J 2 C
a b c d e f



a

Code	Description
T	Metal, Type 4/13
H	Plastic, Type 4/4K/13

b

Code	Description
Blank	No guards
C	Guards on terminals

c

800T Type 4/13	Description	800H Type 4/4K/13
J	White	JR
JX	Black of colored inserts*	JRX

Metal Wing Lever Colors†

Code	Color	Code
JA	Red	—
JG	Grey	—

d

Code	Operator Function
2	Maintained
4	Spring return from left
5	Spring return from right
9†	Spring return from both

Knob Lever‡

Code	Operator Function
17	Maintained
18	Spring return from left
19	Spring return from right
20	Spring return from both

Metal Wing Lever‡

Code	Operator Function
11	Maintained
15	Spring return from left
16	Spring return from right
141	Spring return from both

Coin Slot‡

Code	Operator Function
10	Spring return from both

e

Code	Description
Blank	KB7 cam (std.)
KA1	KA1 cam
KA7	KA7 cam

e (cont'd)

Code	Description
KC1	KC1 cam
KC7	KC7 cam
KD7	KD7 cam
KE7♣	KE7 cam
KQ1	KQ1 cam
KQ7	KQ7 cam
KR1♣	KR1 cam
KR7♣	KR7 cam
KT1♣	KT1 cam
KT7♣	KT7 cam
KU7♣	KU7 cam

f

Code	Description
Blank	No contacts on operator
A	1 N.O. - 1 N.C. 1-800T-XA on white side
B	2 N.O. - 2 N.C. 2-800T-XAs — 1 on white side/1 on black side

PenTUFF (Low Voltage)

AV	1 N.O. - 1 N.C. 1-800T-XAV on white side
BV	2 N.O. - 2 N.C. 2-800T-XAVs — 1 on white side/1 on black side

f (cont'd)

Code	Description
Blank	No contacts
Class 1, Div. 2	Logic Reed
AR	1 N.C. - 1 N.C. 1-800T-XAR on white side
BR	2 N.C. - 2 N.C. 2-800T-XARs — 1 on white side/1 on black side
AP	1 N.C. - 1 N.C. 1-800T-XAP on white side
BP	2 N.C. - 2 N.C. 2-800T-XAPs — 1 on white side/1 on black side
AY	1 N.C. - 1 N.C. 1-800T-XAY on white side
BY	2 N.C. - 2 N.C. 2-800T-XAYs — 1 on white side/1 on black side

★ One insert of each color (blue, green, orange, red, and yellow).
 ‡ Only available on Bul. 800T, Type 4/13 operators.
 § If an overlapping cam is required, consult your local distributor.
 ♣ Not available with wing levers.
 Δ See Table 1 for cam selections and associated targets.

Table 1. Cam and Contact Block Functionality Table

Contact Block Suffix Code	Contact Block Side	Circuits	Cam Codes																														
			KB7 (Std.)	KA1	KA7	KC1	KC7	KD7	KE7	KQ1	KQ7	KR1	KR7	KT1	KT7	KU7																	
A B C H L	White	A	X	O	O	X	O	O	X	O	O	X	X	O	O	X	X	O	X	O	X	X	O	X	X	O	X	O	X	O	O		
		B	O	O	X	O	X	O	O	X	O	O	X	O	O	X	O	O	X	O	O	X	O	O	X	O	O	X	O	O	X	O	
	Black	A	X	O	O	X	O	O	O	X	O	O	X	X	O	O	X	O	O	X	X	O	O	O	X	X	O	O	O	X	O	X	
		B	O	O	X	O	X	O	O	X	O	O	O	X	O	X	O	X	O	X	X	O	X	X	X	X	O	O	X	X	X	O	
	White	A	X	O	O	X	O	O	O	X	O	O	X	X	O	O	X	O	X	X	O	X	X	O	X	X	O	O	X	X	O	O	
		B	O	O	X	O	X	O	O	X	O	O	X	O	O	X	O	X	O	X	O	X	O	X	O	X	O	O	X	O	X	O	
	Black	A	X	O	O	X	O	O	O	X	O	O	X	X	O	O	X	O	O	X	O	O	X	O	O	X	O	O	X	X	O	O	X
		B	O	O	X	O	X	O	O	X	O	O	O	X	O	X	O	X	O	X	X	O	X	X	X	X	O	O	X	X	X	O	

Note: X = Closed/O = Open



Bulletin 700-FS — High Performance Timing Relay

- Adjustable function and timing range timing relays
- DIN Rail mounted without cost of socket
- 22.5 mm wide multi-function or single functions
- Available as SPDT or DPDT contact output, 8 A
- Timing Ranges From 0.05 s...60 hr
- Coil surge protection
- Hazardous location version available

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Connection
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Specifications 9-72
Standards Compliance and
Certifications
See Specification table in this
section, 9-72.

Catalog Number Explanation

Table with 6 columns: Bulletin Number (700), Type of Relay (FS), Operating Mode (H), Contact Output (3), Timing Range (U), Input Voltage (U23).

Single-Function (With SPDT 1 C/O contacts)

Table with 4 columns: 700-FS, a (A), b (3), c (A), d (U23).

Table with 2 columns: Code, Description. Operating Mode section.

Table with 2 columns: All functions:, 1 C/O. Contact Output section.

Table with 2 columns: Code, Description. Timing Range section.

Table with 2 columns: Code, Description. Input Voltage section.

* Preferred availability item.
* Valid for functions "A" and "B" only.

Single Function (With 2PDT 2 C/O contacts)

Operating Mode	Contact Output	Timing Range	Input Voltage	Cat. No.
On-delay	(DPDT) 2 C/O	0.05 s...60 hr‡	12V DC	700-FSA4UZ12
On-delay	(DPDT) 2 C/O		24...48V DC 24...240V AC, 50/60 Hz	700-FSA4UU23
Off-delay	(DPDT) 2 C/O		12V DC	700-FSB4UZ12
Off-delay	(DPDT) 2 C/O		24...48V DC 24...240V AC, 50/60 Hz	700-FSB4UU23

‡ The time range of "0.05 s...60 hr" is selectable in 12 smaller ranges plus an ON and OFF function for maintenance needs.

Note: Information for hazardous location versions of this product (-EX) is available on the Industrial Controls Catalog website: www.ab.com/catalogs.

Single Function With Hazardous Location Certification ✦ (With SPDT 1 C/O contacts)

Operating Mode	Contact Output	Timing Range	Input Voltage	Cat. No.
One Shot / Watch Dog (Pulse Controlled)	(SPDT) 1 C/O	0.05 s...1 s	24...48V DC	700-FSK3AU23-EX
		0.5 s...10 s	24...240V AC 50/60 Hz	700-FSK3CU23-EX

Multi-Function

(This device allows the flexibility of selecting one of 8 single timing functions.)

Operating Mode	Contact Output	Timing Range	Input Voltage	Cat. No.
Multi-function timing relays 8 Single-functions: A, B, C, D, E, F, I, and L ON and OFF function additional (for installation and maintenance) note: See connection diagrams for further description.	(SPDT) 1 C/O	0.05 s...60 hr	12V DC	700-FSM3UZ12
	(SPDT) 1 C/O		24...48V DC 24...240V AC 50/60 Hz	700-FSM3UU23
	(DPDT) 2 C/O		12V DC	700-FSM4UZ12
	(DPDT) 2 C/O		24...48V DC 24...240V AC 50/60 Hz	700-FSM4UU23

Note: Information for hazardous location versions of this product (-EX) is available on the Industrial Controls Catalog website: www.ab.com/catalogs.

Multi-Function With Hazardous Location Certification ✦

(This device allows the flexibility of selecting one of 8 single timing functions.)

Operating Mode	Contact Output	Timing Range	Input Voltage	Cat. No.
M Multi-function timing relays 8 Single-functions: A, B, C, D, E, F, I, and L ON and OFF function additional (for installation and maintenance) Note: See connection diagrams for further description.	(SPDT) 1 C/O	0.05 s...60 h*	24...48V DC 24...240V AC 50/60 Hz	700-FSM3UU23-EX
	(DPDT) 2 C/O			700-FSM4UU23-EX

Temp. Code T4A 2A 32VDC MAX.		
	II 3 G, EEx nL IIC T4 DEMKO 04 ATEX 0404974X 2A 32VDC MAX, Ta ≤ 70 °C	Ind. Cont. Eq. for Hazardous Location Listed 87SL Class 1, Div. 2, Groups A,B,C,D Class 1, Zn 2, Group IIC

Mounting: Product shall be installed in an enclosure constructed in accordance with the requirements of EN50021.



16161 Sola HD UPS

SDU AC - B SERIES DIN RAIL UPS

The SolaHD SDU AC - B Series DIN Rail UPS combines an industry leading compact design with a wide operation temperature range, enhanced communication and unique installation options. The SDU Series provides economical protection from damaging impulses and power interruptions. These units include easy to wire screw terminations for critical devices needing battery back up such as computer based control systems.

APPLICATIONS

- Programmable Logic Controllers
- Factory Automation
- Robotics
- Conveying Equipment
- Computer based Control Systems

FEATURES

- Lightweight, compact industrial design
- Communications port for optional Industrial Ethernet protocols or discrete communication card
- User Replaceable Battery
- Long-Life High-Temperature Battery
- Wide operation temperature range (0 °C to 50 °C)
- Cold start capability
- Software and cable included for easy installation
- Simulated sinewave output
- Remote turn-on and shutdown capabilities

- USB communication port
- Two year limited warranty
- Panel/wall mounting brackets (optional)

CERTIFICATIONS AND COMPLIANCES

- - Low Voltage Directive: EN62040-1
 - EMC Directive: EN62040-2 EN55032; EN 55011, EN 55024, EN 61000-6-1, EN 61000-6-2, EN 61000-6-3, EN 61000-6-4, EN 61326-1, EN61000-3-2, EN 61000-3-3, IEC/EN 61000-4 Series
- UL Recognized Component, UPS Equipment, E1729213
 - **UL 1778 5th Ed.,** CSA C22.2 No. 107.3
 - Suitable for UL 508 at full load output (no derating) and Ind. Control Equipment Applications Overvoltage Cat III, Pollution Degree III

- UL Recognized Component, Hazardous Locations E491259
 - ANSI ISA 12.12.01/CSA 213
 - Class I, Division 2, Groups A, B, C, D, T4
- ODVA Compliant
 - EtherNet/IP™ SDUENETIPCARD has been tested and approved for conformance by the ODVA. More information about EtherNet/IP™ and the ODVA can be obtained from the following website: www.odva.org.
- RoHS Compliant

RELATED PRODUCTS

- Portable MCR Power Conditioners
- STV Surge Protective Devices
- SDN DIN Rail Power Supplies
- STFV Plus SolaHD Tracking Filters

SDU ACCESSORIES

Catalog Number	Description	Approx. Ship Weight - oz. (g)
SDU-PMBRK	Mounting brackets to secure UPS to wall, back of panel or enclosure	16.0 (454.0)
SDUEDC	Enhanced DIN Clip to secure UPS to DIN rail	1.6 (45.3)

COMM CARD ACCESSORIES

Catalog Number	Description	Approx. Ship Weight - oz. (g)
Active - (Industrial Ethernet)		
SDUENETIPCARD	2 Port EtherNet/IP™ COMM CARD	1.0 (28.4)
SDUECATCARD	2 Port EtherCAT COMM CARD	1.0 (28.4)
SDUMBUSCARD	2 Port Modbus® - TCP COMM CARD	1.0 (28.4)
SDUPNETCARD	2 Port Profinet Industrial Protocol COMM CARD	1.0 (28.4)
Passive		
SDUCFRELAYCARD	SDU CF Dry Contact I/O RELAY CARD	1.0 (28.4)

SOLAHD

For product information:
www.solahd.com
 1.800.377.4384



CONSIDER IT SOLVED™

SPECIFICATIONS

Description	SDU 500B	SDU 850B	SDU 500B-5	SDU 850B-5
	Input			
Capacity (VA/Watts)	500/300	850/510	500/300	850/510
Nominal Voltage	120 Vac		230 Vac	
Frequency	50 or 60 Hz			
Harmonic	THD: 38.1%; Maximum single harmonic distortion of: 31.3%			
Power Factor	0.6			
	Output (Back-Up Mode)			
	Simulated sinewave			
Voltage Vac	120 V		230 V	
Frequency	50 or 60 Hz			
Transfer Time	Typical <8 ms			
	Protection			
Input (Internal)	10 A	8 A	6.3 A	
Overload Protection	UPS shutdown if overload exceeds 105% of nominal at 20 s, 120% at 10 s, 130% at 3 s; auto-recovery			
Short Circuit (Utility Mode)	In the event of dead short on the outputs of the UPS, input fuse will break Once the fuse opens, UPS goes to battery mode and goes on battery mode short circuit protection until OSCP is removed			
Short Circuit (Battery Mode)	Retry until the short circuit is removed or battery defect			
	Battery			
Type	Sealed, maintenance-free, lead acid batteries			
Typical Recharge Time	8 hours			
Typical Back-Up Time At full load/half load	4:20/14:30 min.	1:30/7:00 min.	4:20/14:30 min.	1:30/7:00 min.
	Alarm			
ON Battery	Slow beeping every 10 seconds			
Battery Low	Rapid beeping every second			
Overload	Continuous beeping sound			
	Environment			
Ambient Operation	0-95% humidity non-condensing, Ordinary Location: 0 to +50 °C (+32 to +122 °F) up to 3000 m (9842.5 ft.) Hazardous Location: 0 to +40 °C (+32 to +104 °F) up to 2000 m (6600 ft.)			
Audible Noise	< 40 dBA (1 meter from surface)			
Vibration	Operating - IEC60068-2-6, Sine Wave: 10 Hz to 60 Hz displacement of 0.35 mm, 60 Hz to 500 Hz @ 5G; 60 min. per axis for all X, Y, Z direction. Non-operating - IEC60068-2-6, Random: 5 Hz to 500 Hz@ 2 Grms; 20 min per axis for all X,Y,Z			
Shock	Operating - IEC60068-2-27, Half Sine Wave: 10 G for a duration of 10 ms, 3 shocks each in 3 axes in positive and negative direction. Non-operating - IEC60068-2-27, Half Sine Wave : 20 g for duration of 10 ms, 3 shocks in 3 axes in positive and negative direction.			
	Dimensions			
Unit (H x W x D) - in. (mm)	4.89 x 10.91 x 5.22 (124.2 x 277.0 x 132.7)			
Weight - lbs (kg)	10.8 (4.9)	11.5 (5.2)	10.8 (4.9)	11.5 (5.2)



TVSS Surge Protector

Surge Protector and Filter Specifications

Bulletin Numbers 4983-DC, 4983-DD, 4983-DH, 4983-DS, 4983-PF

Topic	Page
Summary of Changes	2
DIN Rail Heavy Duty AC Surge Protectors, 4983-DH	2
DIN Rail AC Power Surge Protective Device, 4983-DS	5
DIN Rail Dataline Surge Protective Device, 4983-DD	8
Panel Mount Filter 4983-PF	10
DIN Rail Combination Filter and Surge Protective Device 4983-DC	13
Additional Resources	15



Summary of Changes

This publication contains new and updated information as indicated in the following table.

Topic	Page
Added 4983-DH Features	2
Added 4983-DH Product Selection	3
Added 4983-DS Features	5
Added 4983-DS Product Selection	5
Added 4983-DD Features	8
Added 4983-DD Product Selection	8
Added 4983-PF Features	10
Added 4983-PF Product Selection	10
Added 4983-DC Features	13
Added 4983-DC Product Selection	13

DIN Rail Heavy Duty AC Surge Protectors, 4983-DH

Bulletin 4983-DH is a heavy-duty surge protector. This SPD combines a high-energy varistor (MOV) network with a gas discharge tube to increase performance in protection level, life duration, and suppression of leakage current. The Bulletin 4983-DH product is connected in parallel.

