

SUBMITTAL FOR:

Devonshire
Island of Bermuda

EQUIPMENT:

One (1) Flo-Septage Receiving Station DM
MODEL: FSR-1200DM

ENGINEER:

GOVT of Bermuda-W&E
Contact: Martin Biffin
56 Church St Hamilton HM12
Bermuda
Phone: 441-295-5151

REPRESENTED BY:

Keen Exporters
Contact: IRA Keeperman
1773 Harrington Park Dr
Jacksonville, FL 32225
Phone: 904-379-5940
Cell Phone: 904-379-3189
ira@keenexp.com

FURNISHED BY:

Enviro-Care
Gurnee, Illinois

WEC PROJECT NUMBER: WEC213223

JUNE 2015



1570 St. Paul Avenue
Gurnee, IL 60031
P: 815-636-8306, F: 815-636-8302
www.enviro-care.com

For:

Devonshire, Island of Bermuda
Bermuda

Equipment:

FLO-Septage Receiving Station DM
Enviro-Care Model FSR-1200DM

Engineer:

Government of Bermuda
Ministry of Public Works
Bermuda

Contact: Daniele Bortoli
Phone: (441) 295-5151
Email: dbortoli@gov.bm

Contractor:

Martin Biffin
Government of Bermuda
Hamilton HM12

Contact: Martin Biffin
Phone: (441) 295-5151
Fax: (441) 295-4675

Enviro-Care Agent:

Keen Exporters
1773 Harrington Park Dr
Jacksonville, FL 32225
Contact: Ira Keeperman
Phone: (904) 379-5940
Fax: (904) 379-3189
Email: ira@keenexp.com

Manufacturer:

Enviro-Care
1570 St. Paul Ave
Gurnee IL 60031
Phone: (815) 636.8306
Fax: (815) 636.8302

Enviro-Care Contact:

Project Manager: Shannon Omark
Phone: (224) 302-0312
Email: somark@enviro-care.com

Enviro-Care Project Number: WEC213223

June 2015

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1 SUBMITTAL INTRODUCTION

SUBMITTAL INTRODUCTION

This submittal is being furnished for the approval of the mechanical and electrical equipment (if applicable) as outlined under the specification section and drawings referred to in the Letter of Clarification.

Scope of Supply: A complete outline of materials to be supplied is listed herein. This submittal package represents Enviro-Care's complete scope of supply. All other materials and services not specifically included on the drawings or within the body of this submittal are to be supplied by others.

- A. **Operation and Maintenance Manuals:** Operation and Maintenance Manuals shall follow in a timely manner and with the content to satisfy the specifications. Final Operation and Maintenance Manuals will be supplied with the equipment. When applicable, "preliminary" Operation and Maintenance Manuals may be furnished prior to shipment of equipment when specifications require Engineer's approval. The manuals will include, but are not limited to, the following information:
- A.1. Complete Bill of Materials for all equipment, including individual component weights
 - A.2. Recommended receiving and storage instructions.
 - A.3. Recommended installation.
 - A.4. Inspection, testing and start-up instructions.
 - A.5. Operation and maintenance instructions
 - A.6. Recommended spare parts list and pricing.
 - A.7. Emergency procedures and trouble-shooting guides.
 - A.8. Accessory equipment information.
 - A.9. "Approved", "Approved as Corrected" and/or "Revised" General Arrangement and Equipment Erection/Assembly drawings.
- B. **Critical Dimensions:** Dimensions which are critical to the design of the equipment, but were not clear and/or not provided in the specifications or Engineer's drawings, appear on Enviro-Care drawings in this submittal package with a cloud around them. **Approval to proceed will not be recognized by Enviro-Care, and production will remain on hold, until all clouded dimensions (if applicable) are confirmed or supplied in writing by the Contractor/ Engineer.** Please note that the Enviro-Care submittal drawings contain dimensions with ★'s denoted to identify variance from contract documents and should be particularly noted. Please also note that all clouded dimensions on the Enviro-Care submittal drawings require written verification from the Contractor before the equipment can be released by Enviro-Care. Please include this written dimensional verification within the returned submittal package to Enviro-Care.
- C. **Re-submittals:** The enclosed information will not be duplicated in any future re-submittals, unless:
- C.1. Items/sections have been commented on and need clarification or revision for the re-submittal.
 - C.2. Specifically requested by the Engineer or Contractor on the return Letter of Transmittal that: *"The entire re-submittal must be duplicated."*

Enviro-Care Company Five-Year Warranty

Warranty Statement and Term:

Enviro-Care Company, Inc. warrants the supplied equipment to the original end user against defects in workmanship or material under normal use and service in compliance with the original design specifications and the maintenance requirements and instructions as found in the Operations & Maintenance Manual. Further, Enviro-Care requires that maintenance logs, as found in the Operations & Maintenance Manual, be completed and faxed or e-mailed to Enviro-Care on a quarterly basis for the duration of this Warranty.

All Enviro-Care supplied equipment is warranted for sixty (60) months from date of start-up or sixty-six (66) months from date of shipment, whichever occurs first.

Warranty Exclusions:

This warranty does not cover costs for labor, standard and/or scheduled maintenance performed, nor does it cover consumables and Enviro-Care parts that, by virtue of their operation, require replacement through normal wear (aka: Wear Parts), unless a defect in material or workmanship can be determined by Enviro-Care.

Wear parts are defined as brushes, rollers, spray nozzles, drum seals and other items specifically identified in the Operations & Maintenance Manual.

Warranty Coverage:

Enviro-Care's liability is limited to the supply or repair of defective parts returned, freight prepaid by buyer to a location specified by Enviro-Care. Repaired or replacement parts will be shipped to buyer prepaid via standard ground freight. Express or expedited shipments will be at the expense of the buyer.

Exclusions and Exceptions:

This Warranty excludes damage or wear to equipment caused by misapplication of product, improper maintenance, accident, abuse, unauthorized alteration or repair, Acts of God, or installation or operation that is non-compliant with Enviro-Care installation and operations instructions.

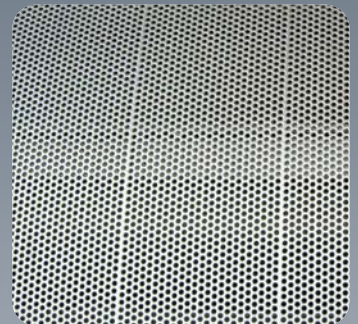
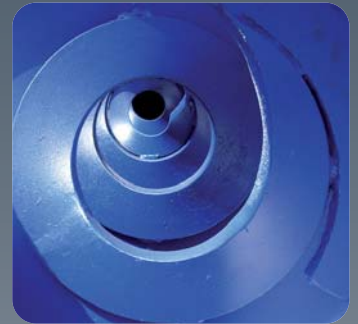
Enviro-Care shall not under any circumstances be liable for any incidental or consequential damages arising from loss, damage to property, personal injury or other damage or losses owing to the failure of Enviro-Care's equipment. The liability of Enviro-Care Company, Inc. is limited as set forth above within the time period set forth above.

Enviro-Care
1570 St. Paul Avenue
Gurnee, IL 60031
P: 815.636.8306 F:815.636.8302
Web: www.enviro-care.com
Email: ecsales@enviro-care.com

FLO-Products

Simply Superior Design

Liquid/Solid Separation



Screening
MBR Pre-treatment
Screenings Washing
Dewatering
Grit Washing
Conveying
Septage Receiving

SCREENING

Flo-Drum Rotating Screen

Municipal/industrial wastewater and MBR pre-treatment

- Screens, washes, conveys and dewateres in one unit.
- Channel widths from 650 to 3000 mm.
- Flows from 1 to 43 MGD based on screen media and opening
- Perforated plate, wedgewire and mesh screen media available depending on application.
- Triple-face seal prevents bypass.
- Channel mounted or tank mounted.
- 304 SS construction (316 SS optional).
- Sliding aluminum covers or stainless steel available.

Typical wastewater screening:

- Perforated plate media.
- 3 mm and 6 mm openings.

MBR pre-treatment screening:

- Perforated plate media.
- 1 to 3 mm openings.



Flo-SeptageStation DM – The “Beast”

The next generation of septage receiving

- Designed specifically for septage receiving, FOG and heavy solids.
- Flows from 525 to 875 gpm.
- Perforated Plate with 6 mm openings.
- Dual drives for better capture and faster unloading.
- Two-stage tank design prevents sedimentation.
- 25° angle of inclination increases capture and removal rate.
- No auger brushes, no screenings recycle, no screen support arms.
- Engineered to handle high solids loading.
- 304 SS construction (316 SS optional).
- No rock trap or grinding required.



Flo-Sieve Screening, Washing, Conveying, Dewatering System

Small municipal and industrial plants

- Six sizes from 200 to 700 mm.
- Flows from 1 to 7 MGD.
- Standard perforated media openings of 3 and 6 mm.
- 35° angle of inclination (45° and 90° available).
- Three spray systems clean the screenings, transport tube and compaction zone.
- Unit pivots out of channel for maintenance.
- In tank design also available.
- 304 SS construction (316 SS optional).
- Carbon steel auger is standard.
- Segmented brush design – economical and efficient brush change-out.



Flo-MultiRake Coarse Bar Screen

Municipal and industrial wastewater applications

- Channel widths from 400 to 2000 mm.
- Coarse bar spacing from 12 to 50 mm.
- Replaceable, segmented and bolted bar racks.
- Minimum of 2 cleaning rakes for faster solids removal.
- Recessed chain drive with no sprockets below the water level.



Flo-MultiRake Perforated Media Screen

Municipal and industrial wastewater applications

- Channel widths from 400 to 2000 mm.
- Perforated openings 3 and 6 mm.
- Multiple brushes and wipers for faster solids removal.
- 90° unit for deep channels and pump stations.
- Recessed chain drive with no sprockets below the water level.
- Economical alternative for small to medium size plants with flows under 10 MGD.



Flo-MultiRake Fine Bar Screen

Municipal and industrial wastewater applications

- Channel widths from 400 to 2000 mm.
- Fine bar spacing 6 – 8 – 10 mm.
- Replaceable, segmented and bolted bar racks.
- Minimum of 6 cleaning rakes for faster solids removal.
- Lower sprocket and maintenance free lower bushings recessed into the side rails.



Flo-MultiRake
shown without Covers

Common Flo-MultiRake Features:

- All three models use the same sturdy frame design.
- 304 SS construction (316 SS optional).
- Fully enclosed with removable covers.
- Gearboxes mounted using torque limiting devices.
- Reverse raking feature.
- 75° to 90° angle of inclination.



Flo-PerfBelt Continuous Perforated Plate Fine Screen

Municipal and industrial wastewater applications

- Widths to a maximum of 2000 mm.
- Perforated media openings 2 - 3 - 6 mm.
- Chain drive recessed into the side rails.
- Discharge cleaning system composed of a rotating brush and spray nozzles.
- 304 SS construction (316 SS optional).
- Screen elements are designed to:
 - eliminate bypass,
 - prevent screenings from falling back into the channel,
 - provide ease of maintenance and element replacement.



Flo-Screen Bar Screen

Low maintenance municipal & industrial wastewater climber screens

- Screen widths to 36".
- Coarse and fine bar spacing from 1/4" to 1-1/2".
- Low maintenance ball screw drive controls rake operation.
- Single rake design.
- Auto-reverse function to clear jams.
- Hydraulic drive for flexible installation.
- Reliable screening for remote, unattended locations.



Flo-RotoDrum Internally-fed Rotating Drum Screen

MBR pre-treatment and wastewater screen for pumped flows

- Available in drum diameters from 500 mm to 1500 mm.
- MBR application – 1 to 3 mm perforated media openings.
- Wastewater applications – perf openings 3 and 6 mm.
- 5° incline for improved dewatering.
- High capture efficiency.
- Strategically placed internal screen drum flights move the solids to discharge.
- External spray bars and brush capture small solids and clean the screen surface.
- 304 SS construction (316 SS optional).
- Full covers for safe, dry, odor-free operation.



Flo-DrumSieve Externally-fed Rotating Drum Screen

Hard to screen applications such as scum, grease or stringy material.

- Wedgewire screen media from 0.25 to 2.5 mm.
- Six sizes with flows from 44 to 9200 gpm.
- Even distribution across exterior screen surface.
- Brass cleaning blade removes solids as screen rotates.
- Designed to be self-cleaning.
- 304 SS construction (316 SS optional).



GRIT & SOLIDS

Flo-WashPress Washer Compactor

Municipal & industrial screenings washing and dewatering

- Capacities from 2 to 6 m³/h (70 to 210 ft³/hr).
- Volume reduction 65% to 75%.
- 35% to 45% dry solids.
- Two washing functions.
- Washed, dewatered screenings pass Paint Filter Test.
- Access to drain pan area for maintenance.
- Low profile design for easy retrofit.



Flo-Press Hydraulic Ram Press

Municipal & industrial screenings dewatering

- Capacities from 1.5 to 3.5 m³/h (53 to 124 ft³/hr).
- Volume reduction to 65%.
- Press dewateres and conveys via discharge piping.
- Wash port in drain for periodic cleaning.
- Good retrofit option.
- Hydraulic power pack can be unit mounted or remote.



Flo-SpiralPress Dewatering Conveyor

Municipal and industrial applications

- Capacities from 2 to 80 m³/h (70 to 2825 ft³/hr).
- High strength alloy steel shaftless spiral.
- Multiple inlet locations.
- Heavy-duty compaction discharge door.
- Unit constructed of 304 SS (316 optional).



Flo-Spiral Shaftless Spiral Conveyor

Municipal and industrial conveying applications

- Three spiral sizes and lengths to 50'.
- Inclinations from 0° to 30°.
- Push or pull operation for flexible distribution.
- Multiple inlet options along length of spiral.
- Shaftless spiral prevents clogging and wrapping of solids.



Flo-GritWash Grit Separation and Washing System

Key component of municipal grit handling systems

- Three capacities from 158 to 476 gpm.
- Washed grit contains less than 3% organics.
- Averages 80 to 90% dry weight.
- 95% particle separation > 0.2 mm.
- Heavy-duty shafted high strength alloy steel spiral.
- Completely enclosed for odor reduction.



Flo-GritOut Grit Classifier

Municipal & industrial grit separator

- Three capacities from 158 to 476 gpm.
- Separates and dewateres grit.
- Separated grit is removed via a heavy duty shaftless spiral.



Flo-Minutor Solids Reduction Comminutor

Municipal and industrial pump station / deep channel grinder.

- Available in 7 sizes with flows from 1 to 23 mgd.
- Cutters and knives are hardened D2 tool steel.
- Uniform cutting blades are easily replaceable.
- Horizontally- shafted grinder.
- Self-cleaning employing incoming flow.



2 SCOPE OF SUPPLY

SCOPE OF SUPPLY

SECTION: Flo-Septage Station DM Specification Revision A, WEC213223

ADDENDA: 0

Equipment: One (1) Flo-Septage Receiving Station DM
Model FSR-1200 DM and Flo-Logic Control System

EACH UNIT FURNISHED COMPLETE BY ENVIRO-CARE WITH THE FOLLOWING COMPONENTS:

Description of Equipment:

- Fully automatic, self-cleaning, dual drive, septage receiving system incorporating a perforated plate rotating drum screen and an integral screenings washing, conveying and dewatering/compacting contained within a stainless steel tank.
- The septage receiving unit shall be a dual drive system which allows the drum and screw to be driven independently.
- A cylindrical drum screen shall be constructed of perforated plate media in 316SS with 6mm perforations around the entire basket.
- The drum screen shall be mounted on the drive end using a large diameter, single row, heavy duty industrial bearing assembly with integral ring gear comprising part of the screen drive system.
- The tank mounted rotating drum screen, conveying and dewatering system shall be positioned at a 25° angle of inclination from horizontal and be generally as described in the Project Specifications.
- A cleaning brush and spray bars shall be located on the outside of the screen drum to prevent small solids from passing through the screen.
- Angled lifting vanes shall be positioned inside the drum screen to retain and lift solids into the screw auger trough.
- The screw auger trough shall extend beyond the drum screen opening at the influent end to maximize solids capture and reduce screenings recycle.
- The drive assembly for the screw shall be attached via a drive support flange welded to the upper end of the screenings transport tube.
- The shafted screenings screw conveyor to be constructed of an epoxy coated high strength alloy steel for maximum torsion resistance.
- Compaction zone integral to the screw conveyor and with latched, hinged cover of 316SS and safety interlock switch.
- The septage receiving unit shall be supplied with a two-stage tank. The inlet section of the tank shall slope toward the screen to prevent sedimentation. The second stage of the tank shall house the rotating drum screen.
- Two(2) solenoid valves shall be provided to control flow to the spray wash assemblies.
- Gear reducers shall be driven by 480V, 3ph, 60 Hz motors (2 HP).

Ancillary Items:

Controls and Electrical Devices

- A. One NEMA 4X, 316 stainless steel Main Control Panel enclosure for 480/3/60 electrical supply to be provided by the manufacturer.
- Disconnect switch with door interlock handle.

- One (1) IEC Soft Starter, Reversing, with Circuit Branch Protection (480VAC Max, 2hp, Drum motor).
- One (1) IEC Motor Starter, Reversing with Circuit Branch Protection (480VAC Max, 2 hp, Screen motor).
- Control Power Transformer, 480-120VAC w/branch circuit protection.
- Surge Protection Device, 120 VAC.
- Programmable Logic Controller, Allen-Bradley MicroLogix, with Ethernet and Required IO.
- Operator Interface Unit, Allen Bradley Panelview C400.
- Panel Heater, with Thermostat (as required).
- Pilot lights, Transformer type (Motor Run & Fault, Control Power, High Water Level).
- Push buttons (E-Stop, System Reset).
- Selector Switches (Motor HOA, Wash Solenoids HOA).
- Barrier relays (2) for capacitance rods.

B. One NEMA 4X, 316 stainless steel Hauler Access Station enclosure to house the printer, magnetic card reader, OIT with compact flash memory card recorder and hauler interaction switches and push buttons.

** Safety Microswitch: Safety interlock switch shall be factory mounted to the compaction/discharge zone access door. Interlock switch shall prevent operation of the screen while the door is open.

** Solenoid Valves: Provide two (2) solenoid valves to control flow to the spray wash assemblies. Each valve shall have a brass body. Each valve shall be 120 volt, single phase, 60 Hz.

** Level control: Provide capacitance rods controlled by an intrinsically safe capacitance relay.

Note 2 - Any items not listed above to be furnished by others and specifically include electrical wiring, conduit or electrical equipment, piping, valves or fittings, shimming material, lubricating oil or grease, shop or field painting, field welding, erection, detail shop fabrication drawings, performance testing, unloading, storage, concrete work, hoist or lifting apparatus, grating, platforms, stairs, handrails, or installation service (except as stated in this proposal).

Also included are the following items:

1. Field Service Startup and Training as specified to include 1 Trip for 2 Days

PERFORMANCE REQUIREMENTS

Conditions	Unit
Number of screens	1
Influent Type	Septage
Influent Solids	4%
Peak flow per screen (gpm)	525
Perforation Size (mm)	6
Screen installation angle	25°

UTILITY REQUIREMENTS/ENVIRONMENTAL CONDITIONS

Conditions	Unit
Spray Wash Water (gpm/psi)	40 gpm/70-120 psi
Power Supply (V/P/Hz)	480V/3PH/60Hz
Screen Installation Location (indoor/outdoor)	Outdoors
Control Panel Location (indoor/outdoor)	Outdoors

Note: This equipment was designed based on information received by Enviro-Care. Some assumptions may have been made in order to select equipment size. All information must be verified by the Engineer.

3 LETTER OF CLARIFICATION



LETTER OF CLARIFICATION

LETTER OF CLARIFICATION

The given specification is for standard Enviro-Care equipment; minimal clarification needed, as follows:

General:

1. Unit anchorage designed around RedHead A7 adhesive system. Adhesive and applicator by others.
2. **The enclosed Enviro-Care's submittal drawings may contain dimensions marked with clouds. This indicates information that needs to be confirmed or corrected by the Engineer and/or the Contractor at the time this submittal is returned. Submittal will not be considered as approved until all clouded dimensions have been confirmed and/or corrected.**

Electrical:

1. Submittal Comments on following two pages have been provided to clarify information about the main control panel and the hauler station. Please confirm agreement with stated items and provide responses for requested information.

Project Name: Devonshire, Bermuda
Project Number: EVC6089
Customer Project: EC213223
Panel Type: Beast Septage Receiving Control Panel / Hauler Station w/DS25 Base

June 12, 2015

1. The main control panel has been designed for a 480VAC-3PH-60HZ power service.
2. The main control panel is designed to provide the 120/1/60 power required to power the hauler station and base unit. Please confirm if this 120/1/60 power supply to the hauler station will be provided from a location other than the main control panel.
3. Equipment run times will be displayed on the operator interface unit (OIU). Additional through the door hour meters have not been provided.
4. Please provide Ethernet address information for the main control panel PLC and hauler station PLC.
5. Please reference the base station control panel drawings, and the current mounting orientation for the hauler station. Please confirm if this a suitable mounting location, or if a different location on the base unit is desired.
6. The flow meter provided is an Endress & Hauser: 53W1H-UL0B1R10BAAA (NEMA 4X, Class 1, Div. 2 rated, 4" Connection).
7. The base unit includes a 6" threaded NPT to 4" camlock fitting inlet connection.
8. The base unit includes a 4" ANSI 150 lb. flange connection.
9. The hauler station has been provided with a Hach SC-200 pH analyzer.
 - The pH probe provided includes a 4.5 meter integral cable.
 - Per information provided by Hach, pH probe solution needs to be changed approximately 1 time a year/
 - Per recommendation from Hach, when the pH probe is in storage, the tip needs to be wetted approximately every 2 months.
 - The pH probe needs to be continuously wetted once the unit is installed.
 - Please confirm the mounting location for the pH probe.
10. Please confirm the maximum ambient temperature for where the control panel will be located.
11. Quantity (100) network swipe cards have been provided.

12. The main control panel PLC and OIU will be programmed with the following software:
- a. PLC: RSLogix 500 (Latest Version)
 - b. OIU: PVC Design Station (Latest Version)



LETTER OF CLARIFICATION

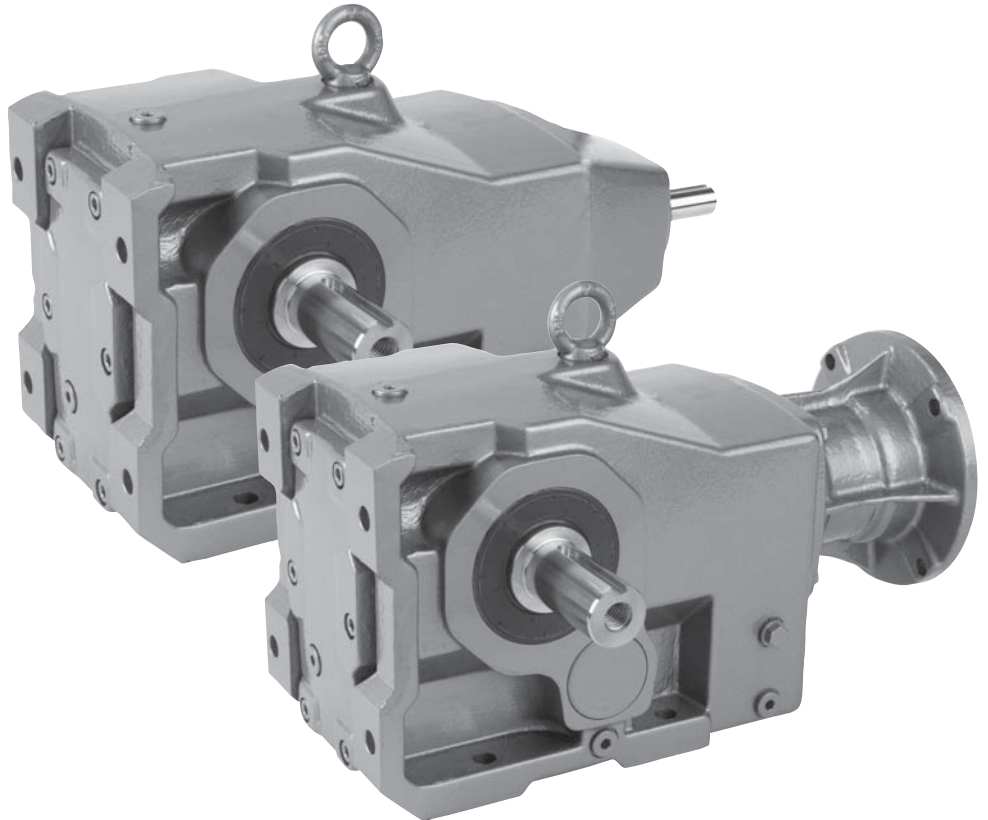
4 ACCESSORY EQUIPMENT

Gear Reducer - Drum

Right-angle Helical-bevel Reducers Selection & Combinations

Selection

- SK 92072
- SK 92172
- SK 92372
- SK 92672
- SK 9012.1
- SK 9013.1
- SK 9016.1
- SK 9017.1
- SK 92772
- SK 9022.1
- SK 9023.1
- SK 9032.1
- SK 9033.1
- SK 9042.1
- SK 9043.1
- SK 9052.1
- SK 9053.1
- SK 9072.1
- SK 9072.1/32
- SK 9072.1/42
- SK 9082.1
- SK 9082.1/42
- SK 9082.1/52
- SK 9086.1
- SK 9086.1/52
- SK 9092.1
- SK 9092.1/52
- SK 9096.1
- SK 9096.1/62
- SK 9096.1/63



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Model Type	Gear Ratio i_{tot}	Output Speed n_2 1750 rpm [rpm]	Output Torque* T_2 [lb-in]	Max. Solid in
				1750 rpm 11 [hp]
SK 92772	4.81	364	3629	7.50
	5.43	322	3761	7.50
	6.11	286	3717	7.50
	6.41	273	3983	7.50
	7.60	230	4204	7.50
	8.55	205	4381	7.50
	9.63	182	4381	7.50
	10.88	161	4558	7.50
	12.43	141	4558	7.50
	13.91	126	4735	7.50
	15.60	112	5177	7.50
	17.83	98	5177	7.50
	19.73	89	5310	7.50
	22.22	79	5487	6.88
25.39	69	5753	6.30	



Helical-Bevel Ordering Guide



	Gear Unit	Shaft/Mounting	Reducer Options	Motor/Input	Motor Options
SK	① SK9016.1	② AF	③	④ N140TC	
				see page 690	see page 690

① Gear Unit			
92072	9012.1	9013.1	9072.1/32
92172	9016.1	9017.1	9072.1/42
92372	9022.1	9023.1	9082.1/42
92672	9032.1	9033.1	9082.1/52
92772	9042.1	9043.1	9086.1/52
	9052.1	9053.1	9092.1/52
	9072.1		9096.1/62
	9082.1		
	9086.1		
	9092.1		
	9096.1		

② Shaft/Mounting		
- Solid Shaft/Foot Mount	VXZ - Solid Shaft/Foot/B14 Flange	AZ - Hollow Shaft/B14 Flange
VZ - Solid Shaft/B14 Flange	VXF - Solid Shaft/Foot/B5 Flange	AF - Hollow Shaft/B5 Flange
VF - Solid Shaft/B5 Flange	LXZ - Double Solid Shaft/Foot/ B14 Flange	AX - Hollow Shaft/Foot Mount
LX - Double Solid Shaft/Foot		AXZ - Hollow Shaft/Footed/B14 Flange
		AXF - Hollow Shaft/Footed/B5 Flange

③ Reducer Options		
<input type="checkbox"/> B - Fixing Element Kit	<input type="checkbox"/> VL - Heavy Duty Output Bearings	<input type="checkbox"/> VI - Flouro-rubber Seals
<input type="checkbox"/> H - Hollow Shaft Cover	<input type="checkbox"/> VL2 - Spread Bearing Design	<input type="checkbox"/> OSG - Oil Sight Glass
<input type="checkbox"/> H66 - IP66 Hollow Shaft Cover	<input type="checkbox"/> VL3 - Oil Safe Spread Bearings	<input type="checkbox"/> OA - Oil Expansion Chamber
<input type="checkbox"/> D - Torque Arm	<input type="checkbox"/> VL4 - Drywell	<input type="checkbox"/> OC - Oil Cooler
<input type="checkbox"/> K - Bottom Mount Torque Arm	<input type="checkbox"/> SM5 - Stainless Steel Shaft	<input type="checkbox"/> WC - Water Cooling Cover
<input type="checkbox"/> PR - Flange Pilot Removal	<input type="checkbox"/> SWA - Special Hollow Shaft	<input type="checkbox"/> LL - Long Term Storage
<input type="checkbox"/> SH - Shrink Disc & Cover	<input type="checkbox"/> SWV - Special Solid Shaft	<input type="checkbox"/> MDP - Magnetic Drain Plug
<input type="checkbox"/> VSH - Heavy Duty Shrink Disc & Cover	<input type="checkbox"/> R - Backstop	<input type="checkbox"/> ADP - Additional Drain Plug

④ Input Shaft	NEMA Adapter	IEC Adapter	Integral Motors		Integral Energy Efficient Motors		Scoop	Motor Platform	Servo Adapter (Keyed)
W	N56C N140TC	IEC 63 IEC 71	63S/4 - 0.16hp 63L/4 - 0.25hp	160L/4 - 20hp 180MX/4 - 25hp	80LH/4 - 1hp 90SH/4 - 1.5hp	200LH/4 - 40hp 225SH/4 - 50hp	S56 S140T	MKN056 MKN140	SEP 100 SEP 130
	N180TC N210TC N250TC N280TC N320TC N360TC N400TC	IEC 80 IEC 90 IEC 100 IEC 112 IEC 132 IEC 160 IEC 180 IEC 200 IEC 225 IEC 250 IEC 280 IEC 315	71L/4 - 0.50hp 80S/4 - 0.75hp 80L/4 - 1hp 90S/4 - 1.5hp 90L/4 - 2hp 100L/4 - 3hp 100LA/4 - 5hp 112M/4 - 5.4hp 132S/4 - 7.5hp 132M/4 - 10hp 160M/4 - 15hp	180LX/4 - 30hp 200L/4 - 40hp 225S/4 - 50hp 252SM/4 - 60hp 250M/4 - 75hp 280S/4 - 100hp 280M/4 - 125hp 315S/4 - 150hp 315M/4 - 175hp 315MA/4 - 200hp 315L/4 - 250hp	90LH/4 - 2hp 100LH/4 - 3hp 112MH/4 - 5hp 132SH/4 - 7.5hp 132MH/4 - 10hp 160MH/4 - 15hp 160LH/4 - 20hp 180MH/4 - 25hp 180LH/4 - 30hp	2525MH/4 - 60hp 250MH/4 - 75hp 280SH/4 - 100hp 280MH/4 - 125hp 315SH/4 - 150hp 315MH/4 - 175hp 315MAH/4 - 200hp 315LH/4 - 250hp	S180T S210T S250T S280T S320T S360T S400T	MKN180 MKN210 MKN250 MKN280 MKN320 MKN360 MKN400	SEP 165 SEP 215 SEP 300 Servo Adapter (Clamp) SEK 100 SEK 130 SEK 165 SEK 215 SEK 300
				Other Speeds Available		Other Speeds Available			

Product Specifications

Ratio
26.29 :1
see pages 398 - 446

Output Speed
rpm
see pages 398 - 446

Mounting Position

- M1
- M2
- M3
- M4
- M5
- M6
- Special

Paint

- Standard Stainless Steel Paint
- NSD+ (gray)
- NSD+W (white)
- NSD-X3 (gray)
- NSD-X3W (white)
- Casting Primed
- Special BLUE

Lubricant

- Standard
- Synthetic
- Food Grade
- Other

Solid Shaft Side (if required)

- Shaft Side A
- Shaft Side B
- Shaft Side A&B
see page 18

Hollow Shaft Diameter (if required)
see pages 566 - 573

B5 Flange Side (if required)

- Flange Side A
- Flange Side B
- Flange Side A&B
see page 18

B5 Flange Diameter (if required)

Torque Arm Side & Location (if required)

- Side A
- Side B
- Location
see page 18

Shrink Disc Side (if required)

- Side A
- Side B
- see page 18

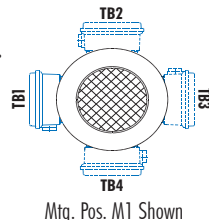
H66 Side (if required)

- H66 Side A
- H66 Side B
- see page 18

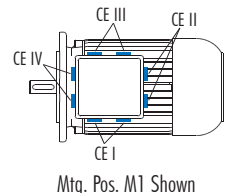
Gearmotor Only Details

- Voltage & Frequency**
- 230/460V-60Hz (460V only ≥ 40 hp)
 - 575V-60Hz
 - 208V-60Hz
 - 400V-50Hz
 - 115/230V-60Hz, 1 ph.
 - Other

- Terminal Box Pos.**
- TB1
 - TB2
 - TB3
 - TB4



- Conduit Entry Loc.**
- CE I *
 - CE II
 - CE III *
 - CE IV
- * Brakemotor





Gearbox Selection

A number of factors are considered when selecting a gear unit, including gearbox rating, service factor, speed and speed variation, horsepower, thermal capacity, ratio, physical size, ambient conditions and cost. Below are some guideline steps to help aid in the gear unit selection.

1. Determine the speed and/or gear ratio
2. Determine the required power or torque
3. Determine Service Factor
4. Select the basic gearbox type and input
5. Determine the required mounting position
6. Select options
7. Checks – overhung load, thrust load, NEMA motor weight, thermal considerations, and other application considerations

1. Speed and Gear Ratio

The first step in selecting a gear unit is determining the final output speed or speeds you need. This speed is normally described in revolutions per minute (rpm). This output speed or speeds is determined by the input speed to the gear unit divided by its gear ratio. Their relationship is described by the following formulas.

$$i \text{ (gear ratio)} = \frac{\text{Input speed [rpm]}}{\text{Output speed [rpm]}}$$

$$\text{Output speed [rpm]} = \frac{\text{Input speed [rpm]}}{i \text{ (gear ratio)}}$$

To specify a gear unit, you can identify either gear ratio needed or the output speed (rpm) if the input speed is known.

2. Power and Torque

The second step for selecting a gear unit is the required power or torque needed to power the load. Torque in this catalog is normally expressed in pound-inches [lb-in].

$$\text{Power [hp]} = \frac{\text{Torque [lb-in]} \times \text{speed [rpm]}}{63025}$$

$$\text{Torque [lb-in]} = \frac{\text{Power [hp]} \times 63025}{\text{speed [rpm]}}$$

For a proper selection you must ensure that the motor or other prime mover can produce enough torque or power and that the gear unit has adequate torque or power capacity. You must also consider if the power or torque is specified at the input or output of the gear unit. The Helical-worm gear units have lower efficiency than in-line or bevel gear units, therefore helical-worm products efficiency may need to be considered in the selection.

To specify a gear unit you can identify either torque or power.

3. Service Factor or Service Class

In addition to power or torque, service factor must also be considered. A service factor is essentially the ratio of extra capacity in a gear unit compared to the power or torque that is needed to run that application. The goal of selecting a gear unit with extra capacity (service factor) is to provide adequate service life in operation.

One reason to apply a larger service factor is if a unit operates more hours per day. If a unit runs 24 hours per day it should normally have a higher service factor than a unit that runs 8 hours per day if you expect the same calendar life.

A second reason for applying a larger service factor is to cope with a more difficult application. Even if it takes the same power and speed to operate a rock crusher as a fan, the rock crusher needs a stronger gearbox (higher service factor) to give the same calendar operating life as the gear unit powering the fan.

The real question is how to determine the proper service factor for a gear unit in an application. Following are four possible methods.

Customer or User Specification

Many customers will have their own service factor guidelines or specifications.

AGMA Service Factoring

American Gear Manufacturers Association (AGMA) publishes lists of recommended service factors for different applications. These service factor recommendations have been determined from the experience of many gear manufacturers and are in AGMA standard 6010. See page 68 for additional detail.

AGMA Service Classes

American Gear Manufacturers Association (AGMA) has another method for selecting gear units service factors. AGMA standard 6009 lists many applications by a service class (I, II, III) with class I being the simplest applications and class III being the hardest. These application service classes are associated with a range of service factors by the following table.

AGMA Service Class	Service Factor
I	1.00 to 1.39
II	1.40 to 1.99
III	2.00 and above

In the gearmotors selection table each unit is also classified by an AGMA service class. See page 64 for additional detail.

Selection Information



NORD Mass Acceleration Service Factoring

NORD often uses a calculation based system to properly assign a service factor. This system considers hours of operation per day, the severity of the application and the number of times the equipment is cycled. See page 62 for additional detail.

4. Gearbox Type & Input

NORD gear drives are available in a number of mechanical configurations including:

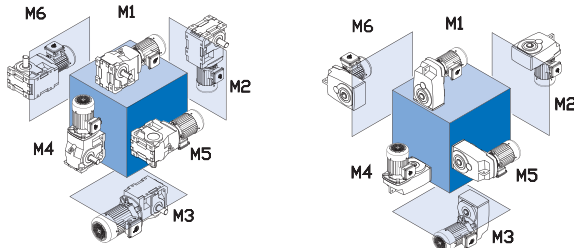
- Helical in-line
- Clincher™ shaft mount
- Right-angle helical-bevel
- Right-angle helical-worm

NORD's modular design allows for a number of different inputs to be added to NORD reducers including:

- Integral motor
- NEMA-C and IEC motor adapter
- Solid input shaft
- Servo motor adapter
- Sugar scoop mount
- Top motor mount platform
- NORDISC™ variable speed friction drives
- Titan™ variable speed belt boxes

5. Mounting Position

The gearbox mounting position is an important and often overlooked specification. The mounting position determines how much oil the gear reducer requires, in addition to determining the position of the oil drain, oil fill and vent on the gear drive. NORD offers six basic mounting positions. If your application requires a variation from the six basic mounting positions, please contact NORD.



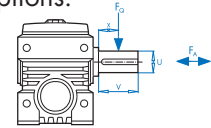
Many gearbox and motor options require a location designation. For example a right-angle helical-bevel unit with a single solid shaft extension requires a shaft extension side location. Please see page 18 for additional options that require location designation.

6. Options

NORD offers a number of mechanical, protective, paint and lubrication options for gear reducers and motors. Please see pages 19 for gear unit options and refer to the motor section (Section G) for motor options.

7. Checks

Overhung Load



An overhung or radial load exists when a force is applied at right-angles to a shaft beyond the shaft's outermost bearing. Pulleys, sheaves and sprockets will cause an overhung load when used as a power take-off. The amount of overhung load will vary, depending on the type of power take-off used and where it is located on the shaft.

Overhung load [FQ] can be found in the gearmotor rating tables and input shaft overhung load ratings [FQ1] can be found on pages 52 - 59. Overhung load capacities should not exceed the values in the table to ensure long bearing life. Overhung load capacities are to be applied at the midpoint of the shaft extension and without thrust loads.

To calculate overhung load see page 52.

Thrust Loads (Axial)

Loads that are directed towards or away from the gearbox along the axis of the shaft are called thrust or axial loads. Output shaft thrust capacity [FA] can be found in the gearmotor rating tables. Input shaft capacity [FA1] can be found on pages 52. Thrust load capacities should not exceed the values listed in the tables to ensure long bearing life. Thrust load capacities are listed for pure axial loads with no overhung load. Contact NORD for combination loads or a more exact examination of the application.

NEMA C-face Motor Weight Limits

When mounting a motor to a NORD NEMA C-face motor adapter it is important to consider the motor's weight. Following is a table that includes the maximum motor weight the NEMA adapter can support. If the motor exceeds the listed weight it must be externally supported. When a C-face mounted motor is externally supported care must be taken to ensure that the support system does not impose additional pre-loads on the NEMA motor adapter.

NEMA Weights

Motor FRAME	56C	143TC	145TC	182TC	184TC
Max Weight [lb]	66	88	110	130	175
Motor FRAME	210TC	250TC	290TC	324TC	326TC
Max Weight [lb]	220	450	550	770	1100
Motor FRAME	365TC				
Max Weight [lb]	1550				

Selection Information



Gear Reducer Ratings

The permissible continuous power limit of gear reducers is limited by both the mechanical rating and the thermal rating. The mechanical rating depends upon the material strength of the gear reducer's gears, bearings, housing, shafts, etc. The mechanical input power limit to the reducer is also a function of the mechanical power rating divided by the relevant reducer service factor.

The thermal rating or thermal limit depends upon the amount heat generated within the reducer and is influenced by a variety of factors including:

- Churning or splashing losses in the lubricant which depend upon reducer type, ratio, input style, mounting position or oil fill-level, and the circumferential travel velocities of the gear wheels.
- The actual speed and load conditions. These factors determine load-dependent losses in the gears and frictional losses in the gears, bearings and seal areas.
- Ambient Conditions:
 - Ambient Temperature.
 - Amount of free air circulation around the drive.
 - Possible near-by heat sources.
 - Heat dissipation or the ability of the reducer to transfer heat through the housing, shafts, and the mating sub-structure or mounting surface.

Observing the Reducer's Thermal Limit

When to Contact NORD

Through computer program analysis NORD can evaluate application conditions and the impact they have on a reducer's thermal capacity.

When applying helical in-line, Clincher™ shaft mount, and helical-bevel gear units of case sizes 6 and larger (SK62, SK6282 and SK9072.1 and larger), consult NORD if any two or more of the following conditions apply:

- Gear ratio, $i_{total} \leq 24:1$ or $\leq 48:1$ for helical-bevel units
- Input power, $P_1 \geq 60$ hp (45 kw)
- Input speed, $n_1 > 1800$
- Vertical positioning (mounting position M2 or M4)
- Input configuration: NEMA C-face, IEC, servo adapter or solid-shaft input (Type-W)
- Elevated ambient temperature $\geq 86^\circ$ F (30 °C)

When applying helical-worm or worm gear units, please consult NORD if any one of the following conditions applies:

- Input speed, $n_1 > 1800$
- Vertical positioning (mounting position M2 or M4)
- Input configuration: NEMA C-face, IEC, servo adapter or solid-shaft input (Type-W)
- Elevated ambient temperature $\geq 86^\circ$ F (30 °C)

Advise NORD of any special application considerations:

- Confined space or limited air circulation
- Exposure to other near-by radiant heat sources
- Dirty or dusty environments
- High altitude operation $> 3,280$ ft (1000 m) a.s.l.

Dangers of Reducer Overheating

The following problems may result when the reducer's thermal capacity or maximum oil sump temperatures are exceeded:

- Lubrication oxidation, breakdown and deterioration.
- A decrease in lubrication viscosity and film thickness.
- Loss of critical bearing and gear clearances required for proper lubrication.
- Increased contact pressures and increased operating temperatures in the critical load zones of the gearing and bearings.
- An increased possibility for metal-to-metal contact and premature component wear.
- A significant reduction in the lubricant's ability to prevent scuffing, pitting, and in extreme cases galling or welding.

Maximum Oil Sump Temperature Limit

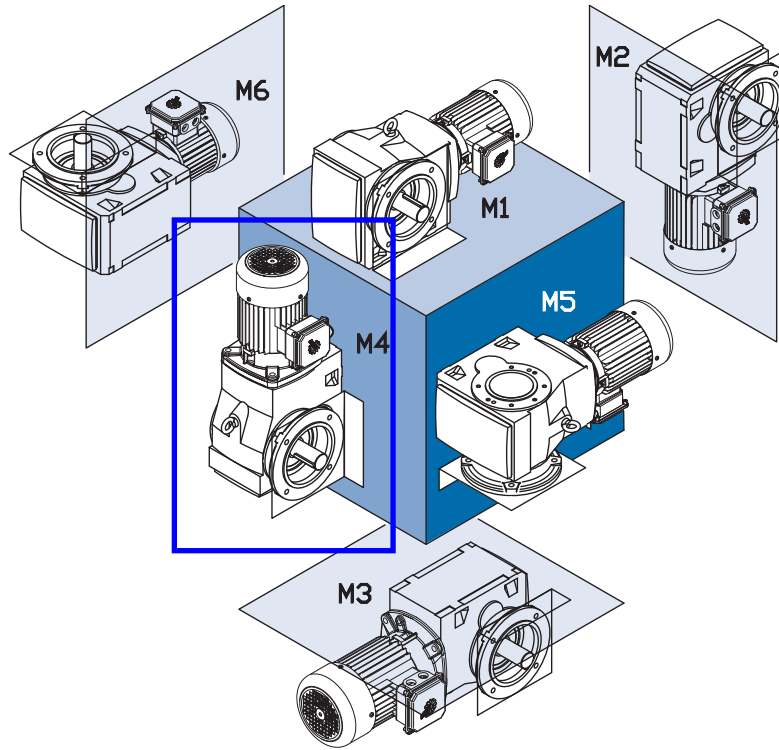
To prevent reducer overheating, the reducer's maximum oil sump temperature limit must not be exceeded for prolonged periods of operation (up to 3 hours continuous operation, depending upon reducer size).

Oil Type	Maximum Oil Temperature Limit	
	NORD	AGMA 9005-D94
Mineral	80-85 °C (176-185 °F)	95 °C (203 °F)
Synthetic	105 °C (220 °F)	107 °C (225 °F)

Measures to Expand the Application Range

There are a variety of measures that may be taken in order to protect against thermal overload and expand the application range of the gear reducer. Common examples include the following:

- Recommending a change in lubrication viscosity and/or a specific synthetic lubricant type.
- Applying high-temperature seals.
- Increasing air flow around the gear unit.
- Shielding or protecting the reducer from high heat sources.
- Considering an integral motor instead of the bolt-on input assembly covers. In many cases the motor fan will substantially increase air-flow around the gear unit.
- Add an Oil Expansion/Overflow Chamber (Option "OA") or an Oil Reservoir (Option "OT").
- Oil Cooler (Option "OC").
- Water Cooling Cover (Option "WC")



Mounting Position	M1		M2		M3		M4		M5		M6	
	Quarts	Liters	Quarts	Liters	Quarts	Liters	Quarts	Liters	Quarts	Liters	Quarts	Liters
SK92072	0.42	0.40	0.63	0.60	0.53	0.50	0.53	0.50	0.42	0.40	0.42	0.40
SK92172	0.53	0.50	0.97	0.92	0.92	0.87	1.11	1.05	0.79	0.75	0.69	0.65
SK92372	1.22	1.15	1.59	1.50	1.27	1.20	1.80	1.70	1.22	1.15	1.22	1.15
SK92672	1.64	1.55	2.96	2.80	2.64	2.50	3.49	3.30	2.54	2.40	2.54	2.40
SK92772	2.91	2.75	4.65	4.40	4.76	4.50	4.76	4.50	3.70	3.50	3.70	3.50
SK9012.1	0.74	0.70	2.01	1.90	2.01	1.90	2.54	2.40	1.27	1.20	1.80	1.70
SK9013.1	1.27	1.20	2.43	2.30	2.33	2.20	3.17	3.00	1.48	1.40	2.01	1.90
SK9016.1	0.74	0.70	2.01	1.90	2.01	1.90	2.54	2.40	1.27	1.20	1.80	1.70
SK9017.1	1.27	1.20	2.43	2.30	2.33	2.20	3.17	3.00	1.48	1.40	2.01	1.90
SK9022.1	1.37	1.30	2.75	2.60	3.70	3.50	4.44	4.20	2.11	2.00	2.96	2.80
SK9023.1	2.54	2.40	3.17	3.00	4.02	3.80	5.60	5.30	2.33	2.20	3.28	3.10
SK9032.1	2.01	1.90	5.50	5.20	6.76	6.40	7.72	7.30	3.49	3.30	5.39	5.10
SK9033.1	4.02	3.80	6.02	5.70	7.29	6.90	8.98	8.50	3.81	3.60	5.92	5.60
SK9042.1	3.81	3.60	10.30	9.70	12.0	11.4	12.2	11.5	6.87	6.50	8.67	8.20
SK9043.1	6.02	5.70	10.8	10.2	15.5	14.7	15.5	14.7	6.98	6.60	10.1	9.60
SK9052.1	7.93	7.50	17.4	16.5	21.1	20.0	23.8	22.5	12.2	11.5	19.0	18.0
SK9053.1	13.2	12.5	19.0	18.0	22.7	21.5	28.0	26.5	13.7	13.0	18.0	17.0
SK9072.1	12.7	12.0	29.1	27.5	34.9	33.0	40.7	38.5	20.1	19.0	27.5	26.0
SK9082.1	22.2	21.0	57.1	54.0	69.8	66.0	84.6	80.0	40.2	38.0	55.0	52.0
SK9086.1	38.1	36.0	82.4	78.0	96.2	91.0	107	101	56.0	53.0	80.3	76.0
SK9092.1	42.3	40.0	137	130	163	154	185	175	86.7	82.0	96.2	91.0
SK9096.1	74.0	70.0	198	187	204	193	272	257	119	113	165	156

Lubrication



Lubrication Types

Proper gearbox lubrication is essential in order to reduce friction, heat, and component wear. Lubricants reduce heat and wear by inserting a protective “fluid boundary” between mating parts and preventing direct metal to metal contact. Lubricants also help prevent corrosion and oxidation, minimize foam, improve heat transfer, optimize reducer efficiency, absorb shock loads and reduce noise.

Mounting position not only determines the proper fill-level but may also have some effect on final reducer assembly. If considering any mounting positions that are not shown as catalog-standard options, it is critical that the customer consult with NORD prior to ordering. Unless otherwise specified, NORD supplies most all gear units (*) factory-filled with the standard lubrication type and the appropriate amount of lubricating oil.

* Gear units SK10282, SK10382, SK11282, SK11382, SK12382, and SK9096.1 are supplied without oil.

Standard Oil Lubricants

Gear Unit Type	Ambient Temperature	Oil Type	ISO Viscosity	Manufacturer Brand / Type
Helical-Inline, Parallel-Shaft, & Helical-Bevel	-4 to 104 °F (-20 to 40 °C)	MIN-EP	VG 220	Shell / Omala 220 ♣
	-40 to 140 °F (-40 to 60 °C)	PAO	VG 220	Mobil SHC 630 ♣
	23 to 104 °F (-5 to 40 °C)	FG	VG 220	Shell / FM 220 ♣
Helical-Worm	-22 to 122 °F (-30 to 50 °C)	PAO	VG 680	Mobil SHC 636 ♣

Optional Oil Lubricants

Gear Unit Type	Ambient Temperature	Oil Type	ISO Viscosity	Manufacturer Brand / Type
Helical-Inline, Parallel-Shaft, & Helical-Bevel	-31 to 176 °F (-35 to 80 °C)	PAO	VG 460	Mobil SHC 634
	-40 to 77 °F (-40 to 25 °C)	PAO	VG 150	Mobil SHC 629
	-40 to 140 °F (-40 to 60 °C)	FG-PAO	VG 220	Shell / Cassida GL 220
Helical-Worm	-40 to 122 °F (-40 to 50 °C)	FG-PAO	VG 460	Shell / Cassida GL 460

Standard Bearing Grease Lubricants

Grease Type / Thickener	Ambient Temperature	NLGI Grade	Manufacturer Brand / Type
Standard (Li-Complex)	-22 to 140 °F (-30 to 60 °C)	NLGI 2	Shell Albida EP LC2 ♣
High Temp (Polyurea)	-13 to 176 °F (-25 to 80 °C)	NLGI 2	Mobil Polyrex EP 2 ♣
Food-Grade (Al-Complex)	-13 to 104 °F (-25 to 40 °C)	NLGI 2	Mobil Grease FM 222 ♣

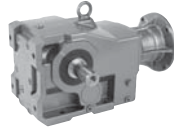
♣ Stocked Lubricant

Oil Formulation Codes

MIN-EP	Mineral Oil with EP Additive
PAO	Synthetic Polyalphaolefin Oil
PG	Synthetic Polyglycol Oil
FG	Food-Grade Oil
FG-PAO	Food-Grade, Synthetic Polyalphaolefin Oil

Important Notes

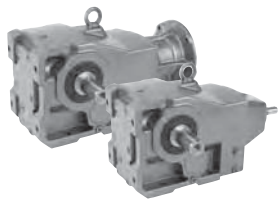
- In worm gears avoid using (EP) gear oils that contain sulfur-phosphorous chemistries, as these additives can react adversely with bronze worm gears and accelerate wear.
- Food grade lubricants must be in compliance with FDA 212 CFR 178.3570 and qualify as a NSF-H1 lubricant. Please consult with lubrication manufacture for more information.
- When making a lubrication change, check with the lubrication supplier to assure compatibility and to obtain recommended cleaning or flushing procedures.
- Do not mix different oils with different additive packages or different base oil formulation types. Polyglycol (PG) oils are not miscible with other oil types and should never be mixed with mineral oil, or Polyalphaolefin (PAO) oil.
- Please Consult NORD if considering cold-temperature oils below an ISO Viscosity VG100 or lower.



Approximate Weights [lb]

Type	W	56C	140TC	180TC	210TC	250TC	280TC	320TC	360TC
SK 92072	15	24	24	–	–	–	–	–	–
SK 92172	26	35	35	–	–	–	–	–	–
SK 92372	40	49	49	60	–	–	–	–	–
SK 92672	79	86	86	97	112	–	–	–	–
SK 9012.1	75	86	86	101	–	–	–	–	–
SK 9013.1	86	90	–	–	–	–	–	–	–
SK 9016.1	77	88	88	104	–	–	–	–	–
SK 9017.1	88	93	–	–	–	–	–	–	–
SK 92772	99	101	101	112	128	128	–	–	–
SK 9022.1	93	104	104	119	–	–	–	–	–
SK 9023.1	104	108	–	–	–	–	–	–	–
SK 9032.1	150	154	154	163	183	–	–	–	–
SK 9033.1	154	165	165	–	–	–	–	–	–
SK 9042.1	276	265	265	280	311	333	–	–	–
SK 9043.1	287	291	291	300	–	–	–	–	–
SK 9052.1	441	430	430	445	476	498	498	–	–
SK 9053.1	459	463	463	472	–	–	–	–	–
SK 9072.1	794	–	–	767	796	851	851	882	915
SK 9072.1/32	803	807	807	816	836	–	–	–	–
SK 9072.1/42	862	–	851	897	919	942	–	–	–
SK 9082.1	1532	–	–	1338	1369	1424	1424	1455	1488
SK 9082.1/42	1435	1424	1424	1440	1471	1493	–	–	–
SK 9082.1/52	1491	–	–	1495	1526	1548	1548	–	–
SK 9086.1	2084	–	–	1890	1921	1976	1976	2007	2040
SK 9086.1/52	2042	2031	2031	2046	2077	2099	2099	–	–
SK 9092.1	3341	–	–	3147	3177	3233	3233	3263	3296
SK 9092.1/52	3299	3288	3288	3303	3334	3356	3356	–	–
SK 9096.1	4221	–	–	–	4057	4113	4113	4143	4176
SK 9096.1/62	4298	4287	4287	4302	4333	4355	4355	–	–
SK 9096.1/63	4315	4304	4304	4319	4350	4372	4372	–	–

Above weights are approximate. Depending upon ratio, oil quantity and optional equipment, reducer weights may be different than shown.
Exact weights can be obtained after the unit is fully assembled.



SK 9016.1, SK 9017.1 NEMA-C + W Ratings & Combinations

Model Type	Gear Ratio	Output Speed n_2 1750 rpm [rpm]	Output Torque* T_{2max} [lb-in]	Maximum input power [◇] Solid input shafts type "W"				NEMA C-Face* Available Combinations										
				Input Speed				56C	140TC	80TC	210TC	250TC	280TC	320TC	360TC			
				1750 rpm [hp]	1150 rpm [hp]	875 rpm [hp]	580 rpm [hp]											
SK 9016.1	12.51	140	4602	5.00	3.30	2.50	1.65	X	X	X								
	15.10	116	4602	5.00	3.30	2.50	1.65	X	X	X								
	17.45	100	4779	5.00	3.30	2.50	1.65	X	X	X								
	20.51	85	5133	5.00	3.30	2.50	1.65	X	X	X								
	23.11	76	4602	5.00	3.30	2.50	1.65	X	X	X								
	26.29	67	5310	5.00	3.30	2.50	1.65	X	X	X								
	30.52	57	5310	4.80	3.17	2.40	1.58	X	X	X*								
	34.81	50	5310	4.21	2.78	2.11	1.39	X	X	X*								
	40.92	43	5310	3.62	2.39	1.81	1.20	X	X	X*								
	46.11	38	5399	3.25	2.15	1.63	1.07	X	X	X*								
	52.44	33	5399	2.83	1.87	1.41	0.93	X	X	X*								
	63.97	27	5399	2.31	1.53	1.16	0.76	X	X	X*								
	71.88	24	5310	2.02	1.33	1.01	0.67	X	X									
	81.38	22	5310	1.85	1.22	0.93	0.61	X	X*									
	91.77	19	4425	1.33	0.88	0.67	0.44	X	X*									
	116.52	15	5399	1.28	0.85	0.64	0.42	X	X*									
	142.41	12	5399	1.03	0.68	0.51	0.34	X	X*									
	149.81	12	5399	1.03	0.68	0.51	0.34	X	X*									
183.10	9.6	5399	0.82	0.54	0.41	0.27	X*	X*										
205.93	8.5	5399	0.73	0.48	0.36	0.24	X*											
234.64	7.5	5222	0.62	0.41	0.31	0.21	X*											
277.84	6.3	5222	0.52	0.34	0.26	0.17	X*											
SK 9017.1	134.32	13	3806	0.50	0.33	0.25	0.17	X*										
	177.89	9.8	5045	0.50	0.33	0.25	0.17	X*										
	235.64	7.4	5399	0.50	0.33	0.25	0.17	X*										
	267.99	6.5	5399	0.50	0.33	0.25	0.17	X*										
	367.33	4.8	5399	0.41	0.27	0.21	0.14	X*										
	493.12	3.5	5399	0.30	0.20	0.15	0.10	X*										
	558.25	3.1	5399	0.27	0.18	0.13	0.09	X*										
	629.56	2.8	5399	0.24	0.16	0.12	0.08	X*										
	1256.07	1.4	5399	0.12	0.08	0.06	0.04	X*										
1412.69	1.2	5399	0.10	0.07	0.05	0.03	X*											

* Caution - The motor power may exceed the gear unit's mechanical torque capacity
 ◇ The mechanical power limit of the solid input shaft type "W" may limit the reducer rating.
 All ratings are mechanical. See page 14 for thermal considerations.

lb	W	56C	140TC	180TC
SK 9016.1	77	88	88	104
SK 9017.1	88	93	-	-

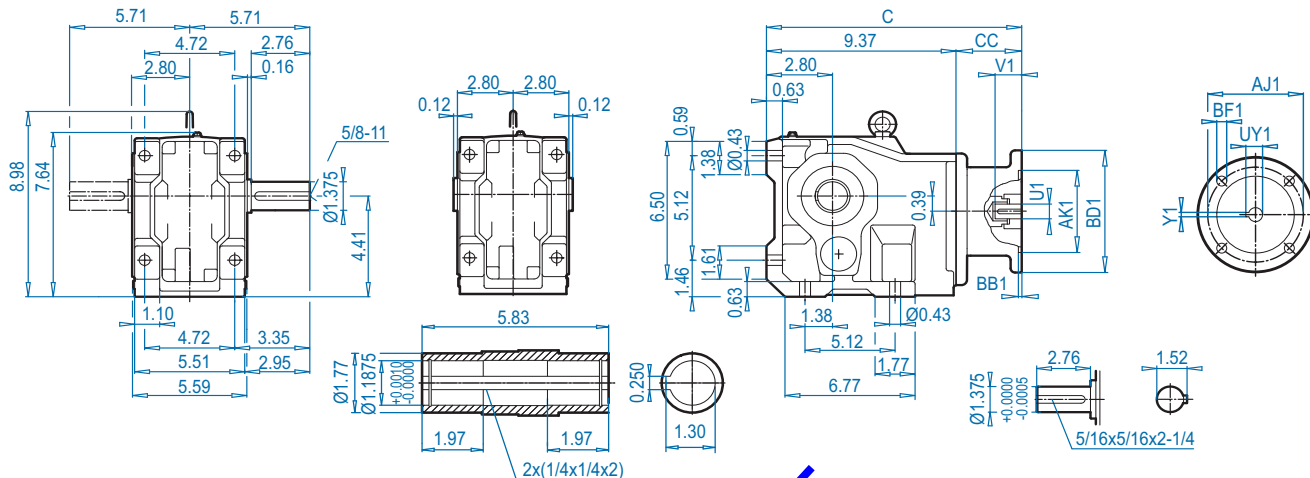
SK 9016.1 + NEMA



SK 9016.1

SK 9016.1AX

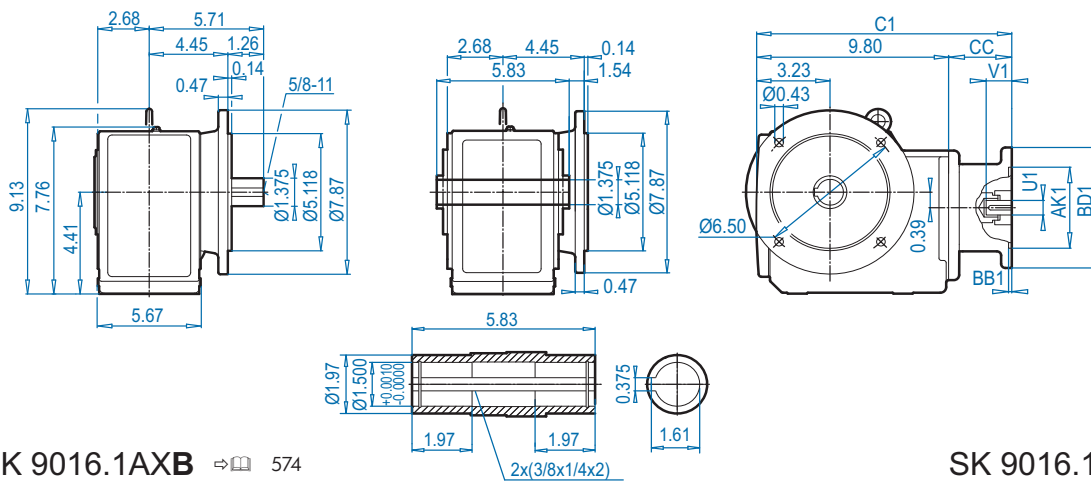
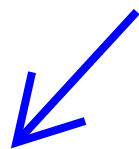
NEMA Input



DIMENSIONS
Dimensions in Inches

SK 9016.1VF

SK 9016.1AF



ALTERNATE SHAFTS SEE PAGES 566 - 573

SK 9016.1AXB ⇒ 574

SK 9016.1AFB ⇒ 574



NEMA Dimensions

Type	AJ1	AK1	BB1	BD1	BF1	U1	V1	UY1	Y1	C	C1	CC
56C	5.88	4.500	0.18	6.54	0.43	0.625	2.06	0.71	0.188	13.87	14.30	4.50
140TC	5.88	4.500	0.18	6.54	0.43	0.875	2.12	0.96	0.188	13.87	14.40	4.50
180TC	7.25	8.500	0.23	9.17	0.59	1.125	2.62	1.24	0.250	15.02	15.45	5.65

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Motor - Drum

MAX-E1® FAMILY NEMA PREMIUM EFFICIENCY



TYPE AEHE, AEHH8N, AEHH8NCF, AEUH8NDC

Effective 05-01-13
Supersedes 08-01-11



APPLICATIONS:

- Fans & Blowers
- Pumps
- Crushers
- Compressor
- Mixers
- Conveyors
- Any Severe Duty/ Petro-Chem/ Pulp & Paper Application

FEATURES:

- 3/4 - 800 hp: 3600, 1800, 1200, 900 RPM
- 1 - 100 hp: Foot Mounted with C-Flange or Round Body C-Flange
- Totally Enclosed Fan Cooled (IP54 Rating; IP55 Ratings for Frames Sizes 5000 and Larger)
- NEMA Premium Efficient Ratings From 1 - 500 hp, Denoted Catalog Number Prefix of "EP" - Note (1)
- Department of Energy Efficiency Certification # CC002A
- 36 Month Warranty from Date of Manufacture
- 3 Phase, 60 Hz, 230/ 460V (Usable on 208V) – 150 hp and Larger are 460V Only - Note (2)
- 575V Ratings Available, Denoted by a Catalog Number Suffix of "5" - Note (2)
- 1.15 Service Factor – Continuous
- NEMA Design B Torques as a Minimum; Design C Motors are Denoted with a superscript "C"
- Class B Temperature Rise, Class F Insulation with Phenolic Alkyd Resin Varnish – 2 Dips and Bakes
- Class F Insulation
- Oversized Main Conduit Box Rotatable in 90 Degree Increments – Fully Gasketed with NPT Threaded Entrance – F1 Mounted. F2 Available – See EXTRAS/ OPTIONS Below
- Designed for 40°C Ambient Temperature and 3300 ft. Elevation - Note (3)
- CSA Certified for Class I, Division II, Groups B, C, D; Temp Code T3C, Non Sparking, Non Static Fan - Note (4)
- Bidirectional Rotation Except 2 Pole Motors 5000 Frame and Larger which are Uni-directional CCW Facing the Drive-End. See EXTRAS/ OPTIONS Below if CW Rotation is Required.
- Cast Iron Frame, End Brackets, Fan Cover, and Main Conduit Box
- Dual Drilled Feet – Longer Frames. (i.e. 145T Drilled Also for 143T) Through 449T Frames Only (5)
- 1045 Carbon Steel Shaft.
- Aluminum Die Cast Squirrel Cage Rotor Construction for Frames 5011 and Smaller. Copper/ Copper Alloy Rotor for Frames 5800-6800 Frames.
- Paint System: Phenolic Rust Proof Base Plus Polyurethane Top Coat/ Paint Color: Light Grey – Munsell N5.0
- Vacuum De-Gassed Re-greaseable Ball Bearings (or Roller) on 280TS Frames and Larger Using Polyrex EM Grease
- Single Shielded Bearings on Frames 140T-280T Pre-Packed with Polyrex EM Grease
- Automatic Grease Discharge Fittings on Frames on Re-Greaseable Motors
- Labyrinth Type Metal Flinger on Both Ends for Frames 280TS to 6800
- Rubber Flinger on Drive-End for Frames 140T to 280T
- Cast Iron Inner and Outer Bearing Caps on Both Ends for Frames 280TS to 6800
- Grounding Terminal Inside Main Box
- Stainless Steel Nameplate
- UL Recognized and CSA Approved for Inverter Duty per NEMA MG 1, Part 31 – 300 hp and Below. 350 hp and Above are Suitable for Inverter Duty per NEMA MG 1, Part 31, 4.4.2 - Note (6)
- Inverter Duty Magnet Wire Capable of Withstanding Voltage Spikes of Up to 2200 Volts
- **Precautions should be taken to eliminate or reduce shaft currents that may be imposed on the motor by the VFD as stated per NEMA MG1, Part 31.4.4.3.**
- Insulated Non-Drive End Bearing on 2-Pole Motors 600 hp and Larger
- Speed Ranges: 20:1 VT, 10:1 CT. 350 hp and Larger are 3:1 CT
- 9 Leads - 5 hp and Below, 12 Leads - 7.5 hp to 125 hp, 6 Leads - 150 hp and Larger
- Breather Drains in Both End Frames for Vertical Mount.

EXTRAS/ OPTIONS:

Please refer to pages 77 - 82 for common modifications that can be performed.

Notes:

- (1) NEMA Premium Efficiency levels only applies to 1-500 hp, 3600, 1800, 1200 RPM.
- (2) 208V or the current rating will not appear on the motor nameplate. Please see Modification for Nameplate adder. TWMC carries minimal 575V stock. Please check availability to ensure required motors are in stock. Ratings may be available from our Canadian warehouses or factory. Pricing and lead time may vary.
- (3) Please consult factory for suitability in higher ambients and higher elevations.
- (4) Self-Certification applies to 300 hp and above.
- (5) EP3006, EP3502 and EP3504 are not dual drilled.
- (6) Motor service factor is 1.0 when operated on a VFD.

DATE
JAN. 4, 2007
CAT. #: EPV0024C

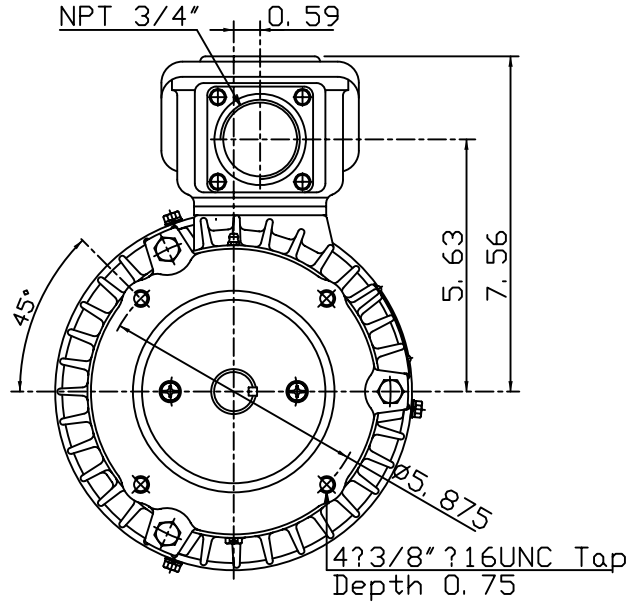
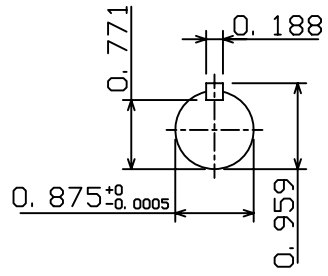
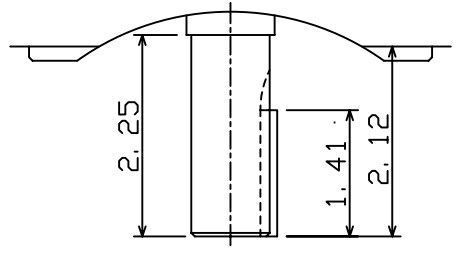
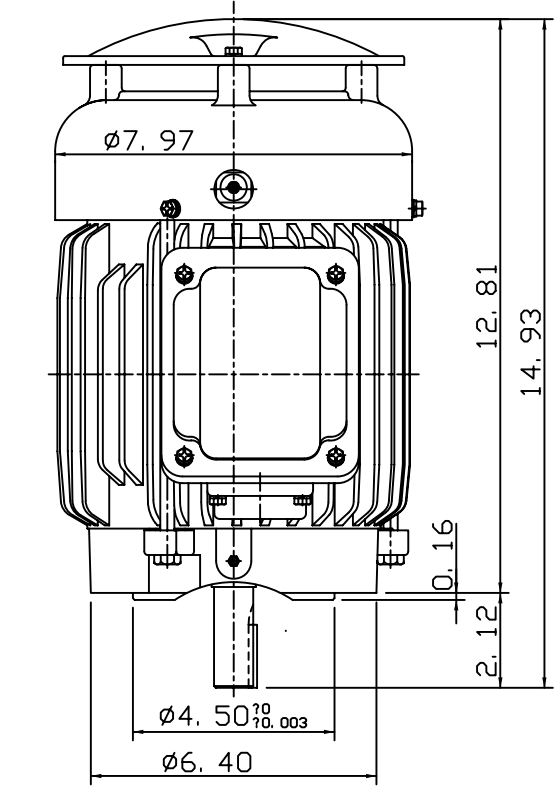
OUTLINE DIMENSIONS
3-PHASE INDUCTION MOTOR

MOTOR TYPE:
AEUH8NDC
FRAME NO. 145TC

Pole	HP	kW	Hz	VOLT	Syn. Speed r/min(rpm)
4	2	1.5	60	230/460	1800

Ins	Rating	Dimension in	Approx Weight	Bearings
F	CONT.	inches	66 LBS	DE: 6205ZZ NDE: 6205ZZ

Totally Enclosed Fan-Cooled Vertical Type. Squirrel-Cage Rotor.