Features

- Highest energy absorption capability of all Bulletin 4893 products
- Robust design avoids unnecessary replacement
- DIN Rail mounted Type 2
- Visual status indicator (on unit)
- Remote status indicator



Product Selection

- N = Neutral
- L/N = Line/neutral
- N/G = Neutral/ground

AC Network	Connection Mode	No. of Poles and Devices Needed	Max. Continuous Operating Voltage (MCOV) (U_c) [V AC]	Lightning Current 10/350 μ s (I_{imp}) [kA]	Max. Discharge Current 8/20 μ s (I_{max}) [kA]	Nominal Discharge Current 8/20 μ s (I_n) [kA]	Protection Level (U_p) [kV]	Measured Limited Voltage [Vpk]	Appropriate Fusing ⁽¹⁾ [A Max.]	Cat. No.
120	L/G or N/G	1	150	25	70	20	1.0	1580	250	4983-DH120-25
	L/G, N/G	2								
120/208	L1/G, L2/G, L3/G, N/G	4	330	25	70	20	1.5	1850	250	4983-DH300-25
	L/G or N/G	1								
	L/G, N/G	2								
230/400	L1/G, L2/G, L3/G, N/G	3								
	L1/G, L2/G, L3/G, N/G	4	330	50	70	20	1.5	1580	500	4983-DH300-50
	L/G or N/G	1								
	L/G, N/G	2								
230/400	L1/G, L2/G, L3/G or N/G	3								
	L1/G, L2/G, L3/G, N/G	4	330	50	70	20	1.5	1580	500	4983-DH300-50
	L/G or N/G	1								
	L/G, N/G	2								
277/480Y	L1/G, L2/G, L3/G, N/G	4								

(1) Fuses required to protect the surge protector in case of short-circuit failure. They must be installed in series with each pole of the surge protector.

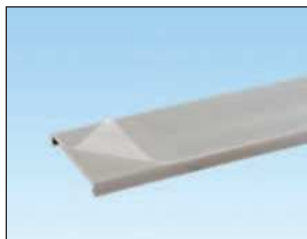
Specifications

Connection/Mounting Type	Parallel/DIN Rail mount
Standards Compliance	UL 1449, CSA 22.2, No.8, IEC 61643-1, EN 61643-11
Certifications	cURus recognized, CE marked, CSA
Conductor Material	Cu, solid or stranded
Conductor Range	#9...3 AWG (6...35 mm ²)
Strip Length	0.6 in. (16 mm)
Tightening Torque	31...35.4 lb•in. (3.5...4 N•m)
No. of Conductors/Terminal	1
Operating Temperature	-40...+80 °C (-40...176 °F)

Panduit® Type C Wiring Duct Cover with Protective Film

specifications

The temporary protection film shall protect duct covers from damage during the installation process. The film shall be see-through, clear and peel away easily from the cover without leaving a sticky residue. The film shall provide a place for writing notes without allowing the ink to bleed through.



technical information

Product construction:	Backing: Clear multi-polymer Adhesive: Acrylic based	
Physical properties:	Total thickness: 2.0 mil (0.05mm) Melting point: >180°F Tensile strength: 4500 PSI	Test Method ASTMD882
	Elongation: 600%	Test Method ASTMD882

Handling and storage: Dry room temperature; 12 month shelf life for best performance.
Remove protective film prior to placing equipment into service.

key features and benefits

High-performance multi-polymer film	Protects cover surface from scratches and grime during storage, handling, and installation; reduces scrap and labor costs
Acrylic-based adhesive	Ensures film will remain adhered during cutting and is easily removed without leaving a sticky residue; achieve faster installations for a clean, finished appearance
Writing surface	Provides an area for notes from installer to field electricians; improves productivity and reduces installation time
Clear material	Easy identification of product color when film is attached; ideal for quick and accurate product selection

applications

Panduit® Type C Wiring Duct Cover with protective film reduces scrap and labor costs by protecting the surface during storage, handling, and installation. Film remains adhered during cutting and is

easily removed without leaving a sticky residue for faster and cleaner installations. Features a convenient writing surface for improved productivity.

Panduit® Type C Wiring Duct Cover with Protective Film

0.50" cover:	C.5**6-F
0.75" cover:	C.75**6-F
1" cover:	C1**6-F
1.5" cover:	C1.5**6-F
2" cover:	C2**6-F
3" cover:	C3**6-F
3" cover:	C3**6-F
4" cover:	C4**6-F

Complete cover part listing by color on back page.

Wiring Duct Compatible with Type C Cover

Type G wide finger/slot wiring duct: G.5X.5**6 to G4X5**6

Type F narrow finger/slot wiring duct: F.5X.5**6 to F4X5**6

Type D round hole wiring duct: D1x1**6 to D4x4**6

Type FS solid wall raceway: FS.5x.5**6NM to FS4x5**6NM

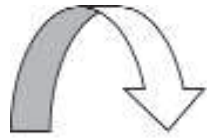
Permanent Marking Pens:

Black:	PFX-0
Red:	PFX-2
White:	PX-10

**= Color code of LG (Light Gray), WH (White), BL (Black), IB (Intrinsic Blue).

Panduct® Type C Wiring Duct Cover with Protective Film

protective film protects covers and provides an area for notes



Peel away here

Panel + Conduit = Panduit

Duct Cover with Film Part Number	Compatible Duct Base Part Number			
	Type G	Type F	Type D	Type FS
C.5LG6-F	G.5X.5LG6 G.5X1LG6 G.5X2LG6 G.5X4LG6	F.5X.5LG6 F.5X1LG6		FS.5X.5LG6NM FS.5X1LG6NM
C.75LG6-F	G.75X.75LG6 G.75X1LG6 G.75X1.5LG6 G.75X2LG6	F.75X.75LG6 F.75X1.5LG6		FS.75X.75LG6NM
C1LG6-F	G1X1LG6 G1X1.5LG6 G1X2LG6 G1X3LG6 G1X4LG6	F1X1LG6 F1X1.5LG6 F1X2LG6 F1X3LG6 F1X4LG6	D1X1LG6 D1X2LG6 D1X3LG6 D1X4LG6	FS1X1LG6NM FS1X1.5LG6NM FS1X2LG6NM FS1X3LG6NM FS1X4LG6NM
C1.5LG6-F	G1.5X1LG6 G1.5X1.5LG6 G1.5X2LG6 G1.5X3LG6 G1.5X4LG6	F1.5X1LG6 F1.5X1.5LG6 F1.5X2LG6 F1.5X3LG6 F1.5X4LG6	 D1.5X2LG6 D1.5X3LG6 D1.5X4LG6	FS1.5X1LG6NM FS1.5X1.5LG6NM FS1.5X2LG6NM FS1.5X3LG6NM
C2LG6-F	G2X1LG6 G2X1.5LG6 G2X2XLG6 G2X3LG6 G2X4LG6 G2X5LG6	F2X1LG6 F2X1.5LG6 F2X2XLG6 F2X3LG6 F2X4LG6 F2X5LG6	 D2X2XLG6 D2X3LG6 D2X4LG6	FS2X1LG6NM FS2X1.5LG6NM FS2X2XLG6NM FS2X3LG6NM FS2X4LG6NM
C2.5LG6-F	G2.5X3LG6	F2.5x3LG6	D2.5X3LG6	
C3LG6-F	G3X1LG6 G3X2LG6 G3X3LG6 G3X4LG6 G3X5LG6	F3X1LG6 F3X2LG6 F3X3LG6 F3X4LG6 F3X5LG6	 D3X2LG6 D3X3LG6 D3X4LG6	FS3X1LG6NM FS3X2LG6NM FS3X3LG6NM FS3X4LG6NM FS3X5LG6NM
C4LG6-F	G4X1.5LG6 G4X2LG6 G4X3LG6 G4X4LG6 G4X5LG6	F4X2LG6 F4X3LG6 F4X4LG6 F4X5LG6	 D4X2LG6 D4X3LG6 D4X4LG6	FS4X2LG6NM FS4X3LG6NM FS4X4LG6NM FS4X5LG6NM

Note: Part Number shown for LG (Light Gray). Cover and base available in BL (Black), WH (White) and IB (Intrinsic Blue) colors.

All sizes are not available in all colors.

Ctn. Qty.: 120'

Ctn. UOM: Feet

Pkg. Qty.: 6'

WORLDWIDE SUBSIDIARIES AND SALES OFFICES

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cs-aus@panduit.com
Phone: 61.3.9794.9020

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For more information

Visit us at www.panduit.com

Contact Customer Service by email: cs@panduit.com
or by phone: 800.777.3300

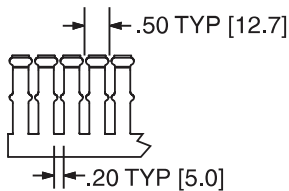
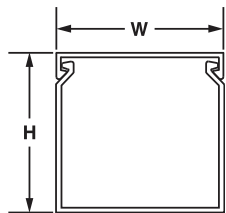
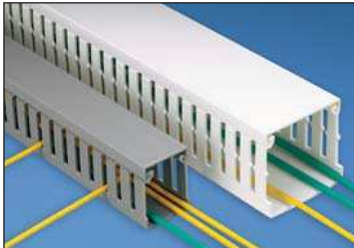
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WDSP28--WW-ENG
Replaces SA-WDSP02
7/2014

WIRING DUCT

Panduit® Type F Narrow Slot Wiring Duct

- Narrow slot/finger design provides more slots to fit the spacing of high-density terminal blocks and other hardware
- Material: Lead-free PVC
- UL recognized continuous use temperature: 122°F (50°C)
- UL 94 flammability rating of V-0
- Conforms with NFPA 79-2007 section 13.3.1 requirement for flame retardant material
- Provided with mounting holes
- Base and cover length is 6 feet



Multiple slot restrictors present with 2" and greater duct wall height.



To order cover with protective film add "-F" to part number. 6" cover not available with film.



Base Part Number	Duct Size (W x H)*		Slot Width		Cover Part Number	Std. Pkg. Qty.	Base Ctn. Qty.	Cover Ctn. Qty.
	In.	mm	In.	mm				
F.5X.5LG6	0.69 x 0.60	17.5 x 15.2	0.20	5.0	C.5LG6	6	120	120
F.5X1LG6	0.69 x 1.06	17.5 x 26.9	0.20	5.0	C.5LG6	6	120	120
F.75X.75LG6	0.93 x 0.82	23.6 x 20.9	0.20	5.0	C.75LG6	6	120	120
F.75X1.5LG6	0.93 x 1.57	23.6 x 39.9	0.20	5.0	C.75LG6	6	120	120
F1X1LG6	1.26 x 1.13	32.0 x 28.7	0.20	5.0	C1LG6	6	120	120
F1X1.5LG6	1.26 x 1.62	32.0 x 41.1	0.20	5.0	C1LG6	6	120	120
F1X2LG6	1.26 x 2.12	32.0 x 53.8	0.20	5.0	C1LG6	6	120	120
F1X3LG6	1.26 x 3.12	32.0 x 79.2	0.20	5.0	C1LG6	6	120	120
F1X4LG6	1.26 x 4.10	32.0 x 104.1	0.20	5.0	C1LG6	6	60	120
F1.5X1LG6	1.75 x 1.12	44.5 x 28.4	0.20	5.0	C1.5LG6	6	120	120
F1.5X1.5LG6	1.75 x 1.62	44.5 x 41.1	0.20	5.0	C1.5LG6	6	120	120
F1.5X2LG6	1.75 x 2.12	44.5 x 53.8	0.20	5.0	C1.5LG6	6	120	120
F1.5X3LG6	1.75 x 3.12	44.5 x 79.2	0.20	5.0	C1.5LG6	6	120	120
F1.5X4LG6	1.75 x 4.10	44.5 x 104.1	0.20	5.0	C1.5LG6	6	60	120
F2X1LG6	2.25 x 1.12	57.2 x 28.4	0.20	5.0	C2LG6	6	120	120
F2X1.5LG6	2.25 x 1.62	57.2 x 41.1	0.20	5.0	C2LG6	6	120	120
F2X2LG6	2.25 x 2.12	57.2 x 53.8	0.20	5.0	C2LG6	6	120	120
F2X3LG6	2.25 x 3.12	57.2 x 79.2	0.20	5.0	C2LG6	6	60	120
F2X4LG6	2.25 x 4.10	57.2 x 104.1	0.20	5.0	C2LG6	6	60	120
F2X5LG6	2.25 x 5.10	57.2 x 129.5	0.20	5.0	C2LG6	6	60	120
F2.5X3LG6	2.75 x 3.12	69.9 x 79.2	0.20	5.0	C2.5LG6	6	120	120
F3X1LG6	3.25 x 1.12	82.6 x 28.4	0.20	5.0	C3LG6	6	120	120
F3X2LG6	3.25 x 2.12	82.6 x 53.8	0.20	5.0	C3LG6	6	120	120
F3X3LG6	3.25 x 3.12	82.6 x 79.2	0.20	5.0	C3LG6	6	60	120
F3X4LG6	3.25 x 4.10	82.6 x 104.1	0.20	5.0	C3LG6	6	60	120
F3X5LG6	3.25 x 5.10	82.6 x 129.5	0.20	5.0	C3LG6	6	60	120
F4X2LG6	4.25 x 2.12	108.0 x 53.8	0.20	5.0	C4LG6	6	60	120
F4X3LG6	4.25 x 3.12	108.0 x 79.2	0.20	5.0	C4LG6	6	60	120
F4X4LG6	4.25 x 4.10	108.0 x 104.1	0.20	5.0	C4LG6	6	60	120
F4X5LG6	4.25 x 5.10	108.0 x 129.5	0.20	5.0	C4LG6	6	60	120
F6X4LG6	6.25 x 4.15	158.8 x 105.4	0.20	5.0	C6LG6	6	60	120

Part number shown for LG (Light Gray). For other color availability see color selection guide, page C1.48. Base and cover sold separately.

*"H" dimension includes duct and cover.

A.
System
Overview

B1.
Cable Ties

B2.
Cable
Accessories

B3.
Stainless
Steel Ties

C1.
Wiring
Duct

C2.
Surface
Raceway

C3.
Abrasion
Protection

C4.
Cable
Management

D1.
Terminals

D2.
Power
Connectors

D3.
Grounding
Connectors

E1.
Labeling
Systems

E2.
Labels

E3.
Pre-Printed
& Write-On
Markers

E4.
Permanent
Identification

E5.
Lockout/
Tagout
& Safety
Solutions

F.
Index

CR1000 and CR3000 HMIs

Red Lion Automation Series



▶▶▶ Operator Interface Panels

CR1000 and CR3000 HMIs provide industry-leading protocol conversion and connectivity choices along with enhanced visual display features to deliver operator interface devices that easily scale and adapt as requirements change.

The CR1000 and CR3000 automation HMIs from Red Lion combine an ever-expanding list of over 300 industrial drivers with the intuitive and powerful Crimson 3.1 development platform to create an operator experience designed to easily adapt as needs change and operations grow. Basic requirements for machine interface and protocol conversion are easily handled by the CR1000 products, while the CR3000 HMIs address more advanced needs with real-time data logging and a built-in web server.