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DWN.	J. H. LIANG	12-23-06
CHKD.	H. C. YAN	12-28-06
APPD.	M. C. TSAI	12-28-06



DWG NO.
31049M990060

TECO Westinghouse

ISSUED 8/29/2014	PERFORMANCE DATA 3-PHASE INDUCTION MOTOR	ENCLOSURE TEFC
TYPE AEUH8NDC		CATALOG# EPV0024C

NAMEPLATE INFORMATION

OUTPUT		POLE	FRAME SIZE	VOLTAGE	HZ	RATED AMBIENT	INS. CLASS	NEMA DESIGN	TIME RATING	SERVICE FACTOR
HP	KW									
2	1.5	4	145TC	230/460	60	40°C	F	B	CONT.	1.15

VARIABLE FREQUENCY DRIVE SERVICE

VARIABLE TORQUE				OHMS/PHASE EQUIVALENT WYE CIRCUIT (AT RATED OPERATING TEMPERATURE 25°C)				
HZ	HP	RPM	TORQUE (lb-ft)	R1	R2	X1	X2	X _m
3~60	0.0003~2	90~1800	0.0175~6.035	3.9555	4.3639	10.417	6.5877	170.99

CONSTANT TORQUE				CONSTANT HORSEPOWER			
HZ	HP	RPM	TORQUE (lb-ft)	HZ	HP	RPM	TORQUE (lb-ft)
6~60	.2~2	180~1800	6.035	60~120	2	1800~3600	6.035~3.0175

TYPICAL PERFORMANCE

FULL LOAD RPM	EFFICIENCY				POWER FACTOR			SOUND PRESSURE LEVEL @ 3 FT Db(A)
	FULL LOAD		3/4 LOAD %	1/2 LOAD %	FULL LOAD %	3/4 LOAD %	1/2 LOAD %	
	MIN.%	NOM.%						
1740	84	86.5	84	84	78	70	57	51

CURRENTS									NEMA KVA CODE LETTER	SAFE STALL TIME IN SECONDS	
NO LOAD			FULL LOAD			LOCKED ROTOR				COLD	HOT
AT 208 VOLT	AT 230 VOLT	AT 460 VOLT	AT 208 VOLT	AT 230 VOLT	AT 460 VOLT	AT 208 VOLT	AT 230 VOLT	AT 460 VOLT			
2.55	2.92	1.46	6.15	5.56	2.78	45.2	50.0	25	L	43	30

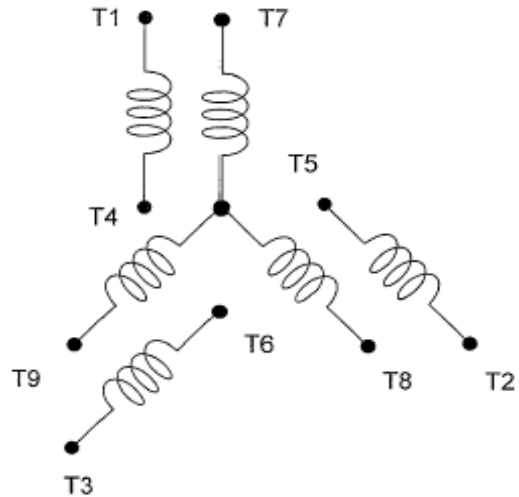
TORQUE				INERTIA			ACCEL TIME (DOL)		ALLOWABLE STARTS PER HOUR	
FULL LOAD (lb-ft)	LOCKED ROTOR %FLT	PULL UP %FLT	BREAK DOWN %FLT	ROTOR WR ² (lb-ft ²)	NEMA LOAD WK ² (lb-ft ²)	MAX ALLOWABLE WK ² (lb-ft ²)	NEMA LOAD WK ² Sec	MAX ALLOWABLE WK ² Sec	COLD	HOT
6.04	270	220	330	0.108	11	51	3.83	17.61	2	1

APPROVED:	M. PRATER	DRAWING NO.	31057EPV0024C	REVISION:	1
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DATE:
September 13, 2006

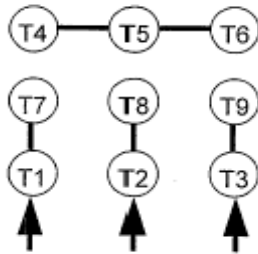
CONNECTION DIAGRAM

CATALOG NO.:
EPV0024C

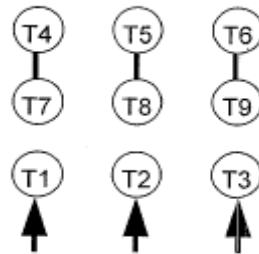


SCHEMATIC - 2Y/Y CONNECTION

ACROSS THE LINE CONNECTION



**LINE
230 VOLT CONNECTION**



**LINE
460 VOLT CONNECTION**



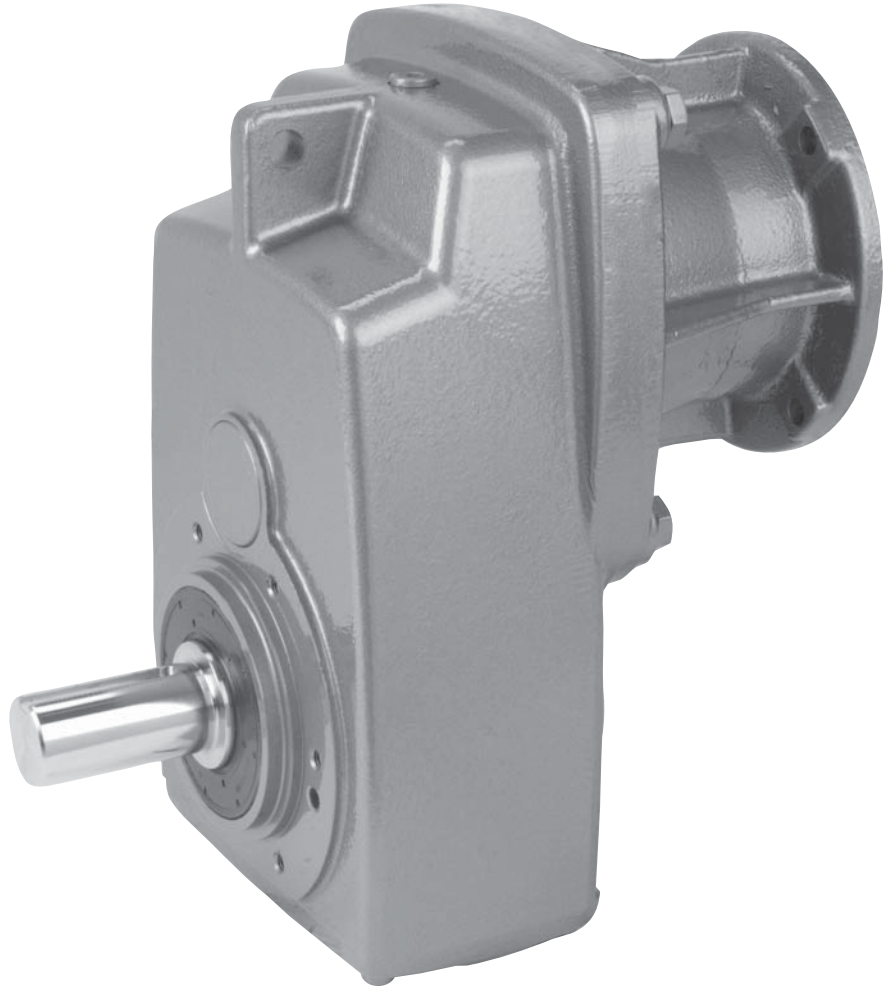
DWG NO.
DAC-1566-2

Gear Reducer - Auger

Clincher™ Shaft Mount Reducers Selection & Combinations

Selection

- SK 0182NB
- SK 0282NB
- SK 1382NB
- SK 1282/02
- SK 1282
- SK 2282
- SK 2382
- SK 2282/02
- SK 3282
- SK 3382
- SK 3282/12
- SK 4282
- SK 4382
- SK 4282/12
- SK 5282
- SK 5382
- SK 5282/12
- SK 6282
- SK 6382
- SK 6282/22
- SK 7282
- SK 7382
- SK 7382/22
- SK 7382/32
- SK 8282
- SK 8382
- SK 8382/32
- SK 8382/42
- SK 9282
- SK 9382
- SK 9382/42
- SK 9382/52
- SK 10282
- SK 10382
- SK 10382/52
- SK 11282
- SK 11382
- SK 11382/52
- SK 12382



www.nord.com

UNICASE™

Model Type	Gear Ratio	Output		T _{2 max}	Maximum input torque for solid input shafts by Input Speed		
		n ₂ 1750 rpm [rpm]	T ₂ [lb-in]		1750 rpm	1150 rpm	875 rpm
SK 2282	4.51	388	1646	5.00	3.30	2.50	
	5.72	306	1876	5.00	3.30	2.50	
	6.43	272	2060	5.00	3.30	2.50	
	7.48	234	2151	5.00	3.30	2.50	
	8.37	209	2266	5.00	3.30	2.50	
	9.03	194	2365	5.00	3.30	2.50	
	10.15	172	3151	5.00	3.30	2.50	
	11.81	148	3398	5.00	3.30	2.50	
	13.23	132	3584	5.00	3.30	2.50	
	16.53	106	4168	5.00	3.30	2.50	
	18.51	95	4301	5.00	3.30	2.50	
	21.90	80	4238	5.00	3.30	2.50	
	23.96	73	3850	4.46	2.94	2.23	
	24.97	70	4237	4.82	3.18	2.41	
	26.83	65	3885	4.01	2.64	2.00	
29.65	59	4425	4.14	2.73	2.07		
31.23	56	3938	3.50	2.31	1.75		
38.54	48	4434	3.38	2.23	1.69		
37.18	47	4071	3.04	2.00	1.52		
48.21	40	4983	3.16	2.09	1.54		



PARALLEL HELICAL CLINCHER

PERFORMANCE SPECIFICATIONS

PERFORMANCE SPECIFICATIONS

Configuration : offset parallel
 Integral motor HP (min/ max) : 0.16 / 200
 Integral motor kW (min/ max) : 0.12 / 160
 Typical efficiency : 97%
 Number of gear reductions : 2 to 6

MOUNTING STYLES

Shaft mount housing style : standard
 Integral torque tab : standard
 B5 flange outside diameter range [in] : 5.51 to 25.98
 B5 flange outside diameter range [mm] : 140 to 660
 Footed housing style available
 B14 flange outside diameter range [in] : 3.94 to 17.72
 B14 flange outside diameter range [mm] : 100 to 450

OPTIONS

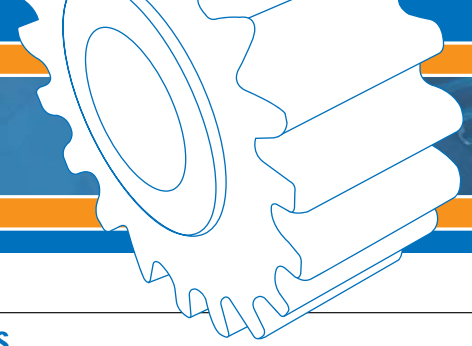
NEMA or IEC input
 Custom adapter flange
 Flange pilot removed
 Shock dampeners
 Effective drywell with flange



RATIO AND SPEED

Minimum standard ratio : 4.03:1
 Maximum standard ratio : 6616.79 (compound assembly)
 Minimum output speed from 1750 rpm motor : 0.26 rpm
 Maximum output speed from 1750 rpm motor : 434 rpm

Unit Size	Torque Max.		Ratio Range min.-max.	Keyed Hollow Shaft Dia.					Solid Shaft Dia.		Shrink Disc Shaft Dia.	
	[lb-in]	[Nm]		Std-[in]	Opt.-[in]	Opt.-[in]	Opt.-[in]	[mm]	[in]	[mm]	[in]	[mm]
SK 0182 NB	1,027	116	4.24 - 81.71	0.750	0.500	-	-	25	0.750	25	-	-
SK 0282 NB	1,460	165	4.03 - 139.16	1.000	1.1875	0.750	-	30	1.000	25	1.188	30
SK 1282	2,620	296	4.79 - 109.50	1.188	1.250	1.000	.0750	30	1.250	30	1.250	30
SK 1382 NB	3,275	370	16.28 - 381.45	1.375	1.4375	1.250	-	35	1.250	30	1.500	35
SK 2282	4,983	563	4.51 - 127.51	1.438	1.500	1.375	1.250	35	1.375	35	1.500	35
SK 2382	4,983	563	82.22 - 763.41	1.438	1.500	1.375	1.250	35	1.375	35	1.500	35
SK 3282	8,983	1,015	4.48 - 112.23	1.625	1.500	1.438	-	40	1.875	45	1.625	40
SK 3382	9,195	1,039	89.60 - 1022.42	1.625	1.500	1.438	-	40	1.875	45	1.625	40
SK 4282	17,700	2,000	4.70 - 155.40	2.062	2.000	1.938	1.688	50	2.250	55	2.000	50
SK 4382	18,381	2,077	66.68 - 1585.08	2.062	2.000	1.938	1.688	50	2.250	55	2.000	50
SK 5282	28,630	3,235	4.32 - 134.03	2.438	2.375	2.188	-	60	2.500	65	2.500	60
SK 5382	28,320	3,200	82.72 - 1367.08	2.438	2.375	2.188	-	60	2.500	65	2.500	60
SK 6282	40,152	4,537	4.39 - 80.33	2.750	2.938	2.438	-	70	3.000	75	3.000	70
SK 6382	53,100	6,000	24.42 - 551.58	2.750	2.938	2.438	-	70	3.000	75	3.000	70
SK 7282	57,266	6,471	4.26 - 69.73	3.188	3.250	2.938	-	80	3.500	90	3.188	80
SK 7382	73,455	8,300	23.46 - 338.79	3.188	3.250	2.938	-	80	3.500	90	3.188	80
SK 8282	93,969	10,618	4.52 - 72.71	4.062	4.000	3.938	3.438	100	4.250	110	4.000	100
SK 8382	116,820	13,200	30.92 - 386.68	4.062	4.000	3.938	3.438	100	4.250	110	4.000	100
SK 9282	158,681	17,930	5.34 - 34.38	4.750	4.938	4.438	-	120	5.250	140	4.750	125
SK 9382	224,790	25,400	35.61 - 352.36	4.750	4.938	4.438	-	120	5.250	140	4.750	125
SK 10282	283,200	32,000	5.20 - 18.24	-	-	-	-	160	6.250	160	6.250	160
SK 10382	329,220	37,200	21.00 - 357.40	-	-	-	-	160	6.250	160	6.250	160
SK 11282	371,700	42,000	7.67 - 34.85	-	-	-	-	180	7.000	180	7.000	180
SK 11382	610,650	69,000	31.96 - 224.76	-	-	-	-	180	7.000	180	7.000	180
SK 12382	796,500	90,000	69.12 - 201.75	-	-	-	-	180	7.000	180	7.000	180



SHAFT DATA

- AISI 1045 or 4140 input and output shaft material
- Input and output shaft key dimensions are according to AISI B17 [in]
- Input and output shaft key dimensions are according to DIN 747 [mm]
- Standard output shaft drill and tap
- 2 hollow shaft keys
- Shrink disc size range [in] : 1.188 to 7.000
- Shrink disc size range [mm] : 30 to 180
- Minimum gripping safety factor range [h6 fit] : 2.2 to 5.9

SHAFT DATA OPTIONS

Double solid output shaft, Shaft fixing element, Custom shaft diameters, Hollow spline per DIN 5480, Custom spline, Cross drilled holes, 304 stainless steel



MOTOR MOUNTING

- Integral motor : 1/6 to 250 HP
- C-face adapter frame size range : 56C to 360TC
- IEC adapter [B5] frame size range : IEC 63 to IEC 315
- Sugar scoop motor availability : 56 to 365T
- Top mount platform motor availability : 56 to 405T

MOTOR MOUNTING OPTIONS

Custom motor adapter, Custom coupling diameter



GEARING

- Up to AGMA Class 13 gear quality rating
- 58 Rockwell C minimum gear hardness
- Ground or skive hobbed hard gear teeth finishing
- Standard drop forged gear blanks
- 275% momentary overload capacity
- Standard hunting tooth ratios



HOUSING

- Class 35 gray iron housing material
- Single setup machining method
- UNICASE™ one piece housing design
- Seals directly contact main housing
- Exceptional housing torsional stiffness
- Thick housing wall section
- Castings are dip sealed



BEARINGS

- ABEC-1 quality bearings
- Standard output ball bearings
- Tapered or spherical heavy-duty output bearings



LUBRICANT & SEALING COMPONENTS

- Factory filled ISO 220 mineral oil
- Standard AUTOVENT™ breather style
- QUADRILIP™ output seal design
- 1 double lip & 1 single lip output shaft oil seals
- Nitrile rubber oil seals

LUBRICANT & SEALING OPTIONS

Custom synthetic lubricating oil, Custom temperature lubricating oil, Fluid grease lubricant, Food grade lubricating oil, Long term storage preparation, Magnetic drain plug, Bulls eye sight glass, Custom drain plug, Fluorinated rubber oil seal material, Custom oil seals



INTERNAL PARTS ASSEMBLY

- Heavy press fit assembly method
- Standard reversing duty
- Typical backlash range [arc minutes] : 6 to 11

INTERNAL PARTS ASSEMBLY OPTIONS

Internal backstop

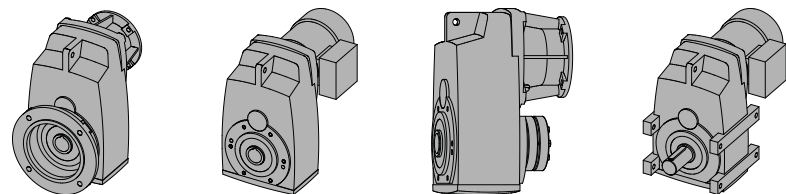


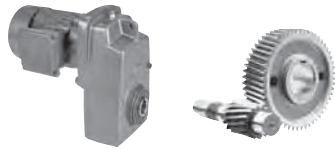
ENVIRONMENTAL PROTECTION

- Exterior primer coverage on all metal exterior surfaces
- Water Based Resin paint type
- 316 stainless steel flake paint additive
- H1 USDA incidental contact exposure

ENVIRONMENTAL OPTIONS

NSD+ protection, Custom paint, Shaft seal covers, High pressure washdown IP66 oil seals





Clincher™ Ordering Guide

	Gear Unit	Shaft/Mounting	Reducer Options	Motor/Input	Motor Options
SK	① 4282	② AF	③	④ N140TC	
				see page 690	see page 690

① Gear Unit				② Shaft/Mounting		
0182NB	1382NB	1282/02	6382/22	VZ - Solid Shaft/B14 Flange	VX - Solid Shaft/Foot	AZ - Hollow Shaft/B14 Flange
0282NB	2382	2282/02	6382/32	VF - Solid Shaft/B5 Flange	LX - Double Solid Shaft/Foot	AF - Hollow Shaft/B5 Flange
1282	3382	3282/12	7382/22	SCP - Screw Conveyor Package		AX - Hollow Shaft/Foot
2282	4382	4282/12	7382/32			
3282	5382	5282/12	8382/22			
4282	6382		8382/32			
5282	7382		9382/42			
6282	8382		9382/52			
7282	9382		10382/52			
8282	10382		11382/52			
9282	11382					
10282	12382					
11282						

③ Reducer Options		
<input type="checkbox"/> B - Fixing Element Kit	<input type="checkbox"/> VL - Heavy Duty Output Bearings	<input type="checkbox"/> VI - Fluoro-rubber Seals
<input type="checkbox"/> G - Rubber Buffers	<input type="checkbox"/> VL2 - Spread Bearing Design	<input type="checkbox"/> OSG - Oil Sight Glass
<input type="checkbox"/> VG - Heavy Duty Rubber Buffers	<input type="checkbox"/> VL3 - Oil Safe Spread Bearing Design	<input type="checkbox"/> OA - Oil Expansion Chamber
<input type="checkbox"/> H - Hollow Shaft Cover	<input type="checkbox"/> VL4 - Drywell Drop Bearing Design	<input type="checkbox"/> OC - Oil Cooler
<input type="checkbox"/> H66 - IP66 Hollow Shaft Cover	<input type="checkbox"/> LX - Double Solid Shaft	<input type="checkbox"/> WC - Water Cooling Cover
<input type="checkbox"/> SH - Shrink Disc & Cover	<input type="checkbox"/> SMS5 - Stainless Steel Output Shaft	<input type="checkbox"/> OT - Oil Reservoir Tank
<input type="checkbox"/> VSH - Heavy Duty Shrink Disc & Cover	<input type="checkbox"/> SWA - Special Hollow Shaft	<input type="checkbox"/> MDP - Magnetic Drain Plug
<input type="checkbox"/> PR - Flange Pilot Removal	<input type="checkbox"/> SWV - Special Solid Shaft	<input type="checkbox"/> ADP - Additional Drain Plug
<input type="checkbox"/> LL - Long Term Storage	<input type="checkbox"/> Cross Drilled Shaft	

④ Input Shaft	NEMA Adapter	IEC Adapter	Integral Motors		Integral Energy Efficient Motors		Scoop	Motor Platform	Servo Adapter (Keyed)
W	N56C	IEC 63	63S/4 - 0.16hp	160L/4 - 20hp	80LH/4 - 1hp	200LH/4 - 40hp	S56	MKN056	SEP 100
	N140TC	IEC 71	63L/4 - 0.25hp	180MX/4 - 25hp	90SH/4 - 1.5hp	225SH/4 - 50hp	S140T	MKN140	SEP 130
	N180TC	IEC 80	71S/4 - 0.33hp	180LX/4 - 30hp	90LH/4 - 2hp	225MH/4 - 60hp	S180T	MKN180	SEP 165
	N210TC	IEC 90	71L/4 - 0.50hp	200L/4 - 40hp	100LH/4 - 3hp	250MH/4 - 75hp	S210T	MKN210	SEP 215
	N250TC	IEC 100	80S/4 - 0.75hp	225S/4 - 50hp	112MH/4 - 5hp	280SH/4 - 100hp	S250T	MKN250	SEP 300
	N280TC	IEC 112	80L/4 - 1hp	225M/4 - 60hp	132SH/4 - 7.5hp	280MH/4 - 125hp	S280T	MKN280	Servo Adapter (Clamp)
	N320TC	IEC 132	90S/4 - 1.5hp	250M/4 - 75hp	132MH/4 - 10hp	315SH/4 - 150hp	S320T	MKN320	
	N360TC	IEC 160	90L/4 - 2hp	280S/4 - 100hp	160MH/4 - 15hp	315MH/4 - 175hp	S360T	MKN360	SEK 100
	N400TC	IEC 180	100L/4 - 3hp	280M/4 - 125hp	160LH/4 - 20hp	315MAH/4 - 200hp	S400T	MKN400	SEK 130
		IEC 200	100LA/4 - 5hp	315S/4 - 150hp	180MH/4 - 25hp	315LH/4 - 250hp			SEK 165
		IEC 225	112M/4 - 5.4hp	315M/4 - 175hp	180LH/4 - 30hp				SEK 215
		IEC 250	132S/4 - 7.5hp	315MA/4 - 200hp					SEK 300
		IEC 280	132M/4 - 10hp	315L/4 - 250hp					
		IEC 315	160M/4 - 15hp	Other Speeds Available		Other Speeds Available			

Product Specifications

Ratio
90.52 :1
see pages 244 - 288
— OR —
Output Speed
rpm
see pages 244 - 288

Mounting Position

- M1
- M2
- M3
- M4
- M5
- M6
- Special _____

Paint

- Standard Stainless Steel Paint
- NSD+ (gray)
- NSD+W (white)
- NSD-X3 (gray)
- NSD-X3W (white)
- Coating Paint _____
- Special **BLUE**

Lubricant

- Standard
- Synthetic
- Food Grade
- Other _____

Hollow Shaft Diameter (If required)
see pages 388 - 393

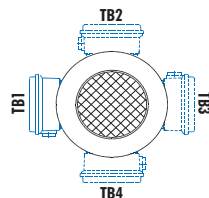
B5 Flange Diameter (If required)

SCP Drive Shaft Diameter (If required)
see page 29

Gearmotor Only Details

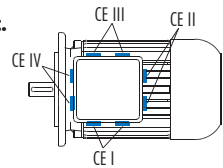
- Voltage & Frequency**
- 230/460V-60Hz (460V only ≥ 40 hp)
 - 575V-60Hz
 - 208V-60Hz
 - 400V-50Hz
 - 115/230V-60Hz, 1 ph.
 - Other _____

- Terminal Box Pos.**
- TB1
 - TB2
 - TB3
 - TB4



Mtg. Pos. M1 Shown

- Conduit Entry Loc.**
- CE I *
 - CE II
 - CE III *
 - CE IV



* Brakemotor

Mtg. Pos. M1 Shown



Gearbox Selection

A number of factors are considered when selecting a gear unit, including gearbox rating, service factor, speed and speed variation, horsepower, thermal capacity, ratio, physical size, ambient conditions and cost. Below are some guideline steps to help aid in the gear unit selection.

1. Determine the speed and/or gear ratio
2. Determine the required power or torque
3. Determine Service Factor
4. Select the basic gearbox type and input
5. Determine the required mounting position
6. Select options
7. Checks – overhung load, thrust load, NEMA motor weight, thermal considerations, and other application considerations

1. Speed and Gear Ratio

The first step in selecting a gear unit is determining the final output speed or speeds you need. This speed is normally described in revolutions per minute (rpm). This output speed or speeds is determined by the input speed to the gear unit divided by its gear ratio. Their relationship is described by the following formulas.

$$i \text{ (gear ratio)} = \frac{\text{Input speed [rpm]}}{\text{Output speed [rpm]}}$$

$$\text{Output speed [rpm]} = \frac{\text{Input speed [rpm]}}{i \text{ (gear ratio)}}$$

To specify a gear unit, you can identify either gear ratio needed or the output speed (rpm) if the input speed is known.

2. Power and Torque

The second step for selecting a gear unit is the required power or torque needed to power the load. Torque in this catalog is normally expressed in pound-inches [lb-in].

$$\text{Power [hp]} = \frac{\text{Torque [lb-in]} \times \text{speed [rpm]}}{63025}$$

$$\text{Torque [lb-in]} = \frac{\text{Power [hp]} \times 63025}{\text{speed [rpm]}}$$

For a proper selection you must ensure that the motor or other prime mover can produce enough torque or power and that the gear unit has adequate torque or power capacity. You must also consider if the power or torque is specified at the input or output of the gear unit. The Helical-worm gear units have lower efficiency than in-line or bevel gear units, therefore helical-worm products efficiency may need to be considered in the selection.

To specify a gear unit you can identify either torque or power.

3. Service Factor or Service Class

In addition to power or torque, service factor must also be considered. A service factor is essentially the ratio of extra capacity in a gear unit compared to the power or torque that is needed to run that application. The goal of selecting a gear unit with extra capacity (service factor) is to provide adequate service life in operation.

One reason to apply a larger service factor is if a unit operates more hours per day. If a unit runs 24 hours per day it should normally have a higher service factor than a unit that runs 8 hours per day if you expect the same calendar life.

A second reason for applying a larger service factor is to cope with a more difficult application. Even if it takes the same power and speed to operate a rock crusher as a fan, the rock crusher needs a stronger gearbox (higher service factor) to give the same calendar operating life as the gear unit powering the fan.

The real question is how to determine the proper service factor for a gear unit in an application. Following are four possible methods.

Customer or User Specification

Many customers will have their own service factor guidelines or specifications.

AGMA Service Factoring

American Gear Manufacturers Association (AGMA) publishes lists of recommended service factors for different applications. These service factor recommendations have been determined from the experience of many gear manufacturers and are in AGMA standard 6010. See page 68 for additional detail.

AGMA Service Classes

American Gear Manufactures Association (AGMA) has another method for selecting gear units service factors. AGMA standard 6009 lists many applications by a service class (I, II, III) with class I being the simplest applications and class III being the hardest. These application service classes are associated with a range of service factors by the following table.

AGMA Service Class	Service Factor
I	1.00 to 1.39
II	1.40 to 1.99
III	2.00 and above

In the gearmotors selection table each unit is also classified by an AGMA service class. See page 64 for additional detail.

Selection Information



NORD Mass Acceleration Service Factoring

NORD often uses a calculation based system to properly assign a service factor. This system considers hours of operation per day, the severity of the application and the number of times the equipment is cycled. See page 62 for additional detail.

4. Gearbox Type & Input

NORD gear drives are available in a number of mechanical configurations including:

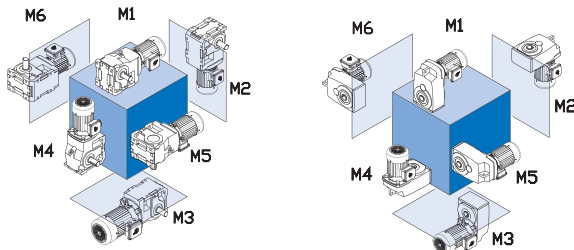
- Helical in-line
- Clincher™ shaft mount
- Right-angle helical-bevel
- Right-angle helical-worm

NORD's modular design allows for a number of different inputs to be added to NORD reducers including:

- Integral motor
- NEMA-C and IEC motor adapter
- Solid input shaft
- Servo motor adapter
- Sugar scoop mount
- Top motor mount platform
- NORDISC™ variable speed friction drives
- Titan™ variable speed belt boxes

5. Mounting Position

The gearbox mounting position is an important and often overlooked specification. The mounting position determines how much oil the gear reducer requires, in addition to determining the position of the oil drain, oil fill and vent on the gear drive. NORD offers six basic mounting positions. If your application requires a variation from the six basic mounting positions, please contact NORD.



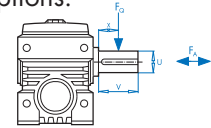
Many gearbox and motor options require a location designation. For example a right-angle helical-bevel unit with a single solid shaft extension requires a shaft extension side location. Please see page 18 for additional options that require location designation.

6. Options

NORD offers a number of mechanical, protective, paint and lubrication options for gear reducers and motors. Please see pages 19 for gear unit options and refer to the motor section (Section G) for motor options.

7. Checks

Overhung Load



An overhung or radial load exists when a force is applied at right-angles to a shaft beyond the shaft's outermost bearing. Pulleys, sheaves and sprockets will cause an overhung load when used as a power take-off. The amount of overhung load will vary, depending on the type of power take-off used and where it is located on the shaft.

Overhung load [FQ] can be found in the gearmotor rating tables and input shaft overhung load ratings [FQ1] can be found on pages 52 - 59. Overhung load capacities should not exceed the values in the table to ensure long bearing life. Overhung load capacities are to be applied at the midpoint of the shaft extension and without thrust loads.

To calculate overhung load see page 52.

Thrust Loads (Axial)

Loads that are directed towards or away from the gearbox along the axis of the shaft are called thrust or axial loads. Output shaft thrust capacity [FA] can be found in the gearmotor rating tables. Input shaft capacity [FA1] can be found on pages 52. Thrust load capacities should not exceed the values listed in the tables to ensure long bearing life. Thrust load capacities are listed for pure axial loads with no overhung load. Contact NORD for combination loads or a more exact examination of the application.

NEMA C-face Motor Weight Limits

When mounting a motor to a NORD NEMA C-face motor adapter it is important to consider the motor's weight. Following is a table that includes the maximum motor weight the NEMA adapter can support. If the motor exceeds the listed weight it must be externally supported. When a C-face mounted motor is externally supported care must be taken to ensure that the support system does not impose additional pre-loads on the NEMA motor adapter.

NEMA Weights

Motor FRAME	56C	143TC	145TC	182TC	184TC
Max Weight [lb]	66	88	110	130	175
Motor FRAME	210TC	250TC	290TC	324TC	326TC
Max Weight [lb]	220	450	550	770	1100
Motor FRAME	365TC				
Max Weight [lb]	1550				

Selection Information



Gear Reducer Ratings

The permissible continuous power limit of gear reducers is limited by both the mechanical rating and the thermal rating. The mechanical rating depends upon the material strength of the gear reducer's gears, bearings, housing, shafts, etc. The mechanical input power limit to the reducer is also a function of the mechanical power rating divided by the relevant reducer service factor.

The thermal rating or thermal limit depends upon the amount heat generated within the reducer and is influenced by a variety of factors including:

- Churning or splashing losses in the lubricant which depend upon reducer type, ratio, input style, mounting position or oil fill-level, and the circumferential travel velocities of the gear wheels.
- The actual speed and load conditions. These factors determine load-dependent losses in the gears and frictional losses in the gears, bearings and seal areas.
- Ambient Conditions:
 - Ambient Temperature.
 - Amount of free air circulation around the drive.
 - Possible near-by heat sources.
 - Heat dissipation or the ability of the reducer to transfer heat through the housing, shafts, and the mating sub-structure or mounting surface.

Observing the Reducer's Thermal Limit

When to Contact NORD

Through computer program analysis NORD can evaluate application conditions and the impact they have on a reducer's thermal capacity.

When applying helical in-line, Clincher™ shaft mount, and helical-bevel gear units of case sizes 6 and larger (SK62, SK6282 and SK9072.1 and larger), consult NORD if any two or more of the following conditions apply:

- Gear ratio, $i_{total} \leq 24:1$ or $\leq 48:1$ for helical-bevel units
- Input power, $P_1 \geq 60$ hp (45 kw)
- Input speed, $n_1 > 1800$
- Vertical positioning (mounting position M2 or M4)
- Input configuration: NEMA C-face, IEC, servo adapter or solid-shaft input (Type-W)
- Elevated ambient temperature $\geq 86^\circ$ F (30 °C)

When applying helical-worm or worm gear units, please consult NORD if any one of the following conditions applies:

- Input speed, $n_1 > 1800$
- Vertical positioning (mounting position M2 or M4)
- Input configuration: NEMA C-face, IEC, servo adapter or solid-shaft input (Type-W)
- Elevated ambient temperature $\geq 86^\circ$ F (30 °C)

Advise NORD of any special application considerations:

- Confined space or limited air circulation
- Exposure to other near-by radiant heat sources
- Dirty or dusty environments
- High altitude operation $> 3,280$ ft (1000 m) a.s.l.

Dangers of Reducer Overheating

The following problems may result when the reducer's thermal capacity or maximum oil sump temperatures are exceeded:

- Lubrication oxidation, breakdown and deterioration.
- A decrease in lubrication viscosity and film thickness.
- Loss of critical bearing and gear clearances required for proper lubrication.
- Increased contact pressures and increased operating temperatures in the critical load zones of the gearing and bearings.
- An increased possibility for metal-to-metal contact and premature component wear.
- A significant reduction in the lubricant's ability to prevent scuffing, pitting, and in extreme cases galling or welding.

Maximum Oil Sump Temperature Limit

To prevent reducer overheating, the reducer's maximum oil sump temperature limit must not be exceeded for prolonged periods of operation (up to 3 hours continuous operation, depending upon reducer size).

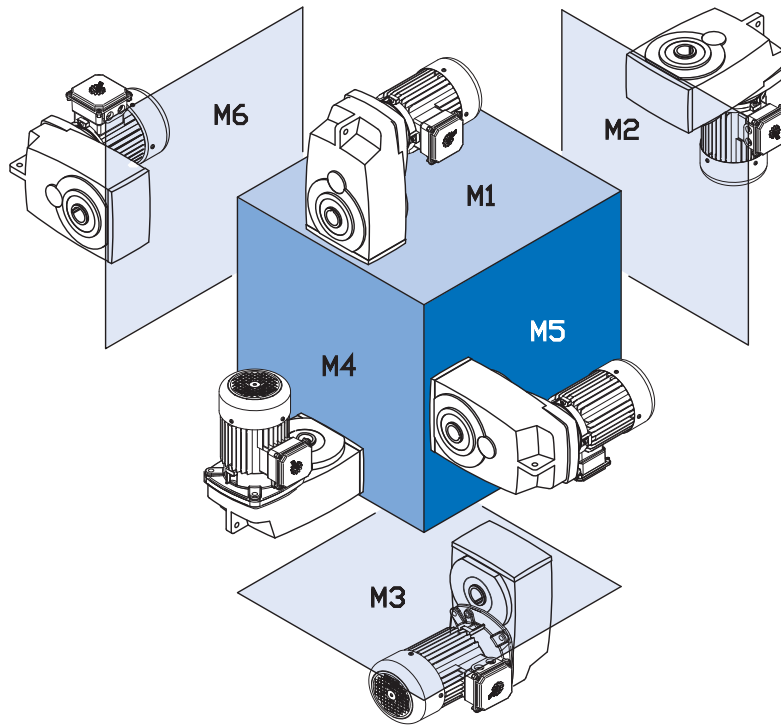
Oil Type	Maximum Oil Temperature Limit	
	NORD	AGMA 9005-D94
Mineral	80-85 °C (176-185 °F)	95 °C (203 °F)
Synthetic	105 °C (220 °F)	107 °C (225 °F)

Measures to Expand the Application Range

There are a variety of measures that may be taken in order to protect against thermal overload and expand the application range of the gear reducer. Common examples include the following:

- Recommending a change in lubrication viscosity and/or a specific synthetic lubricant type.
- Applying high-temperature seals.
- Increasing air flow around the gear unit.
- Shielding or protecting the reducer from high heat sources.
- Considering an integral motor instead of the bolt-on input assembly covers. In many cases the motor fan will substantially increase air-flow around the gear unit.
- Add an Oil Expansion/Overflow Chamber (Option "OA") or an Oil Reservoir (Option "OT").
- Oil Cooler (Option "OC").
- Water Cooling Cover (Option "WC")

Clincher™ Shaft Mount Positions & Oil Fill Quantities



Mounting Position	M1		M2		M3		M4		M5		M6	
	Quarts	Liters	Quarts	Liters	Quarts	Liters	Quarts	Liters	Quarts	Liters	Quarts	Liters
SK0182NB	0.42	0.40	0.58	0.55	0.63	0.60	0.58	0.55	0.37	0.35	0.37	0.35
SK0282NB	0.74	0.70	1.06	1.00	0.85	0.80	1.16	1.10	0.95	0.90	0.95	0.90
SK1382NB	1.37	1.30	2.43	2.30	1.48	1.40	2.22	2.10	2.11	2.00	2.01	1.90
SK1282	0.95	0.90	1.37	1.30	0.95	0.90	1.27	1.20	1.00	0.95	1.00	0.95
SK2282	1.74	1.65	2.54	2.40	2.01	1.90	2.11	2.00	1.90	1.80	1.90	1.80
SK2382	1.80	1.70	2.75	2.60	2.01	1.90	3.28	3.10	1.59	1.50	1.59	1.50
SK3282	3.33	3.15	4.33	4.10	3.44	3.25	4.33	4.10	3.33	3.15	3.33	3.15
SK3382	4.33	4.10	5.18	4.90	3.49	3.30	5.92	5.60	3.49	3.30	3.49	3.30
SK4282	4.97	4.70	6.45	6.10	5.02	4.75	5.71	5.40	4.97	4.70	4.97	4.70
SK4382	6.24	5.90	7.19	6.80	5.18	4.90	8.77	8.30	5.18	4.90	5.18	4.90
SK5282	7.93	7.50	9.30	8.80	7.93	7.50	9.30	8.80	7.61	7.20	7.61	7.20
SK5382	13.2	12.5	12.7	12.0	7.08	6.70	14.8	14.0	8.77	8.30	8.77	8.30
SK6282	18.0	17.0	14.8	14.0	12.7	12.0	18.5	17.5	10.6	10.0	14.8	14.0
SK6382	17.4	16.5	13.7	13.0	10.1	9.60	19.0	18.0	14.8	14.0	13.2	12.5
SK7282	26.4	25.0	22.2	21.0	21.1	20.0	28.5	27.0	16.9	16.0	22.2	21.0
SK7382	23.3	22.0	21.1	20.0	16.9	16.0	26.4	25.0	24.3	23.0	20.1	19.0
SK8282	39.1	37.0	34.9	33.0	31.7	30.0	43.3	41.0	32.8	31.0	32.8	31.0
SK8382	35.9	34.0	33.8	32.0	26.4	25.0	40.2	38.0	37.0	35.0	31.7	30.0
SK9282	78.2	74.0	74.0	70.0	58.1	55.0	76.1	72.0	63.4	60.0	62.4	59.0
SK9382	77.2	73.0	74.0	70.0	47.6	45.0	78.2	74.0	68.7	65.0	63.4	60.0
SK10282*	95.1	90.0	95.1	90.0	42.3	40.0	95.1	90.0	63.4	60.0	86.7	82.0
SK10382*	89.8	85.0	106	100	77.2	73.0	106	100	84.6	80.0	84.6	80.0
SK11282*	174	165	169	160	153	145	206	195	106	100	148	140
SK11382*	169	160	164	155	148	140	222	210	164	155	143	135
SK12382*	169	160	164	155	148	140	222	210	164	155	143	135

* These units shipped without oil

Lubrication



Lubrication Types

Proper gearbox lubrication is essential in order to reduce friction, heat, and component wear. Lubricants reduce heat and wear by inserting a protective “fluid boundary” between mating parts and preventing direct metal to metal contact. Lubricants also help prevent corrosion and oxidation, minimize foam, improve heat transfer, optimize reducer efficiency, absorb shock loads and reduce noise.

Mounting position not only determines the proper fill-level but may also have some effect on final reducer assembly. If considering any mounting positions that are not shown as catalog-standard options, it is critical that the customer consult with NORD prior to ordering. Unless otherwise specified, NORD supplies most all gear units (*) factory-filled with the standard lubrication type and the appropriate amount of lubricating oil.

* Gear units SK10282, SK10382, SK11282, SK11382, SK12382, and SK9096.1 are supplied without oil.

Standard Oil Lubricants

Gear Unit Type	Ambient Temperature	Oil Type	ISO Viscosity	Manufacturer Brand / Type
Helical-Inline, Parallel-Shaft, & Helical-Bevel	-4 to 104 °F (-20 to 40 °C)	MIN-EP	VG 220	Shell / Omala 220 ♣
	-40 to 140 °F (-40 to 60 °C)	PAO	VG 220	Mobil SHC 630 ♣
	23 to 104 °F (-5 to 40 °C)	FG	VG 220	Shell / FM 220 ♣
Helical-Worm	-22 to 122 °F (-30 to 50 °C)	PAO	VG 680	Mobil SHC 636 ♣

Optional Oil Lubricants

Gear Unit Type	Ambient Temperature	Oil Type	ISO Viscosity	Manufacturer Brand / Type
Helical-Inline, Parallel-Shaft, & Helical-Bevel	-31 to 176 °F (-35 to 80 °C)	PAO	VG 460	Mobil SHC 634
	-40 to 77 °F (-40 to 25 °C)	PAO	VG 150	Mobil SHC 629
	-40 to 140 °F (-40 to 60 °C)	FG-PAO	VG 220	Shell / Cassida GL 220
Helical-Worm	-40 to 122 °F (-40 to 50 °C)	FG-PAO	VG 460	Shell / Cassida GL 460

Standard Bearing Grease Lubricants

Grease Type / Thickener	Ambient Temperature	NLGI Grade	Manufacturer Brand / Type
Standard (Li-Complex)	-22 to 140 °F (-30 to 60 °C)	NLGI 2	Shell Albida EP LC2 ♣
High Temp (Polyurea)	-13 to 176 °F (-25 to 80 °C)	NLGI 2	Mobil Polyrex EP 2 ♣
Food-Grade (Al-Complex)	-13 to 104 °F (-25 to 40 °C)	NLGI 2	Mobil Grease FM 222 ♣

♣ Stocked Lubricant

Oil Formulation Codes

MIN-EP	Mineral Oil with EP Additive
PAO	Synthetic Polyalphaolefin Oil
PG	Synthetic Polyglycol Oil
FG	Food-Grade Oil
FG-PAO	Food-Grade, Synthetic Polyalphaolefin Oil

Important Notes

- In worm gears avoid using (EP) gear oils that contain sulfur-phosphorous chemistries, as these additives can react adversely with bronze worm gears and accelerate wear.
- Food grade lubricants must be in compliance with FDA 212 CFR 178.3570 and qualify as a NSF-H1 lubricant. Please consult with lubrication manufacture for more information.
- When making a lubrication change, check with the lubrication supplier to assure compatibility and to obtain recommended cleaning or flushing procedures.
- Do not mix different oils with different additive packages or different base oil formulation types. Polyglycol (PG) oils are not miscible with other oil types and should never be mixed with mineral oil, or Polyalphaolefin (PAO) oil.
- Please Consult NORD if considering cold-temperature oils below an ISO Viscosity VG100 or lower.



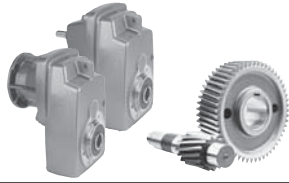
Clincher™ Shaft Mount Weights - Reducer



Approximate Weights [lb]

Type	W	56C	140TC	180TC	210TC	250TC	280TC	320TC	360TC
SK 0182 NB	13	22	22	–	–	–	–	–	–
SK 0282 NB	22	31	31	–	–	–	–	–	–
SK 1282	40	51	51	66	–	–	–	–	–
SK 1382 NB	49	57	57	68	–	–	–	–	–
SK 1282/02	57	68	–	–	–	–	–	–	–
SK 2282	77	82	82	90	–	–	–	–	–
SK 2382	79	90	90	–	–	–	–	–	–
SK 2282/02	82	93	–	–	–	–	–	–	–
SK 3282	110	115	115	124	143	–	–	–	–
SK 3382	115	126	126	–	–	–	–	–	–
SK 3282/12	119	130	130	–	–	–	–	–	–
SK 4282			154	170	201	223	–	–	–
SK 4382	176	181	181	190	–	–	–	–	–
SK 4282/12	152	163	163	179	–	–	–	–	–
SK 5282	245	234	234	249	280	302	322	–	–
SK 5382	265	269	269	278	278	–	–	–	–
SK 5282/12	231	243	243	258	–	–	–	–	–
SK 6282	474	–	–	448	476	531	531	562	562
SK 6382	423	412	412	428	459	481	481	–	–
SK 6382/22	443	448	448	456	–	–	–	–	–
SK 6382/32	467	472	472	481	501	–	–	–	–
SK 7282	613	–	–	587	615	670	670	701	734
SK 7382	628	–	–	602	631	686	686	717	750
SK 7382/22	604	609	609	618	–	–	–	–	–
SK 7382/32	628	633	633	642	662	–	–	–	–
SK 8282	1061	–	–	869	897	953	953	983	1138
SK 8382	904	–	–	878	906	961	961	992	1025
SK 8382/32	904	908	908	917	–	–	–	–	–
SK 8382/42	959	948	948	964	994	–	–	–	–
SK 9282	1724	–	–	–	–	–	1616	1647	1801
SK 9382	1570	–	–	1645	1572	1627	1627	1658	1813
SK 9382/42	1625	1614	1614	1629	1660	–	–	–	–
SK 9382/52	1689	–	–	1693	1724	1746	1766	–	–
SK 10282	2825	–	–	–	–	–	–	–	3001
SK 10382	2880	–	–	–	–	2871	2871	2902	3056
SK 10382/52	2933	2922	2922	2937	2968	2990	2990	–	–
SK 11282	4558	–	–	–	–	–	–	–	4734
SK 11382	4728	–	–	–	–	4719	4719	4750	4904
SK 11382/52	4780	4769	4769	4785	4816	4838	4838	–	–
SK12382	4728	–	–	–	–	4719	4719	4750	4904

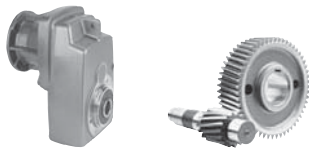
Above weights are approximate. Depending upon ratio, oil quantity and optional equipment, reducer weights may be different than shown. Exact weights can be obtained after the unit is fully assembled.



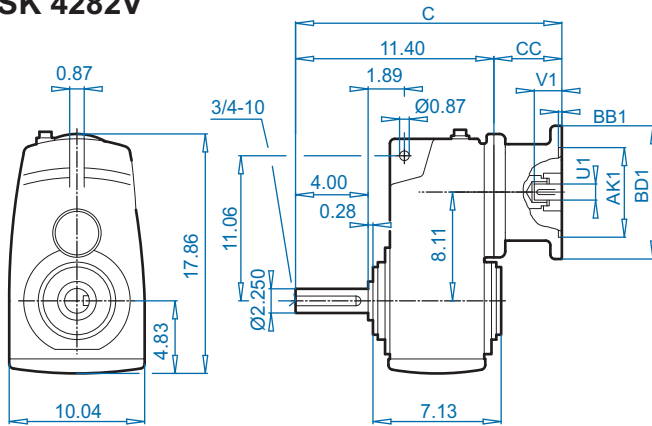
Model Type	Gear Ratio i_{tot}	Output Speed n_2 1750 rpm [rpm]	Output Torque* T_{2max} [lb-in]	Maximum input power [◇] Solid input shafts type "W"				NEMA C-Face* Available Combinations								
				Input Speed				56C	140TC	80TC	210TC	250TC	280TC	320TC	360TC	
				1750 rpm	1150 rpm	875 rpm	580 rpm									
SK 4282	4.70	372	9160	20.00	13.20	10.00	6.60		X	X	X					
	5.00	350	9160	20.00	13.20	10.00	6.60		X	X	X					
	5.43	322	9160	20.00	13.20	10.00	6.60		X	X	X					
	6.06	289	10620	20.00	13.20	10.00	6.60	X	X	X	X					
	7.13	245	10638	20.00	13.20	10.00	6.60	X	X	X	X					
	8.33	210	11257	20.00	13.20	10.00	6.60	X	X	X	X					
	9.23	190	14461	20.00	13.20	10.00	6.60	X	X	X	X					
	10.85	161	15045	20.00	13.20	10.00	6.60	X	X	X	X					
	12.68	138	15488	20.00	13.20	10.00	6.60	X	X	X	X					
	15.20	115	15930	20.00	13.20	10.00	6.60	X	X	X	X					
	18.18	96	15930	20.00	13.20	10.00	6.60	X	X	X	X					
	21.45	82	14921	19.41	12.81	9.71	6.41	X	X	X	X	X*				
	22.39	78	15036	18.61	12.28	9.30	6.14	X	X	X	X	X*				
	26.25	67	14231	15.13	9.98	7.56	4.99	X	X	X	X	X*				
	26.43	66	15815	16.56	10.93	8.28	5.47	X	X	X	X	X*				
	26.72	65	14160	14.60	9.64	7.30	4.82		X	X						
	32.04	55	15797	13.79	9.10	6.89	4.55		X	X						
	32.34	54	14337	12.28	8.11	6.14	4.05	X	X	X	X	X*				
	36.40	48	12169	9.27	6.12	4.63	3.06		X	X	X*					
	36.81	48	12390	9.44	6.23	4.72	3.11	X	X	X	X*					
	38.31	46	17700	12.92	8.53	6.46	4.26		X	X	X*					
	40.74	43	13771	9.40	6.20	4.70	3.10	X	X	X	X*					
	43.65	40	14160	8.99	5.93	4.49	2.97		X	X	X*					
	45.05	39	14107	8.73	5.76	4.36	2.88	X	X	X	X*					
52.20	34	16089	8.68	5.73	4.34	2.86		X	X	X*						
61.60	28	15877	7.05	4.66	3.53	2.33		X	X	X*						
75.39	23	14063	5.13	3.39	2.57	1.69		X	X	X*						
76.70	23	14063	5.13	3.39	2.57	1.69	X	X	X							
90.52	19	14160	4.27	2.82	2.13	1.41	X	X	X*							
110.78	16	14160	3.59	2.37	1.80	1.19	X	X	X*							
155.40	11	11284	1.97	1.30	0.98	0.65	X	X*								

* Caution - The motor power may exceed the gear unit's mechanical torque capacity
 ◇ The mechanical power limit of the solid input shaft type "W" may limit the reducer rating.
 All ratings are mechanical. See page 14 for thermal considerations.

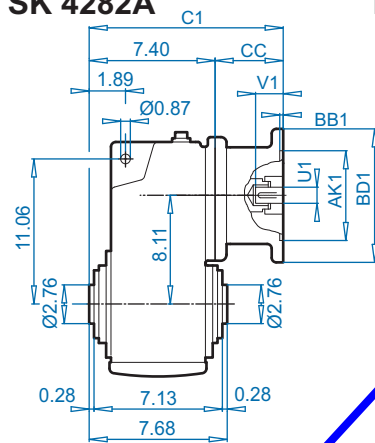
Model	W	56C	140TC	180TC	210TC	250TC
SK 4282	165	154	170	170	201	223



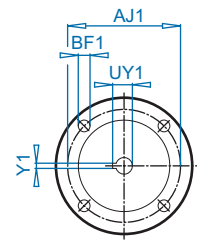
SK 4282V



SK 4282A

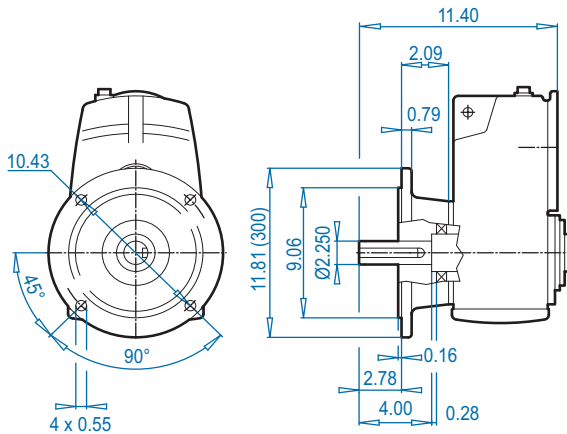


NEMA Input

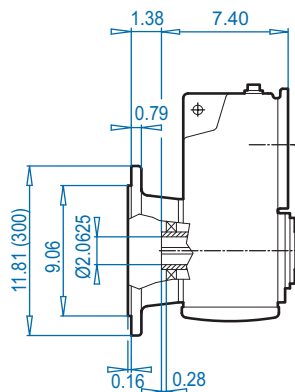


Dimensions in Inches
DIMENSIONS

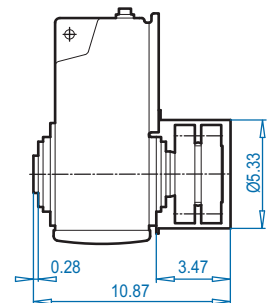
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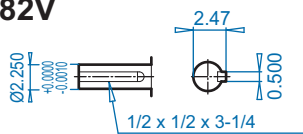
SK 4282AF



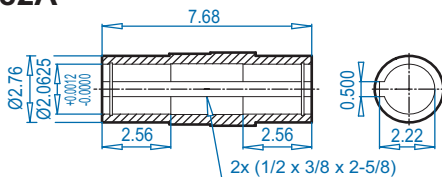
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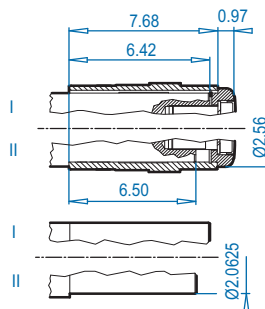
SK 4282V



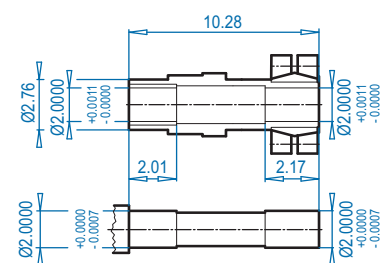
SK 4282A



SK 4282AB ⇨ 394



SK 4282AS ⇨ 391



NEMA Dimensions

Type	AJ1	AK1	BB1	BD1	BF1	U1	V1	UY1	Y1	C	C1	CC
56C	5.88	4.500	0.18	6.54	0.43	0.625	2.06	0.71	0.188	15.74	11.74	4.30
140TC	5.88	4.500	0.18	6.54	0.43	0.875	2.12	0.96	0.188	15.74	11.74	4.30
180TC	7.25	8.500	0.23	9.17	0.59	1.125	2.62	1.24	0.250	19.34	15.34	7.90
210TC	7.25	8.500	0.39	9.17	0.59	1.375	3.12	1.52	0.312	19.34	15.34	7.90
250TC	7.25	8.500	0.23	9.17	0.59	1.625	3.75	1.80	0.375	19.34	15.34	7.90

ALTERNATE SHAFTS SEE PAGES 388 - 393



Enviro-Care

A WAMGROUP® Company

Motor - Auger

Enviro-Care

P: 815.636.8306 F:815.636.8302

Web: www.enviro-care.com Email: ecsales@enviro-care.com

MAX-E1® FAMILY NEMA PREMIUM EFFICIENCY



TYPE AEHE, AEHH8N, AEHH8NCF, AEUH8NDC

Effective 05-01-13
Supersedes 08-01-11



APPLICATIONS:

- Fans & Blowers
- Pumps
- Crushers
- Compressor
- Mixers
- Conveyors
- Any Severe Duty/ Petro-Chem/ Pulp & Paper Application

FEATURES:

- 3/4 - 800 hp: 3600, 1800, 1200, 900 RPM
- 1 - 100 hp: Foot Mounted with C-Flange or Round Body C-Flange
- Totally Enclosed Fan Cooled (IP54 Rating; IP55 Ratings for Frames Sizes 5000 and Larger)
- NEMA Premium Efficient Ratings From 1 - 500 hp, Denoted Catalog Number Prefix of "EP" - Note (1)
- Department of Energy Efficiency Certification # CC002A
- 36 Month Warranty from Date of Manufacture
- 3 Phase, 60 Hz, 230/ 460V (Usable on 208V) – 150 hp and Larger are 460V Only - Note (2)
- 575V Ratings Available, Denoted by a Catalog Number Suffix of "5" - Note (2)
- 1.15 Service Factor – Continuous
- NEMA Design B Torques as a Minimum; Design C Motors are Denoted with a superscript "C"
- Class B Temperature Rise, Class F Insulation with Phenolic Alkyd Resin Varnish – 2 Dips and Bakes
- Class F Insulation
- Oversized Main Conduit Box Rotatable in 90 Degree Increments – Fully Gasketed with NPT Threaded Entrance – F1 Mounted. F2 Available – See EXTRAS/ OPTIONS Below
- Designed for 40°C Ambient Temperature and 3300 ft. Elevation - Note (3)
- CSA Certified for Class I, Division II, Groups B, C, D; Temp Code T3C, Non Sparking, Non Static Fan - Note (4)
- Bidirectional Rotation Except 2 Pole Motors 5000 Frame and Larger which are Uni-directional CCW Facing the Drive-End. See EXTRAS/ OPTIONS Below if CW Rotation is Required.
- Cast Iron Frame, End Brackets, Fan Cover, and Main Conduit Box
- Dual Drilled Feet – Longer Frames. (i.e. 145T Drilled Also for 143T) Through 449T Frames Only (5)
- 1045 Carbon Steel Shaft.
- Aluminum Die Cast Squirrel Cage Rotor Construction for Frames 5011 and Smaller. Copper/ Copper Alloy Rotor for Frames 5800-6800 Frames.
- Paint System: Phenolic Rust Proof Base Plus Polyurethane Top Coat/ Paint Color: Light Grey – Munsell N5.0
- Vacuum De-Gassed Re-greaseable Ball Bearings (or Roller) on 280TS Frames and Larger Using Polyrex EM Grease
- Single Shielded Bearings on Frames 140T-280T Pre-Packed with Polyrex EM Grease
- Automatic Grease Discharge Fittings on Frames on Re-Greaseable Motors
- Labyrinth Type Metal Flinger on Both Ends for Frames 280TS to 6800
- Rubber Flinger on Drive-End for Frames 140T to 280T
- Cast Iron Inner and Outer Bearing Caps on Both Ends for Frames 280TS to 6800
- Grounding Terminal Inside Main Box
- Stainless Steel Nameplate
- UL Recognized and CSA Approved for Inverter Duty per NEMA MG 1, Part 31 – 300 hp and Below. 350 hp and Above are Suitable for Inverter Duty per NEMA MG 1, Part 31, 4.4.2 - Note (6)
- Inverter Duty Magnet Wire Capable of Withstanding Voltage Spikes of Up to 2200 Volts
- **Precautions should be taken to eliminate or reduce shaft currents that may be imposed on the motor by the VFD as stated per NEMA MG1, Part 31.4.4.3.**
- Insulated Non-Drive End Bearing on 2-Pole Motors 600 hp and Larger
- Speed Ranges: 20:1 VT, 10:1 CT. 350 hp and Larger are 3:1 CT
- 9 Leads - 5 hp and Below, 12 Leads - 7.5 hp to 125 hp, 6 Leads - 150 hp and Larger
- Breather Drains in Both End Frames for Vertical Mount.

EXTRAS/ OPTIONS:

Please refer to pages 77 - 82 for common modifications that can be performed.

Notes:

- (1) NEMA Premium Efficiency levels only applies to 1-500 hp, 3600, 1800, 1200 RPM.
- (2) 208V or the current rating will not appear on the motor nameplate. Please see Modification for Nameplate adder. TWMC carries minimal 575V stock. Please check availability to ensure required motors are in stock. Ratings may be available from our Canadian warehouses or factory. Pricing and lead time may vary.
- (3) Please consult factory for suitability in higher ambients and higher elevations.
- (4) Self-Certification applies to 300 hp and above.
- (5) EP3006, EP3502 and EP3504 are not dual drilled.
- (6) Motor service factor is 1.0 when operated on a VFD.

DATE
JAN. 4, 2007
CAT. #: EPV0024C

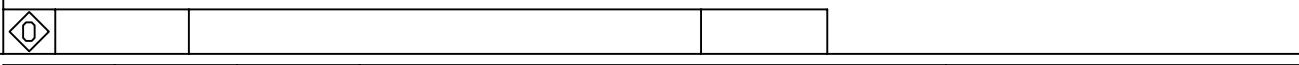
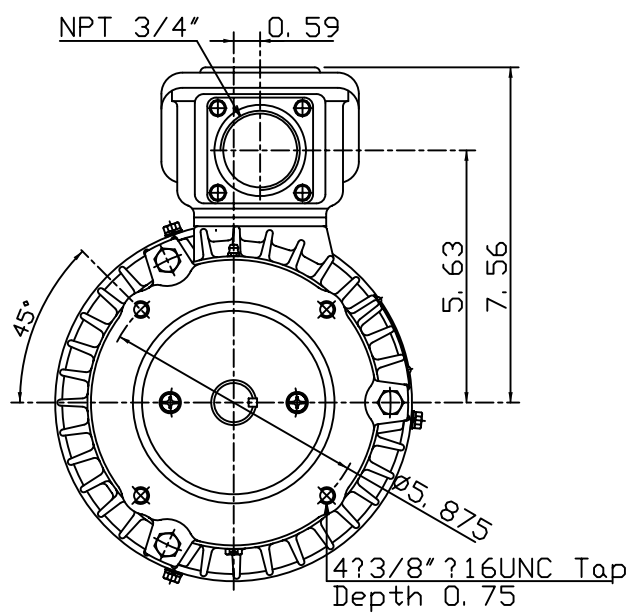
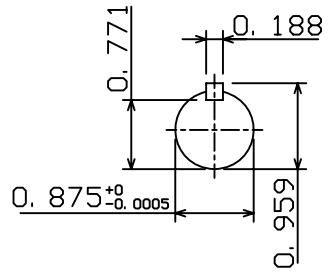
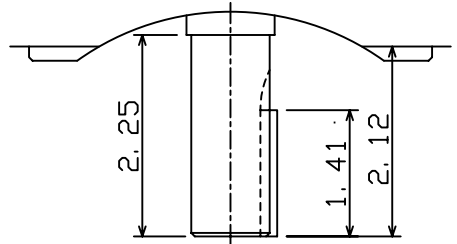
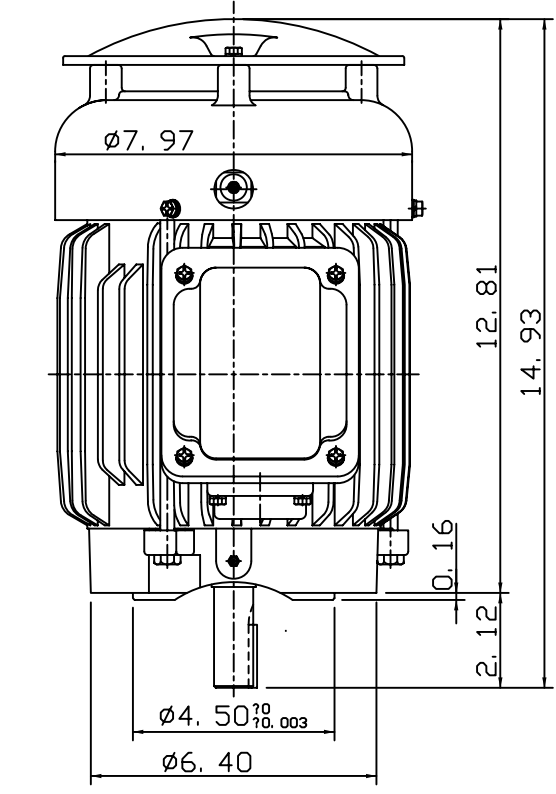
OUTLINE DIMENSIONS
3-PHASE INDUCTION MOTOR

MOTOR TYPE:
AEUH8NDC
FRAME NO. 145TC

Pole	HP	kW	Hz	VOLT	Syn. Speed r/min(rpm)
4	2	1.5	60	230/460	1800

Ins	Rating	Dimension in	Approx Weight	Bearings
F	CONT.	inches	66 LBS	DE: 6205ZZ NDE: 6205ZZ

Totally Enclosed Fan-Cooled Vertical Type. Squirrel-Cage Rotor.



DWN.	J. H. LIANG	12-23-06
CHKD.	H. C. YAN	12-28-06
APPD.	M. C. TSAI	12-28-06



DWG NO.
31049M990060

TECO Westinghouse

ISSUED 8/29/2014	PERFORMANCE DATA 3-PHASE INDUCTION MOTOR	ENCLOSURE TEFC
TYPE AEUH8NDC		CATALOG# EPV0024C

NAMEPLATE INFORMATION

OUTPUT		POLE	FRAME SIZE	VOLTAGE	HZ	RATED AMBIENT	INS. CLASS	NEMA DESIGN	TIME RATING	SERVICE FACTOR
HP	KW									
2	1.5	4	145TC	230/460	60	40°C	F	B	CONT.	1.15

VARIABLE FREQUENCY DRIVE SERVICE

VARIABLE TORQUE				OHMS/PHASE EQUIVALENT WYE CIRCUIT (AT RATED OPERATING TEMPERATURE 25°C)				
HZ	HP	RPM	TORQUE (lb-ft)	R1	R2	X1	X2	X _m
3~60	0.0003~2	90~1800	0.0175~6.035	3.9555	4.3639	10.417	6.5877	170.99

CONSTANT TORQUE				CONSTANT HORSEPOWER			
HZ	HP	RPM	TORQUE (lb-ft)	HZ	HP	RPM	TORQUE (lb-ft)
6~60	.2~2	180~1800	6.035	60~120	2	1800~3600	6.035~3.0175

TYPICAL PERFORMANCE

FULL LOAD RPM	EFFICIENCY				POWER FACTOR			SOUND PRESSURE LEVEL @ 3 FT Db(A)
	FULL LOAD		3/4 LOAD %	1/2 LOAD %	FULL LOAD %	3/4 LOAD %	1/2 LOAD %	
	MIN.%	NOM.%						
1740	84	86.5	84	84	78	70	57	51

CURRENTS									NEMA KVA CODE LETTER	SAFE STALL TIME IN SECONDS	
NO LOAD			FULL LOAD			LOCKED ROTOR				COLD	HOT
AT 208 VOLT	AT 230 VOLT	AT 460 VOLT	AT 208 VOLT	AT 230 VOLT	AT 460 VOLT	AT 208 VOLT	AT 230 VOLT	AT 460 VOLT			
2.55	2.92	1.46	6.15	5.56	2.78	45.2	50.0	25	L	43	30

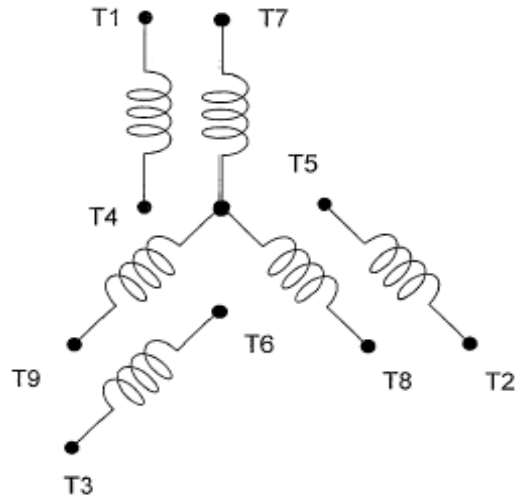
TORQUE				INERTIA			ACCEL TIME (DOL)		ALLOWABLE STARTS PER HOUR	
FULL LOAD (lb-ft)	LOCKED ROTOR %FLT	PULL UP %FLT	BREAK DOWN %FLT	ROTOR WR ² (lb-ft ²)	NEMA LOAD WK ² (lb-ft ²)	MAX ALLOWABLE WK ² (lb-ft ²)	NEMA LOAD WK ² Sec	MAX ALLOWABLE WK ² Sec	COLD	HOT
6.04	270	220	330	0.108	11	51	3.83	17.61	2	1

APPROVED:	M. PRATER	DRAWING NO.	31057EPV0024C	REVISION:	1
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DATE:
September 13, 2006

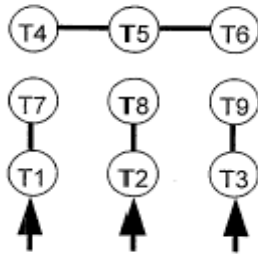
CONNECTION DIAGRAM

CATALOG NO.:
EPV0024C

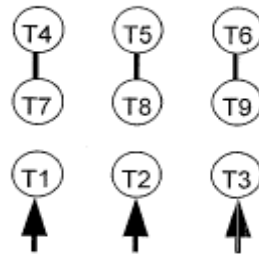


SCHEMATIC - 2Y/Y CONNECTION

ACROSS THE LINE CONNECTION



**LINE
230 VOLT CONNECTION**



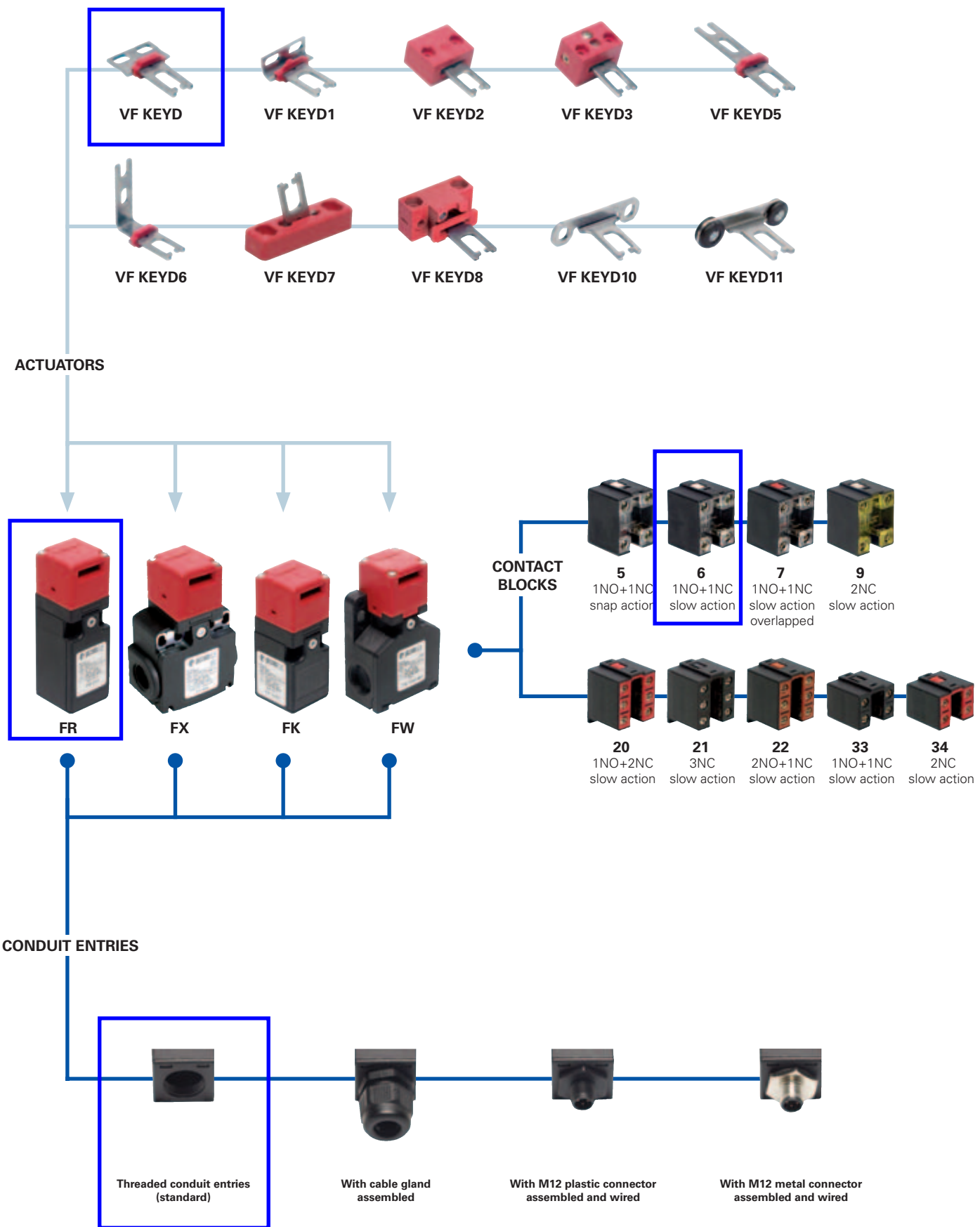
**LINE
460 VOLT CONNECTION**



DWG NO.
DAC-1566-2

Motor Cutout Switch

Selection diagram





Code structure

Attention! The feasibility of a code number does not mean the effective availability of a product. Please contact our sales office.

article options
FR 693-E3D1XGM2K70

Housing

FR	polymer housing, one conduit entry
FX	polymer housing, two conduit entries
FW	polymer housing, three conduit entries

Contact blocks

5	1NO+1NC, snap action
6	1NO+1NC, slow action
7	1NO+1NC, slow action overlapped
9	2NC, slow action
20	1NO+2NC, slow action
21	3NC, slow action
22	2NO+1NC, slow action
33	1NO+1NC, slow action
34	2NC, slow action

Head type

92	detachable head (only for FW housing)
93	not detachable head (only for FR-FX-FK housing)

Actuator extraction force

	10 N (standard)
E3	30 N

Actuators

	without actuator (standard)
D	with straight actuator
D1	with right-angled actuator
D2	with jointed actuator
...

Preinstalled cable gland or connectors

	no cable gland or connector (standard)
K21	with assembled cable gland suitable for Ø 6 to Ø 12 mm cables range
...
K70	with 4 poles M12 plastic connector
...

For the complete list of all combinations, please contact our technical office.

Threaded conduit entry

	PG 13,5 (standard) (only for FR-FX housing)
A	PG 11 (only for FR-FX housing)
M1	M16x1,5
M2	M20x1,5

Contacts type

	silver contacts (standard)
G	silver contacts gold plated 1 µm

External metallic parts

	zinc-plated steel (standard)
X	stainless steel

article options
FK 3393-E3D1XGM1K22

Housing

FK	polymer housing, one conduit entry
-----------	------------------------------------

Contact blocks

33	1NO+1NC, slow action
34	2NC, slow action

Actuator extraction force

	10 N (standard)
E3	30 N

Actuators

	without actuator (standard)
D	with straight actuator
D1	with right-angled actuator
D2	with jointed actuator
...

Preinstalled cable gland

	no cable gland (standard)
K22	with assembled cable gland suitable for Ø 5 to Ø 10 mm cables range
K26	with assembled cable gland suitable for Ø 3 to Ø 7 mm cables range

Threaded conduit entry

	PG 11 (standard)
M1	M16x1,5

Contacts type

	silver contacts (standard)
G	silver contacts gold plated 1 µm

External metallic parts

	zinc-plated steel (standard)
X	stainless steel

1
1A
1B
2
2A
2B
2C
2D
2E
3
3A
3B
3C
4
4A
4B
4C
4D
4E
4F
4G
4H
5
6



Patented

Main data

- Polymer housing, from one to three conduit entries
- Protection degree IP67
- 9 contact blocks available
- 8 stainless steel actuators available
- M12 assembled connector versions
- Silver contacts gold plated versions

Markings and quality marks:

Approval IMQ: EG610
 Approval UL: E131787
 Approval CCC: 2007010305230013
 (FR-FX-FK series)
 Approval ECU: 1010151

Technical data**Housing**

Made of glass-reinforced polymer, self-extinguishing, shock-proof thermoplastic resin and with double insulation

FR and FK series one conduit entry

FX series two conduit entries

FW series three knock out conduit entries

Protection degree: IP67 according to EN 60529
 (electrical contacts)

General data

Safety parameters: see page 6/32
 Ambient temperature: from -25°C to +80°C
 Version for operation in ambient temperature from -40°C to +80°C on request
 Max operating frequency: 3600 operations cycles¹/hour
 Mechanical endurance: 1 million of operations cycles¹
 Max actuating speed: 0,5 m/s
 Min. actuating speed: 1 mm/s
 Actuator extraction force: 10 N (30 N -E3 version)
 Driving torque for installation: see pages 6/1-6/10

(1) One operation cycle means two movements, one to close and one to open contacts, as foreseen by EN 60947-5-1 standard.

Cross section of the conductors (flexible copper wire)

Contact blocks 20, 21, 22, 33, 34:	min.	1 x 0,34 mm ²	(1 x AWG 22)
	max.	2 x 1,5 mm ²	(2 x AWG 16)
Contact blocks 5, 6, 7, 9:	min.	1 x 0,5 mm ²	(1 x AWG 20)
	max.	2 x 2,5 mm ²	(2 x AWG 14)

In conformity with standards:

IEC 60947-5-1, EN 60947-5-1, IEC 60204-1, EN 60204-1, EN 1088, EN ISO 12100-1, EN ISO 12100-2, IEC 60529, EN 60529, NFC 63-140, VDE 0660-200, VDE 0113, CENELEC EN 50013, BG-GS-ET-15.

Approvals:

IEC 60947-5-1, UL 508, GB14048.5-2001

In conformity with requirements requested by:

Low Voltage Directive 2006/95/EC, Machinery Directive 2006/42/EC and Electromagnetic Compatibility 2004/108/EC.

Positive contact opening in conformity with standards:

IEC 60947-5-1, EN 60947-5-1, VDE 0660-206.

⚠ If not expressly indicated in this chapter, for the right installation and the correct utilization of all articles see requirements indicated from page 6/1 to page 6/10.

Electrical data**Utilization categories**

without connector	Thermal current (I _{th}):	10 A	Alternate current: AC15 (50...60 Hz)			
	Rated insulation voltage (U _i):	500 Vac 600 Vdc	U _e (V)	250	400	500
		400 Vac 500 Vdc	I _e (A)	6	4	1
	Conditional short circuit current:	for contact blocks 20, 21, 22, 33, 34	Direct current: DC13			
	Protection against short circuits:	1000 A according to EN 60947-5-1	U _e (V)	24	125	250
Pollution degree:	fuse 10 A 500 V type aM	I _e (A)	6	1,1	0,4	
		3				

with 4 poles M12 connector	Thermal current (I _{th}):	4 A	Alternate current: AC15 (50...60 Hz)			
	Rated insulation voltage (U _i):	250 Vac 300 Vdc	U _e (V)	24	120	250
		Protection against short circuits:	fuse 4 A 500 V type gG	I _e (A)	4	4
	Pollution degree:	3	Direct current: DC13			
			U _e (V)	24	125	250
		I _e (A)	4	1,1	0,4	

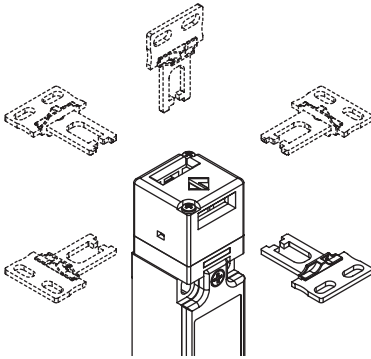
with 8 poles M12 connector	Thermal current (I _{th}):	2 A	Alternate current: AC15 (50...60 Hz)			
	Rated insulation voltage (U _i):	30 Vac 36 Vdc	U _e (V)	24		
		Protection against short circuits:	fuse 2 A 500 V type gG	I _e (A)	2	
	Pollution degree:	3	Direct current: DC13			
			U _e (V)	24		
		I _e (A)	2			



Description

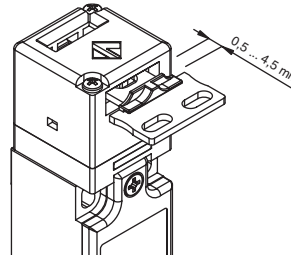
These safety switches are ideal to control gates, sliding doors and other guards protecting dangerous parts of machine. The stainless steel actuator is fastened to the moving part of the guard, so it is removed from the switch on every opening of the guard. The switch mechanism guarantees that removing the actuator forces the positive opening of the electrical contacts. Easy to install, these switches can be applied to any kind of protection (with hinge, sliding and removable ones). Besides, the possibility to actuate the switch only with its actuator guarantees that the machine can be restarted only when the guard has been closed. All products (except FW series) are equipped with a particular mechanical hooking that does not allow the separation of the head from the body during its positioning.

Rotating heads



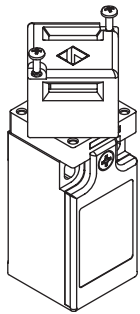
Removing the two fastening screws, in all switches, the head can be rotated in 90° steps.

Actuator regulation zone



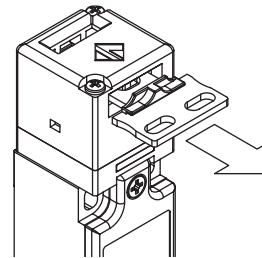
This switch has a wide backlash of the actuator into the head (4 mm) for an easier installation. With closed door, check that the actuator doesn't knock straight against the head of the switch; it must be in the adjustment zone (0,5...4,5 mm)

Not detachable head



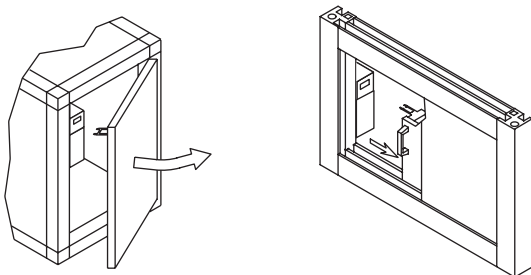
The action head type "93" is completely interchangeable and compatible with previous head type "92", but it has the advantage to be not detachable from the switch body even if it is always adjustable in 90° steps (Pizzato Elettrica patent). The new head is safer because it cannot be ruined during installation. The head fixing screws have been reduced to only two (instead of the previous four) and so the rotation operation will be quicker and cheaper.

Versions with 30 N actuator extraction force



Versions with 30 N actuator holding force instead of the standard 10 N are available.

Installation examples



Limits of utilization

Do not use where dust and dirt may penetrate in any way into the head and deposit there, in particular where metal dust, concrete or chemicals are spread.
Do not use where explosive or inflammable gas is present.

Data type approved by IMQ, CCC and EZU

Rated insulation voltage (Ui): 500 Vac
400 Vac for contact blocks 20, 21, 22, 33, 34
Thermal current (Ith): 10 A
Protection against short circuits: fuse 10 A 500 V type aM
Protection degree: IP67
MV terminals (screw clamps)
Pollution degree 3
Utilization category: AC15
Operation voltage (Ue): 400 Vac (50 Hz)
Operation current (Ie): 3 A
Forms of the contact element: Zb, Y+Y, Y+Y+X, Y+Y+Y, Y+X+X
Positive opening of contacts on contact block 5, 6, 7, 9, 20, 21, 22, 33, 34

In conformity with standards: EN 60947-1, EN 60947-5-1 and subsequent modifications and completions, fundamental requirements of the Low Voltage Directive 2006/95/CE and subsequent modifications and completions.

Please contact our technical service for the list of approved products.

Data type approved by UL

Utilization categories Q300 (69 VA, 125-250 Vdc)
A600 (720 VA, 120-600 Vac)
Data of the housing type 1, 4X "indoor use only"; 12, 13
For all contact blocks use 60 or 75 °C copper (Cu) conductor and wire size No. 12-14 AWG. Terminal tightening torque of 7,1 lb-in (0.8 Nm).
In conformity with standard: UL 508

Please contact our technical service for the list of approved products.

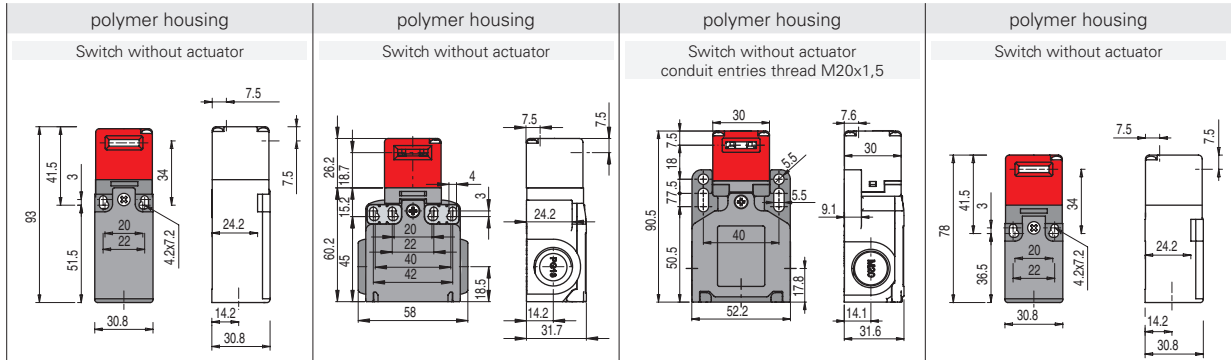
1
1A
1B
2
2A
2B
2C
2D
2E
3
3A
3B
3C
4
4A
4B
4C
4D
4E
4F
4G
4H
5
6

Dimensional drawings

Contacts type:

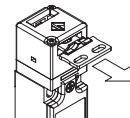
- R = snap action
- L = slow action
- LO = slow action overlapped

Contact blocks



	FR 593	FX 593	FW 592-M2	
5	R FR 593 \ominus 1NO+1NC	FX 593 \ominus 1NO+1NC	FW 592-M2 \ominus 1NO+1NC	
6	FR 693 \ominus 1NO+1NC	FX 693 \ominus 1NO+1NC	FW 692-M2 \ominus 1NO+1NC	
7	LO FR 793 \ominus 1NO+1NC	FX 793 \ominus 1NO+1NC	FW 792-M2 \ominus 1NO+1NC	
9	FR 993 \ominus 2NC	FX 993 \ominus 2NC	FW 992-M2 \ominus 2NC	
20	L FR 2093 \ominus 1NO+2NC	FX 2093 \ominus 1NO+2NC	FW 2092-M2 \ominus 1NO+2NC	
21	L FR 2193 \ominus 3NC	FX 2193 \ominus 3NC	FW 2192-M2 \ominus 3NC	
22	L FR 2293 \ominus 2NO+1NC	FX 2293 \ominus 2NO+1NC	FW 2292-M2 \ominus 2NO+1NC	
33	L FR 3393 \ominus 1NO+1NC	FX 3393 \ominus 1NO+1NC	FW 3392-M2 \ominus 1NO+1NC	FK 3393 \ominus 1NO+1NC
34	L FR 3493 \ominus 2NC	FX 3493 \ominus 2NC	FW 3492-M2 \ominus 2NC	FK 3493 \ominus 2NC
Min. force	10 N (18 N \ominus)	10 N (18 N \ominus)	10 N (18 N \ominus)	10 N (18 N \ominus)

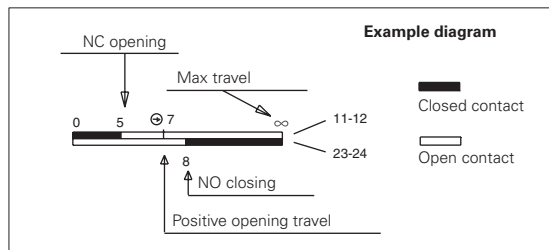
All switches listed above are available in the version with 30N actuator extraction force. To obtain these products, the order code has to be changed adding the extension "-E3", for example FR 693-E3.



Min. force 30 N version	30 N (38 N \ominus)	30 N (38 N \ominus)	30 N (38 N \ominus)	30 N (38 N \ominus)
-------------------------	------------------------	------------------------	------------------------	------------------------

How to read travel diagrams

All measures in the diagrams are in mm



IMPORTANT:

NC contact has to be considered with inserted actuator. **In safety applications** it is necessary to activate the switch **at least up to the positive opening point** indicated in the diagrams with the symbol \ominus . Operate the switch **at least with the positive opening force**, indicated between brackets, below each article, next the value of minimum force.