INDUSTRY APPLICATIONS

- > Factory Automation
- > OEM Machine Builders
- > Automotive
- > Food & Beverage
- > Water/Wastewater

PRODUCT HIGHLIGHTS

- > NEMA 4X, IP66 Front Panel Rating
- > Industrial Environmental Specifications
 - Wide operating temperature
 - High shock and vibration tolerance
 - CE, UL/cUL, UL/cUL Hazardous
- > Supports over 300 Industrial Drivers
- > SD Card for database upload/download
- > Built-In Web Server for Remote Access*
- > Real-Time Data Logging*

FEATURES & BENEFITS

- > Full-color HMI touchscreen
 - A variety of 4.3" to 15" models with widescreen (model dependent) ensures the right fit for virtually any application
 - 16M colors
- > Industry-leading protocol conversion
 - Communicate with over 300 protocols
 - Easily convert between serial, USB and Ethernet devices
 - Convert up to 6 protocols simultaneously with CR1000 and up to 15 with CR3000
 - Manage multi-vendor environments with ease
- > Powerful Integration Capabilities
 - Crimson 3.1 software enables point-and-click configuration
 - Updated 3D symbols and primitives create a modern operator experience
 - Ethernet, USB and serial ports make communication simple
 - Robust web server* provides remote access and control to reduce costly site visits
 - Send email and/or SMS notifications on alarm conditions*
 - Built-in data logging enhances troubleshooting and helps meet regulatory requirements
 - Automate population of data values using SQL Queries feature*

* Model dependent

industrial
automation



►►► CR1000 and CR3000 Specifications

COMMUNICATION PROPERTIES

USB Ports

USB Device:

CR1000 and CR3000 (All Models) - (1) USB Device

Type B adheres to USB specification 1.1

USB Host:

CR3000 (4.3") – (1) USB Host port

CR3000 (7", 10.4", 15") – (2) USB Host ports

Type A adheres to USB specification 2.0 and supports full-speed data transfers with hardware overcurrent protected (0.5 A max per port)

Serial Ports for programming or communications: Format/Baud rates independently configurable

CR1000 (All) - One (1) RS232 and One (1) RS232/RS422/RS485 selectable

CR3000 (4.3") - Two (2) RS232 and One (1) RS422/RS485

CR3000 (7", 10.4", 15") - Two (2) RS232 and Two (2) RS422/RS485

Ethernet Ports: 1500 Vrms network isolation

CR1000 (All) - One (1) 10/100 BASE-T(X) port (RJ45)

CR3000 (4.3") - One (1) 10/100 BASE-T(X) port (RJ45)

CR3000 (7", 10.4", 15") - Two (2) 10/100 BASE-T(X) ports (RJ45)

POWER INPUT

CR1000 (All models) 24 VDC +/- 20%

CR3000 (All models) 10 to 30 VDC

Must use a Class 2 circuit according to National Electrical Code (NEC), NFPA-70 or Canadian Electrical Code (CEC), Part I, C22.1 or a Limited Power Supply (LPS) according to IEC 60950-1 or Limited-energy circuit according to IEC 61010-1. Power connection via removable three position terminal block.

Battery: Lithium coin cell

Typical lifetime of 5 years

POWER CONNECTION

High compression cage-clamp terminal block

Wire Strip Length: 0.3" (7.5 mm)

Wire Gauge Capacity: 12 to 24 AWG (3.31 to 0.20 mm²) copper wire

Torque: 4.4-5.3 inch-lbs (0.5-0.6 N-m)

NETWORK MEDIA

10BaseT: ≥ Cat3 cable

100BaseTX: ≥ Cat5 cable

ENVIRONMENTAL

Operating Temperature: -10°C to 50°C

Storage Temperature: -20°C to 70°C

Operating Humidity: 0 to 85% (non condensing)

Operating Altitude: Up to 2000 meters

Shock: 30 g per IEC 68-2-27

Vibration: 2 g @ 5-500 Hz per IEC 68-2-6

CERTIFICATION & COMPLIANCE

CE Approved

Immunity: IEC/EN 61000-6-2 for Industrial Locations

Emissions: IEC/EN 6100-6-4 for Industrial Locations; CISPR 11 Class A

Safety: IEC/EN 61010-1

RoHS Compliant

UL Listed

Class I, Division 2, Groups A, B, C and D for CR3000 only

Type 4X Indoor / IP66 Enclosure rating (front face only)

MECHANICAL

Construction: Polycarbonate enclosure with NEMA 4X/IP66 rating for indoor use when correctly fitted with the gasket provided. Installation Category II, Pollution Degree 2.

Weight:

CR1000 4.3" model – 15.0 oz (425 g)

CR1000 7" model – 1.91 lb (868 g)

CR1000 10.4" model – 3.08 lb (1.395 Kg)

CR3000 4.3" model – 1.00 lb (454 g)

CR3000 7" model – 2.01 lb (913 g)

CR3000 10.4" model – 3.16 lb (1.435 Kg)

CR3000 15" model – 4.12 lb (2.155 Kg)

Specifications are subject to change. Visit www.redlion.net for more information.

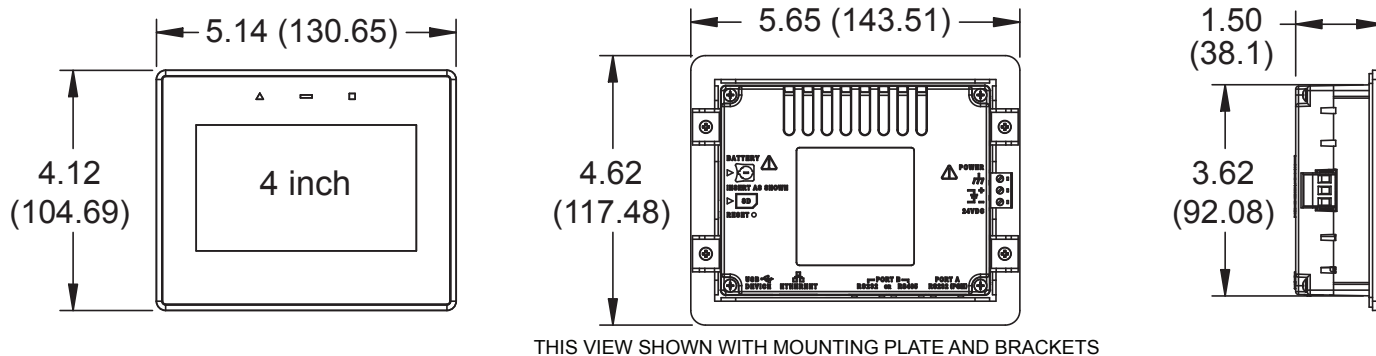
CR1000 and CR3000 HMIs Ordering Guide

MODEL NUMBER*	DESCRIPTION	SIZE (IN.)	PIXELS	SERIAL/ ETHERNET PORTS	USB HOST	DATA LOGGING & WEB SERVER	EXPANSION PORT	SD CARD SLOT
CR1000-04000-00210	4.3" HMI	4.3	480 x 272	2/1	0	No	No	Yes
CR1000-07000-00210	7" HMI	7	800 x 480	2/1	0	No	No	Yes
CR1000-10000-00210	10.4" HMI	10.4	800 x 600	2/1	0	No	No	Yes
CR3000-04000-00310	4.3" HMI with Data Logging and Web Server	4.3	480 x 272	3/1	1	Yes	Yes	Yes
CR3000-07000-00420	7" HMI with Data Logging and Web Server	7	800 x 480	4/2	2	Yes	Yes	Yes
CR3000-10000-00420	10" HMI with Data Logging and Web Server	10.4	800 x 600	4/2	2	Yes	Yes	Yes
CR3000-15000-00420	15" HMI with Data Logging and Web Server	15	1024 x 768	4/2	2	Yes	Yes	Yes

* Dashes in listed model numbers added to improve readability, and are not included in orderable part numbers.

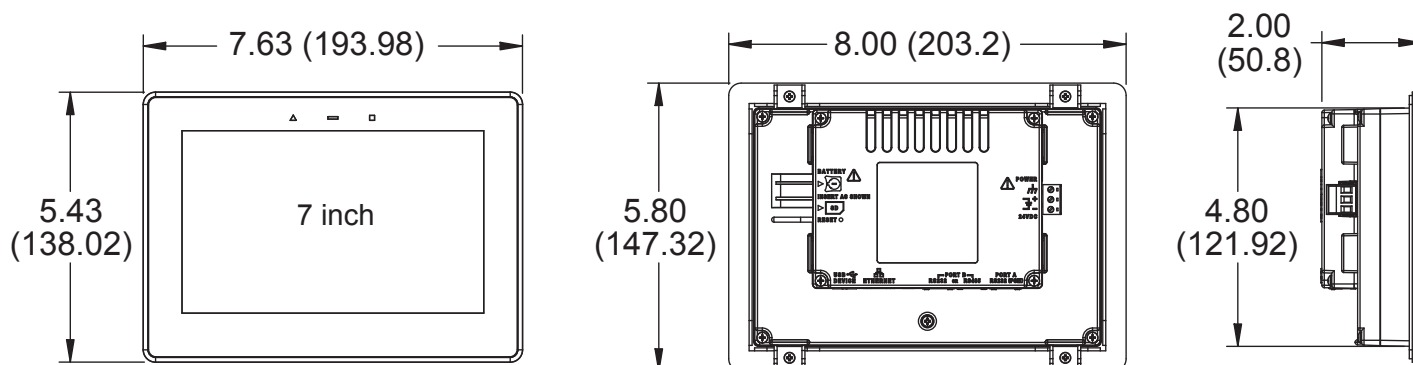
▶▶▶ CR1000 Dimensions in Inches (mm)

4.3" models



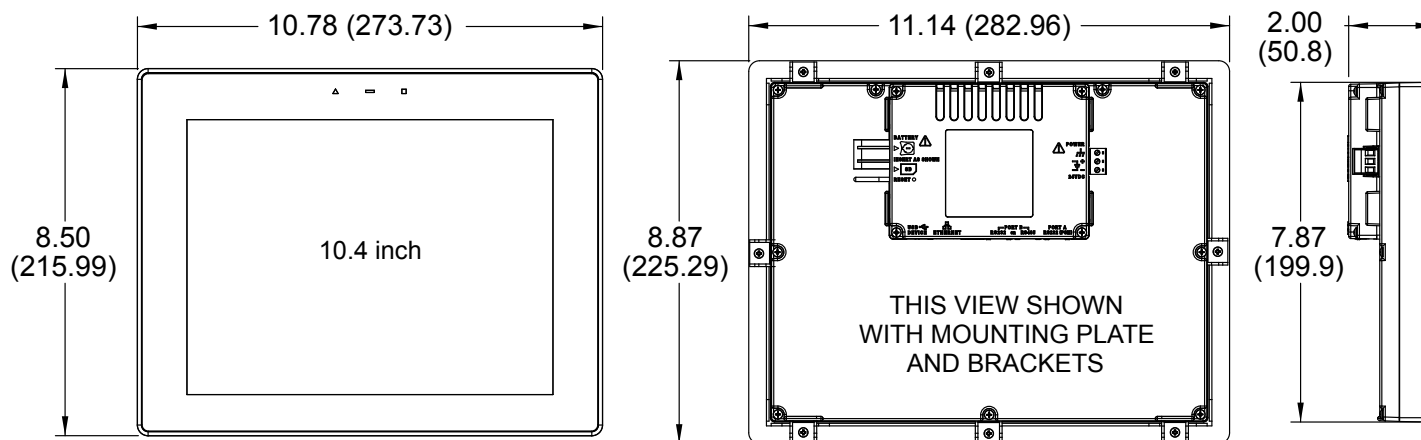
THIS VIEW SHOWN WITH MOUNTING PLATE AND BRACKETS

7" Models



THIS VIEW SHOWN WITH MOUNTING PLATE AND BRACKETS

10" Models



THIS VIEW SHOWN WITH MOUNTING PLATE AND BRACKETS

Bulletin 1492 DIN Rail Receptacle

Advantages

- Quick to snap on 35 mm DIN rail and easy to wire
- Available with ground fault current interrupt (GFCI) or standard duplex outlets
- Feature of visual indication of power included with GFCI receptacle



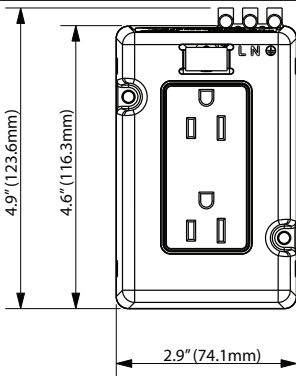
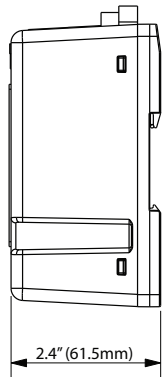
1492-REC15G
GFCI Receptacle

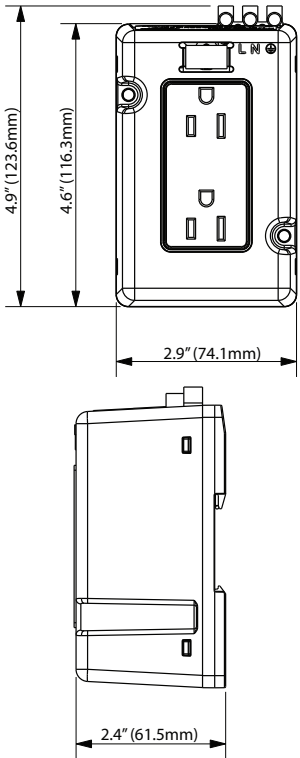


1492-REC15
Standard Duplex Receptacle

Overview

The Bulletin 1492 DIN rail receptacle is an enclosed 15 Amp power outlet. It is a convenient power source for portable computers or test devices for in-the-panel troubleshooting.

Technical Specifications for the DIN Rail Receptacle			Dimensions	
	1492-REC15	1492-REC15G		
Mechanical Ratings				
	15 Amp Duplex	15 Amp GFCI		
Operating Temperatures	-13°F to 140°F (-25°C to 60°C)			
Storage Temperatures, Short Term	-31°F to 176°F (-35°C to 80°C)			
Terminal Wire Sizes	#20 - #10 AWG solid or stranded			
Terminal Torque	7 lb.-in. (.79 Nm)			
Electrical Ratings				
Device Ratings	15 Amp, 125V	15 Amp, 125V		
Operating Frequency	50 - 60 Hz			
Dielectric Voltage	Withstands 2000V per UL498	Withstands 1500V per UL498		
Current Interrupting	N/A	10 kA		
Trip Level	N/A	5±1 mA		
Material Listing				
Enclosure Cover, Flammability	PBT/polycarbonate blend, UL94 rating V0 @ .63mm			
Enclosure Base, Flammability	Polyamide 6/6 30% GF, UL94 rating V0 @ .63mm			
Spring	Stainless Steel			
Standards and Certifications				
	UL 508A (file # E54866)			
	cULus			
	UL498	UL 498, UL 943		
	NEMA WD-6			
	NEMA 5-15R			



	Cat. No.	Pkg. Qty.
Marking Systems Marker Card:	1492-MS10x17 (40/card)	5





~~05 50 00-1~~

3R 10" Column

This section references 10"
Column. Sizes may changer
per project design.



Chief hydraulic motor, pump and tank code.

APB1HO8A0S10H-30





APB1HO8A0S10H-30

CUSTOM PRODUCTS

CHIEF AP

CHIEF™ AP series units are powered by vertically or horizontally mounted AC electric motors. Use the guide below to customize a AP series unit to meet your applications needs. Once you've marked the specs you require, you can email CustomQutoes@BaileyHydraulics.com or call us at 1-800-800-1810. You may also fax this sheet in at 1-800-800-1811. Be sure to include your contact information.