Accessories See page 5/1

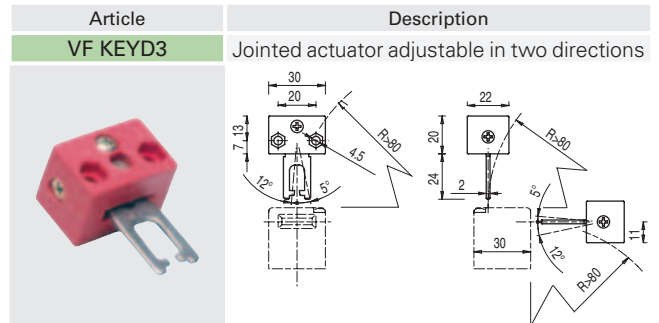
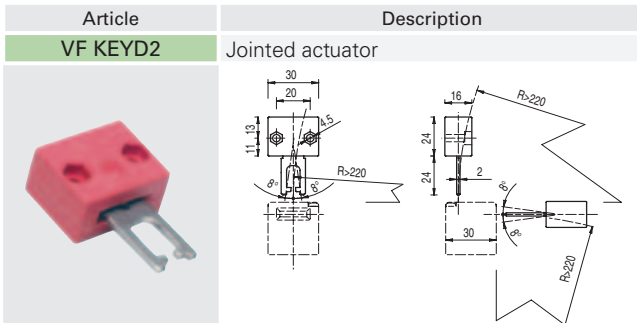
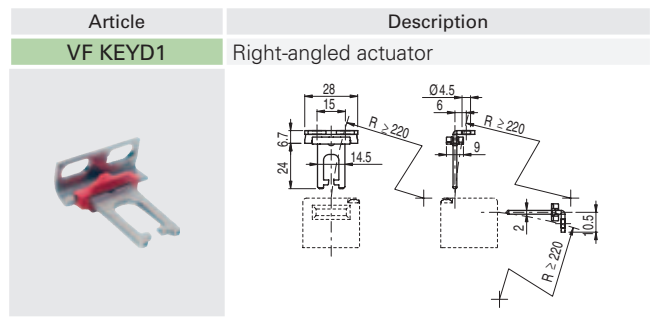
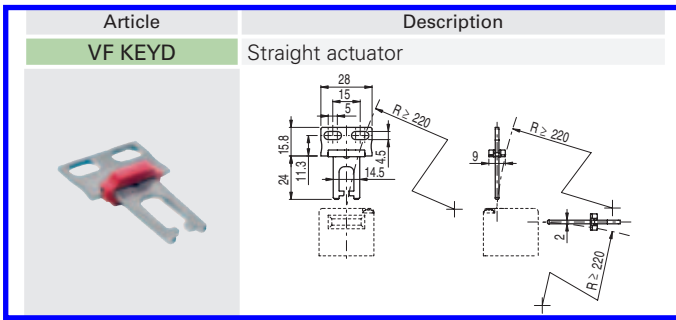
Items with code on the green background are available in stock

All measures in the drawings are in mm



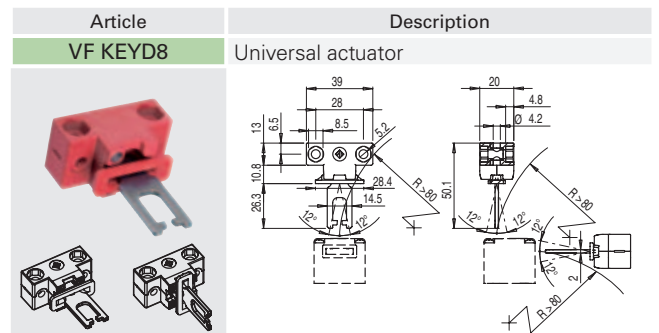
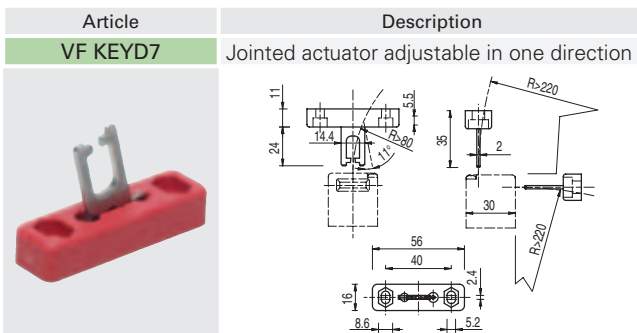
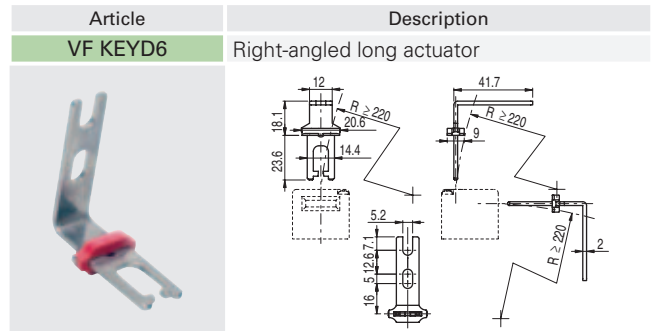
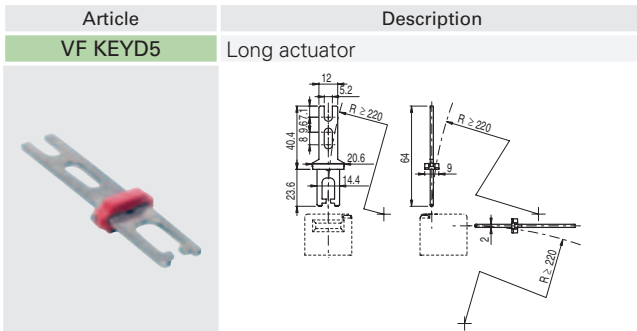
Actuators stainless steel

IMPORTANT: These actuators must be used with FR, FX, FK and FW (e.g. FR 693)



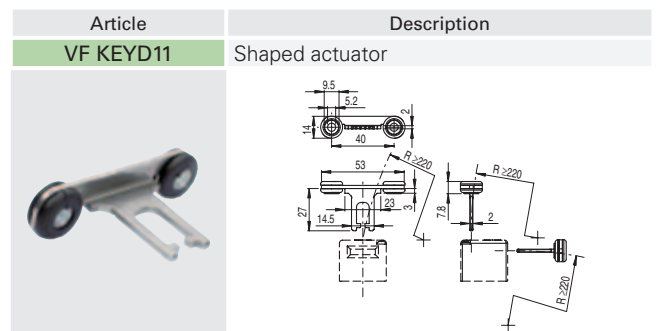
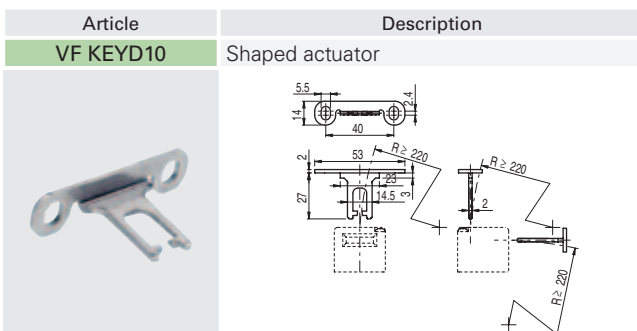
The actuator can flex in four directions for applications where the door alignment is not precise.

Actuator adjustable in two directions for doors with reduced dimensions.



Actuator adjustable in one direction for doors with reduced dimensions.

Jointed and two directions adjustable actuator for doors with reduced dimensions. The actuator has two couples of fixing holes and it is possible to rotate the actuator-working plan (see picture).



1
1A
1B
2
2A
2B
2C
2D
2E
3
3A
3B
3C
4
4A
4B
4C
4D
4E
4F
4G
4H
5
6



Enviro-Care

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Conductivity Probe

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Warrick® Sensor Fittings and Probes

Warrick Liquid Level Sensors are available in single- and multi-probe models and with a variety of fittings. The versatility of the Warrick design makes these sensors ideal for a diverse range of applications.

Examples include:

- Food and Beverage
- Caustics and Acids
- Sumps
- Reservoirs
- Pharmaceuticals
- Boilers and Steam Generators
- Ponds
- Sewage and Wastewater

Probe Styles

- Metal Rods
- Wire Suspended
- Corrosion Resistant
- Sanitary



Fitting Styles

- 3/8" to 3" Threaded Mount
- Bracket Mount
- Flange Mount
- External Mount
- Sanitary Mount
- Condulet Mount






Sensor Selection Chart

SERIES		3E	3N	3F	3G	3C	3K	3J	3L	3M	3MT	3S	3R	3T	3B	3H	3W	3Y
Page Number		E-20	E-20	E-19	E-19	E-23	E-23	E-18	E-18	E-25	E-25	E-24	E-21	E-21	E-20	E-18	E-22	E-22
Body Options	Flange			•	•													
	Pipe Thread	•			•			•										
	Flat Mount		•		•													
	Side Chamber					•	•											
	Non-Contact Electrodes											•						
	Food Grade Connection									•	•							
	Bracket Mount											•						
Fitting Body Material Options	Brass	•	•	•		•		•										
	PVC		•	•	•													
	1018 Carbon Steel			•														
	Stainless Steel	•		•														
	Forged Steel			•														
	Nylon									•	•							
	Cast Iron	•				•	•	•				•						
Housing Material	Coated Aluminum	•	•	•		•	•	•				•						
	Polycarbonate				•													
Number of Probes	1 to 3		•					•										
	1 to 4					•	•			•	•							
	1 to 7	•		•	•							•						
Electrodes	Electrode Only								•				•	•	•	•	•	•

Designed for OEM

- ▶ Compact
- ▶ One-Piece Probe/Body Construction
- ▶ Quick Install & Connect
- ▶ Order Sized to Your Spec

These Warrick fitting are designed for OEM use. They are shipped ready for quick installation. Integrated probes eliminate pre-assembly tasks, and avoid potential vibration-induced loosening when installed with power tools. Choose from single- or multi-electrode probe series. Gems supplies these series with probes pre-cut to lengths you specify.

Series	3J	3H	3L
			
Probe Quantity	1, 2 or 3	1	1
Mounting Size	1" NPT	3/8" NPT or 5/8" NF/NFE	1/8" NPT
Materials			
Body	Case iron or red brass	316 stainless steel	316 stainless steel
Terminal Housing	Diecast aluminum, epoxy coated (optional)	—	—
Probe	316 stainless steel	316 stainless steel	316 stainless steel
Insulation	Teflon®	Teflon®	Teflon®
Probe Diameter	3/16"	1/4"	3/16"
Pressure/Temperature	0 psig @ 500°F	250 psig @ 406°F	150 psig @ 365°F
Approvals	—	U.L. File #MP2489, Vol. 1 Sec. 1; CSA; FM	U.L. File #MP2489
Use the Bold characters from the chart below to construct a product code.	<p>Series 3J</p> <p>Number of Probes 1 – One 2 – Two 3 – Three</p> <p>Body Material¹ B – Cast Iron C – Red Brass</p> <p>Housing 0 – None 1 – Optional Housing</p> <p>Length of Probes² A – All probes 10-1/4" C – For lengths less than 10-1/4" indicate length as inches in decimal form</p>	<p>Series 3H</p> <p>Thread 1 – 3/8" – 18 NPT 2 – 5/8" – 18 UNF 3 – 5/8" – 24 UNEF</p> <p>Sleeve¹ B – Teflon® 3/4" Long</p> <p>Length (Feet)² 1 – One 2 – Two 3 – Three</p>	<p>Series 3L</p> <p>Connection Size 1 – 1/8" NPT 2 – 2-1/4" NPT</p> <p>Insulator Length D – Teflon® 1-1/4"</p> <p>Length in Inches^{1, 2} 02 – Two 06 – Six 10 – Ten 03 – Three 07 – Seven 11 – Eleven 04 – Four 08 – Eight 12 – Twelve 05 – Five 09 – Nine</p>
Notes	1. Probes are stainless steel. Custom options available. Consult factory. 2. 10-1/4" maximum	1. Longer Teflon® sleeves are available. Contact factory or your representative 2. Custom probe and insulation lengths are available. Contact your representative.	1. 12" maximum 2. Indicate fractional inches in decimal form (01.75 = 1-3/4")

WARRICK CONDUCTIVITY SENSORS

Solenoid Valve – 1/2"

Features

- Wide range of pressure ratings, sizes, and resilient materials provide long service life and low internal leakage
- High Flow Valves for liquid, corrosive, and air/inert gas service
- Industrial applications include:
 - Car wash
 - Laundry equipment
 - Air compressors
 - Industrial water control
 - Pumps

Construction

Valve Parts in Contact with Fluids		
Body	Brass	304 Stainless Steel
Seals and Discs	NBR or PTFE	
Disc-Holder	PA	
Core Tube	305 Stainless Steel	
Core and Plugnut	430F Stainless Steel	
Springs	302 Stainless Steel	
Shading Coil	Copper	Silver

Electrical

Standard Coil and Class of Insulation	Watt Rating and Power Consumption				Spare Coil Part Number			
	DC Watts	AC			General Purpose		Explosionproof	
		Watts	VA Holding	VA Inrush	AC	DC	AC	DC
F	-	0.1	10	40	230210	-	230214	-
F	11.6	10.1	25	70	238610	230710	230014	230714
F	16.8	16.1	35	180	272610	97617	272614	97617
F	-	17.1	40	93	238610	-	238614	-
F	-	20	43	240	99257	-	99257	-
F	-	20.1	48	240	272610	-	272614	-
H	30.6	-	-	-	-	74073	-	74073
H	40.6	-	-	-	-	238910	-	238914

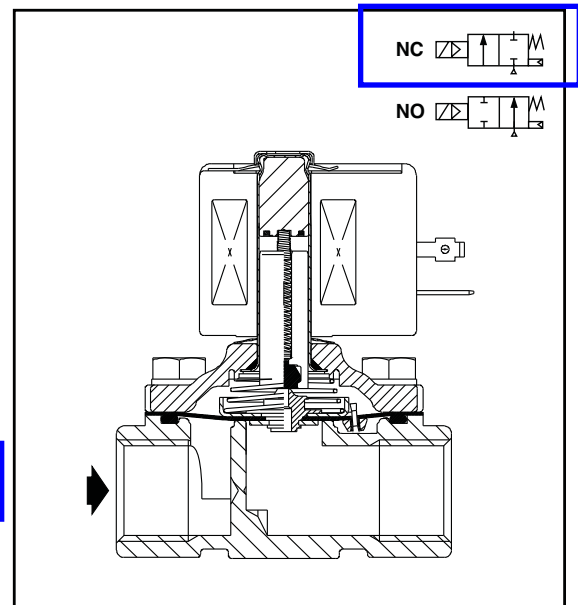
Standard Voltages: 24, 120, 240, 480 volts AC, 60 Hz (or 110, 220 volts AC, 50 Hz). 6, 12, 24, 120, 240 volts DC. Must be specified when ordering.
Other voltages available when required.

Solenoid Enclosures

Standard: RedHat II - Watertight, Types 1, 2, 3, 3S, 4, and 4X; RedHat - Type I.

Optional: RedHat II - Explosionproof and Watertight, Types 3, 3S, 4, 4X, 6, 6P, 7, and 9; Red-Hat - Explosionproof and Watertight, Types 3, 4, 4X, 7, and 9.

(To order, add prefix "EF" to catalog number, except Catalog Numbers 8210B057, 8210B058, and 8210B059, which are not available with Explosionproof enclosures.)
See *Optional Features Section* for other available options.



Nominal Ambient Temp. Ranges

RedHat II/
RedHat AC: 32°F to 125°F (0°C to 52°C)

RedHat II DC: 32°F to 104°F (0°C to 40°C)

RedHat DC: 32°F to 77°F (0°C to 25°C)
(104°F/40°C occasionally)

8210G227 AC: 32°F to 130°F (0°C to 54°C)
DC: 32°F to 90°F (0°C to 32°C)

Refer to *Engineering Section* for details.

Approvals

UL listed as indicated. CSA certified.
RedHat II meets applicable CE directives.
Refer to *Engineering Section* for details.

Specifications (English units)

Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Operating Pressure Differential (psi)						Max. Fluid Temp. °F		Brass Body			Stainless Steel Body			Watt Rating/Class of Coil Insulation ⑦		
			Min.	Max. AC			Max. DC			AC	DC	Catalog Number	Constr. Ref. No. ④	UL ⑤ Listing	Catalog Number	Constr. Ref. No. ④	UL ⑤ Listing	AC	DC
				Air-Inert Gas	Water	Light Oil @ 300 SSU	Air-Inert Gas	Water	Light Oil @ 300 SSU										
NORMALLY CLOSED (Closed when de-energized), NBR or PTFE ② Seating																			
3/8	3/8	1.5	①	150	125	-	40	40	-	180	150	8210G73 ③	1P	●	8210G36 ③	1P	●	0.1/F	11.6/F
3/8	5/8	3	0	150	150	-	40	40	-	180	150	8210G93	5D	○	-	-	-	10.1/F	11.6/F
3/8	5/8	3	5	200	150	135	125	100	-	180	150	8210G1	6D	○	-	-	-	6.1/F	11.6/F
3/8	5/8	3	5	300	300	300	-	-	-	175	-	8210G6	5D	○	-	-	-	17.1/F	-
1/2	7/16	2.2	①	150	125	-	40	40	-	180	150	8210G15 ③	2P	●	8210G37 ③	2P	●	16.1/F	11.6/F
1/2	5/8	4	0	150	150	-	40	40	-	180	150	8210G94	5D	○	-	-	-	10.1/F	11.6/F
1/2	5/8	4	5	150	150	125	40	40	-	175	150	-	-	-	8210G87	7D	●	17.1/F	11.6/F
1/2	5/8	4	5	200	150	135	125	100	100	180	150	8210G2	6D	○	-	-	-	6.1/F	11.6/F
1/2	5/8	4	5	300	300	300	-	-	-	175	-	8210G7	5D	○	-	-	-	17.1/F	-
1/2	5/8	4	5	300	300	-	300	300	-	180	125	8210G227	5D	○	-	-	-	17.1/F	40.6/H
3/4	3/8	4.5	0	150	150	125	40	40	-	175	150	-	-	-	8210G88	7D	●	17.1/F	11.6/F
3/4	3/4	5	5	125	125	125	100	90	75	180	150	8210G9	9D	○	-	-	-	6.1/F	11.6/F
3/4	3/4	5	0	150	150	-	40	40	-	180	150	8210G95	8D	○	-	-	-	10.1/F	11.6/F
3/4	3/4	6.5	5	250	150	100	125	125	125	180	150	8210G3	11D	○	-	-	-	6.1/F	11.6/F
3/4	3/4	6	0	-	-	-	200	180	180	-	77	8210B26 ② ‡	10P	-	-	-	-	-	30.6/H
3/4	3/4	6	0	350	300	200	-	-	-	200	-	8210G26 ② ‡	40P	●	-	-	-	-	16.1F
1	1	13	0	-	-	-	100	100	80	-	77	8210B54 ‡	31D	-	8210D89	15D	-	-	30.6/H
1	1	13	0	150	125	125	-	-	-	180	-	8210G54	41D	●	8210G89	45D	●	16.1/F	-
1	1	13	5	150	150	100	125	125	125	180	150	8210G4	12D	○	-	-	-	6.1/F	11.6/F
1	1	13.5	0	300	225	115	-	-	-	200	-	8210G27 ‡	42P	●	-	-	-	20.1/F	-
1	1	13.5	10	300	300	300	-	-	-	175	-	8210G78 ②	13P	-	-	-	-	17.1/F	-
1 1/4	1 1/8	15	0	-	-	-	100	100	80	-	77	8210B55 ‡	32D	-	-	-	-	-	30.6/H
1 1/4	1 1/8	15	0	150	125	125	-	-	-	180	-	8210G55	43D	●	-	-	-	-	16.1/F
1 1/4	1 1/8	15	5	150	150	100	125	125	125	180	150	8210G8	16D	○	-	-	-	6.1/F	11.6/F
1 1/2	1 1/4	22.5	0	-	-	-	100	100	80	-	77	8210B56 ‡	33D	-	-	-	-	-	30.6/H
1 1/2	1 1/4	22.5	0	150	125	125	-	-	-	180	-	8210G56 ‡	44D	●	-	-	-	-	16.1/F
1 1/2	1 1/4	22.5	5	150	150	100	125	125	125	180	150	8210G22	18D	●	-	-	-	6.1/F	11.6/F
2	1 3/4	43	5	150	125	90	50	50	50	180	150	8210G100	20P	●	-	-	-	6.1/F	11.6/F
2 1/2	1 3/4	45	5	150	125	90	50	50	50	180	150	8210G101	21P	●	-	-	-	6.1/F	11.6/F
NORMALLY OPEN (Open when de-energized), NBR Seating (PA Disc-Holder, except as noted)																			
3/8	5/8	3	0	150	150	125	125	125	80	180	150	8210G33	23D	●	-	-	-	10.1/F	11.6/F
3/8	5/8	3	5	250	200	200	250	200	200	180	180	8210G11 ⑧ ⑨	39D	●	-	-	-	10.1/F	11.6/F
1/2	5/8	4	0	150	150	125	125	125	80	180	150	8210G34	23D	●	-	-	-	10.1/F	11.6/F
1/2	5/8	3	0	150	150	100	125	125	80	180	150	-	-	-	8210G30	37D	●	10.1/F	11.6/F
1/2	5/8	4	5	250	200	200	250	200	200	180	180	8210G12 ⑧ ⑨	39D	●	-	-	-	10.1/F	11.6/F
3/4	3/4	5.5	0	150	150	125	125	125	80	180	150	8210G35	25D	●	-	-	-	10.1/F	11.6/F
3/4	5/8	3	0	150	150	100	125	125	80	180	150	-	-	-	8210G38	38D	●	10.1/F	11.6/F
3/4	3/4	6.5	5	-	-	-	250	200	200	-	180	8210C13	24D	●	-	-	-	-	16.8/F
3/4	3/4	6.5	5	250	200	200	-	-	-	180	-	8210G13	46D	●	-	-	-	16.1/F	-
1	1	13	0	125	125	125	-	-	-	180	-	8210B57 ⑥ ⑩	34D	●	-	-	-	20/F	-
1	1	13	5	-	-	-	125	125	125	-	180	8210D14	26D	●	-	-	-	-	16.8/F
1	1	13	5	150	125	-	-	-	-	180	-	8210G14	47D	●	-	-	-	16.1/F	-
1 1/4	1 1/8	15	0	125	125	125	-	-	-	180	-	8210B58 ⑥ ⑩	35D	●	-	-	-	20/F	-
1 1/4	1 1/8	15	5	-	-	-	125	125	125	-	180	8210D18	28D	●	-	-	-	-	16.8/F
1 1/4	1 1/8	15	5	150	150	125	-	-	-	180	-	8210G18	48D	●	-	-	-	16.1/F	-
1 1/2	1 1/4	22.5	0	125	125	125	-	-	-	180	-	8210B59 ⑥ ⑩	36D	●	-	-	-	20/F	-
1 1/2	1 1/4	22.5	5	-	-	-	125	125	125	-	180	8210D32	29D	●	-	-	-	-	16.8/F
1 1/2	1 1/4	22.5	5	150	150	125	-	-	-	180	-	8210G32	49D	●	-	-	-	16.1/F	-
2	1 3/4	43	5	-	-	-	125	125	125	-	150	8210I03	30P	●	-	-	-	-	16.8/F
2	1 3/4	43	5	125	125	125	-	-	-	180	-	8210G103	50P	●	-	-	-	16.1/F	-
2 1/2	1 3/4	45	5	-	-	-	125	125	125	-	150	8210I04	27P	●	-	-	-	-	16.8/F
2 1/2	1 3/4	45	5	125	125	125	-	-	-	180	-	8210G104	51P	●	-	-	-	16.1/F	-

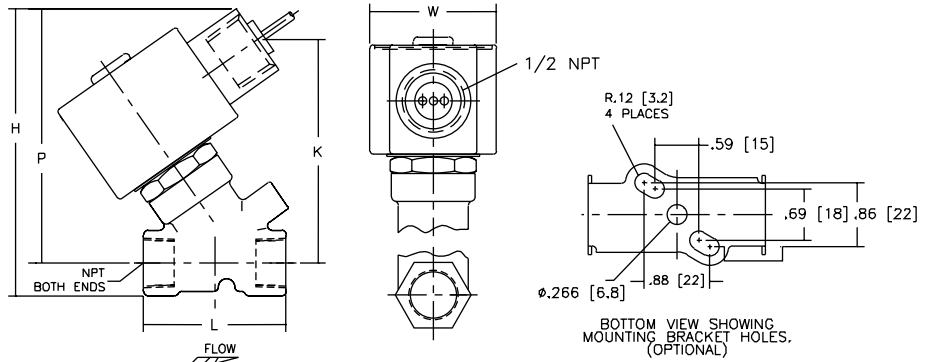
Notes: ① 5 psi on Air; 1 psi on Water.
 ② Valve provided with PTFE main disc.
 ③ Valve includes Ultem (G.E. trademark) piston.
 ④ Letter "D" denotes diaphragm construction; "P" denotes piston construction.
 ⑤ Safety Shutoff Valve; ● General Purpose Valve.
 Refer to Engineering Section (Approvals) for details.
 ⑥ Valves not available with Explosionproof enclosures.
 ⑦ On 50 hertz service, the watt rating for the 6.1/F solenoid is 8.1 watts.
 ⑧ AC construction also has PA seating.
 ⑨ No disc-holder.
 ⑩ Stainless Steel disc-holder.
 ‡ Must have solenoid mounted vertical and upright.

Dimensions: inches (mm)

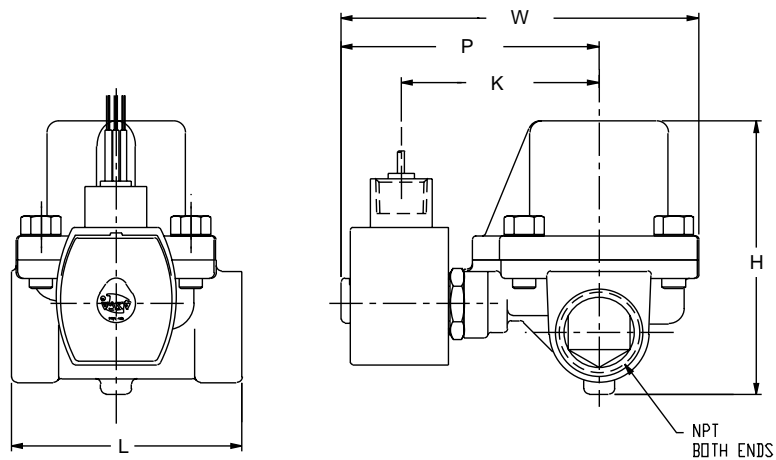
Constr. Ref. No.		H	K	L	P	W
1*	ins.	3.85	3.00	1.91	3.41	1.69
	mm	98	76	49	87	43
2*	ins.	4.17	3.25	2.28	3.63	1.69
	mm	106	83	58	92	43
13	ins.	4.44	3.22	3.75	4.19	5.81
	mm	113	82	95	106	147
5	ins.	3.84	2.31	2.75	3.28	2.28
	mm	98	59	70	83	58
6	ins.	3.56	1.94	2.75	2.50	2.28
	mm	86	49	70	71	58
7	ins.	4.19	2.50	2.81	3.47	2.39
	mm	106	64	71	88	61
8	ins.	4.13	2.47	2.81	3.44	2.29
	mm	105	63	71	87	58
9*	ins.	3.66	2.10	2.81	2.96	2.28
	mm	93	53	71	75	58
10*①	ins.	5.25	X	2.81	4.59	2.31
	mm	133	X	71	117	59
11*	ins.	4.16	2.66	3.84	3.52	2.75
	mm	106	68	98	89	70
12	ins.	5.64	3.15	3.75	4.01	3.36
	mm	143	80	95	102	85
15*	ins.	5.34	X	3.75	4.47	3.84
	mm	136	X	95	114	98
16	ins.	5.64	3.15	3.66	4.01	3.56
	mm	143	80	93	102	90
18	ins.	6.11	3.30	4.38	4.16	3.92
	mm	155	84	111	106	100
20*	ins.	7.33	3.71	5.06	4.57	4.87
	mm	186	94	129	116	124
21*	ins.	7.33	3.71	5.50	4.57	4.87
	mm	186	94	140	116	124
23	ins.	4.35	2.65	2.75	3.79	2.28
	mm	110	67	70	96	58
24	ins.	5.06	X	3.78	4.44	2.75
	mm	129	X	96	113	70
25	ins.	4.64	2.81	2.81	3.94	2.28
	mm	118	71	71	100	58
26	ins.	6.53	X	3.75	4.91	3.19
	mm	166	X	95	125	81
27	ins.	8.22	X	5.50	5.47	4.87
	mm	209	X	139	139	124
28	ins.	6.53	X	3.66	4.91	3.19
	mm	166	X	93	125	81
29	ins.	7.03	X	4.38	5.06	4.40
	mm	179	X	111	129	112

① Valves must be mounted with solenoid vertical and upright.
* DC dimensions slightly larger.

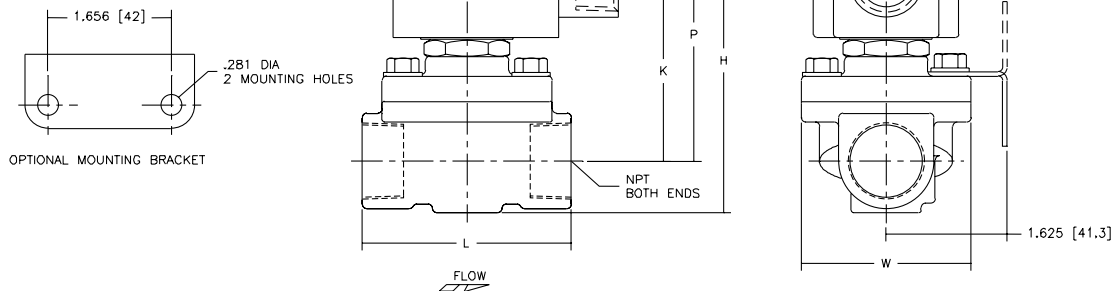
Constr. Refs. 1, 2



Constr. Ref. 13



Constr. Refs. 5-9, 11, 20, 21, 23, 25, 37, 38



Solenoid Valve – 1"

Features

- Wide range of pressure ratings, sizes, and resilient materials provide long service life and low internal leakage
- High Flow Valves for liquid, corrosive, and air/inert gas service
- Industrial applications include:
 - Car wash
 - Laundry equipment
 - Air compressors
 - Industrial water control
 - Pumps

Construction

Valve Parts in Contact with Fluids		
Body	Brass	304 Stainless Steel
Seals and Discs	NBR or PTFE	
Disc-Holder	PA	
Core Tube	305 Stainless Steel	
Core and Plugnut	430F Stainless Steel	
Springs	302 Stainless Steel	
Shading Coil	Copper	Silver

Electrical

Standard Coil and Class of Insulation	Watt Rating and Power Consumption				Spare Coil Part Number			
	DC Watts	AC			General Purpose		Explosionproof	
		Watts	VA Holding	VA Inrush	AC	DC	AC	DC
F	-	6.1	16	40	238210	-	238214	-
F	11.6	10.1	25	70	238610	238710	238614	238714
F	16.8	16.1	35	180	272610	07617	272614	07617
F	-	17.1	40	93	238610	-	238614	-
F	-	20	43	240	99257	-	99257	-
F	-	20.1	48	240	272610	-	272614	-
H	30.6	-	-	-	-	74073	-	74073
H	40.6	-	-	-	-	238910	-	238914

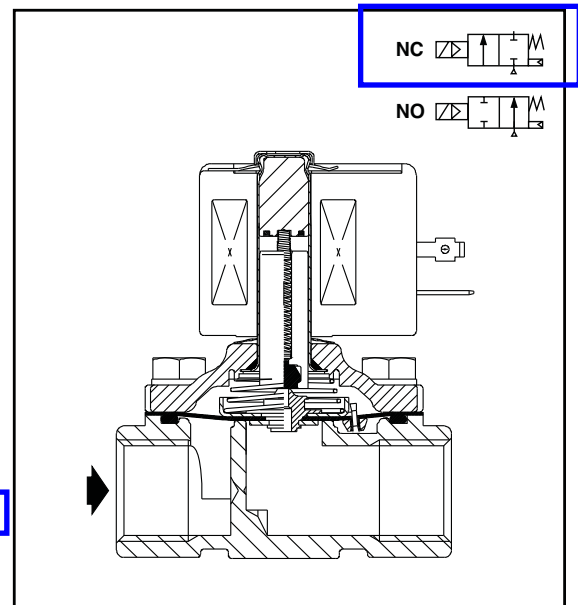
Standard Voltages: 24, 120, 240, 480 volts AC, 60 Hz (or 110, 220 volts AC, 50 Hz). 6, 12, 24, 120, 240 volts DC. Must be specified when ordering.
Other voltages available when required.

Solenoid Enclosures

Standard: RedHat II - Watertight, Types 1, 2, 3, 3S, 4, and 4X; RedHat - Type I.

Optional: RedHat II - Explosionproof and Watertight, Types 3, 3S, 4, 4X, 6, 6P, 7, and 9; Red-Hat - Explosionproof and Watertight, Types 3, 4, 4X, 7, and 9.

(To order, add prefix "EF" to catalog number, except Catalog Numbers 8210B057, 8210B058, and 8210B059, which are not available with Explosionproof enclosures.)
See *Optional Features Section* for other available options.



Nominal Ambient Temp. Ranges

- RedHat II/
RedHat AC: 32°F to 125°F (0°C to 52°C)
- RedHat II DC: 32°F to 104°F (0°C to 40°C)
- RedHat DC: 32°F to 77°F (0°C to 25°C)
(104°F/40°C occasionally)
- 8210G227 AC: 32°F to 130°F (0°C to 54°C)
DC: 32°F to 90°F (0°C to 32°C)

Refer to *Engineering Section* for details.

Approvals

UL listed as indicated. CSA certified.
RedHat II meets applicable CE directives.
Refer to *Engineering Section* for details.

Specifications (English units)

Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Min.	Operating Pressure Differential (psi)						Max. Fluid Temp. °F		Brass Body			Stainless Steel Body			Watt Rating/Class of Coil Insulation ⑦		
				Max. AC			Max. DC			AC	DC	Catalog Number	Constr. Ref. No. ④	UL ⑤ Listing	Catalog Number	Constr. Ref. No. ④	UL ⑤ Listing	AC	DC	
				Air-Inert Gas	Water	Light Oil @ 300 SSU	Air-Inert Gas	Water	Light Oil @ 300 SSU											
NORMALLY CLOSED (Closed when de-energized), NBR or PTFE ② Seating																				
3/8	3/8	1.5	①	150	125	-	40	40	-	180	150	8210G73 ③	1P	●	8210G36 ③	1P	●	6.1/F	11.6/F	
3/8	5/8	3	0	150	150	-	40	40	-	180	150	8210G93	5D	○	-	-	-	10.1/F	11.6/F	
3/8	5/8	3	5	200	150	135	125	100	100	180	150	8210G1	6D	○	-	-	-	6.1/F	11.6/F	
3/8	5/8	3	5	300	300	300	-	-	-	175	-	8210G6	5D	○	-	-	-	17.1/F	-	
1/2	7/16	2.2	①	150	125	-	40	40	-	180	150	8210G15 ③	2P	●	8210G37 ③	2P	●	6.1/F	11.6/F	
1/2	5/8	4	0	150	150	-	40	40	-	180	150	8210G94	5D	○	-	-	-	10.1/F	11.6/F	
1/2	5/8	4	0	150	150	125	40	40	-	175	150	-	-	-	8210G87	7D	●	17.1/F	11.6/F	
1/2	5/8	4	5	200	150	135	125	100	100	180	150	8210G2	6D	○	-	-	-	6.1/F	11.6/F	
1/2	5/8	4	5	300	300	300	-	-	-	175	-	8210G7	5D	○	-	-	-	17.1/F	-	
1/2	5/8	4	5	300	300	-	300	300	-	180	125	8210G227	5D	○	-	-	-	17.1/F	40.6/H	
3/4	5/8	4.5	0	150	150	125	40	40	-	175	150	-	-	-	8210G88	7D	●	17.1/F	11.6/F	
3/4	3/4	5	5	125	125	125	100	90	75	180	150	8210G9	9D	○	-	-	-	6.1/F	11.6/F	
3/4	3/4	5	0	150	150	-	40	40	-	180	150	8210G95	8D	○	-	-	-	10.1/F	11.6/F	
3/4	3/4	6.5	5	250	150	100	125	125	125	180	150	8210G3	11D	○	-	-	-	6.1/F	11.6/F	
3/4	3/4	6	0	-	-	-	200	180	180	-	77	8210B26 ② ‡	10P	-	-	-	-	-	30.6/H	
3/4	3/4	6	0	350	300	200	-	-	-	200	-	8210G26 ② ‡	40P	●	-	-	-	-	16.1/F	-
1	1	13	0	-	-	-	100	100	80	-	77	8210B54 ‡	31D	○	8210B80	15D	○	-	20.1/F	-
1	1	13	0	150	125	125	-	-	-	180	-	8210G54	41D	●	8210G89	45D	●	16.1/F	-	
1	1	13	5	150	150	100	125	125	125	180	150	8210G4	12D	○	-	-	-	6.1/F	11.6/F	
1	1	13.5	0	300	225	115	-	-	-	200	-	8210G27 ‡	42P	●	-	-	-	20.1/F	-	
1	1	13.5	10	300	300	300	-	-	-	175	-	8210G78 ②	13P	-	-	-	-	17.1/F	-	
1 1/4	1 1/8	15	0	-	-	-	100	100	80	-	77	8210B55 ‡	32D	-	-	-	-	-	30.6/H	
1 1/4	1 1/8	15	0	150	125	125	-	-	-	180	-	8210G55	43D	●	-	-	-	16.1/F	-	
1 1/4	1 1/8	15	5	150	150	100	125	125	125	180	150	8210G8	16D	○	-	-	-	6.1/F	11.6/F	
1 1/2	1 1/4	22.5	0	-	-	-	100	100	80	-	77	8210B56 ‡	33D	-	-	-	-	-	30.6/H	
1 1/2	1 1/4	22.5	0	150	125	125	-	-	-	180	-	8210G56 ‡	44D	●	-	-	-	16.1/F	-	
1 1/2	1 1/4	22.5	5	150	150	100	125	125	125	180	150	8210G22	18D	●	-	-	-	6.1/F	11.6/F	
2	1 3/4	43	5	150	125	90	50	50	50	180	150	8210G100	20P	●	-	-	-	6.1/F	11.6/F	
2 1/2	1 3/4	45	5	150	125	90	50	50	50	180	150	8210G101	21P	●	-	-	-	6.1/F	11.6/F	
NORMALLY OPEN (Open when de-energized), NBR Seating (PA Disc-Holder, except as noted)																				
3/8	5/8	3	0	150	150	125	125	125	80	180	150	8210G33	23D	●	-	-	-	10.1/F	11.6/F	
3/8	5/8	3	5	250	200	200	250	200	200	180	180	8210G11 ⑧ ⑨	39D	●	-	-	-	10.1/F	11.6/F	
1/2	5/8	4	0	150	150	125	125	125	80	180	150	8210G34	23D	●	-	-	-	10.1/F	11.6/F	
1/2	5/8	3	0	150	150	100	125	125	80	180	150	-	-	-	8210G30	37D	●	10.1/F	11.6/F	
1/2	5/8	4	5	250	200	200	250	200	200	180	180	8210G12 ⑧ ⑨	39D	●	-	-	-	10.1/F	11.6/F	
3/4	3/4	5.5	0	150	150	125	125	125	80	180	150	8210G35	25D	●	-	-	-	10.1/F	11.6/F	
3/4	5/8	3	0	150	150	100	125	125	80	180	150	-	-	-	8210G38	38D	●	10.1/F	11.6/F	
3/4	3/4	6.5	5	-	-	-	250	200	200	-	180	8210C13	24D	●	-	-	-	-	16.8/F	
3/4	3/4	6.5	5	250	200	200	-	-	-	180	-	8210G13	46D	●	-	-	-	16.1/F	-	
1	1	13	0	125	125	125	-	-	-	180	-	8210B57 ⑥ ⑩	34D	●	-	-	-	20/F	-	
1	1	13	5	-	-	-	125	125	125	-	180	8210D14	26D	●	-	-	-	-	16.8/F	
1	1	13	5	150	150	125	-	-	-	180	-	8210G14	47D	●	-	-	-	16.1/F	-	
1 1/4	1 1/8	15	0	125	125	125	-	-	-	180	-	8210B58 ⑥ ⑩	35D	●	-	-	-	20/F	-	
1 1/4	1 1/8	15	5	-	-	-	125	125	125	-	180	8210D18	28D	●	-	-	-	-	16.8/F	
1 1/4	1 1/8	15	5	150	150	125	-	-	-	180	-	8210G18	48D	●	-	-	-	16.1/F	-	
1 1/2	1 1/4	22.5	0	125	125	125	-	-	-	180	-	8210B59 ⑥ ⑩	36D	●	-	-	-	20/F	-	
1 1/2	1 1/4	22.5	5	-	-	-	125	125	125	-	180	8210D32	29D	●	-	-	-	-	16.8/F	
1 1/2	1 1/4	22.5	5	150	150	125	-	-	-	180	-	8210G32	49D	●	-	-	-	16.1/F	-	
2	1 3/4	43	5	-	-	-	125	125	125	-	150	8210I03	30P	●	-	-	-	-	16.8/F	
2	1 3/4	43	5	125	125	125	-	-	-	180	-	8210G103	50P	●	-	-	-	16.1/F	-	
2 1/2	1 3/4	45	5	-	-	-	125	125	125	-	150	8210I04	27P	●	-	-	-	-	16.8/F	
2 1/2	1 3/4	45	5	125	125	125	-	-	-	180	-	8210G104	51P	●	-	-	-	16.1/F	-	

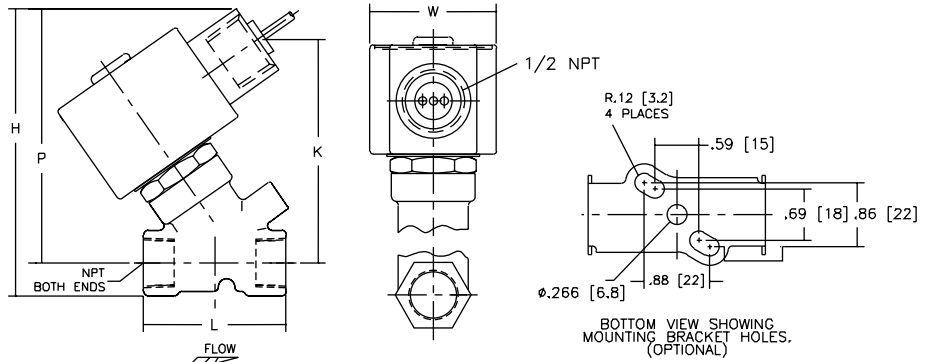
Notes: ① 5 psi on Air; 1 psi on Water.
 ② Valve provided with PTFE main disc.
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 ④ Letter "D" denotes diaphragm construction; "P" denotes piston construction.
 ⑤ ○ Safety Shutoff Valve; ● General Purpose Valve.
 Refer to Engineering Section (Approvals) for details.
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 ⑦ On 50 hertz service, the watt rating for the 6.1/F solenoid is 8.1 watts.
 ⑧ AC construction also has PA seating.
 ⑨ No disc-holder.
 ⑩ Stainless Steel disc-holder.
 ‡ Must have solenoid mounted vertical and upright.

Dimensions: inches (mm)

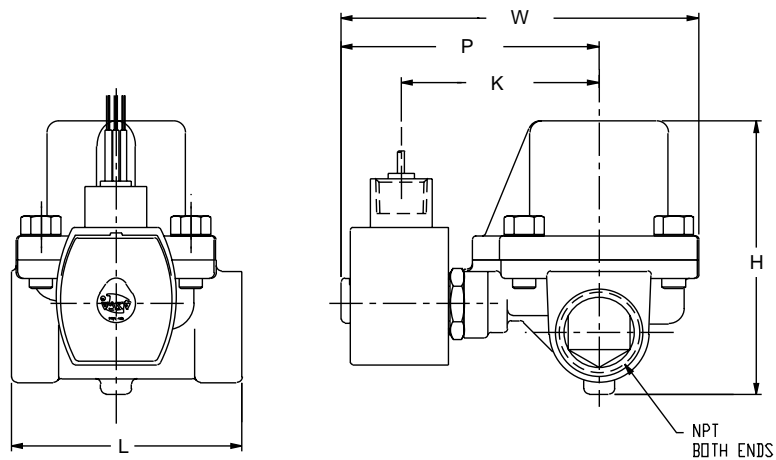
Constr. Ref. No.		H	K	L	P	W
1*	ins.	3.85	3.00	1.91	3.41	1.69
	mm	98	76	49	87	43
2*	ins.	4.17	3.25	2.28	3.63	1.69
	mm	106	83	58	92	43
13	ins.	4.44	3.22	3.75	4.19	5.81
	mm	113	82	95	106	147
5	ins.	3.84	2.31	2.75	3.28	2.28
	mm	98	59	70	83	58
6	ins.	3.85	1.94	2.75	2.88	2.28
	mm	86	49	70	71	58
7	ins.	4.19	2.50	2.81	3.47	2.39
	mm	106	64	71	88	61
8	ins.	4.13	2.47	2.81	3.44	2.29
	mm	105	63	71	87	58
9*	ins.	3.66	2.10	2.81	2.96	2.28
	mm	93	53	71	75	58
10*①	ins.	5.25	X	2.81	4.59	2.31
	mm	133	X	71	117	59
11*	ins.	4.16	2.66	3.84	3.52	2.75
	mm	106	68	98	89	70
12	ins.	5.64	3.15	3.75	4.01	3.36
	mm	143	80	95	102	85
15*	ins.	5.34	X	3.75	4.47	3.84
	mm	136	X	95	114	98
16	ins.	5.64	3.15	3.66	4.01	3.56
	mm	143	80	93	102	90
18	ins.	6.11	3.30	4.38	4.16	3.92
	mm	155	84	111	106	100
20*	ins.	7.33	3.71	5.06	4.57	4.87
	mm	186	94	129	116	124
21*	ins.	7.33	3.71	5.50	4.57	4.87
	mm	186	94	140	116	124
23	ins.	4.35	2.65	2.75	3.79	2.28
	mm	110	67	70	96	58
24	ins.	5.06	X	3.78	4.44	2.75
	mm	129	X	96	113	70
25	ins.	4.64	2.81	2.81	3.94	2.28
	mm	118	71	71	100	58
26	ins.	6.53	X	3.75	4.91	3.19
	mm	166	X	95	125	81
27	ins.	8.22	X	5.50	5.47	4.87
	mm	209	X	139	139	124
28	ins.	6.53	X	3.66	4.91	3.19
	mm	166	X	93	125	81
29	ins.	7.03	X	4.38	5.06	4.40
	mm	179	X	111	129	112

① Valves must be mounted with solenoid vertical and upright.
* DC dimensions slightly larger.

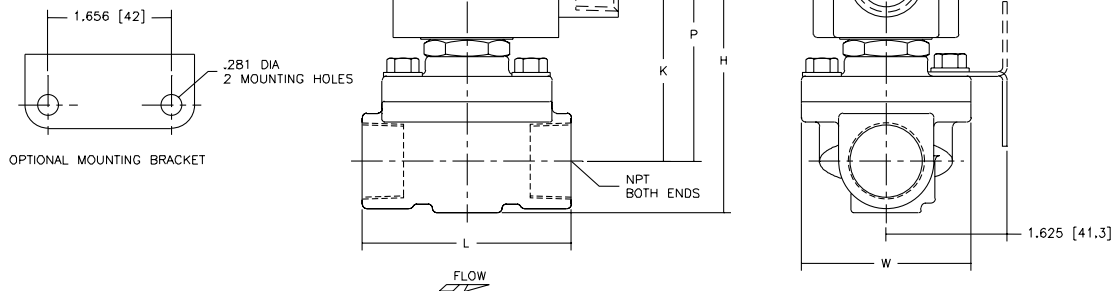
Constr. Refs. 1, 2



Constr. Ref. 13



Constr. Refs. 5-9, 11, 20, 21, 23, 25, 37, 38



Flowmeter



Level



Pressure



Flow



Temperature

Liquid
Analysis

Registration

Systems
Components

Services



Solutions

Technical Information

Proline Promag 50W, 53W

Electromagnetic Flow Measuring System

Flow measurement of liquids in water or wastewater applications



Application

Electromagnetic flowmeter for bidirectional measurement of liquids with a minimum conductivity of $\geq 5 \mu\text{S}/\text{cm}$:

- Drinking water
- Wastewater
- Sewage sludge
- Flow measurement up to 110000 m³/h (484315 gal/min)
- Fluid temperature up to +80 °C (+176 °F)
- Process pressures up to 40 bar (580 psi)
- Lengths in accordance with DVGW/ISO

Application-specific lining of the measuring pipe from polyurethane or hard rubber with the following drinking water permissions:

- KTW
- WRAS
- NSF
- ACS

Approvals for hazardous area:

- ATEX
- IECEX
- FM

- CSA
- NEPSI

Connection to process control system:

- HART
- PROFIBUS DP/PA
- FOUNDATION Fieldbus
- MODBUS RS485

Your benefits

Promag measuring devices offer you cost-effective flow measurement with a high degree of accuracy for a wide range of process conditions.

The uniform Proline transmitter concept comprises:

- Modular device and operating concept resulting in a higher degree of efficiency
- Software options for batching, electrode cleaning and for measuring pulsating flow
- High degree of reliability and measuring stability
- Uniform operating concept

The tried-and-tested Promag sensors offer:

- No pressure loss
- Not sensitive to vibrations
- Simple installation and commissioning

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Function and system design

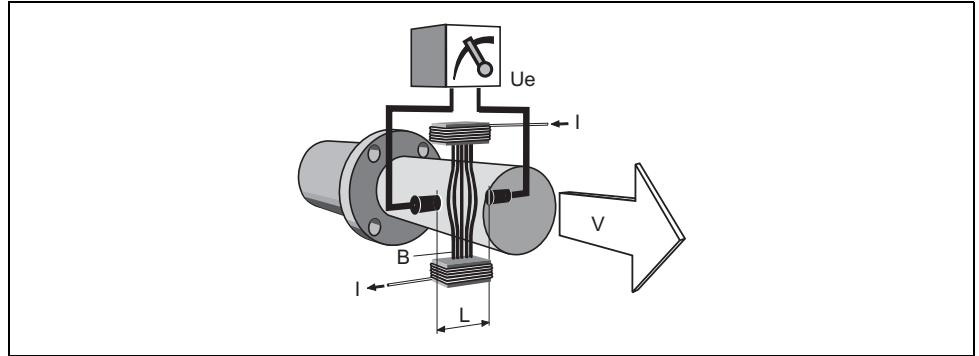
Measuring principle

Following Faraday's law of magnetic induction, a voltage is induced in a conductor moving through a magnetic field.

In the electromagnetic measuring principle, the flowing medium is the moving conductor.

The voltage induced is proportional to the flow velocity and is supplied to the amplifier by means of two measuring electrodes. The flow volume is calculated by means of the pipe cross-sectional area.

The DC magnetic field is created through a switched direct current of alternating polarity.



$$U_e = B \cdot L \cdot v$$

$$Q = A \cdot v$$

U_e	Induced voltage
B	Magnetic induction (magnetic field)
L	Electrode spacing
v	Flow velocity
Q	Volume flow
A	Pipe cross-section
I	Current strength

Measuring system

The measuring system consists of a transmitter and a sensor.

Two versions are available:

- Compact version: Transmitter and sensor form a mechanical unit.
- Remote version: Sensor is mounted separate from the transmitter.

Transmitter:

- Promag 50 (user interface with push buttons for operation, two-line display, illuminated)
- Promag 53 ("Touch Control" without opening the housing, four-line display, unilluminated)

Sensor:

- Promag W (DN 25 to 2000 / 1 to 78")

Input

Measured variable	Flow velocity (proportional to induced voltage)
Measuring ranges	Measuring ranges for liquids Typically $v = 0.01$ to 10 m/s (0.03 to 33 ft/s) with the specified accuracy
Operable flow range	Over 1000 : 1
Input signal	<p>Status input (auxiliary input)</p> <ul style="list-style-type: none"> ■ $U = 3$ to 30 V DC, $R_i = 5$ kΩ, galvanically isolated ■ Configurable for: totalizer(s) reset, measured value suppression, error-message reset <p>Status input (auxiliary input) with PROFIBUS DP and MODBUS RS485</p> <ul style="list-style-type: none"> ■ $U = 3$ to 30 V DC, $R_i = 3$ kΩ, galvanically isolated ■ Switching level: 3 to 30 V DC, independent of polarity ■ Configurable for: totalizer(s) reset, measured value suppression, error-message reset, batching start/stop (optional), batch totalizer reset (optional) <p>Current input (only Promag 53)</p> <ul style="list-style-type: none"> ■ active/passive selectable, galvanically isolated, full scale value selectable, resolution: 3 μA, temperature coefficient: typ. 0.005% o.r./$^{\circ}$C (o.r. = of reading) ■ active: 4 to 20 mA, $R_i \leq 150$ Ω, max. 24 V DC, short-circuit-proof ■ passive: 0/4 to 20 mA, $R_i < 150$ Ω, max. 30 V DC

Output

Output signal	<p>Promag 50</p> <p>Current output active/passive selectable, galvanically isolated, time constant selectable (0.01 to 100 s), full scale value selectable, temperature coefficient: typ. 0.005% o.r./$^{\circ}$C (o.r. = of reading), resolution: 0.5 μA</p> <ul style="list-style-type: none"> ■ active: 0/4 to 20 mA, $R_L < 700$ Ω (HART: $R_L \geq 250$ Ω) ■ passive: 4 to 20 mA, operating voltage V_S: 18 to 30 V DC, $R_i \geq 150$ Ω <p>Pulse/frequency output passive, open collector, 30 V DC, 250 mA, galvanically isolated</p> <ul style="list-style-type: none"> ■ Frequency output: full scale frequency 2 to 1000 Hz ($f_{max} = 1250$ Hz), on/off ratio 1:1, pulse width max. 10s ■ Pulse output: pulse value and pulse polarity selectable, max. pulse width configurable (0.5 to 2000 ms) <p>PROFIBUS DP interface</p> <ul style="list-style-type: none"> ■ Transmission technology (Physical Layer): RS485 in accordance with ANSI/TIA/EIA-485-A: 1998, galvanically isolated ■ Profil version 3.0 ■ Data transmission rate: 9,6 kBaud to 12 MBaud ■ Automatic data transmission rate recognition ■ Function blocks: 1 \times analog Input, 1 \times totalizer ■ Output data: volume flow, totalizer ■ Input data: positive zero return (ON/OFF), totalizer control, value for local display ■ Cyclic data transmission compatible with previous model Promag 33 ■ Bus address adjustable via miniature switches or local display (optional) at the measuring device <p>PROFIBUS PA interface</p> <ul style="list-style-type: none"> ■ Transmission technology (Physical Layer): IEC 61158-2 (MBP), galvanically isolated ■ Profil version 3.0 ■ Current consumption: 11 mA ■ Permissible supply voltage: 9 to 32 V ■ Bus connection with integrated reverse polarity protection ■ Error current FDE (Fault Disconnection Electronic): 0 mA ■ Function blocks: 1 \times analog input, 2 \times totalizer ■ Output data: volume flow, totalizer ■ Input data: positive zero return (ON/OFF), control totalizer, value for local display ■ Cyclic data transmission compatible with previous model Promag 33 ■ Bus address adjustable via miniature switches or local display (optional) at the measuring device
----------------------	---

Promag 53**Current output**

active/passive selectable, galvanically isolated, time constant selectable (0.01 to 100 s), full scale value selectable, temperature coefficient: typ. 0.005% o.r./°C (o.r. = of reading), resolution: 0.5 μ A

- active: 0/4 to 20 mA, $R_L < 700 \Omega$ (HART: $R_L \geq 250 \Omega$)
- passive: 4 to 20 mA, operating voltage V_S : 18 to 30 V DC, $R_i \geq 150 \Omega$

Pulse/frequency output

active/passive selectable, galvanically isolated (Ex i version: only passive)

- active: 24 V DC, 25 mA (max. 250 mA during 20 ms), $R_L > 100 \Omega$
- passive: open collector, 30 V DC, 250 mA
- Frequency output: full scale frequency 2 to 10000 Hz ($f_{max} = 12500$ Hz), EEx-ia: 2 to 5000 Hz; on/off ratio 1:1, pulse width max. 10 s
- Pulse output: pulse value and pulse polarity selectable, max. pulse width configurable (0.05 to 2000 ms)

PROFIBUS DP interface

- Transmission technology (Physical Layer): RS485 in accordance with ANSI/TIA/EIA-485-A: 1998, galvanically isolated
- Profil version 3.0
- Data transmission rate: 9,6 kBaud to 12 MBaud
- Automatic data transmission rate recognition
- Function blocks: 2 \times analog Input, 3 \times totalizer
- Output data: volume flow, calculated mass flow, totalizer 1 to 3
- Input data: positive zero return (ON/OFF), totalizer control, value for local display
- Cyclic data transmission compatible with previous model Promag 33
- Bus address adjustable via miniature switches or local display (optional) at the measuring device
- Available output combination \rightarrow 8

PROFIBUS PA interface

- Transmission technology (Physical Layer): IEC 61158-2 (MBP), galvanically isolated
- Profil version 3.0
- Current consumption: 11 mA
- Permissible supply voltage: 9 to 32 V
- Bus connection with integrated reverse polarity protection
- Error current FDE (Fault Disconnection Electronic): 0 mA
- Function blocks: 2 \times analog input, 3 \times totalizer
- Output data: volume flow, calculated mass flow, totalizer 1 to 3
- Input data: positive zero return (ON/OFF), totalizer control, value for local display
- Cyclic data transmission compatible with previous model Promag 33
- Bus address adjustable via miniature switches or local display (optional) at the measuring device

MODBUS RS485 interface

- Transmission technology (Physical Layer): RS485 in accordance with ANSI/TIA/EIA-485-A: 1998, galvanically isolated
- MODBUS device type: Slave
- Address range: 1 to 247
- Bus address adjustable via miniature switches or local display (optional) at the measuring device
- Supported MODBUS function codes: 03, 04, 06, 08, 16, 23
- Broadcast: supported with the function codes 06, 16, 23
- Übertragungsmodus: RTU oder ASCII
- Supported baudrate: 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 Baud
- Response time:
 - Direct data access = typically 25 to 50 ms
 - Auto-scan buffer (data range) = typically 3 to 5 ms
- Available output combination \rightarrow 8

FOUNDATION Fieldbus interface

- FOUNDATION Fieldbus H1
- Transmission technology (Physical Layer): IEC 61158-2 (MBP), galvanically isolated
- ITK version 5.01
- Current consumption: 12 mA
- Error current FDE (Fault Disconnection Electronic): 0 mA
- Bus connection with integrated reverse polarity protection
- Function blocks:
 - 5 × Analog Input (execution time: 18 ms each)
 - 1 × PID (25 ms)
 - 1 × Digital Output (18 ms)
 - 1 × Signal Characterizer (20 ms)
 - 1 × Input Selector (20 ms)
 - 1 × Arithmetic (20 ms)
 - 1 × Integrator (18 ms)
- Output data: volume flow, calculated mass flow, temperature, totalizer 1 to 3
- Input data: positive zero return (ON/OFF), reset totalizer
- Link Master (LM) functionality is supported

Signal on alarm	<ul style="list-style-type: none"> ■ Current output → failure response selectable (e.g. in accordance with NAMUR recommendation NE 43) ■ Pulse/frequency output → failure response selectable ■ Status output (Promag 50) → non-conductive by fault or power supply failure ■ Relay output (Promag 53) → de-energized by fault or power supply failure
------------------------	--

Load	see "Output signal"
-------------	---------------------

Low flow cutoff	Switch points for low flow cutoff are selectable.
------------------------	---

Galvanic isolation	All circuits for inputs, outputs and power supply are galvanically isolated from each other.
---------------------------	--

Switching output	<p>Status output (Promag 50, Promag 53) Open collector, max. 30 V DC / 250 mA, galvanically isolated. Configurable for: error messages, Empty Pipe Detection (EPD), flow direction, limit values.</p> <p>Relay outputs (Promag 53) Normally closed (NC or break) or normally open (NO or make) contacts available (default: relay 1 = NO, relay 2 = NC), max. 30 V / 0,5 A AC ; 60 V / 0,1 A DC, galvanically isolated. Configurable for: error messages, Empty Pipe Detection (EPD), flow direction, limit values, batching contacts.</p>
-------------------------	---

Promag 53W, 1" to 24"

Promag 53W 1 H - U L 0 B 1 R 1 0 B A A

Nominal Diameter

- 25 1"
- 40 1-1/2"
- 50 2"
- 80 3"
- 1H 4"
- 1F 6"
- 2H 8"
- 2F 10"
- 3H 12"
- 3F 14"
- 4H 16"
- 4F 18"
- 5H 20"
- 6H 24"

010 Liner

- D Hard rubber, NFS61 drinking water approval (not available for 1", 1-1/2" or 2" sensors)
- H Hard rubber (not available for 1", 1-1/2" or 2" sensors)
- P Polyurethane, NSF61 drinking water approval
- S Hard rubber HR (not available for 1", 1-1/2" or 2" sensors)
- U Polyurethane
- 9 Special version, to be specified

020 Process connection

- L Class 150 ANSI B16.5 CS steel A105 flanges
- M Class 300 ANSI B16.5 CS steel A105 flanges (not for 8" and larger)
- R Class 150 ANSI B16.5 316L SS flanges
- S Class 300 ANSI B16.5 316L SS flanges (not for 8" and larger)
- 9 Special version, to be specified

030 Electrodes / material

- 0 Measuring, reference and EPD electrodes / 316L SS
- 1 Measuring, reference and EPD electrodes / Alloy C22
- 2 Measuring, reference and EPD electrodes / tantalum
- 7 Measuring electrode, exchangeable / 316L SS (for hard rubber liner only, 14" and larger sensors, no EPD or reference electrodes, for safe areas only)
- G Measuring, reference and EPD electrodes, bullet nose / 316L SS
- H Measuring, reference and EPD electrodes, bullet nose / Alloy C-22
- 9 Special version, to be specified

040 Calibration

- B 3-point calibration, 0.2%
- E SCS/AZLA 3-point, 0.2% calibration (ISO/IEC 17025) with certificate traceable according to ISO 9000 (specify range)
- 9 Special version, to be specified

050 Certificates

- 1 Standard, no certificate
- 2 3.1B material certificate for pipe and flanges
- 3 2.3 pressure test certificate (1.5 x PN, 3 minutes) for sensors up to 12" only
- 4 3.1B material and 2.3 pressure test certificate for sensors up to 12" only
- 5 CRN approval
- 8 CRN approval + material certificate + pressure test
- 9 Special version, to be specified

060 Approvals

- A For use in non-hazardous areas
- N FM explosion proof Class I, Div. 1 / CSA Class I, Div. 1 (only for aluminum field housing, compact version, not for 14" and larger sensors)
- R FM non-incendive Class I, Div. 2 / CSA Class I, Div. 2

070 Housing

- A NEMA 4X (IP 67) compact aluminum housing
- C NEMA 4X (IP 67) remote wall-mounted (only for approvals A or R)
- G NEMA 4X (IP 67) remote aluminum field housing for non-hazardous areas
- K NEMA 6P sensor, wall-mounted housing (only for approvals A or R)
- N NEMA 6P sensor, aluminum field housing, non-hazardous
- P NEMA 4X (IP 67) compact aluminum housing, HE (harsh environment), compact and remote sensor sizes up to 12" only *
- S NEMA 4X (IP 67) remote wall-mounted housing, HE (harsh environment), remote sensor sizes 14" to 24" (only for approvals A and R) *
- 1 -40°F (-40°C) ambient temperature, NEMA 4X (IP 67), compact, aluminum field housing (only for approvals A and R)
- 3 -40°F (-40°C) ambient temperature, NEMA 4X (IP 67), compact (only for approvals A and R)
- 5 -40°F (-40°C) ambient temperature, NEMA 4X (IP 67) wall mount housing, for NEMA 6P sensor (only for approvals A and R)
- 9 Special version, to be specified

080 Cable for remote

- 0 Without cable
- 1 15 foot coil and signal cable
- 2 30 foot coil and signal cable
- 5 Coil and signal cable, specify length (maximum 650 ft depending on conductivity of process material)
- 7 Coil and signal cable, flexible conduit, specify length (maximum 650 ft depending on conductivity of process material)
- 9 Special version, to be specified

090 Cable entries

- B 1/2" NPT
- L 1/2" NPT fieldbus connector (only for approval A and R)
- 9 Special version, to be specified

100 Power supply / display

- 7 85 to 260 VAC, without display, remote configuration only (not for wall mount or SS housing)
- 8 20 to 55 VAC / 16 to 62 VDC, without display, remote configuration only (not for wall mount or SS housing)
- A 85 to 260 VAC, with display, push button operation (language: EN, ES, FR, IT, NL, PT, DE)
- B 20 to 55 VAC / 16 to 62 VDC, with display, push button operation (language: EN, ES, FR, IT, NL, PT, DE)
- X Sensor only (without transmitter, only available up to 8")
- 9 Special version, to be specified

110 Software

- A Standard software
- C ECC electrode cleaning circuit (only for approvals A and R)
- 9 Special version, to be specified

120 Outputs / Inputs

- Fixed communication boards
 - A Current HART, SIL, frequency
 - B Current HART, SIL, frequency, 2 relays
 - F PROFIBUS-PA, IS
 - G Foundation Fieldbus, IS
 - H PROFIBUS-PA
 - J PROFIBUS-DP
 - K Foundation Fieldbus
 - Q Modbus RS485, status input
 - S Current HART, SIL, frequency; active I.S
 - T Current HART, SIL, frequency; passive I.S
- Flexible communication boards
 - C Current HART, SIL, frequency, 2 relays, flexible module
 - D Current HART, SIL, frequency, relay, and status input, flexible module
 - L Current HART, SIL, 2 relays and status input/output
 - M Current HART, SIL, 2 frequency output, status input
 - N Modbus RS 485, current and frequency output, status input
 - P PROFIBUS-DP, current and frequency output, status input
 - V PROFIBUS-DP, two relay outputs, status input
 - 2 Current HART, SIL, relay, current, frequency outputs
 - 4 Current HART, SIL, relay, frequency outputs, current input
 - 7 Modbus RS485, two relay outputs, status input
 - X Sensor only
 - 9 Special version, to be specified

* Harsh environment (HE) option is available for process conditions where cool process temperatures in tropical (high humidity) environments or process fluids which undergo large cyclical temperature variations which can cause high amounts of moisture that could condense onto the measurement tube.

Control Panel Components

Catalog Cuts

5SJ4 1 10 - 7 HG41
a b c d e

a Frame Style	
Code	Description
5SJ4	Standard Frame

b Poles	
Code	Description
1	1-Pole
2	2-Pole
3	3-Pole

c Rated Current	
Code	Rated Current (I _n)
14	0.3
05	0.5
01	1
15	1.6
02	2
03	3
04	4
11	5
06	6
08	8
10	10
13	13
18	15
16	16
20	20
25	25
30	30
32	32
35	35
40	40
45	45
50	50
60	60
63	63

d Trip Curve (Characteristic)			
Code	Trip Curve	Magnetic Trip Point	Thermal Trip Point
6	B	3 to 5 I _n	1.13 to 1.45 Breaker Rating
7	C	5 to 10 I _n	
8	D	10 to 20 I _n	

e Version	
Code	Description
HG40	240 VAC, Same Polarity
HG41	240 VAC
HG42	480Y/277 VAC

Certifications:
 CE
 UL Listed and Certified to Canadian Standards
 HACR Rated

SIEMENS

03-056-035

EleMech Part Number
Refer to Bill of Materials
for more information

03-056-****

A '****' Suffix indicates
this information is for
multiple devices.

Refer to
Electrical Drawings

Rev: 0 Device Tag: CBS

Date: MM/DD/YYYY Job Number: ELE5000 Page # 1/1

By: Engineer Initials

Manuf.: PNo: SIEMENS: 5SJ4102-7HG40

Manufacturer: Model Number

Reference Job #

C1.5WH6



- **Base and covers sold separately**
- Non-slip cover design incorporates integral high friction lining to inhibit cover movement
- Cover flush with base provides greater wire capacity and improves aesthetics
- Easy cover removal makes changes to wiring quick and easy
- Available in various colors



10-069-000

• Part Number	C1.5WH6
• RoHS Compliancy Status	Compliant
• Part Description	Covers duct to protect wires, improve aesthetics and provides greater wire capacity. Base and covers sold separately.
• Product Type	Type C Cover for Flush Cover Wiring Duct
• Material	Lead-Free PVC
• Color	White
• Length (ft.)	6
• Length (m)	1.82
• CE Compliant	Yes
• Pricing Description	Duct Cover, PVC, 1.5"W X 6', White



Rev: 0

Date: 6/5/2015

By: PTW

Device Tag:

Job Number: EVC6089

Page # 1/1

Manuf.: PNO: PANDUIT: C1.5WH6

C1WH6



- **Base and covers sold separately**
- Non-slip cover design incorporates integral high friction lining to inhibit cover movement
- Cover flush with base provides greater wire capacity and improves aesthetics
- Easy cover removal makes changes to wiring quick and easy
- Available in various colors



10-069-001

• Part Number	C1WH6
• RoHS Compliancy Status	Compliant
• Part Description	Covers duct to protect wires, improve aesthetics and provides greater wire capacity. Base and covers sold separately.
• Product Type	Type C Cover for Flush Cover Wiring Duct
• Material	Lead-Free PVC
• Color	White
• Length (ft.)	6
• Length (m)	1.82
• CE Compliant	Yes
• Pricing Description	Duct Cover, PVC, 1"W X 6", White



Rev: 0

Device Tag:

Date: 6/5/2015

By: PTW

Job Number: EVC6089

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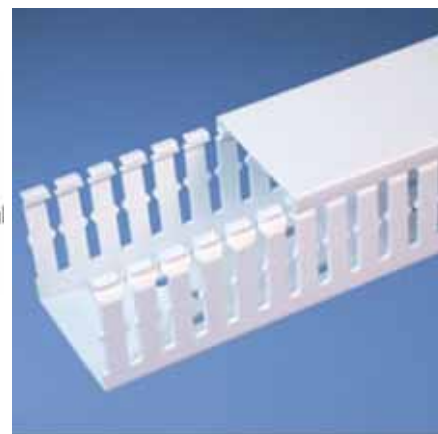
Manuf.: . PNo: PANDUIT: C1WH6

F1.5X3WH6



Specifications

- Made of lead-free PVC
- UL Recognized continuous use temperature: 122°F (50°C)
- UL94 Flammability Rating of V-0
- Conforms with NFPA 79-2002 section 14.3.1 requirement for flame retardant material
- Available in Light Gray and White
- Provided with mounting holes



10-069-005

• Part Number	F1.5X3WH6
• RoHS Compliancy Status	Compliant
• Part Description	Narrow finger, slotted wiring duct.
• Material	Lead-Free PVC
• Color	White
• CSA Certified	Yes
• Length (ft.)	6
• CE Compliant	Yes
• CE Marking	Yes
• Duct Size W x H (In.)	1.75 x 3.12
• Duct Size W x H (mm)	44.5 x 79.2
• Mounting Method	Standard Mounting Holes
• Pricing Description	Slotted Duct,PVC,1.5"X3"X6',White



Rev: 0

Device Tag:

Date: 6/5/2015

By: PTW

Job Number: EVC6089

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Manuf.: . PNo: PANDUIT: F1.5X3WH6

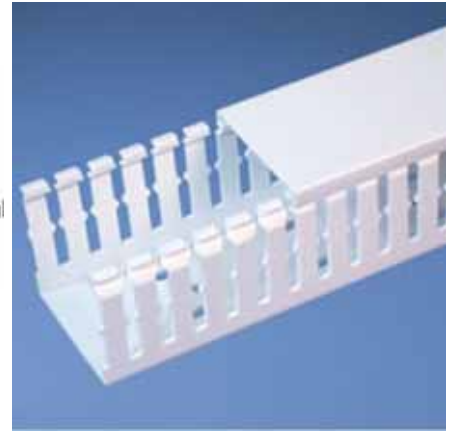
F1X3WH6

PANDUIT

10-069-007

Specifications

- Made of lead-free PVC
- UL Recognized continuous use temperature: 122°F (50°C)
- UL94 Flammability Rating of V-0
- Conforms with NFPA 79-2002 section 14.3.1 requirement for flame retardant material
- Available in Light Gray and White
- Provided with mounting holes



• Part Number	F1X3WH6
• RoHS Compliancy Status	Compliant
• Part Description	Narrow finger, slotted wiring duct.
• Material	Lead-Free PVC
• Color	White
• CSA Certified	Yes
• Length (ft.)	6
• CE Compliant	Yes
• CE Marking	Yes
• Duct Size W x H (In.)	1.26 x 3.12
• Duct Size W x H (mm)	32.0 x 79.2
• Mounting Method	Standard Mounting Holes
• Pricing Description	Slotted Duct,PVC,1"X3"X6',White


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Rev: 0

Date: 6/5/2015

By: PTW

Device Tag:

Job Number: EVC6089

Page # 1/1

Manuf.: . PNo: PANDUIT: F1X3WH6

Din Rail Sizes

Catalog Number	Lengths per Pack
G1*	12
G1F	12
OMEGA 2F	20
OMEGA 2F1*	40
OMEGA 3*	20
OMEGA 3F	20
OMEGA 3F1	20
OMEGA 3FD	10
OMEGA 3A	10
OMEGA 3AF	10
OMEGA 3AF1*	10
OMEGA 3AFD	20
OMEGA 3B	10
OMEGA 3B1*	10
OMEGA 75	2
ALUMINUM	
OMEGA 32A1*	6
OMEGA 32A2	6
OMEGA 3FAL1	40
GROMMET	
IG-11	10
COPPER	
OMEGA 3ACU	1
STAINLESS STEEL	
OMEGA 3SS	2
OMEGA 3SS1*	6

Each length is 2 Meters Long (6' 6 3/4") except as noted
 * One Meter Long
 All Din Rails are RoHS compliant.



Rev: 0

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Device Tag:

Job Number: EVC6089

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Manuf.: . PNo: IBOCO: OMEGA 3 AF

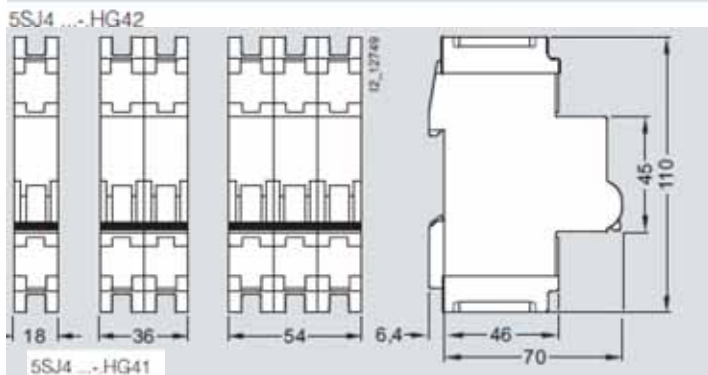
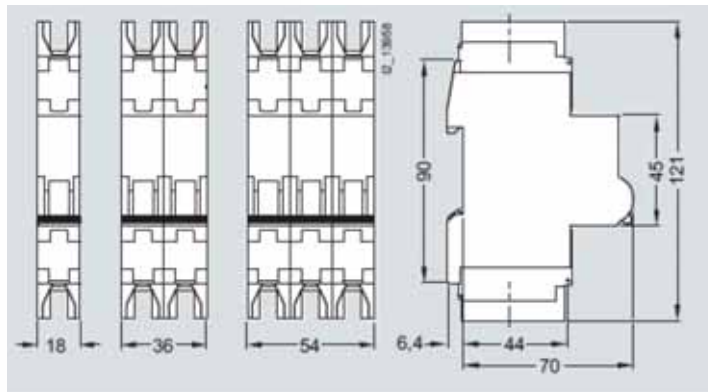
5SJ4 1 10 – 7 HG41

a b c d e

a	Frame Style	
	Code	Description
	5SJ4	Standard Frame

b	Poles	
	Code	Description
	1	1-Pole
	2	2-Pole
3	3-Pole	

c	Rated Current	
	Code	Rated Current (I_n)
	14	0.3
	05	0.5
	01	1
	15	1.6
	02	2
	03	3
	04	4
	11	5
	06	6
	08	8
	10	10
	13	13
	18	15
	16	16
	20	20
	25	25
	30	30
	32	32
	35	35
	40	40
	45	45
	50	50
	60	60
	63	63

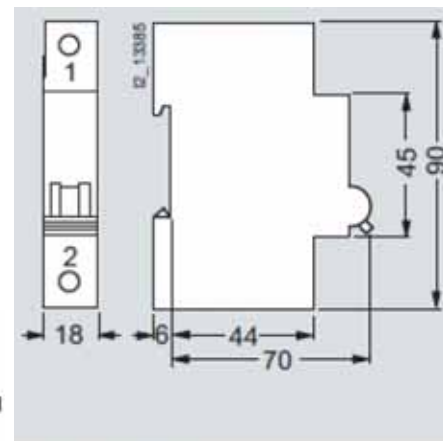


d	Trip Curve (Characteristic)			
	Code	Trip Curve	Magnetic Trip Point	Thermal Trip Point
	6	B	3 to 5 I_n	1.13 to 1.45 Breaker Rating
	7	C	5 to 10 I_n	
	8	D	10 to 20 I_n	

e	Version	
	Code	Description
	HG40	240 VAC, Same Polarity
	HG41	240 VAC
	HG42	480Y/277 VAC

Certifications:

CE
UL Listed and Certified to Canadian Standards
HACR Rated



5SJ4 ...-HG40



630-499-7080 · www.elemechinc.com

Rev: 0

Date: 6/5/2015

By: PTW

Device Tag:

CB5,7

Job Number: EVC6089

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Manuf.: . PNo:

SIEMENS: 5SJ4108-7HG40

Monitoring Relays 1-Phase True RMS AC Over or Under Current Type DIB01 100A



04-094-000

Ordering Key **DIB 01 C M24 100A**



Input Specifications

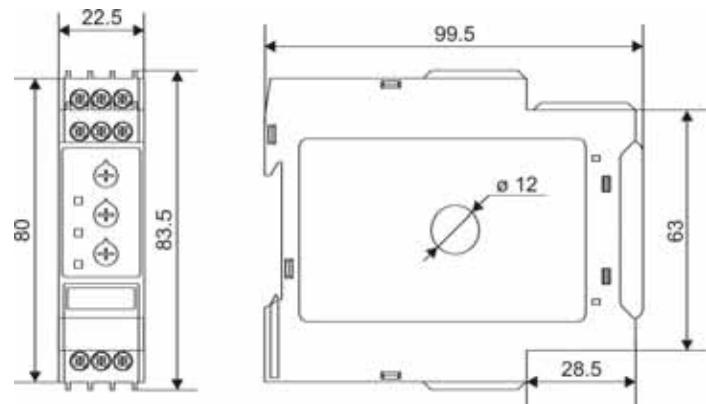
Input (current level) DIB01 100A	Built-in current transformer	Contact input DIB01 Disabled Enabled Latch disable	Terminals A1, Y1 Open < 10 kΩ > 500 ms
Measuring ranges Selectable by DIP-switch			
2 to 20 A AC	Max current 120 A		
5 to 50 A AC	120 A		
10 to 100 A AC	120 A		
Max. current for 30 s	250 A		
Max. current for 1 s	2000 A		

Supply Specifications

Power supply Rated operational voltage through terminals: A1, A2	Overvoltage cat. III (IEC 60664, IEC 60038) 24 VDC - 15% +10% 24 to 240 VAC ± 15% 45 to 65 Hz
Dielectric voltage Supply to input Supply to output Input to output	4 kV 4 kV 4 kV
Rated operational power DC AC	1 W 1 W / 35 VA

Output Specifications

Output Rated insulation voltage	SPDT relay 250 VAC
Contact ratings (AgSnO₂) Resistive loads DC 12 Small inductive loads AC 15 DC 13	μ 8 A @ 250 VAC 5 A @ 24 VDC 2.5 A @ 250 VAC 2.5 A @ 24 VDC
Mechanical life	≥ 30 x 10 ⁶ operations
Electrical life	≥ 10 ⁵ operations (at 8 A, 250 V, cos φ = 1)
Operating frequency	≤ 7200 operations/h
Dielectric strength Dielectric voltage Rated impulse withstand volt.	≥ 2 kVAC (rms) 4 kV (1.2/50 μs)



Rev: 0	Device Tag: CM1,2	
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Manuf.: . PNo: GAVAZZI: DIB01CM24100A

RXZS2

bus jumper for Zelio Relay RXZ sockets with separate contacts



06-058-012

Main

Commercial Status	Commercialised
Range of product	Zelio Relay
Accessory / separate part type	Jumper
Accessory / separate part designation	Bus jumper
Sale per indivisible quantity	10

Complementary

Product compatibility	Socket RXZ
Accessory / separate part destination	All RXZ sockets with separate contacts
[Ith] conventional free air thermal current	5 A
Product weight	0.005 kg

Ordering and shipping details

Category	21128 - ZELIO ICE CUBE RELAY ACCESSORIES
Discount Schedule	CP2
GTIN	00785901924098
Nbr. of units in pkg.	10
Package weight(Lbs)	0.01
Stock Code	Stock - Normally stocked in distribution facility
Returnability	Y
Country of origin	CN



Rev: 0

Date: 6/5/2015

By: PTW

Device Tag:

CR1-10

Job Number: EVC6089

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Manuf.: . PNo: SQUARE D: RXZ S2

Zelio[®] Plug-in Relays

RXM



06-058-014

Relay type		RXM 2AB●●●	RXM 3AB●●●	RXM 4AB●●●	RXM 4GB●●●
Number and type of contacts (see page 11)		2 C/O	3 C/O	4 C/O	4 C/O
Contact materials		AgNi			AgAu
Conventional thermal current (Ith)	For ambient temperature ≤ 131 °F (55 °C)	12 A	10 A	6 A	3 A
Rated operational current	Conforming to IEC in utilization category AC-1	N/O 6 A	10 A 5 A	6 A 3 A	2 A 1 A
	Conforming to UL (resistive @ 277 Vac)	12 A	10 A	6 A	3 A
Maximum operating rate In operating cycles/hour	No load	18,000			
	Under load	1,200			
Switching voltage	Maximum	250 Vac/Vdc			
Switching capacity	Minimum	10 mA on 17 V			2 mA on 5 V
	Maximum	3,000 VA	2,500 VA	1,500 VA	750 VA
Utilization coefficient		20%			
Mechanical durability in millions of operating cycles		10			
Electrical durability in millions of operating cycles	Resistive load	0.1			
Conforming to standards		IEC/EN 61810-1 (iss. 2), UL 508, CSA C22-2 n° 14			
Product certifications		cULus File E164862 CCN NLDX, NLDX7; cURus File E164862 CCN NLDX2, NLDX8; CSA pending; CE; RoHS compliant			
Ambient air temperature around the device	Storage	-40–185 °F (-40–85 °C)			
	Operation	-40–131 °F (-40–55 °C)			
Vibration resistance	Conforming to IEC/EN 60068-2-6	> 6 gn (10–50 Hz)			
Degree of protection	Conforming to IEC/EN 60529	IP 40			
Shock resistance conforming to IEC/EN 60068-2-27	Opening	10 gn			
	Closing	5 gn			
Protection category (see page 36)		RT I			
Mounting position		Any			

Insulation characteristics

Rated insulation voltage (Ui)		250 V (IEC), 300 V (UL, CSA)
Rated impulse withstand voltage (Uimp)		3,6 kV (1,2/50 μs)
Dielectric strength (rms voltage)	Between coil and contact	2,500 Vac
	Between poles	2,500 Vac
	Between contacts	1,500 Vac



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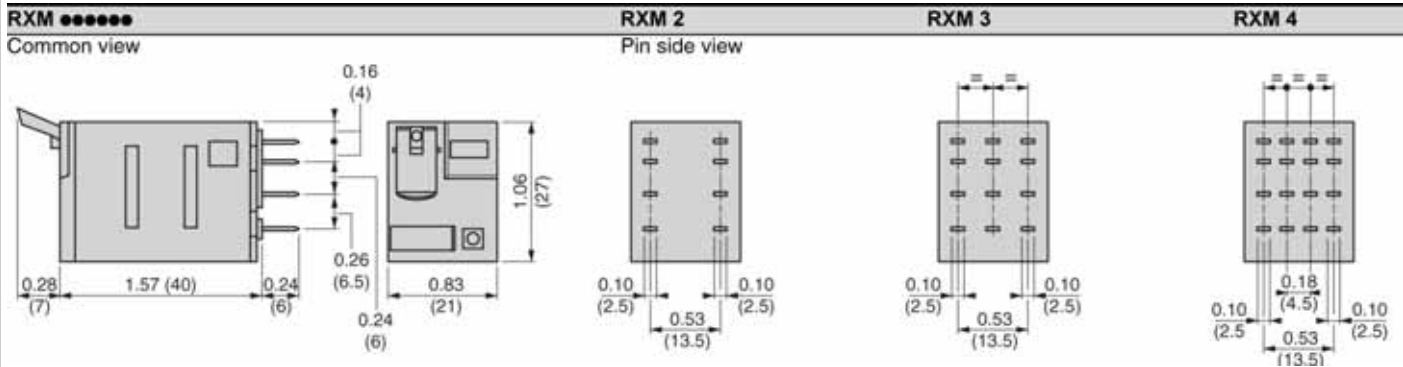
Manuf.: PNo:

SQUARE D: RXM4AB2F7

Coil Voltage	Number and type of contacts - Thermal current (Ith)								
	2 C/O -12 A			3 C/O - 10 A			4 C/O - 6 A		
	Catalog Number	Weight		Catalog Number	Weight		Catalog Number	Weight	
lb.		kg	lb.		kg	lb.		kg	
12 Vdc	RXM 2AB1JD	0.08	0.037	RXM 3AB1JD	0.08	0.038	RXM 4AB1JD	0.08	0.036
24 Vdc	RXM 2AB1BD	0.08	0.037	RXM 3AB1BD	0.08	0.038	RXM 4AB1BD	0.08	0.036
48 Vdc	RXM 2AB1ED	0.08	0.037	RXM 3AB1ED	0.08	0.038	RXM 4AB1ED	0.08	0.036
110 Vdc	RXM 2AB1FD	0.08	0.037	RXM 3AB1FD	0.08	0.038	RXM 4AB1FD	0.08	0.036
220 Vdc	-	-	-	-	-	-	RXM 4AB1MD	0.08	0.036
24 Vac	RXM 2AB1B7	0.08	0.037	RXM 3AB1B7	0.08	0.038	RXM 4AB1B7	0.08	0.036
48 Vac	RXM 2AB1E7	0.08	0.037	RXM 3AB1E7	0.08	0.038	RXM 4AB1E7	0.08	0.036
120 Vac	RXM 2AB1F7	0.08	0.037	RXM 3AB1F7	0.08	0.038	RXM 4AB1F7	0.08	0.036
230 Vac	RXM 2AB1P7	0.08	0.037	RXM 3AB1P7	0.08	0.038	RXM 4AB1P7	0.08	0.036
240 Vac	-	-	-	-	-	-	RXM 4AB1U7	0.08	0.036

Miniature relays with LED (sold in lots of 10)

12 Vdc	RXM 2AB2JD	0.08	0.037	RXM 3AB2JD	0.08	0.038	RXM 4AB2JD	0.08	0.036
24 Vdc	RXM 2AB2BD	0.08	0.037	RXM 3AB2BD	0.08	0.038	RXM 4AB2BD	0.08	0.036
48 Vdc	RXM 2AB2ED	0.08	0.037	RXM 3AB2ED	0.08	0.038	RXM 4AB2ED	0.08	0.036
110 Vdc	RXM 2AB2FD	0.08	0.037	RXM 3AB2FD	0.08	0.038	RXM 4AB2FD	0.08	0.036
125 Vdc	-	-	-	-	-	-	RXM 4AB2GD	0.08	0.036
24 Vac	RXM 2AB2B7	0.08	0.037	RXM 3AB2B7	0.08	0.038	RXM 4AB2B7	0.08	0.036
48 Vac	RXM 2AB2E7	0.08	0.037	RXM 3AB2E7	0.08	0.038	RXM 4AB2E7	0.08	0.036
120 Vac	RXM 2AB2F7	0.08	0.037	RXM 3AB2F7	0.08	0.038	RXM 4AB2F7	0.08	0.036
230 Vac	RXM 2AB2P7	0.08	0.037	RXM 3AB2P7	0.08	0.038	RXM 4AB2P7	0.08	0.036



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Device Tag:

CR1-10

Job Number: EVC6089

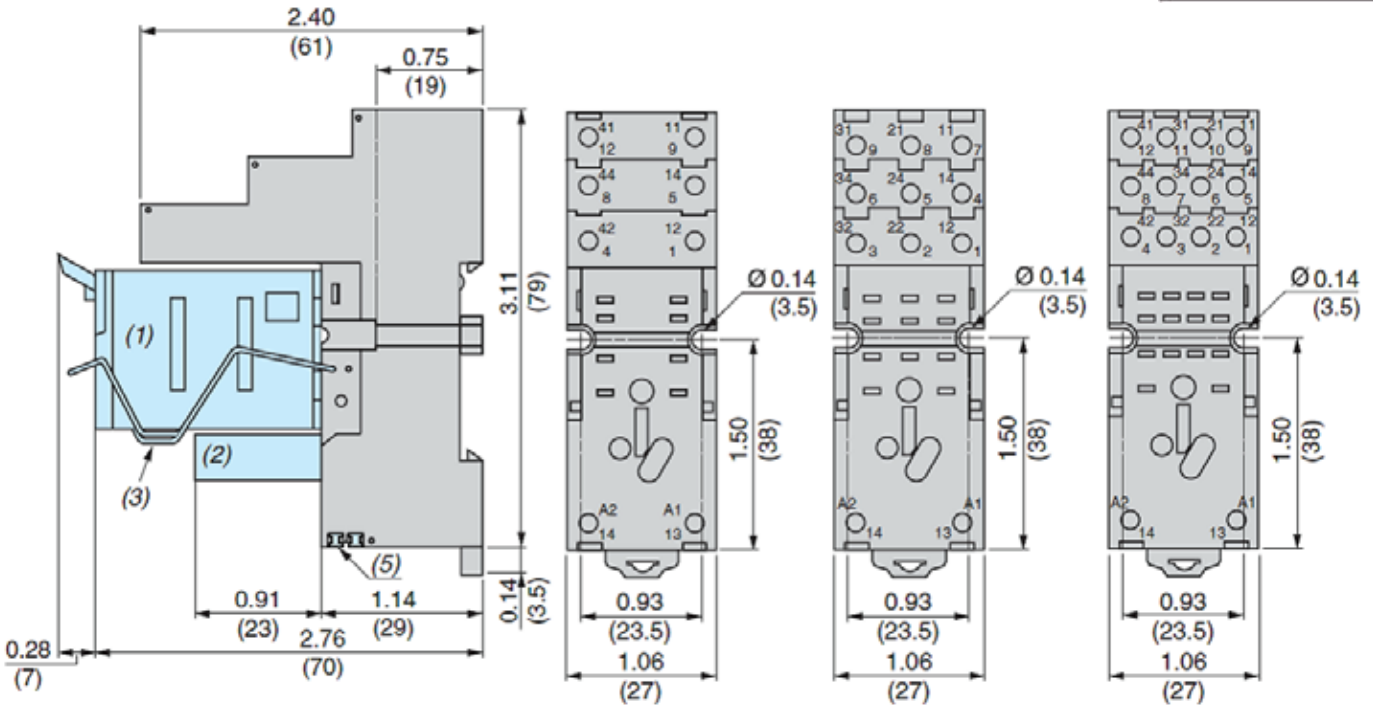
Page # 2/2

Manuf.: PNO:

SQUARE D: RXM4AB2F7

Common side view

Pin side view



Sockets (sold in lots of 10)

Contact terminal arrangement	Connection	Relay type	Catalog Number	Weight	
				lb.	kg
Mixed	Screw clamp terminals	RXM 2●●●● ¹ RXM 4●●●●	RXZ E2M114 ²	0.11	0.048
	Box lug connector	RXM 2●●●● ¹ RXM 4●●●●	RXZ E2M114M ²	0.12	0.056
Separate	Box lug connector	RXM 2●●●●	RXZ E2S108M ³	0.13	0.058
		RXM 3●●●●	RXZ E2S111M ²	0.15	0.066
		RXM 4●●●●	RXZ E2S114M ²	0.15	0.070

¹ When mounting relay RXM 2●●●● on socket RXZ E2M●●●●, the thermal current must not exceed 10 A.

² Thermal current Ith: 10 A

³ Thermal current Ith: 12 A

Socket type	RXZ E2S108M	RXZ E2S111M	RXZ E2S114M	RXZ E2M114	RXZ E2M114M
Relay types used	RXM 2●●●●	RXM 3●●●●	RXM 4●●●●	RXM 2●●●● ¹ RXM 4●●●●	RXM 2●●●● ¹ RXM 4●●●●
Product certifications	cURus File E172326 CCN SWIV2, SWIV8; CSA (pending); CE; RoHS compliant				
Conventional thermal current (Ith)	12 A	10 A			
Degree of protection	Conforming to IEC/EN 60529 IP 20				
Connection	Solid wire without cable end		1 conductor: AWG 20-12 (0.5-2.5 mm ²) 2 conductors: AWG 20-14 (0.5-1.5 mm ²)		
	Flexible wire with cable end		1 conductor: AWG 24-14 (0.2-2.5 mm ²) 2 conductors: AWG 24-16 (0.2-1.5 mm ²)		
	Flexible wire without cable end		1 conductor: AWG 24-14 (0.2-2.5 mm ²) 2 conductors: AWG 24-16 (0.2-1.5 mm ²)		
Maximum tightening torque	5.3 lbf-in (0.6 Nm) (M3 screw)				
Contact terminal arrangement	Separate			Mixed	
Bus jumper Ith: 5 A	Yes			No	

Conforming to standards	IEC/EN 61810-1 (iss. 2), UL 508, CSA C22-2 n° 14				
Product certifications	cULus File E164862 CCN NLDX, NLDX7; cURus File E164862 CCN NLDX2, NLDX8; CSA pending; CE; RoHS compliant				



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Date: 6/5/2015

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Device Tag:

CR1-10

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Manuf.: PNo:

SQUARE D: RXZE2S114M

General Data

Part No: 07.311.4053.1

Description: End Cover – Black

Type of end plate – Yes

Snap in - Yes

Inflammability Class of insulation material acc. With UL94 – V0



07-063-000



Rev: 0

Date: 6/5/2015

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Device Tag:

DB1

Job Number: EVC6089

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Manuf.: PNo: WIELAND: 07.311.4053.1

Cross connectors, (jumper bars) uninsulated

07-063-001

Type	Part no.	Std. pack
WKM 4/15	6 mm spacing	Screw: M 3
2pole 9215 - 2	Z7.210.3227.0	50
3pole 9215 - 3	Z7.210.3327.0	50
4pole 9215 - 4	Z7.210.3427.0	50
5pole 9215 - 5	Z7.210.3527.0	50
6pole 9215 - 6	Z7.210.3627.0	50
70pole 9215 M-70	Z7.210.3027.0	10



General

Colour	Other
Type	Cross connector
Modular spacing	6 mm
Number of bridged clamps	4
Mounting method	Screwable
Insulated	No

Accessories

Type	Cross connector
Mounting method	Screwable
Insulated	No
Colour	Other
Number of bridged clamps	4
Modular spacing	6 mm



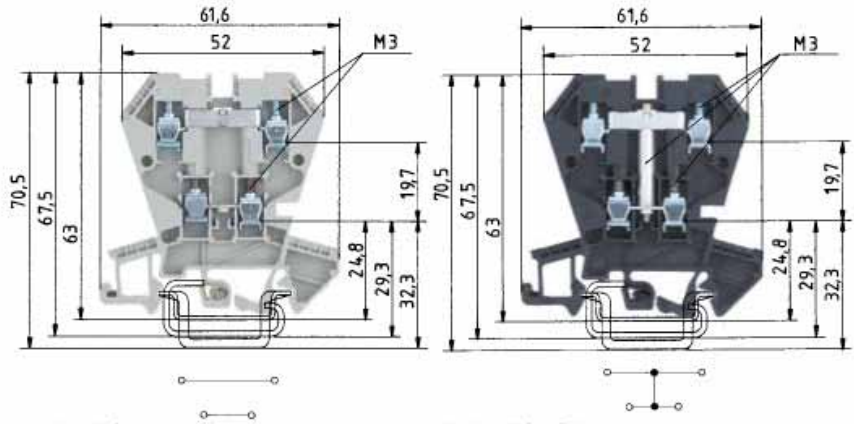
Rev:	0	Device Tag:	
Date:	6/5/2015	DB1	
By:	PTW	Job Number:	EVC6089
		Page #	1/1

Manuf.: . PNo: WIELAND: Z7.210.3427

Multi-tier blocks with screw connection

selos

07-063-002



0344 (E) II 2GD IM2
Ex e I/II
EN 60 947-7-1:2002
EN 60 947-7-2:2002
UL ratings
CSA ratings
KEMA 02 ATEX 2114 U¹⁾
Width
Approvals

Field/factory wiring
EN 60 079-0/EN 60 079-7
Wire strip length

WK 4 E/U		V		A		WK 4 E/U /VB		V		A	
fine-stranded	solid	0.5-4mm ²	0.5-4mm ²	300V	32	fine-stranded	solid	0.5-4mm ²	0.5-4mm ²	300V	32
		No. 22-10 AWG		300V	20	No. 22-10 AWG		300V		300V	20
		No. 20-12 AWG		300V	10	No. 20-12 AWG		300V		300V	10
		0.5-4mm ²	0.5-4mm ²	275 V	24/24 ²⁾	0.5-4mm ²	0.5-4mm ²	275 V		275 V	24
		6 mm			9mm	6 mm					9mm

	Type	Part No.	Std. Pack	Type	Part No.	Std. Pack	
Multi-tier block gray	WK 4 E/U	57.404.7055.0	100				
Multi-tier block, vert. connected black				WK 4 E/U/VB SCHWARZ	57.404.6955.1	100	
Multi-tier ground block green/yellow							
Function block red							
Function block orange							
Accessories							
1. Mounting rail TS 35, DIN rail 7.5 mm high L = 2 m	35 x 27 x 7.5 EN 60715	98.300.0000.0	1	35 x 27 x 7.5 EN 60715	98.300.0000.0	1	
Mounting rail TS 35, DIN rail, 15 mm high L = 2 m	35 x 24 x 15 EN 60715	98.360.0000.0	1	35 x 24 x 15 EN 60715	98.360.0000.0	1	
Mounting rail TS 32, G rail* L = 2 m	9006 EN 60715 G-32	98.190.0000.0	1	9006 EN 60715 G-32	98.190.0000.0	1	
2. End clamp with U-foot* 10mm wide	WE 1/U	25.523.5753.0	100	WE 1/U	25.523.5753.0	100	
End clamp TS 35, with screw 8mm wide	9708/2 S35	25.522.8553.0	100	9708/2 S35	25.522.8553.0	100	
End clamp TS 35, without screw 8mm wide	9708	25.522.7053.0	100	WEF 1/35	25.523.9353.0	100	
3. End plate gray	AP 4 E	07.311.4055.0	10	AP 4 E	07.311.4055.0	10	
blue							
4. Partition gray	TW 4 E	07.311.5055.0	10	TW 4 E	07.311.5055.0	10	
blue							
5. Cross connector with screws 2 pole	9215-2	Z7.210.3227.0	50	9215-2	07.210.3227.0	1	
for top tier 3 pole	9215-3	Z7.210.3327.0	50	9215-3	07.210.3327.0	1	
up to 6 pole	9215-6	Z7.210.3627.0	50	9215-6	07.210.3627.0	1	
Jumper comb for lower tier block 2 pole	IVBS WK 4 E-2	Z7.256.4227.0	10	IVBS WK 4 E-2	Z7.256.4227.0	10	
insulated, angled up to 6 pole	IVBS WK 4 E-6	Z7.256.4627.0	10	IVBS WK 4 E-6	Z7.256.4627.0	10	
Jumper comb for lower tier block 2 pole	IVB WK 4 E-2	Z7.255.2227.0	10	IVB WK 4 E-2	Z7.255.2227.0	10	
insulated, straight up to 6 pole	IVB WK 4 E-6	Z7.255.2627.0	10	IVB WK 4 E-6	Z7.255.2627.0	10	
6. Partition plate with marking facility							
7. Single cover with marking facility	AD VB 4/15 GELB	04.326.2953.8	10	AD VB 4/15 GELB	04.326.2953.8	10	
8. Cover with warning symbol over 4 blocks							
For more accessories see pages 60-77							
For marking systems see pages 70-75							
¹⁾ Please note the mounting instructions on the cover page.				²⁾ With/without jumper			
³⁾ With end plates 500 V/6 kV				⁴⁾ Do not use in Ex environments.			
⁵⁾ Ratings to adjacent feed-through blocks of the same series and size				⁶⁾ For the current carrying capability of the mounting rail see AT catalog section facts & DATA .			



Rev: 0
Date: 6/5/2015
By: PTW

Device Tag: DB1
Job Number: EVC6089

Manuf.: PNo: WIELAND: 57.404.6955.1

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Item No. 57.504.9055.0



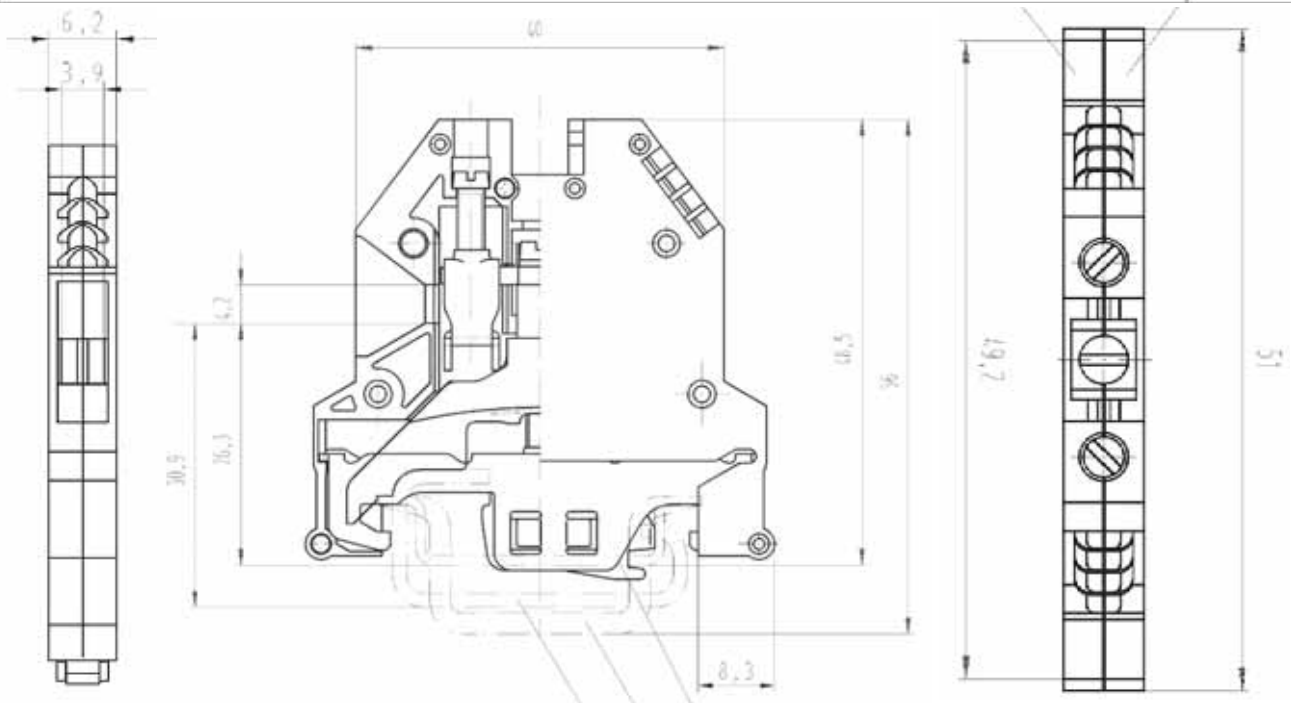
Earth terminal WK 4 SL/ U /N0

Ground DIN rail terminal block with screw connection for mounting on TS 35 and TS 32, nominal cross section 4 mm², width 6 mm, color green/yellow



42-063-004

Rated impulse voltage	8 kV
Pollution degree	3
Closing plate required	No
Length	51 mm
Type of insulation material	Thermoplastic
Cross section UL	22-10 AWG
Cross section CSA	20-10 AWG
Maximum cross section fine stranded	4 mm ²
Wire strip length	9 mm
Torque conductor mounting	0.5 Nm
Torque rail mounting	0,5



Rev: 0

Date: 6/5/2015

By: PTW

Device Tag:

DB1, TB1

Job Number: EVC6089

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Manuf.: PNO: WIELAND: 57.504.9055.0



SwitchLine
Non-fusible disconnect switches
Compact, Heavy duty
16A – 2000A, 600V



09-001-A010

OT63F3

OT80F3

Catalog number	3 pole	OT16F3	OT25F3	OT40F3	OT63F3	OT80F3	OT30F3	OT60F3	OT100F3
General purpose amp rating	A	20	30	40	60	80	30	60	100
Catalog reference	Page #	1.10	1.10	1.10	1.10	1.10	1.11	1.11	1.11
Approvals [Ⓞ]									
	2 pole	—	—	—	—	—	—	—	—
	3 pole	CSA C22.2 No.14	CSA C22.2 No.14	CSA C22.2 No.14	CSA C22.2 No.14	CSA C22.2 No.14	CSA C22.2 No.4	CSA C22.2 No.4	CSA C22.2 No.4
	4 pole	CSA C22.2 No.14	CSA C22.2 No.14	CSA C22.2 No.14	CSA C22.2 No.14	CSA C22.2 No.14	CSA C22.2 No.4	CSA C22.2 No.4	CSA C22.2 No.4
Technical ratings									
CSA,UL[Ⓞ]									
Max operating voltage	V	600	600	600	600	600	600VAC / 250VDC	600VAC / 250VDC	600VAC / 250VDC
Max horsepower rating									
Three phase									
	208V HP	3	7.5	10	15	20	10	20	25
	240V HP	5	7.5	10	15	20	10	20	30
	480V HP	10	15	20	30	40	20	40	50
	600V HP	10	20	25	30	40	30	40	50
Single phase									
	120V HP	1	1.5	2	2	2	2	3	5
	240V HP	2	3	5	7.5	10	5	7.5	15
Technical ratings									
IEC[Ⓞ]									
Rated insulation and operational voltage. AC20 and DC20 [Ⓞ]	V	750	750	750	750	750	750	750	750
Rated thermal current, I _{th}									
AC 20/DC 20 open	A	25	32	40	63	80	40	63	115
AC 20/DC 20 enclosed	A	25	32	40	63	80	40	63	115
AC 21A ≤ 500V	A	16	25	40	63	80	40	63	100
690V	A	16	25	40	63	80	40	63	100
Rated operational power AC23									
400/415V	kW	7.5	9	11	22	37	15	18.5	37
690V	kW	7.5	9	11	15	18.5	15	15	37
Physical characteristics									
Weight [Ⓞ] 3 pole	Kg	0.11	0.11	0.11	0.27	0.27	0.36	0.36	0.36
Dimension 3 pole									
	H mm	68	68	68	91	91	100	100	100
	W mm	35	35	35	53	53	70	70	70
	D mm	56	56	56	72	72	75	75	75



Rev: 0

Date: 6/5/2015

By: PTW

Device Tag:

DS1

Job Number: EVC6089

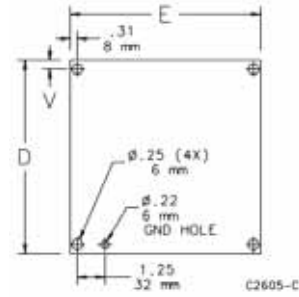
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Manuf.: . PNo: ABB: OT63F3 ASSEMBLY

SUB-PANELS FOR ENCLOSURES



SUB-PANEL CATALOG NUMBER	SUB-PANEL DIMENSIONS (IN.)
A-D<u>P</u>ESS	D x E



NOTE:

1. 6 indicates 316 Stainless Steel.
2. AL indicates Aluminum
3. G indicates Conductive Steel

11-035-139

Catalog Number	Material	Panel Size D x E (in.)	Panel Size D x E (mm)	V (in.)	V (mm)
A6P4	Painted steel	4.88 x 2.88	124 x 73	0.31	8
A6P4G	Conductive steel	4.88 x 2.88	124 x 73	0.31	8
A6P4SS	Stainless Steel	4.88 x 2.88	124 x 73	0.31	8
A6P4AL	Aluminum	4.88 x 2.88	124 x 73	0.31	8
A6P6	Painted steel	4.88 x 4.88	124 x 124	0.31	8
A6P6G	Conductive steel	4.88 x 4.88	124 x 124	0.31	8
A6P6SS	Stainless Steel	4.88 x 4.88	124 x 124	0.31	8
A6P6AL	Aluminum	4.88 x 4.88	124 x 124	0.31	8
A8P6	Painted steel	6.75 x 4.88	171 x 124	0.25	6
A8P6G	Conductive steel	6.75 x 4.88	171 x 124	0.25	6
A8P6SS	Stainless Steel	6.75 x 4.88	171 x 124	0.25	6
A8P6AL	Aluminum	6.75 x 4.88	171 x 124	0.25	6
A8P8	Painted steel	6.75 x 6.88	171 x 175	0.25	6
A8P8AL	Aluminum	6.75 x 6.88	171 x 175	0.25	6
A10P8	Painted steel	8.75 x 6.88	222 x 175	0.25	6
A10P8G	Conductive steel	8.75 x 6.88	222 x 175	0.25	6
A10P8SS	Stainless Steel	8.75 x 6.88	222 x 175	0.25	6
A10P8AL	Aluminum	8.75 x 6.88	222 x 175	0.25	6
A10P10	Painted steel	8.75 x 8.88	222 x 226	0.25	6
A10P10G	Conductive steel	8.75 x 8.88	222 x 226	0.25	6
A10P10AL	Aluminum	8.75 x 8.88	222 x 226	0.25	6
A12P6	Painted steel	10.75 x 4.88	273 x 124	0.25	6
A12P6G	Conductive steel	10.75 x 4.88	273 x 124	0.25	6
A12P10	Painted steel	10.75 x 8.88	273 x 226	0.25	6
A12P10G	Conductive steel	10.75 x 8.88	273 x 226	0.25	6
A12P10SS	Stainless Steel	10.75 x 8.88	273 x 226	0.25	6
A12P10AL	Aluminum	10.75 x 8.88	273 x 226	0.25	6
A12P12	Painted steel	10.75 x 10.88	273 x 276	0.25	6
A12P12G	Conductive steel	10.75 x 10.88	273 x 276	0.25	6
A12P12SS	Stainless Steel	10.75 x 10.88	273 x 276	0.25	6
A14P8	Painted steel	12.75 x 6.88	324 x 175	0.25	6
A14P8G	Conductive steel	12.75 x 6.88	324 x 175	0.25	6
A14P12	Painted steel	12.75 x 10.88	324 x 276	0.25	6
A14P12G	Conductive steel	12.75 x 10.88	324 x 276	0.25	6
A14P12SS	Stainless Steel	12.75 x 10.88	324 x 276	0.25	6
A14P12AL	Aluminum	12.75 x 10.88	324 x 276	0.25	6
A16P10	Painted steel	14.75 x 8.88	375 x 226	0.25	6
A16P10G	Conductive steel	14.75 x 8.88	375 x 226	0.25	6
A16P14	Painted steel	14.75 x 12.88	375 x 327	0.25	6
A16P14G	Conductive steel	14.75 x 12.88	375 x 327	0.25	6
A16P14SS	Stainless Steel	14.75 x 12.88	375 x 327	0.25	6
A16P14AL	Aluminum	14.75 x 12.88	375 x 327	0.25	6
A18P16	Painted steel	16.75 x 14.88	425 x 378	0.25	6
A18P16G	Conductive steel	16.75 x 14.88	425 x 378	0.25	6
A18P16SS	Stainless Steel	16.75 x 14.88	425 x 378	0.25	6
A18P16AL	Aluminum	16.75 x 14.88	425 x 378	0.25	6



Rev: 0

Date: 6/5/2015

By: PTW

Device Tag:

EN1

Job Number: EVC6089

Page # 1/1

Manuf.: . PNo: HOFFMAN: A-42P30

ENCLOSURE CATALOG NUMBER	ENCLOSURE DIMENSIONS (IN.)	SUB-PANEL CATALOG NUMBER
A-AHBCSS6LP	A x B x C	A APB

NOTE: 6 indicates 316 Stainless Steel.



APPLICATION

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

SPECIFICATIONS

- 14 gauge Type 304 or Type 316L stainless steel bodies and doors
- Seams continuously welded and ground smooth
- Seamless foam-in-place gasket
- Rolled lip around three sides of door
- Stainless steel door clamp assembly
- Hasp and staple for padlocking
- Door removed by pulling stainless steel continuous hinge pin
- Data pocket is high-impact thermoplastic
- Collar studs provided for mounting optional panels
- Exterior hardware on Type 316L stainless steel enclosures matches enclosure material
- Bonding provision on door; grounding stud on body

FINISH

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

ACCESSORIES

- See also *Accessories*.
- Fast-Operating Clamp Assembly
- Panels for Type 3R, 4, 4X, 12 and 13 Enclosures
- Junction Box and Wall-Mount Enclosure Swing Out Panel Kit
- Steel and Stainless Steel Window Kits
- H2OMIT™ Vent Drains, Type 4X
- H2OMIT™ Thermoelectric Dehumidifier

MODIFICATION AND CUSTOMIZATION

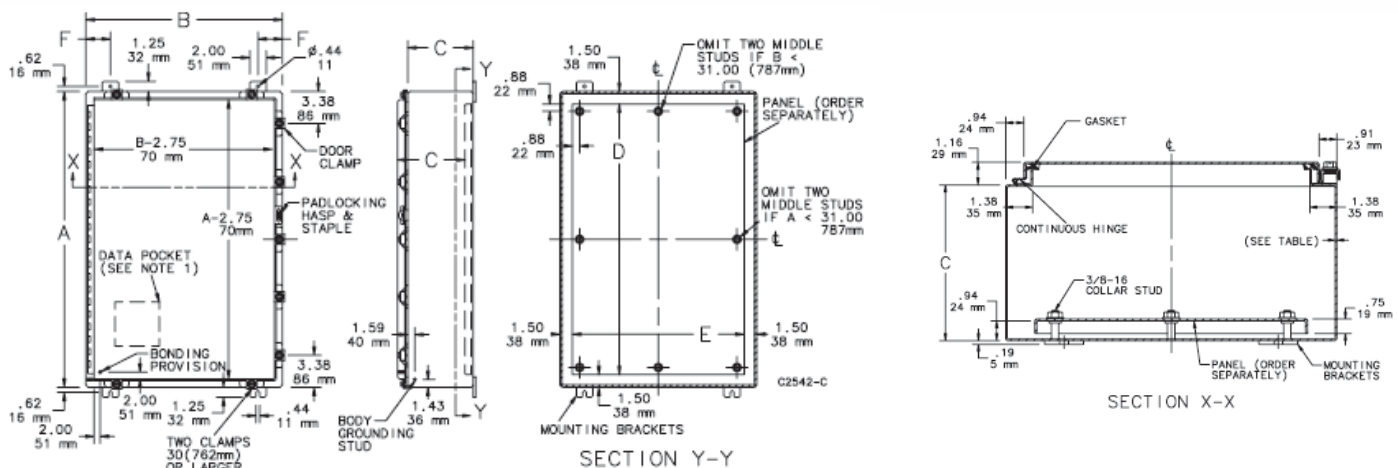
Hoffman excels at modifying and customizing products to your specifications. Contact your local Hoffman sales office or distributor for complete information.

BULLETIN: A4S

INDUSTRY STANDARDS

UL 508A Listed; Type 3R, 4, 4X, 12; File No. E61997
cUL Listed per CSA C22.2 No 94; Type 3R, 4, 4X, 12; File No. E61997

NEMA/EEMAC Type 3, 3R, 4, 4X, 12, 13
CSA File No. 421B6: Type 4, 4X, 12
IEC 60529, IP66
Meets NEMA Type 3RX requirements



Rev: 0

Date: 6/5/2015

By: PTW

Device Tag:

EN1

Job Number: EVC6089

Page # 1/1

Manuf.: PNo: HOFFMAN: A-42H3010SS6LP



Copper Connectors
T&B Catalog Number:

UPC Number:
Status:
Description:

L70
 78378613002
 Active

Type L - Copper Single Conductor, One-Hole Mount for Conductor Range 14 Sol.-4 Str.

Features

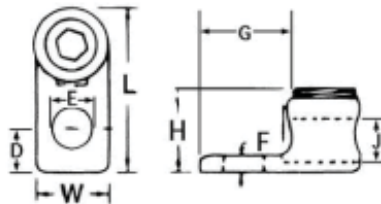
Cold forged from pure electrolytic copper with 99 percent conductivity.

General

Style	Type L - Copper Single Conductor, One-Hole Mount
Material	Copper
Wire Range	14 Sol.-4 Str.

Dimension Information

Length (inches)	1 1/8
Width (inches)	17/32
Height (inches)	35/64
D (inches)	9/32
E (inches)	9/32
F (inches)	3/32
G (inches)	21/32
J (inches)	9/32



Packaging

T&B Inner Pack	100
Package in Units	1000
T&B Sold in UOM	Each
T&B Weight Per UOM	3.32 lbs. per 100

Notes

Available with screwdriver slot head screws only.
 UL 486A tested.

Certifications

RoHS Compliance	Yes
-----------------	-----

Certifications



File Nbr:
 E9809

For further technical assistance, please contact us...

Thomas & Betts - USA
 8155 T&B Blvd.
 Memphis, TN 38125
 www.tnb.com

T&B Technical Support
 MS 3B-50
 8155 T&B Blvd.
 Memphis, TN 38125

Hours: 7AM - 6PM CDT
 Monday-Friday
 Phone: (888) 862-3289
 Fax: (901) 252-1321
 Email: techsupport@tnb.com



Rev: 0

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Device Tag:

GND

Job Number: EVC6089

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Manuf.: . PNo: BLACKBURN: L70

Flexible Heaters

Flexible Heater Installation Methods

Flexible Heater Pressure Sensitive Adhesive (PSA)

PSA

For ease of attachment specify PSA. Installation is simple: just peel off the protective liner and apply. It will adhere to most clean smooth surfaces. Care must be taken when installing to attain a smooth, consistent, uniform bond to achieve maximum results.

Maximum Temperature:

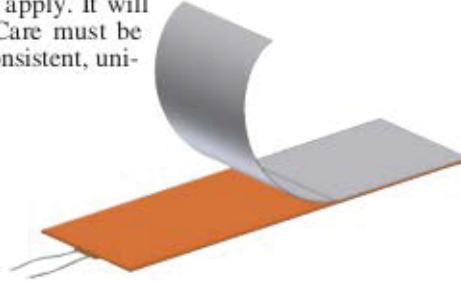
Continuous – 300°F (149°C)
Intermittent – 500°F (260°C)

Recommended Watt Density:

Under 5 W/in² (0.78 W/cm²)

PSA Plus

A layer of aluminum foil is vulcanized to the back of the heater for added heat dissipation prior to the application of PSA.



17-451-001

UL Recognized: U.S. & Canada E65652

CSA Certified: 043099

Tempco PN: **SHS80707**
SILICONE RUBBER HEATER
3.000" W x 5.000" L
12" Teflon® leads in location A
Wire construction
Pressure sensitive adhesive
75 watts, 120 volts



Tempco PN: **SHS80708**
SILICONE RUBBER HEATER
4.500" W x 6.500" L
12" Teflon® leads in location A
Wire construction
Pressure sensitive adhesive
150 watts, 120 volts



Rev: 0

Date: 6/5/2015

By: PTW

Device Tag:

HTR1

Job Number: EVC6089

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Manuf.: . PNo: TEMPCO: SHS80708

Zelio® Plug-In Relays

RPM power relays



Telemecanique

06-058-024

General characteristics

Conforming to standards		IEC/EN 61810-1 (iss. 2), UL 508, CSA C22-2 n° 14	
Product certifications		cULus File E164862 CCN NLDX, NLDX7; cURus File E164862 CCN NLDX2, NLDX8; CSA; CE; RoHS compliant	
Ambient air temperature around the device	Storage	°C (F)	-40... +85 (-40... +185)
	Operation	°C (F)	-40... +55 (-40... +131)
Vibration resistance conforming to IEC/EN 60068-2-6	In operation	3 gn (10...150 Hz/± 1 mm / 5g/5 cycles)	
	Not operating	5 gn (10...150 Hz/± 1 mm / 5g/5 cycles)	
Degree of protection	Conforming to IEC/EN 60529	IP 40	
Shock resistance conforming to IEC/EN 60068-2-27	Opening	15 gn	
	Closing	15 gn	
Protection category	RT I		
Mounting position	Any		

Insulation characteristics

Rated insulation voltage (Ui)	Conforming to IEC/EN 60947	V	250 (IEC), 300 (UL, CSA)
Rated impulse withstand voltage (Uimp)		kV	4 (1.2/50 μs)
Dielectric strength (rms voltage)	Between coil and contact	~ V	1550
	Between poles	~ V	1550
	Between contacts	~ V	1500

Contact characteristics

Relay type		RPM1●●●	RPM2●●●	RPM3●●●	RPM4●●●	
Number and type of contacts		1 C/O	2 C/O	3 C/O	4 C/O	
Contact materials		AgNi				
Conventional thermal current (Ith)	For ambient temperature ≤ 55 °C	A	15			
	Conforming to IEC	NO	A	15		
Rated operational current in utilization categories AC-1 and DC-1	Conforming to IEC	NC	A	7.5		
	Conforming to UL		A	15		
Switching current	Minimum	mA	10			
Switching voltage	Maximum	V	~/~ 250 (IEC)			
	Minimum	V	17			
Nominal load (resistive)		A	15 / 250 ~ V			
		A	15 / 28 ~ V			
Switching capacity	Maximum	~ ~	VA	3750		
			W	420		
			mW	170		
Maximum operating rate In operating cycles/hour	No-load		18 000			
	Under load		1200			
Utilization coefficient			20 %			
Mechanical durability	In millions of operating cycles		10			
Electrical durability In millions of operating cycles	Resistive load		0.1		0.06	
	Inductive load		See curves below			

Electrical durability of contacts
Resistive load ~

Reduction coefficient for inductive load ~
(depending on power factor cos φ)

Maximum switching capacity on resistive load ~



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IR1-9

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Manuf.: PNO: SQUARE D: RPM12F7

Power relays without LED (sold in lots of 10)

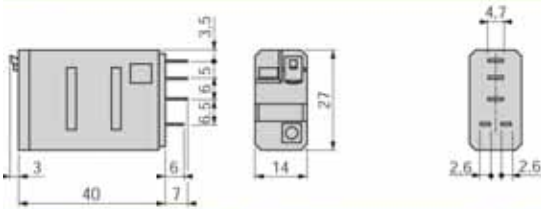
Control circuit voltage	Number and type of contacts - Thermal current (Ith)							
	1 C/O - 15 A		2 C/O - 15 A		3 C/O - 15 A		4 C/O - 15 A	
	Catalog number	Weight	Catalog number	Weight	Catalog number	Weight	Catalog number	Weight
V		kg		kg		kg		kg
≡ 12	RPM11JD	0.026	RPM21JD	0.036	RPM31JD	0.054	RPM41JD	0.071
≡ 24	RPM11BD	0.026	RPM21BD	0.036	RPM31BD	0.054	RPM41BD	0.071
≡ 48	RPM11ED	0.026	RPM21ED	0.036	RPM31ED	0.054	RPM41ED	0.071
≡ 110	RPM11FD	0.026	RPM21FD	0.036	RPM31FD	0.054	RPM41FD	0.071
~ 24	RPM11B7	0.026	RPM21B7	0.036	RPM31B7	0.054	RPM41B7	0.071
~ 48	RPM11E7	0.026	RPM21E7	0.036	RPM31E7	0.054	RPM41E7	0.071
~ 120	RPM11F7	0.026	RPM21F7	0.036	RPM31F7	0.054	RPM41F7	0.071
~ 230	RPM11P7	0.026	RPM21P7	0.036	RPM31P7	0.054	RPM41P7	0.071

Power relays with LED (sold in lots of 10)

≡ 12	RPM12JD	0.026	RPM22JD	0.036	RPM32JD	0.054	RPM42JD	0.071
≡ 24	RPM12BD	0.026	RPM22BD	0.036	RPM32BD	0.054	RPM42BD	0.071
≡ 48	RPM12ED	0.026	RPM22ED	0.036	RPM32ED	0.054	RPM42ED	0.071
≡ 110	RPM12FD	0.026	RPM22FD	0.036	RPM32FD	0.054	RPM42FD	0.071
~ 24	RPM12B7	0.026	RPM22B7	0.036	RPM32B7	0.054	RPM42B7	0.071
~ 48	RPM12E7	0.026	RPM22E7	0.036	RPM32E7	0.054	RPM42E7	0.071
~ 120	RPM12F7	0.026	RPM22F7	0.036	RPM32F7	0.054	RPM42F7	0.071
~ 230	RPM12P7	0.026	RPM22P7	0.036	RPM32P7	0.054	RPM42P7	0.071

Dimensions (mm):

Power relays
RPM 1

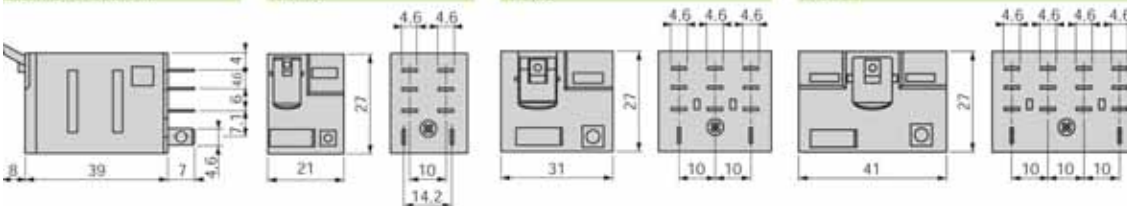


Common side view

RPM2

RPM 3

RPM 4



Rev: 0

Date: 6/5/2015

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Device Tag:

IR1-9

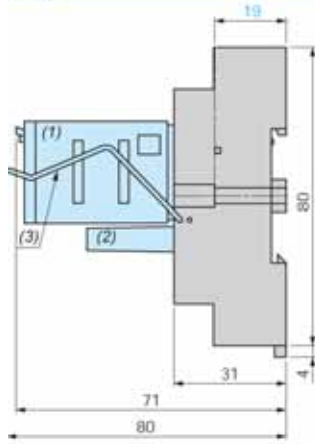
Job Number: EVC6089

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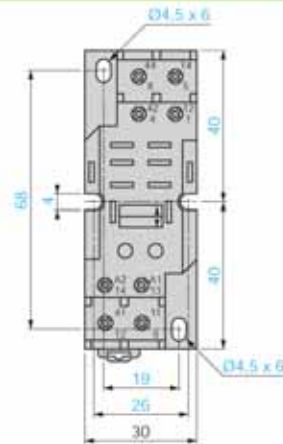
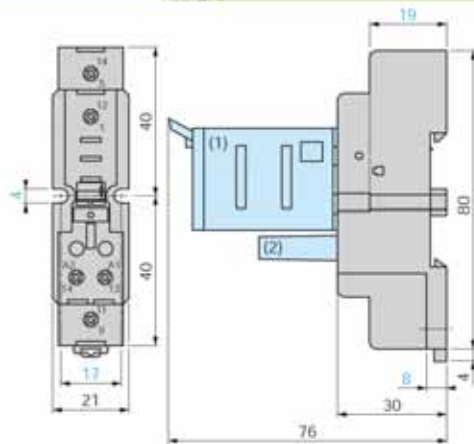
Manuf.: PNo:

SQUARE D: RPM12F7

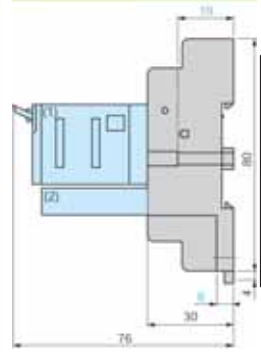
Sockets
RPZF1



RPZF2



Common side view



Socket characteristics

Socket type	RPZF1	RPZF2	RPZF3	RPZF4
Relay types used	RPM1●●●	RPM2●●●	RPM3●●●	RPM4●●●
Protection module types used	RXM02●●● RXM04●●●	RXM02●●● RXM04●●●	RUW24●●●	RUW24●●●
Contact terminal arrangement	Mixed			
Wire connection method	Screw clamp terminals			
Product certifications	cURus File E172326 CCN SWIV2, SWIV8; CSA; CE; RoHS compliant			
Conforming to standards	IEC 61984, CE			

Electrical characteristics

Conventional thermal current (Ith)	A	16
Maximum operating voltage	V	250 (IEC)

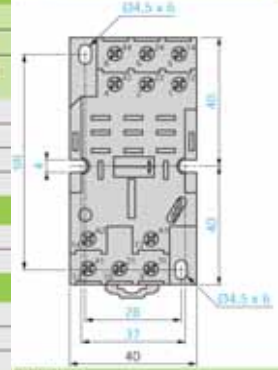
Insulation characteristics

Between adjacent output contacts	Vrms	2500
Between input and output contacts	Vrms	2500
Between contacts and DIN rail	Vrms	2500

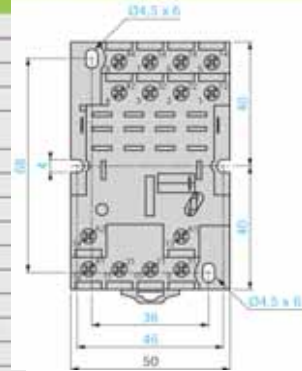
General characteristics

Ambient air temperature around the device	Operation	°C	-40...+55
	Storage	°C	-40...+85
Degree of protection	Conforming to IEC/EN 60529	IP	20
Connection	Solid wire	1 conductor	0.5...1.5 mm ² - AWG 20...AWG 16
		2 conductors	0.5...1.5 mm ² - AWG 20...AWG 16
	Flexible wire with cable end	1 conductor	0.25...1 mm ² - AWG 22...AWG 17
		2 conductors	0.25...1 mm ² - AWG 22...AWG 17
Maximum tightening torque / Screw size	Nm		1 / M3 screw
Mounting	35 mm DIN rail / panel mount		
Mounting on DIN rail	By red plastic clip		
Terminal referencing	IEC, NEMA		
Compatibility with the metal hold-down clip	Yes	No	
Timer module compatibility	No		Yes
Protection module	RXM040W, RXM041●●, RXM021●●		RUW24●●
Clip-in ID tags	No		
Wire connection method	Screw clamp terminals		

RPZF3



RPZF4



Sockets

Contact terminal arrangement	Connection	Relay type	Sold in lots of	Catalog number	Weight kg
Mixed	Screw clamp terminals	RPM1●●●	10	RPZF1	0.042
		RPM2●●●	10	RPZF2	0.054
		RPM3●●●	10	RPZF3	0.072
		RPM4●●●	10	RPZF4	0.094



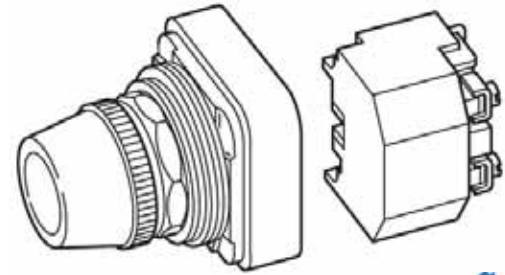
Rev:	0	Device Tag:	IR1-9
Date:	6/5/2015		
By:	PTW	Job Number:	EVC6089
		Page #	1/1

Manuf.: . PNo: SQUARE D: RPZR235

800H PR 16

a

g



a

g

32-005-048

PR	Transformer (or Dual Input)
16	120V AC 50/60 Hz

Lamp Test Options	
Code	Description
Blank	No test option
T	Push-to-test
DT	Dual input — transformer relay

Lens Color	
Code	Color
Blank	No lens
A	Amber
B	Blue
C	Clear
G	Green
R	Red
W	White

Electrical Ratings	
Contact Ratings	Refer to the Contact Ratings tables below
Dielectric Strength	2200V for one minute; 1300V for one minute (Logic Reed)
Electrical Design Life Cycles	1,000,000 at maximum rated load
Mechanical Ratings	
Vibration	10...200 Hz 1.52 mm displacement (peak-to-peak) Max./10 G Max. (except Logic Reed)
Shock	1/2 cycle sine wave for 11 milliseconds \geq 25 G (contact fragility) and no damage at 100 G
Degree of Protection	Type 4/4X/13; Watertight/Corrosion-Resistant, Oiltight IEC 529 IP66/65
Mechanical Design Life Cycles	
Push Buttons (Momentary, Non-Illuminated)	10,000,000 minimum
Push Buttons (Momentary, Illuminated)	250,000 minimum
Push Buttons (Push-Pull/Twist-to-Release)	250,000 minimum
Selector Switches (Non-Illuminated)	1,000,000 minimum
Selector Switches (Illuminated)	200,000 minimum
Potentiometers	100,000 minimum
All other devices	200,000 minimum
Contact Operation	Shallow, mini, and Low Voltage Contact Blocks: Slow, double make and break Logic Reed and Sealed Switch Contact Blocks: Single break magnetic
Typical Operating Forces	
Operators without contact blocks	Flush, Extended, Standard Mushroom, Jumbo Plastic Mushroom: 2 lbs Max. Maintained Selector Switch: 3.6 in. lbs maximum
Spring Return Selector Switches	3.6 in. lbs to stop; 0.2 in. lbs to return
Illuminated Push Buttons and Push-to-Test Pilot Lights	5 lbs maximum
3-Position Push-Pull	8 lbs maximum push to in position or pull to center position (15 lbs maximum pull to out position)
Push-Pull and Push-Pull/Twist	9 lbs maximum push or pull, 30 in. oz. maximum twist, 6 in. oz. minimum return
Potentiometer	Rotational Torque: 3...12 in.-oz. Stopping Torque: 12 in.-lbs (minimum)
Contact Blocks	800T-XA: 1 lb
	Logic Reed: 1 lb maximum
	Sealed Switch: 3 lbs maximum at 0.205" plunger travel
Stackable Sealed Switch	1 lb maximum
Environment	
Temperature Range	Operating: -40...+131°F (-40C...+55°C) Storage: -40...+185°F (-40...+85°C)
Note: Operating temperatures below freezing are based on the absence of moisture and liquids. Consult your local Allen-Bradley Sales Office for use in lower temperature applications.	
Humidity	50% at +104°F (+40°C)



Rev: 0	Device Tag: LT1-6	
Date: 6/5/2015		
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Manuf.: . PNo: ALLEN-BRADLEY: 800H-PR16

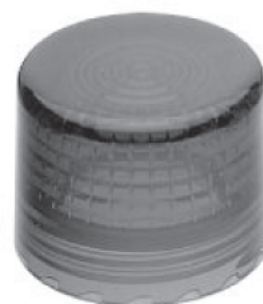
ALLEN-BRADLEY 30 MM NEMA

32-005-***

Color	800T/H Pilot Light Color Caps	
	Standard*	Push-to-Test*
	Cat. No.	Cat. No.
Amber	800T-N26A	800T-N42
Blue	800T-N26B	800T-N43
Clear	800T-N26C	800T-N45
Green	800T-N26G	800T-N41
Red	800T-N26R	800T-N40
White	800T-N26W	800T-N44



Standard



Push-to-Test



Rev: 0

Date: 6/5/2015

By: PTW

Device Tag:

LT6

Job Number: EVC6089

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Manuf.: PNo: ALLEN-BRADLEY: 800T-N26A

Auxiliary Contacts

Allen-Bradley

22-005-010





Auxiliary Contact Blocks for Front Mounting ❶

- 2- and 4-pole
 - Quick and easy mounting without tools
 - Electronic-compatible contacts down to 17V, 5 mA
 - Mutual positive guidance to the main contactor poles (except for L types)
 - Models with equal function with several terminal numbering choices
- L = Late break / Early make

Auxiliary contact blocks for front installation ❷

- 2 and 4 poles
- Quick and easy mounting without tools
- Contacts compatible with electronics
- Mutual positive guidance with the main contactor poles (except for L types)
- Models with equal function with several terminal numbering choices

L = late break / early make

 N.O.	 N.C.	Connection Diagrams	For Use With	Cat. No.
0	2		100-C all C30⊗00...C85⊗00	100-FA02 100-FB02
1	1		100-C all C30⊗00...C85⊗00 C09⊗10...C23⊗10	100-FA11 100-FB11 100-FC11
2	0		100-C all C30⊗00...C85⊗00	100-FA20 100-FB20
1L	1L		100-C all C30⊗00...C85⊗00	100-FAL11 100-FBL11
0	4		100-C all	100-FA04
1	3		100-C all	100-FA13
2	2		100-C all C30⊗00...C85⊗00 C09⊗10...C23⊗10	100-FA22 100-FB22 100-FC22
3	1		100-C all C09⊗10...C23⊗10	100-FA31 100-FC31
4	0		100-C all	100-FA40
1+1L	1+1L		100-C all	100-FAL22



Rev: 0

Date: 6/5/2015

By: PTW

Device Tag:

M1,2-F/R

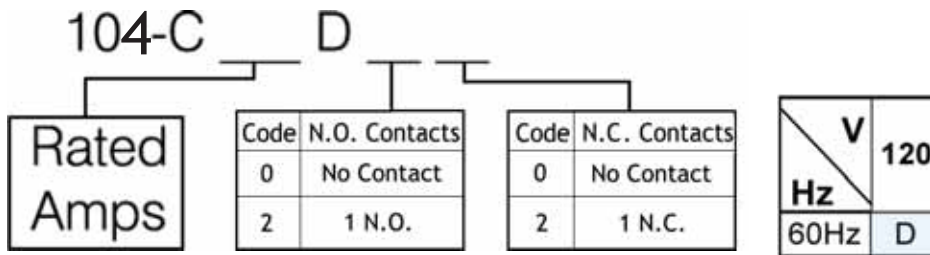
Job Number: EVC6089

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Manuf.: PNO: ALLEN-BRADLEY: 100-FA31

Bulletin 100-C Contactors

Allen-Bradley



22-005-012

Reversing AC- and DC-Operated Contactors

I _e [A]	Ratings for Switching AC Motors – AC-2, AC-3, AC-4											Auxiliary Contacts Installed per Contactor		Cat. No.
			3-Phase kW (50 Hz)				Hp (60 Hz)					N.O.	N.C. *	
	AC-3	AC-1	230V	400V/415V	500V	690V	1-Phase		3-Phase					
						115V	230V	200V	230V	460V	575V			
9	32	3	4	4	4	1/2	1-1/2	2	2	5	7-1/2	1	1	104-C09®22
12	32	4	5.5	5.5	5.5	1/2	2	3	3	7-1/2	10	1	1	104-C12®22
16	32	5.5	7.5	7.5	7.5	1	3	5	5	10	15	1	1	104-C16®22
23	32	7.5	11	13	10	2	3	5	7-1/2	15	15	1	1	104-C23®22
30	65	10	15	15	15	2	5	7-1/2	10	20	25	0	1	104-C30®02
												1	1	104-C30®22
37	65	11	18.5/20	20	18.5	3	5	10	10	25	30	0	1	104-C37®02
												1	1	104-C37®22
43	85	13	22	25	22	3	7.5	10	15	30	30	0	1	104-C43®02
												1	1	104-C43®22
55	85	15	30	30	30	5	10	15	20	40	40	0	1	104-C55®02
												1	1	104-C55®22
60	100	18.5	32	37	32	5	10	15	20	40	50	0	1	104-C60®02
												1	1	104-C60®22
72	100	22	40	45	40	5	15	20	25	50	60	0	1	104-C72®02
												1	1	104-C72®22
85	100	25	45	55	45	7-1/2	15	25	30	60	60	0	1	104-C85®02
												1	1	104-C85®22
97	130	30	55	55	55	10	20	30	30	75	75	0	1	104-C97®02
												1	1	104-C97®22

⊗ Coil Voltage Code and Terminal Position

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

[V]	12	24	32	36	42	48	100	100-110	110	120	127	200	200-220	208	208-240	220-230	230	230-240	240	277	347	380	380-400	400	400-415	440	480	500	550	600
50 Hz	R	K	V	W	X	Y	KP	-	D	P	S	KG	L	-	-	F	-	VA	T	-	-	-	N	-	G	B	-	M	C	-
60 Hz	Q	J	-	V	-	X	KP	-	D	-	-	KG	H	L	-	-	-	A	T	I	E	-	-	-	N	B	-	-	C	
50/60 Hz	-	KJ	-	-	-	KY	KP	-	KD	-	-	KG	KLS	-	-	KLS	KF	-	KA	-	-	-	-	KN	-	KB	-	-	-	



Rev: 0

Date: 6/5/2015

By: PTW

Device Tag:

M1,2-F/R

Job Number: EVC6089

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Manuf.: PNO: ALLEN-BRADLEY: 104-C09D22

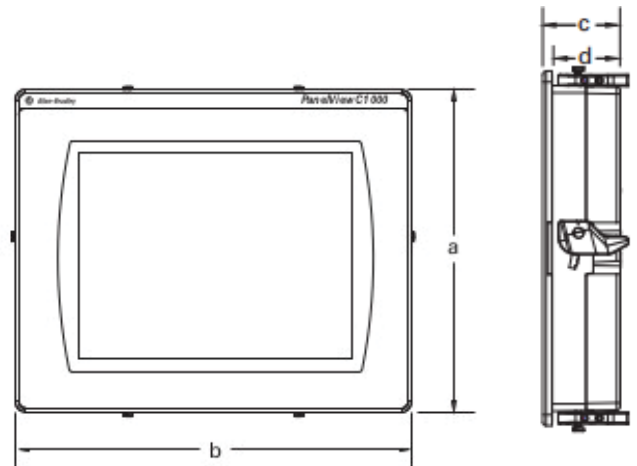
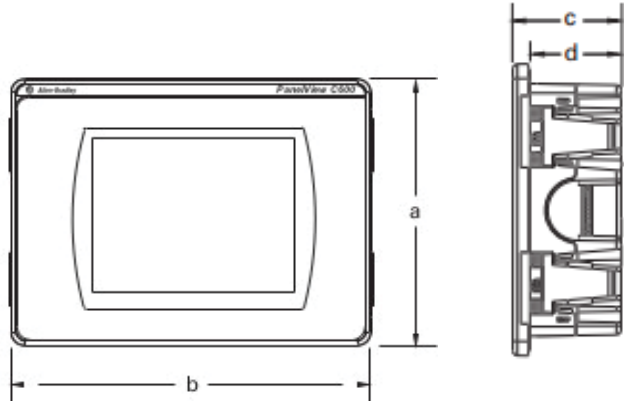
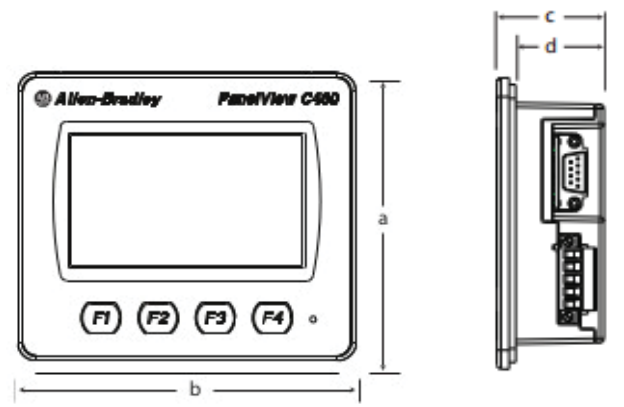
Specifications



Allen-Bradley

26-005-054

Attribute	Value
Display type	
C200	Monochrome transmissive STN passive matrix
C300	Monochrome transmissive FSTN passive matrix
C400	Color transmissive TFT active matrix LCD
C600	Monochrome transmissive FSTN passive matrix or Color transmissive CSTN passive matrix or Color transmissive TFT active matrix LCD
C1000	Color transmissive TFT active matrix LCD
Display size	
C200	2 in.
C300	3 in.
C400	4 in.
C600	5.7 in.
C1000	10.4 in.
Display area	
C200	49 x 14 mm (1.93 x 0.55 in.)
C300	67 x 33 mm (2.64 x 1.30 in.)
C400	95.04 x 53.856 mm (3.742 x 2.12 in.)
C600	115 x 86 mm (4.53 x 3.39 in.)
C1000	211 x 158 mm (8.31 x 6.22 in.)
Resolution (pixels)	
C200	122 x 32
C300	128 x 64
C400	480 x 272
C600	320 x 240
C1000	640 x 480
Backlight	50,000 hours life, min., backlight not replaceable
C200	Yellow/Green status indicator
C300	White status indicator
C600 and C1000	CCFL
C400 and C600 (2711C-T6T)	40,000 hours life, min., backlight not replaceable
	White LED
Operator input	
C200	Function keys or combination function keys and numeric keypad
C300	Analog touch or combination function keys and numeric keypad
C400	Analog touch and function keys
C600 and C1000	Analog touch



Attribute	Value
Memory card	
C200, C300, and C400	USB port
C600 and C1000	USB port and Secure digital (SD) card
Programming port	USB device port
Battery life	5 years min at 25 °C (77 °F)
Real-time clock	
C200 and C300	No battery backup
C400, C600, and C1000	Battery backup
Input voltage range	18...30V DC (24V DC nom)
Power consumption, max	
C200 and C300	5 W (0.21 A at 24V DC)
C400	7 W (0.28 A at 24V DC)
C600	10 W (0.42 A at 24V DC)
C1000	18 W (0.75 A at 24V DC)
Weight, approx.	
C200 function key	0.19 kg (0.40 lb)
C200 keypad, C300 keypad	0.30 kg (0.65 lb)
C300 touch	0.20 kg (0.43 lb)
C400 touch	0.347 kg (0.76 lb)
C600 touch	0.68 kg (1.48 lb)
C1000 touch	1.57 kg (3.41 lb)
Dimensions (HxWxD), approx.	
C200 function key	80 x 116 x 54 mm (3.15 x 4.54 x 2.13 in.)
C300 touch	80 x 116 x 57 mm (3.15 x 4.54 x 2.23 in.)
C200 keypad, C300 keypad	119 x 139 x 55 mm (4.69 x 5.47 x 2.15 in.)
C400 touch	113 x 138 x 43 mm (4.45 x 5.43 x 1.69 in.)
C600 touch	154 x 209 x 57 mm (6.0 x 8.23 x 2.25 in.)
C1000 touch	250 x 308 x 54 mm (9.84 x 12.13 x 2.13 in.)



Rev: 0

Date: 6/5/2015

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Device Tag:

OIU1

Job Number: EVC6089

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Manuf.: PNO: ALLEN-BRADLEY: 2711C-T4T

Environmental

Attribute	Value
Temperature, operating	0...50 °C (32...122 °F)
Temperature, nonoperating	-25...70 °C (13...158 °F)
Heat dissipation C200 and C300 C400 C600 C1000	16 BTU/hr 24 BTU/hr 32 BTU/hr 58 BTU/hr
Relative humidity	0...95% noncondensing
Shock, operating	15 g at 11 ms
Shock, nonoperating	30 g at 11 ms
Vibration	2 g at 10...500 Hz
Enclosure type ratings	NEMA/UL Type 4X (indoor) 12, 13, and IEC IP54, IP65 2711C-T6M, 2711C-T6C Series B only: NEMA/UL Type 12, 13, and IEC IP54

Certifications

Certifications (when product is marked) ⁽¹⁾	Value
c-UL-us	UL Listed Industrial Control Equipment, certified for US and Canada. See UL File E113724. UL Listed for Class I, Division 2 Group A,B,C,D Hazardous Locations, certified for U.S. and Canada. See UL File E10314.
CE	European Union 2004/108/EC EMC Directive, compliant with: EN 61000-6-2; Industrial Immunity EN 61000-6-4; Industrial Emissions
C-Tick	Australian Radiocommunications Act, compliant with: AS/NZS CISPR 11; Industrial Emissions
KC	Korean Registration of Broadcasting and Communications Equipment, compliant with: Article 58-2 of Radio Waves Act, Clause 3

Catalog Number Configuration

Cat. No.	Model	Operator Input	Size	Display Type
2711C-F2M	C200	Function keys	2 in.	Monochrome
2711C-K2M		Numeric and function keys		
2711C-T3M	C300	Touch screen	3 in.	
2711C-K3M		Numeric and function keys		
2711C-T6M	C600	Touch screen	6 in.	Monochrome
2711C-T6C				Color STN
2711C-T6T				Color TFT
2711C-T10C	C1000	Touch screen	10 in.	Color STN
2711C-T4T	C400	Touch screen and function keys	4 in.	Color TFT

PanelView Component C600, C1000, and C400 Dimensions

PanelView Component	Height, Approx.	Width, Approx.	Overall Depth, Approx.	Mounted Depth, Approx.
	a	b	c	d
C400 Touch	113 mm (4.45 in.)	138 mm (5.43 in.)	43 mm (1.69 in.)	38 mm (1.49 in.)
C600 Touch	154 mm (6.0 in.)	209 mm (8.23 in.)	57 mm (2.25 in.)	49 mm (1.93 in.)
C1000 Touch	250 mm (9.84 in.)	308 mm (12.13 in.)	54 mm (2.13 in.)	49 mm (1.93 in.)



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OIU1

Job Number: EVC6089

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Manuf.: PNo:

ALLEN-BRADLEY: 2711C-T4T

E1 Plus Solid-State Overload Relays


Allen-Bradley

Bulletin 193-EE – Three-Phase Devices

- Selectable Trip Class (10, 15, 20, 30)
- Selectable Auto/Manual-Auto Reset
- Screw-Type Control Terminals

Mounts to Contactor	Adjustment Range (A)	Cat. No. ①
100-C09...100-C23	0.1...0.5	193-EEAB
	0.2...1.0	193-EEBB
	1.0...5.0	193-EECB
	3.2...16	193-EEDB
	5.4...27	193-EEEB
100-C30...100-C43	5.4...27	193-EEDD
	9...45	193-EEFD
100-C60...100-C85	18...90	193-EEGE

Specifications

Cat. No.		193-ED1_B, 193-EE_B, and 592-EE_T
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
Flexible-Stranded with Ferrule	Single Conductor Torque	2.5...16 mm ² 2.5 N·m
	Two Conductor Torque	2.5...10 mm ² ● 3.4 N·m
Coarse-Stranded / Solid	Single Conductor Torque	2.5...25 mm ² 2.5 N·m
	Two Conductor Torque	6...16 mm ² ● 3.4 N·m
Stranded / Solid	Single Conductor Torque	14...6 AWG 22 lb-in
	Two Conductor Torque	14...6 AWG ● 30 lb-in
Pozidrive Screwdriver Size		2
Slotted Screwdriver (mm)		1 x 6
Hexagon Socket Size (mm)		—
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_{th}		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

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 68-2-3f
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	
Nature of Relay	Solid-State	
Trip Rating	120% FLA	
Trip Class	Type ED	10
	Type EE	10, 15, 20, 30
Reset Mode	Type ED	Manual
	Type EE	Automatic or Manual

Electromagnetic Compatibility

Electrostatic Discharge Immunity	Test Level	8 kV Air Discharge 6 kV Contact Discharge
	Performance Level	1 ●●
RF Immunity	Test Level	10 V/m
	Performance Level	1 ●●
Electrical Fast Transient/Burst Immunity	Test Level	4 kV
	Performance Level	1 ●●
Surge Immunity	Test Level	2 kV (L-E) 1 kV (L-L)
	Performance Level	1 ●●



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Manuf.: PNO:

ALLEN-BRADLEY: 193-EECB

Rev:

0

Date:

6/5/2015

By:

PTW

Device Tag:

OL1,2

Job Number:

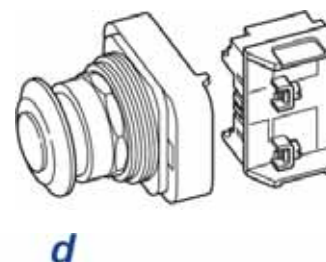
EVC6089

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28-005-037



800H – FRXT



b **c** **d**

b **d**

29-005-010

Head Type ❶		Contact Block(s)			
Code	Description	Code	Operator Position		Description
FRXT	Twist to Release				
FRXJT	Jumbo Head with Twist-to-Release ❷	Blank	—	—	No Contacts on operator
c		D1	O	X	1 N.O.
Color Cap		D2	X	O	1 N.C.
Code	Color	D4	X	O	1 N.C.L.B.
6	Red	A1	O	X	1 N.O. - 1 N.C.L.B.
			X	O	
		A5	X	O	2 N.C.L.B.
			X	O	

Electrical Ratings	
Contact Ratings	Refer to the Contact Ratings tables below
Dielectric Strength	2200V for one minute; 1300V for one minute (Logic Reed)
Electrical Design Life Cycles	1,000,000 at maximum rated load
Mechanical Ratings	
Vibration	10...200 Hz 1.52 mm displacement (peak-to-peak) Max./10 G Max. (except Logic Reed)
Shock	1/2 cycle sine wave for 11 milliseconds ≥ 25 G (contact fragility) and no damage at 100 G
Degree of Protection	Type 4/4X/13; Watertight/Corrosion-Resistant, Oiltight IEC 529 IP66/65
Mechanical Design Life Cycles	
Push Buttons (Momentary, Non-Illuminated)	10,000,000 minimum
Push Buttons (Momentary, Illuminated)	250,000 minimum
Push Buttons (Push-Pull/Twist-to-Release)	250,000 minimum
Selector (Non-Illuminated)	1,000,000 minimum
Switches (Illuminated)	200,000 minimum
Potentiometers	100,000 minimum
All other devices	200,000 minimum
Contact Operation	Shallow, mini, and Low Voltage Contact Blocks: Slow, double make and break Logic Reed and Sealed Switch Contact Blocks: Single break magnetic
Typical Operating Forces	
Operators without contact blocks	Flush, Extended, Standard Mushroom, Jumbo Plastic Mushroom: 2 lbs Max. Maintained Selector Switch: 3.6 in. lbs maximum
Spring Return Selector Switches	3.6 in. lbs to stop; 0.2 in. lbs to return
Illuminated Push Buttons and Push-to-Test Pilot Lights	5 lbs maximum
3-Position Push-Pull	8 lbs maximum push to in position or pull to center position (15 lbs maximum pull to out position)
Push-Pull and Push-Pull/Twist	9 lbs maximum push or pull, 30 in. oz. maximum twist, 6 in. oz. minimum return
Potentiometer	Rotational Torque: 3...12 in.-oz. Stopping Torque: 12 in.-lbs (minimum)
Contact Blocks	800T-XA: 1 lb Logic Reed: 1 lb maximum Sealed Switch: 3 lbs maximum at 0.205" plunger travel Stackable Sealed Switch: 1 lb maximum
Environment	
Temperature Range	Operating: -40...+131°F (-40C...+55°C) Storage: -40...+185°F (-40...+85°C)
Note: Operating temperatures below freezing are based on the absence of moisture and liquids. Consult your local Allen-Bradley Sales Office for use in lower temperature applications.	
Humidity	50% at +104°F (+40°C)



Rev: 0	Device Tag: PB1	
Date: 6/5/2015		
By: PTW	Job Number: EVC6089	Page # 1/1

Manuf.: PNo: ALLEN-BRADLEY: 800H-FRXT6D4

Contact Blocks

Allen-Bradley

02-005-000

Number of Contacts	Shallow Block ①②
	Cat. No.
1 N.O.	800T-XD1
1 N.C.	800T-XD2
1 N.O. (Early Make)	800T-XD3
1 N.C. (Late Break)	800T-XD4
1 N.O. - 1 N.C.	800T-XA
2 N.O.	800T-XA2 ④
2 N.C.	800T-XA4
1 N.C. (Late Break) 1 N.O.	800T-XA1
1 N.C. (Late Break) 1 N.C.	800T-XA7



Shallow Block

Add Y for Stackable Contacts

Electrical Ratings	
Contact Ratings	Refer to the Contact Ratings tables below
Dielectric Strength	2200V for one minute; 1300V for one minute (Logic Reed)
Electrical Design Life Cycles	1,000,000 at maximum rated load
Mechanical Ratings	
Vibration	10...200 Hz 1.52 mm displacement (peak-to-peak) Max./10 G Max. (except Logic Reed)
Shock	1/2 cycle sine wave for 11 milliseconds \geq 25 G (contact fragility) and no damage at 100 G
Degree of Protection	Type 4/4X/13; Watertight/Corrosion-Resistant, Oiltight IEC 529 IP66/65
Mechanical Design Life Cycles	
Push Buttons (Momentary, Non-Illuminated)	10,000,000 minimum
Push Buttons (Momentary, Illuminated)	250,000 minimum
Push Buttons (Push-Pull/Twist-to-Release)	250,000 minimum
Selector Switches (Non-Illuminated)	1,000,000 minimum
Selector Switches (Illuminated)	200,000 minimum
Potentiometers	100,000 minimum
All other devices	200,000 minimum
Contact Operation	Shallow, mini, and Low Voltage Contact Blocks: Slow, double make and break Logic Reed and Sealed Switch Contact Blocks: Single break magnetic
Typical Operating Forces	
Operators without contact blocks	Flush, Extended, Standard Mushroom, Jumbo Plastic Mushroom: 2 lbs Max. Maintained Selector Switch: 3.6 in. lbs maximum
Spring Return Selector Switches	3.6 in. lbs to stop; 0.2 in. lbs to return
Illuminated Push Buttons and Push-to-Test Pilot Lights	5 lbs maximum
3-Position Push-Pull	8 lbs maximum push to in position or pull to center position (15 lbs maximum pull to out position)
Push-Pull and Push-Pull/Twist	9 lbs maximum push or pull, 30 in. oz. maximum twist, 6 in. oz. minimum return
Potentiometer	Rotational Torque: 3...12 in.-oz. Stopping Torque: 12 in.-lbs (minimum)
Contact Blocks	800T-XA: 1 lb Logic Reed: 1 lb maximum Sealed Switch: 3 lbs maximum at 0.205" plunger travel Stackable Sealed Switch: 1 lb maximum
Environment	
Temperature Range	Operating: -40...+131°F (-40C...+55°C) Storage: -40...+185°F (-40...+85°C)
Note: Operating temperatures below freezing are based on the absence of moisture and liquids. Consult your local Allen-Bradley Sales Office for use in lower temperature applications.	
Humidity	50% at +104°F (+40°C)



Rev: 0	Device Tag: PB2	
Date: 6/5/2015		
By: PTW	Job Number: EVC6089	Page # 1/1

Manuf.: . PNo: ALLEN-BRADLEY: 800T-XA

800H-

c

d

f



Extended Head Unit

29-005-037

c

d

f

Operator Type		Color Cap		Contact Block(s)	
Description	800H Type 4/4X/13	Code	Description	Code	Description
		Code	1	Green	D1
Flush head	AR	2	Black	D2	1 N.C.
Extended head	BR	3	Orange†	D3	1 N.O.E.M.
Mushroom head	DR	4	Gray†	D4	1 N.C.L.B.
		5	White†	Blank	No Contacts
		6	Red		
		7	Blue		
		9	Yellow		

Electrical Ratings

Contact Ratings	Refer to the Contact Ratings tables below
Dielectric Strength	2200V for one minute; 1300V for one minute (Logic Reed)
Electrical Design Life Cycles	1,000,000 at maximum rated load

Mechanical Ratings

Vibration	10...200 Hz 1.52 mm displacement (peak-to-peak) Max./10 G Max. (except Logic Reed)
Shock	1/2 cycle sine wave for 11 milliseconds ≥ 25 G (contact fragility) and no damage at 100 G
Degree of Protection	Type 4/4X/13; Watertight/Corrosion-Resistant, Oiltight IEC 529 IP66/65
Mechanical Design Life Cycles	
Push Buttons (Momentary, Non-Illuminated)	10,000,000 minimum
Push Buttons (Momentary, Illuminated)	250,000 minimum
Push Buttons (Push-Pull/Twist-to-Release)	250,000 minimum
Selector Switches (Non-Illuminated)	1,000,000 minimum
Selector Switches (Illuminated)	200,000 minimum
Potentiometers	100,000 minimum
All other devices	200,000 minimum

Contact Operation	Shallow, mini, and Low Voltage Contact Blocks: Slow, double make and break Logic Reed and Sealed Switch Contact Blocks: Single break magnetic
Typical Operating Forces	
Operators without contact blocks	Flush, Extended, Standard Mushroom, Jumbo Plastic Mushroom: 2 lbs Max. Maintained Selector Switch: 3.6 in. lbs maximum
Spring Return Selector Switches	3.6 in. lbs to stop; 0.2 in. lbs to return
Illuminated Push Buttons and Push-to-Test Pilot Lights	5 lbs maximum
3-Position Push-Pull	8 lbs maximum push to in position or pull to center position (15 lbs maximum pull to out position)
Push-Pull and Push-Pull/Twist	9 lbs maximum push or pull, 30 in. oz. maximum twist, 6 in. oz. minimum return
Potentiometer	Rotational Torque: 3...12 in.-oz. Stopping Torque: 12 in.-lbs (minimum)
Contact Blocks	800T-XA: 1 lb Logic Reed: 1 lb maximum Sealed Switch: 3 lbs maximum at 0.205" plunger travel Stackable Sealed Switch: 1 lb maximum

Environment

Temperature Range	Operating: -40...+131°F (-40C...+55°C) Storage: -40...+185°F (-40...+85°C)
Humidity	50% at +104°F (+40°C)
Note: Operating temperatures below freezing are based on the absence of moisture and liquids. Consult your local Allen-Bradley Sales Office for use in lower temperature applications.	



Rev: 0	Device Tag: PB2	
Date: 6/5/2015		
By: PTW	Job Number: EVC6089	Page # 1/1

Manuf.: PNO: ALLEN-BRADLEY: 800H-AR2D2

MicroLogix™ 1400 / 1766

Allen-Bradley

Small Programmable Logic Controller

33-005-154

Overview

The new Allen-Bradley® MicroLogix™ 1400 from Rockwell Automation complements the existing MicroLogix family of small programmable logic controllers. MicroLogix 1400 combines the features you demand from MicroLogix 1100, such as EtherNet/IP, online editing, and a built-in LCD, plus provides you with enhanced features, such as: higher I/O count, faster High Speed Counter/PTO and enhanced network capabilities

Take advantage of the built-in LCD with back lighting to set the Ethernet network configuration, display floating point values on a user configurable display, display OEM logos at startup and read or write any binary, integer and long file elements in the data table. Controllers without embedded analog come with 32 digital I/O count, while analog versions have 32 digital I/O and 6 analog I/O. All versions can be expanded using up to seven 1762 I/O modules - the same I/O modules that MicroLogix 1100 and 1200 utilize.



Three embedded communication ports provide you with superior communications capabilities. MicroLogix 1400 offers an isolated RS232C/RS485 combination port; a non-isolated RS232C port; and an RJ-45 port for 10/100 Mbps EtherNet/IP peer-to-peer messaging.

Similar to the rest of the MicroLogix family, MicroLogix 1400 is programmed with RSLogix 500 programming software (Version 8.1 and above) as well as new RSLogix Micro programming software.