HYDRAULIC MOTOR, "M1" & HYAULIC RESERVIOR, 'HR-1"

HP	Phase/Volt	RPM	Motor	Pump	Circuit	Tank	Relief
A = 1/2 B = 1 C = 2 D = 3 E = 5	1 = 115v/230v* 3 = 230v/460v	L = 1725* H = 3450	AP				In 100s of psi

HP	Phase/Volt	RPM	Max Pressure
A = 1/2	1 = 115v/230v*	L = 1725*	
B = 1	3 = 230v/460v	H = 3450	
C = 2			
D = 3			
E = 5			

HP	Max Pressure
08 = 0.049	4000
10 = 0.061	4000
12 = 0.073	4000
16 = 0.098	4000
20 = 0.122	4000
25 = 0.153	4000
31 = 0.189	3600
40 = 0.244	3000
50 = 0.305	2300
63* = 0.384	1800
80* = 0.488	1500

Valve Type	Operator
A = pumping station	0 = none
B = single acting	1 = manual
C = double acting	2 = solenoid (115v)
D = double acting tandem center	3 = solenoid (230v)
E = D03 Subplate	4 = (12v)
	5 = (24v)

Material	AP Size*	Position
P = poly	02 = 1/2 gal	H = horiz.
S = steel	03 = 3/4 gal	V = vertical
	04s = 1 gal slim	
	04f = 1 gal fat	
	05 = 1.2 gals	
	06 = 1.5 gals	
	08 = 2 gals	
	10 = 2.5 gals	
	12 = 3 gals	
	16 = 4 gals	
	28 = 7 gals (vertical only)	
	56 = 14 gals (vertical only)	

HP = (PSI x GPM) / (1714 x 85%)

AP Horizontal

Not all combinations are possible. Reasonable effort has been made to make the code as intuitive as possible, however, the Bailey Power Unit Team may need to make adjustments and reserves the right to do so if the combination requested cannot be accomplished.

* Only use with Low RPM Motor
CID = (GPM x 231) / (RPM x 90%)

*All unit combinations have relief valve.

*Nominal
Note: For continuous use and hard working applications a minimum 3:1 reservoir size to pump flow volume is recommended.



Custom Power Units Preconfigured and priced units

BAILEY NO.	MODEL CODE	GPM	PSI	TANK GALS	MOUNTING	PRICE EACH
1/2 Horsepower						
300-657	A1L08A0S10H-23	0.32	2150	2.5	Horiz.	624.00
300-802	A3L12A0S08H-15	0.49	1450	2	Horiz.	624.00
300-675	A1L12A0S06H-15	0.49	1450	1.5	Horiz.	624.00
300-803	A1L31A0S12H-06	1.20	550	3	Horiz.	635.00
1 Horsepower						
300-579	B1H08A0S10H-22	0.65	2150	2.5	Horiz.	610.00
300-805	B3L16A0S06H-22	0.65	2150	1.5	Horiz.	635.00
300-666	B1H12A0S10H-14	1.00	1400	2.5	Horiz.	610.00
300-455	B3L25A0S10H-14	1.00	1350	2.5	Horiz.	635.00
300-512	B1H20A0S10H-08	1.60	800	2.5	Horiz.	619.00
300-806	B1H31A0S28V-05	2.50	500	7	Vert.	795.00
2 Horsepower						
300-308	C1H12A0S06H-29	1.00	2850	1.5	Horiz.	625.00
300-810	C3H12A0S12H-29	1.00	2850	3	Horiz.	638.00
300-416	C1H16A0S10H-24	1.20	2350	2.5	Horiz.	663.00
300-205	C1H20A0S12H-18	1.60	1750	3	Horiz.	680.00
300-551	C1H25A0S08H-14	2.00	1350	2	Horiz.	663.00
300-206	C1H20A0S28V-18	1.60	1750	7	Vert.	838.00
300-811	C1H31A0S28V-11	2.50	1050	7	Vert.	896.00

BAILEY NO.	MODEL CODE	GPM	PSI	TANK GALS	MOUNTING	PRICE EACH
2 Horsepower						
300-812	C3H31A0S28V-11	2.50	1050	7	Vert.	882.00
300-377	C1H50A0S56V-07	4.00	650	14	Vert.	899.00
3 Horsepower						
300-393	D3H16A0S10H-36	1.20	3500	2.5	Horiz.	687.00
300-358	D3H25A0S12H-20	2.00	2000	3	Horiz.	665.00
300-304	D3H25A0S28V-20	2.00	2000	7	Vert.	835.00
300-204	D3H31A0S56V-17	2.50	1650	14	Vert.	880.00
300-560	D3H31A0S08H-17	2.50	1650	2	Horiz.	687.00
300-344	D3H40A0S10H-13	3.20	1250	2.5	Horiz.	675.00
300-815	D3H40A0S28V-13	3.20	1250	7	Vert.	904.00
300-816	D3H50A0S56V-10	4.00	950	14	Vert.	960.00
5 Horsepower						
300-210	E3H25A0S28V-45	2.00	3000	7	Vert.	895.00
300-556	E3H25A0S16H-35	2.00	3500	4	Horiz.	746.00
300-538	E3H31A0S28V-28	2.50	2800	7	Vert.	899.00
300-409	E3H40A0S28V-22	3.20	2150	7	Vert.	970.00
300-526	E3H40A0S56V-22	3.20	2150	14	Vert.	961.00
300-818	E3H50A0S56V-17	4.00	1700	14	Vert.	972.00

Two-Stage • Unloading pressure is 600 PSI • 3/8" Ports

BAILEY NO.	MFR. NO.	RESERVOIR	FIRST STAGE	SECOND STAGE	HP	MOTOR PHASE	VOLTS	MOUNTING	PRICE EACH
300-202	APC1H20/12A0S12H-06/30	3 gals	2.4 GPM @ 600 PSI	.9 GPM @ 3000 PSI	2	Three	230/460	Horiz.	892.00
300-201	APE3H40/25A0S28V-06/36	7 gals	5 GPM @ 600 PSI	2 GPM @ 3600 PSI	5	Three	230/460	Vert.	1185.00

Customer Information

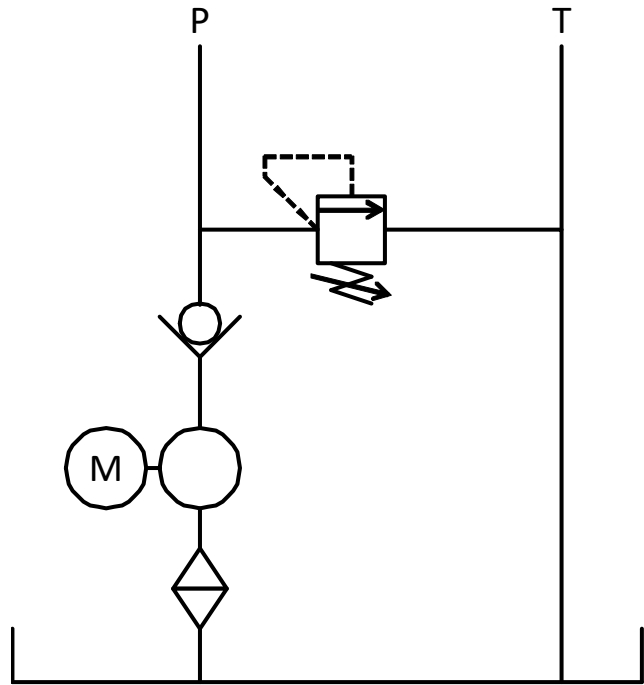
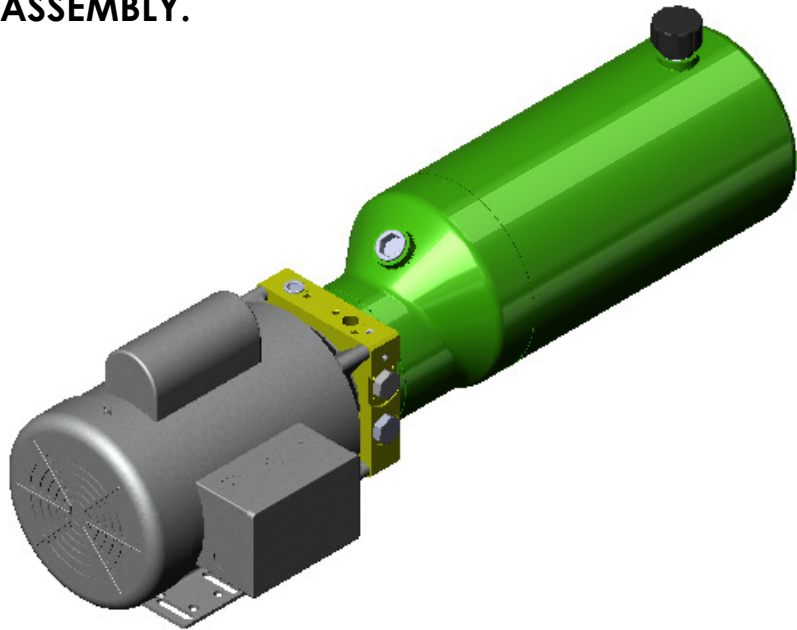
This page can be used as a faxable work order sheet or call us with the numbers you filled in and we will do the rest.

Customer ID: _____ (In yellow box on back cover) Fill out and Fax To Bailey at 1-800-800-1811

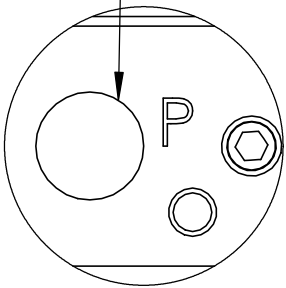
Contact: _____ Phone: _____

Company: _____ E-mail: _____

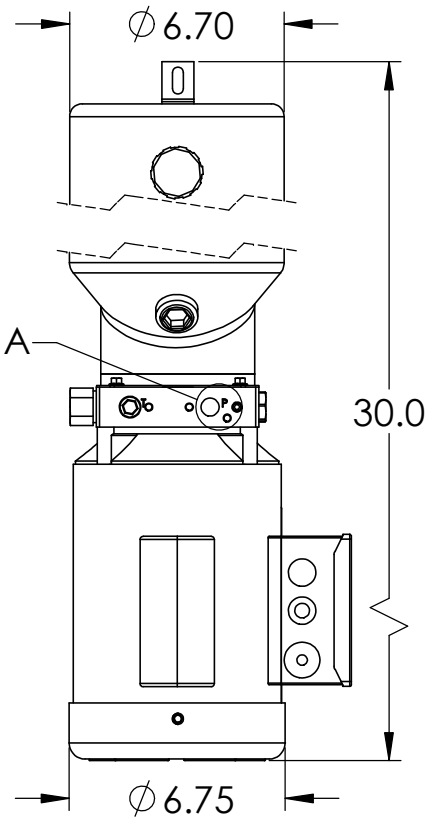
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3/8 NPT PRESSURE PORT

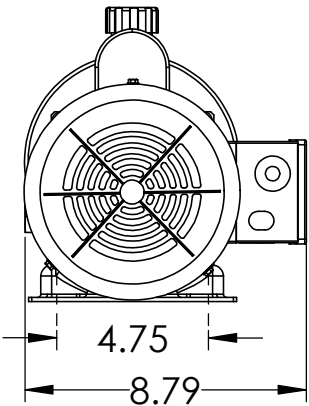
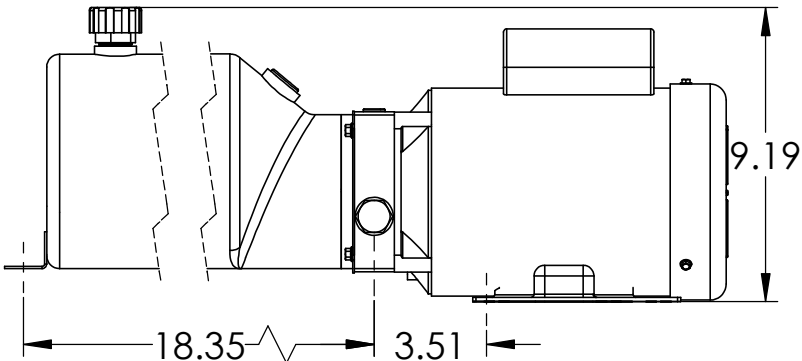
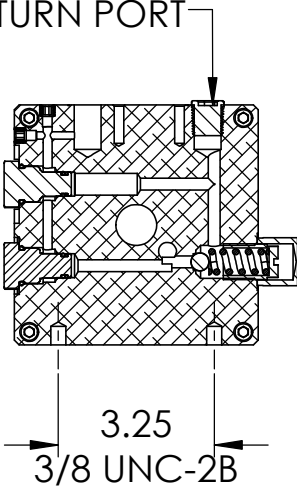


DETAIL A
SCALE 2 : 1



3/8 NPT AUX RETURN PORT

END HEAD
SECTION B-B
SCALE 1 : 2



XXXXX SPECIFICATIONS AND MACHINE NOTES: XXXXX

AC 0.6GPM@2100PSI PUMPING STATION
MOTOR: AC 1 HP, SINGLE PHASE, 115/230V 3450 RPM
PUMP: 0.8 CC
RESERVOIR: STEEL 2.5 GALLON (NOMINAL)
VALVE: INTEGRATED RELIEF AND CHECK
DIRECTIONAL VALVE: N/A PUMPING STATION ONLY
ACCESSORIES: 100 MESH STRAINER, FILLER BREATHER

Tolerances

DIMENSIONS ARE IN INCHES
ANGULAR: MACH $\pm 2^\circ$
X.X ± 0.1
X.XX ± 0.02
X.XXX ± 0.005
NON-MACHINED SURFACES $\pm .060$
BURNOUT SURFACES $\pm .120$

Wgt. (lbs)

41

Bailey
Part#

300579

Rev.