Manuf.: PNo:
ALLEN-BRADLEY: 1766-L32AWA

Rev: 0
Date: 6/5/2015
By: PTW

Device Tag:
PLC1
Job Number: EVC6089
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MicroLogix	1766-L32BWA	1766-L32AWA	1766-L32BXB	1766-L32BWAA	1766-L32AWAA	1766-L32BXBA
Input Power	120/240 VAC		24 VDC	120/240 VAC		24 VDC
Memory	non-volatile battery backed RAM					
User Program / User Data Space	10 K / 10K configurable					
Data Logging / Recipe Storage	128 K (without Recipe) / up to 64 K (after subtracting Data Logging)					
Battery Back-up	Yes					
Back-up Memory Module	Yes					
Digital Inputs	(12) Fast 24VDC (8) Normal 24VDC	(20) 120VAC	(12) Fast 24VDC (8) Normal 24VDC	(12) Fast 24VDC (8) Normal 24VDC	(20) 120VAC	(12) Fast 24VDC (8) Normal 24VDC
Digital Outputs	(12) Relay	(12) Relay	(6) Relay (3) Fast DC (3) Normal DC	(12) Relay	(12) Relay	(6) Relay (3) Fast DC (3) Normal DC
Analog Inputs / Outputs	None			(4) Voltage Inputs / (2) Voltage Outputs		
Serial Ports	(1)RS232C/RS485*, (1)RS232C**					
Serial Protocols	DF1 Full Duplex, DF1 Half Duplex Master/Slave, DF1 Radio Modem, DH-485, Modbus RTU Master/Slave, ASCII, DNP 3 Slave					
Ethernet Ports	(1) 10/100 EtherNet/IP port					
Ethernet Protocols	EtherNet/IP messaging only					
Trim Potentiometers	2 Digital					
High-Speed Inputs	Up to 6 channels @ 100 kHz	N/A	Up to 6 channels @ 100 kHz	Up to 6 channels @ 100 kHz	N/A	Up to 6 channels @ 100 kHz
Real Time Clock	Yes, embedded					
PID	Yes (limited by loop and stack memory)					
PWM / PTO	N/A		3 channel PTO (100kHz)\PWM (40kHz)	N/A		3 channel PTO (100kHz)\PWM (40kHz)
Dual Axis Servo control	N/A		Through embedded PTO	N/A		Through embedded PTO
Embedded LCD	Yes					
Floating Point Math	Yes					
Online Editing	Yes					
Operating Temperature	-20° C to +60° C					
Storage Temperature	-40° C (or -30° C) to +85° C					



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Manuf.: PNO: ALLEN-BRADLEY: 1766-L32AWA

Switch Mode Power Supply

DRP024V060W1AZ

60W 1Phase Plastic



37-323-000

General Data		
Isolation voltage		
Input / output	type test/routine test	4KVAC / 3KVAC
Input / PE	type test/routine test	1.5KVAC / 1.5KVAC
output / PE	type test/routine test	1.5KVAC / 500VAC
Degree of protection		IPX0
Class of protection		Class I with PE connection
MTBF		>800,000hrs
Type of housing		Plastic (PC), closed
Dimensions (W / H / D) + mounting rail		32mm x 113mm x 120.6mm
Weight		0.32Kg approx
STATUS Indicator		
LED (6) DC OUTPUT OK		YES (GREEN LED)
Climatic Data		
Ambient temperature (Operating)		-20°C to 75°C (>50°C derating)
Ambient temperature (Storage)		-25°C to 85°C
Humidity	at+25 °C, no condensation	<95% RH
Vibration (Non-Operating)		10Hz to 500Hz @ 50 m/s ² (5G peak) ; displacement of 0.35mm; 90 min per axis for all X,Y,Z direction. Refer to IEC68000-2-6. Note: all figures quoted are amplitudes (peak value)
Shock (in all directions)		30G (300ms) in all directions according to IEC68-2-27
Pollution degree		2
Climatic class		3K3 according to EN 60721
CE In conformance with EMC guideline 89/336/EEC and low voltage directive 73/23/EEC		DINRAIL 1AC / 24V DC / 2.5A (D0116888)
EMC (electromagnetic compatibility)		
Immunity to interference according to EN 61000-6-2		
• EN 61000-4-2 ²⁾ Discharge of static electricity (ESD)	Housing Contact discharge: Discharge in air:	LEVEL 4 8KV 15KV
• EN 61000-4-3 ¹⁾ Electromagnetic HF field	Housing Frequency/Field intensity:	LEVEL 3 80MHz - 14 Hz / 10v/m, with 1kHz tone/80% modulation
• EN 61000-4-4 ²⁾ Fast transients (Burst):	Input Output: Signal:	2KV ¹⁾ - -
• EN 61000-4-5 ²⁾ Surge voltage capacities (Surge):	Input Output: Signal:	2KV ¹⁾ / 2KV ¹⁾ (Level 3) - -
• EN 61000-4-6 ¹⁾ Conducted disturbance	I/O Frequency / U _c :	Level 3 0.15MHz - 80MHz / 10Vrms.
• EN 61000-4-11 ²⁾ Voltage dips		Input : Main Buffering > 20ms.
Noise emission according to EN 6100-6-3		
• Emitted radio interface		EN55011 (EN55022) CLASS B ¹⁾
• Radio interference voltage		EN55011 (EN55022) CLASS B ¹⁾

60W1Ph Plastic	
Input Data (1)	
Nominal input voltage (wide-range input)	100-240VAC
Input Voltage range	85-264VAC (DC input range 120-375VDC)
Frequency	47-63Hz (0Hz at DC input)
Current consumption (at nominal values)	1.5A Max
Inrush current limitation, I ¹ (+25 °C) typ.	< 40A @ 115VAC, < 80A @ 230VAC
Mains buffering at nominal load (typ.)	> 20ms @ 115VAC, > 125ms @230VAC
Turn-on time after applying the mains voltage	< 2.5Secs.
Transient surge voltage protection	VARISTOR
Input fuse, internal (device protection)	T 3.15AH / 250V
Recommended backup fuse power circuit-breaker characteristic	6A, 10A or 16A, B.
Discharge current to PE	< 1mA
Connection Method	Screw Connection.
Stripping Length	7mm or use suitable lug to crimp

Output Data (2)	
Nominal output voltage U _N / tolerance	24VDC±2%
Setting range of the output voltage	22-28VDC
Nominal output current I _N with convection cooling: -20 to +50°C	2.5A
Derating above +50°C	2.5% / K. (< 0°C 1% / K., > 70°C 4% / K.)
Current limitation at short-circuits approx.	I _{SURGE} = 150% of P _O Max typically.
Startup with capacitive loads	Max 8,000µF
Max. power dissipation idling/nominal load approx.	10W
Efficiency (at 115VAC and nominal values)	> 85% typical.
Residual ripple/ peak switching (20 MHz) (at nominal values)	< 50mV / < 240mVpp
Can be connected in parallel for redundancy and increased capacity	YES with oring Diode.
Surge voltage protection against internal surge voltages	YES

<p>630-499-7080 · www.elemechinc.com</p>	Rev: 0	Device Tag:	
	Date: 6/5/2015	PS1	
Manuf.: PNo: DELTA: DRP024V060W1AZ	By: PTW	Job Number: EVC6089	Page # 1/1

Softstarters

Type PSR



88-001-000

Motor power

208 V	240 V	480 V	600V	Max rated motor Weight	Catalog No.
P_{HP}	P_{HP}	P_{HP}	P_{HP}	current, I_n A	

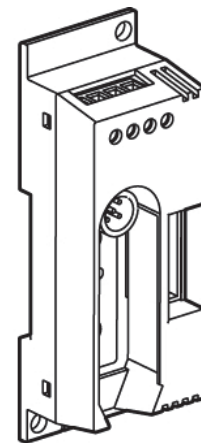
208 – 600 V AC

Supply voltage 100-240 V AC

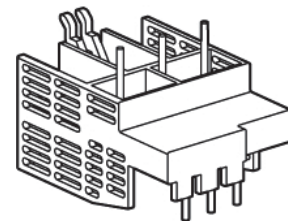
0.5	0.75	2	2	3.4	PSR3-600-70
1	1.5	3	5	6.1	PSR6-600-70
2	2	4	7.5	9.0	PSR9-600-70
3	3	7.5	10	11.0	PSR12-600-70
3	5	10	10	15.2	PSR16-600-70
7.5	7.5	15	20	24.2	PSR25-600-70
7.5	10	20	25	28.0	PSR30-600-70
10	10	25	30	34.0	PSR37-600-70
15	15	30	40	46.2	PSR45-600-70

Supply voltage 24 V DC

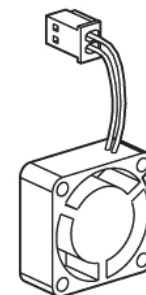
0.5	0.75	2	2	3.4	PSR3-600-81
1	1.5	3	5	6.1	PSR6-600-81
2	2	4	7.5	9.0	PSR9-600-81
3	3	7.5	10	11.0	PSR12-600-81
3	5	10	10	15.2	PSR16-600-81
7.5	7.5	15	20	24.2	PSR25-600-81
7.5	10	20	25	28.0	PSR30-600-81
10	10	25	30	34.0	PSR37-600-81
15	15	30	40	46.0	PSR45-600-81



PSR-FBPA



PSR16-MS116



PSR-FAN

Accessories

Description

Catalog No.

Fieldbus Plug Connection Accessory

The same accessory for all sizes

PSR-FBPA

Connection kit PSR3-16 and MS116

PSR16-MS116

Connection kit PSR37-45 and MS450

PSR45-MS450

Fan

All sizes can be equipped with auxiliary cooling fan for increased starting capacity.

PSR-FAN



Rev: 0

Date: 6/5/2015

By: PTW

Device Tag:

SMS1

Job Number: EVC6089

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Manuf.: PNo:

ABB: PSR3-600-70

Technical data

Rated insulation voltage, U_i	600 V									
Rated operational voltage, U_o	208...600 V									
Rated supply voltage, U_s	100...240 V AC or 24 V DC									
Rated operational current, I_r	PSR3	PSR6	PSR9	PSR12	PSR16	PSR25	PSR30	PSR37	PSR45	
	3.9 A	6.8 A	9 A	12 A	16 A	25 A	30 A	37 A	45 A	
Starting capacity at I_r	4 x I_r for 6 sec.									
Number of starts per hour	standard 10 (4 x I_r during 6 s)									
with aux. fan	20 (4 x I_r during 6 s)									
Service factor	100 %									
Ambient temperature	during operation ¹⁾	-25 °C to +60 °C		-13 °F to +140 °F						
	during storage	-40 °C to +70 °C		-40 °F to +158 °F						
Maximum altitude ²⁾	4000 m									
Degree of protection,		PSR3	PSR6	PSR9	PSR12	PSR16	PSR25	PSR30	PSR37	PSR45
main circuit		IP20	IP20	IP20	IP20	IP20	IP20	IP20	IP10	IP10
control circuit		IP20	IP20	IP20	IP20	IP20	IP20	IP20	IP20	IP20
Connectable cable area,		PSR3 - PSR16			PSR25 - PSR30			PSR37 - PSR45		
main circuit		1 x 2.5 mm ² (1 x 14 AWG)			1 x 10 mm ² (1 x 8 AWG)			1 x 35 mm ² (1 x 2 AWG)		
		2 x 2.5 mm ² (2 x 14 AWG)			2 x 10 mm ² (2 x 8 AWG)			2 x 16 mm ² (2 x 6 AWG)		
control circuit		PSR3 - PSR16			PSR25 - PSR45					
		1 x 2.5 mm ² (1 x 14 AWG)			1 x 2.5 mm ² (1 x 14 AWG)					
		2 x 2.5 mm ² (2 x 14 AWG)			2 x 1.5 mm ² (2 x 16 AWG)					
Signal relays		PSR3 - PSR16				PSR25 - PSR45				
for Run signal										
Resistive load		240 V, 2 A				250 V, 5 A				
AC-15 (Contactor)		240 V, 0.5 A				250 V, 0.5 A				
for Top of Ramp signal										
Resistive load		-				250 V, 2 A				
AC-15 (Contactor)		-				250 V, 0.5 A				
LED	for On/Ready	Green								
	for Run/Top Of Ramp	Green								
Setting of Start Ramp		1-10 sec.								
Stop Ramp		0-20 sec.								
Initial- and End Voltage		40-70%								



Manuf.: PNo:

ABB: PSR3-600-70

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Selector Switch

Allen-Bradley

800H-HR 2 A

JR *d* *e*



39-005-***

Number of Positions

Code	Description
HR	2-Position
JR	3-Position

d

Standard Knob Operators

Code	Operator Function
2	Maintained
4	Spring Return from Left
5	Spring Return from Right
91	Spring Return from Both

Contact Block(s)

Code	Description	2-Position		3-Position		
Standard (Pen TUFF)	Standard (Pen TUFF)					
A (AV)	1 N.O. - 1 N.C. 1-800T-XA or (XAV) on white side	O	X	X	O	O
		X	O	O	O	X
Blank	No contacts					

e

Electrical Ratings

Contact Ratings	Refer to the Contact Ratings tables below
Dielectric Strength	2200V for one minute; 1300V for one minute (Logic Reed)
Electrical Design Life Cycles	1,000,000 at maximum rated load

Mechanical Ratings

Vibration	10...200 Hz 1.52 mm displacement (peak-to-peak) Max./10 G Max. (except Logic Reed)
Shock	1/2 cycle sine wave for 11 milliseconds ≥ 25 G (contact fragility) and no damage at 100 G
Degree of Protection	Type 4/4X/13; Watertight/Corrosion-Resistant, Oiltight IEC 529 IP66/65
Mechanical Design Life Cycles	
Push Buttons (Momentary, Non-Illuminated)	10,000,000 minimum
Push Buttons (Momentary, Illuminated)	250,000 minimum
Push Buttons (Push-Pull/Twist-to-Release)	250,000 minimum
Selector Switches (Non-Illuminated)	1,000,000 minimum
Selector Switches (Illuminated)	200,000 minimum
Potentiometers	100,000 minimum
All other devices	200,000 minimum
Contact Operation	Shallow, mini, and Low Voltage Contact Blocks: Slow, double make and break Logic Reed and Sealed Switch Contact Blocks: Single break magnetic
Typical Operating Forces	
Operators without contact blocks	Flush, Extended, Standard Mushroom, Jumbo Plastic Mushroom: 2 lbs Max. Maintained Selector Switch: 3.6 in. lbs maximum
Spring Return Selector Switches	3.6 in. lbs to stop; 0.2 in. lbs to return
Illuminated Push Buttons and Push-to-Test Pilot Lights	5 lbs maximum
3-Position Push-Pull	8 lbs maximum push to in position or pull to center position (15 lbs maximum pull to out position)
Push-Pull and Push-Pull/Twist	9 lbs maximum push or pull, 30 in. oz. maximum twist, 6 in. oz. minimum return
Potentiometer	Rotational Torque: 3...12 in.-oz. Stopping Torque: 12 in.-lbs (minimum)
Contact Blocks	800T-XA: 1 lb Logic Reed: 1 lb maximum Sealed Switch: 3 lbs maximum at 0.205" plunger travel Stackable Sealed Switch: 1 lb maximum

Environment

Temperature Range	Operating: -40...+131°F (-40C...+55°C) Storage: -40...+185°F (-40...+85°C)
Humidity	50% at +104°F (+40°C)

Note: Operating temperatures below freezing are based on the absence of moisture and liquids. Consult your local Allen-Bradley Sales Office for use in lower temperature applications.



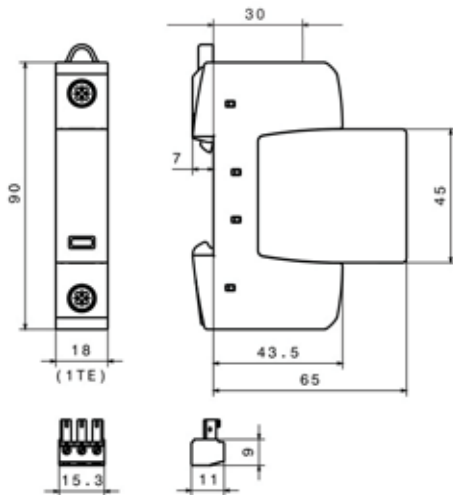
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Manuf.: PNo: ALLEN-BRADLEY: 800H-JR2A

Surge Protection Made Simple™ for UL Applications

Single Pole BSP UL Series for 120, 240 and 347Vac

Single-Phase 2 Wire Systems



Dimensions - mm



BSPM1120S2G
BSPM1240S2G
BSPM1347S2G

40-012-001

ORDERING INFORMATION				
Nominal System Voltage		120Vac	240, 277 or 240 & 277Vac	347Vac
Max. Continuous Operating AC Voltage (MCOV) [Vc]		275Vac	385Vac	600Vac
Catalog Numbers:	Without Remote Signaling	BSPM1120S2G	BSPM1240S2G	BSPM1347S2G
	With Remote Signaling	BSPM1120S2GR	BSPM1240S2GR	BSPM1347S2GR
Replacement Module	MOV Technology	BPM275UL	BPM385UL	BPM600UL
SPECIFICATIONS				
Rated Voltage		120-127Vac	240-277Vac	347Vac
Voltage Protection Rating V_{PR}		1kV	1.5kV	2kV
SCCR		200kA	200kA	125kA
Nominal Discharge Current I_n (kA)			20kA	
Max. Discharge Current I_{max} (kA)			40kA	
Response Time t_A			<25 ns	
Frequency			50/60Hz	
Number of Poles			1	
Number of Wires/Connection Points			2 Wires / 2 Connection Points	
Operating State/Fault Indication			Green (good) / Red (replace)	
Cross-Sectional Area (min.)			14AWG - Cu Stranded, Solid or Fine	
Cross-Sectional Area (max.)			2AWG - Cu Solid or Stranded / 4AWG - Cu Fine	
Terminal Torque			45 lb-in	
For Mounting On			35mm DIN Rail per to EN 60715	
Enclosure Material			Thermoplastic, UL 94V0	
Degree of Protection			IP20 (finger-safe)	
Location Category			Indoor	
Capacity			1 Mods, DIN 43880	
Application			UL Type 2 Component Assembly	
Standard			UL 1449, 3rd Edition	
Agency Information			cURus, RoHS Compliant	
Product Warranty			Five Years*	
REMOTE CONTACT SIGNALING				
Remote Contact Signaling Type			Changeover Contact	
AC Switching Capacity (Volts/Amps)			250V/0.5A	
DC Switching Capacity (Volts/Amps)			250V/0.1A; 125V/0.2A; 75V/0.5A	
Conductor Ratings and Cross-Sectional Area for Remote Contact Signal Terminals			60/75°C Max. 1.5mm ² /14AWG Solid/Flexible	
Ordering Information			Order from Catalog Numbers Above	

**SCCR Rated
BSP UL Series (Type 2)**

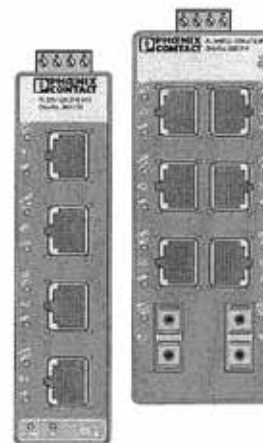


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Manuf.: . PNO: BUSSMAN: BSPM1120S2G

FL SWITCH SFN ...

Five and Eight Port Standard Function Ethernet Switches with Narrow Housings – Gigabit as an Option



33-098-002

Ordering Data

Ethernet Switches with 10/100 Mbps

Description	Type	Order No.
Ethernet switch with 5 RJ45 ports for 10/100 Mbps	FL SWITCH SFN 5TX	2891152

Description

The FL SWITCH SFN ... range of Factory Line switches with standard functions in numerous versions can be used for quick and cost-effective Ethernet network expansion to the field level. Due to their narrow housing design, the components are suitable for universal remote use in control cabinets and junction boxes. The switches have five or eight ports, up to two of which are glass fiber ports provided in SC or ST format. The switches support the auto negotiation function at the twisted pair ports and offer transmission speeds of 10/100/1000 Mbps depending on the switch version. Mixed operation for the connection of segments with different data transmission speeds is also supported. The glass fiber ports only support 100 Mbps or 1000 Mbps (Gigabit version).

The RJ45 ports offer an auto crossing function, which means it is not necessary to make a distinction between 1:1 and crossover cables.

The fiber optic ports can be used to extend the segment length up to 20 km. Unused RJ45 ports can be fitted with security caps to provide mechanical protection against unauthorized use.

Features and Fields of Application

- Increased network performance
 - Switched Ethernet reduces traffic and non predictable timing
 - Quality of Service: Pretagged high priority messages are forwarded before lower priority messages during periods of high network traffic loading
 - Gigabit options for data intensive applications
 - Easy network expansion
 - No configuration of the switch
 - Autonegotiation and autocross simplify cabling
 - Coupling copper network segments with different bit rates with automatic detection of the data transmission speed of 10 Mbps, 100 Mbps or 1000 Mbps depending on the switch version.
 - Fiber optic options extend distance and electrical noise immunity
 - 1 or 2 ports option
 - SC or ST connector options
 - Multimode or singlemode option
- Low cost, low complexity security (optional)
- Connect Layer 1 security elements at the RJ45 port to restrict access or tampering
 - No software setup needed



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Manuf.: . PNo: PHOENIX: 2891152



Standards and Certifications

- UL listed
- CSA certified



Enclosures

Eaton encapsulated transformers, Types EP and EPT, use a NEMA 3R rated enclosure as standard.

41-018-A042

120 x 240 Volts to 120/240 Volts ①

kVA	Full Capacity Taps		Type	°C Temp. Rise	Frame	Wiring Diagram Number	Weight Lbs (kg)	Weathershield	Style Number
	FCAN	FCBN							
0.5	—	—	EP	115	FR57P	3E	16 (7)	Indoor–Outdoor	S10N11P51P
1	—	—	EP	115	FR67P	3E	31 (14)	Indoor–Outdoor	S10N11P01P
1.5	—	—	EP	115	FR67P	3E	42 (19)	Indoor–Outdoor	S10N11P16P
2	—	—	EP	115	FR68P	3E	42 (19)	Indoor–Outdoor	S10N11P02P
3	—	—	EP	115	FR176	3E	55 (25)	Indoor–Outdoor	S10N11S03N
5	—	—	EP	115	FR177	3E	113 (51)	Indoor–Outdoor	S10N11S05N
7.5	—	—	EP	115	FR178	3E	123 (56)	Indoor–Outdoor	S10N11S07N
10	—	—	EP	115	FR179	3E	193 (88)	Indoor–Outdoor	S10N11S10N
15	—	—	EP	115	FR180	3E	216 (98)	Indoor–Outdoor	S10N11S15N
25	—	—	EP	115	FR182	3E	375 (170)	Indoor–Outdoor	S10N11S25N

240 x 480 Volts to 120/240 Volts Stainless Steel ②

kVA	Full Capacity Taps		Type	°C Temp. Rise	Frame	Wiring Diagram Number	Weight Lbs (kg)	Weathershield	Style Number
	FCAN	FCBN							
3	—	—	EP	115	FR176	3A	65 (30)	Indoor–Outdoor	S20N11S03SS
5	—	—	EP	115	FR177	3A	113 (51)	Indoor–Outdoor	S20N11S05SS
7.5	—	—	EP	115	FR178	3A	123 (56)	Indoor–Outdoor	S20N11S07SS
10	—	—	EP	115	FR179	3A	193 (88)	Indoor–Outdoor	S20N11S10SS
15	—	—	EP	115	FR180	3A	205 (93)	Indoor–Outdoor	S20N11S15SS
25	—	—	EP	115	FR182	3A	375 (170)	Indoor–Outdoor	S20N11S25SS

Notes

For 304 grade stainless steel enclosure, replace 10th character of catalog number with an "SS" suffix, e.g., P48G11S03SS
 For 316 grade stainless steel enclosure, replace 10th character of catalog number with an "S6" suffix, e.g., P48G11S03S6
 For other ratings or catalog numbers not shown, or for special enclosure types (including stainless steel), refer to Eaton. Frame drawings/dimensions information begins on **Page V2-T2-215**.



Rev: 0

Date: 6/5/2015

By: PTW

Device Tag:

T1

Job Number: EVC6089

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Manuf.: PNO:
 :UTLER-HAMMER: S20N11P16PS6 ASSEMBL

240 x 480 Volts to 120/240 Volts

kVA	Full Capacity Taps		Type	°C Temp. Rise	Frame	Wiring Diagram Number	Weight Lbs (kg)	Weathershield	Style Number
	FCAN	FCBN							
0.050	—	—	EP	115	FR52	3A	7 (3)	Indoor-Outdoor	S20N11S81N
0.075	—	—	EP	115	FR54	3A	7 (3)	Indoor-Outdoor	S20N11S85N
0.100	—	—	EP	115	FR54	3A	7 (3)	Indoor-Outdoor	S20N11S82N
0.150	—	—	EP	115	FR55	3A	8 (4)	Indoor-Outdoor	S20N11S83N
0.25	—	—	EP	115	FR57P	3A	12 (5)	Indoor-Outdoor	S20N11P26P
0.5	—	—	EP	115	FR57P	3A	16 (7)	Indoor-Outdoor	S20N11P51P
0.75	—	—	EP	115	FR58AP	3A	26 (12)	Indoor-Outdoor	S20N11P76P
1	—	—	EP	115	FR67P	3A	31 (14)	Indoor-Outdoor	S20N11P01P
1.5	—	—	EP	115	FR67P	3A	42 (19)	Indoor-Outdoor	S20N11P16P
2	—	—	EP	115	FR68P	3A	42 (19)	Indoor-Outdoor	S20N11P02P
3	—	—	EP	115	FR176	3A	65 (30)	Indoor-Outdoor	S20N11S03N
3	②	②	EP	115	FR176	3A	65 (30)	Indoor-Outdoor	S20K11S03N
5	—	—	EP	115	FR177	3A	113 (51)	Indoor-Outdoor	S20N11S05N
5	②	②	EP	115	FR177	9A	105 (48)	Indoor-Outdoor	S20K11S05N
7.5	—	—	EP	115	FR178	3A	105 (48)	Indoor-Outdoor	S20N11S07N
7.5	②	②	EP	115	FR178	9A	123 (56)	Indoor-Outdoor	S20K11S07N
10	—	—	EP	115	FR179	3A	193 (88)	Indoor-Outdoor	S20N11S10N
10	②	②	EP	115	FR179	9A	193 (88)	Indoor-Outdoor	S20K11S10N
15	—	—	EP	115	FR180	3A	216 (98)	Indoor-Outdoor	S20N11S15N
15	③	③	EP	115	FR180	23A	216 (98)	Indoor-Outdoor	S20L11S15N
25	—	—	EP	115	FR182	3A	385 (175)	Indoor-Outdoor	S20N11S25N
25	③	③	EP	115	FR182	23A	375 (170)	Indoor-Outdoor	S20L11S25N
37.5	④	④	EP	115	FR300A	248A	735 (334)	Indoor-Outdoor	S20L11S37 ④

600 Volts to 120/240 Volts

kVA	Full Capacity Taps		Type	°C Temp. Rise	Frame	Wiring Diagram Number	Weight Lbs (kg)	Weathershield	Style Number
	FCAN	FCBN							
0.5	—	2 at -5%	EP	115	FR57P	2I	16 (7)	Indoor-Outdoor	S60G11P51P
0.75	—	2 at -5%	EP	115	FR58AP	2I	26 (12)	Indoor-Outdoor	S60G11P76P
1	—	2 at -5%	EP	115	FR67P	2I	31 (14)	Indoor-Outdoor	S60G11P01P
1.5	—	2 at -5%	EP	115	FR67P	2I	42 (19)	Indoor-Outdoor	S60G11P16P
2	—	2 at -5%	EP	115	FR68P	2I	42 (19)	Indoor-Outdoor	S60G11P02P
3	—	2 at -5%	EP	115	FR176	2I	65 (30)	Indoor-Outdoor	S60G11S03N
5	—	2 at -5%	EP	115	FR177	2I	105 (48)	Indoor-Outdoor	S60G11S05N
7.5	—	2 at -5%	EP	115	FR178	2I	123 (56)	Indoor-Outdoor	S60G11S07N
10	—	2 at -5%	EP	115	FR179	2I	193 (88)	Indoor-Outdoor	S60G11S10N
15	—	4 at -2.5%	EP	115	FR180	527A	216 (98)	Indoor-Outdoor	S60J11S15N
25	—	4 at -2.5%	EP	115	FR182	527A	385 (175)	Indoor-Outdoor	S60J11S25N
25	2 at 2.5%	4 at -2.5%	EP	115	FR132	838	395 (180)	Indoor-Outdoor	S60M11S25N

Notes

- ① Contact Eaton for availability of 0.05–0.25 kVA designs.
- ② 1 at +10% FCBN at 240 volts; 2 at +5% FCBN at 480 volts.
- ③ 2 at +5% FCBN at 240 volts; 4 at +2.5% FCBN at 480 volts.
- ④ Floor-mount only.

Contact your local Eaton sales office for CE Mark transformer requirements. For other ratings or styles not shown, or for special enclosure types (including stainless steel), refer to Eaton. Frame drawings/dimensions information begins on **Page V2-T2-213**.



Rev: 0

Date: 6/5/2015

By: PTW

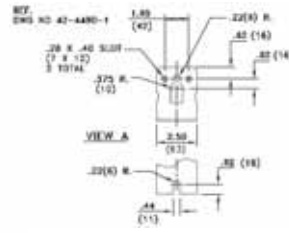
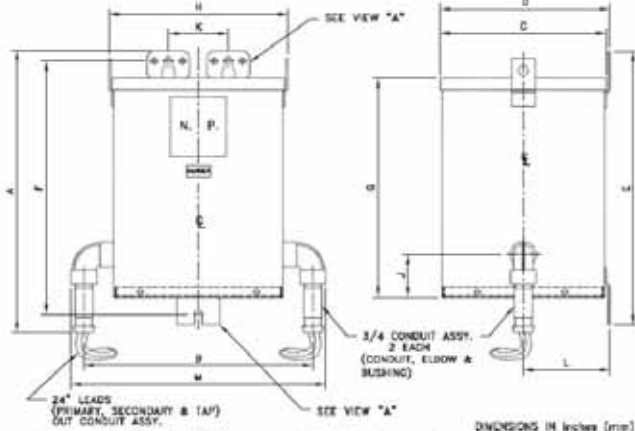
Device Tag:

T1

Job Number: EVC6089

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Manuf.: PNo: UTLER-HAMMER: S20N11P16PS6 ASSEMBL

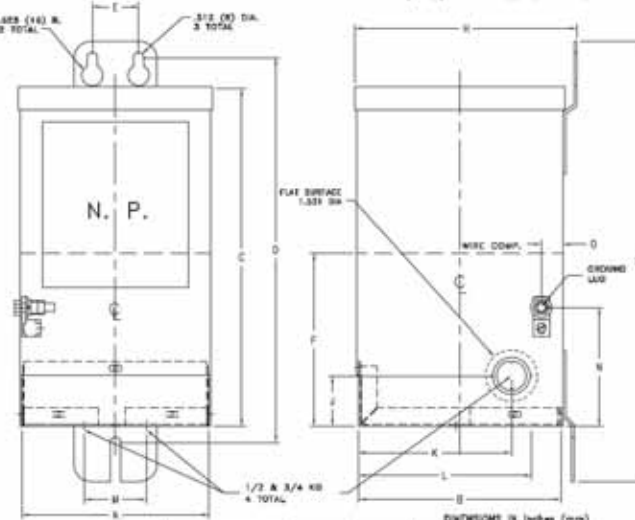


24" LEADS (PRIMARY, SECONDARY & TAP) OUT CONDUIT ASSY.

SEE VIEW "A"

DIMENSIONS IN inches (mm)

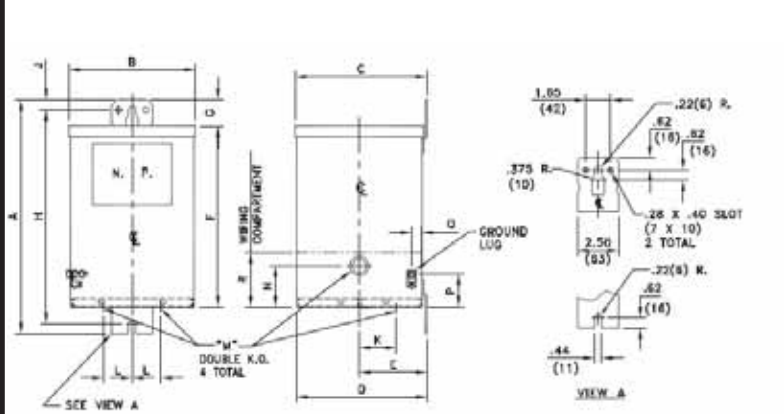
FRAME	APPROX. NET WT. LBS(KG)	A	B	C	D	E	F
FR177H	113(51) 120(56)	16.53(420)	13.76(350)	9.67(246)	9.88(251)	16.15(410)	14.90(378)
		G	H	J	K	L	M
		12.82(326)	10.06(256)	2.50(64)	3.50(89)	5.06(128)	15.54(395)



DIMENSIONS IN inches (mm)

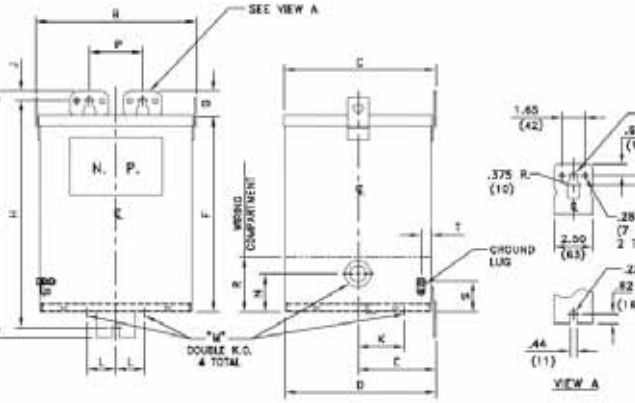
FRAME	A	B	C	D	E	F
FR177F	3.53(141)	6.39(162)	10.00(254)	11.40(291)	1.37(35)	5.12(130)
	G	H	J	K	L	M
	13.22(335)	6.58(167)	1.50(38)	4.32(110)	5.11(130)	1.80(47)
	H	O				
	3.50(89)	0.64(16)				

Rev 1 - MAR/10



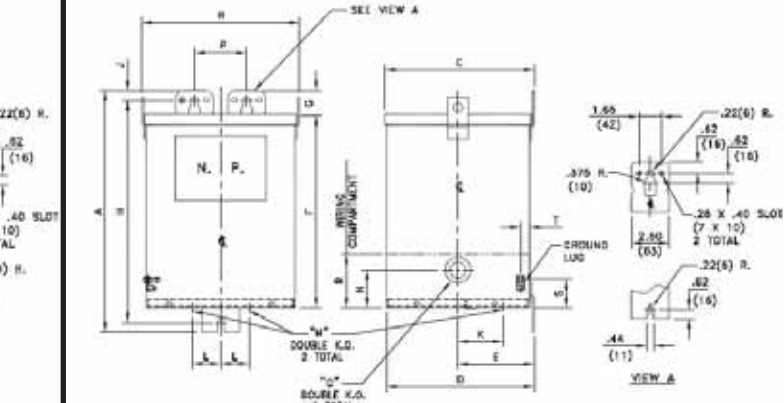
DIMENSIONS IN inches (mm)

FRAME	APPROX. NET WT. LBS(KG)	A	B	C	D	E	F	G	H	J
FR176	65(30) 69(31)	14.25(360)	7.68(195)	8.00(203)	7.94(202)	4.08(103)	11.06(281)	1.63(41)	13.00(330)	.63(16)
		K	L	M	N	P	Q			
		2.25(57)	1.75(44)	.75(19, 19)	2.50(64)	3.52(84)	2.00(51)	.65(17)		



DIMENSIONS IN inches (mm)

FRAME	APPROX. NET WT. LBS(KG)	A	B	C	D	E	F	G	H
FR178	123(55) 132(60)	16.00(406)	16.58(424)	9.99(254)	9.99(249)	5.09(129)	12.82(326)	1.63(41)	14.70(370)
		J	K	L	M	N	P	R	
		.63(16)	3.00(76)	1.88(48)	.75, 1.25(19, 32)	2.00(51)	3.48(88)	3.61(92)	
		S	T						
		2.00(51)	.85(21)						



DIMENSIONS IN inches (mm)

FRAME	APPROX. NET WT. LBS(KG)	A	B	C	D	E	F	G	H	J
FR179	193(87) 222(101)	19.00(483)	13.38(340)	10.50(267)	10.48(266)	5.43(138)	15.85(402)	1.63(41)	17.75(451)	.63(16)
		K	L	M	N	P	Q	R		
		3.38(86)	1.84(48)	.75, 1.25(19, 32)	2.50(64)	3.48(88)	1.00, 1.50(25, 38)	3.79(95)		
		S	T							
		2.00(51)	.65(17)							



Rev: 0
Date: 6/5/2015
By: PTW

Device Tag: T1
Job Number: EVC6089
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**End clamp for TS 35
with screw connection**

9708/2 S 35

Z5.522.8553.0



42-063-009



Rev: 0

Date: 6/5/2015

By: PTW

Device Tag:

TB,DB

Job Number:
EVC6089

Page #
1/1

Manuf.: PNo:

WIELAND: Z5.522.8553

Item No. Z7.281.1227.0

Insulated jumper bar IVBWK 4 - 2

Cross connector, insulated for DIN rail terminal blocks type WK ..., 2-pole



42-063-015

Item No.	Z7.281.1227.0
EAN	4015573156081
order unit	10 Piece(s)

Technical data

Accessories

ArticlePrice	
Colour	Yellow
Type	Cross connector
Modular spacing	5.95 mm
Number of bridged clamps	2
Mounting method	Screwable
Insulated	Yes



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By: PTW

Device Tag:

TB1

Job Number: EVC6089

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Manuf.: . PNo: WIELAND: Z7.281.1227

Datasheet

Art.No. 07.311.0155.0

End plate AP 2,5 -4 /V0

End plate for DIN rail terminal blocks type WK ..., color gray



42-063-001

Art.No.	07.311.0155.0
EAN	4015573392663
Order unit	10 pieces

Approvals

Technical data

General

Colour	Grey
Type of end plate	Yes
Type of partition	No
Thickness	1.5 mm
Snap in	Yes
Inflammability class of insulation material acc. with UL94	V0

Accessories

Type of end plate	Yes
Type of partition	No
Colour	Grey
Thickness	1.5 mm
Snap in	Yes
Inflammability class of insulation material acc. with UL94	V0



Rev: 0

Date: 6/5/2015

By: PTW

Device Tag:

TB1-3

Job Number: EVC6089

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Manuf.: PNO: WIELAND: 07.311.0155.0

Feed-through blocks with screw connection

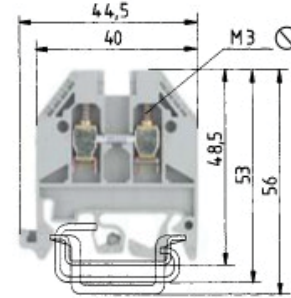
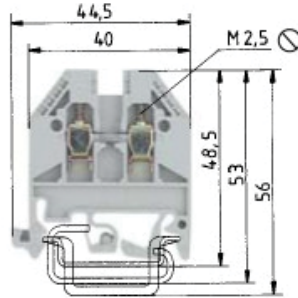
selosIOS

UL wire connection versions

¹⁾ or 2x no. 14 sol/str AWG
or 2x no. 16 sol/str AWG
or 2x no. 18 sol/str AWG
or 3x no. 20 sol/str AWG or 3x no. 22 sol/str AWG

²⁾ or 2x no. 12 sol/str AWG
or 2x no. 16 sol/str AWG
or 3x no. 18 sol/str AWG or 3x no. 22 sol/str AWG

³⁾ or 2x no. 12 sol/str AWG
or 2x no. 14 sol/str AWG
or 3x no. 16 sol/str AWG



0344 Ex II 2GD IM2
Ex e I/II
EN 60947-7-1:2002
UL ratings
CSA ratings
KEMA 02 ATEX 2114 U¹⁾ EN 60079-0/EN 60079-7
Width
Approvals

Field/factory wiring

Wire strip length

WK 2,5/U

fine-stranded solid V A
0.5-2.5 mm² 0.5-4 mm² 800V/8 kV/3 24
No. 22-12 AWG 600V 20/30
No. 24-12 AWG 600V 25
0.5-2.5 mm² 0.5-4 mm² 690V 23

5 mm 9 mm
ATEX LR 9U 9A Ex

WK 4/U

fine-stranded solid V A
0.5-4 mm² 0.5-6 mm² 800V/8 kV/3 32
No. 22-10 AWG⁴⁾ 600V 30/35
No. 20-10 AWG 600V 40
0.5-4 mm² 0.5-6 mm² 690V 14/27³⁾

6 mm 9 mm
ATEX LR 9U 9A Ex

	Type	Part No.	Std. Pack	Type	Part No.	Std. Pack	
Feed-through block	gray	WK 2,5/U	57.503.0055.0	100	WK 4/U	57.504.0055.0	100
Feed-through block Ex i	blue	WK 2,5/U BLAU	57.503.0055.6	100	WK 4/U BLAU	57.504.0055.6	100
Accessories							
1. Mounting rail TS 35, DIN rail 7.5 mm high	L = 2 m	35 x 27 x 7,5 EN 60715	98.300.0000.0	1	35 x 27 x 7,5 EN 60715	98.300.0000.0	1
Mounting rail TS 35, DIN rail, 15 mm high	L = 2 m	35 x 24 x 15 EN 60715	98.360.0000.0	1	35 x 24 x 15 EN 60715	98.360.0000.0	1
Mounting rail TS 32, G rail ²⁾	L = 2 m	9006 EN 60715 G-32	98.190.0000.0	1	9006 EN 60715 G-32	98.190.0000.0	1
2. End clamp with U-foot ³⁾	10 mm wide	WE 1/U	25.523.5753.0	100	WE 1/U	25.523.5753.0	100
End clamp TS 35, with screw	8 mm wide	9708/2 S35	25.522.8553.0	100	9708/2 S35	25.522.8553.0	100
End clamp TS 35, without screw	8 mm wide	WEF 1/35	25.523.9353.0	100	WEF 1/35	25.523.9353.0	100
3. End plate	gray	AP 2,5 - 4	07.311.0155.0	10	AP 2,5 - 4	07.311.0155.0	10
	blue	AP 2,5 - 4 BLAU	07.311.0155.6	10	AP 2,5 - 4 BLAU	07.311.0155.6	10
4. Partition	gray	TW 2,5 - 4	07.311.1155.0	10	TW 2,5 - 4	07.311.1155.0	10
	blue	TW 2,5 - 4 BLAU	07.311.1155.6	10	TW 2,5 - 4 BLAU	07.311.1155.6	10
5. Cross connector with screws	2 pole	IVB WK 2,5 - 2	Z7.280.2227.0	10	IVB WK 4 - 2	Z7.281.1227.0	10
insulated	3 pole	IVB WK 2,5 - 3	Z7.280.2327.0	10	IVB WK 4 - 3	Z7.281.1327.0	10
	up to 12 pole	IVB WK 2,5 - 12	Z7.280.3227.0	10	IVB WK 4 - 12	Z7.281.2227.0	10
6. Partition plate with marking facility		TS 2,5 GELB	07.311.2053.8	10	TS 4 GELB	07.311.2153.8	10
7. Single cover with marking facility		AD VB 2,5 GELB	04.326.2053.8	10	AD VB 4 GELB	04.326.2153.8	10
8. Cover with warning symbol over 4 blocks		AD VB 5/4 GELB	04.343.4756.8	10	AD VB 6/4 GELB	04.343.4856.8	10
For more accessories see pages 60-77				*1) For maintaining the proper isolation distances, the open side of a feed-through terminal block as well as both sides of a jumper are to be enclosed by partitions.			
For marking systems see pages 70-75				*1) Please note the mounting instructions on the cover page. *2) Do not use in Ex environments. *3) With/without jumper			



Rev: 0

Date: 6/5/2015

By: PTW

Device Tag:

TB1-3





Job Number: EVC6089

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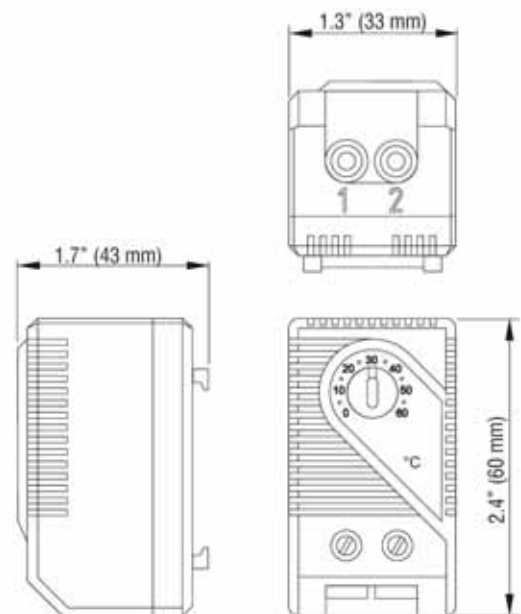
Manuf.: PNo: WIELAND: 57.504.0055.0



Technical Data KT 011

Part No.	Contact type	Scale on housing
01140.9-00	normally closed 	30 - 140°F
01141.9-00	normally open 	30 - 140°F
01146.9-00	normally closed 	0 - 60°C
01147.9-00	normally open 	0 - 60°C

Sensor element:	Thermostatic bi-metal
Maximum tolerance:	±7.2°F (4K)
Switching difference (hysteresis):	12.6°F ± 5.4°F (7°C ± 3K)
Service life:	100,000 cycles
Switching capacity (max. load):	15A resistive/2A inductive @ 120 VAC 10A resistive/2A inductive @ 250 VAC DC 30W
EMI/EMC compliance:	EN 55014-1-2, EN 61000-3-2, EN 61000-3-3
Connections:	2-pole terminal for AWG 14 max. (2.5 mm ²)
Mounting:	Clip for 35 mm DIN rail (EN 50022)
Dimensions (H x W x D):	2.4 x 1.3 x 1.7" (60 x 33 x 43 mm)
Housing:	Plastic, UL94V-0
Weight:	1.27 oz (36 g)
Protection type:	IP 20
Operating/storage temperature:	-49 to 158°F (-45 to 70°C)
Agency approvals:	UL, CSA



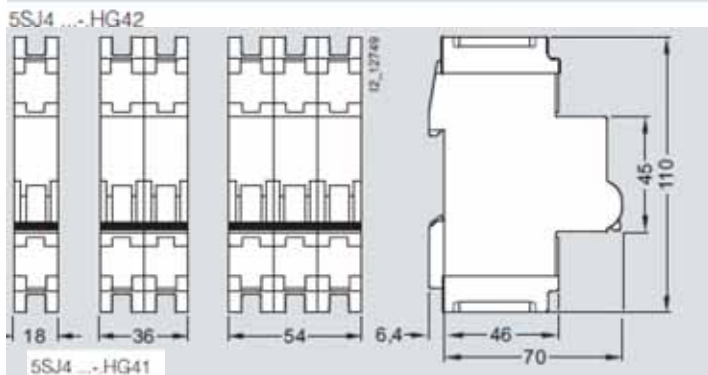
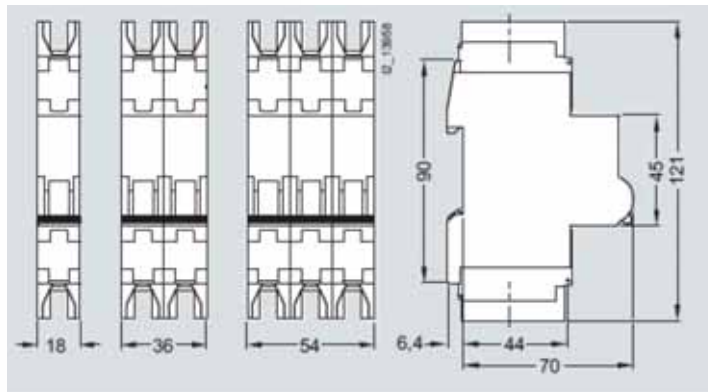
5SJ4 1 10 – 7 HG41

a b c d e

a	Frame Style	
	Code	Description
	5SJ4	Standard Frame

b	Poles	
	Code	Description
	1	1-Pole
	2	2-Pole
3	3-Pole	

c	Rated Current	
	Code	Rated Current (I_n)
	14	0.3
	05	0.5
	01	1
	15	1.6
	02	2
	03	3
	04	4
	11	5
	06	6
	08	8
	10	10
	13	13
	18	15
	16	16
	20	20
	25	25
	30	30
	32	32
	35	35
	40	40
	45	45
	50	50
	60	60
	63	63

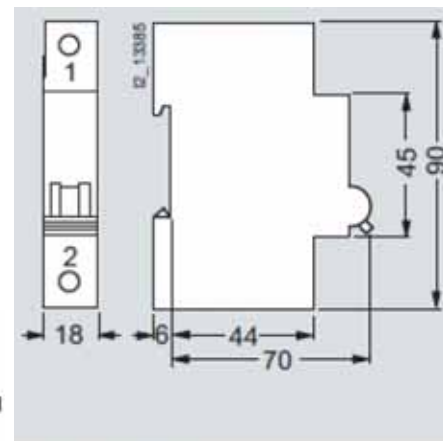


d	Trip Curve (Characteristic)			
	Code	Trip Curve	Magnetic Trip Point	Thermal Trip Point
	6	B	3 to 5 I_n	1.13 to 1.45 Breaker Rating
	7	C	5 to 10 I_n	
	8	D	10 to 20 I_n	

e	Version	
	Code	Description
	HG40	240 VAC, Same Polarity
	HG41	240 VAC
	HG42	480Y/277 VAC

Certifications:

CE
UL Listed and Certified to Canadian Standards
HACR Rated



5SJ4 ...-HG40



Rev: 0

Date: 6/5/2015

By: PTW

Device Tag:

CB1

Job Number: EVC6089

Page # 1/1

Manuf.: . PNo: SIEMENS: 5SJ4104-7HG40

Proline Promag 50W, 53W

Electromagnetic Flow Measuring System

Flow measurement in water or wastewater applications

Endress+Hauser 

People for Process Automation

60-203-000



Promag 53

Current output:

active/passive selectable, galvanically isolated, time constant selectable (0.01 to 100 s), full scale value selectable, temperature coefficient: typically 0.003% o.r./°F (0.005% o.r./°C), resolution: 0.5 μ A (o.r. = of reading)

- active: 0/4 to 20 mA, $R_L < 700 \Omega$ (HART: $R_L \geq 250 \Omega$)
- passive: 4 to 20 mA, operating voltage V_S 18 to 30 V DC, $R_i \leq 150 \Omega$

Pulse/frequency output:

active/passive selectable, galvanically isolated (Ex i version: only passive)

- active: 24 V DC, 25 mA (max. 250 mA during 20 ms), $R_L > 100 \Omega$
- passive: open collector, 30 V DC, 250 mA

Supply voltage

85 to 260 V AC, 45 to 65 Hz
20 to 55 V AC, 45 to 65 Hz
16 to 62 V DC

PROFIBUS PA and FOUNDATION Fieldbus

Non-hazardous: 9 to 32 V DC

Intrinsically safe: 9 to 24 V DC

Explosion proof: 9 to 32 V DC

Power consumption

AC: <15 VA (including sensor)

DC: <15 W (including sensor)

Switch-on current:

- max. 13.5 A (< 50 ms) at 24 V DC
- max. 3 A (< 5 ms) at 260 V AC


630-499-7080 · www.elemechinc.com

Rev: 0

Date: 6/5/2015

By: PTW

Device Tag:

FM1

Job Number: EVC6089

Page # 1/2

Manuf.: PNo: ENDRESS & HAUSER: 53W1H-UL0B1R10BAA/

Promag 53W, 1" to 24" sizes

Promag 53 W 0 1 2 3 4 5 6 7 8 9 10 11 12

Nominal Diameter

- 0 25 1"
- 40 1-1/2"
- 50 2"
- 80 3"
- 1H 4"
- 1F 6"
- 2H 8"
- 2F 10"
- 3H 12"
- 3F 14"
- 4H 16"
- 4F 18"
- 5H 20"
- 6H 24"

- 1 Liner
 - H Hard rubber (not available for 1", 1-1/2" or 2" sensors)
 - U Polyurethane
- 2 Process connection
 - L Class 150 ANSI B16.5 CS steel A105 flanges
 - M Class 300 ANSI B16.5 CS steel A105 flanges (not for 8" and larger)
 - R Class 150 ANSI B16.5 316L SS flanges
 - S Class 300 ANSI B16.5 316L SS flanges (not for 8" and larger)
- 3 Electrodes / material
 - 0 Measuring, reference and EPD electrodes / 316L SS
 - 1 Measuring, reference and EPD electrodes / Alloy C22
 - 2 Measuring, reference and EPD electrodes / tantalum
 - 7 Measuring electrode, exchangeable / 316L SS (for hard rubber liner only, 14" and larger sensors, no EPD or reference electrodes, for safe areas only)
 - G Measuring, reference and EPD electrodes, bullet nose / 316L SS
 - H Measuring, reference and EPD electrodes, bullet nose / Alloy C-22
- 4 Calibration
 - B 3-point calibration, 0.2%
 - E SCS/A2LA 3-point, 0.2% calibration (ISO/IEC 17025) with certificate traceable according to ISO 9000 (specify range)
- 5 Certificates
 - 1 Standard, no certificate
 - 2 3.1B material certificate for pipe and flanges
 - 3 2.3 pressure test certificate (1.5 x PN, 3 minutes) for sensors up to 12" only
 - 4 3.1B material and 2.3 pressure test certificate for sensors up to 12" only
- 6 Approvals
 - A For use in non-hazardous areas
 - N FM explosion proof of Class I, Div. 1 / CSA Class I, Div. 1 (only for aluminum field housing, compact version, not for 14" and larger sensors)
 - R FM non-incendive Class I, Div. 2 / CSA Class I, Div. 2
- 7 Housing
 - A NEMA 4X (IP 67) compact aluminum housing
 - C NEMA 4X (IP 67) remote wall-mounted (only for approvals A or R)
 - G NEMA 4X (IP 67) remote aluminum field housing for non-hazardous areas
 - K NEMA 6P sensor, wall-mounted housing (only for approvals A or R)
 - N NEMA 6P sensor, aluminum field housing, non-hazardous
 - P NEMA 4X (IP 67) compact aluminum housing, HE (harsh environment), compact and remote sensor sizes up to 12" only *
 - S NEMA 4X (IP 67) remote wall-mounted housing, HE (harsh environment), remote sensor sizes 14" to 78" (only for approvals A and R) *
 - 1 -40°F (-40°C) ambient temperature, NEMA 4X (IP 67), compact, aluminum field housing (only for approvals A and R)
 - 3 -40°F (-40°C) ambient temperature, NEMA 4X (IP 67), compact (only for approvals A and R)
 - 5 -40°F (-40°C) ambient temperature, NEMA 4X (IP 67) wall mount housing, for NEMA 6P sensor (only for approvals A and R)

- 8 Cable for remote
 - 0 Without cable
 - 1 15 foot coil and signal cable
 - 2 30 foot coil and signal cable
 - 5 Coil and signal cable, specify length (maximum 650 ft depending on conductivity of process material)
 - 7 Coil and signal cable, flexible conduit, specify length (maximum 650 ft depending on conductivity of process material)
- 9 Cable entries
 - B 1/2" NPT
 - L 1/2" NPT fieldbus connector (only for approval A and R)
- 10 Power supply / display
 - 7 85 to 260 VAC, without display, remote configuration only (not for wall mount or SS housing)
 - 8 20 to 55 VAC / 16 to 62 VDC, without display, remote configuration only (not for wall mount or SS housing)
 - A 85 to 260 VAC, with display, push button operation (language: EN, ES, FR, IT, NL, PT, DE)
 - B 20 to 55 VAC / 16 to 62 VDC, with display, push button operation (language: EN, ES, FR, IT, NL, PT, DE)
 - X Sensor only (without transmitter, only available up to 8")
- 11 Software
 - A Standard software
 - C ECC electrode cleaning circuit (only for approvals A and R)
- 12 Outputs / Inputs
 - Fixed communication boards
 - A Current HART, frequency
 - B Current HART, frequency, 2 relays
 - F PROFIBUS-PA, IS
 - G Foundation Fieldbus, IS
 - H PROFIBUS-PA
 - J PROFIBUS-DP
 - K Foundation Fieldbus
 - Q Modbus RS485, status input
 - S Current HART, frequency; active IS
 - T Current HART, frequency; passive IS
 - Flexible communication boards
 - C Current HART, frequency, 2 relays, flexible module
 - D Current HART, frequency, relay, and status input, flexible module
 - L Current HART, 2 relays and status input/output
 - M Current HART, 2 frequency output, status input
 - N Modbus RS 485, current and frequency output, status input
 - P PROFIBUS-DP, current and frequency output, status input
 - V PROFIBUS-DP, two relay outputs, status input
 - 2 Current HART, relay, current, frequency outputs
 - 4 Current HART, relay, frequency outputs, current input
 - 7 Modbus RS485, two relay outputs, status input
 - X Sensor only

* Harsh environment (HE) option is available for process conditions where cool process temperatures in tropical (high humidity) environments or process fluids which undergo large cyclical temperature variations which can cause high amounts of moisture that could condense onto the measurement tube.



Rev: 0

Date: 6/5/2015

By: PTW

Device Tag: FM1

Job Number: EVC6089

Page # 2/2

Zelio® Plug-In Relays

RPM power relays



Telemecanique

06-058-028

General characteristics

Conforming to standards		IEC/EN 61810-1 (iss. 2), UL 508, CSA C22-2 n° 14	
Product certifications		cULus File E164862 CCN NLDX, NLDX7; cURus File E164862 CCN NLDX2, NLDX8; CSA; CE; RoHS compliant	
Ambient air temperature around the device	Storage	°C (F)	-40... +85 (-40... +185)
	Operation	°C (F)	-40... +55 (-40... +131)
Vibration resistance conforming to IEC/EN 60068-2-6	In operation	3 gn (10...150 Hz/± 1 mm / 5g/5 cycles)	
	Not operating	5 gn (10...150 Hz/± 1 mm / 5g/5 cycles)	
Degree of protection	Conforming to IEC/EN 60529	IP 40	
Shock resistance conforming to IEC/EN 60068-2-27	Opening	15 gn	
	Closing	15 gn	
Protection category		RT I	
Mounting position		Any	

Insulation characteristics

Rated insulation voltage (Ui)	Conforming to IEC/EN 60947	V	250 (IEC), 300 (UL, CSA)
Rated impulse withstand voltage (Uimp)		kV	4 (1.2/50 μs)
Dielectric strength (rms voltage)	Between coil and contact	~ V	1550
	Between poles	~ V	1550
	Between contacts	~ V	1500

Contact characteristics

Relay type		RPM1●●●	RPM2●●●	RPM3●●●	RPM4●●●	
Number and type of contacts		1 C/O	2 C/O	3 C/O	4 C/O	
Contact materials		AgNi				
Conventional thermal current (Ith)	For ambient temperature ≤ 55 °C	A	15			
	Conforming to IEC	NO	A	15		
Rated operational current in utilization categories AC-1 and DC-1	Conforming to IEC	NC	A	7.5		
	Conforming to UL		A	15		
Switching current	Minimum	mA	10			
Switching voltage	Maximum	V	~/∞ 250 (IEC)			
	Minimum	V	17			
Nominal load (resistive)		A	15 / 250 ~ V			
		A	15 / 28 ∞ V			
Switching capacity	Maximum	~ ∞	VA	3750		
			W	420		
			mW	170		
Maximum operating rate In operating cycles/hour	No-load		18 000			
	Under load		1200			
Utilization coefficient			20 %			
Mechanical durability	In millions of operating cycles		10			
Electrical durability In millions of operating cycles	Resistive load		0.1		0.06	
	Inductive load		See curves below			

Electrical durability of contacts
Resistive load ~

Reduction coefficient for inductive load ~
(depending on power factor cos φ)

Maximum switching capacity on resistive load ∞



Rev: 0

Date: 6/5/2015

By: PTW

Device Tag:

IR1-4

Job Number: EVC6089

Page # 1/2

Manuf.: PNO: SQUARE D: RPM12BD

Power relays without LED (sold in lots of 10)

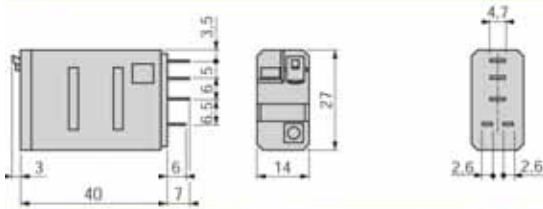
Control circuit voltage	Number and type of contacts - Thermal current (Ith)							
	1 C/O - 15 A		2 C/O - 15 A		3 C/O - 15 A		4 C/O - 15 A	
	Catalog number	Weight	Catalog number	Weight	Catalog number	Weight	Catalog number	Weight
V		kg		kg		kg		kg
≡ 12	RPM11JD	0.026	RPM21JD	0.036	RPM31JD	0.054	RPM41JD	0.071
≡ 24	RPM11BD	0.026	RPM21BD	0.036	RPM31BD	0.054	RPM41BD	0.071
≡ 48	RPM11ED	0.026	RPM21ED	0.036	RPM31ED	0.054	RPM41ED	0.071
≡ 110	RPM11FD	0.026	RPM21FD	0.036	RPM31FD	0.054	RPM41FD	0.071
~ 24	RPM11B7	0.026	RPM21B7	0.036	RPM31B7	0.054	RPM41B7	0.071
~ 48	RPM11E7	0.026	RPM21E7	0.036	RPM31E7	0.054	RPM41E7	0.071
~ 120	RPM11F7	0.026	RPM21F7	0.036	RPM31F7	0.054	RPM41F7	0.071
~ 230	RPM11P7	0.026	RPM21P7	0.036	RPM31P7	0.054	RPM41P7	0.071

Power relays with LED (sold in lots of 10)

≡ 12	RPM12JD	0.026	RPM22JD	0.036	RPM32JD	0.054	RPM42JD	0.071
≡ 24	RPM12BD	0.026	RPM22BD	0.036	RPM32BD	0.054	RPM42BD	0.071
≡ 48	RPM12ED	0.026	RPM22ED	0.036	RPM32ED	0.054	RPM42ED	0.071
≡ 110	RPM12FD	0.026	RPM22FD	0.036	RPM32FD	0.054	RPM42FD	0.071
~ 24	RPM12B7	0.026	RPM22B7	0.036	RPM32B7	0.054	RPM42B7	0.071
~ 48	RPM12E7	0.026	RPM22E7	0.036	RPM32E7	0.054	RPM42E7	0.071
~ 120	RPM12F7	0.026	RPM22F7	0.036	RPM32F7	0.054	RPM42F7	0.071
~ 230	RPM12P7	0.026	RPM22P7	0.036	RPM32P7	0.054	RPM42P7	0.071

Dimensions (mm):

Power relays
RPM 1

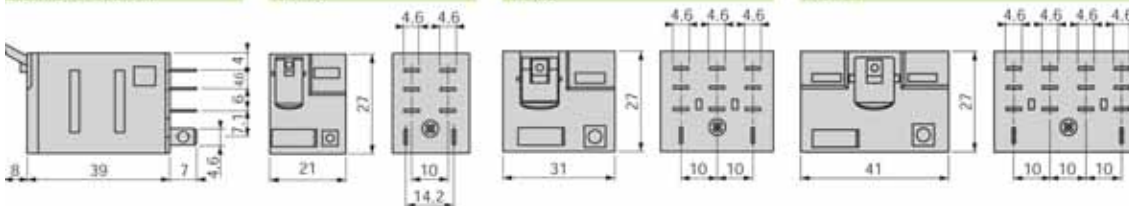


Common side view

RPM 2

RPM 3

RPM 4



Rev: 0

Date: 6/5/2015

By: PTW

Device Tag:

IR1-4

Job Number: EVC6089

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Manuf.: PNo:

SQUARE D: RPM12BD

Feed-through blocks with screw connection

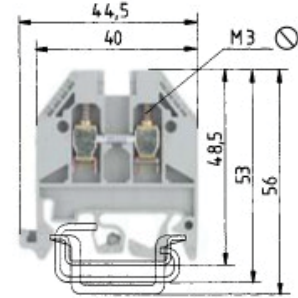
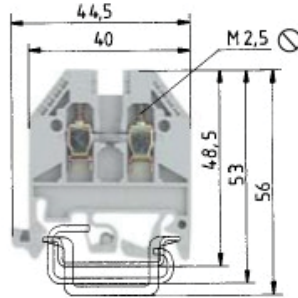
selosIOS

UL wire connection versions

¹⁾ or 2x no. 14 sol/str AWG
or 2x no. 16 sol/str AWG
or 2x no. 18 sol/str AWG
or 3x no. 20 sol/str AWG or 3x no. 22 sol/str AWG

²⁾ or 2x no. 12 sol/str AWG
or 2x no. 16 sol/str AWG
or 3x no. 18 sol/str AWG or 3x no. 22 sol/str AWG

³⁾ or 2x no. 12 sol/str AWG
or 2x no. 14 sol/str AWG
or 3x no. 16 sol/str AWG



0344 Ex II 2GD IM2
Ex e I/II
EN 60947-7-1:2002
UL ratings
CSA ratings
KEMA 02 ATEX 2114 U¹⁾ EN 60079-0/EN 60079-7
Width
Approvals

Field/factory wiring
Wire strip length

WK 2,5/U

fine-stranded solid V A
0.5-2.5 mm² 0.5-4 mm² 800V/8 kV/3 24
No. 22-12 AWG 600V 20/30
No. 24-12 AWG 600V 25
0.5-2.5 mm² 0.5-4 mm² 690V 23

UL ATEX LR 9U 9A Ex

WK 4/U

fine-stranded solid V A
0.5-4 mm² 0.5-6 mm² 800V/8 kV/3 32
No. 22-10 AWG⁴⁾ 600V 30/35
No. 20-10 AWG 600V 40
0.5-4 mm² 0.5-6 mm² 690V 14/27³⁾

UL ATEX LR 9U 9A Ex

Feed-through block	Type	Part No.	Std. Pack	Type	Part No.	Std. Pack	
Feed-through block	gray	WK 2,5/U	57.503.0055.0	100	WK 4/U	57.504.0055.0	100
Feed-through block Ex i	blue	WK 2,5/U BLAU	57.503.0055.6	100	WK 4/U BLAU	57.504.0055.6	100
Accessories							
1. Mounting rail TS 35, DIN rail 7.5 mm high	L = 2 m	35 x 27 x 7,5 EN 60715	98.300.0000.0	1	35 x 27 x 7,5 EN 60715	98.300.0000.0	1
Mounting rail TS 35, DIN rail, 15 mm high	L = 2 m	35 x 24 x 15 EN 60715	98.360.0000.0	1	35 x 24 x 15 EN 60715	98.360.0000.0	1
Mounting rail TS 32, G rail ²⁾	L = 2 m	9006 EN 60715 G-32	98.190.0000.0	1	9006 EN 60715 G-32	98.190.0000.0	1
2. End clamp with U-foot ³⁾	10 mm wide	WE 1/U	25.523.5753.0	100	WE 1/U	25.523.5753.0	100
End clamp TS 35, with screw	8 mm wide	9708/2 S35	25.522.8553.0	100	9708/2 S35	25.522.8553.0	100
End clamp TS 35, without screw	8 mm wide	WEF 1/35	25.523.9353.0	100	WEF 1/35	25.523.9353.0	100
3. End plate	gray	AP 2,5 - 4	07.311.0155.0	10	AP 2,5 - 4	07.311.0155.0	10
	blue	AP 2,5 - 4 BLAU	07.311.0155.6	10	AP 2,5 - 4 BLAU	07.311.0155.6	10
4. Partition	gray	TW 2,5 - 4	07.311.1155.0	10	TW 2,5 - 4	07.311.1155.0	10
	blue	TW 2,5 - 4 BLAU	07.311.1155.6	10	TW 2,5 - 4 BLAU	07.311.1155.6	10
5. Cross connector with screws	2 pole	IVB WK 2,5 - 2	Z7.280.2227.0	10	IVB WK 4 - 2	Z7.281.1227.0	10
insulated	3 pole	IVB WK 2,5 - 3	Z7.280.2327.0	10	IVB WK 4 - 3	Z7.281.1327.0	10
	up to 12 pole	IVB WK 2,5 - 12	Z7.280.3227.0	10	IVB WK 4 - 12	Z7.281.2227.0	10
6. Partition plate with marking facility		TS 2,5 GELB	07.311.2053.8	10	TS 4 GELB	07.311.2153.8	10
7. Single cover with marking facility		AD VB 2,5 GELB	04.326.2053.8	10	AD VB 4 GELB	04.326.2153.8	10
8. Cover with warning symbol over 4 blocks		AD VB 5/4 GELB	04.343.4756.8	10	AD VB 6/4 GELB	04.343.4856.8	10

For more accessories see pages 60-77
For marking systems see pages 70-75
¹⁾ For maintaining the proper isolation distances, the open side of a feed-through terminal block as well as both sides of a jumper are to be enclosed by partitions.
²⁾ Please note the mounting instructions on the cover page. ³⁾ Do not use in Ex environments. ⁴⁾ With/without jumper

 630-499-7080 · www.elemechinc.com	Rev: 0	Device Tag:	
	Date: 6/5/2015	TB	
Manuf.: PNo: WIELAND: 57.504.0055.0	By: PTW	Job Number: EVC6089	Page # 1/1

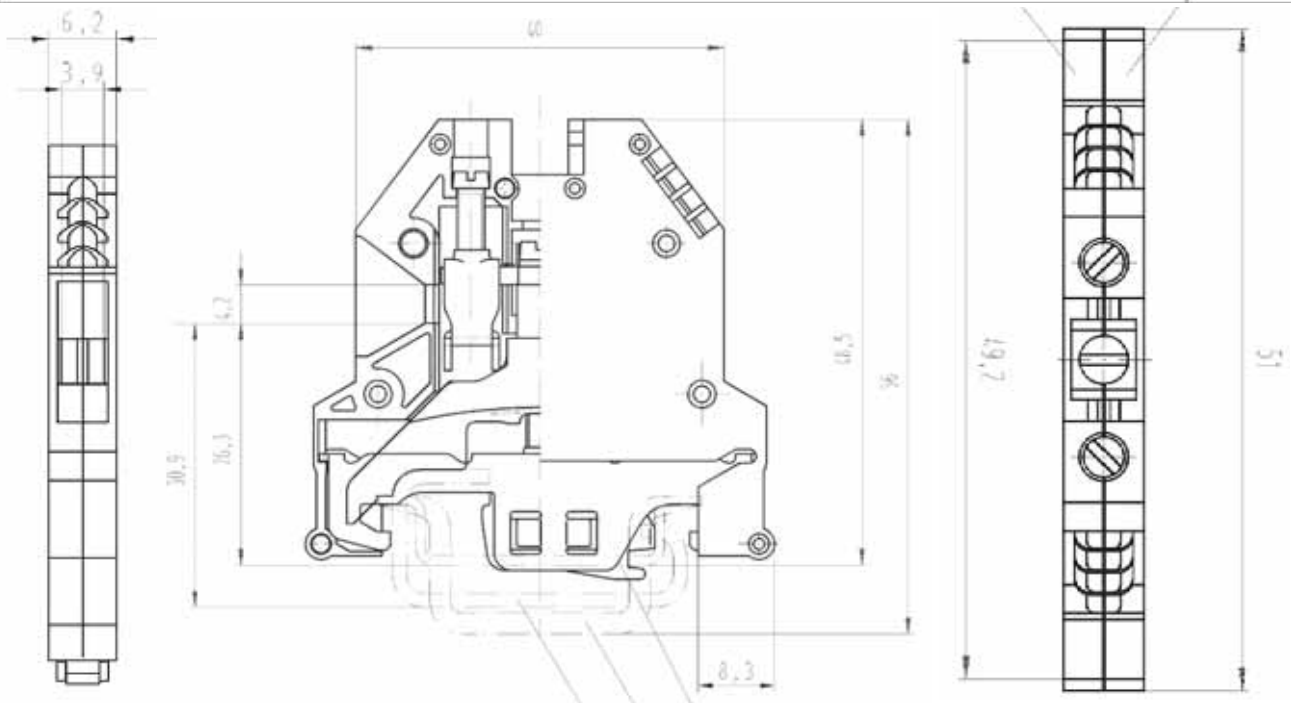
Earth terminal WK 4 SL/ U /N0

Ground DIN rail terminal block with screw connection for mounting on TS 35 and TS 32, nominal cross section 4 mm², width 6 mm, color green/yellow



42-063-004

Rated impulse voltage	8 kV
Pollution degree	3
Closing plate required	No
Length	51 mm
Type of insulation material	Thermoplastic
Cross section UL	22-10 AWG
Cross section CSA	20-10 AWG
Maximum cross section fine stranded	4 mm ²
Wire strip length	9 mm
Torque conductor mounting	0.5 Nm
Torque rail mounting	0,5



Rev: 0	Device Tag: TB	
Date: 6/5/2015		
By: PTW	Job Number: EVC6089	Page # 1/1

Manuf.: . PNo: WIELAND: 57.504.9055.0

C1WH6

PANDUIT

- **Base and covers sold separately**
- Non-slip cover design incorporates integral high friction lining to inhibit cover movement
- Cover flush with base provides greater wire capacity and improves aesthetics
- Easy cover removal makes changes to wiring quick and easy
- Available in various colors



10-069-001

• Part Number	C1WH6
• RoHS Compliancy Status	Compliant
• Part Description	Covers duct to protect wires, improve aesthetics and provides greater wire capacity. Base and covers sold separately.
• Product Type	Type C Cover for Flush Cover Wiring Duct
• Material	Lead-Free PVC
• Color	White
• Length (ft.)	6
• Length (m)	1.82
• CE Compliant	Yes
• Pricing Description	Duct Cover, PVC, 1"W X 6", White


630-499-7080 · www.elemechinc.com

Rev: 0

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By: PTW

Device Tag:

Job Number: EVC6089

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Manuf.: . PNo: PANDUIT: C1WH6

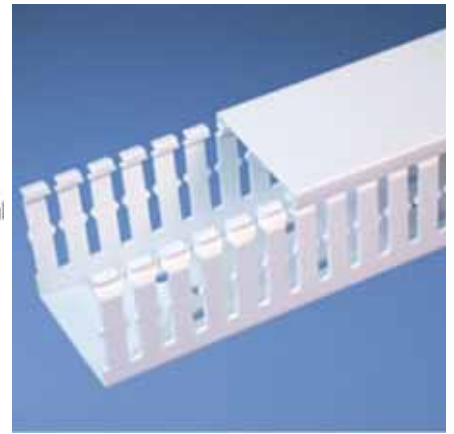
F1X3WH6

PANDUIT

10-069-007

Specifications

- Made of lead-free PVC
- UL Recognized continuous use temperature: 122°F (50°C)
- UL94 Flammability Rating of V-0
- Conforms with NFPA 79-2002 section 14.3.1 requirement for flame retardant material
- Available in Light Gray and White
- Provided with mounting holes



• Part Number	F1X3WH6
• RoHS Compliancy Status	Compliant
• Part Description	Narrow finger, slotted wiring duct.
• Material	Lead-Free PVC
• Color	White
• CSA Certified	Yes
• Length (ft.)	6
• CE Compliant	Yes
• CE Marking	Yes
• Duct Size W x H (In.)	1.26 x 3.12
• Duct Size W x H (mm)	32.0 x 79.2
• Mounting Method	Standard Mounting Holes
• Pricing Description	Slotted Duct,PVC,1"X3"X6',White


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Rev: 0

Date: 6/5/2015

By: PTW

Device Tag:

Job Number: EVC6089

Page # 1/1

Manuf.: . PNo: PANDUIT: F1X3WH6

Din Rail Sizes

Catalog Number	Lengths per Pack
G1*	12
G1F	12
OMEGA 2F	20
OMEGA 2F1*	40
OMEGA 3*	20
OMEGA 3F	20
OMEGA 3F1	20
OMEGA 3FD	10
OMEGA 3A	10
OMEGA 3AF	10
OMEGA 3AF1*	10
OMEGA 3AFD	20
OMEGA 3B	10
OMEGA 3B1*	10
OMEGA 75	2
ALUMINUM	
OMEGA 32A1*	6
OMEGA 32A2	6
OMEGA 3FAL1	40
GROMMET	
IG-11	10
COPPER	
OMEGA 3ACU	1
STAINLESS STEEL	
OMEGA 3SS	2
OMEGA 3SS1*	6

Each length is 2 Meters Long (6' 6 3/4") except as noted
 * One Meter Long
 All Din Rails are RoHS compliant.



Rev: 0

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By: PTW

Device Tag:

Job Number: EVC6089

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Manuf.: PNo: IBOCO: OMEGA 3 AF

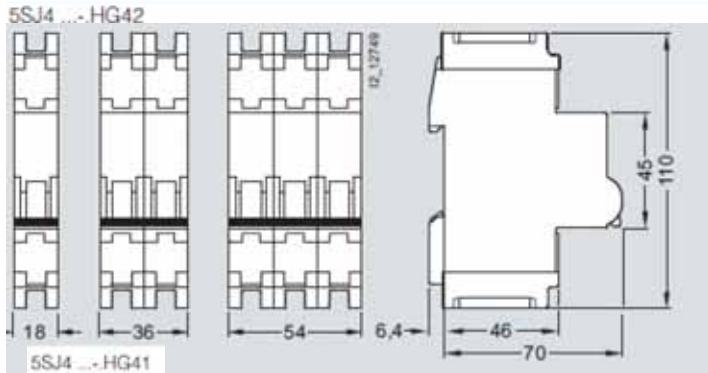
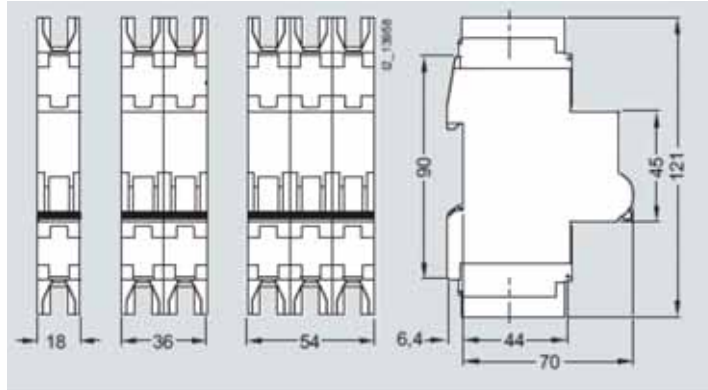
5SJ4 1 10 – 7 HG41

a b c d e

a	Frame Style	
	Code	Description
	5SJ4	Standard Frame

b	Poles	
	Code	Description
	1	1-Pole
	2	2-Pole
3	3-Pole	

c	Rated Current	
	Code	Rated Current (I_n)
	14	0.3
	05	0.5
	01	1
	15	1.6
	02	2
	03	3
	04	4
	11	5
	06	6
	08	8
	10	10
	13	13
	18	15
	16	16
	20	20
	25	25
	30	30
	32	32
	35	35
	40	40
	45	45
	50	50
	60	60
	63	63

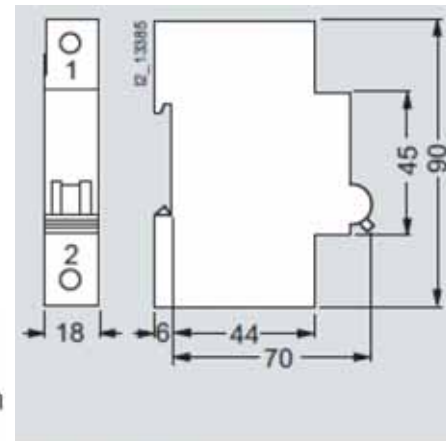


d	Trip Curve (Characteristic)			
	Code	Trip Curve	Magnetic Trip Point	Thermal Trip Point
	6	B	3 to 5 I_n	1.13 to 1.45 Breaker Rating
	7	C	5 to 10 I_n	
	8	D	10 to 20 I_n	

e	Version	
	Code	Description
	HG40	240 VAC, Same Polarity
	HG41	240 VAC
	HG42	480Y/277 VAC

Certifications:

CE
 UL Listed and Certified to Canadian Standards
 HACR Rated



5SJ4 ...-HG40



Rev: 0

Date: 6/5/2015

By: PTW

Device Tag:

CB

Job Number: EVC6089

Page # 1/1

Manuf.: . PNo: SIEMENS: 5SJ4106-7HG40

03-056-028

DataTuff Industrial Ethernet Cord Sets (RJ45). Cat 5e 4-Pair, 24 AWG - Heavy Duty Oil- & Sunlight-Resistant Black Jackets

IP67 interface complies with the *EtherCAT/IP* specification (IEC 61076-3-106 Variant 1)



57-009-010

• **Cord Sets (RJ45)**

Cat 6 or Cat 5e UTP or FTP with solid 24 AWG conductors and industrial-grade sunlight/oil resistant jackets. Suitable for use in IP67 or IP20 installations.

IP20 Cord Set



Shielded with Solid Conductors (ref: Belden Bonded-Pair Cable 7929A)

Cable Rating NEC: CMR, CMX-Outdoor CEC: CMR FT4. MSHA

Belden Part No.	IP Rating	Length meters (Ft.)	Tethered Cap	Package Quantity
E504001 010S1	IP67	1 m (3.3 ft.)	Yes	1
E504002 010S1	IP67	2 m (6.6 ft.)	Yes	1
E504003 010S1	IP67	3 m (9.8 ft.)	Yes	1
E504005 010S1	IP67	5 m (16.4 ft.)	Yes	1
E504025 010S1	IP67	25 m (82 ft.)	Yes	1
E505001 010S1	IP20	1 m (3.3 ft.)	-	1
E505002 010S1	IP20	2 m (6.6 ft.)	-	1
E505003 010S1	IP20	3 m (9.8 ft.)	-	1
E505005 010S1	IP20	5 m (16.4 ft.)	-	1



Rev: 0

Date: 6/5/2015

By: PTW

Device Tag:

CBL1

Job Number: EVC6089

Page # 1/1

Manuf.: PNO: BELDEN: E505001-010S1

General Data

Part No: 07.311.4053.1

Description: End Cover – Black

Type of end plate – Yes

Snap in - Yes

Inflammability Class of insulation material acc. With UL94 – V0



07-063-000



Rev: 0

Date: 6/5/2015

By: PTW

Device Tag:

DB1

Job Number: EVC6089

Page # 1/1

Manuf.: PNo: WIELAND: 07.311.4053.1

Cross connectors, (jumper bars) uninsulated

07-063-001

Type	Part no.	Std. pack
WKM 4/15	6 mm spacing	Screw: M 3
2pole 9215 - 2	Z7.210.3227.0	50
3pole 9215 - 3	Z7.210.3327.0	50
4pole 9215 - 4	Z7.210.3427.0	50
5pole 9215 - 5	Z7.210.3527.0	50
6pole 9215 - 6	Z7.210.3627.0	50
70pole 9215 M-70	Z7.210.3027.0	10



General

Colour	Other
Type	Cross connector
Modular spacing	6 mm
Number of bridged clamps	4
Mounting method	Screwable
Insulated	No

Accessories

Type	Cross connector
Mounting method	Screwable
Insulated	No
Colour	Other
Number of bridged clamps	4
Modular spacing	6 mm



Rev:	0	Device Tag:	
Date:	6/5/2015	DB1	
By:	PTW	Job Number:	EVC6089
		Page #	1/1

Manuf.: . PNo: WIELAND: Z7.210.3427

Item No. 57.504.9055.0



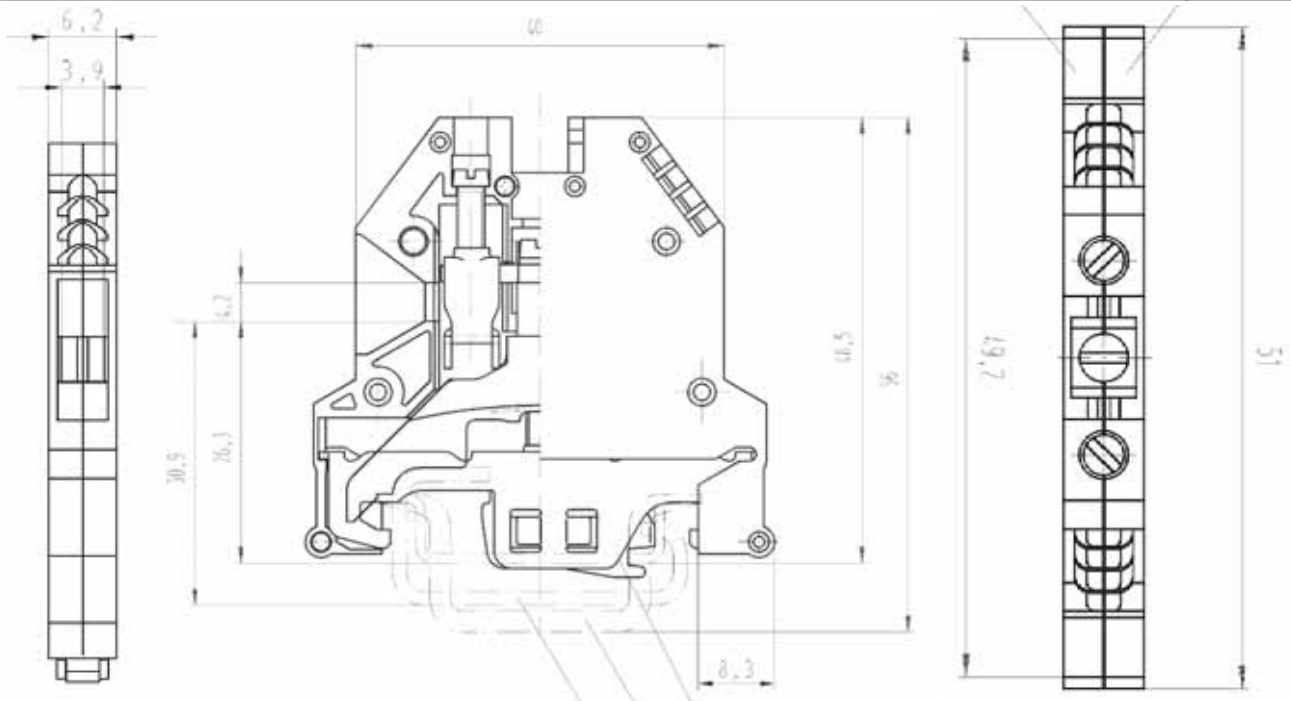
Earth terminal WK 4 SL/ U /N0

Ground DIN rail terminal block with screw connection for mounting on TS 35 and TS 32, nominal cross section 4 mm², width 6 mm, color green/yellow



42-063-004

Rated impulse voltage	8 kV
Pollution degree	3
Closing plate required	No
Length	51 mm
Type of insulation material	Thermoplastic
Cross section UL	22-10 AWG
Cross section CSA	20-10 AWG
Maximum cross section fine stranded	4 mm ²
Wire strip length	9 mm
Torque conductor mounting	0.5 Nm
Torque rail mounting	0,5



Rev: 0

Date: 6/5/2015

By: PTW

Device Tag:

DB1, TB1

Job Number: EVC6089

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Manuf.: PNO: WIELAND: 57.504.9055.0



Copper Connectors
T&B Catalog Number:

UPC Number:
Status:
Description:

L70
 78378613002
 Active

Type L - Copper Single Conductor, One-Hole Mount for Conductor Range 14 Sol.-4 Str.

Features

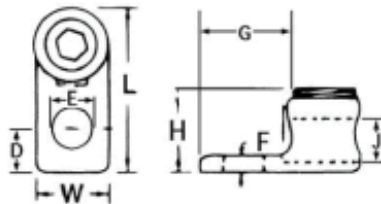
Cold forged from pure electrolytic copper with 99 percent conductivity.

General

Style	Type L - Copper Single Conductor, One-Hole Mount
Material	Copper
Wire Range	14 Sol.-4 Str.

Dimension Information

Length (inches)	1 1/8
Width (inches)	17/32
Height (inches)	35/64
D (inches)	9/32
E (inches)	9/32
F (inches)	3/32
G (inches)	21/32
J (inches)	9/32



Packaging

T&B Inner Pack	100
Package in Units	1000
T&B Sold in UOM	Each
T&B Weight Per UOM	3.32 lbs. per 100

Notes

Available with screwdriver slot head screws only.
 UL 486A tested.

Certifications

RoHS Compliance	Yes
-----------------	-----

Certifications



File Nbr:
 E9809

For further technical assistance, please contact us...

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Hours: 7AM - 6PM CDT
 Monday-Friday
 Phone: (888) 862-3289
 Fax: (901) 252-1321
 Email: techsupport@tnb.com



Rev:	0	Device Tag:	
Date:	6/5/2015	GND	
By:	PTW	Job Number:	Page #
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Manuf.: . PNo: BLACKBURN: L70

CS 060 Touch-Safe Heater 50 - 150W

17-034-003

Part No.	Heating capacity ¹⁾	Max. current (inrush)	Air outlet temperature ²⁾	Dimensions	Weight (approx.)
06000.0-00	50W	2.5A	187°F (86°C)	4.3 x 2.4 x 3.5" (110 x 60 x 90mm)	290g
06010.0-00	100W	4.5A	248°F (120°C)	4.3 x 2.4 x 3.5" (110 x 60 x 90mm)	300g
06020.0-00	150W	8A	293°F (145°C)	5.9 x 2.4 x 3.5" (150 x 60 x 90mm)	440g

¹⁾ see Heating capacity / Ambient temperature diagram

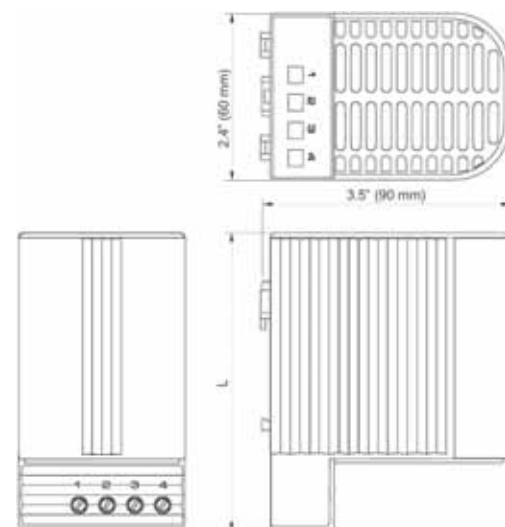
²⁾ measured 2" (50mm) above protective grill

³⁾ tolerance of ± 5K

Technical Data

Operating voltage	120-240VAC* (min. 110V, max. 265V)
Heating capacity	see table
Heating element	PTC resistor - temperature limiting
Surface temperature	< 176°F (80°C), except upper protective grill
Connection	4-pole terminal AWG 14 max (2.5mm ²), torque 0.8Nm max.
Housing	plastic, UL 94V-0, black
Mounting	clip for 35mm DIN rail, EN 60 715
Mounting position	vertical
Operating / Storage temperature	-4 to +158°F (-20 to +70°C) / -49 to +158°F (-45 to +70°C)
Protection class / Protection type	II (double insulated) / IP20
Approvals	UL File No. E150057, VDE
Note	other voltages available upon request

*Operating with voltages below 140V AC/DC reduces heating performance by approx. 10%.



Rev: 0

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HTR1

Job Number: EVC6089

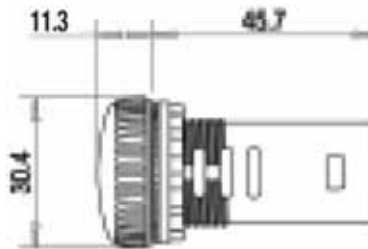
Page # 1/1

Manuf.: . PNo: STEGO: 06020.0-00

800FD - P **3** N **7**
 a b c
 a b c

Lens & LED Color		Voltage		Screw Termination	
Code	Color	Code	Type	Code	Description
0	Amber	3	24V AC/DC	Blank	Standard
3	Green	5	120V AC	R	Ring Lug
4	Red	7	240V AC		
5	Yellow				
6	Blue				
7	Clear				

Environmental	
Temperature range (operating)	-25...+60°C (-13...140°F)^
Temperature range (short term storage)	-40...+85°C (-40...185°F)
Humidity	50...95% RH from 25...60°C (77...140°F)



Electrical Ratings				
Standard contact block ratings		B300, R300; AC 15, DC 13; 300 VAC; EN/IEC 60947-5-1 and UL 508, 17V, 5 mA min.		
LED Module Ratings	Nominal Voltage	Range	Nominal Current Draw	Frequency
	24V AC	20...26V AC	32 mA	50/60 Hz
	24V DC	18...30V DC	24 mA	DC
	120V AC	102...132V AC	22 mA	50/60 Hz
	240V AC	204...264V AC	22 mA	50/60 Hz
Thermal current		5 A max. enclosed (40°C ambient) to UL508, EN/IEC 60947-5-1		
Insulation voltage (Ui)		300V		
Wire capacity (screw terminal)		#18...14 AWG (0.75...2.5 mm ²), Max. (2) #14 AWG, uses same size wire only		
Recommendations for Ring Lug termination option-		6.35 mm (0.250 in.) Max. outer diameter with 3.8 mm (0.148 in.) hole diameter		
Recommended tightening torque on screw terminals		0.7...0.9 N•m (6...8 lb-in.)		
Dielectric strength (minimum)		2500V for one minute		
External short circuit protection		5 A type gL/gG cartridge fuse to EN 60269-2-1 or gN (Class J to UL 248-8 or Class CC to UL 248-4)		
Electrical shock protection		Finger-safe conforming to IP2X		

Product Certifications	
Certifications	UL, CSA, CCC, CE
Conformity to standards - CE marked	UL 508, EN 60947-1, EN 60947-5-1, EN 60947-5-5
Terminal identification	EN/IEC 60947-1

 630-499-7080 · www.elemechinc.com	Rev: 0	Device Tag:	
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Manuf.: . PNo: ALLEN-BRADLEY: 800FD-P3N3	By: PTW	Job Number: EVC6089	Page # 1/1

S1300



26-264-002

Secure, robust, outdoor payment solution.

Technical Specifications:

Keypad

- Plastic: 10 numeric, 6 function keys and 4 screen-addressable keys

Display

- LCD: 4 lines x 20 characters (standard)
- LED: Backlight

Card Reader

- Magnetic stripe: Tracks 1 and 2 (standard);

Communications

- RS-232 (standard)
- RS-422 LAN port (optional)

Memory

- 64KB SRAM for applications
- 64KB SRAM for data

Power

- AC: 100-240 V, 50/60 Hz
- DC: 12 VDC @ 200mA

Security

- Physical: Intrusion detection and secure CPU
- Visa PED approved

PIN Encryption

- DES: PIN-ANSI X9.8, MAC-ANSI X9.9 Part 1-ANSI X9.24
- Triple DES: ANSI X9.52
- Key management: 12 master/session keys or DUKPT

Footprint

- 4.21 in x 10.0 in x 4.92 in/10.69 cm x 25.4 cm x 12.5 cm

Weight

- 2.3 lbs/0.86 kg

Environment

- Temperature: -20 – 60°C/-4 – 150°F
- Humidity: Max 90%, non-condensing
- ESD: 12,000 volts
- Class IP65 rated keypad

Reliability

- 100,000 hours (MTBF calculated)



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OIU1

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Manuf.: . PNo: HYPERCOM: 3313-00220

800H-

c

d

f



Extended Head Unit

29-005-006

c

d

f

Operator Type		Color Cap		Contact Block(s)	
Description	800H Type 4/4X/13	Code	Description	Code	Description
		Code	1	Green	D1
Flush head	AR	2	Black	D2	1 N.C.
Extended head	BR	3	Orange†	D3	1 N.O.E.M.
Mushroom head	DR	4	Gray†	D4	1 N.C.L.B.
		5	White†	Blank	No Contacts
		6	Red		
		7	Blue		
		9	Yellow		

Electrical Ratings

Contact Ratings	Refer to the Contact Ratings tables below
Dielectric Strength	2200V for one minute; 1300V for one minute (Logic Reed)
Electrical Design Life Cycles	1,000,000 at maximum rated load

Mechanical Ratings

Vibration	10...200 Hz 1.52 mm displacement (peak-to-peak) Max./10 G Max. (except Logic Reed)	
Shock	1/2 cycle sine wave for 11 milliseconds ≥ 25 G (contact fragility) and no damage at 100 G	
Degree of Protection	Type 4/4X/13; Watertight/Corrosion-Resistant, Oiltight IEC 529 IP66/65	
Mechanical Design Life Cycles		
Push Buttons	(Momentary, Non-Illuminated) 10,000,000 minimum (Momentary, Illuminated) 250,000 minimum (Push-Pull/Twist-to-Release) 250,000 minimum	
Selector Switches	(Non-Illuminated) 1,000,000 minimum (Illuminated) 200,000 minimum	
Potentiometers	100,000 minimum	
All other devices	200,000 minimum	
Contact Operation	Shallow, mini, and Low Voltage Contact Blocks: Slow, double make and break Logic Reed and Sealed Switch Contact Blocks: Single break magnetic	
Typical Operating Forces		
Operators without contact blocks	Flush, Extended, Standard Mushroom, Jumbo Plastic Mushroom: 2 lbs Max. Maintained Selector Switch: 3.6 in. lbs maximum	
Spring Return Selector Switches	3.6 in. lbs to stop; 0.2 in. lbs to return	
Illuminated Push Buttons and Push-to-Test Pilot Lights	5 lbs maximum	
3-Position Push-Pull	8 lbs maximum push to in position or pull to center position (15 lbs maximum pull to out position)	
Push-Pull and Push-Pull/Twist	9 lbs maximum push or pull, 30 in. oz. maximum twist, 6 in. oz. minimum return	
Potentiometer	Rotational Torque 3...12 in.-oz. Stopping Torque 12 in.-lbs (minimum)	
Contact Blocks	800T-XA 1 lb Logic Reed 1 lb maximum Sealed Switch 3 lbs maximum at 0.205" plunger travel Stackable Sealed Switch 1 lb maximum	

Environment

Temperature Range	Operating -40...+131°F (-40C...+55°C) Storage -40...+185°F (-40...+85°C)
Humidity	50% at +104°F (+40°C)

Note: Operating temperatures below freezing are based on the absence of moisture and liquids. Consult your local Allen-Bradley Sales Office for use in lower temperature applications.



Rev: 0	Device Tag: PB1	
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Manuf.: PNO: ALLEN-BRADLEY: 800H-BR2D2

MicroLogix™ Analog Input/Output Module

(Catalog Number 1762-IF2OF2)

Allen-Bradley

33-005-048

General Specifications

Specification	Value
Dimensions	90 mm (height) x 87 mm (depth) x 40 mm (width) height including mounting tabs is 110 mm 3.54 in. (height) x 3.43 in. (depth) x 1.58 in. (width) height including mounting tabs is 4.33 in.
Approximate Shipping Weight (with carton)	240g (0.53 lbs.)
Storage Temperature	-40°C to +85°C (-40°F to +185°F)
Operating Temperature	0°C to +55°C (-32°F to +131°F)
Operating Humidity	5% to 95% non-condensing
Operating Altitude	2000 meters (6561 feet)
Vibration	Operating: 10 to 500 Hz, 5G, 0.030 in. max. peak-to-peak
Shock	Operating: 30G
Bus Current Draw (max.)	40 mA at 5V dc 105 mA at 24V dc
Analog Normal Operating Range	Voltage: 0 to 10V dc Current: 4 to 20 mA
Full Scale ⁽¹⁾ Analog Ranges	Voltage: 0 to 10.5V dc Current: 0 to 21 mA
Resolution	12 bits (unipolar)
Repeatability ⁽²⁾	±0.1%
Input and Output Group to System Isolation	30V ac/30V dc rated working voltage ⁽³⁾ (N.E.C. Class 2 required) (IEC Class 2 reinforced insulation) type test: 500V ac or 707V dc for 1 minute
Module Power LED	On: indicates power is applied.
Recommended Cable	Belden™ 8761 (shielded)



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PLC1

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Manuf.: PNo: ALLEN-BRADLEY: 1762-IF2OF2

Input Specifications

Specification	Value
Number of Inputs	2 differential (unipolar)
A/D Converter Type	Successive approximation
Common Mode Voltage Range ⁽¹⁾	±27 V
Common Mode Rejection ⁽²⁾	> 55 dB at 50 and 60 Hz
Non-linearity (in percent full scale)	±0.1%
Typical Overall Accuracy ⁽³⁾	±0.5% full scale at 0 to 55°C ±0.3% full scale at 25°C
Input Impedance	Voltage Terminal: 200KΩ Current Terminal: 250Ω
Current Input Protection	±32 mA
Voltage Input Protection	±30 V
Channel Diagnostics	Over or under range or open circuit condition by bit reporting for analog inputs.

Output Specifications

Specification	Value
Number of Outputs	2 single-ended (unipolar)
D/A Converter Type	Resistor string
Resistive Load on Current Output	0 to 500 Ω (includes wire resistance)
Load Range on Voltage Output	> 1KΩ
Reactive Load, Current Output	< 0.1 mH
Reactive Load, Voltage Output	< 1 μF
Typical Overall Accuracy ⁽¹⁾	±1% full scale at 0 to 55°C ±0.5% full scale at 25°C
Output Ripple range 0 to 500 Hz (referred to output range)	< ±0.1%
Non-linearity (in percent full scale)	< ±0.5%
Open and Short-Circuit Protection	Continuous
Output Protection	±32 mA



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Manuf.: PNo:

ALLEN-BRADLEY: 1762-IF2OF2

MicroLogix™ 1400 / 1766

Allen-Bradley

Small Programmable Logic Controller

33-005-163

Overview

The new Allen-Bradley® MicroLogix™ 1400 from Rockwell Automation complements the existing MicroLogix family of small programmable logic controllers. MicroLogix 1400 combines the features you demand from MicroLogix 1100, such as EtherNet/IP, online editing, and a built-in LCD, plus provides you with enhanced features, such as: higher I/O count, faster High Speed Counter/PTO and enhanced network capabilities

Take advantage of the built-in LCD with back lighting to set the Ethernet network configuration, display floating point values on a user configurable display, display OEM logos at startup and read or write any binary, integer and long file elements in the data table. Controllers without embedded analog come with 32 digital I/O count, while analog versions have 32 digital I/O and 6 analog I/O. All versions can be expanded using up to seven 1762 I/O modules - the same I/O modules that MicroLogix 1100 and 1200 utilize.

Three embedded communication ports provide you with superior communications capabilities. MicroLogix 1400 offers an isolated RS232C/RS485 combination port; a non-isolated RS232C port; and an RJ-45 port for 10/100 Mbps EtherNet/IP peer-to-peer messaging.

Similar to the rest of the MicroLogix family, MicroLogix 1400 is programmed with RSLogix 500 programming software (Version 8.1 and above) as well as new RSLogix Micro programming software.



Manuf.: PNo:

ALLEN-BRADLEY: 1766-L32BWA

Rev:

0

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EVC6089

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MicroLogix	1766-L32BWA	1766-L32AWA	1766-L32BXB	1766-L32BWAA	1766-L32AWAA	1766-L32BXBA
Input Power	120/240 VAC		24 VDC	120/240 VAC		24 VDC
Memory	non-volatile battery backed RAM					
User Program / User Data Space	10 K / 10K configurable					
Data Logging / Recipe Storage	128 K (without Recipe) / up to 64 K (after subtracting Data Logging)					
Battery Back-up	Yes					
Back-up Memory Module	Yes					
Digital Inputs	(12) Fast 24VDC (8) Normal 24VDC	(20) 120VAC	(12) Fast 24VDC (8) Normal 24VDC	(12) Fast 24VDC (8) Normal 24VDC	(20) 120VAC	(12) Fast 24VDC (8) Normal 24VDC
Digital Outputs	(12) Relay	(12) Relay	(6) Relay (3) Fast DC (3) Normal DC	(12) Relay	(12) Relay	(6) Relay (3) Fast DC (3) Normal DC
Analog Inputs / Outputs	None			(4) Voltage Inputs / (2) Voltage Outputs		
Serial Ports	(1)RS232C/RS485*, (1)RS232C**					
Serial Protocols	DF1 Full Duplex, DF1 Half Duplex Master/Slave, DF1 Radio Modem, DH-485, Modbus RTU Master/Slave, ASCII, DNP 3 Slave					
Ethernet Ports	(1) 10/100 EtherNet/IP port					
Ethernet Protocols	EtherNet/IP messaging only					
Trim Potentiometers	2 Digital					
High-Speed Inputs	Up to 6 channels @ 100 kHz	N/A	Up to 6 channels @ 100 kHz	Up to 6 channels @ 100 kHz	N/A	Up to 6 channels @ 100 kHz
Real Time Clock	Yes, embedded					
PID	Yes (limited by loop and stack memory)					
PWM / PTO	N/A		3 channel PTO (100kHz)\PWM (40kHz)	N/A		3 channel PTO (100kHz)\PWM (40kHz)
Dual Axis Servo control	N/A		Through embedded PTO	N/A		Through embedded PTO
Embedded LCD	Yes					
Floating Point Math	Yes					
Online Editing	Yes					
Operating Temperature	-20° C to +60° C					
Storage Temperature	-40° C (or -30° C) to +85° C					



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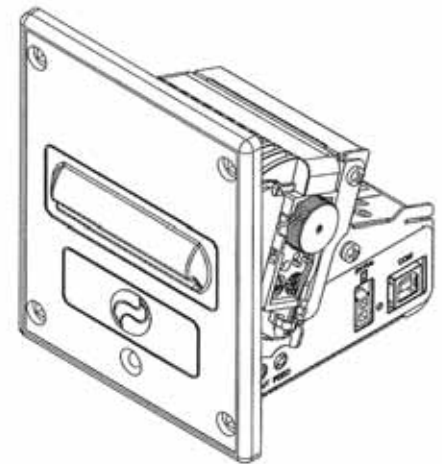
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Manuf.: PNO:
ALLEN-BRADLEY: 1766-L32BWA

TICKET PRINTER TG1260 series TG2460 series 60 mm

36-338-003

Description	TG1260	TG2460
Print method	Thermal fixed head (8 dot/mm)	
Resolution	204DPI (8 dot/mm)	
Paper specifications		
Type of paper	Thermal rolls heat sensitive side on outside of roll	
Recommended type of paper	KANZAN KF50 (55g/m ²) or MITSUBISHI PG5075	
Paper thickness	0.063 ± 0.005 mm (KF 50)	
Paper width	60 mm ± 0.5 mm	
External roll diameter	Max 100 mm (with external paper holder support)	
Internal roll core diameter	13 mm	
Core thickness	2mm (+1mm)	
Core type	Cardboard or plastic	
Sensor	Head temperature, paper end, paper jam, ticket presence on output OPTIONAL: external near paper end.	
Print direction	Normal, 180°	
Print format	Height/ width from 1 to 4, bold, negative, uderlined, italic.	
Character fonts	ASCII standard, EPSON, International.	
Standard interfaces	Serial RS232. USB	
Baude rate	From 1200 to 115200 bps	
Printing speed	45 mm/sec (normal) 36 mm/sec (low)	140 mm/sec (normal) 110 mm/sec (low)
Power supply	12 V ± 10%	24 V ± 10%
Current absorption		
Operating absorption	2,5 A	3 A
Peak absorption	3 A	4 A
Stand by	0,05 A	0,1 A
Environmental conditions		
Operating temperature	-20 + +70°C	
Operating humidity	10% - 80% w/o condensation	
Storage temperature/ humidity	-20 + +70°C / 10% + - 90% Rh	
Weight	625 gr	
Options	- Adjustable paper holder support with near paper end sensor - Paper dispenser unit (only for autocutter model)	



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PRN1

Job Number: EVC6089

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Manuf.: . PNo: CUSTOM: 915CG020100300

Switch Mode Power Supply

DRP024V060W1AZ

60W 1Phase Plastic



37-323-000

General Data		
Isolation voltage		
Input / output	type test/routine test	4KVAC / 3KVAC
Input / PE	type test/routine test	1.5KVAC / 1.5KVAC
output / PE	type test/routine test	1.5KVAC / 500VAC
Degree of protection		IPX0
Class of protection		Class I with PE connection
MTBF		>800,000hrs
Type of housing		Plastic (PC), closed
Dimensions (W / H / D) + mounting rail		32mm x 113mm x 120.6mm
Weight		0.32Kg approx
STATUS Indicator		
LED (6) DC OUTPUT OK		YES (GREEN LED)
Climatic Data		
Ambient temperature (Operating)		-20°C to 75°C (>50°C derating)
Ambient temperature (Storage)		-25°C to 85°C
Humidity	at+25 °C, no condensation	<95% RH
Vibration (Non-Operating)		10Hz to 500Hz @ 50 m/s ² (5G peak) ; displacement of 0.35mm; 90 min per axis for all X, Y, Z direction. Refer to IEC68000-2-6. Note: all figures quoted are amplitudes (peak value)
Shock (in all directions)		30G (300ms) in all directions according to IEC68-2-27
Pollution degree		2
Climatic class		3K3 according to EN 60721
CE In conformance with EMC guideline 89/336/EEC and low voltage directive 73/23/EEC		DINRAIL 1AC / 24V DC / 2.5A (D0116888)
EMC (electromagnetic compatibility)		
Immunity to interference according to EN 61000-6-2		
• EN 61000-4-2 ²⁾ Discharge of static electricity (ESD)	Housing Contact discharge: Discharge in air:	LEVEL 4 8KV 15KV
• EN 61000-4-3 ¹⁾ Electromagnetic HF field	Housing Frequency/Field intensity:	LEVEL 3 80MHz - 14 Hz / 10v/m, with 1kHz tone/80% modulation
• EN 61000-4-4 ²⁾ Fast transients (Burst):	Input Output: Signal:	2KV ¹⁾ - -
• EN 61000-4-5 ²⁾ Surge voltage capacities (Surge):	Input Output: Signal:	2KV ¹⁾ / 2KV ¹⁾ (Level 3) - -
• EN 61000-4-6 ¹⁾ Conducted disturbance	I/O Frequency / U _c :	Level 3 0.15MHz - 80MHz / 10Vrms.
• EN 61000-4-11 ²⁾ Voltage dips		Input : Main Buffering > 20ms.
Noise emission according to EN 6100-6-3		
• Emitted radio interface		EN55011 (EN55022) CLASS B ¹⁾
• Radio interference voltage		EN55011 (EN55022) CLASS B ¹⁾

60W1Ph Plastic	
Input Data (1)	
Nominal input voltage (wide-range input)	100-240VAC
Input Voltage range	85-264VAC (DC input range 120-375VDC)
Frequency	47-63Hz (0Hz at DC input)
Current consumption (at nominal values)	1.5A Max
Inrush current limitation, I ¹ (+25 °C) typ.	< 40A @ 115VAC, < 80A @ 230VAC
Mains buffering at nominal load (typ.)	> 20ms @ 115VAC, > 125ms @230VAC
Turn-on time after applying the mains voltage	< 2.5Secs.
Transient surge voltage protection	VARISTOR
Input fuse, internal (device protection)	T 3.15AH / 250V
Recommended backup fuse power circuit-breaker characteristic	6A, 10A or 16A, B.
Discharge current to PE	< 1mA
Connection Method	Screw Connection.
Stripping Length	7mm or use suitable lug to crimp

Output Data (2)	
Nominal output voltage U _N / tolerance	24VDC±2%
Setting range of the output voltage	22-28VDC
Nominal output current I _N with convection cooling: -20 to +50°C	2.5A
Derating above +50°C	2.5% / K. (< 0°C 1% / K., > 70°C 4% / K.)
Current limitation at short-circuits approx.	I _{SURGE} = 150% of P _O Max typically.
Startup with capacitive loads	Max 8,000µF
Max. power dissipation idling/nominal load approx.	10W
Efficiency (at 115VAC and nominal values)	> 85% typical.
Residual ripple/ peak switching (20 MHz) (at nominal values)	< 50mV / < 240mVpp
Can be connected in parallel for redundancy and increased capacity	YES with oring Diode.
Surge voltage protection against internal surge voltages	YES

 <p>630-499-7080 · www.elemechinc.com</p>	Rev: 0	Device Tag:	
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Manuf.: PNo: DELTA: DRP024V060W1AZ	By: PTW	Job Number: EVC6089	Page # 1/1

AC Outlet Module

These modules are intended for use within cabinets and enclosures as 120Vac outlets for power tools, lights, test equipment, computers, etc.

- Compact, easy to install
- CSA approved, UL recognized
- Four versions available:
 - single outlet with 5A circuit breaker
 - duplex outlet
 - duplex GFI, 15A
 - duplex GFI, 20A
- Single and duplex versions mount on 32mm and 35mm DIN rails
- GFI versions mount on 35mm DIN rail or can be direct mounted using an optional mounting kit





14-113-000

Rated data

Input voltage	120Vac
Rated current	5A max via outlet 10A via redundant terminals
Wire range	26 - 12 AWG (0.14 - 4.0mm ²)

Ordering data

Ordering data	Type	Cat.No.
TS32 / TS35 mounting ( / )	Single outlet with circuit breaker (supplemental protector with manual reset via push button)	991548 0001

Dimensions

Width	35mm
Length	70mm
Height	55mm

Approvals

 LR-229352,  E252394



Rev: 0

Date: 6/5/2015

By: PTW

Device Tag:

RECP1

Job Number: EVC6089

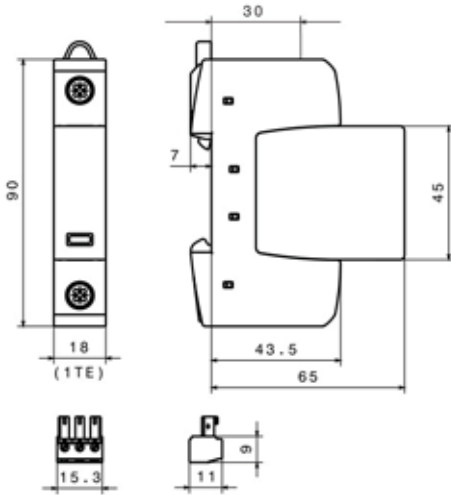
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Manuf.: . PNO: WEIDMULLER: 9915480001

Surge Protection Made Simple™ for UL Applications

Single Pole BSP UL Series for 120, 240 and 347Vac

Single-Phase 2 Wire Systems



Dimensions - mm



BSPM1120S2G
BSPM1240S2G
BSPM1347S2G

40-012-004

ORDERING INFORMATION				
Nominal System Voltage		120Vac	240, 277 or 240 & 277Vac	347Vac
Max. Continuous Operating AC Voltage (MCOV) [Vc]		275Vac	385Vac	600Vac
Catalog Numbers:	Without Remote Signaling	BSPM1120S2G	BSPM1240S2G	BSPM1347S2G
	With Remote Signaling	BSPM1120S2GR	BSPM1240S2GR	BSPM1347S2GR
Replacement Module	MOV Technology	BPM275UL	BPM385UL	BPM600UL
SPECIFICATIONS				
Rated Voltage		120-127Vac	240-277Vac	347Vac
Voltage Protection Rating V_{PR}		1kV	1.5kV	2kV
SCCR		200kA	200kA	125kA
Nominal Discharge Current I_n (kA)			20kA	
Max. Discharge Current I_{max} (kA)			40kA	
Response Time t_A			<25 ns	
Frequency			50/60Hz	
Number of Poles			1	
Number of Wires/Connection Points			2 Wires / 2 Connection Points	
Operating State/Fault Indication			Green (good) / Red (replace)	
Cross-Sectional Area (min.)			14AWG - Cu Stranded, Solid or Fine	
Cross-Sectional Area (max.)			2AWG - Cu Solid or Stranded / 4AWG - Cu Fine	
Terminal Torque			45 lb-in	
For Mounting On			35mm DIN Rail per to EN 60715	
Enclosure Material			Thermoplastic, UL 94V0	
Degree of Protection			IP20 (finger-safe)	
Location Category			Indoor	
Capacity			1 Mods, DIN 43880	
Application			UL Type 2 Component Assembly	
Standard			UL 1449, 3rd Edition	
Agency Information			cURus, RoHS Compliant	
Product Warranty			Five Years*	
REMOTE CONTACT SIGNALING				
Remote Contact Signaling Type			Changeover Contact	
AC Switching Capacity (Volts/Amps)			250V/0.5A	
DC Switching Capacity (Volts/Amps)			250V/0.1A; 125V/0.2A; 75V/0.5A	
Conductor Ratings and Cross-Sectional Area for Remote Contact Signal Terminals			60/75°C Max. 1.5mm ² /14AWG Solid/Flexible	
Ordering Information			Order from Catalog Numbers Above	

SCCR Rated
BSP UL Series (Type 2)

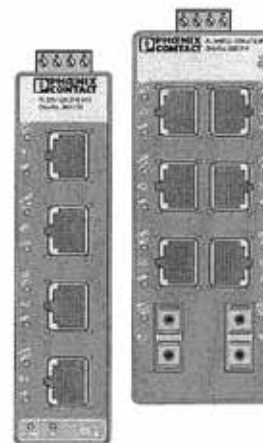


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By:	PTW	Job Number:	EVC6089
		Page #	1/1

Manuf.: . PNO:
BUSSMAN: BSPM1120S2GR

FL SWITCH SFN ...

Five and Eight Port Standard Function Ethernet Switches with Narrow Housings – Gigabit as an Option



33-098-002

Ordering Data

Ethernet Switches with 10/100 Mbps

Description	Type	Order No.
Ethernet switch with 5 RJ45 ports for 10/100 Mbps	FL SWITCH SFN 5TX	2891152

Description

The FL SWITCH SFN ... range of Factory Line switches with standard functions in numerous versions can be used for quick and cost-effective Ethernet network expansion to the field level. Due to their narrow housing design, the components are suitable for universal remote use in control cabinets and junction boxes. The switches have five or eight ports, up to two of which are glass fiber ports provided in SC or ST format. The switches support the auto negotiation function at the twisted pair ports and offer transmission speeds of 10/100/1000 Mbps depending on the switch version. Mixed operation for the connection of segments with different data transmission speeds is also supported. The glass fiber ports only support 100 Mbps or 1000 Mbps (Gigabit version).

The RJ45 ports offer an auto crossing function, which means it is not necessary to make a distinction between 1:1 and crossover cables.

The fiber optic ports can be used to extend the segment length up to 20 km. Unused RJ45 ports can be fitted with security caps to provide mechanical protection against unauthorized use.

Features and Fields of Application

- Increased network performance
 - Switched Ethernet reduces traffic and non predictable timing
 - Quality of Service: Pretagged high priority messages are forwarded before lower priority messages during periods of high network traffic loading
 - Gigabit options for data intensive applications
 - Easy network expansion
 - No configuration of the switch
 - Autonegotiation and autocross simplify cabling
 - Coupling copper network segments with different bit rates with automatic detection of the data transmission speed of 10 Mbps, 100 Mbps or 1000 Mbps depending on the switch version.
 - Fiber optic options extend distance and electrical noise immunity
 - 1 or 2 ports option
 - SC or ST connector options
 - Multimode or singlemode option
- Low cost, low complexity security (optional)
- Connect Layer 1 security elements at the RJ45 port to restrict access or tampering
 - No software setup needed



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Manuf.: . PNo: PHOENIX: 2891152

Datasheet

Art.No. 07.311.0155.0

End plate AP 2,5 -4 /V0

End plate for DIN rail terminal blocks type WK ..., color gray



42-063-001

Art.No.	07.311.0155.0
EAN	4015573392663
Order unit	10 pieces

Approvals

Technical data

General

Colour	Grey
Type of end plate	Yes
Type of partition	No
Thickness	1.5 mm
Snap in	Yes
Inflammability class of insulation material acc. with UL94	V0

Accessories

Type of end plate	Yes
Type of partition	No
Colour	Grey
Thickness	1.5 mm
Snap in	Yes
Inflammability class of insulation material acc. with UL94	V0



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TB1,2

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Manuf.: . PNO: WIELAND: 07.311.0155.0

Feed-through blocks with screw connection

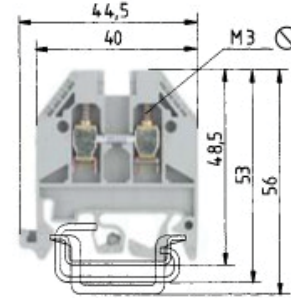
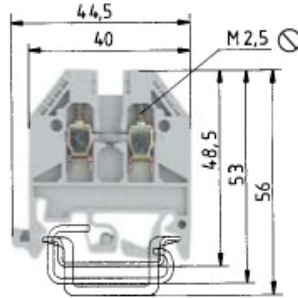
selosIOS

UL wire connection versions

¹⁾ or 2x no. 14 sol/str AWG
or 2x no. 16 sol/str AWG
or 2x no. 18 sol/str AWG
or 3x no. 20 sol/str AWG or 3x no. 22 sol/str AWG

²⁾ or 2x no. 12 sol/str AWG
or 2x no. 16 sol/str AWG
or 3x no. 18 sol/str AWG or 3x no. 22 sol/str AWG

³⁾ or 2x no. 12 sol/str AWG
or 2x no. 14 sol/str AWG
or 3x no. 16 sol/str AWG



0344 Ex II 2GD IM2
Ex e I/II
EN 60947-7-1:2002
UL ratings
CSA ratings
KEMA 02 ATEX 2114 U¹⁾ EN 60079-0/EN 60079-7
Width
Approvals

Field/factory wiring

Wire strip length

WK 2,5/U

fine-stranded solid V A
0.5-2.5 mm² 0.5-4 mm² 800V/8 kV/3 24
No. 22-12 AWG 600V 20/30
No. 24-12 AWG 600V 25
0.5-2.5 mm² 0.5-4 mm² 690V 23

5 mm 9 mm
ATEX LR 9U 9A Ex

WK 4/U

fine-stranded solid V A
0.5-4 mm² 0.5-6 mm² 800V/8 kV/3 32
No. 22-10 AWG⁴⁾ 600V 30/35
No. 20-10 AWG 600V 40
0.5-4 mm² 0.5-6 mm² 690V 14/27³⁾

6 mm 9 mm
ATEX LR 9U 9A Ex

Feed-through block	Type	Part No.	Std. Pack	Type	Part No.	Std. Pack	
Feed-through block	gray	WK 2,5/U	57.503.0055.0	100	WK 4/U	57.504.0055.0	100
Feed-through block Ex i	blue	WK 2,5/U BLAU	57.503.0055.6	100	WK 4/U BLAU	57.504.0055.6	100
Accessories							
1. Mounting rail TS 35, DIN rail 7.5 mm high	L = 2 m	35 x 27 x 7,5 EN 60715	98.300.0000.0	1	35 x 27 x 7,5 EN 60715	98.300.0000.0	1
Mounting rail TS 35, DIN rail, 15 mm high	L = 2 m	35 x 24 x 15 EN 60715	98.360.0000.0	1	35 x 24 x 15 EN 60715	98.360.0000.0	1
Mounting rail TS 32, G rail ²⁾	L = 2 m	9006 EN 60715 G-32	98.190.0000.0	1	9006 EN 60715 G-32	98.190.0000.0	1
2. End clamp with U-foot ³⁾	10 mm wide	WE 1/U	25.523.5753.0	100	WE 1/U	25.523.5753.0	100
End clamp TS 35, with screw	8 mm wide	9708/2 S35	25.522.8553.0	100	9708/2 S35	25.522.8553.0	100
End clamp TS 35, without screw	8 mm wide	WEF 1/35	25.523.9353.0	100	WEF 1/35	25.523.9353.0	100
3. End plate	gray	AP 2,5 - 4	07.311.0155.0	10	AP 2,5 - 4	07.311.0155.0	10
	blue	AP 2,5 - 4 BLAU	07.311.0155.6	10	AP 2,5 - 4 BLAU	07.311.0155.6	10
4. Partition	gray	TW 2,5 - 4	07.311.1155.0	10	TW 2,5 - 4	07.311.1155.0	10
	blue	TW 2,5 - 4 BLAU	07.311.1155.6	10	TW 2,5 - 4 BLAU	07.311.1155.6	10
5. Cross connector with screws	2 pole	IVB WK 2,5 - 2	Z7.280.2227.0	10	IVB WK 4 - 2	Z7.281.1227.0	10
insulated	3 pole	IVB WK 2,5 - 3	Z7.280.2327.0	10	IVB WK 4 - 3	Z7.281.1327.0	10
	up to 12 pole	IVB WK 2,5 - 12	Z7.280.3227.0	10	IVB WK 4 - 12	Z7.281.2227.0	10
6. Partition plate with marking facility		TS 2,5 GELB	07.311.2053.8	10	TS 4 GELB	07.311.2153.8	10
7. Single cover with marking facility		AD VB 2,5 GELB	04.326.2053.8	10	AD VB 4 GELB	04.326.2153.8	10
8. Cover with warning symbol over 4 blocks		AD VB 5/4 GELB	04.343.4756.8	10	AD VB 6/4 GELB	04.343.4856.8	10
For more accessories see pages 60-77							
For marking systems see pages 70-75							
¹⁾ For maintaining the proper isolation distances, the open side of a feed-through terminal block as well as both sides of a jumper are to be enclosed by partitions. ²⁾ Please note the mounting instructions on the cover page. ³⁾ Do not use in Ex environments. ⁴⁾ With/without jumper							



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Manuf.: PNo: WIELAND: 57.504.0055.0

End clamp for TS 35
with screw connection

9708/2 S 35

Z5.522.8553.0



42-063-009



Rev: 0

Date: 6/5/2015

By: PTW

Device Tag:

TB1,2,DB1

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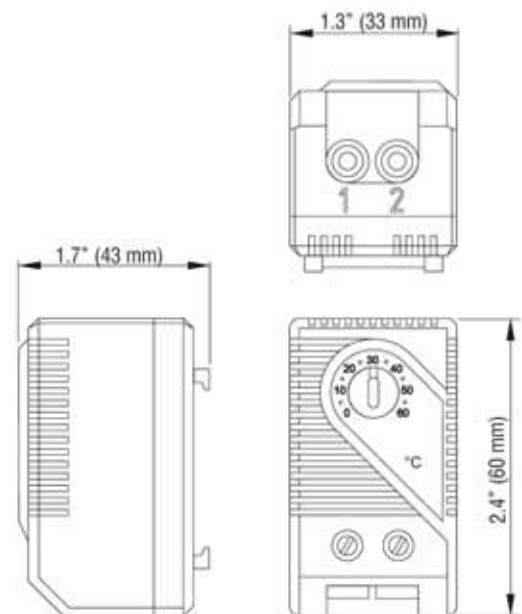
WIELAND: Z5.522.8553



Technical Data KT 011

Part No.	Contact type	Scale on housing
01140.9-00	normally closed 	30 - 140°F
01141.9-00	normally open 	30 - 140°F
01146.9-00	normally closed 	0 - 60°C
01147.9-00	normally open 	0 - 60°C

Sensor element:	Thermostatic bi-metal
Maximum tolerance:	±7.2°F (4K)
Switching difference (hysteresis):	12.6°F ± 5.4°F (7°C ± 3K)
Service life:	100,000 cycles
Switching capacity (max. load):	15A resistive/2A inductive @ 120 VAC 10A resistive/2A inductive @ 250 VAC DC 30W
EMI/EMC compliance:	EN 55014-1-2, EN 61000-3-2, EN 61000-3-3
Connections:	2-pole terminal for AWG 14 max. (2.5 mm ²)
Mounting:	Clip for 35 mm DIN rail (EN 50022)
Dimensions (H x W x D):	2.4 x 1.3 x 1.7" (60 x 33 x 43 mm)
Housing:	Plastic, UL94V-0
Weight:	1.27 oz (36 g)
Protection type:	IP 20
Operating/storage temperature:	-49 to 158°F (-45 to 70°C)
Agency approvals:	UL, CSA



AHCI

Cubic Feet Protected

Code	Application Method
DV	Foam Device
E	Emmitter
R	Tape Roll
S	Spray



11-035-345

Catalog Number	Enclosure Volume Protected
AHCI1DV	1 cu. ft. (28.32 liters)
AHCI5E	5 cu. ft. (141.6 liters)
AHCI10E	10 cu. ft. (283.2 liters)
AHCI60R	60 cu. ft. per roll (1699 liters)
AHCI240R	240 cu. ft. per roll (6797 liters)
AHCI238S	Corrosion Inhibitor Spray

AHCI1DV

Foam device protects one cubic foot (28 liters) of enclosure volume for approximately one year. Size: .25 x 1.25 x 3.00 in. (6 x 32 x 76mm). Package quantity 50.

AHCI60R

Tape protects sixty cubic feet of enclosure volume per roll. Use approximately 2.50" (6.3cm) of tape per cubic foot (28 liters) of enclosure volume to be protected. Each roll of tape is packaged individually in a resealable bag. Size: .25" x .75" x 12.00' (6mm x 19mm x 3.6m). Package quantity 3.

AHCI240R

Tape protects 240 cubic feet of enclosure volume per roll. Use approximately 1.00" (2.5cm) of tape per cubic foot (28 liters) of enclosure volume to be protected. Each roll of tape is packaged individually in a resealable bag. Size: .25" x 2.00" x 20.00' (6mm x 51mm x 6.1m). Package quantity 1.

AHCI5E

Emitter protects five cubic feet (142 liters) of enclosure volume for approximately one year. Emitters contain additional red metal (non-ferrous) inhibitors. Size: 2.50" (diameter) x 1.50" (high) (63mm x 38mm). Package quantity 25.

AHCI10E

Emitter protects ten cubic feet (283 liters) of enclosure volume for approximately one year. Emitters contain additional red metal (non-ferrous) inhibitors. Size: 2.50" (diameter) x 2.00" (high) (63mm x 51mm). Package quantity 12.

AHCI238S

Spray is a non-conductive, nonflammable, vapor phase film and is non-toxic. It has essentially neutral pH value. Application provides instant protection against corrosion. Spray is water soluble and can be easily flushed away with water if desired. This product should be kept from freezing, and has a shelf life of 2+ years in normal warehouse conditions. Package quantity 6.

Life Expectancy And Usage

The normal useful life-span of Hoffman corrosion inhibitors is in excess of one year. However, inhibitor life expectancy is shortened by approximately 25% when exposed to temperatures above 104° F (40°C). This product is not recommended for use where temperature exceeds 199°F. Ventilated enclosures or enclosures not sealed properly, as well as frequent door openings, also shorten the product life. Additional inhibitors should be used if these conditions exist. Since Hoffman corrosion inhibitors are vapor-phase protective, all surfaces to be protected should be accessible to the vapors. The maximum distance the vapors can travel is approximately 1.50 feet (.46 meters). Protection of long narrow enclosures can be achieved with tape or multiple inhibitors.



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Manuf.: PNO:

HOFFMAN: A-HCI10E

By:

PTW

Differential pH and ORP Sensors



31-393-000

pH Sensors

Most pH applications fall in the 2.5 to 12.5 pH range. A Hach pHD sc Differential pH sensor with the wide-range glass process electrode performs exceptionally well in this range. Some industrial applications require accurate measurement and control below 2 or above 12 pH. In these special cases, please contact Hach Technical Support for further details.

Measuring Range

-2 to 14 pH

Sensitivity

± 0.01 pH

Stability

0.03 pH per 24 hours, non-cumulative

Operating Temperature

Digital Sensor: -5 to 70°C (23 to 158°F)

Analog Sensor with Digital Gateway: -5 to 105°C (23 to 221°F)

Immersion Sensor: 0 to 50°C (32 to 122°F)

Flow Rate

3 m (10 ft.) per second, maximum

Sensor Pressure/Temperature Limits

Digital: 6.9 bar at 70°C (100 psi at 158°F)

Analog: 6.9 bar at 105°C (100 psi at 221°F)

Built-in Temperature Element

NTC 300 ohm thermistor for automatic temperature compensation and analyzer temperature readout

Transmission Distance

100 m (328 ft.), maximum

1000 m (3280 ft.), maximum when used with a termination box

Sensor Cable (integral)

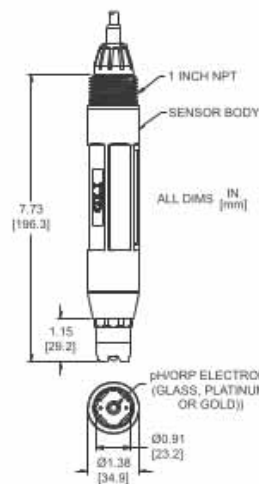
4 conductor cable with one shield and polyurethane jacket; rated to 105°C (221°F); 10 m (33 ft.) standard length

Wetted Materials

PEEK® or Ryton® (PVDF), salt bridge of matching material with Kynar® junction, glass process electrode, titanium ground electrode, and Viton® O-ring seals

(pH sensor with optional HF-resistant glass process electrode has 316 stainless steel ground electrode, and perfluoroelastomer wetted O-rings; consult factory for other available wetted O-ring materials)

Analog Convertible Style



pHD Analog Sensors

All analog sensors include built-in preamplifier and integral 4.5 m (15 ft.) cable terminated with stripped and tinned wires.

Definitions of body styles:

- Convertible – 1-inch NPT threads at both ends, designed for tee-mounting or other flow through mountings, and pipe mounting for immersion
- Insertion – has no threads on the electrode end, designed for use with insertion valve assembly
- Sanitary – has a 2-inch flange for a Tri-Clover style fitting

pH Sensors

Product Number	Body Material	Body Style	Electrode Material	Max Temp
PD1P1	PEEK ¹	Convertible	Glass, General Purpose	95°C (203°F)
PD1P3	PEEK ¹	Convertible	Glass, HF-resistant	95°C (203°F)
PD2P1	PEEK ¹	Insertion	Glass, General Purpose	95°C (203°F)
PD3P1	PEEK ¹	Sanitary	Glass, General Purpose	95°C (203°F)
PD1R1	Ryton ²	Convertible	Glass, General Purpose	95°C (203°F)
PD1R3	Ryton ²	Convertible	Glass, HF-resistant	95°C (203°F)

¹Polyetheretherketone ²Polyphenylene Sulfide

ORP Sensors

Product Number	Body Material	Body Style	Electrode Material	Max Temp
RD1P5	PEEK ¹	Convertible	Platinum	95°C (203°F)
RD1P6	PEEK ¹	Convertible	Gold	95°C (203°F)
RD2P5	PEEK ¹	Insertion	Platinum	95°C (203°F)
RD1R5	Ryton ²	Convertible	Platinum	95°C (203°F)
RD1R6	Ryton ²	Convertible	Gold	95°C (203°F)

¹Polyetheretherketone ²Polyphenylene Sulfide



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Manuf.: PNo:

HACH: PD1P1

Differential pH and ORP Sensors



To complete your pH and ORP measurement system, choose from these Hach controllers...

31-393-002

Model sc200 Controller

(see Lit. #2665)

The sc200 controller platform can be configured to operate either 2 Digital Sensor Inputs, or 1 or 2 Analog Sensor Inputs, or a combination of Digital and Analog Sensor Inputs. Customers may choose their communication options from a variety of offerings ranging from MODBUS RTU to Profibus DPV1.



sc200 for Hach Digital Sensors

- LXV404.99.00552** sc200 controller, 2 channel, digital
- LXV404.99.00502** sc200 controller, 1 channel, digital
- LXV404.99.00542** sc200 controller, 2 channel, digital & mA input
- LXV404.99.00512** sc200 controller, 2 channel, digital & pH/DO
- LXV404.99.00522** sc200 controller, 2 channel, digital & Conductivity
- LXV404.99.00532** sc200 controller, 2 channel, digital & Flow

sc200 for Hach Analog Sensors

- LXV404.99.00102** sc200 controller, 1 channel, pH/DO
- LXV404.99.00112** sc200 controller, 2 channel, pH/DO
- LXV404.99.00202** sc200 controller, 1 channel, Conductivity
- LXV404.99.00222** sc200 controller, 2 channel, Conductivity
- LXV404.99.00212** sc200 controller, 2 channel, pH/DO & Conductivity
- LXV404.99.00302** sc200 controller, 1 channel, Flow
- LXV404.99.00332** sc200 controller, 2 channel, Flow
- LXV404.99.00312** sc200 controller, 2 channel, Flow & pH/DO
- LXV404.99.00322** sc200 controller, 2 channel, Flow & Conductivity

Note: Other sensor combinations are available. Please contact Hach Technical Support or your Hach representative.

Note: Communication options (MODBUS and Profibus DPV1) are available.

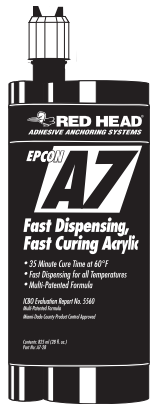


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Manuf.: PNo: HACH: LXV404.99.00102

Anchor Bolts

A7 Adhesive



Fast Dispensing, Fast Curing Acrylic Adhesive

The acrylic resin and hardening agent are completely mixed as they are simultaneously dispensed from the dual cartridge through a static mixing nozzle, directly into the anchor hole. A7 can be used with threaded rod or rebar (for fastening to hollow base materials, see pages 32 and 35).



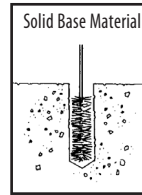
ADVANTAGES

- All weather formula
- No drip, no sag, easy clean up
- Fast & easy dispensing, even 28-oz. cartridges can be hand dispensed
- Fast curing time, 35 minutes at 60°F
- Not mix ratio sensitive
- NSF 61 Approved
- Rods are easier to insert into the hole with A7 compared with other adhesives
- Works in damp holes and underwater applications
- Requires less adhesive—can be used in 1/16" oversized or 1/8" oversized holes
- **One formula** for both hollow and solid base materials

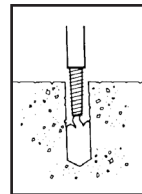
Curing Times

BASE MATERIAL (F°/C°)	WORKING TIME	FULL CURE TIME
100°/ 38°	5 minutes	25 minutes
80°/ 27°	5.5 minutes	30 minutes
60°/ 16°	7 minutes	35 minutes
40°/ 4°	15 minutes	75 minutes
20°/ -7°	35 minutes	6 hours
0°/ -18°	4 hours	24 hours

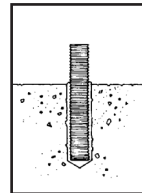
INSTALLATION STEPS



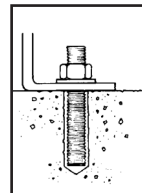
1. Drill 1/16" oversize diameter holes for 1/4"-1/2" diameter threaded rods and #3 rebar. Drill 1/8" oversize diameter holes for 5/8"-1-1/4" diameter threaded rods, #4 rebar, grout filled blocks and brick pinning. Clean out hole from bottom with forced air. Complete hole preparation with brush and repeat cleaning with forced air (leave no dust or slurry).



2. When starting new cartridge or new nozzle, dispense and discard enough adhesive until uniform light grey color is achieved. Insert the nozzle into the bottom of the hole and fill to 1/2 the hole depth.



3. Insert rod slowly by hand into the bottom of the hole with a slow twisting motion. This insures adhesive fills voids and crevices and uniformly coats the anchor rod.



4. See table for working times and curing times. After the suggested cure time is met, install and tighten fixture into place.



Certified to
ANSI/NSF 61

APPROVALS/LISTINGS



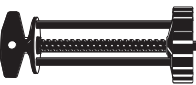

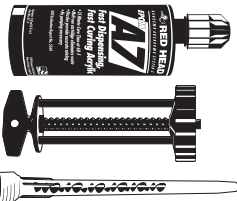
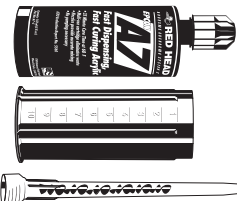
ICC Evaluation Service, Inc. – #ER-5560

City of Los Angeles – RR#25379

DOT Approvals

NSF Standard 61 Certified for Drinking Water Components

A7-5 fl. oz. Ordering Information

PART NUMBER	DESCRIPTION	BOX QTY	PART NUMBER	DESCRIPTION	BOX QTY
 A7-5	5 Fluid Ounce Cartridge A7	12	 A7-5	5 Fluid Ounce Cartridge A7	12
 A500	Reusable Plastic Dispenser	12	 A501	Reusable Caulking Gun Adaptor	12
 A500 KIT	Convenient Dispensing Kit Packaged in a Solid Plastic Shell with (1) A500 Plastic Dispenser (1) A7-5 Cartridge and (1) A24 Nozzle Nozzle diameter fits 3/8" to 5/8" holes	8	 A501 KIT	Convenient Dispensing Kit Packaged in a Solid Plastic Shell with (1) A501 Plastic Dispenser (1) A7-5 Cartridge and (1) A24 Nozzle Nozzle diameter fits 3/8" to 5/8" holes	8

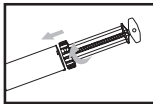
AVAILABLE WITH YOUR CHOICE OF TWO, EASY DISPENSING SYSTEMS

A500 PLASTIC DISPENSER

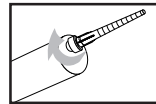
Attaches directly to cartridge allowing for easy hand dispensing. **No extra tools are required.**



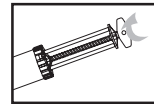
Simple Assembly and Dispensing



1. Twist-lock dispenser onto cartridge.



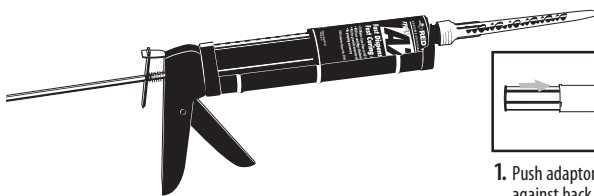
2. Thread nozzle onto cartridge.



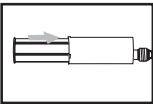
3. Turn lever in order to dispense adhesive.

A501 CAULKING GUN ADAPTOR

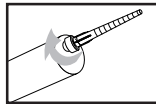
Allows cartridge to work with most standard caulking guns (caulking gun supplied by contractor).



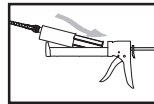
Simple Assembly and Dispensing



1. Push adaptor tightly against back of cartridge.



2. Thread nozzle onto cartridge.



3. Place assembly in caulking gun and dispense adhesive.

EASY PACKAGING!

A500 and A501 kits are perfect for both counter or pegboard hanging display.



A500 Kit



A501 Kit

ESTIMATING TABLES

A7 Number of Anchoring Installations per Cartridge* Using Reinforcing 5 Fluid Ounce Cartridge Bar and Threaded Rod with A7 Adhesive in Solid Concrete

REBAR	DRILL HOLE DIA. INCHES	EMBEDMENT DEPTH IN INCHES (mm)			
		2 (50.8)	4 (101.6)	6 (152.4)	8 (203.2)
# 3	7/16	60	30	20	15
# 4	5/8	34	17	11	8
# 5	3/4	26	13	9	6
# 6	7/8	21	10	7	5
# 7	1	19	10	6	5
# 8	1-1/8	16	8	5	4

* The number of anchoring installations is based upon calculations of hole volumes using ANSI tolerance carbide tipped drill bits, the nominal areas of the reinforcing bars and the stress areas of the threaded rods. These estimates do not account for waste.

ROD In (mm)	DRILL HOLE DIA. INCHES	EMBEDMENT DEPTH IN INCHES (mm)			
		2 (50.8)	4 (101.6)	6 (152.4)	8 (203.2)
3/8 (9.5)	7/16	48	24	16	12
1/2 (12.7)	9/16	35	17	12	9
5/8 (15.9)	11/16	25	12	8	6
	3/4	18	9	6	4
3/4 (19.1)	13/16	18	9	6	4
	7/8	14	7	5	4
7/8 (22.2)	15/16	17	8	6	4
	1	12	6	4	3
1 (25.4)	1-1/16	14	7	5	4
	1-1/8	10	5	3	2

PERFORMANCE TABLE

A7 Acrylic Adhesive Average Ultimate Tension and Shear Loads^{1,2,3} for Threaded Rod Installed in Solid Concrete

THREADED ROD DIA. In. (mm)	DRILL HOLE DIAMETER In. (mm)	MAX. CLAMPING FORCE AFTER PROPER CURE Ft.-Lbs. (Nm)	EMBEDMENT IN CONCRETE In. (mm)	2000 PSI (13.8 MPa) CONCRETE		4000 PSI (27.6 MPa) CONCRETE	
				ULTIMATE TENSION Lbs. (kN)	ULTIMATE SHEAR Lbs. (kN)	ULTIMATE TENSION Lbs. (kN)	ULTIMATE SHEAR Lbs. (kN)
3/8 (9.5)	7/16 (11.1)	13 - 18 (17-24)	1-1/2 (38.1)	N/A	N/A	3,734 (16.6)	4,126 (18.3)
			3-3/8 (85.7)	5,852 (26.0)	5,220 (23.2)	10,977 (48.8)	5,220 (23.2)
			4-1/2 (114.3)	7,729 (34.4)	5,220 (23.2)	11,661 (51.9)	5,220 (23.2)
1/2 (12.7)	9/16 (14.3)	22 - 25 (29-33)	2 (50.8)	N/A	N/A	6,022 (26.8)	8,029 (35.7)
			4-1/2 (114.3)	10,798 (48.0)	8,029 (35.7)	17,162 (76.3)	8,029 (35.7)
			6 (152.4)	14,210 (63.2)	8,029 (35.7)	17,372 (77.3)	8,029 (35.7)
5/8 (15.9)	11/16 (17.5) or 3/4 (19.1)	55 - 80 (74-108)	2-1/2 (63.5)	N/A	N/A	7,330 (32.6)	11,256 (50.1)
			5-5/8 (142.9)	16,417 (73.0)	15,967 (71.0)	26,504 (117.9)	15,967 (71.0)
			7-1/2 (190.5)	18,747 (83.4)	15,967 (71.0)	29,381 (130.7)	15,967 (71.0)
3/4 (19.1)	13/16 (20.6) or 7/8 (22.2)	106 - 160 (143-216)	3 (76.2)	N/A	N/A	8,634 (38.4)	20,126 (89.5)
			6-3/4 (171.5)	18,618 (82.8)	20,126 (89.5)	29,727 (132.2)	20,126 (89.5)
			9 (228.6)	23,934 (106.5)	20,126 (89.5)	37,728 (167.8)	20,126 (89.5)
7/8 (22.2)	15/16 (23.8) or 1 (25.4)	185 - 250 (250-338)	3-1/2 (88.9)	N/A	N/A	13,650 (60.7)	20,920 (92.9)
			7-7/8 (200.0)	N/A	29,866 (132.9)	44,915 (199.8)	29,866 (132.9)
			10-1/2 (266.7)	36,881 (164.1)	29,866 (132.9)	48,321 (215.0)	29,866 (132.9)
1 (25.4)	1-1/16 (27.0) or 1-1/8 (28.6)	276 - 330 (374-447)	4 (101.6)	N/A	N/A	16,266 (72.2)	33,152 (147.5)
			9 (228.6)	32,215 (143.3)	37,538 (167.0)	48,209 (214.5)	37,538 (167.0)
			12 (304.8)	46,064 (204.9)	37,538 (167.0)	63,950 (284.5)	37,538 (167.0)
1-1/4 (31.8)	1-5/16 (33.3) or 1-3/8 (34.9)	370 - 660 (501-894)	5 (127.0)	N/A	N/A	21,838 (97.1)	33,152 (147.5)
			11-1/4 (285.8)	45,962 (204.5)	58,412 (259.8)	56,715 (252.3)	58,412 (259.8)
			15 (381.0)	62,208 (276.7)	58,412 (259.8)	84,385 (375.4)	58,412 (259.8)

1 Allowable working loads for the single installations under static loading should not exceed 25% capacity or the allowable load of the anchor rod.

2 Ultimate load values in 2000 and 4000 psi stone aggregate concrete. Ultimate loads are indicated for the embedment shown in the Embedment in Concrete column. Performance values are based on the use of high strength threaded rod (ASTM A193 Gr. B7). The use of lower strength rods will result in lower ultimate tension and shear loads.

3 Linear interpolation may be used for intermediate spacing and edge distances (see pages 13-14).

PERFORMANCE TABLE

A7 Acrylic Adhesive Allowable Tension Loads¹ for Threaded Rod Installed in Solid Concrete

THREADED ROD DIA. In. (mm)	DRILL HOLE DIAMETER In. (mm)	MIN. EMBEDMENT DEPTH In. (mm)	ALLOWABLE TENSION LOAD BASED ON ADHESIVE BOND STRENGTH		ALLOWABLE TENSION LOAD BASED ON STEEL STRENGTH		
			2000 PSI (13.8 MPa) CONCRETE Lbs. (kN)	4000 PSI (27.6 MPa) CONCRETE Lbs. (kN)	ASTM A307 (SAE 1018) Lbs. (kN)	ASTM A193 GR. B7 Lbs. (kN)	ASTM F593 AISI 304 SS Lbs. (kN)
3/8 (9.5)	7/16 (11.1)	1-1/2 (38.1)	N/A	934 (4.2)	2,080 (9.3)	4,340 (19.3)	3,995 (17.8)
		3-3/8 (85.7)	1,460 (6.5)	2,740 (12.2)	2,080 (9.3)	4,340 (19.3)	3,995 (17.8)
		4-1/2 (114.3)	1,930 (8.6)	2,915 (13.0)	2,080 (9.3)	4,340 (19.3)	3,995 (17.8)
1/2 (12.7)	9/16 (14.3)	2 (50.8)	N/A	1,505 (6.7)	3,730 (16.6)	7,780 (34.6)	7,155 (31.8)
		4-1/2 (114.3)	2,700 (12.0)	4,290 (19.1)	3,730 (16.6)	7,780 (34.6)	7,155 (31.8)
		6 (152.4)	3,550 (15.8)	4,340 (19.3)	3,730 (16.6)	7,780 (34.6)	7,155 (31.8)
5/8 (15.9)	11/16 (17.5) or 3/4 (19.1)	2-1/2 (63.5)	N/A	1,832 (8.2)	5,870 (26.1)	12,230 (54.4)	11,250 (50.0)
		5-5/8 (142.9)	4,100 (18.3)	6,625 (29.5)	5,870 (26.1)	12,230 (54.4)	11,250 (50.0)
		7-1/2 (190.5)	4,685 (20.8)	7,345 (32.7)	5,870 (26.1)	12,230 (54.4)	11,250 (50.0)
3/4 (19.1)	13/16 (20.6) or 7/8 (22.2)	3 (76.2)	N/A	2,158 (9.6)	8,490 (37.8)	17,690 (78.7)	14,860 (66.1)
		6-3/4 (171.5)	4,655 (20.7)	7,430 (33.1)	8,490 (37.8)	17,690 (78.7)	14,860 (66.1)
		9 (228.6)	5,980 (26.6)	9,430 (42.0)	8,490 (37.8)	17,690 (78.7)	14,860 (66.1)
7/8 (22.2)	15/16 (23.8) or 1 (25.4)	3-1/2 (88.9)	N/A	3,413 (15.2)	11,600 (51.6)	25,510 (113.5)	20,835 (92.7)
		7-7/8 (200.0)	N/A	11,230 (49.9)	11,600 (51.6)	25,510 (113.5)	20,835 (92.7)
		10-1/2 (266.7)	9,220 (41.0)	12,080 (53.7)	11,600 (51.6)	25,510 (113.5)	20,834 (92.7)
1 (25.4)	1-1/16 (27.0) or 1-1/8 (28.6)	4 (101.6)	N/A	4,067 (18.1)	15,180 (67.5)	31,620 (140.7)	26,560 (118.1)
		9 (228.6)	8,050 (35.8)	12,050 (53.6)	15,180 (67.5)	31,620 (140.7)	26,560 (118.1)
		12 (304.8)	11,515 (51.2)	15,985 (71.1)	15,180 (67.5)	31,620 (140.7)	26,560 (118.1)
1-1/4 (31.8)	1-5/16 (33.3) or 1-3/8 (34.9)	5 (127.0)	N/A	5,460 (24.3)	23,800 (105.9)	49,580 (220.6)	34,670 (154.2)
		11-1/4 (285.8)	11,490 (51.1)	14,175 (63.1)	23,800 (105.9)	49,580 (220.6)	34,670 (154.2)
		15 (381.0)	15,550 (69.2)	21,095 (93.8)	23,800 (105.9)	49,580 (220.6)	34,670 (154.2)

1 Use lower value of either bond or steel strength for allowable tensile load.

PERFORMANCE TABLE

 DRILL HOLE DIAMETERS
 PROVIDED ON PAGES 7-10

A7
Acrylic Adhesive
Allowable Shear Loads¹ for Threaded Rod Installed in Solid Concrete

THREADED ROD DIA. In. (mm)	DRILL HOLE DIAMETER In. (mm)	MIN. EMBEDMENT DEPTH In. (mm)	ALLOWABLE SHEAR LOAD BASED ON CONCRETE STRENGTH		ALLOWABLE SHEAR LOAD BASED ON STEEL STRENGTH		
			2000 PSI (13.8 MPa) CONCRETE Lbs. (kN)	4000 PSI (27.6 MPa) CONCRETE Lbs. (kN)	ASTM A307 (SAE 1018) Lbs. (kN)	ASTM A193 GR. B7 (SAE 4140) Lbs. (kN)	ASTM F593 AISI 304 SS Lbs. (kN)
3/8 (9.5)	7/16 (11.1)	1-1/2 (38.1)	N/A	1,031 (4.6)	1,040 (4.6)	2,170 (9.7)	1,995 (8.9)
		3-3/8 (85.7)	1,305 (5.8)	1,305 (5.8)	1,040 (4.6)	2,170 (9.7)	1,995 (8.9)
1/2 (12.7)	9/16 (14.3)	2 (50.8)	N/A	2,005 (8.9)	1,870 (8.3)	3,895 (17.3)	3,585 (15.9)
		4-1/2 (114.3)	2,005 (8.9)	2,005 (8.9)	1,870 (8.3)	3,895 (17.3)	3,585 (15.9)
5/8 (15.9)	11/16 (17.5) or 3/4 (19.1)	2-1/2 (63.5) 5-5/8 (142.9)	N/A	2,814 (12.5) 3,990 (17.8)	2,940 (13.1) 2,940 (13.1)	6,125 (27.2) 6,125 (27.2)	5,635 (25.1) 5,635 (25.1)
	3/4 (19.1)	13/16 (20.6) or 7/8 (22.2)	3 (76.2) 6-3/4 (171.5)	N/A	5,030 (22.4) 5,030 (22.4)	4,250 (18.9) 4,250 (18.9)	8,855 (39.4) 8,855 (39.4)
7/8 (22.2)		15/16 (23.8) or 1 (25.4)	3-1/2 (88.9) 7-7/8 (200.0)	N/A	5,230 (23.3) 7,465 (33.2)	5,800 (25.8) 5,800 (25.8)	12,760 (56.8) 12,760 (56.8)
	1 (25.4)	1-1/16 (27.0) or 1-1/8 (28.6)	4 (101.6) 9 (228.6)	N/A	8,288 (36.9) 9,385 (41.7)	7,590 (33.8) 7,590 (33.8)	15,810 (70.3) 15,810 (70.3)
1-1/4 (31.8)		1-5/16 (33.3) or 1-3/8 (34.9)	5 (127.0) 11-1/4 (285.8)	N/A	8,288 (36.9) 14,600 (64.9)	11,900 (52.9) 11,900 (52.9)	24,790 (100.3) 24,790 (100.3)

¹Use lower value of either concrete or steel strength for allowable shear load.

PERFORMANCE TABLE
A7
Acrylic Adhesive
Average Ultimate Tension and Shear Loads^{1,2} for Threaded Rod Installed in Grout Filled Concrete Block

THREADED ROD DIA. In. (mm)	DRILL HOLE DIAMETER In. (mm)	EMBEDMENT DEPTH In. (mm)	ANCHOR LOCATION	ULTIMATE TENSION Lbs. (kN)	ULTIMATE SHEAR Lbs. (kN)
1/2 (12.7)	5/8 (15.9)	4-1/4 (108.0)	GROUTED CELL	5,170 (23.0)	8,500 (37.8)
5/8 (15.9)	3/4 (19.1)	5 (127.0)	GROUTED CELL	6,320 (28.1)	10,850 (48.3)
3/4 (19.1)	7/8 (22.2)	6-5/8 (168.3)	GROUTED CELL	10,910 (48.5)	17,075 (76.0)

¹ Allowable working loads for the single installations should not exceed 25% (an industry standard) capacity or the allowable load of the anchor rod. Loads based upon testing with ASTM A193, Grade B7 rods.

² The tabulated values are for anchors installed at minimum 12 inch edge distance and minimum 8 inch spacing.

PERFORMANCE TABLE
A7
Acrylic Adhesive
Average Ultimate Tension and Shear Loads¹ for Threaded Rod Installed in Grouted² Brick Masonry Constructed of Solid Red Brick Units

THREADED ROD DIA. In. (mm)	DRILL HOLE DIAMETER In. (mm)	EMBEDMENT DEPTH In. (mm)	ANCHOR LOCATION	ULTIMATE TENSION Lbs. (kN)	ULTIMATE SHEAR Lbs. (kN)
1/4 (6.4)	3/8 (9.5)	3-1/2 (88.9)	CENTER OF BRICK FACE	2,130 (9.5)	1,165 (5.2)
		6 (152.4)		3,575 (15.9)	1,550 (6.9)
3/8 (9.5)	1/2 (12.7)	3-1/2 (88.9)	CENTER OF BRICK FACE	2,130 (9.5)	4,150 (18.5)
		6 (152.4)		8,875 (39.5)	6,950 (30.9)
1/2 (12.7)	5/8 (15.9)	3-1/2 (88.9)	CENTER OF BRICK FACE	2,130 (9.5)	3,090 (13.7)
		6 (152.4)		12,155 (54.1)	7,910 (35.2)

¹ Allowable working loads for the single installations should not exceed 25% (an industry standard) capacity or the allowable load of the anchor rod. Loads based upon testing with ASTM A193, Grade B7 rods.

² Void between brick wythes was grouted solid; therefore the use of screens was not necessary.

For hollow block, see page 32.

PERFORMANCE TABLE

 DRILL HOLE DIAMETERS
 PROVIDED ON PAGES 7-10

A7 Acrylic Adhesive Average Ultimate Tension Loads^{1,2,3} for Reinforcing Bar Installed in Solid Concrete

REINFORCING BAR DIA. In. (mm)	EMBEDMENT IN CONCRETE In. (mm)	2000 PSI (13.8 MPa) CONCRETE		4000 PSI (27.6 MPa) CONCRETE		ULTIMATE TENSILE AND YIELD STRENGTH GRADE 60 REBAR	
		ULTIMATE TENSION Lbs. (kN)		ULTIMATE TENSION Lbs. (kN)		MINIMUM YIELD STRENGTH Lbs. (kN)	MINIMUM ULTIMATE TENSILE STRENGTH Lbs. (kN)
# 3 (9.5)	3-3/8 (85.7)	6,180 (27.5)	8,324 (37.0)	6,600 (29.4)	9,900 (44.0)		
	4-1/2 (114.3)	7,560 (33.6)	11,418 (50.8)	6,600 (29.4)	9,900 (44.0)		
# 4 (12.7)	4-1/2 (114.3)	9,949 (44.3)	16,657 (74.1)	12,000 (53.4)	18,000 (80.1)		
	6 (152.4)	15,058 (66.9)	17,828 (79.3)	12,000 (53.4)	18,000 (80.1)		
# 5 (15.9)	5-5/8 (142.9)	14,012 (62.3)	20,896 (93.0)	18,600 (82.7)	27,900 (124.1)		
	7-1/2 (190.5)	16,718 (74.4)	26,072 (116.0)	18,600 (82.7)	27,900 (124.1)		
# 6 (19.1)	6-3/4 (171.5)	21,247 (94.5)	26,691 (118.7)	26,400 (117.4)	39,600 (176.2)		
	9 (228.6)	33,325 (148.2)	37,425 (166.5)	26,400 (117.4)	39,600 (176.2)		
# 7 (22.2)	7-7/8 (200.0)	N/A	40,374 (179.6)	36,000 (160.1)	54,000 (240.2)		
	10-1/2 (266.7)	38,975 (173.4)	46,050 (204.8)	36,000 (160.1)	54,000 (240.2)		
# 8 (25.4)	9 (228.6)	35,600 (158.4)	47,311 (210.5)	47,400 (210.9)	71,100 (316.3)		
	12 (304.8)	41,010 (182.4)	66,140 (294.2)	47,400 (210.9)	71,100 (316.3)		
# 9 (28.6)	10-1/8 (257.2)	N/A	57,221 (254.5)	60,000 (266.9)	90,000 (400.4)		
	13-1/2 (342.9)	N/A	79,966 (355.7)	60,000 (266.9)	90,000 (400.4)		
# 10 (31.8)	11-1/4 (285.8)	49,045 (218.2)	73,091 (325.1)	76,200 (339.0)	114,300 (508.5)		
	15 (381.0)	69,079 (307.3)	83,295 (370.5)	76,200 (339.0)	114,300 (508.5)		
# 11 (34.9)	12-3/8 (314.3)	63,397 (282.0)	75,047 (333.8)	93,600 (416.4)	140,400 (624.6)		
	16-1/2 (419.1)	81,707 (363.5)	91,989 (409.2)	93,600 (416.4)	140,400 (624.6)		

1 Allowable working loads for the single installations under static loading should not exceed 25% capacity or the allowable load of the anchor rod.

2 Ultimate load values in 2000 and 4000 psi stone aggregate concrete. Ultimate loads are indicated for the embedment shown in the Embedment in Concrete column. Performance values are based on the use of minimum Grade 60 reinforcing bar. The use of lower strength rods will result in lower ultimate tension loads.

3 SHEAR DATA: Provided the distance from the rebar to the edge of the concrete member exceeds 1.25 times the embedment depth of the rebar, calculate the ultimate shear load for the rebar anchorage as 60% of the ultimate tensile strength of the rebar.