0

Paint

Black

Customer
Name

Date

Initial

Smart
Part#

APB1H08A0S10H-30

Yellow
Sheet

Detailed

8/19/16

WGK



Bailey International LLC
2527 Westcott Blvd.
Knoxville, TN 37931
TEL: 865-588-6000
FAX: 865-588-6001
www.bailey.net

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Rev

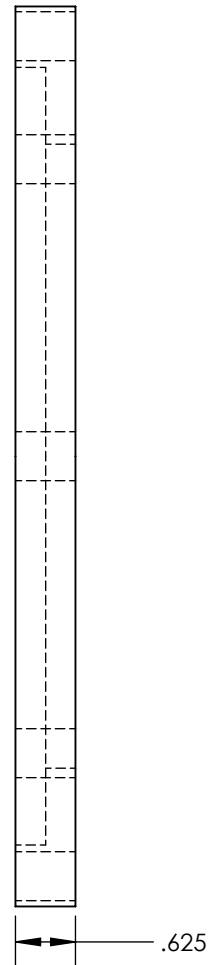
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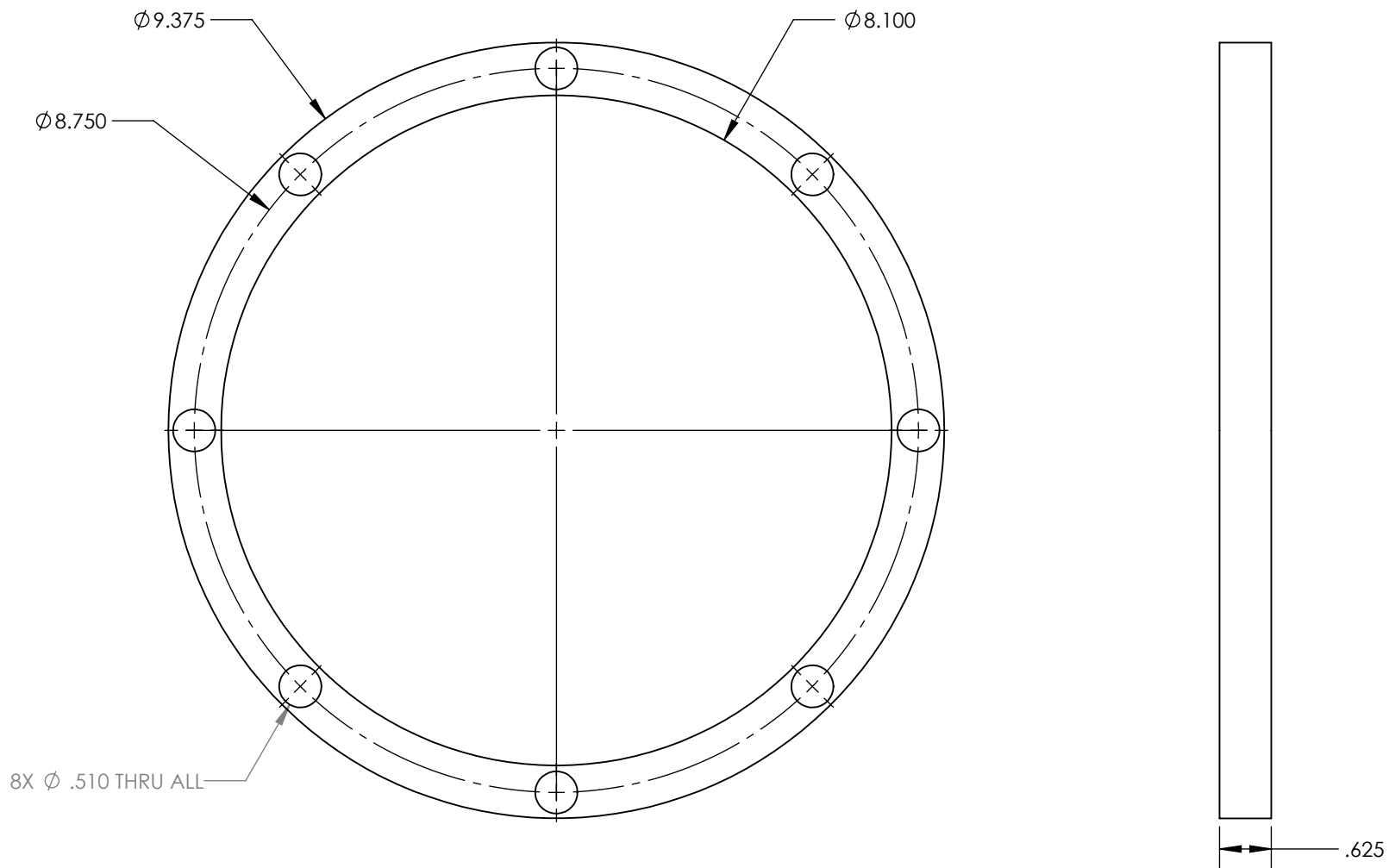
Date

Comments

Initial

App.





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UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL $\pm$
ANGULAR: MACH $\pm$ BEND $\pm$
TWO PLACE DECIMAL $\pm$
THREE PLACE DECIMAL $\pm$

INTERPRET GEOMETRIC
TOLERANCING PER:

MATERIAL
SST

FINISH

DO NOT SCALE DRAWING

DRAWN

CHECKED

ENG APPR.

MFG APPR.

NAME
B.G.

DATE

COMMENTS:

Pasco Machine
518 W Columbia St.
Pasco, WA 99301 509-547-2448

COMPANY: Kent Madison

DESCRIPTION:

SIZE
A

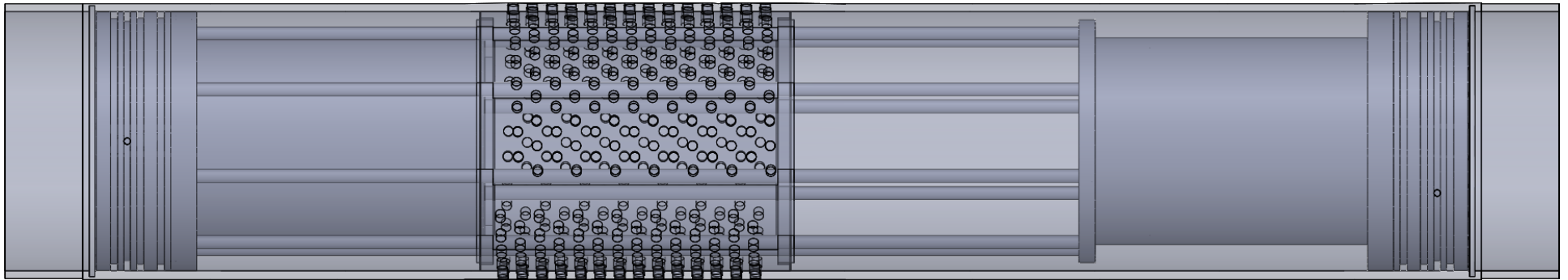
PART NAME (DWG NO)
3R10 Rings

REV

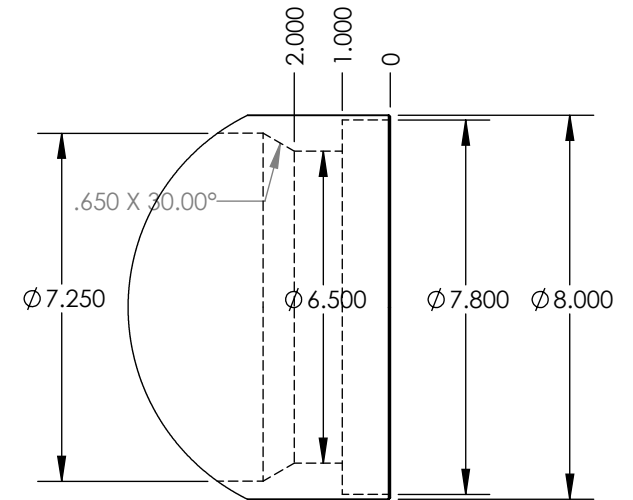
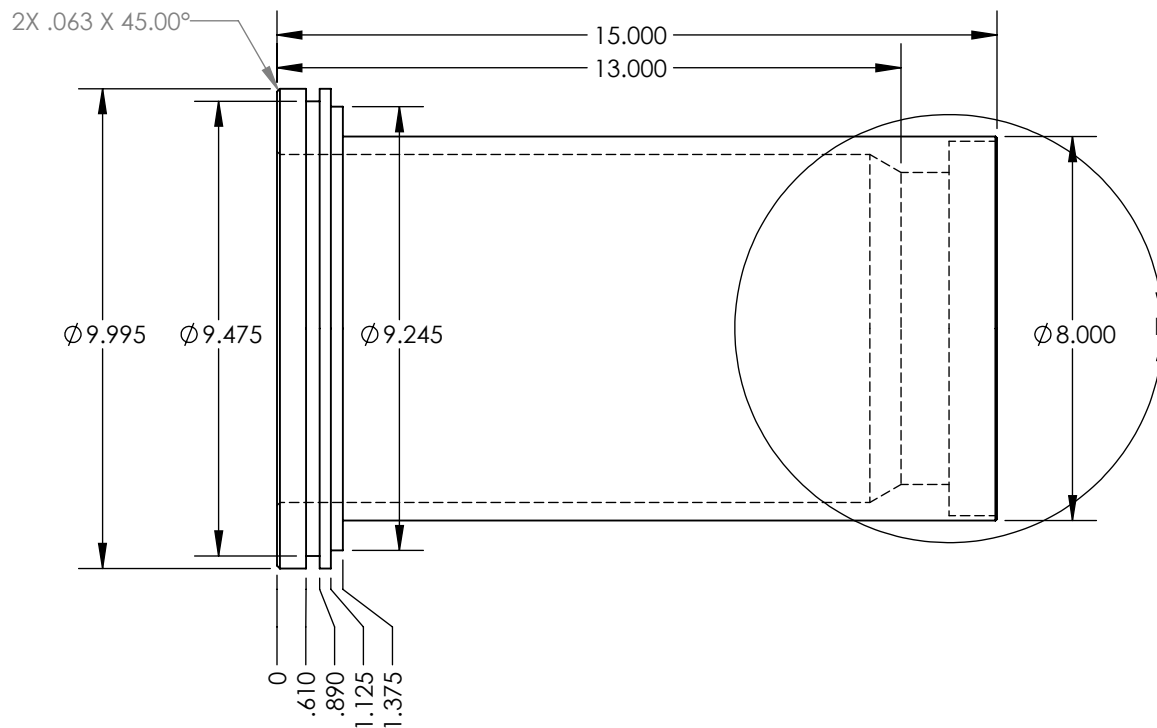
SCALE: 1:4

WEIGHT:

SHEET 2 OF 2

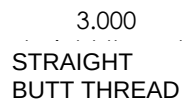
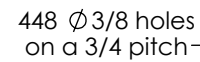


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	DIMENSIONS ARE IN INCHES	DRAWN	B.G.		COMPANY: DESCRIPTION:		
	TOLERANCES:	CHECKED					
	FRACTIONAL $\pm$	ENG APPR.					
	ANGULAR: MACH $\pm$ BEND $\pm$	MFG APPR.					
	INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.			SIZE A PART NAME (DWG NO) Assem1 REV SCALE: 1:12 WEIGHT: SHEET 1 OF 1		
	MATERIAL	COMMENTS:					
	FINISH						
	DO NOT SCALE DRAWING						



DETAIL D
SCALE 1 : 4

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	DIMENSIONS ARE IN INCHES	DRAWN	B.G.				
	TOLERANCES:	CHECKED					
	FRACTIONAL ±	ENG APPR.			COMPANY: DESCRIPTION:		
	ANGULAR: MACH ± BEND ±	MFG APPR.					
TWO PLACE DECIMAL ±	Q.A.				SIZE	PART NAME (DWG NO)	REV
THREE PLACE DECIMAL ±	COMMENTS:				A	C-bored Piston Gland	
INTERPRET GEOMETRIC TOLERANCING PER:					SCALE: 1:8 WEIGHT: SHEET 1 OF 1		
MATERIAL							
SST							
FINISH							
DO NOT SCALE DRAWING							



Threads are to be STRAIGHT BUTT
THREAD.



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Pasco Machine Company Inc. IS
PROHIBITED.

DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL ±
ANGULAR: MACH ± BEND ±
TWO PLACE DECIMAL ±
THREE PLACE DECIMAL ±

INTERPRET GEOMETRIC
TOLERANCING PER:

MATERIAL

FINISH

DO NOT SCALE DRAWING

DRAWN

CHECKED

ENG APPR.

MFG APPR.

Q.A.

COMMENTS:

NAM

B.G.

DATE _____

518 W Columbia St.
Pasco, WA 99301 509-547-2448

COMPANY:

DESCRIPTION:

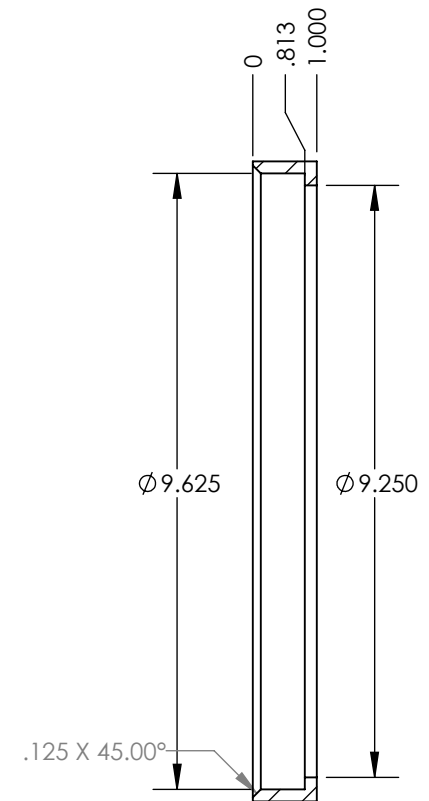
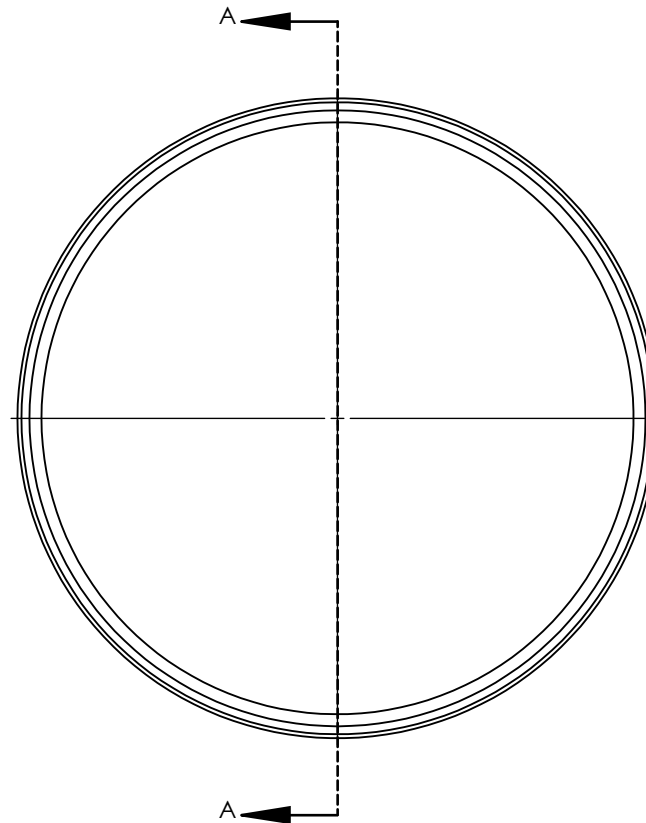
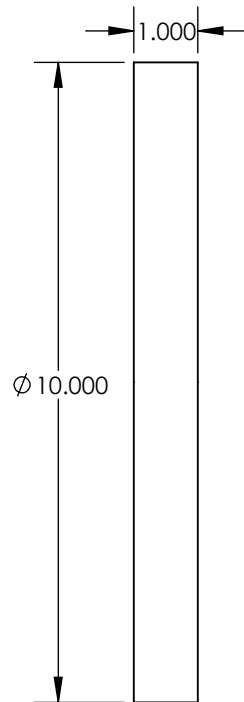
SIZE
A