A7 Acrylic Adhesive Recommended Edge Distance Requirements for Shear Loads Installed in Solid Concrete

ANCHOR DIAMETER In. (mm)	EMBEDMENT DEPTH In. (mm)	CRITICAL EDGE DISTANCE In. (mm)		INTERPOLATED EDGE DISTANCE In. (mm)		INTERPOLATED EDGE DISTANCE In. (mm)		MINIMUM EDGE DISTANCE In. (mm)	
		100% LOAD CAPACITY		(80% LOAD CAPACITY)		(50% LOAD CAPACITY)		(10% LOAD CAPACITY)	
3/8 (9.5)	3-3/8 (85.7)	4-3/16 (106.4)	3-7/16 (87.3)	2-5/16 (58.7)	13/16 (20.6)				
1/2 (12.7)	4-1/2 (114.3)	5-5/8 (142.9)	4-5/8 (117.5)	3-1/8 (79.4)	1-1/8 (28.6)				
5/8 (15.9)	5-5/8 (142.9)	7 (177.8)	5-3/4 (146.1)	3-1/8 (79.4)	1-3/8 (34.9)				
3/4 (19.1)	6-3/4 (171.5)	8-7/16 (214.2)	6-15/16 (176.2)	4-5/8 (117.5)	1-5/8 (41.3)				
1 (25.4)	9 (228.6)	11-1/4 (285.8)	9-1/4 (235.0)	6-1/4 (158.8)	2-1/4 (57.2)				
1-1/4 (31.8)	11-1/4 (285.8)	14-1/16 (357.2)	11-5/8 (295.3)	7-7/8 (200.0)	2-7/8 (73.0)				

Combined Tension and Shear Loading—for A7 Adhesive Anchors

Allowable loads for anchors under tension and shear loading at the same time (combined loading) will be lower than the allowable loads for anchors subjected to 100% tension or 100% shear. Use the following equation to evaluate anchors in combined loading conditions:

$$\left(\frac{N_a}{N_s}\right)^{5/3} + \left(\frac{V_a}{V_s}\right)^{5/3} \leq 1$$

 N_a = Applied Service Tension Load

 N_s = Allowable Tension Load

 V_a = Applied Service Shear Load

 V_s = Allowable Shear Load

PERFORMANCE TABLE

A7 Recommended Edge Distance Requirements for Acrylic Adhesive Tension Loads Installed in Solid Concrete

ANCHOR DIAMETER In. (mm)	EMBEDMENT DEPTH In. (mm)	CRITICAL EDGE DISTANCE In. (mm) (100% LOAD CAPACITY)	INTERPOLATED EDGE DISTANCE In. (mm) (90% LOAD CAPACITY)	INTERPOLATED EDGE DISTANCE In. (mm) (80% LOAD CAPACITY)	MINIMUM EDGE DISTANCE In. (mm) (70% LOAD CAPACITY)
3/8 (9.5)	3-3/8 (85.7) 4-1/2 (114.3)	2-1/2 (63.5) 3-3/8 (85.7)	1-15/16 (49.2) 2-5/8 (66.7)	1-3/8 (34.9) 1-7/8 (47.6)	13/16 (26.2) 1-1/8 (28.6)
1/2 (12.7)	4-1/2 (114.3) 6 (152.4)	3-3/8 (85.7) 4-1/2 (114.3)	2-5/8 (66.7) 3-1/2 (88.9)	1-7/8 (47.6) 2-1/2 (63.5)	1-1/8 (28.6) 1-1/2 (38.1)
5/8 (15.9)	5-5/8 (142.9) 7-1/2 (190.5)	4-3/16 (106.4) 5-5/8 (142.9)	3-1/4 (82.6) 4-3/8 (111.1)	2-5/16 (58.7) 3-1/8 (79.4)	1-3/8 (34.9) 1-7/8 (47.6)
3/4 (19.1)	6-3/4 (171.5) 9 (228.6)	5-1/16 (128.6) 6-3/4 (171.5)	3-15/16 (100.0) 5-1/4 (133.4)	2-13/16 (71.4) 3-3/4 (95.3)	1-5/8 (15.9) 2-1/4 (57.2)
1 (25.4)	9 (228.6) 12 (304.8)	6-3/4 (171.5) 9 (228.6)	5-1/4 (133.4) 7 (177.8)	3-3/4 (95.3) 5 (127.0)	2-1/4 (57.2) 3 (76.2)
1-1/4 (31.8)	11-1/4 (285.8) 15 (381.0)	8-7/16 (214.3) 11-1/4 (285.8)	6-9/16 (166.7) 8-3/4 (222.2)	4-3/4 (120.7) 6-1/4 (158.8)	2-7/8 (73.0) 3-3/4 (95.3)

A7 Recommended Spacing Requirements for Tension Loads Installed in Concrete, Lightweight Concrete and Hollow Block

ANCHOR DIAMETER In. (mm)	EMBEDMENT DEPTH In. (mm)	CRITICAL SPACING In. (mm) (100% LOAD CAPACITY)	INTERPOLATED SPACING In. (mm) (90% LOAD CAPACITY)	MINIMUM SPACING In. (mm) (80% LOAD CAPACITY)
3/8 (9.5)	3-3/8 (85.7) 4-1/2 (114.3)	4-3/16 (106.4) 5-5/8 (142.9)	2-1/2 (63.5) 3-3/8 (85.7)	13/16 (20.6) 1-1/8 (28.6)
1/2 (12.7)	4-1/2 (114.3) 6 (152.4)	5-5/8 (142.9) 7-1/2 (190.5)	3-3/8 (85.7) 4-1/2 (114.3)	1-1/8 (28.6) 1-1/2 (38.1)
5/8 (15.9)	5-5/8 (142.9) 7-1/2 (190.5)	7 (177.8) 9-3/8 (238.1)	4-3/16 (106.4) 5-5/8 (142.9)	1-3/8 (34.9) 1-7/8 (47.6)
3/4 (19.1)	6-3/4 (171.5) 9 (228.6)	8-7/16 (214.3) 11-1/4 (285.8)	5 (127.0) 6-3/4 (171.5)	1-5/8 (41.3) 2-1/4 (57.2)
1 (25.4)	9 (228.6) 12 (304.8)	11-1/4 (285.8) 15 (381.0)	6-3/4 (171.5) 9 (228.6)	2-1/4 (57.2) 3 (76.2)
1-1/4 (31.8)	11-1/4 (285.8) 15 (381.0)	14-1/16 (357.2) 18-3/4 (476.3)	8-1/2 (215.9) 11-1/4 (285.8)	2-7/8 (73.0) 3-3/4 (95.5)

A7 Adhesive Edge/Spacing Distance Load Factor Summary for Installation of Threaded Rod and Reinforcing Bar^{1,2}

LOAD FACTOR	DISTANCE FROM EDGE OF CONCRETE
Critical Edge Distance—Tension	
100% Tension Load	→ 0.75 x Anchor Embedment
Minimum Edge Distance—Tension	
70% Tension Load	→ 0.25 x Anchor Embedment
Critical Edge Distance—Shear	
100% Shear Load	→ 1.25 x Anchor Embedment
Minimum Edge Distance—Shear	
10% Shear Load	→ 0.25 x Anchor Embedment
LOAD FACTOR	DISTANCE FROM ANOTHER ANCHOR
Critical Spacing—Tension	
100% Tension Load	→ 1.25 x Anchor Embedment
Minimum Spacing—Tension	
80% Tension Load	→ 0.25 x Anchor Embedment
Critical Spacing—Shear	
100% Shear Load	→ 1.25 x Anchor Embedment
Minimum Spacing—Shear	
25% Shear Load	→ 0.25 x Anchor Embedment

1 Use linear interpolation for load factors at edge distances or spacing distances between critical and minimum.

2 Anchors are affected by multiple combination of spacing and/or edge distance loading and direction of the loading. Use the product of tension and shear loading factors in design.

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5 ENCLOSURES

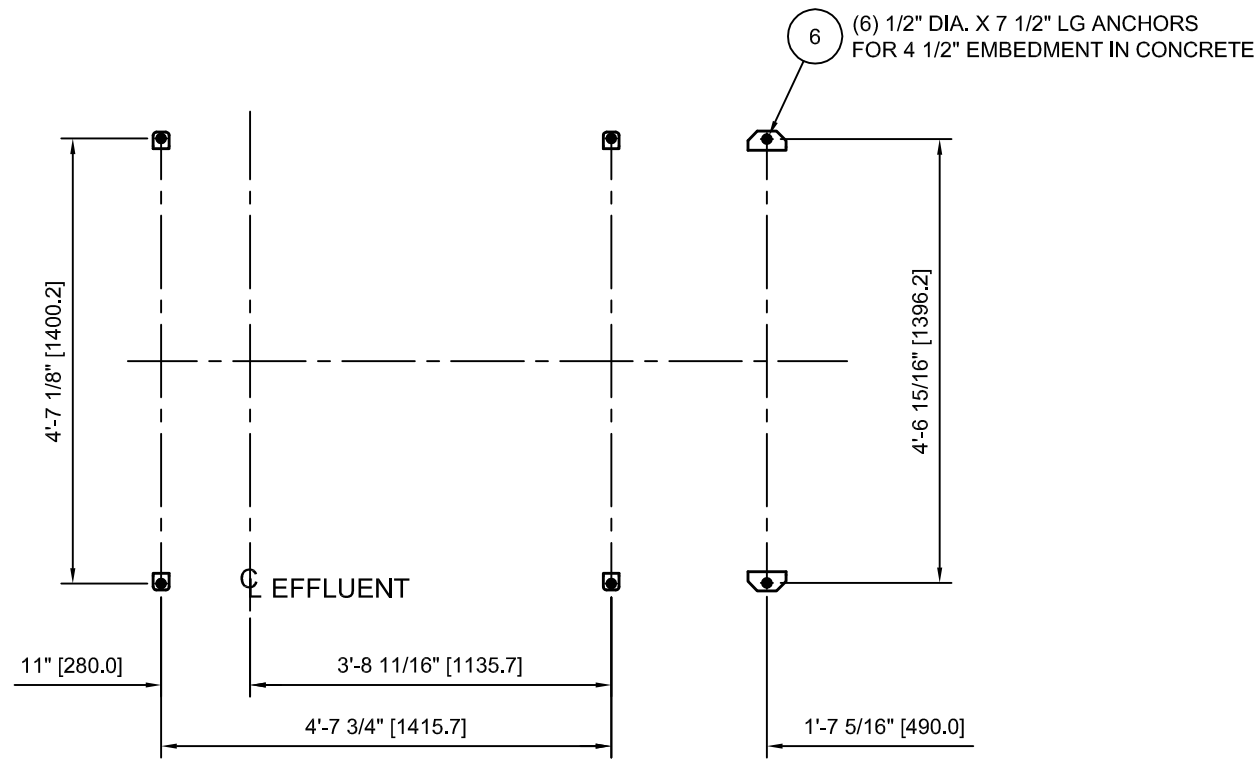
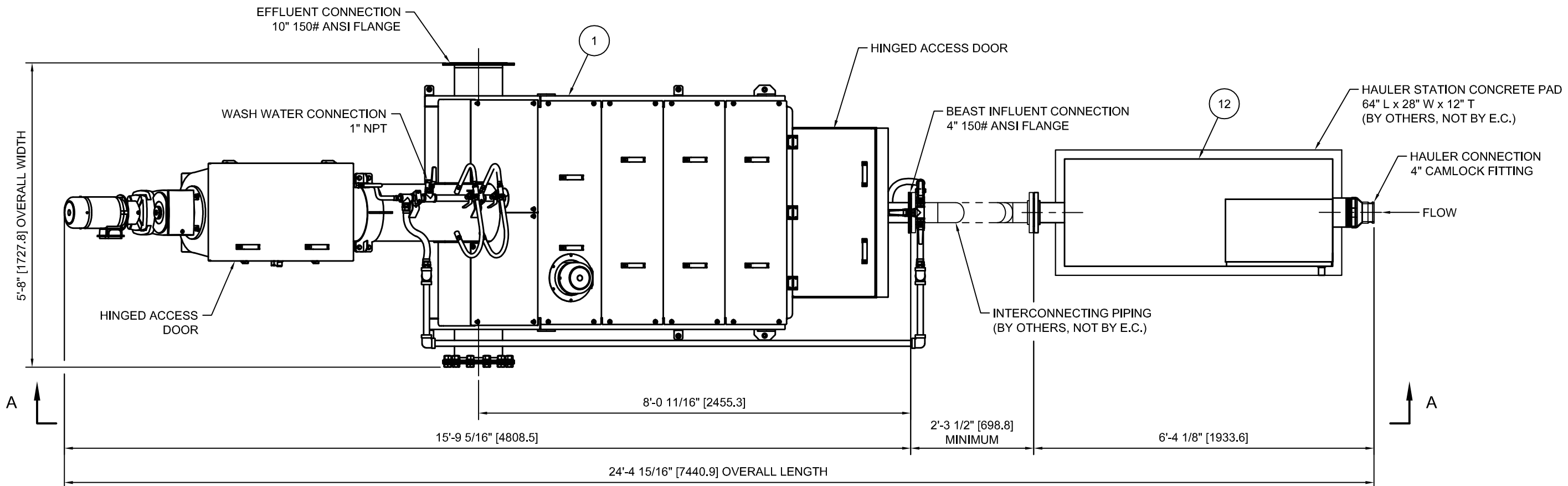


Job Number: WEC213223			
Job Name: Devonshire, Island of Bermuda			
Revision: 0			
Approval Date:	Approved By	Created By	SO12

Line	Part Number	Part Name	Revision	Quantity	Unit of Measure	Material	Notes
1	WEC213223A-1	BEAST Flo-Septage Receiving Station DM		1	EA	316SS	Main Unit
2	RED-SK9016.1AF-N140TC	Reducer, Drum - NORD, Ratio 26.29:1		1	EA	Cast Iron	ordered w Main Unit
3	RED-SK4282AF-N140TC	Reducer, Auger - NORD, Ratio 90.52:1		1	EA	Cast Iron	ordered w Main Unit
4	MTR-EPV0024C	Motor - TECO, 2HP, 4 POLE, 230/460V, 60HZ		2	EA	Cast Iron	Same motor, drum & auger, Frame size 145TC
5	BHH316-050C0100	1/2" capscrew x 1" LG		8	EA	316SS	
6	EPO316-050C0750	Anchor rod, 1/2" x 7 1/2" LG		4	EA	316SS	Epoxy and applicator by others, not by EC
7	SV-8210G94	Solenoid valve, ASCO, 1/2", 120VAC		1	EA	BRS	
8	SV-8210G54	Solenoid valve, ASCO, 1", 120VAC		2	EA	BRS	
9	MCS-FR693-D	Motor Cutout Switch, Pizzato		1	EA	RESIN	ordered w Main Unit
10	LS-3H1B2	Conductivity probe, Warrick		3	EA	316SS	
11	WEC213223-CP01	Control panel, 480/3/60, NEMA 4X		1	EA	316SS	
12	WEC213223-CP02/03/04	Hauler Station Assembly		1	EA	316SS	
							No Spares included

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Q:\Projects-EC Active\WEC213223 Devonshire, Island of Bermuda\7 Product Drawings\Submittal Drawings\WEC213223-100



NOTES:

- MOTORS:
 DRUM: 2 HP, 230/460 VOLT, 3 PHASE, 60 HZ
 AUGER: 2 HP, 230/460 VOLT, 3 PHASE, 60 HZ
 MOTORS MAY SHIP LOOSE. BOLTS WILL BE SUPPLIED BY ENVIRO-CARE, TO ATTACH MOTOR TO GEAR REDUCER.
- ITEM # 10: CONTROL PANEL, 480V/3PH/60HZ. PH ANALYZER SHIPPED W/ CONTROL PANEL. INSTALLATION LOCATIONS OF CONTROL PANEL & PH ANALYZER PER OWNERS INSTRUCTIONS.
- WEIGHTS:
 SCREEN - 3,500 LBS (1,580 KG)
 HAULER STATION - 1,200 LBS (545 KG)
- WATER REQUIREMENTS: 40 GPM @ 70-120 PSI (2.5 L/S @ 5-8 BAR)
- ALL INTERCONNECTING PIPING AND WIRING BY OTHERS, NOT BY ENVIRO-CARE.
- ITEMS # 2 & 11 NOT SHOWN, REFER TO PARTS LIST FOR DESCRIPTION AND QUANTITIES.
- ALL DIMENSIONS ARE IN INCHES [MM].

PROCESS DESIGN INFORMATION:

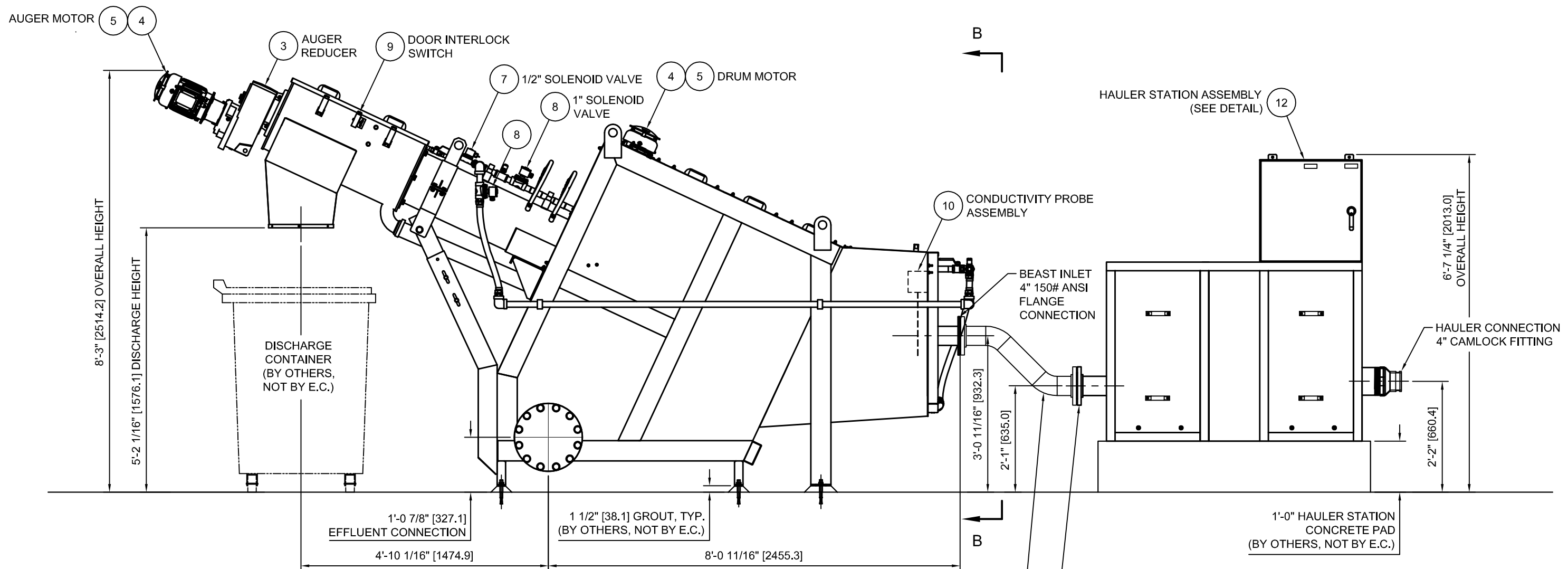
APPLICATION:	SEPTAGE SCREENING
PEAK DESIGN FLOW:	525 GPM (41 L/S)
SCREEN INCLINE:	25 DEGREES FROM HORIZONTAL
PERFORATION SIZE:	6 MM

A WAMGROUP Company			
TITLE: GENERAL ARRANGEMENT DRAWING DEVONSHIRE, ISLAND OF BERMUDA FLO-SEPTAGE STATION DM FSR-1200 DM			
DRAWING BY	CHECKED BY	B SIZE SCALE	DATE
CK09	SO12	1/2" = 1'-0"	2015-06-12
PROJECT NUMBER	DRAWING NUMBER	SHEET	REV
WEC213223	WEC213223-100	1 OF 3	0

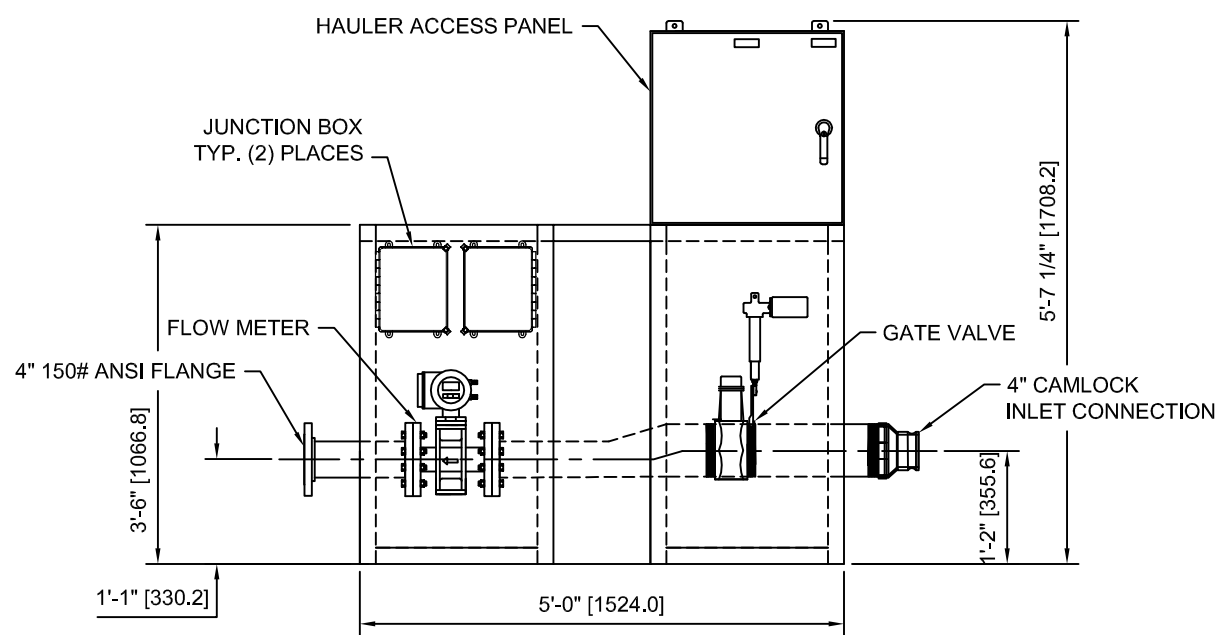
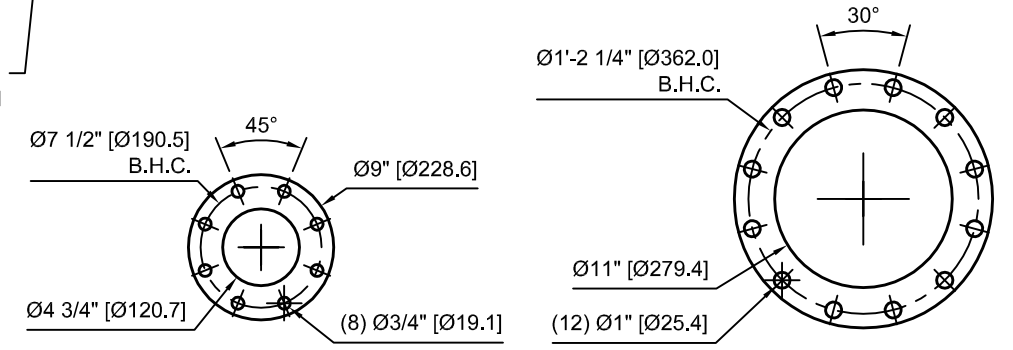
REV	REVISION DESCRIPTION	REVISION BY	APPROVED BY	DATE

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SECTION A - A



HAULER STATION DETAIL

REV	REVISION DESCRIPTION	REVISION BY	APPROVED BY	DATE

Enviro-Care
A WAMGROUP Company

THIRD ANGLE PROJECTION



TITLE
 GENERAL ARRANGEMENT DRAWING
 DEVONSHIRE, ISLAND OF BERMUDA
 FLO-SEPTAGE STATION DM
 FSR-1200 DM

DRAWING BY CK09	CHECKED BY SO12	B SIZE SCALE 1/2" = 1'-0"	DATE 2015-06-12
PROJECT NUMBER WEC213223	DRAWING NUMBER WEC213223-100	SHEET 2 OF 3	REV 0

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1. ENVIRO-CARE RESERVES PROPRIETARY RIGHTS TO THIS DRAWING AND THE DATA SHOWN THEREON, WHICH IS SUBMITTED IN CONFIDENCE.
2. IF APPLICABLE, A STAR DENOTES VARIANCE FROM CONTRACT DOCUMENTS AND SHOULD BE PARTICULARLY NOTED.
3. IF APPLICABLE, A CLOUD DENOTES DIMENSIONS WHICH ARE CRITICAL TO THE DESIGN OF THE EQUIPMENT, BUT NOT CLEAR AND/OR NOT PROVIDED IN THE CONTRACT DOCUMENTS.
4. THE FOLLOWING DEFINES THE RESPONSIBILITY OF ENVIRO-CARE WITH REGARD TO THE INFORMATION SHOWN ON THIS DRAWING.
 - A. THIS DRAWING IS NOT TO BE USED FOR CONSTRUCTION OR INSTALLATION PURPOSES UNTIL IT HAS BEEN APPROVED BY THE OWNER, THE ENGINEER OR AN AUTHORIZED REPRESENTATIVE.
 - B. DIMENSIONS, WEIGHTS, AND OTHER INFORMATION ARE PROVIDED TO ACCOMMODATE THE STRUCTURE TO THE EQUIPMENT AS SHOWN.
 - C. ENVIRO-CARE IS NOT RESPONSIBLE FOR ANY CONCRETE STRUCTURE DESIGN. THE ENGINEER IS TO DETERMINE SIZES TO SUIT LOCAL REQUIREMENTS.
 - D. ENVIRO-CARE IS NOT RESPONSIBLE FOR DAMAGE, INJURY OR LOSS RESULTING FROM USE OF THE SUPPLIED EQUIPMENT.
 - E. CHARGES FOR MODIFICATIONS OR ADDITIONS TO THE EQUIPMENT WILL NOT BE ACCEPTED BY ENVIRO-CARE, UNLESS PRIOR APPROVAL HAS BEEN OBTAINED IN WRITING FROM AN AUTHORIZED ENVIRO-CARE REPRESENTATIVE.
4. ALL CONCRETE, GROUT, CONCRETE REINFORCING, SLIDE GATES, PIPING, VALVES, PIPE SUPPORTS OR FITTINGS, WALL BRACKETS, ELECTRICAL WIRING, CONDUIT, OR ELECTRICAL EQUIPMENT, ERECTION, FIELD PAINTING OR PAINT, FIELD WELDING OR WELD ROD, GREASE, OR LUBRICATING OIL, EXCEPT AS SPECIFICALLY NOTED IS TO BE BY OTHERS, NOT BY ENVIRO-CARE.
5. ALL ONSITE WELDING MUST CONFORM TO THE LATEST STANDARDS OF THE AMERICAN WELDING SOCIETY.
6. UNIT ANCHORAGE DESIGNED AROUND RED HEAD A7 EXPANSION ANCHOR SYSTEM. ANCHORS SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.
7. ANCHOR DIMENSIONS SHOWN ARE PROVIDED FOR REFERENCE ONLY. USE SUPPORTS & BRACKETS AS TEMPLATE TO LOCATE ANCHOR BOLT LOCATIONS.
8. SEE PARTS LIST FOR ITEM IDENTIFICATION.

REV	REVISION DESCRIPTION	REVISION BY	APPROVED BY	DATE

			
<small>PROPERTY OF ENVIRO-CARE COMPANY. ALL RIGHTS RESERVED. NO PART OF THIS DRAWING MAY BE REPRODUCED IN ANY FORM WITHOUT WRITTEN PERMISSION FROM ENVIRO-CARE. ENVIRO-CARE COMPANY RESERVES THE RIGHT TO ALTER DATA OR THE DESIGN OF ITS EQUIPMENT AT ANY TIME WITHOUT PRIOR NOTICE AND WITHOUT ANY OBLIGATION WHATSOEVER.</small>			
TITLE GENERAL ARRANGEMENT DRAWING DEVONSHIRE, ISLAND OF BERMUDA FLO-SEPTAGE STATION DM FSR-1200 DM			
DRAWING BY	CHECKED BY	B SIZE SCALE	DATE
CK09	SO12	NONE	2015-06-12
PROJECT NUMBER	DRAWING NUMBER	SHEET	REV
WEC213223	WEC213223-100	3 OF 3	0

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Item	Component	Description	Manufacturer Part Number	QTY	Device
Beast - Septage Receiving Control Panel (Quantity: 1)					
1	00-000-000	Wire, Hardware, Wire labels, etc.	EleMech: Miscellaneous	2	
2	10-069-000	Wireway Duct Cover, 1.5"W, 6 Ft. Section, w/Panduit F Series	Panduit: C1.5WH6	6	
3	10-069-001	Wireway Duct Cover, 1"W, 6 Ft. Section, w/Panduit F Series	Panduit: C1WH6	6	
4	10-069-005	Wireway Duct, 1.5"Wx3"H, 6 Foot Section	Panduit: F1.5X3WH6	6	
5	10-069-007	Wireway Duct, 1"Wx3"H, 6 Foot Section	Panduit: F1X3WH6	6	
6	25-000-A001	Legendplate Assembly, Yellow E-Stop, Standard Encl.	EleMech: 25-000-A001 Assembly	1	
7	25-000-A002	Legendplate Assembly, White, Black Text, Standard Encl.	EleMech: 25-000-A002 Assembly	14	
8	25-000-A019	Nameplate Assembly, White: Power Supply - 3/60/480VAC	EleMech: 25-000-A019 Assembly	1	
9	42-063-007	Terminal Block, Din Rail, 35MM Wide, 15 High, 2 Meters Long	iboco: Omega 3 AF	1	
10	52-000-003	Label, Underwriters Laboratories 698A, w/Decal Set	EleMech: 698A	1	
11	18-000-002	Steel Barrier, 14 Ga., White Finish, 0.5"Wx10.0"x6.0"D	EleMech: 18-000-002	1	BAR1
12	03-056-067	Circuit Breaker, 3 Pole, 480VAC, 8A, 10kA, UL489, Type D	Siemens: 5SJ4308-8HG42	2	CB1,2
13	03-056-050	Circuit Breaker, 2 Pole, 480VAC, 8A, 10kA, UL489, Type D	Siemens: 5SJ4208-8HG42	1	CB3
14	03-056-039	Circuit Breaker, 1 Pole, 240VAC, 16A, 14kA, UL489, Type C	Siemens: 5SJ4116-7HG40	1	CB4
15	03-056-029	Circuit Breaker, 1 Pole, 240VAC, 8A, 14kA, UL489, Type C	Siemens: 5SJ4108-7HG40	2	CB5,7
16	03-056-030	Circuit Breaker, 1 Pole, 240VAC, 10A, 14kA, UL489, Type C	Siemens: 5SJ4110-7HG40	1	CB6
17	57-005-000	Cable, Comm., PC DB9 to PLC 8 Pin Mini-Din, 6.5 Ft.	Allen-Bradley: 1761-CBL-PM02	1	CBL1
18	57-009-008	Cable, Comm., Ethernet, Cat. 5, 600V,4 PAIR, 24AWG, 6.6 FT	Belden: E505002-010S1	1	CBL2
19	04-094-000	Current Monitor, Selectable, SPST, 120V ,2-100A, w/Delay	Gavazzi: DIB01CM24100A	2	CM1,2
20	06-058-012	Control Relay, Bus Jumper, 2-Pole, w/Telemec. RXM Relay	Square D: RXZ S2	9	CR1-10
21	06-058-014	Control Relay, 4PDT,120VAC, 14Pin Spade, Indicator, Operator	Square D: RXM4AB2F7	10	CR1-10
22	38-058-004	Socket, 14 Pin Spade, Din, Screw Term., 3Tier, 250V w/4-Pole	Square D: RXZE2S114M	10	CR1-10
23	07-063-000	Distribution Block, End Cover, 4 Pole, 300V,10A, w/WK4E\VB	Wieland: 07.311.4053.1	1	DB1
24	07-063-001	Distribution Block, Jumper, 4 Pole, 300V,10A, w/WK4E\VB	Wieland: Z7.210.3427	3	DB1
25	07-063-002	Distribution Block, Single Pole, 10A, 300V, WK4E\VB	Wieland: 57.404.6955.1	13	DB1
26	42-063-004	Terminal Block, Ground, 30A, 600V, 6MM Wide, w/WK4/U	Wieland: 57.504.9055.0	6	DB1,TB1
27	09-001-A010	Disconnect Assembly, Non-Fused, 60 Amp, NEMA 4X, 8-10" Depth	ABB: OT63F3 Assembly	1	DS1
28	11-000-A001	Wind Kit, Alum/Hinge, Wing Knob w/out Frame, 12"H x 12"W	EleMech: 11-000-A001	1	EN1
29	11-035-139	Sub-Panel, Painted Steel, w/42"Hx30"W C. Hinge Encl	Hoffman: A-42P30	1	EN1

Item	Component	Description	Manufacturer Part Number	QTY	Device
30	11-035-235	Enclosure, Nema 4X, 316SS, 42"Hx30"Wx10"D, C. Hinge	Hoffman: A-42H3010SS6LP	1	EN1
31	15-011-000	Ground Lug	Blackburn: L70	2	GND
32	17-451-001	Heater, Silicone, Flat, 120VAC, 150 Watt, w/12" Lead, UL/CSA	Tempco: SHS80708	1	HTR1
33	52-137-003	Label, Caution: Heater Element, 1.5"Wx0.75"H, White/Red	Nameplate Tech: 52-137-003	1	HTR1
34	06-058-024	Control Relay, SPDT,120VAC, 5Pin Spade, Operator, 15A	Square D: RPM12F7	10	IR1-10
35	06-058-027	Control Relay Retension Clip, w/Telemec. RPM 1-Pole Relay	Square D: RPZR235	10	IR1-10
36	38-058-009	Socket, 5 Pin Spade, Din Mount, Screw Term., w/ RPM 1-Pole	Square D: RPZF1	10	IR1-10
37	52-137-002	Label, Multiple Supply Sources, Warning, 2.5"Wx1.5"H, Yellow	Nameplate Tech: 52-137-002	1	LBL1
38	52-137-000	Label, High Voltage, Danger, 2.25"Wx4.0"H, White/Black/Red	Nameplate Tech: 52-137-000	1	LBL2
39	100-237-001	Probe Sensor, 120VAC, 1NO/1NC, 10K Ohm, Open Type	Gems Sensors: 27A1E0	2	LR1,2
40	32-005-046	Lens, Pilot Light, White, NEMA 4X, Standard, w/A-B 800H	Allen-Bradley: 800T-N26W	1	LT1
41	32-005-048	Pilot light, NEMA 4X, 120VAC, Transformer, No Lens	Allen-Bradley: 800H-PR16	6	LT1-6
42	32-005-044	Lens, Pilot Light, Green, NEMA 4X, Standard, w/A-B 800H	Allen-Bradley: 800T-N26G	2	LT2,4
43	32-005-045	Lens, Pilot Light, Red, NEMA 4X, Standard, w/A-B 800H	Allen-Bradley: 800T-N26R	2	LT3,5
44	32-005-042	Lens, Pilot Light, Amber, NEMA 4X, Standard, w/A-B 800H	Allen-Bradley: 800T-N26A	1	LT6
45	22-005-010	Aux. Contact, Top mounted, 3NO/1NC, w/A-B 100C/104C	Allen-Bradley: 100-FA31	4	M1,2-F/R
46	22-005-012	Contact, 3PH, Reversing, 9 Amp, 1NO Aux., 120VAC Coil	Allen-Bradley: 104-C09D22	2	M1,2-F/R
47	25-000-A010	Nameplate Assembly, White, Black Text, 1"Hx3"W	EleMech: 25-000-A010 Assembly	3	NP1,2,4
48	25-000-A048	Nameplate Assem., Yellow: Intrinsic. Safe Circuits:Gem144600	EleMech: 25-000-A048 Assembly	1	NP3
49	26-005-054	OIU, PV C400, NEMA 4X Indoor, 24VDC, Color, Touch, Ethernet	Allen-Bradley: 2711C-T4T	1	OIU1
50	EVC-292-P002	Program, OIU, Panelview C400, Standard	EleMech: EVC-292-P002	1	OIU1
51	28-005-037	Overload Relay, 3PH, Adj Class, 1.0-5.0A, w/100-C09...C23	Allen-Bradley: 193-EECB	2	OL1,2
52	29-005-010	Pushbutton E-Stop, NEMA 4X, Oper+1NCLB, Twist Rel. Red Head	Allen-Bradley: 800H-FRXT6D4	1	PB1
53	02-005-000	Contact Block, 1NO/1NC, w/A-B 800 Series	Allen-Bradley: 800T-XA	1	PB2
54	29-005-037	Pushbutton, NEMA 4X, Oper+1NC, Flush Head, Black	Allen-Bradley: 800H-AR2D2	1	PB2
55	33-005-154	MicroLogix 1400, 20-120V In, 12-Rly Out, 2-232, Eth, 120VAC	Allen-Bradley: 1766-L32AWA	1	PLC1
56	EVC-292-P001	Program, PLC, MicroLogix 1400, Standard	EleMech: EVC-292-P001	1	PLC1
57	37-323-000	Power Supply, 60W, 100-240VAC 1.5A In, 24VDC 2.5A Out	Delta: DRP024V060W1AZ	1	PS1
58	88-001-000	Soft Starter, 3PH, Non-Rev., 3.9A, 208-600V	ABB: PSR3-600-70	1	SMS1
59	39-005-009	Selector Switch, NEMA 4X, 3 Pos. Maintained, 1NO-1NC	Allen-Bradley: 800H-JR2A	5	SS1,3,5,6,

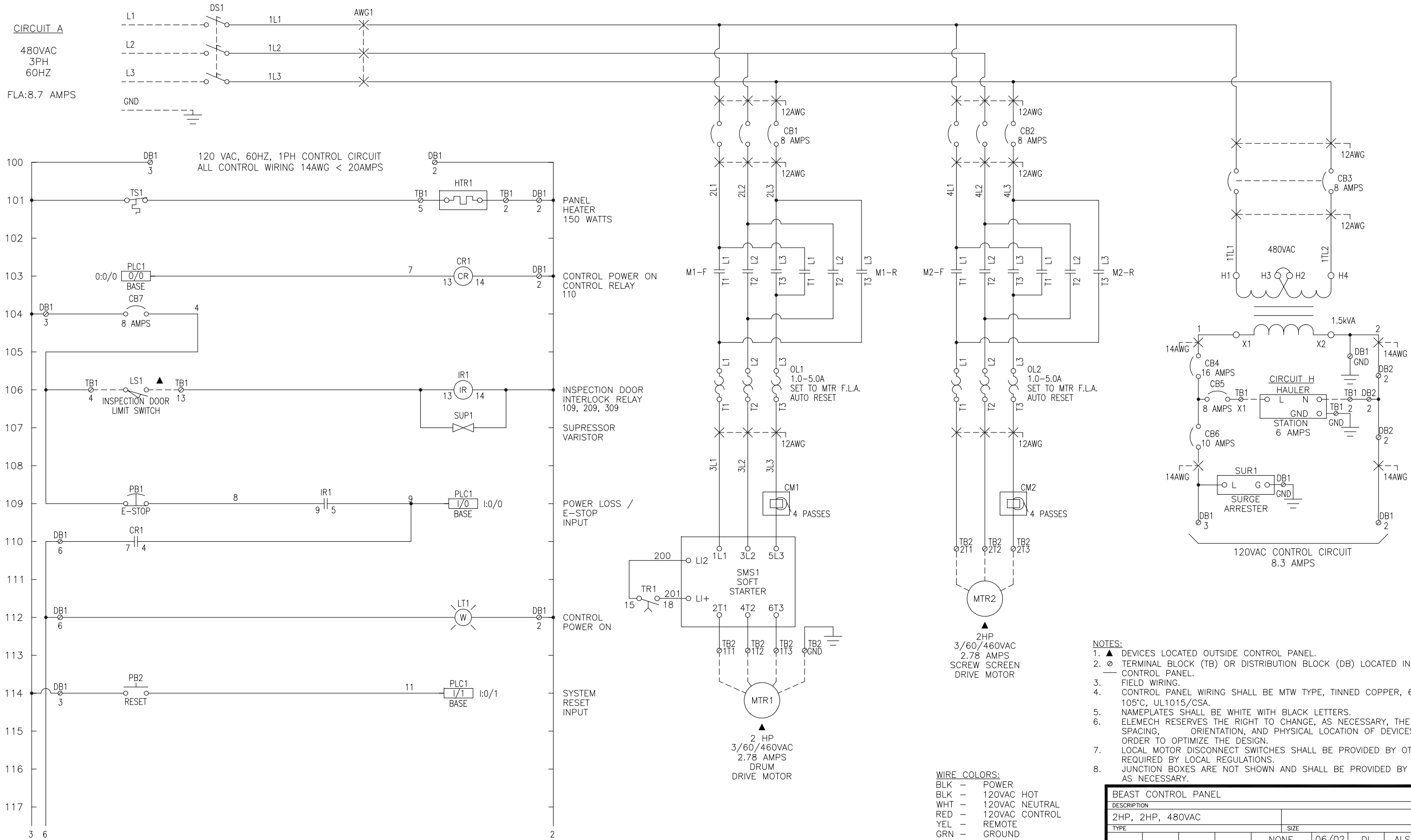
Item	Component	Description	Manufacturer Part Number	QTY	Device
60	39-005-011	Selector Switch, Nema 4X, 3 Pos. Spring Fr. Right, 1NO-1NC	Allen-Bradley: 800H-JR5A	2	SS2,4
61	40-012-001	Surge Suppressor, 1 Pole, 120VAC, 200kA SCCR, DIN	Bussman: BSPM1120S2G	1	SUR1
62	33-098-002	Ethernet Switch, 5TX, 9-32VDC, RJ45, 5 Port, 10/100	Phoenix: 2891152	1	SW1
63	41-018-A042	Transformer Assembly, 480/240-120VAC, 1.5KVA, NEMA 3R, 316SS	Cutler-Hammer: S20N11P16PS6 Assen	1	T1
64	42-063-009	Terminal Block, End Clamp, w/WKN10/U	Wieland: Z5.522.8553	10	TB,DB
65	42-063-008	Terminal Block, Labels, Blank, w/WK4/U-(600 tags per box)	Wieland: Z4.242.6353	22	TB1
66	42-063-015	Terminal Block, Jumper, w/WK4/U, 02 pole, Insulated	Wieland: Z7.281.1227	3	TB1
67	42-063-001	Terminal Block, End Plate, Beige, w/WK4/U	Wieland: 07.311.0155.0	3	TB1-3
68	42-063-003	Terminal Block, Single Pole, 30A, 600V, 6MM Wide, WK4/U	Wieland: 57.504.0055.0	51	TB1-3
69	42-063-000	Terminal Block, Labels, Custom Printed, w/WK4/U	Wieland: 04.242.6353-CUSTOM	106	TB1-3,DB
70	46-034-000	Thermostat, for heater control, N.C.contact, 6 amp,30-140 F.	Stego: 01140.9-00	1	TS1
Hauler Station Control Components (Quantity: 1)					
71	03-056-026	Circuit Breaker, 1 Pole, 240VAC, 4A, 14kA, UL489, Type C	Siemens: 5SJ4104-7HG40	1	CB1
72	11-008-A000	Enclosure Drain Breather, 1/2"NPT, Assembly	Appleton: ECDB50B Assembly	1	DRN1
73	11-000-083	Enclosure, OICP, NEMA 4X, 316SS, 24"Hx24"Wx14"D, C. Hinge	EleMech: ELE-24EL2414SS6LP	1	EN1
74	60-203-000	Flowmeter, Flowtube/Trans, 4", NEMA 4X, 120VAC, C1D2	Endress & Hauser: 53W1H-ULOB1R10E	1	FM1
75	06-058-027	Control Relay Retension Clip, w/Telemec. RPM 1-Pole Relay	Square D: RPZR235	4	IR1-4
76	06-058-028	Control Relay, SPDT, 24VDC, 5Pin Spade, Operator, 15A	Square D: RPM12BD	4	IR1-4
77	38-058-009	Socket, 5 Pin Spade, Din Mount, Screw Term., w/ RPM 1-Pole	Square D: RPZF1	4	IR1-4
78	42-063-000	Terminal Block, Labels, Custom Printed, w/WK4/U	Wieland: 04.242.6353-CUSTOM	30	TB
79	42-063-003	Terminal Block, Single Pole, 30A, 600V, 6MM Wide, WK4/U	Wieland: 57.504.0055.0	13	TB
80	42-063-004	Terminal Block, Ground, 30A, 600V, 6MM Wide, w/WK4/U	Wieland: 57.504.9055.0	2	TB
Hauler Station Control Panel, Standard Parts, See Notes (Quantity: 1)					
81	00-000-000	Wire, Hardware, Wire labels, etc.	EleMech: Miscellaneous	1	
82	10-069-001	Wireway Duct Cover, 1"W, 6 Ft. Section, w/Panduit F Series	Panduit: C1WH6	6	
83	10-069-007	Wireway Duct, 1"Wx3"H, 6 Foot Section	Panduit: F1X3WH6	6	
84	25-000-A002	Legendplate Assembly, White, Black Text, Standard Encl.	EleMech: 25-000-A002 Assembly	2	
85	42-063-007	Terminal Block, Din Rail, 35MM Wide, 15 High, 2 Meters Long	Iboco: Omega 3 AF	1	
86	52-000-004	Decal, Printer Paper Replacement	EleMech: Printer	1	
87	52-000-023	Label, PortALogic, Green/White, Custom	EleMech: 1989737365	2	

Item	Component	Description	Manufacturer Part Number	QTY	Device
88	03-056-028	Circuit Breaker, 1 Pole, 240VAC, 6A, 14kA, UL489, Type C	Siemens: 5SJ4106-7HG40	1	CB
89	57-009-010	Cable, Comm., Ethernet, Cat. 5, 600V,4 PAIR, 24AWG, 3.3 FT	Belden: E505001-010S1	1	CBL1
90	57-000-A023	Cable, Comm., Custom TG2460 to ML1400, RJ45 to 8 Pin, 5'	EleMech: 57-000-A023	1	CBL2
91	57-000-A025	Cable, Comm., Custom ML1400 to S1300, 5'	EleMech: 57-000-A025	1	CBL3
92	57-009-006	Cable, Signal, Shielded, 2 Conductor, 18AWG, Per Foot	Belden: 8760	3	CBL4
93	07-063-000	Distribution Block, End Cover, 4 Pole, 300V,10A, w/WK4E\V\VB	Wieland: 07.311.4053.1	2	DB1
94	07-063-001	Distribution Block, Jumper, 4 Pole, 300V,10A, w/WK4E\V\VB	Wieland: Z7.210.3427	4	DB1
95	07-063-002	Distribution Block, Single Pole, 10A, 300V, WK4E\V\VB	Wieland: 57.404.6955.1	8	DB1
96	42-063-004	Terminal Block, Ground, 30A, 600V, 6MM Wide, w/WK4/U	Wieland: 57.504.9055.0	5	DB1,TB1
97	11-000-A026	Enclosure Inner Door, OICP Upgrade Kit w/Card Reader/Printer	EleMech: 11-000-A026	1	EN1
98	15-011-000	Ground Lug	Blackburn: L70	1	GND
99	17-034-003	Heater, 150 Watts, 120VAC, w/Out Thermostat, UR	Stego: 06020.0-00	1	HTR1
100	52-137-003	Label, Caution: Heater Element, 1.5"Wx0.75"H, White/Red	Nameplate Tech: 52-137-003	1	HTR1
101	32-005-171	Pilot light, NEMA 4X, 24VAC/DC, LED, Green, 22mm	Allen-Bradley: 800FD-P3N3	1	LT1
102	25-000-A010	Nameplate Assembly, White, Black Text, 1"Hx3"W	EleMech: 25-000-A010 Assembly	3	NP1-3
103	26-264-002	OIU,S1300 Series,12VDC,16Key Pinpad,4X20 Display, RS232(Horz	Hypercom: 3313-00220	1	OIU1
104	ELE-33-P002	Program, OICP, S1300, Standard	EleMech: ELE-33-P002	1	OIU1
105	29-005-006	Pushbutton, NEMA 4X, Oper+1NC, Extended Head, Black	Allen-Bradley: 800H-BR2D2	1	PB1
106	33-005-048	MicroLogix 1100/1200/1400, Combo Analog 2-Input/2-Output	Allen-Bradley: 1762-IF2OF2	1	PLC1
107	33-005-163	MicroLogix 1400, 20-24VDC In, 12-Rly Out, 2-232, Eth, 120VAC	Allen-Bradley: 1766-L32BWA	1	PLC1
108	ELE-33-P004	Program, PLC, MicroLogix 1400, Standard	EleMech: ELE-33-P004	1	PLC1
109	26-000-000	Drip Shield, Clear Plastic, Double Sided Tape	EleMech: 26-000-000	1	PRN1
110	36-338-002	Arm, Paper, w/Custom TG Series	Custom: 974CE010000309	1	PRN1
111	36-338-003	Printer, Serial/USB Interface, Auto Cutter, Custom TG2460	Custom: 915CG020100300	1	PRN1
112	36-443-000	Printer, Clear Receipt Cover, Adhesive Mount	EleMech: 36-443-000	1	PRN1
113	37-323-000	Power Supply, 60W, 100-240VAC 1.5A In, 24VDC 2.5A Out	Delta: DRP024V060W1AZ	1	PS1
114	26-264-003	OIU,S1300 Series, Power Supply 12VDC	Hypercom: DDD-0610	1	PS2
115	14-113-000	Receptacle, Single, Din Rail, w/5 A Circuit Breaker, 125VAC	Weidmuller: 9915480001	1	RECP1
116	40-012-004	Surge Suppressor, 1 Pole, 120VAC, 200kA SCCR, DIN, Trip Ind.	Bussman: BSPM1120S2GR	1	SUR1
117	33-098-002	Ethernet Switch, 5TX, 9-32VDC, RJ45, 5 Port, 10/100	Phoenix: 2891152	1	SW1

Item	Component	Description	Manufacturer Part Number	QTY	Device
118	42-063-008	Terminal Block, Labels, Blank, w/WK4/U-(600 tags per box)	Wieland: Z4.242.6353	10	TB1
119	42-063-001	Terminal Block, End Plate, Beige, w/WK4/U	Wieland: 07.311.0155.0	2	TB1,2
120	42-063-003	Terminal Block, Single Pole, 30A, 600V, 6MM Wide, WK4/U	Wieland: 57.504.0055.0	29	TB1,2
121	42-063-000	Terminal Block, Labels, Custom Printed, w/WK4/U	Wieland: 04.242.6353-CUSTOM	74	TB1,2,DB1
122	42-063-009	Terminal Block, End Clamp, w/WKN10/U	Wieland: Z5.522.8553	5	TB1,2,DB1
123	46-034-000	Thermostat, for heater control, N.C.contact, 6 amp,30-140 F.	Stego: 01140.9-00	1	TS1
124	52-000-000	Label, Underwriters Laboratories 508A, w/Decal Set	EleMech: 508A	1	UL
Hauler Station, Valve Control, 24VDC (Quantity: 1)					
125	53-037-001	1/2" Flex. Fitting, Compression/Male, Non-Metallic, Swivel	Hubbell: PS0509NGY	1	
126	53-037-002	3/4" Flex. Fitting, Compression/Male, Non-Metallic, Swivel	Hubbell: PS0759NGY	1	
127	53-267-001	1/2" cord grip, 0.23-0.47" Cable, IP68, Nylon, w/Lock Nut	Remke: RD13NA-BKNR	2	
128	57-009-002	Cable, Comm., Ethernet, Cat. 5, 8 Conductor, 24AWG, Per Foot	Belden: 1583A	1	CBL4
129	102-098-001	Electronic Reversing DC Load Relay, 10 A, 24VDC	Phoenix: ELR W/1/10-24DC	1	ELR1
130	11-035-125	Sub-Panel, Painted Steel, w/10"Hx8"W Junction Box	Hoffman: A-10P8	1	EN
131	11-035-670	Enclosure, Nema 4X, Fiberglass, 10"Hx8"Wx6"D, Clamp Style	Hoffman: A-1086CHQRFG	1	EN
132	15-011-000	Ground Lug	Blackburn: L70	1	GND
133	37-312-002	Power Supply, 240W, 115-230VAC 5.0A Input, 24VDC 10.0A Out	Puls: CS10.241	1	PS1
134	42-063-000	Terminal Block, Labels, Custom Printed, w/WK4/U	Wieland: 04.242.6353-CUSTOM	20	TB3
135	42-063-001	Terminal Block, End Plate, Beige, w/WK4/U	Wieland: 07.311.0155.0	1	TB3
136	42-063-003	Terminal Block, Single Pole, 30A, 600V, 6MM Wide, WK4/U	Wieland: 57.504.0055.0	10	TB3
137	42-063-009	Terminal Block, End Clamp, w/WKN10/U	Wieland: Z5.522.8553	2	TB3
Hauler Station. Inlet Valve Stand- 2-Door 316 S.S.3-Section (Quantity: 1)					
138	11-000-304	Hauler Enclosure Stand, 316SS, Back Plate, 42"x24"	EleMech: 11-000-304	2	BACK
139	11-000-305	Hauler Enclosure Stand, 316SS, Base, 20"x2"	EleMech: 11-000-305	2	BASE
140	11-000-306	Hauler Enclosure Stand, 316SS, Door, 40"x20"	EleMech: 11-000-306	2	DOOR
141	11-023-000	Enclosure Handle, Polyamide-Black, w/Swing-Out Panel Kits	Emka: 1095-06	4	HANDLE
142	ELE-33-A015	Hauler Station, Hardware, PB25	EleMech: ELE-33-A015	1	HARDWARE
143	11-055-025	Enclosure, Key Lock Door Latch (Specify 6mm Cam)	Saginaw: SCE-DLKLD-6MM	4	LOCK
144	11-000-309	Hauler Enclosure Stand, 316SS, Spacer, 42"x12"	EleMech: 11-000-309	2	SPACER
145	11-000-308	Hauler Enclosure Stand, 316SS, Cover, 60"x24"	EleMech: 11-000-308	1	TOP

Item	Component	Description	Manufacturer Part Number	QTY	Device
146	11-000-307	Hauler Enclosure Stand, 316SS, Walls, 42"x24"	EleMech: 11-000-307	4	WALLS
Hauler Station Valve and 6"/4" Piping (Quantity: 1)					
147	55-077-000	Actuator, 4"strk, 24DC, 10:1ratio, 6K rpm, 3/8"dia, 90deg	Motion: 85151-322	1	ACT
148	118-257-011	Flange Pack, Bolt, 5/8"x5-1/2", SS, Hex Head	Fastenal: 77315	16	BOLT
149	53-000-035	Flange, 4" NPT Threaded Female, Class 150, 304 Stainless	Ferg: 4"SS 304L 150#Thrd FLG(IS4LRFT	2	FLANGE
150	119-000-001	Reducing Adaptor, 6" Female NPT, 4" AR Male Adaptor	Var Co: ARAL AR4060AL	1	INLET
151	00-000-000	Wire, Hardware, Wire labels, etc.	EleMech: Miscellaneous	1	MISC
152	118-257-012	Flange Pack, Nut, 5/8", SS, Hex	Fastenal: 77716	16	NUT
153	15-213-009	Pipe Clamp, Unistrut Attached, 6" Pipe, 304SS	B-Line: B2020 SS4	2	PIPE
154	15-213-011	Pipe Clamp, Unistrut Attached, 4" Pipe, 304SS	B-Line: B2017 SS4	2	PIPE
155	53-000-020	Pipe, 6"Dia, 14"Long, Sch.40, 304SS, (2) NPT	EleMech: Pipe-6"Dx14"L-SCH40-304-2	1	PIPE
156	53-000-076	Pipe, 6"x4" Dia, 30"Long, Sch.40, 304SS, (1) NPT, (1) Flng	EleMech Pipe: 6"x4"Dx30"L-S40-304-1	1	PIPE
157	53-000-078	Pipe, 4"Dia, 12"Long, Sch.40, 304SS, (2) NPT	EleMech: Pipe-4"Dx12"L-SCH40-304-2	1	PIPE
158	119-000-000	Lever Valve, 6" Full Port, Brass FNPT, Lever Operator	Var Co: 362-301-6 (VL-301-6)	1	VALVE
Hauler Station, 120VAC Junction Box, w/Heat Tracing, CB (Quantity: 1)					
159	53-037-001	1/2" Flex. Fitting, Compression/Male, Non-Metallic, Swivel	Hubbell: PS0509NGY	1	
160	53-037-002	3/4" Flex. Fitting, Compression/Male, Non-Metallic, Swivel	Hubbell: PS0759NGY	2	
161	53-267-001	1/2" cord grip, 0.23-0.47" Cable, IP68, Nylon, w/Lock Nut	Remke: RD13NA-BKNR	2	
162	03-058-000	Circuit Breaker, 1 Pole, 120VAC, 15A, 30mA GFCI, QO Series	Square D: QO115EPD	1	CB1
163	03-058-006	Circuit Breaker, Mounting Base, w/QO1 Series	Square D: QOMB1	1	CB1
164	03-056-026	Circuit Breaker, 1 Pole, 240VAC, 4A, 14kA, UL489, Type C	Siemens: 5SJ4104-7HG40	2	CB2,3
165	57-018-001	Connector, RJ45 Port, Panel Mount, 22mm	Cutler-Hammer: M22-RJ45-SA	1	EJACK1
166	11-035-125	Sub-Panel, Painted Steel, w/10"Hx8"W Junction Box	Hoffman: A-10P8	1	EN
167	11-035-670	Enclosure, Nema 4X, Fiberglass, 10"Hx8"Wx6"D, Clamp Style	Hoffman: A-1086CHQRFG	1	EN
168	15-011-000	Ground Lug	Blackburn: L70	1	GND
169	42-063-000	Terminal Block, Labels, Custom Printed, w/WK4/U	Wieland: 04.242.6353-CUSTOM	32	TB4
170	42-063-001	Terminal Block, End Plate, Beige, w/WK4/U	Wieland: 07.311.0155.0	1	TB4
171	42-063-003	Terminal Block, Single Pole, 30A, 600V, 6MM Wide, WK4/U	Wieland: 57.504.0055.0	13	TB4
172	42-063-004	Terminal Block, Ground, 30A, 600V, 6MM Wide, w/WK4/U	Wieland: 57.504.9055.0	3	TB4
173	42-063-009	Terminal Block, End Clamp, w/WKN10/U	Wieland: Z5.522.8553	2	TB4

Item	Component	Description	Manufacturer Part Number	QTY	Device
Spare Parts / Ship Loose (Total Quantity Provided)					
174	11-035-345	Corrosion Inhibitor, Foam Type, Protects 10 Cubic Feet	Hoffman: A-HCI10E	6	
175	31-393-002	PH Analyzer, SC200, 120VAC, (2) 4-20mA, NEMA 4X, Analog In	Hach: LXV404.99.00102	1	
176	31-393-000	PH Probe, PD1P1, 1" NPT, Both Ends, Analog, 4.5m Cable	Hach: PD1P1	1	
177	70-000-034	Software, Flo-Logic, Version 1.0	EleMech: 70-000-034	1	
178	36-338-001	Printer, Paper, Thermal, 1 Ply, 120mm, w/Custom TG Series	Custom: T12516400	5	
Card Reader, Card Kit Assembly, 100-Printed, Numbered (Quantity: 1)					
179	89-263-003	Card Reader, Ribbon, YMCKO, 500 Images, DTC550 only	Fargo: 86200	1	BULK RIB.
180	89-263-005	Card Reader, Blank Cards, 60% -40%, Hi-C, 30 Mil	ID Wholesalers: CR8030HI	100	Card

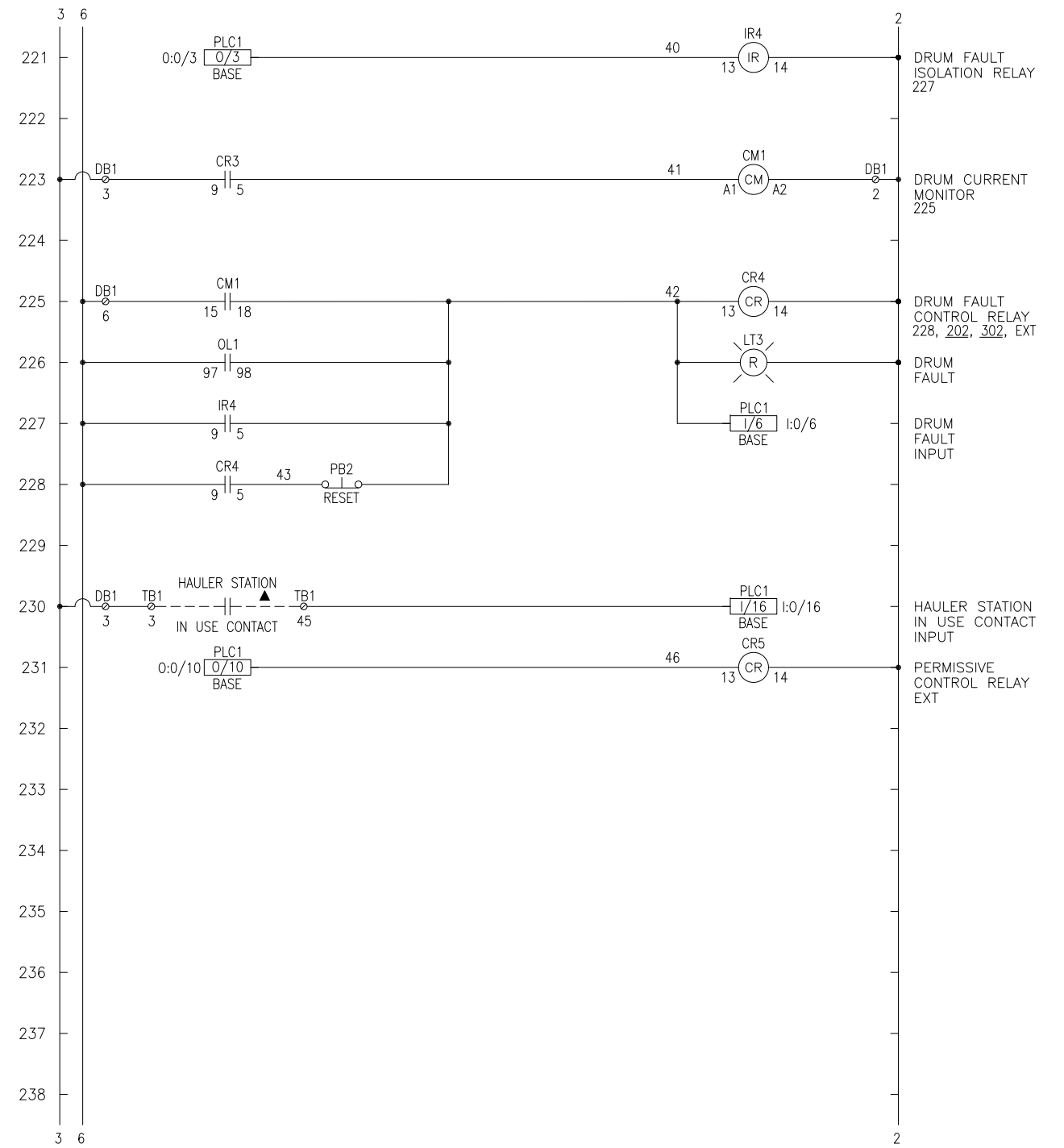
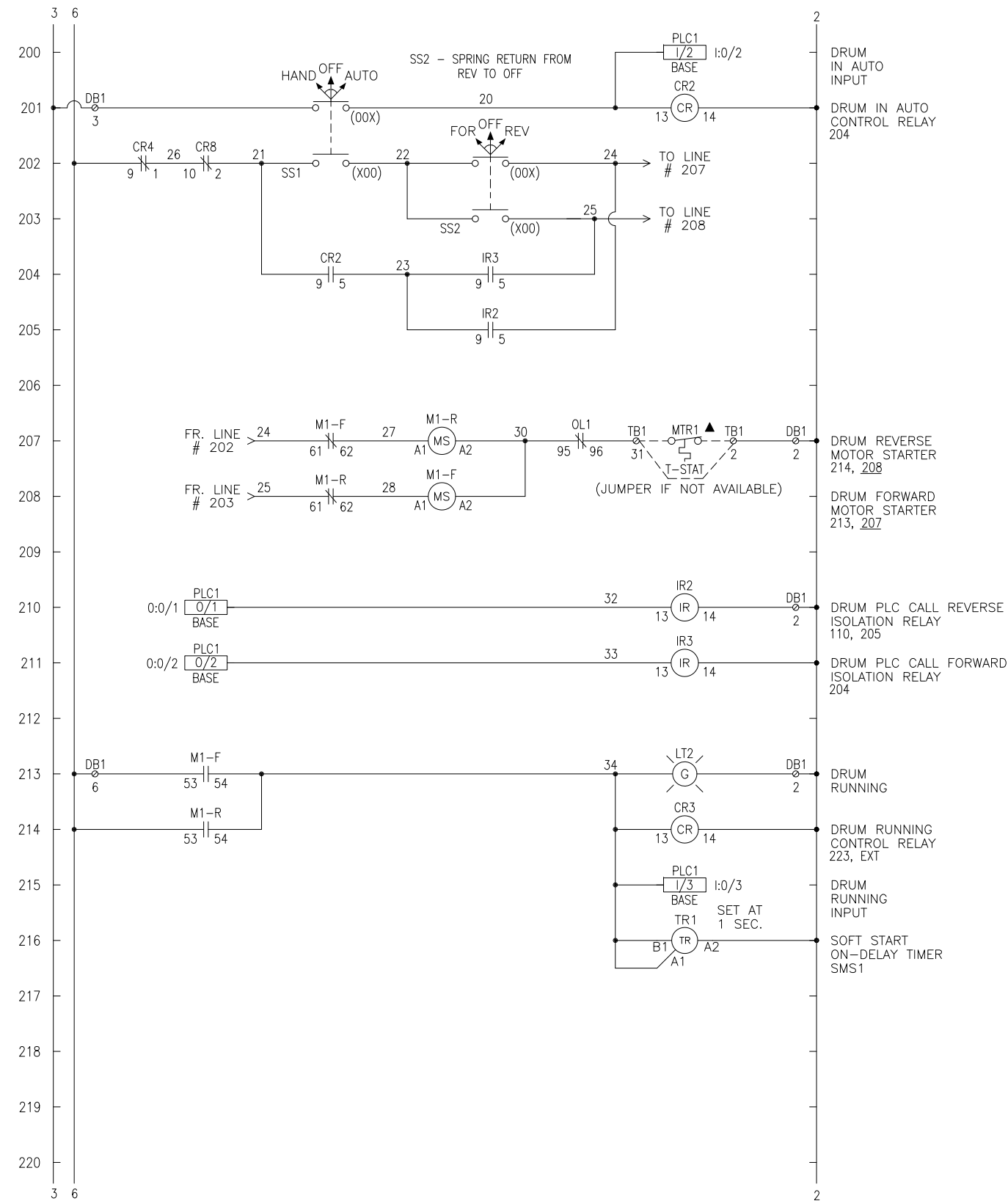


BEAST CONTROL PANEL									
DESCRIPTION									
2HP, 2HP, 480VAC					SIZE				
TYPE									
DATE		STD. BY		STD. CHKD.		STD. APPVD		SCALE	
NONE		06/02		DI		ALS		ALS	
DRAWING NUMBER PROJECT NUMBER REV.									
CPO 1					WEC213223				
SHEET NO.									
1 OF 9									

REVISION	BY	CHKD	DATE	LTR



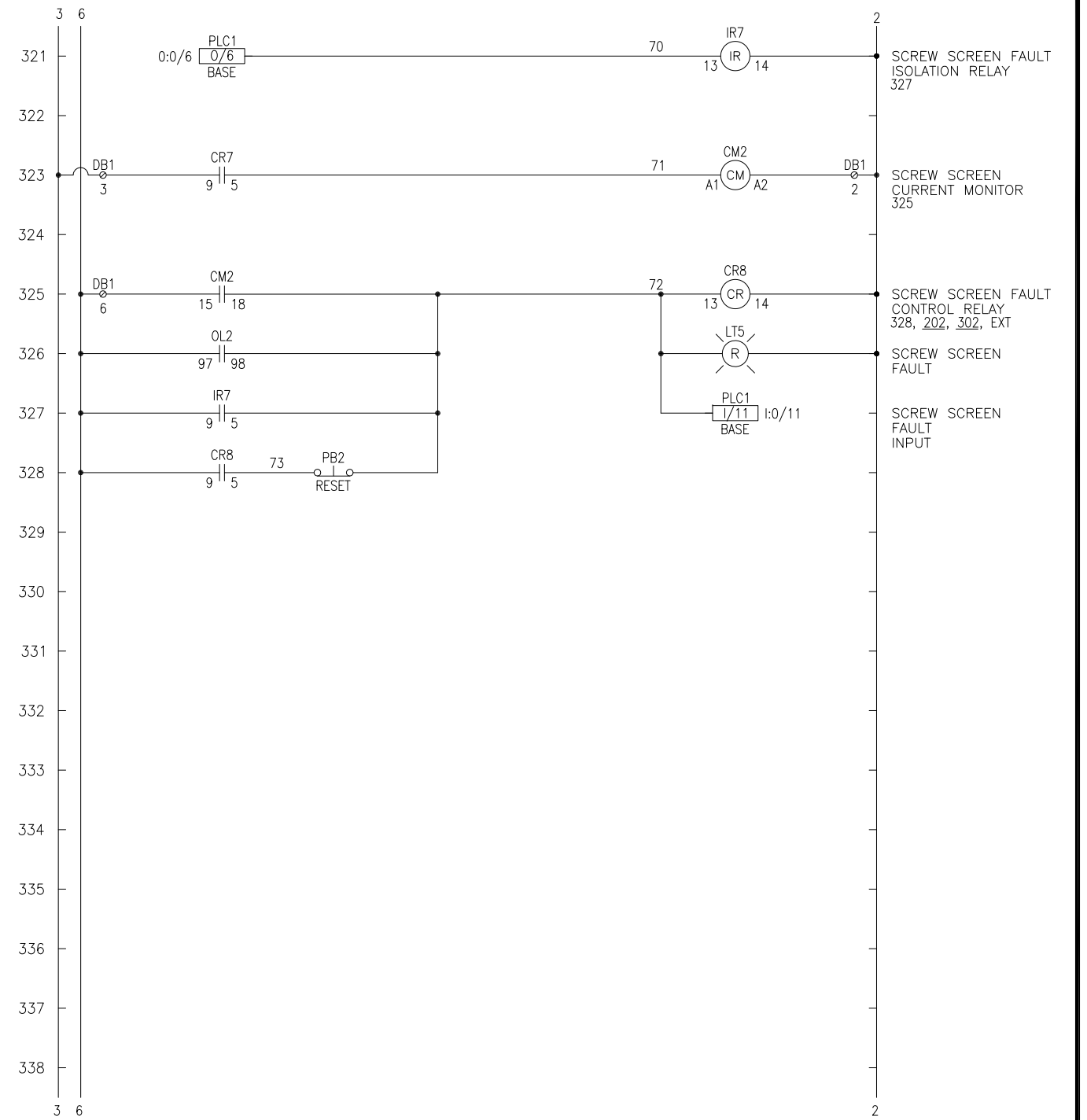
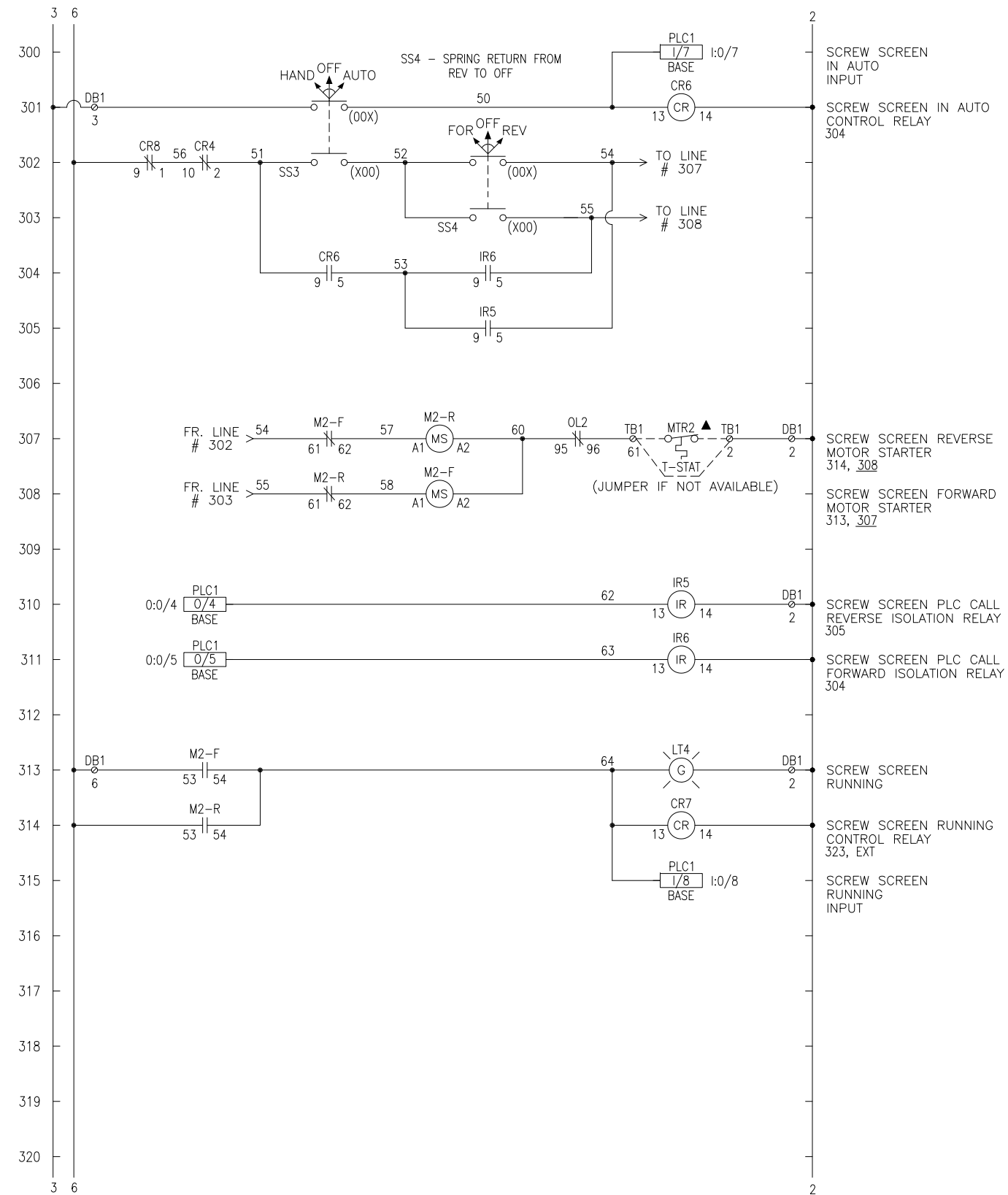
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DESCRIPTION									
2HP, 2HP, 480VAC									
TYPE									
NONE									
DATE	STD. BY	STD. CHKD.	STD. APPVD	SCALE	DATE	PROJ. BY	PROJ. CHKD.	PROJ. APPVD	ALS
					06/02	DI	ALS	ALS	
DRAWING NUMBER					PROJECT NUMBER				
CPO 1					WEC213223				
SHEET NO.									
2 OF 9									

REVISION	BY	CHKD	DATE	LTR

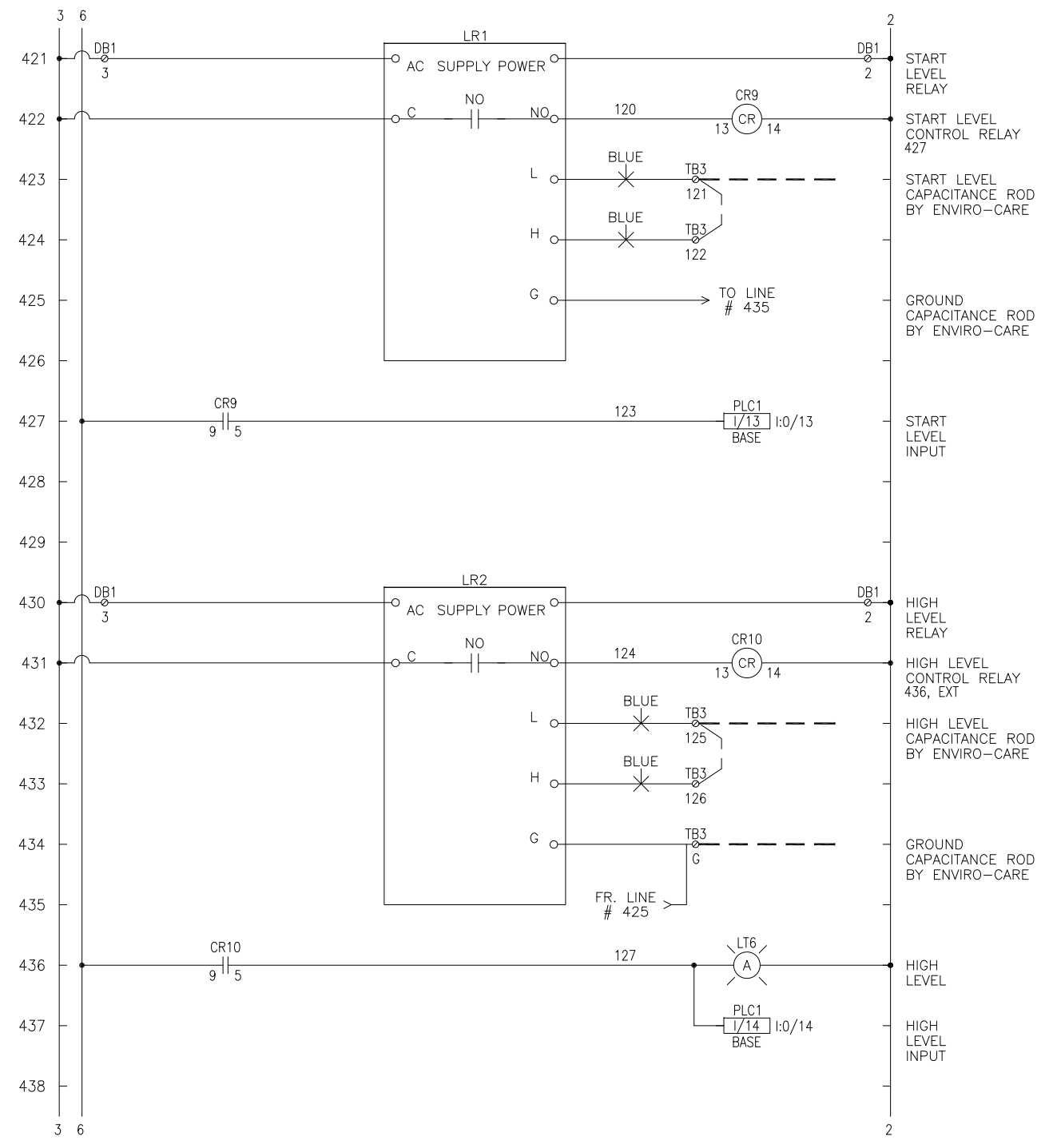
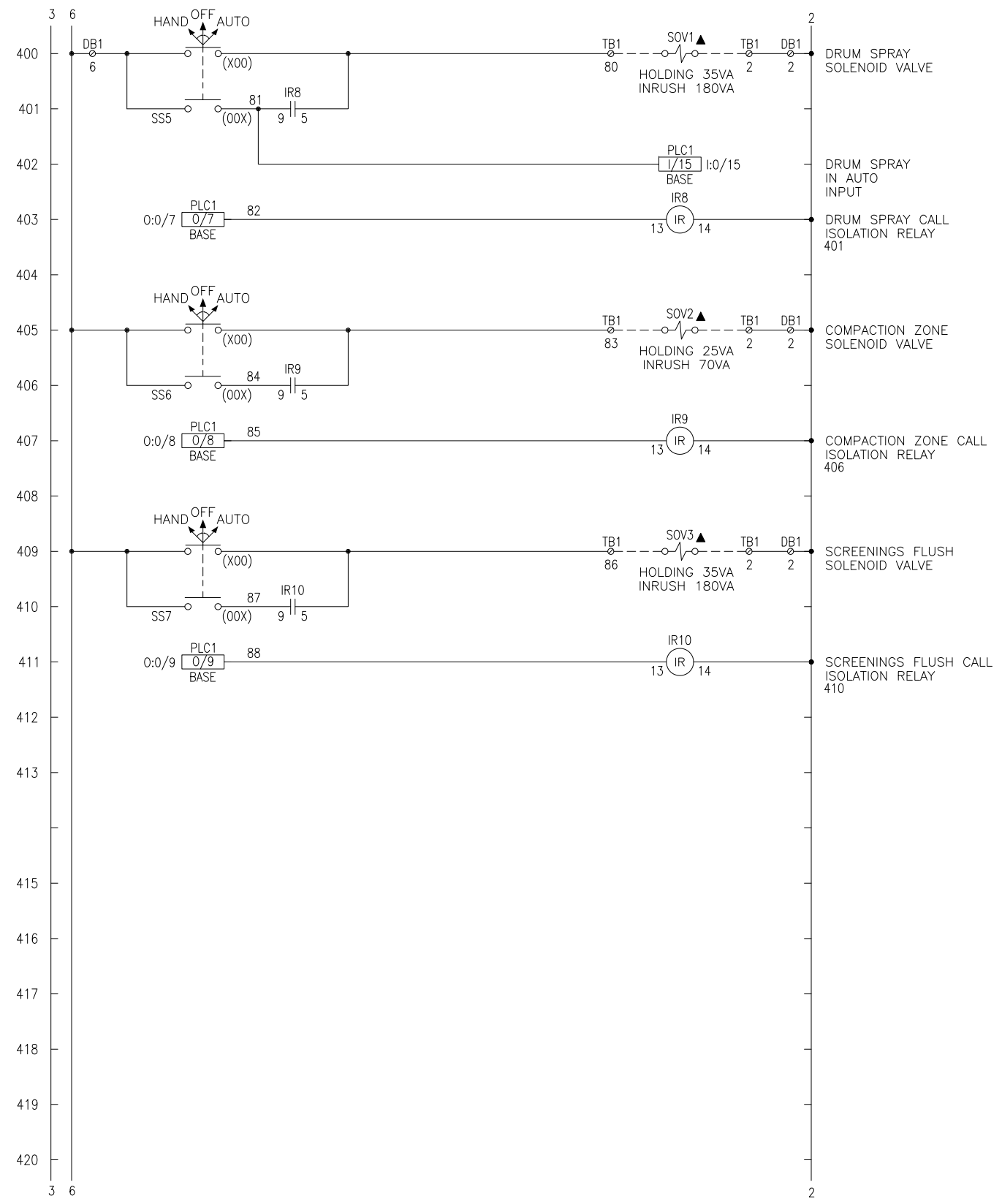
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SHEET NO.									
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BEAST CONTROL PANEL									
DESCRIPTION									
2HP, 2HP, 480VAC									
TYPE									
SIZE									
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DATE	STD. BY	STD. CHKD.	STD. APPVD	SCALE	DATE	PROL. BY	PROJ. CHKD.	PROJ. APPVD	REV.
DRAWING NUMBER					PROJECT NUMBER				
CPO 1					WEC213223				
SHEET NO.									
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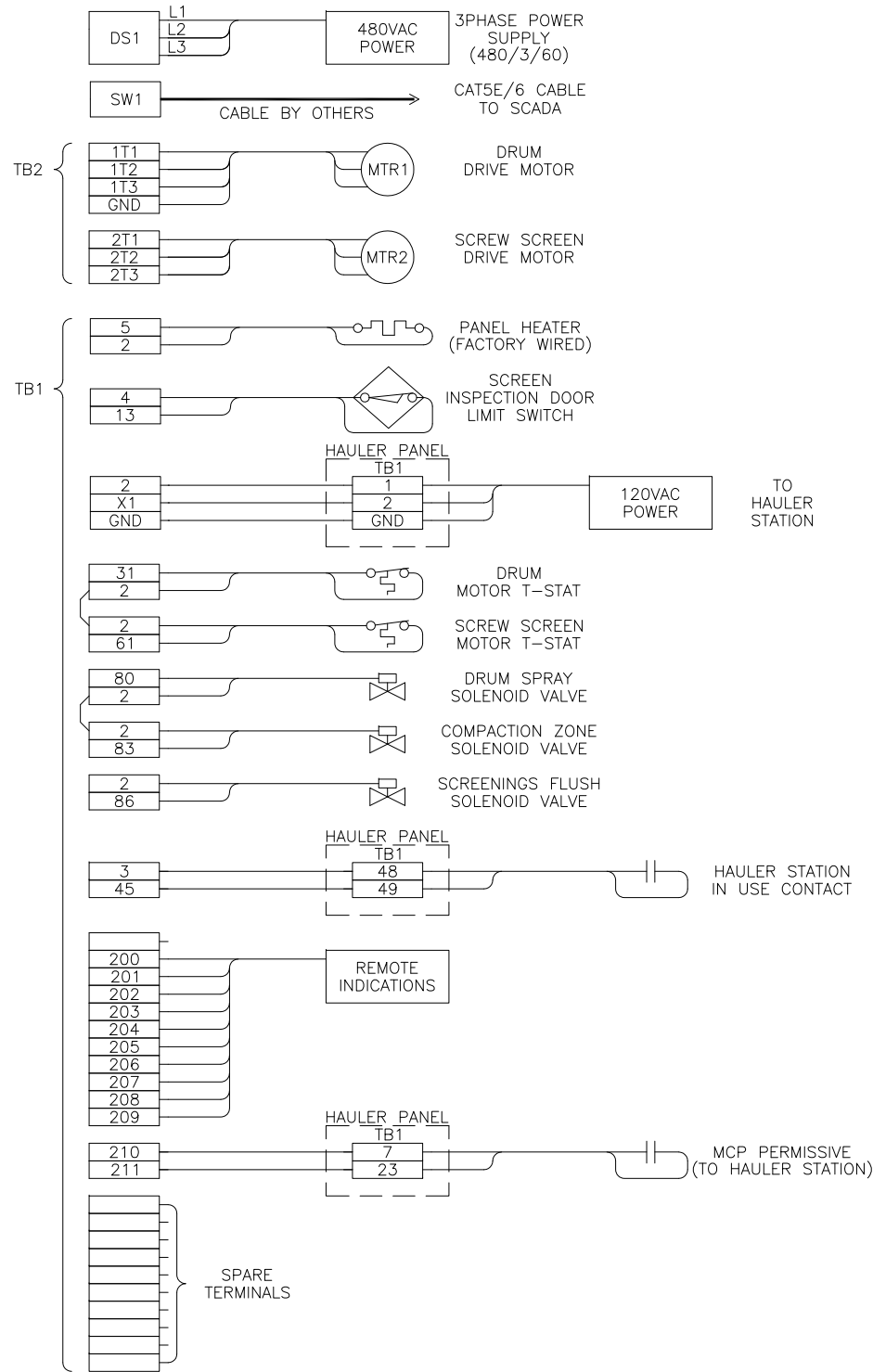
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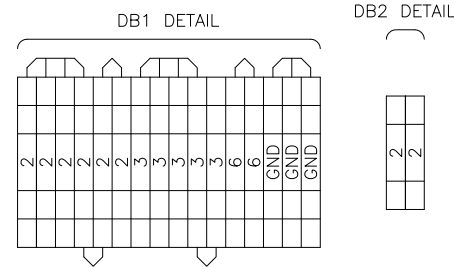
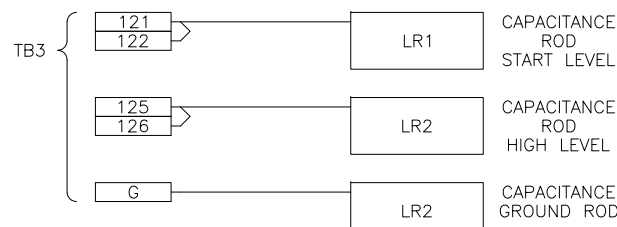
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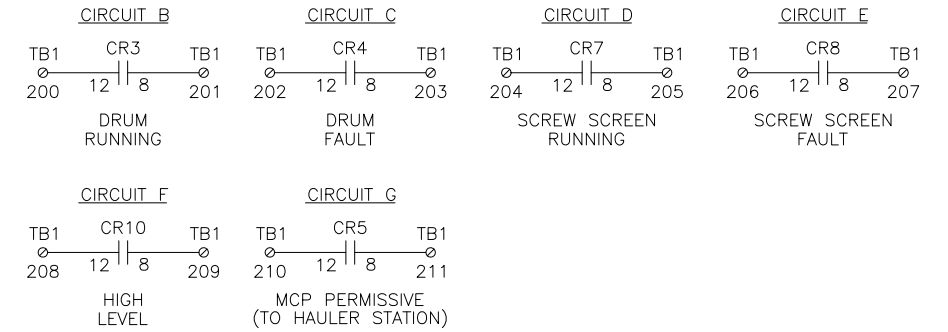
FIELD WIRING DIAGRAM



FIELD WIRING DIAGRAM



DRY OUTPUT CONTACTS



MAX. CONTROLLED LOAD: 6A @ 120VAC

NOTE: BRANCH CIRCUIT PROTECTION PROVIDED BY OTHERS PER N.E.C.