PART NAME (DWG NO)	Pipe
--------------------	------

REV

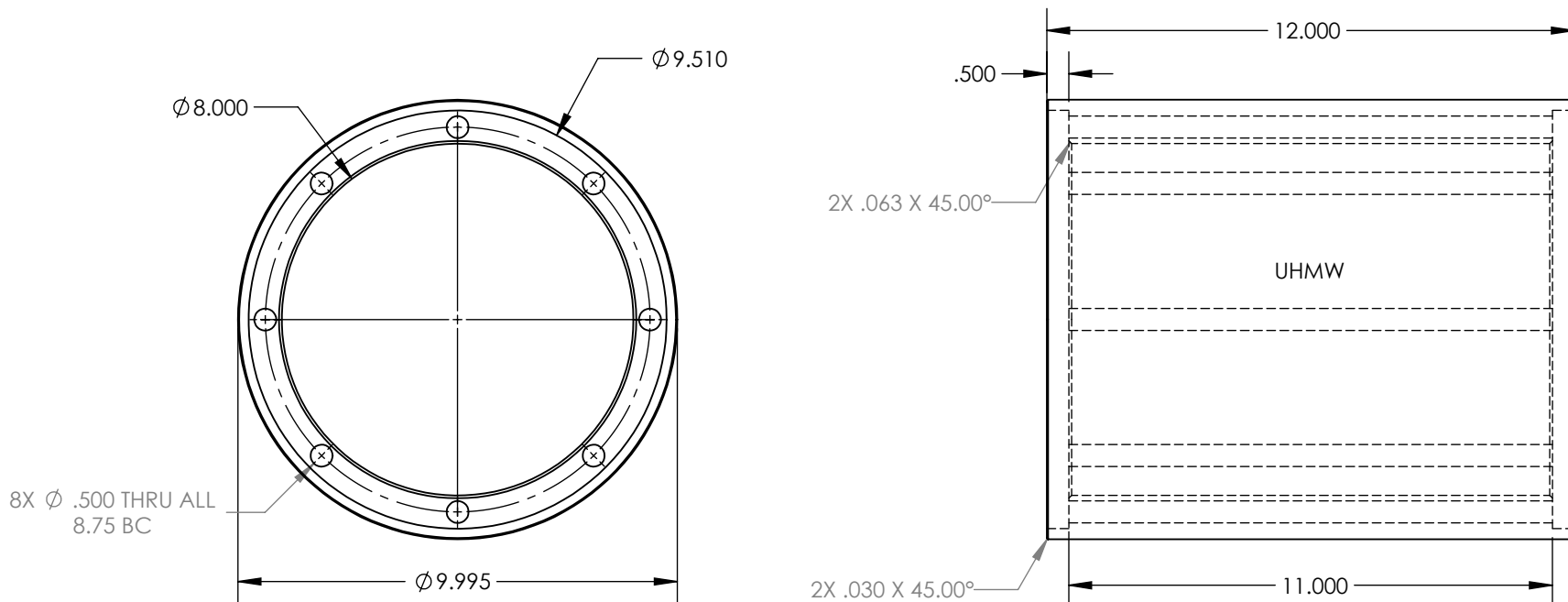
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SHEET 1 OF 1



SECTION A-A
SCALE 1 : 3

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	DIMENSIONS ARE IN INCHES		DRAWN	B.G.		
	TOLERANCES:		CHECKED			
	FRACTIONAL $\pm$		ENG APPR.		COMPANY:	
	ANGULAR: MACH $\pm$ BEND $\pm$		MFG APPR.			
TWO PLACE DECIMAL $\pm$		Q.A.		SIZE	PART NAME (DWG NO)	REV
THREE PLACE DECIMAL $\pm$		COMMENTS:		A	Piston Cup Seal	
INTERPRET GEOMETRIC TOLERANCING PER:				SCALE: 1:8		WEIGHT:
MATERIAL				SHEET 1 OF 1		
FINISH						
DO NOT SCALE DRAWING						



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	DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ± ANGULAR: MACH ± BEND ± TWO PLACE DECIMAL ± THREE PLACE DECIMAL ±			DRAWN		B.G.					7/19/2017							
				CHECKED														
				ENG APPR.														
				MFG APPR.														
	INTERPRET GEOMETRIC TOLERANCING PER:			Q.A.						COMPANY: Kent Madison								
				COMMENTS:														
	MATERIAL									SIZE			PART NAME (DWG NO)			REV		
	UHMW																	
	FINISH									SCALE: 1:8			WEIGHT:			SHEET 1 OF 1		
DO NOT SCALE DRAWING																		



INDUSTRIAL FLUID POWER COMPONENTS
AND SYSTEMS

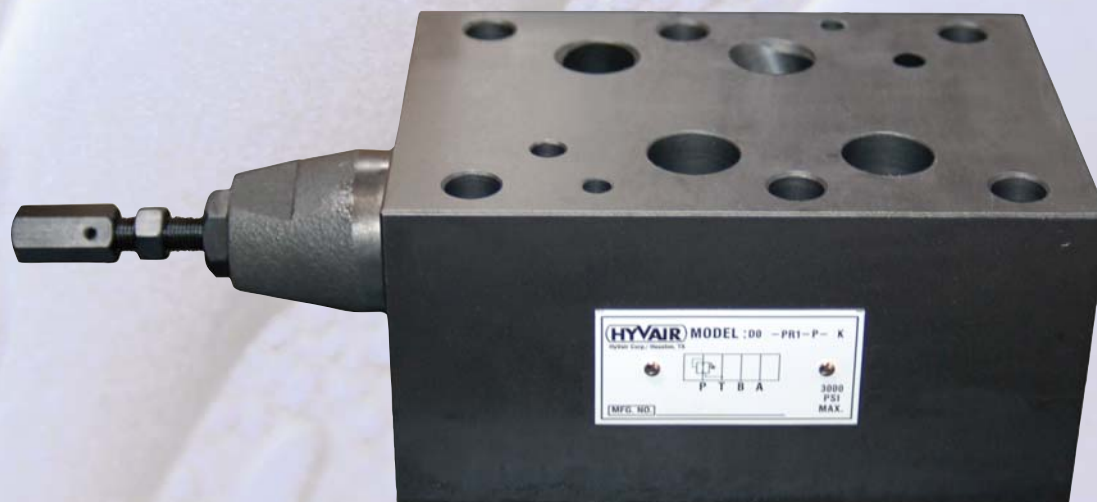
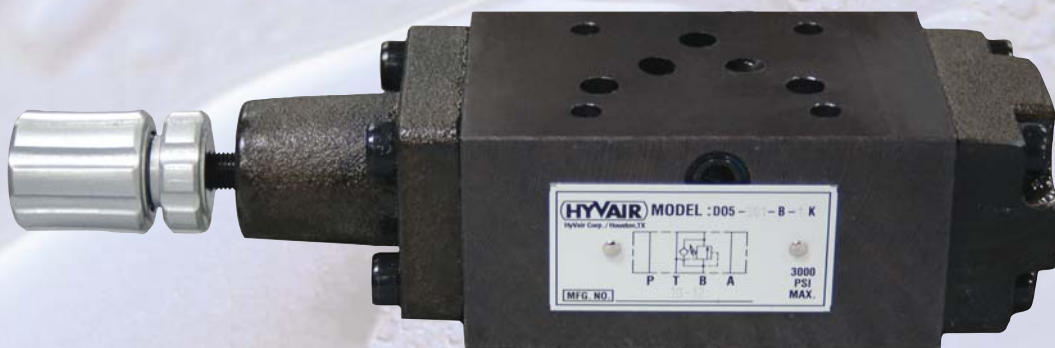
D03, D05 & D08 SERIES

Modular/ Stackable Valves



D03-DPC1-AB70

D05-SQ1-B-1K



D08-PR1-P-3K

Features

1. **Rugged Steel Body Designs:** Designed for high cycle and quick response applications
2. **Uniform Height:** Valve body thickness is the same for each series and provides a clean, neat uniform appearance. This also reduces the number of bolt kits.
3. **Better Performance:** Modular valving eliminates leaky connections, reduces plumbing costs and places controls together.
4. **Space Savings:** Manifold mounted control circuits greatly reduce space requirements from conventional line mounted valves.
5. **Adjustment:** Hand knobs with locknuts provided standard- tools are not required for adjustments.

D08-DPC1-AB

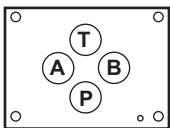
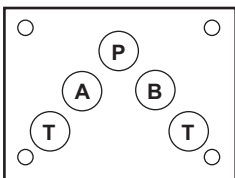
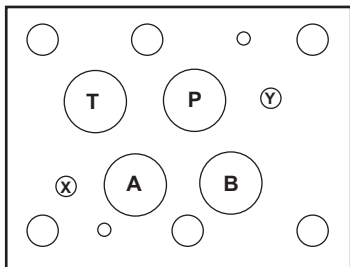


D05-POR1-PT

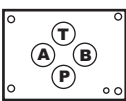
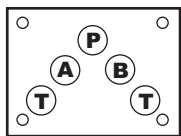
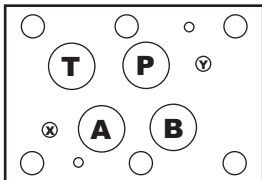
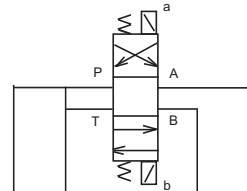


D03-FC1-AB-MO

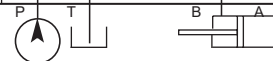
Specifications

Size	D03	D05	D08
Mounting Surfaces: General Patterns			
Mounting Surface	NFPA T3.5.1.MR1-D03	T3.5.1.MR1-D05	T3.5.1.MR1-D08
	ISO ISO 4401-03	ISO 4401-05	ISO 4401-08
Nominal Flow Rates*	5 gpm (19 lpm)	12 gpm (45 lpm)	50 gpm (190 lpm) 35 gpm (130 lpm) for PR1 & DPC1
Maximum Pressure	3000 psi (210 bar)		
Operating Conditions	Working Temperature	40- 160° F (5- 70°C)	
	Operating Viscosity	80- 300 SUS (17- 65 cSt)	
	Max. Start-up Viscosity	1500 SUS (315 cSt)	
	Filtration	25 micron or less, (ISO 18/15)	
	Recommended Fluids	Petroleum Based Fluids- ISO VG32-68, Most Vegetable Oils	

Common Models

 D03 Series	 D05 Series	 D08 Series	Function	
D03-PR1-B-*K	D05-PR1-B-*K	N/A	Pressure Reducing B Port	
D03-SPC1-B-70	D05-SPC1-B-70	N/A	Single Pilot Check B Port	
D03-SPC1-A-70	D05-SPC1-A-70	N/A	Single Pilot Check A Port	
D03-DPC1-AB-70	D05-DPC1-AB-70	D08-DPC1-AB-70	Double Pilot Check A & B Ports	
D03-POR1-ABBA-*K	D05-POR1-ABBA-*K	N/A	Double P.O. Relief B to A & A to b (Cross Port)	
D03-SQ1-B-*K	D05-SQ1-B-*K	N/A	Sequence Valve B Port	
D03-SQ1-A-*K	D05-SQ1-A-*K	N/A	Sequence Valve A Port	
D03-POR1-BT-*K	D05-POR1-BT-*K	N/A	Pilot Operated Relief B to T Port	
D03-POR1-AT-*K	D05-POR1-AT-*K	N/A	Pilot Operated Relief A to T Port	
D03-POR1-ATBT-*K	D05-POR1-ATBT-*K	N/A	Double P.O. Relief A to T & B to T	
D03-FC1-AB-MO	D05-FC1-AB-MO	D08-FC1-AB-MO	MeterOut Flow Control A & B Ports	
D03-N1-P	D05-N1-P	D08-NC1-P (w/ Check)	Needle Valve P Port	
D03-PR1-P-*K (6 gpm max.)	D05-PR1-P-*K (12 gpm max.)	D08-PR1-P-*K	Pressure Reducing P Port	
D03-C1-P-7	D05-C1-P-7	D08-NC1-P (w/needle valve)	Check Valve P Port	
D03-POR1-PT-*K	D05-POR1-PT-*K	D08-POR1-PT-*K	Pilot Operated Relief P to T Port	
SD03- MD03- ⇨ See subplates and multiple valve manifolds	SD05- MD05- ⇨ See subplates and multiple valve manifolds	SD08- MD08- ⇨ See subplates and multiple valve manifolds	Subplate/ Manifold	

*= 1K (120-1000 psi) or -3K (500-3000 psi) adjustment





D03, D05 & D08 Series

Modular/ Stackable Valves

Ordering Information

D03 - PR 1 - P - 1K - H

Size	Function	Design Code	Location/ Flow Path	Function
D03	C = Check		A = A port	omit = Not Applicable
D05	CB = Counter Balance		B = B port	7 = 7 psi cracking
D08	DPC = Double Pilot Check		AB = A and B	70 = 70 psi cracking
	DR = Direct Acting Relief		P = P port	.5K = Adj. 50-500
	EFC = Elect-Prop. Flow Control		T = T port	1K = Adj. 120-1000
	FC = Flow Control		PT = P to T port	3K = Adj. 500-3000
	N = Needle Valve		AT = A to T port	MI = Meter in
	NC = Needle w/ Check		BT = B to T port	MO = Meter out
	PCFC = Press Comp F. C.		ATBT = A to T and B to T port	
	POR = Pilot Operated Relief		ABBA = A to B and B to A	
	PR = Press Reducing			
	SQ = Sequence			
	SPC = Single Pilot Check			

D03-N1-P

Hex Adjuster:

(Hex size) 9/16" U.S.
14 mm Metric



Shown with optional hex adjustment.

Hex Adjuster
(No Knob)

Dimensional Data

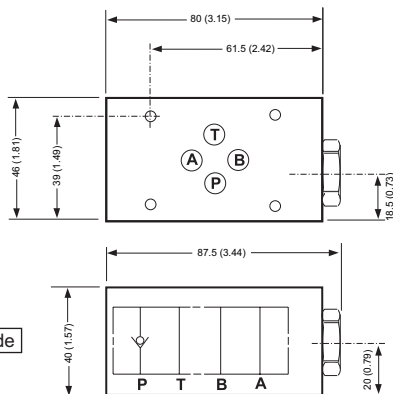
Series D03-C1-P Check Valve



Units: mm/ (Inch)
Weight: 2.9 lbs/ 1.15 kgs

Solenoid Valve Side

Subplate/ Manifold Side



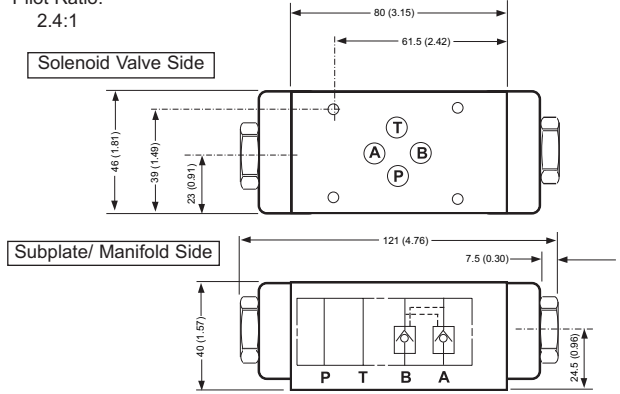
Series D03-DPC1-AB-70 Double Pilot Operated Check Valve

Units: mm/ (Inch)
Weight: 2.9 lbs/ 1.3 kgs

Pilot Ratio:
2.4:1

Solenoid Valve Side

Subplate/ Manifold Side



Note: Dimensions are identical for D03-SPC1 (Single Pilot Check)-
subtract left or right hex end cap.

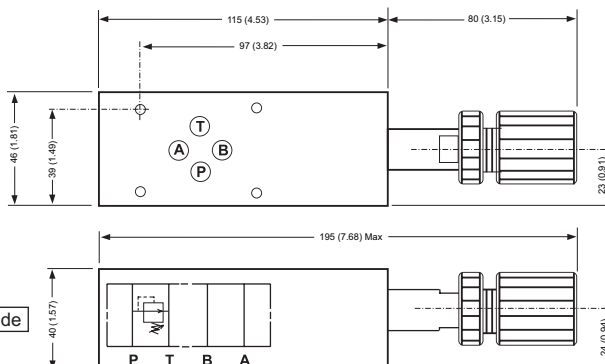
Series D03-POR1-PT Pilot Operated Relief Valve

Note- Dimensions are identical for:
D03-POR1-AT
D03-POR1-BT

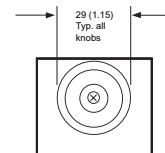
Solenoid Valve Side

Subplate/ Manifold Side

Units: mm/ (Inch)
Weight: 3.5 lbs/ 1.6 kgs



Note- Add this dimension
to left side for models:
D03-POR1-ABBA
D03-POR1-ATBT



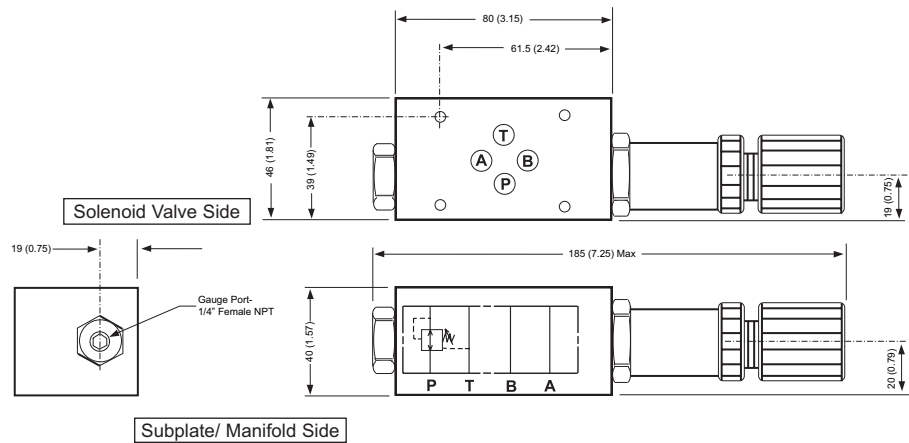
Dimensional Data

Series D03-PR1-P Pressure Reducing Valve

Note- Dimensions are identical for:
D03-PR1-A
D03-PR1-B



Units: mm/ (Inch)
Weight: 2.9 lbs/ 1.3 kgs

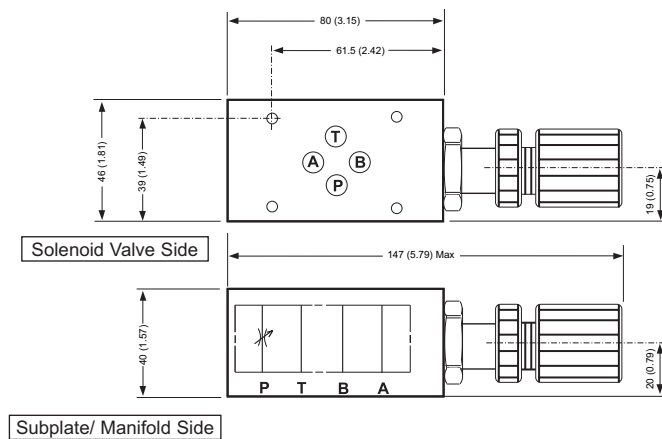


Series D03-N1-P Needle Valve



Shown with standard hand knob.

Units: mm/ (Inch)
Weight: 2.42 lbs/ 1.1 kgs

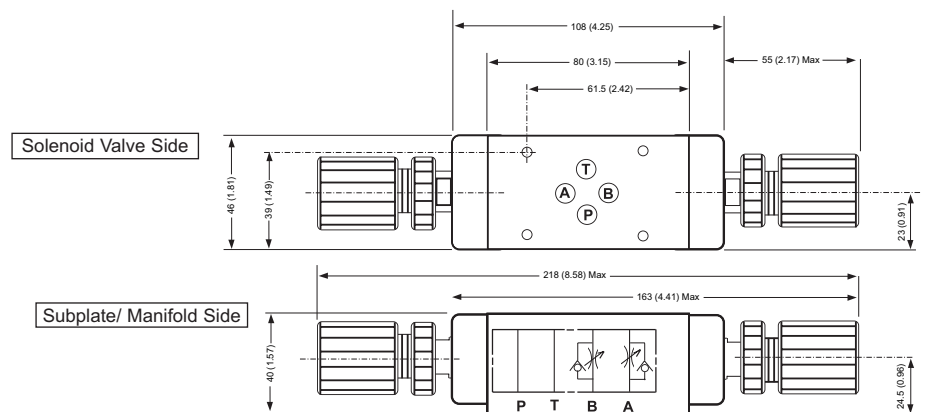


Series D03-FC1-AB-MO Flow Control

Note- Dimensions are identical for:
D03-FC1-AB-MI



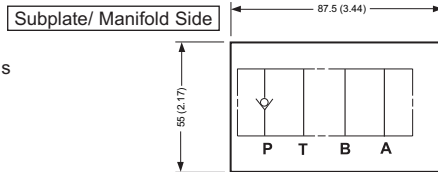
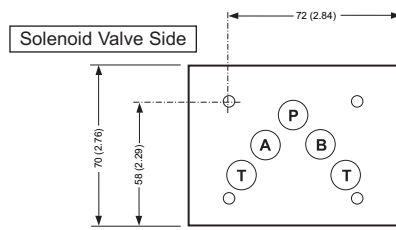
Units: mm/ (Inch)
Weight: 2.8 lbs/ 1.25 kgs



Note: Dimensions are identical for single flow control valve- subtract left or right adjusting knob dimension.

Dimensional Data

Series D05-C1-P Check Valve



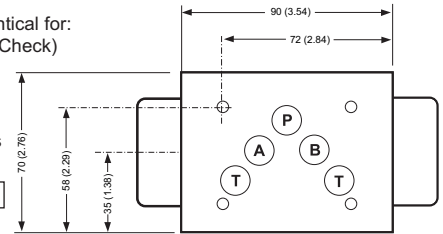
Units: mm/ (Inch)
Weight: 5.28 lbs/ 2.4 kgs

Series D05-DPC1-AB-70 Double Pilot Operated Check Valve

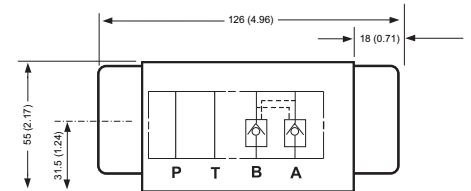
Note- Dimensions are identical for:
D05-SPC1 (Single Pilot Check)

Units: mm/ (Inch)
Weight: 7.48 lbs/ 3.4 kgs

Solenoid Valve Side



Subplate/ Manifold Side



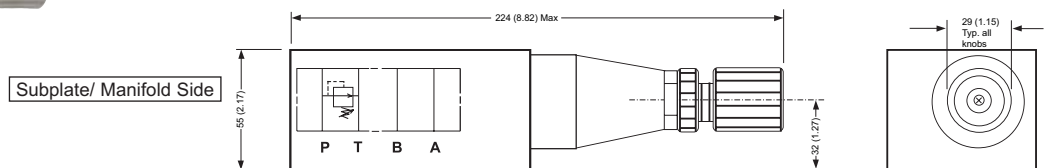
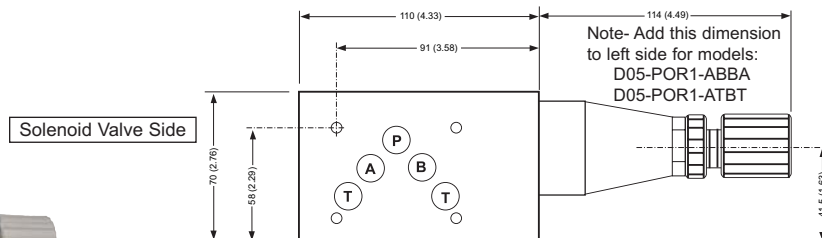
Pilot Ratios:
16.7:1 1st stage
27: 2nd stage

Series D05-POR1-PT Pilot Operated Relief Valve

Note- Dimensions are identical for:
D05-POR1-AT
D05-POR1-BT



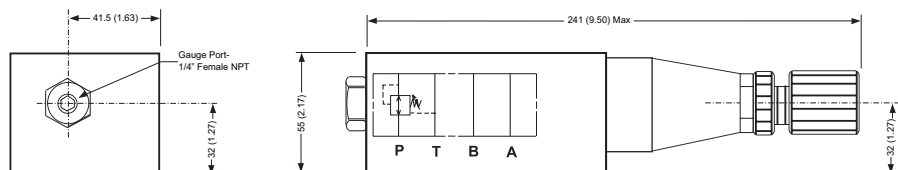
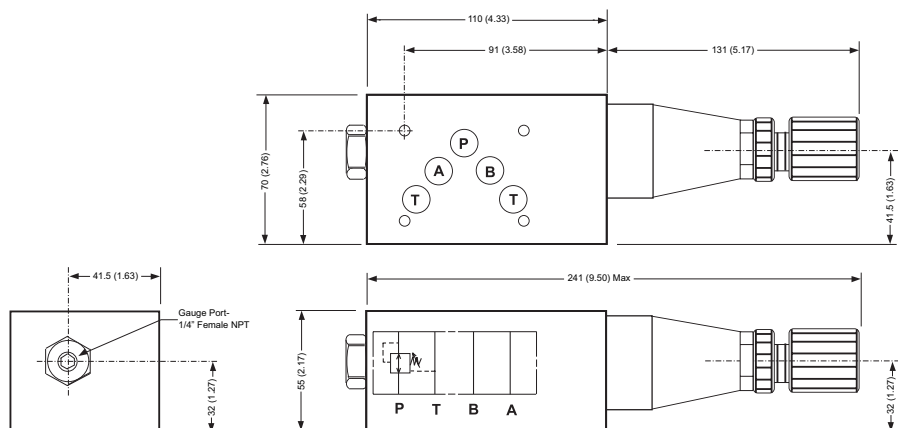
Units: mm/ (Inch)
Weight: 7.7 lbs/ 3.5 kgs



Series D05-PR1-P Pressure Reducing Valve

Note- Dimensions are identical for:
D05-PR1-A

Units: mm/ (Inch)
Weight: 7.7 lbs/ 3.5 kgs



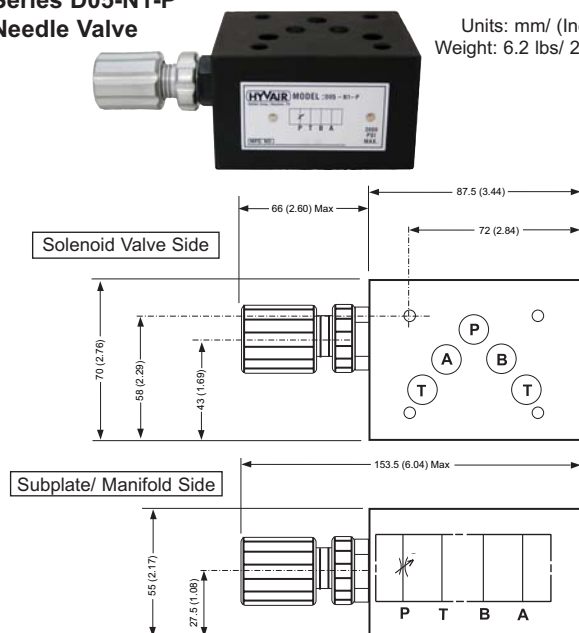


D03, D05 & D08 Series Modular/ Stackable Valves

Dimensional Data

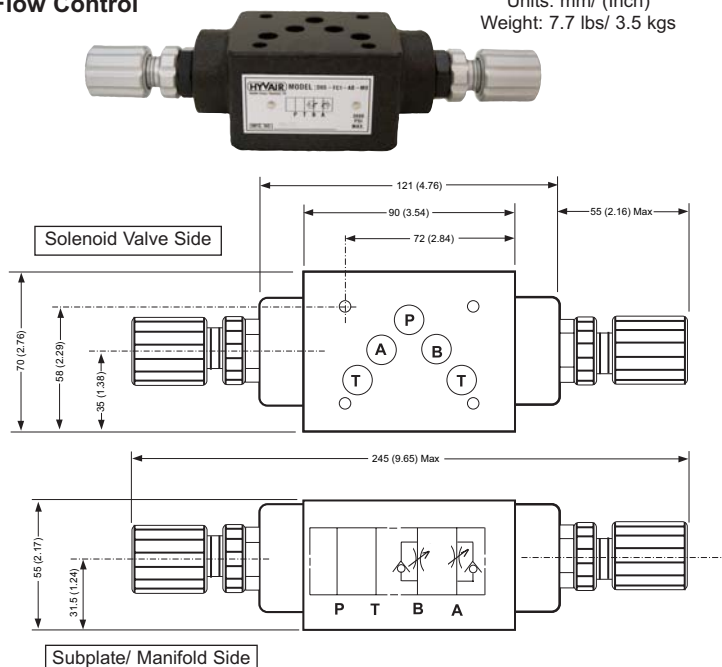
Series D05-N1-P Needle Valve

Units: mm/ (Inch)
Weight: 6.2 lbs/ 2.8 kgs



Series D05-FC1-AB-MO Flow Control

Units: mm/ (Inch)
Weight: 7.7 lbs/ 3.5 kgs

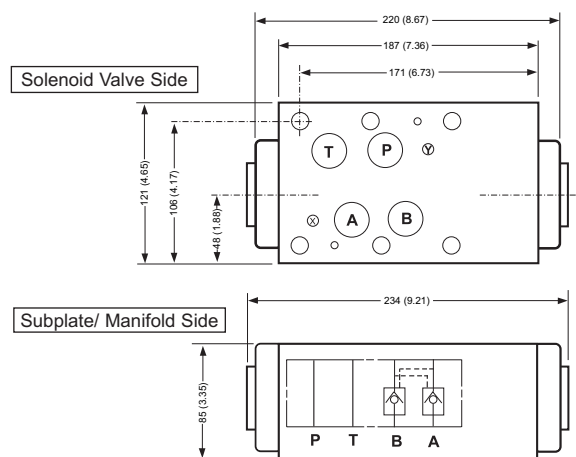


Note: Dimensions are identical for single flow control- subtract left or right adjusting knob dimension.

Series D08-DPC1-AB-70 Double Pilot Operated Check Valve

Series D08-C1-P Check Valve

Units: mm/ (Inch)
Weight: 27.5 lbs/ 12.5 kgs



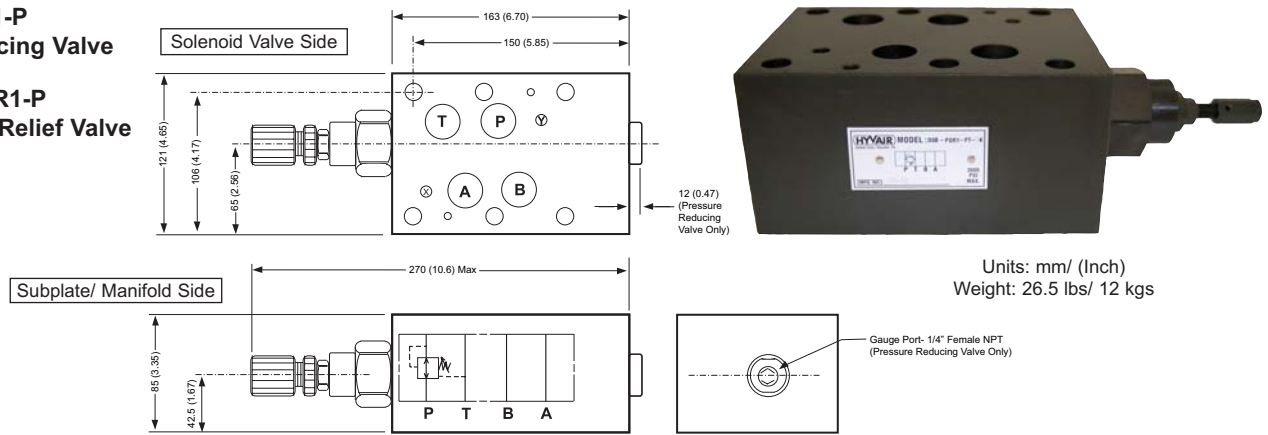


D03, D05 & D08 Series Modular/ Stackable Valves

Dimensional Data

Series D08-PR1-P Pressure Reducing Valve

Series D08-POR1-P Pilot Operated Relief Valve

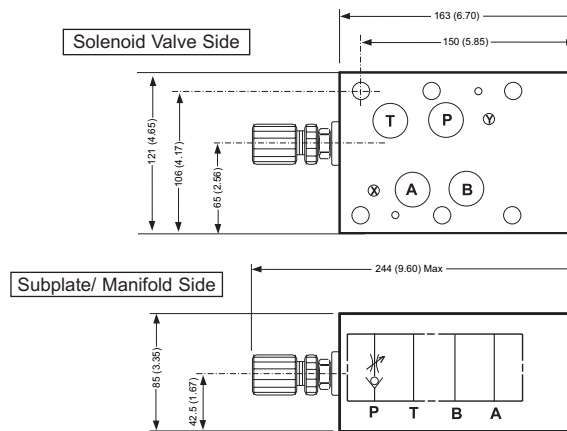


Units: mm/ (Inch)
Weight: 26.5 lbs/ 12 kgs

Series D08-NC1-P Needle Valve w/ Check



Units: mm/ (Inch)
Weight: 24.2 lbs/ 11 kgs

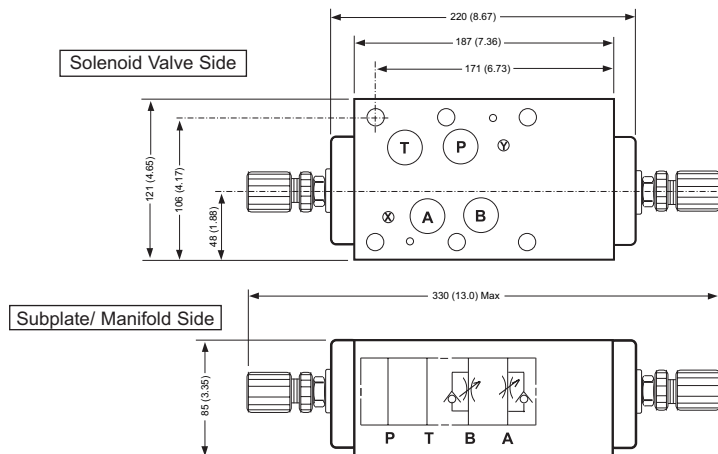


Series D08-FC1-AB-MO Flow Control



Units: mm/ (Inch)
Weight: 24.4 lbs/ 12.2 kgs

Note: Dimensions are identical for single flow control or needle valve- subtract left or right adjusting knob dimension.





860-434-2222



[HOME](#)

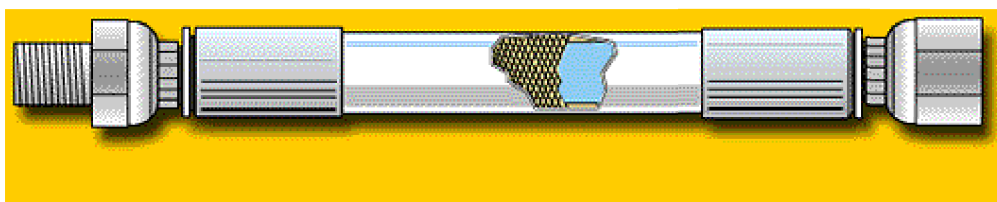
[ABOUT](#)

[HOSE SOLUTIONS](#) ▼

[HEATED HOSE](#)

[CONTACT](#)

SCT Series High Pressure/Temperature Silicone Covered Teflon® Hose



KleenFLO (US Patented 6481466) is made specifically to meet UL-1889 requirements for commercial filters of cooking hot oil. This SCT Series Hot Oil Hose is a smooth bore teflon core, stainless steel reinforcement hot oil hose with a virgin white silicone cover. All hot fluid transfer hose models handle up to 500°F (260°C) and can be rated for vacuum applications if specified. All fluid transfer models feature excellent flexibility and can be operated in continuous movement conditions. Our state-of-the art extrusion process provides a uniform bonded white (or red) virgin silicone exterior cover resulting in a smaller outside diameter...which translates into a tighter bend radius.



Operating Pressure

- 1,500 psi operating pressure
- 6,000 psi burst pressure

Sizes Available: 0.500" ID in stock, .312" ID, .405" ID & .625" ID available. Special sizes available upon request.

Construction



860-434-2222



[HOME](#)

[ABOUT](#)

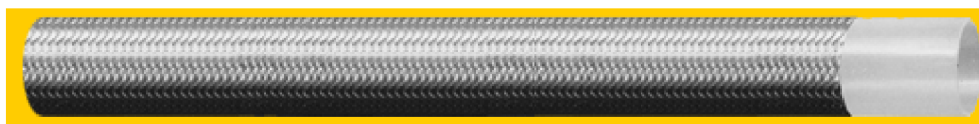
[HOSE SOLUTIONS](#) ▾

[HEATED HOSE](#)

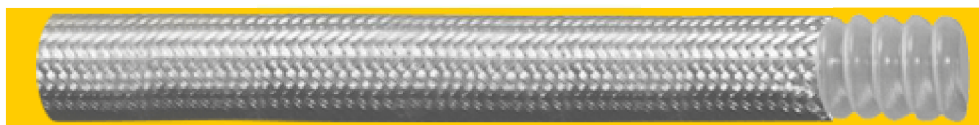
[CONTACT](#)

SmoothFlo Teflon Hose

KleenFLO is made specifically to meet UL-1889 requirements for commercial filters of cooking hot oil. For all of our teflon hose selections, we offer complete fabrication and hydro-testing capabilities. Additionally, we offer rapid delivery on our products.



Smooth Bore



Convuluted

□ **SERIES MP – MEDIUM PRESSURE SMOOTH BORE TEFLON HOSE**

□ **SERIES MPX – EXTREME FLEXIBILITY SMOOTH BORE TEFLON HOSE**

□ **SERIES HP – HIGH PRESSURE SMOOTH BORE TEFLON HOSE**

Specifications

Part#	Part#	Hose	Operating		
Conductive	Non-Conductive	Size	Avg. ID	Avg. O.D.	PSI PSI
SMP-C03	SMP-NC03	3/16	.125	.250	3,000 12,000
SMP-C04	SMP-NC04	1/4	.187	.312	3,000 12,000
SMP-C05	SMP-NC05	5/16	.250	.375	3,000 12,000
SMP-C06	SMP-NC06	3/8	.312	.445	2,500 10,000
SMP-C07	SMP-NC07	7/16	.375	.503	2,250 9,000
SMP-C08	SMP-NC08	1/2	.405	.549	2,000 8,000
SMP-C10	SMP-NC10	5/8	.500	.648	1,500 6,000
SMP-C12	SMP-NC12	3/4	.625	.778	1,200 4,800
SMP-C14	SMP-NC14	7/8	.750	.885	1,100 4,400
SMP-C16	SMP-NC16	1	.875	1.030	1,000 4,000
SMP-C18	SMP-NC18	1-1/8	1.000	1.135	900 3,600
SMP-C20	SMP-NC20	1-1/4	1.125	1.290	750 3,000

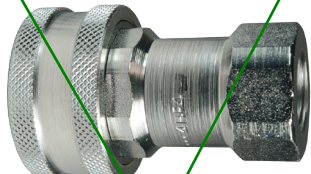
H-Series Hydraulic Couplings

**FEMALE
HYDRAULIC HOSE
FITTING**

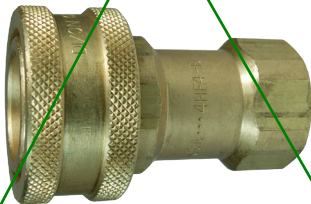
Features:

- poppet style shut-off valves in both coupler and plug
- designed to prevent fluid loss when disconnected
- meets dimensional requirements of **ISO 7241 Series B**
- interchangeable with Parker-Hannifin 60 series, see Hydraulic Profile Chart on page H-6
- Buna-N seals standards. Contact Dixon® for additional seal material options.
- Contact Dixon® for pressure ratings and other technical information.

H-Series ISO-B Industrial Interchange Poppet Valve Female Threaded Couplers



steel



brass

Body Size	Threads	Previous Part #	Steel		Previous Part #	Brass	
			Part #	Price/E		Part #	Price/E
1/8"	1/8" - 27 NPTF	---	1HF1	\$24.33	---	1HF1-B	\$24.19
	7/16" - 20 ORB	---	1HOF2	30.12	---	---	---
1/4"	1/4" - 18 NPTF	16-263	2HF2	23.16	B16-263	2HF2-B	22.51
	1/4" - 19 BSPP	---	2HBF2	25.48	---	2HBF2-B	24.76
	9/16" - 18 ORB	---	2HOF3	27.80	---	---	---
3/8"	3/8" - 18 NPTF	16-363	3HF3	28.95	B16-363	3HF3-B	31.29
	3/8" - 19 BSPP	---	3HBF3	33.30	---	3HBF3-B	36.02
	3/4" - 16 ORB	---	3HOF4	37.65	---	---	---
1/2"	1/2" - 14 NPTF	16-463	4HF4	36.48	B16-463	4HF4-B	41.08
	1/2" - 14 BSPP	---	4HBF4	45.38	---	4HBF4-B	47.66
	7/8" - 14 ORB	---	4HOF5	48.65	---	---	---
3/4"	3/4" - 14 NPTF	16-663	6HF6	58.75	B16-663	6HF6-B	80.03
	3/4" - 14 BSPP	---	6HBF6	69.49	---	6HBF6-B	87.79
	1-1/16" - 12 ORB	---	6HOF6	75.20	---	---	---
1"	1" - 11 1/2 NPTF	16-863	8HF8	97.08	B16-863	8HF8-B	110.20
	1" - 11 BSPP	---	8HBF8	97.08	---	8HBF8-B	110.20
	1-5/16" - 12 ORB	---	8HOF8	110.03	---	---	---

Body Size	Threads	Previous Part #	303 Stainless Steel		316 Stainless Steel	
			Part #	Price/E	Part #	Price/E
1/8"	1/8" - 27 NPTF	---	1HF1-S	\$72.39	1HF1-SS	\$134.75
1/4"	1/4" - 18 NPTF	SS16-263	2HF2-S	62.72	2HF2-SS	150.98
	1/4" - 19 BSPP	---	2HBF2-S	62.72	2HBF2-SS	150.98
3/8"	3/8" - 18 NPTF	SS16-363	3HF3-S	88.13	3HF3-SS	201.61
	3/8" - 19 BSPP	---	3HBF3-S	88.13	3HBF3-SS	201.61
1/2"	1/2" - 14 NPTF	SS16-463	4HF4-S	144.79	4HF4-SS	282.72
	1/2" - 14 BSPP	---	4HBF4-S	144.79	4HBF4-SS	318.81
3/4"	3/4" - 14 NPTF	SS16-663	6HF6-S	227.26	6HF6-SS	427.09
	3/4" - 14 BSPP	---	6HBF6-S	227.26	6HBF6-SS	504.53
1"	1" - 11 1/2 NPTF	SS16-863	8HF8-S	362.87	8HF8-SS	649.66
	1" - 11 BSPP	---	8HBF8-S	362.87	8HBF8-SS	649.66



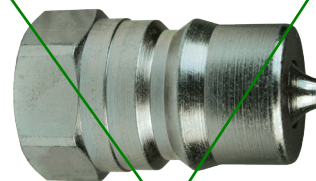
303 stainless

H-Series ISO-B Industrial Interchange Female Threaded Plugs

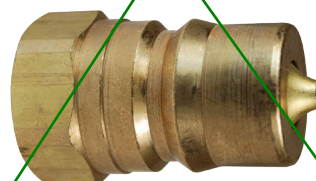
Body Size	Threads	Previous Part #	Steel		Previous Part #	Brass	
			Part #	Price/E		Part #	Price/E
1/8"	1/8" - 27 NPTF	---	H1F1	\$9.85	---	H1F1-B	\$9.57
	7/16" - 20 ORB	---	H1OF2	12.16	---	---	---
1/4"	1/4" - 18 NPTF	17-263	H2F2	10.95	B17-263	H2F2-B	10.64
	1/4" - 19 BSPP	---	H2BF2	12.74	---	H2BF2-B	12.38
	9/16" - 18 ORB	---	H2OF3	12.98	---	---	---
3/8"	3/8" - 18 NPTF	17-363	H3F3	13.20	B17-363	H3F3-B	15.76
	3/8" - 19 BSPP	---	H3BF3	16.68	---	H3BF3-B	19.14
	3/4" - 16 ORB	---	H3OF4	22.01	---	---	---
1/2"	1/2" - 14 NPTF	17-463	H4F4	14.36	B17-463	H4F4-B	18.57
	1/2" - 14 BSPP	---	H4BF4	18.44	---	H4BF4-B	18.57
	7/8" - 14 ORB	---	H4OF5	24.33	---	---	---
3/4"	3/4" - 14 NPTF	17-663	H6F6	28.38	B17-663	H6F6-B	31.58
	3/4" - 14 BSPP	---	H6BF6	33.59	---	H6BF6-B	36.98
	1-1/16" - 12 ORB	---	H6OF6	37.07	---	---	---
1"	1" - 1 1/2 NPTF	17-863	H8F8	40.54	B17-863	H8F8-B	48.40
	1" - 11 BSPP	---	H8BF8	44.01	---	H8BF8-B	51.78
	1-5/16" - 12 ORB	---	H8OF8	67.76	---	---	---

**MALE
HYDRAULIC
HOSE FITTING**

Hydraulic Fittings

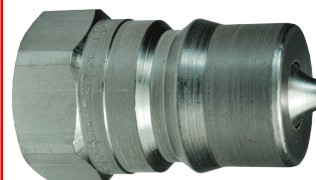


steel



brass

Body Size	Threads	Previous Part #	303 Stainless Steel		316 Stainless Steel	
			Part #	Price/E	Part #	Price/E
1/8"	1/8" - 27 NPTF	---	H1F1-S	\$23.16	H1F1-SS	\$57.75
1/4"	1/4" - 18 NPTF	SS17-263	H2F2-S	26.14	H2F2-SS	69.34
	1/4" - 19 BSPP	---	H2BF2-S	26.14	H2BF2-SS	69.34
3/8"	3/8" - 18 NPTF	SS17-363	H3F3-S	42.95	H3F3-SS	102.32
	3/8" - 19 BSPP	---	H3BF3-S	42.95	H3BF3-SS	102.32
1/2"	1/2" - 14 NPTF	SS17-463	H4F4-S	68.05	H4F4-SS	132.33
	1/2" - 14 BSPP	---	H4BF4-S	70.08	H4BF4-SS	149.03
3/4"	3/4" - 14 NPTF	SS17-663	H6F6-S	103.67	H6F6-SS	186.47
	3/4" - 14 BSPP	---	H6BF6-S	103.67	H6BF6-SS	250.45
1"	1" - 1 1/2 NPTF	SS17-863	H8F8-S	164.21	H8F8-SS	294.75
	1" - 11 BSPP	---	H8BF8-S	179.54	H8BF8-SS	358.51



303 stainless

H-Series ISO-B Industrial Interchange Male Threaded Plugs

Body Size	Threads	Steel	
		Part #	Price/E
1/4"	3/8" - 18 NPTF	H2M3	\$14.96



Body Size	Threads	303 Stainless Steel	
		Part #	Price/E
1/2"	3/4" - 14 NPTF	H4M6-S	\$100.65