BEAST CONTROL PANEL									
DESCRIPTION									
2HP, 2HP, 480VAC									
TYPE									
NONE									
SIZE									
06/02									
DI									
ALS									
ALS									
DATE	STD. BY	STD. CHKD.	STD. APPVD	SCALE	DATE	PROJ. BY	PROJ. CHKD.	PROJ. APPVD	REV.
DRAWING NUMBER					PROJECT NUMBER				
CPO 1					WEC213223				
SHEET NO.									
6 OF 9									

REVISION	BY	CHKD	DATE	LTR



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DEVICE SETTINGS

PLC1 - I/O

ALLEN-BRADLEY MICROLOGIX 1400															<input type="checkbox"/> POWER
IN															<input type="checkbox"/> RUN
0	2	5	7	8	10	13	15	17	19						<input type="checkbox"/> FAULT
1	3	4	6	9	11	12	14	16	18						<input type="checkbox"/> FORCE
OUT															<input type="checkbox"/> COM0
0	1	2	3	4	7	8	10						<input type="checkbox"/> DCOMM		
5	6	9	11												

PLC INPUTS

I/0	CONTROL POWER ON
I/1	SYSTEM RESET
I/2	DRUM IN AUTO
I/3	DRUM RUNNING
I/4	SPARE
I/5	SPARE
I/6	DRUM FAULT
I/7	SCREW SCREEN IN AUTO
I/8	SCREW SCREEN RUNNING
I/9	SPARE
I/10	SPARE
I/11	SCREW SCREEN FAULT
I/12	SPARE
I/13	START LEVEL
I/14	HIGH LEVEL
I/15	DRUM SPRAY IN AUTO
I/16	HAULER STATION IN USE
I/17	SPARE
I/18	SPARE
I/19	SPARE

PLC OUTPUTS

O/0	CONTROL POWER ENABLE
O/1	DRUM CALL TO RUN REVERSE
O/2	DRUM CALL TO RUN FORWARD
O/3	DRUM FAULT
O/4	SCREW SCREEN CALL TO RUN REVERSE
O/5	SCREW SCREEN CALL TO RUN FORWARD
O/6	SCREW SCREEN FAULT
O/7	DRUM SPRAY CALL TO OPEN
O/8	COMP. ZONE SPRAY CALL TO OPEN
O/9	SCREENINGS FLUSH CALL TO OPEN
O/10	PERMISSIVE
O/11	SPARE

PLC STATUS BITS

S:1/8 - FAULT OVERRIDE AT POWERUP = 1

PLC1 - SETPOINTS

REGISTER NUMBER	DESCRIPTION	FACTORY SETTING	RANGE
N7:1	DRUM - OFF DELAY TIME	60 SEC.	0-300 SEC.
N7:7	DRUM - CALLED FOR NOT RUNNING	5 SEC.	0-60 SEC.
N7:8	SCREW SCREEN - OFF DELAY TIME	70 SEC.	0-300 SEC.
N7:12	SCREW SCREEN - CALLED FOR NOT RUNNING	5 SEC.	0-60 SEC.
N7:13	COMP. ZONE WASH - REPEAT CYCLE ON TIME	30 SEC.	0-120 SEC.
N7:14	COMP. ZONE WASH - REPEAT CYCLE OFF TIME	4 HOURS	0-24 HR.
N7:15	SCREENINGS FLUSH - REPEAT CYCLE ON TIME	5 SEC.	0-999 SEC.
N7:16	SCREENINGS FLUSH - REPEAT CYCLE OFF TIME	0 SEC.	0-999 SEC.
N7:17	SCREENINGS FLUSH - OFF DELAY TIME	120 SEC.	0-999 SEC.
N7:18	HIGH LEVEL - OFF DELAY	30 SEC.	0-999 SEC.

NOTES:

- THE ABOVE IS A PARTIAL LISTING OF SETPOINTS. ONLY THE SETPOINTS THAT ARE SHOWN ABOVE SHALL BE ALTERED IN THE FIELD.

HTR1

HEATER ON/OFF | 40 °F

DEVICE SETTINGS

PLC1 - COMMUNICATIONS SETUP

PARAMETER	VALUE
DRIVER	DF1 FULL DUPLEX
BAUD RATE	9600
PARITY	NONE
STOP BITS	1
ERROR DETECTION	CRC

CHANNEL 1 - SYSTEM

PARAMETER	VALUE
IP ADDRESS	10.0.0.1
SUBNET MASK	255.255.255.0
GATEWAY ADDRESS	0.0.0.0
BOOTP ENABLE	NO

QIU1 - COMMUNICATIONS SETUP

PARAMETER	VALUE
DRIVER	DF1 FULL DUPLEX
BAUD RATE	9600
PARITY/STOP BITS	NONE/1
ERROR DETECTION	CRC
HANDSHAKING	OFF

CM1.2 - CURRENT MONITOR

DIAL	SETTING
TRIP POINT	MIN
TRIP DELAY	MIN

NOTES:

- THE CURRENT MONITOR DIAL SHALL BE SET TO MINIMUM FROM THE FACTORY.
- FIELD CONFIGURATION SHALL BE PERFORMED BY THE STARTUP TECHNICIAN PER THE APPROPRIATE TECHNICAL DOCUMENT.

PLC1 - SCADA MONITORING

REGISTER NUMBER	DESCRIPTION	FUNCTION	DATA TYPE
N25:0/0	CONTROL POWER ON	READ	BIT
N25:0/1	DRUM IN AUTO	READ	BIT
N25:0/2	DRUM RUNNING	READ	BIT
N25:0/3	DRUM FAULT	READ	BIT
N25:0/4	SCREEN IN AUTO	READ	BIT
N25:0/5	SCREEN RUNNING	READ	BIT
N25:0/6	SCREEN FAULT	READ	BIT
N25:0/7	START LEVEL	READ	BIT
N25:0/8	HIGH LEVEL	READ	BIT
N25:0/9	DRUM SPRAY IN AUTO	READ	BIT
N25:0/10	HAULER STATION IN USE	READ	BIT

BEAST CONTROL PANEL									
DESCRIPTION									
2HP, 2HP, 480VAC									
TYPE									
NONE									
DATE									
SCALE									
DRAWING NUMBER									
PROJECT NUMBER									
REV.									
CPO 1 WEC213223									
Enviro-Care									
SHEET NO. 7 OF 9									

REVISION	BY	CHKD	DATE	LTR

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SEQUENCE OF OPERATION

CONTROL POWER ON-DELAY:

EACH TIME THE CONTROL PANEL POWER SUPPLY IS CYCLED, THE PLC WILL ALLOW ALL SOLID STATE DEVICES TO BECOME FULLY ENERGIZED BEFORE ENABLING THE CONTROL POWER CIRCUIT.

DRUM MODES OF OPERATION:

HAND: WHEN THE DRUM SELECTOR IS IN THE HAND POSITION, THE DRUM WILL CYCLE ON AND OFF WITH THE DRUM FOR-OFF-REV SELECTOR.

FOR: WHEN THE DRUM SELECTOR IS IN THE HAND POSITION, AND THE FORWARD DIRECTION IS SELECTED, THE DRUM WILL RUN CONTINUOUSLY IN THE FORWARD DIRECTION.

REV: WHEN THE DRUM SELECTOR IS IN THE HAND POSITION AND THE REVERSE DIRECTION SELECTED, THE DRUM WILL RUN CONTINUOUSLY IN THE REVERSE DIRECTION. THIS SWITCH WILL SPRING RETURN FROM REV TO OFF.

AUTO: WHEN THE DRUM SELECTOR IS IN THE AUTO POSITION, THE DRUM WILL RUN WHEN THE MATERIAL REACHES THE START LEVEL LEVEL PROBE. THE UNIT WILL CONTINUE TO RUN AFTER THE LEVEL OF MATERIAL DROPS BELOW THE START LEVEL LEVEL PROBE, FOR THE TIME SET IN THE DRUM OFF DELAY TIMER.

SCREW SCREEN MODES OF OPERATION:

HAND: WHEN THE SCREW SCREEN SELECTOR IS IN THE HAND POSITION, THE SCREW SCREEN WILL CYCLE ON AND OFF WITH THE SCREW SCREEN FOR-OFF-REV SELECTOR.

FOR: WHEN THE SCREW SCREEN SELECTOR IS IN THE HAND POSITION, AND THE FORWARD DIRECTION IS SELECTED, THE SCREW SCREEN WILL RUN CONTINUOUSLY IN THE FORWARD DIRECTION.

REV: WHEN THE SCREW SCREEN SELECTOR IS IN THE HAND POSITION AND THE REVERSE DIRECTION SELECTED, THE SCREW SCREEN WILL RUN CONTINUOUSLY IN THE REVERSE DIRECTION. THIS SWITCH WILL SPRING RETURN FROM REV TO OFF.

AUTO: WHEN THE SCREW SCREEN SELECTOR IS IN THE AUTO POSITION THE SCREW SCREEN WILL RUN WHEN THE MATERIAL REACHES THE START LEVEL LEVEL PROBE. THE UNIT WILL CONTINUE TO RUN AFTER THE LEVEL OF MATERIAL DROPS BELOW THE START LEVEL LEVEL PROBE, FOR THE TIME SET IN THE SCREW SCREEN OFF DELAY TIMER.

NOTE: PRESSING AND HOLDING THE SYSTEM RESET PUSHBUTTON FOR 3 SECONDS WILL INITIATE A DRUM AND SCREW CYCLE IF THE DRUM AND SCREW SELECTORS ARE IN AUTO POSITION.

DRUM SPRAY MODES OF OPERATION:

HAND: WHEN THE DRUM SPRAY SELECTOR IS IN THE HAND POSITION, THE BASKET SPRAY BAR WILL RUN CONTINUOUSLY.

AUTO: WHEN THE DRUM SPRAY SELECTOR IS IN THE AUTO POSITION, THE DRUM SPRAY WILL RUN WHEN THE SCREW SCREEN AND DRUM ARE RUNNING IN THE FORWARD DIRECTION.

COMPACTION ZONE WASH MODES OF OPERATION:

HAND: WHEN THE COMPACTION ZONE WASH SELECTOR IS IN THE HAND POSITION, THE COMPACTION ZONE WASH WILL RUN CONTINUOUSLY.

AUTO: WHEN THE COMPACTION ZONE WASH SELECTOR IS IN THE AUTO POSITION, THE COMPACTION ZONE WASH WILL RUN INDEPENDENTLY ACCORDING TO THE ON/OFF REPEAT CYCLE TIMERS.

SCREENINGS FLUSH MODES OF OPERATION:

HAND: WHEN THE SCREENINGS FLUSH SELECTOR IS IN THE HAND POSITION, THE SCREENINGS FLUSH WILL RUN CONTINUOUSLY.

AUTO: WHEN THE SCREENINGS FLUSH SELECTOR IS IN THE AUTO POSITION, THE SCREENINGS FLUSH WILL RUN ACCORDING TO THE ON/OFF REPEAT CYCLE TIMERS, WHILE THE SCREW SCREEN AND DRUM ARE RUNNING. WHEN THE SCREW SCREEN STOPS, THE SCREENINGS FLUSH WILL RUN CONTINUOUSLY FOR THE TIME SET IN THE SCREENINGS FLUSH OFF DELAY.

NOTE:

THE SCREENINGS FLUSH CAN RUN CONTINUOUSLY BY SETTING THE OFF TIME TO ZERO.

PERMISSIVE CONTACT:

THE PERMISSIVE DRY CONTACT WILL CLOSE WHEN ALL NECESSARY SELECTOR SWITCHES ARE IN AUTO, THERE ARE NO FAULTS PRESENT, THE E-STOP IS OK, AND THERE IS NO HIGH LEVEL CONDITION.

NOTE: THE PERMISSIVE DRY CONTACT IS MONITORED BY THE HAULER STATION.

HIGH LEVEL:

IF THE LEVEL RAISES ABOVE THE HIGH LEVEL LEVEL PROBE, A HIGH LEVEL ALARM WILL BE MESSAGED ON THE OIU AND THE INLET VALVE WILL CLOSE. THE INLET VALVE WILL OPEN AGAIN AFTER THE LEVEL DROPS BELOW THE START LEVEL PROBE. THIS MESSAGE WILL REMAIN ON THE OIU UNTIL UNTIL THE HIGH LEVEL CONDITION HAS CLEARED. THIS ALARM WILL BE LOGGED IN THE ALARM HISTORY.

NOTE: THE HAULER STATION WILL CONTROL THE INLET VALVE.

NOTE: WHEN THE HAULER STATION IN USE CONTACT IS LOST, THE DRUM AND SCREW WILL RUN FOR TIME SET IN THE RESPECTIVE OFF DELAY TIMERS. THE SCREENINGS FLUSH WILL REMAIN ON WHILE THE DRUM AND SCREW ARE RUNNING AND WILL REMAIN ON FOR THE SCREENINGS FLUSH OFF DELAY AFTER THEY STOP.

SEQUENCE OF OPERATION

EMERGENCY STOP:

WHEN ANY OF THE E-STOP PUSHBUTTONS ARE PRESSED OR INSPECTION DOOR IS OPENED, THE DRUM AND SCREW SCREEN WILL STOP IMMEDIATELY, ALL VALVES WILL GO TO AN UNPOWERED STATE, AND THE CONTROL POWER ON LIGHT WILL DE-ENERGIZE. TO RESET, ENSURE ALL E-STOPS ARE ENABLED, INSPECTION DOOR IS CLOSED, AND PRESS THE SYSTEM RESET PUSHBUTTON.

NOTE: IF THE POWER TO THE PANEL IS INTERRUPTED, THE EQUIPMENT MAY CYCLE IMMEDIATELY ONCE THE POWER IS RESTORED. PRESSING THE SYSTEM RESET PUSHBUTTON AFTER A POWER OUTAGE WILL NOT BE REQUIRED.

OIU - INFORMATION:

1. THE OIU WILL DISPLAY THE ELAPSED MOTOR RUN TIMES.
2. ALL ADJUSTABLE SETPOINTS CAN BE ACCESSED AND ADJUSTED THROUGH THE OIU.
3. THE PRESENT FAULT WILL BE DISPLAYED ON THE OIU.
4. THE HISTORY OF ALL PAST FAULTS CAN BE ACCESSED THROUGH THE OIU.

FAULTS:

DRUM FAULTS/RESETS:

1. A FAULT OCCURS WHEN THE DRUM CURRENT MONITOR IS TRIPPED. THE DRUM WILL STOP IMMEDIATELY, AND THE DRUM FAULT LIGHT WILL BE ILLUMINATED.
RESET: PUSH THE SYSTEM RESET BUTTON.
2. A FAULT OCCURS WHEN THE DRUM MOTOR STARTER THERMAL OVERLOAD IS TRIPPED. THE DRUM WILL STOP IMMEDIATELY, AND THE DRUM FAULT LIGHT WILL BE ILLUMINATED.
RESET: PUSH THE RESET PUSHBUTTON ON THE DRUM MOTOR STARTER THERMAL OVERLOAD LOCATED INSIDE THE CONTROL PANEL. UNLESS ENTRY INTO THE CONTROL PANEL IS BEING PERFORMED BY A QUALIFIED ELECTRICIAN, THE CONTROL PANEL POWER SHOULD BE SHUT OFF PRIOR TO ENTRY.
3. A FAULT OCCURS WHEN THE DRUM MOTOR THERMOSTAT IS TRIPPED. THE DRUM WILL STOP IMMEDIATELY.
RESET: FAULT 3 RESETS AUTOMATICALLY WHEN THE DRUM MOTOR RETURNS TO A SAFE TEMPERATURE.
4. A FAULT OCCURS IF THE PLC DOES NOT RECEIVE RUNNING CONFIRMATION OF THE DRUM AFTER THE DRUM RUN CONFIRMATION TIME HAS ELAPSED.
RESET: PUSH THE SYSTEM RESET BUTTON.


SCREW SCREEN FAULTS/RESETS:

1. A FAULT OCCURS WHEN THE SCREW SCREEN CURRENT MONITOR IS TRIPPED. THE SCREW WILL STOP IMMEDIATELY, AND THE SCREW FAULT LIGHT WILL BE ILLUMINATED.
RESET: PUSH THE SYSTEM RESET BUTTON.
2. A FAULT OCCURS WHEN THE SCREW SCREEN MOTOR STARTER THERMAL OVERLOAD IS TRIPPED. THE SCREW WILL STOP IMMEDIATELY, AND THE SCREW FAULT LIGHT WILL BE ILLUMINATED.
RESET: PUSH THE RESET PUSHBUTTON ON THE SCREW MOTOR STARTER THERMAL OVERLOAD LOCATED INSIDE THE CONTROL PANEL. UNLESS ENTRY INTO THE CONTROL PANEL IS BEING PERFORMED BY A QUALIFIED ELECTRICIAN, THE CONTROL PANEL POWER SHOULD BE SHUT OFF PRIOR TO ENTRY.
3. A FAULT OCCURS WHEN THE SCREW SCREEN MOTOR THERMOSTAT IS TRIPPED. THE SCREW WILL STOP IMMEDIATELY.
RESET: FAULT 3 RESETS AUTOMATICALLY WHEN THE SCREW MOTOR RETURNS TO A SAFE TEMPERATURE.
4. A FAULT OCCURS IF THE PLC DOES NOT RECEIVE RUNNING CONFIRMATION OF THE SCREW SCREEN AFTER THE SCREW SCREEN RUN CONFIRMATION TIME HAS ELAPSED.
RESET: PUSH THE SYSTEM RESET BUTTON.

NOTE:

1. IN AUTO MODE, IF THE DRUM FAULTS THE SCREW SCREEN WILL STOP.
2. IN AUTO MODE, IF THE SCREW SCREEN FAULTS, THE DRUM WILL STOP.

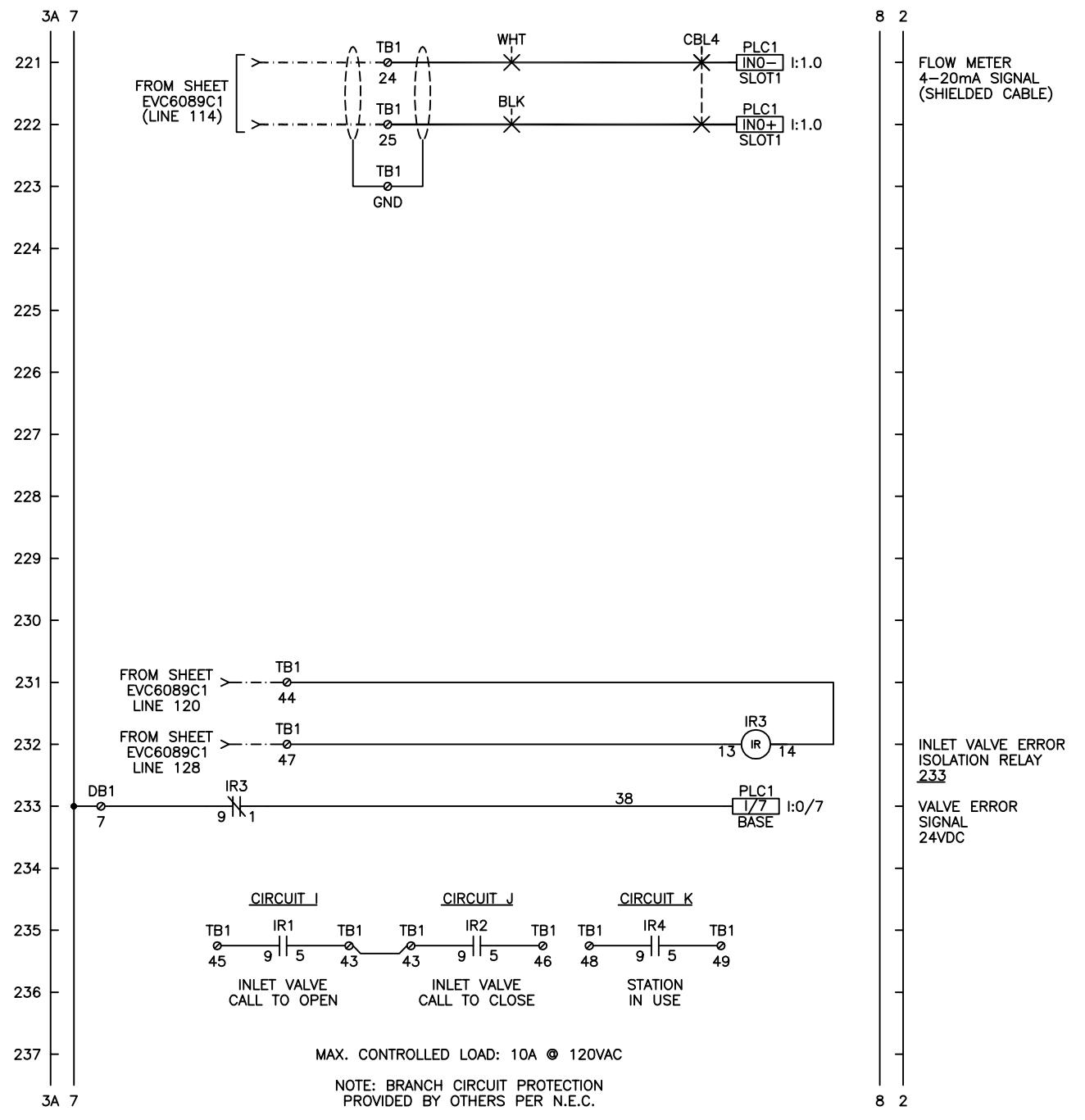
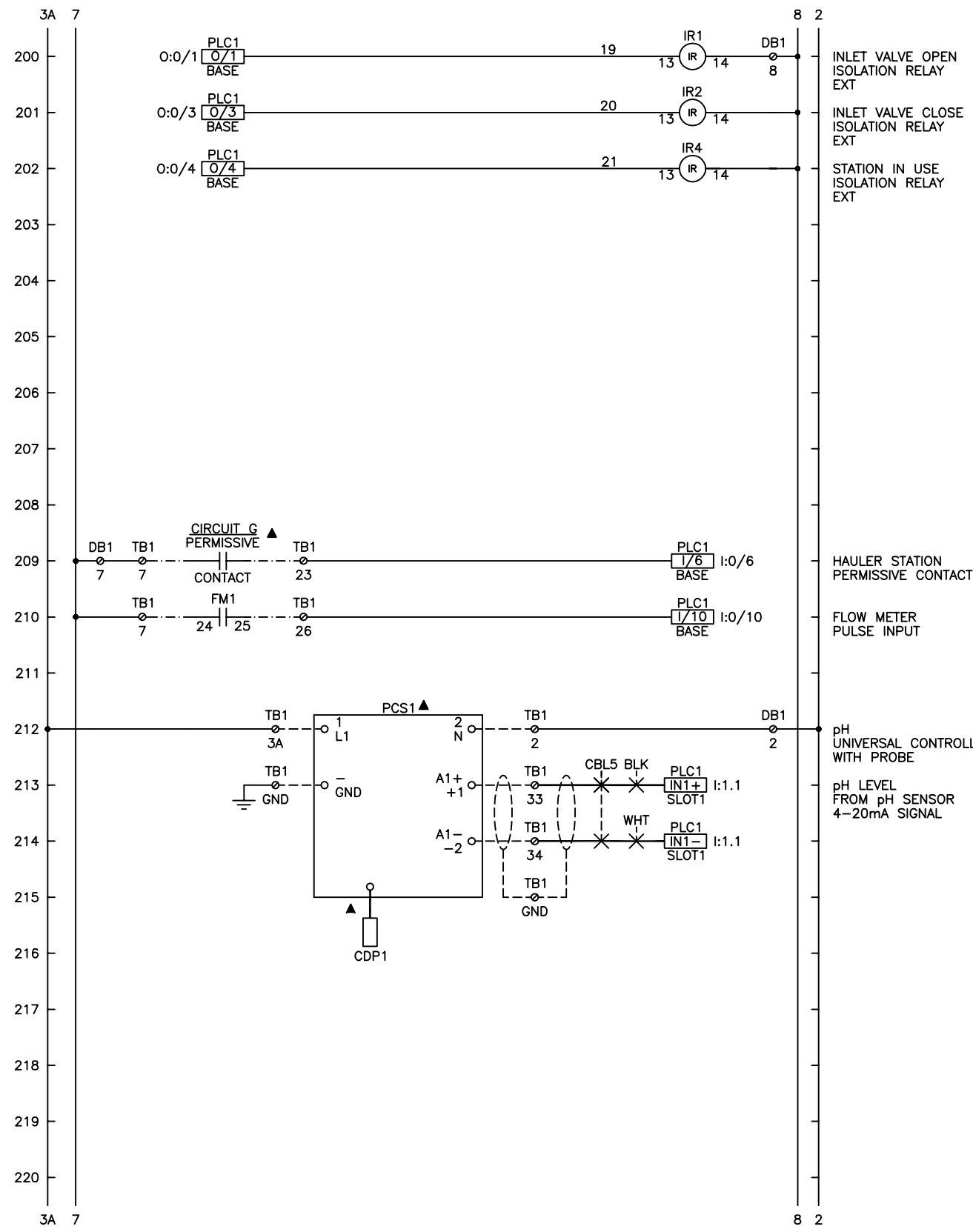
REVISION	BY	CHKD	DATE	LTR

BEAST CONTROL PANEL									
DESCRIPTION									
2HP, 2HP, 480VAC									
TYPE					SIZE				
					NONE	06/02	DI	ALS	ALS
DATE	STD. BY	STD.CHKD.	STD.APPVD	SCALE	DATE	PROJ. BY	PROJ.CHKD.	PROJ.APPVD	REV.
DRAWING NUMBER					PROJECT NUMBER				
CPO 1					WEC213223				
									SHEET NO.
									8 OF 9

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NO.	REVISION	BY	CHKD	DATE	LTR

SEPTAGE HAULER ACCESS STATION										
DESCRIPTION										
120VAC					SIZE					
TYPE	NONE				06/02	DI	ALS	ALS		
DATE	STD. BY	STD. CHKD.	STD. APPVD	SCALE	DATE	PROJ. BY	PROJ. CHKD.	PROJ. APPVD		
DRAWING NUMBER					PROJECT NUMBER					
CPO2					WEC213223					
SHEET NO.										
2 OF 4										

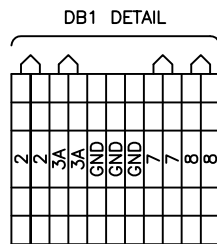
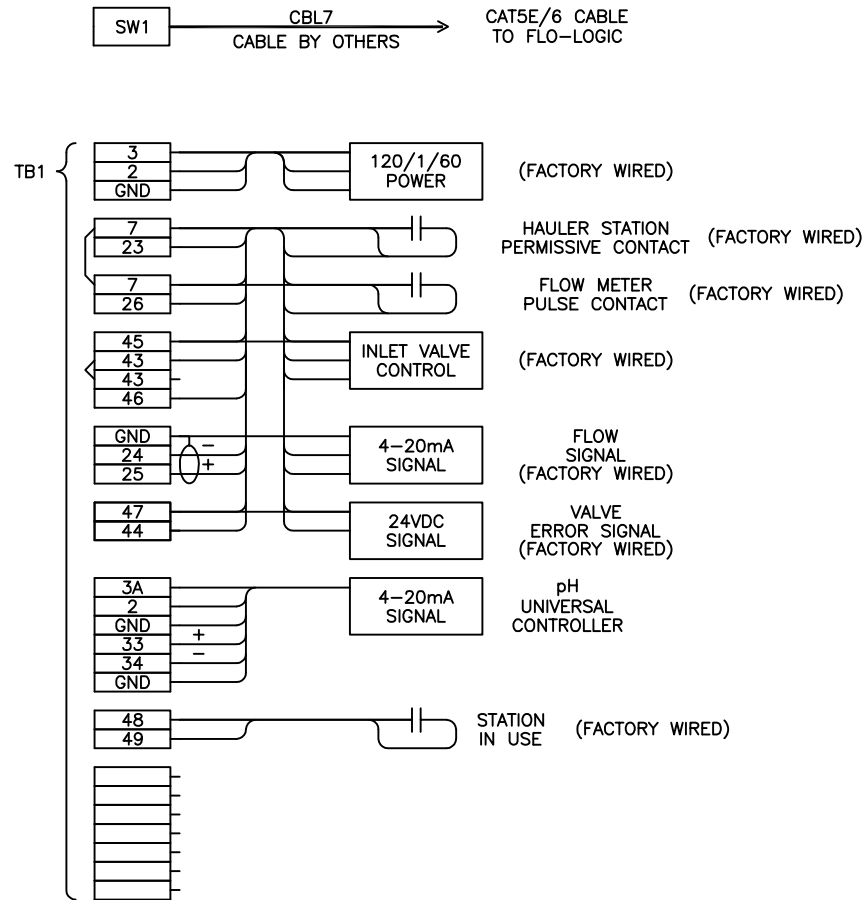


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USER INSTRUCTIONS:

1. INSERT CARD INTO CARD READER.
2. AFTER ENTERING A VALID PIN AND WASTE TYPE, THE VALVE WILL OPEN, AND THE HAULER MAY BEGIN DUMPING
4. WHEN THE LOAD IS COMPLETE, THE USER SHALL PRESS THE HAUL COMPLETE PUSHBUTTON TO INITIATE A LOGOFF SEQUENCE.
5. DURING THE LOGOFF SEQUENCE, THE INLET VALVE WILL CLOSE, THE SYSTEM READY PILOT LIGHT WILL DE-ENERGIZE, AND THE SYSTEM WILL PRINT A RECEIPT FOR THE HAULER SHOWING TOTALIZED GALLONS.
6. THE SYSTEM IS NOW READY TO PROCESS THE NEXT USER'S LOAD.
7. IF A FAULT OCCURS WHEN A LOAD IS IN PROCESS, THE SYSTEM READY PILOT LIGHT WILL DE-ENERGIZE, THE DISPLAY WILL IDENTIFY THE FAULT. THE INLET VALVE WILL CLOSE, AND THE USER WILL BE LOGGED OUT OF THE SYSTEM. THE SYSTEM WILL PRINT A RECEIPT SHOWING THE FAULT ID.

TERMINAL WIRING DIAGRAM



FM1 - ENDRESS & HAUSER PROMAG 53W

BLOCK GROUP	GROUP	FUNCTION	DEFAULT	FACTORY SETTING	
MEASURED VARIABLES	SYSTEM UNITS	UNIT VOL. FLOW	VARIABLES	GAL/MIN	
		UNIT VOLUME	VARIABLES	GAL	
	TOTALIZER	TOTALIZER 1	UNIT TOTALIZER	VARIABLES	GAL
		TOTALIZER 2	TOTALIZER MODE	BALANCE	FORWARD
OUTPUTS	CURRENT OUTPUT 1: CONFIG	CURRENT SPAN	4-20mA NAM	4-20mA	
		VALUE	0.4mA	0	
	PULSE OUTPUT 1: CONFIG	PULSE VALVE	VARIABLES	1GAL/PULSE	
		PULSE WIDTH	100 ms	50 ms	
BASIC FUNCTION	PROCESS PARAMETER: CONFIG	ON-VALUE LF CUT OFF	VARIABLES	2 GAL/MIN	
		EMPTY PIPE DETECTION	OFF	ON STD	
	SYSTEM PARAMETER: CONFIG	EPD/OED RESP TIME	1.0 s	1.0 s	
		INSTALL DIRECTION SENSOR	NORMAL	REVERSE	

NOTES:

1. THE ABOVE IS A PARTIAL LISTING OF SET-POINTS. REFER TO THE INSTRUCTION MANUAL FOR A COMPLETE PARAMETER LISTING.
2. FOR PARAMETER ADJUSTMENT, DEFAULT PASS CODE IS 0053.
3. ** INDICATES A PARAMETER THAT MUST BE CONFIRMED BY THE START-UP TECHNICIAN.

FAULT ID CODES

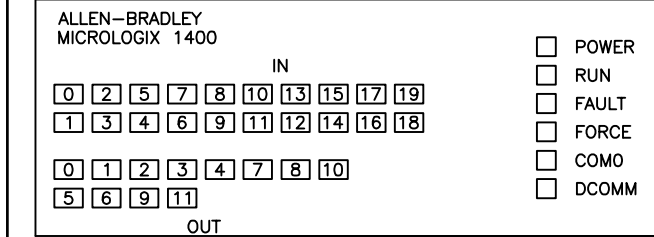
FAULT ID	DESCRIPTION
1	MAIN CONTROL PANEL FAULT
2	VALVE FAULT
3	DUMP TIMER LIMIT EXCEEDED
4	NO FLOW LOGOFF TIMER LIMIT EXCEEDED
5	LOW pH
6	HIGH pH

PLC1 - SETPOINTS

REGISTER NUMBER	DESCRIPTION	FACTORY SETTING	RANGE
L21:3	LOW SCALE (4mA)	*	0-2M uS/cm
L21:4	HIGH SCALE (20mA)	*	0-2M uS/cm
L21:5	SCALED OUTPUT	*	0-2M uS/cm
L21:1	LOW ALARM TRIP POINT	*	0-2M uS/cm
L21:2	HIGH ALARM TRIP POINT	*	0-2M uS/cm
L21:0	FAULT DELAY (DISABLED WHEN SET TO 0)	1	0-999 SEC

DEVICE SETTINGS

PLC1 - I/O



PLC INPUTS

- I/0 - CONTROL POWER ON
- I/1 - SPARE
- I/2 - SPARE
- I/3 - SPARE
- I/4 - HAUL COMPLETE
- I/5 - SPARE
- I/6 - HAULER STATION PERMISSIVE
- I/7 - VALVE ERROR
- I/8 - SPARE
- I/9 - SPARE
- I/10 - PULSE INPUT
- I/11 - SPARE
- I/12 - SPARE
- I/13 - SPARE
- I/14 - SPARE
- I/15 - SPARE
- I/16 - SPARE
- I/17 - SPARE
- I/18 - SPARE
- I/19 - SPARE

PLC OUTPUTS

- O/0 - SYSTEM READY
- O/1 - INLET VALVE CALL TO OPEN
- O/2 - SPARE
- O/3 - INLET VALVE CALL TO CLOSE
- O/4 - STATION IN USE
- O/5 - SPARE
- O/6 - SPARE
- O/7 - SPARE
- O/8 - SPARE
- O/9 - SPARE
- O/10 - SPARE
- O/11 - SPARE

PLC STATUS BITS

S:1/8 - FAULT OVERRIDE AT POWERUP = 1

PLC ANALOG INPUTS - SLOT NO.1

- IN0 - FLOW METER
- IN1 - pH SENSOR

PLC ANALOG OUTPUTS - SLOT NO.1

- OUT0 - SPARE
- OUT1 - SPARE

PLC - COMMUNICATIONS SETUP

PARAMETER	VALUE
DRIVER	DF1 FULL DUPLEX
BAUD RATE	9600
PARITY	NONE
STOP BITS	1
ERROR DETECTION	CRC

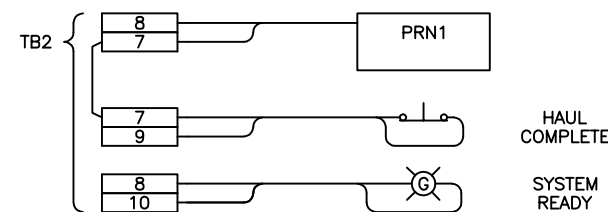
CHANNEL 1 - SYSTEM

PARAMETER	VALUE
IP ADDRESS	10.0.0.2
SUBNET MASK	255.255.255.0
GATEWAY ADDRESS	0.0.0.0
BOOTP ENABLE	NO

HTR1

HEATER ON/OFF | 40 °F

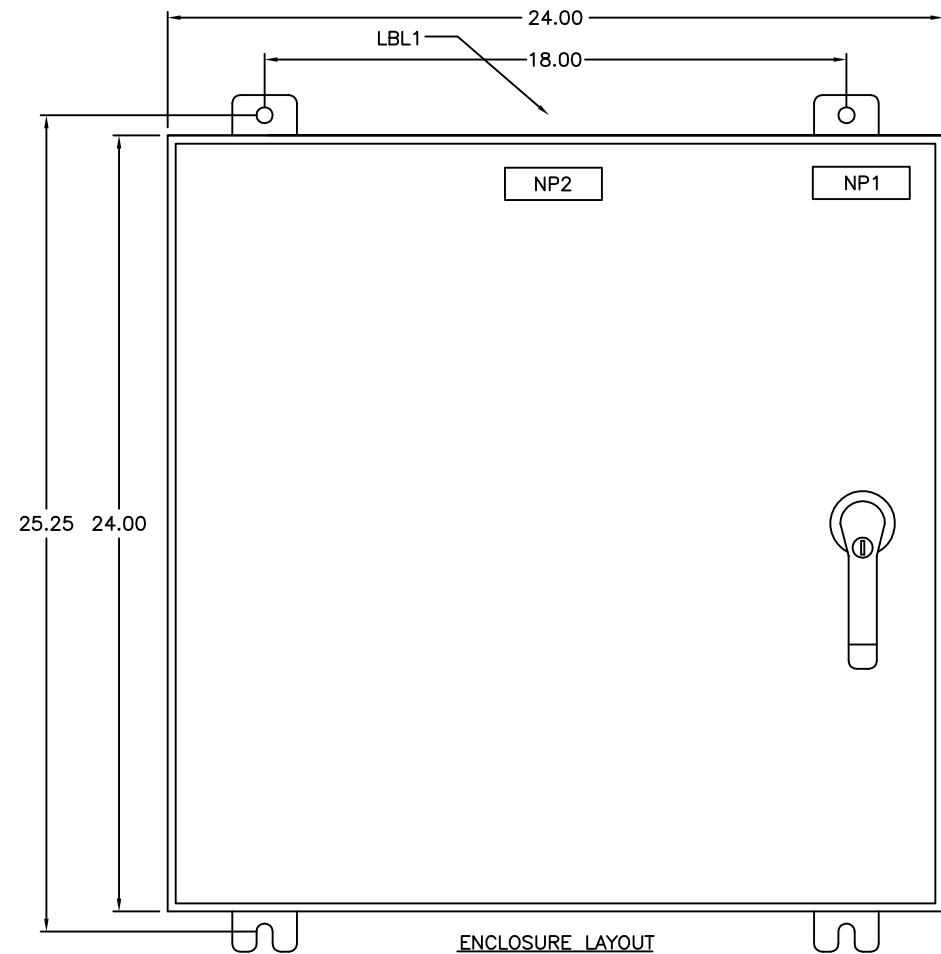
INNER DOOR WIRING DIAGRAM



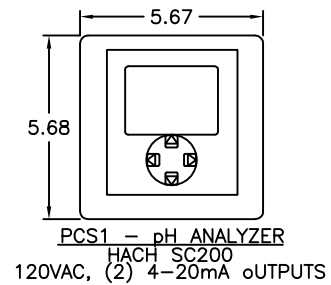
SEPTAGE HAULER ACCESS STATION									
DESCRIPTION									
120VAC					SIZE				
TYPE									
NONE 06/02 DI ALS ALS									
DATE	STD. BY	STD. CHKD.	STD. APPVD	SCALE	DATE	PROJ. BY	PROJ. CHKD.	PROJ. APPVD	REV.
DRAWING NUMBER					PROJECT NUMBER				
CPO2					WEC213223				
SHEET NO.									
3 OF 4									



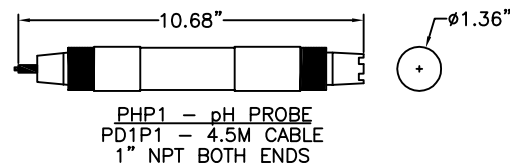
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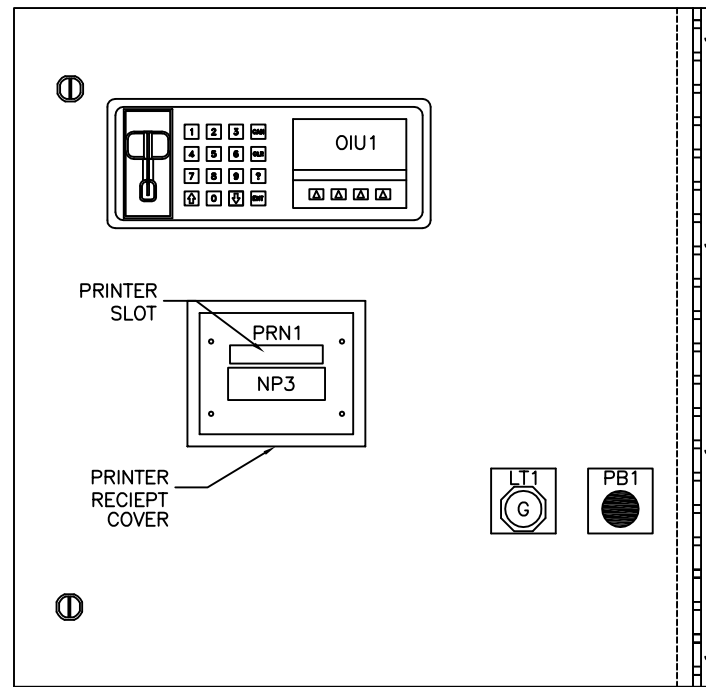
ENCLOSURE LAYOUT
 24"Hx24"Wx14"D
 NEMA 4X 316 STAINLESS STEEL
 HAULER STATION
 WITH 3-POINT LATCHING HANDLE AND
 DRIP SHIELD OVER OUTER DOOR



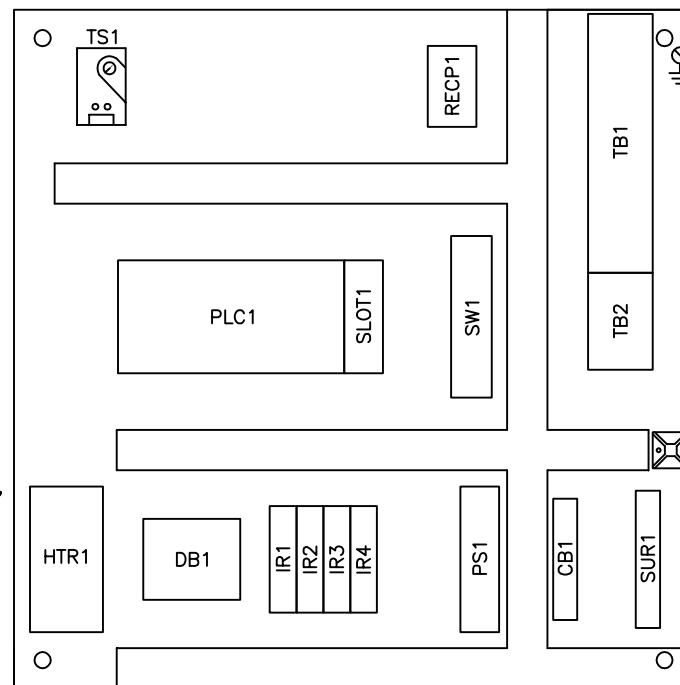
PCS1 - pH ANALYZER
 HACH SC200
 120VAC, (2) 4-20mA oUTPUTS



PHP1 - pH PROBE
 PD1P1 - 4.5M CABLE
 1" NPT BOTH ENDS



INNER DOOR LAYOUT
 21"Hx21"W



SUB-PANEL LAYOUT
 21"Hx21"W

LEGENDPLATES:
 LT1 - SYSTEM READY
 PB1 - HAUL COMPLETE

NAMEPLATES:
 NP1 - 120VAC - 1PH - 60HZ
 NP2 - HAULER STATION
 NP3 - RECEIPT - DO NOT TUG ON PAPER

LABELS:
 LBL1 - WARNING DAMAGE RESULTING FROM
 INSTALLATION OF TOP ENTRY
 CONDUIT WILL VOID WARRANTY
 - USE PROPER FITTINGS, MEYERS
 TYPE 4 OR EQUAL
 - PROTECT INTERIOR DEVICES
 FROM INSTALLATION DEBRIS

SEPTAGE HAULER ACCESS STATION									
DESCRIPTION									
120VAC									
TYPE									
SIZE									
DATE	STD. BY	STD.CHKD.	STD.APPVD	SCALE	DATE	PROJ. BY	PROJ.CHKD.	PROJ.APPVD	REV.
				NONE	06/02	DI	ALS	ALS	
DRAWING NUMBER					PROJECT NUMBER				
CPO2					WEC213223				

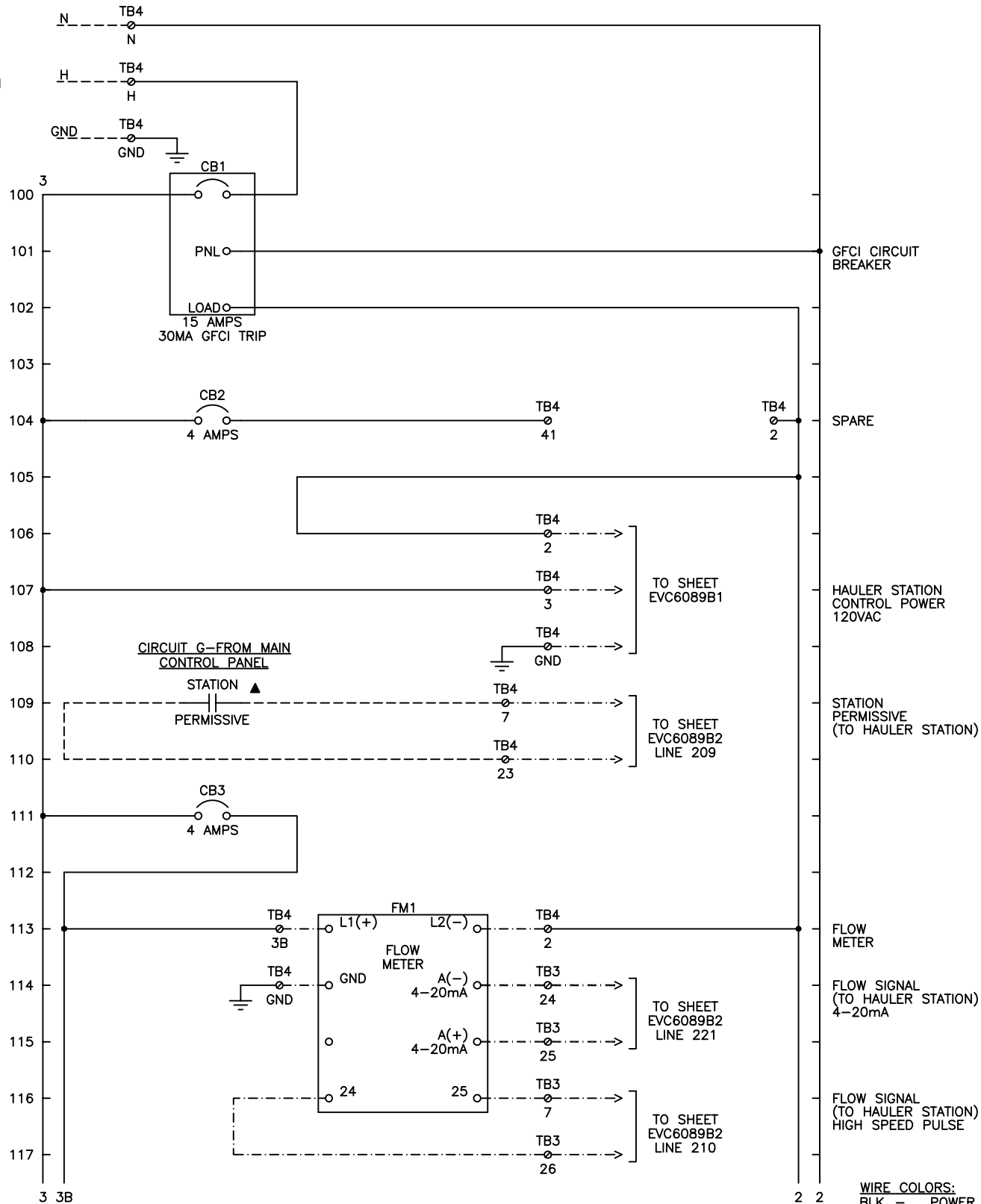
REVISION	BY	CHKD	DATE	LTR

Enviro-Care SHEET NO. 4 OF 4

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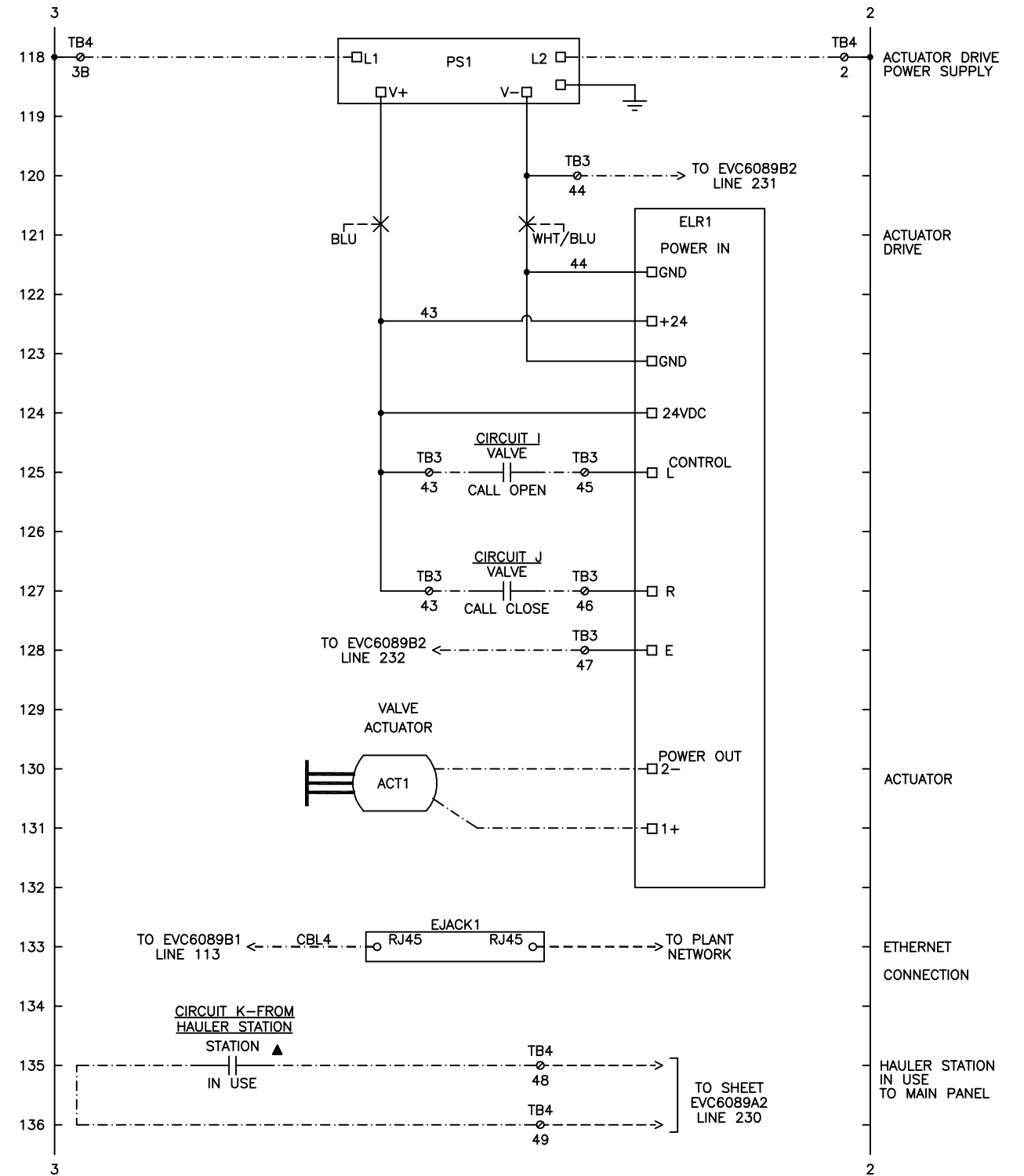
CIRCUIT A
120VAC
1PH
60HZ

8A FROM
EVC6089A1



WIRE COLORS:
 BLK - POWER
 BLK - 120VAC HOT
 WHT - 120VAC NEUTRAL
 RED - 120VAC CONTROL
 YEL - REMOTE
 GRN - GROUND
 BLU - DC POSITIVE/CONTROL
 WHT/BLU - DC NEUTRAL

- NOTES:**
- ▲ DEVICES LOCATED OUTSIDE CONTROL PANEL.
 - ⊙ TERMINAL BLOCK (TB) OR DISTRIBUTION BLOCK (DB) LOCATED IN CONTROL PANEL.
 - TERMINAL BLOCK LOCATED IN REVERSING LOAD RELAY.
 - - - FIELD WIRING
 - - - INTERNAL CONDUIT WIRING.
 - ELEMECH RESERVES THE RIGHT TO CHANGE, AS NECESSARY, THE SPACING, ORIENTATION, AND PHYSICAL LOCATION OF DEVICES IN ORDER TO OPTIMIZE THE DESIGN.

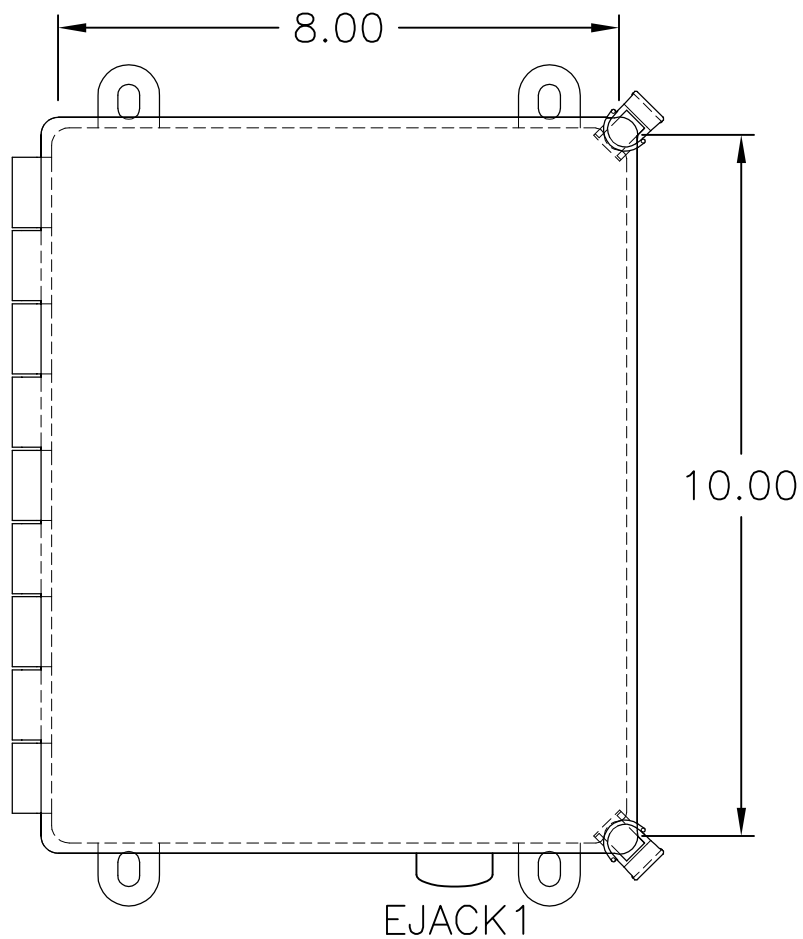


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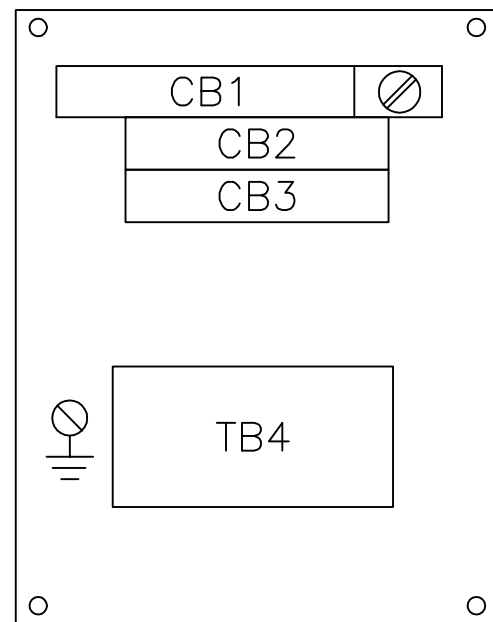
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TYPE					SIZE				
06/02					NONE				
DATE	STD. BY	STD. CHKD.	STD. APPVD	SCALE	DATE	PROJ. BY	PROJ. CHKD.	PROJ. APPVD	REV.
DRAWING NUMBER					PROJECT NUMBER				
CPO3					WEC213223				
SHEET NO.									
1 OF 2									



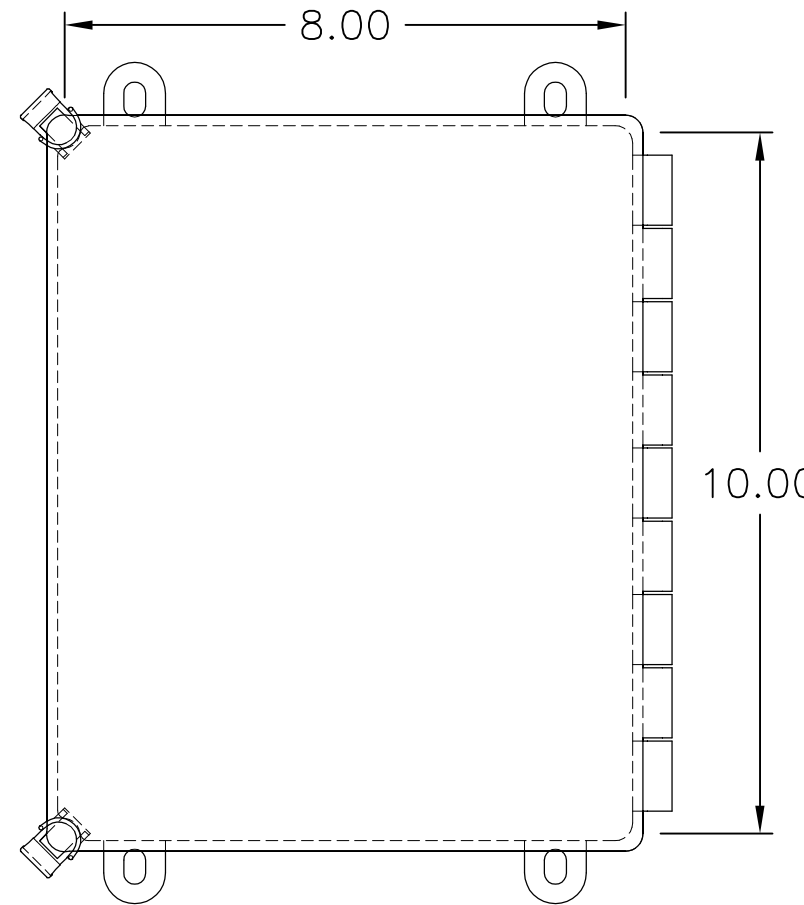
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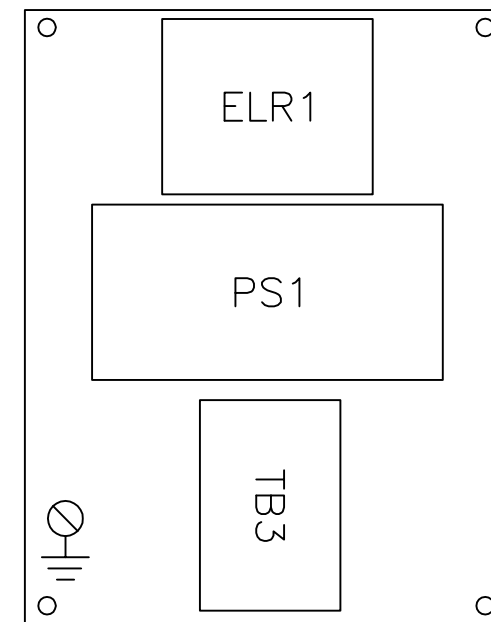
ENCLOSURE LAYOUT - EN3
10"Hx8"Wx6"D
NEMA 4X FIBERGLASS



SUB-PANEL LAYOUT
8.75"Hx6.88"W

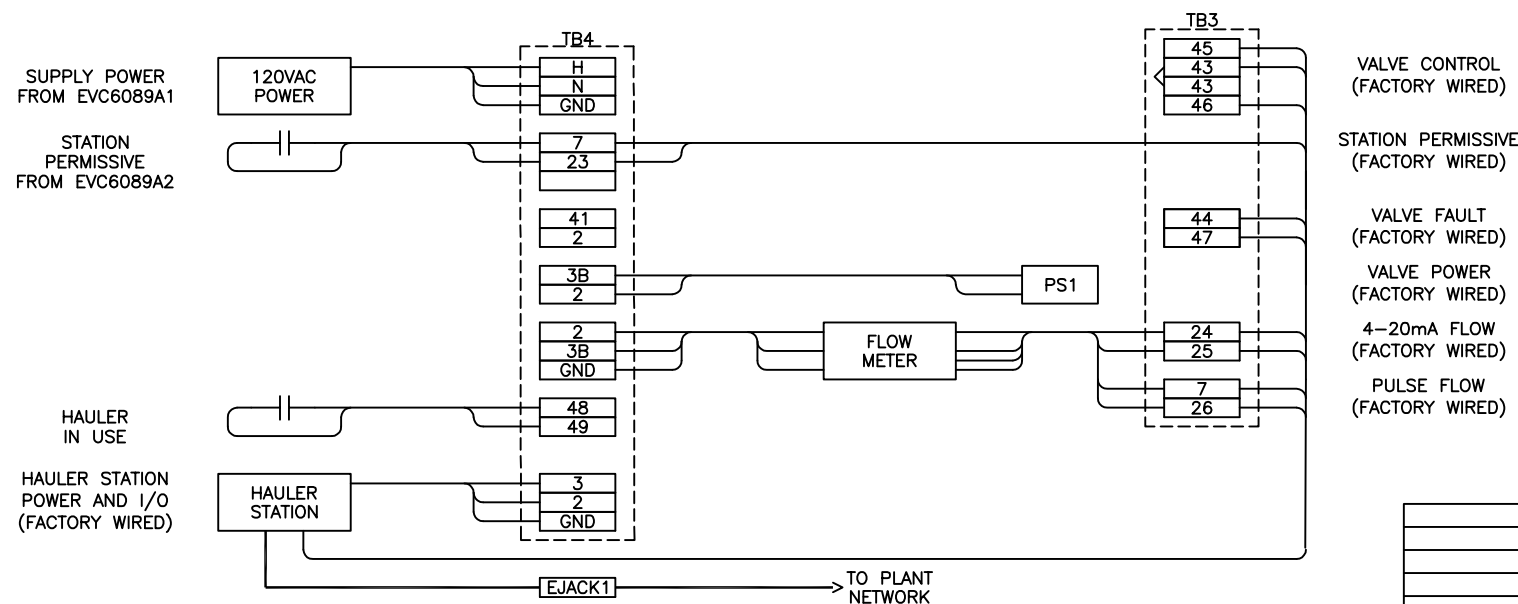


ENCLOSURE LAYOUT - EN2
10"Hx8"Wx6"D
NEMA 4X FIBERGLASS



SUB-PANEL LAYOUT
8.75"Hx6.88"W

TERMINAL WIRING DIAGRAM

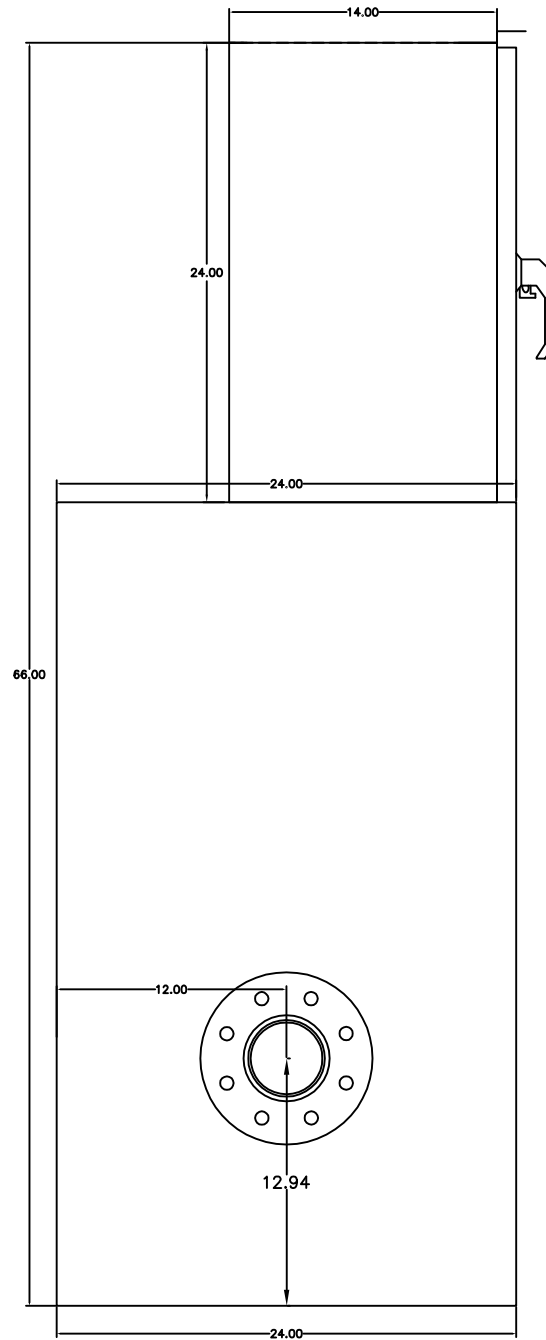


REVISION	BY	CHKD	DATE	LTR

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DESCRIPTION										
120VAC					SIZE					
TYPE	NONE				DI	ALS	ALS			
DATE	STD. BY	STD. CHKD.	STD. APPVD.	SCALE	DATE	PROJ. BY	PROJ. CHKD.	PROJ. APPVD.		
DRAWING NUMBER					PROJECT NUMBER					
CPO3					WEC213223					
SHEET NO.										
2 OF 2										

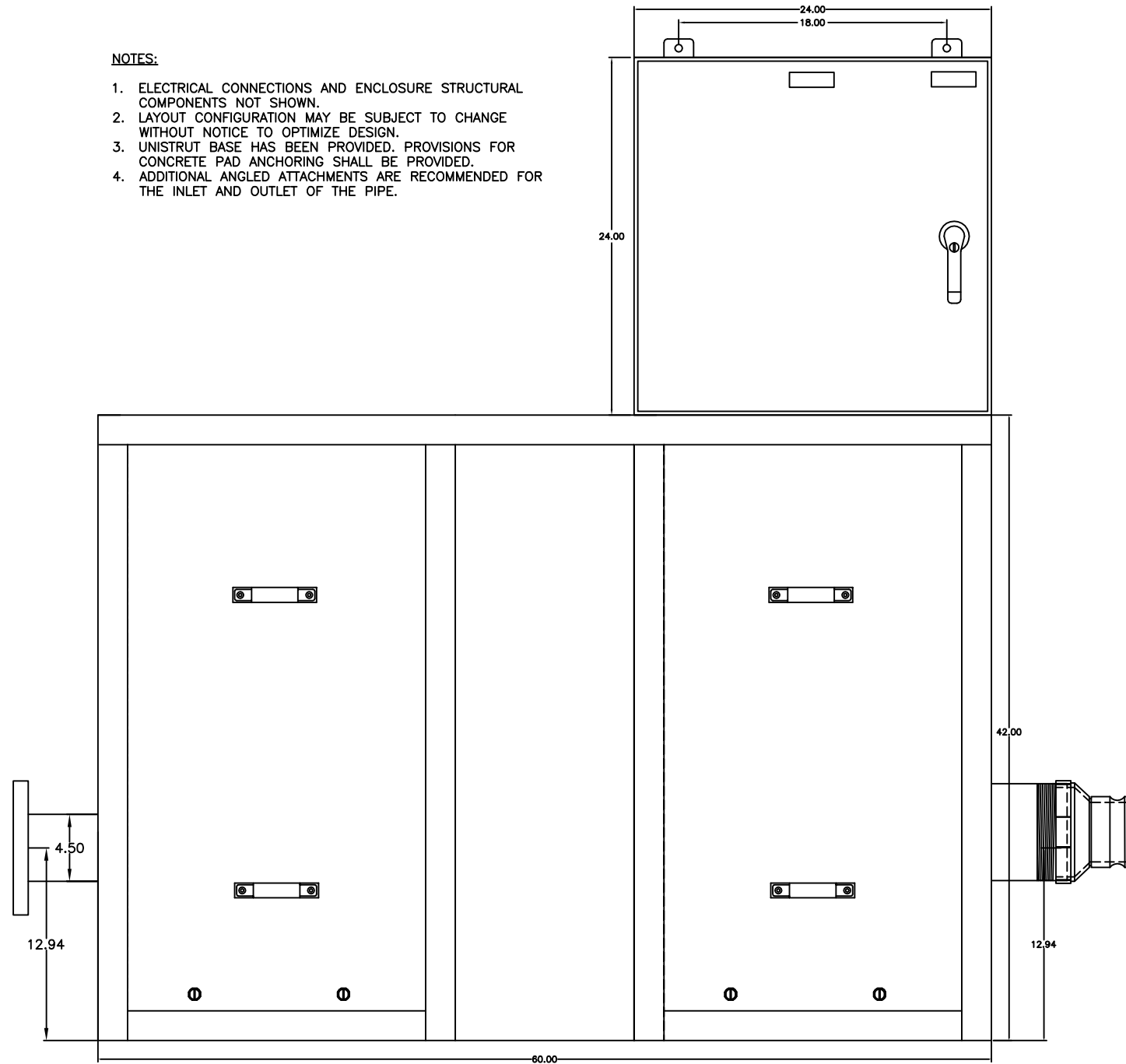


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NOTES:

1. ELECTRICAL CONNECTIONS AND ENCLOSURE STRUCTURAL COMPONENTS NOT SHOWN.
2. LAYOUT CONFIGURATION MAY BE SUBJECT TO CHANGE WITHOUT NOTICE TO OPTIMIZE DESIGN.
3. UNISTRUT BASE HAS BEEN PROVIDED. PROVISIONS FOR CONCRETE PAD ANCHORING SHALL BE PROVIDED.
4. ADDITIONAL ANGLED ATTACHMENTS ARE RECOMMENDED FOR THE INLET AND OUTLET OF THE PIPE.

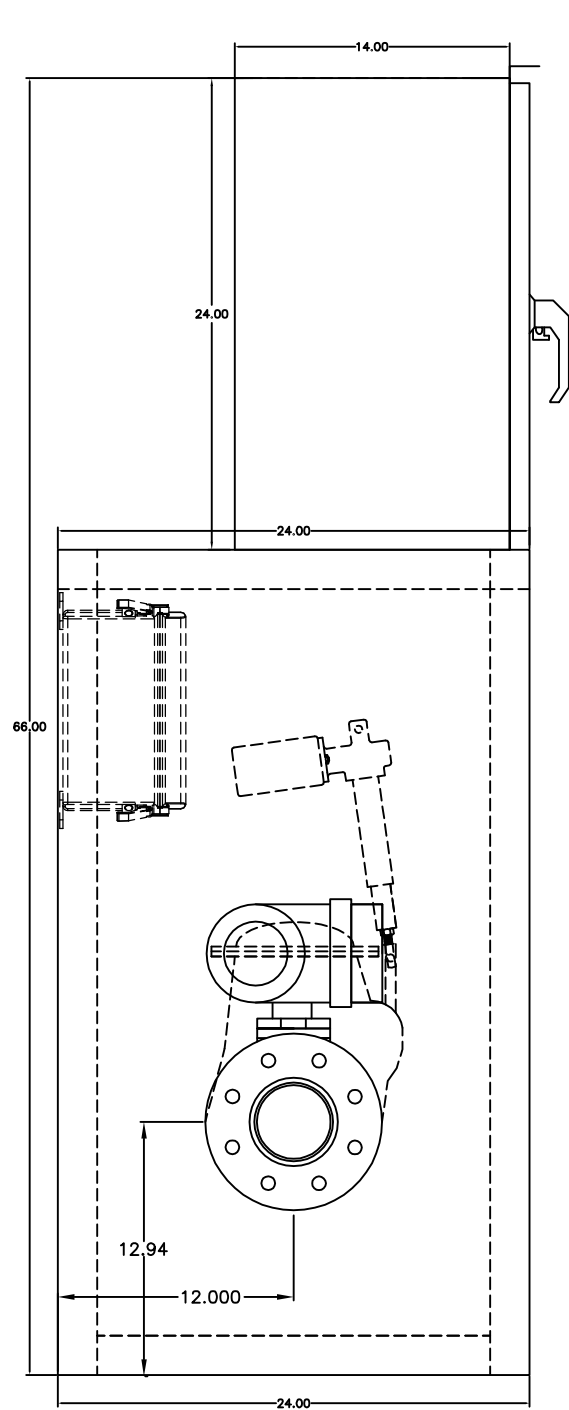


SEPTAGE HAULER ACCESS STATION									
DESCRIPTION									
120VAC									
TYPE									
NONE									
SIZE									
06/02									
DI									
ALS									
ALS									
DATE	STD. BY	STD. CHKD.	STD. APPVD.	SCALE	DATE	PROJ. BY	PROJ. CHKD.	PROJ. APPVD.	REV.
DRAWING NUMBER							PROJECT NUMBER		
CPO4							WEC213223		
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REVISION									LTR
									BY
									CHKD
									DATE
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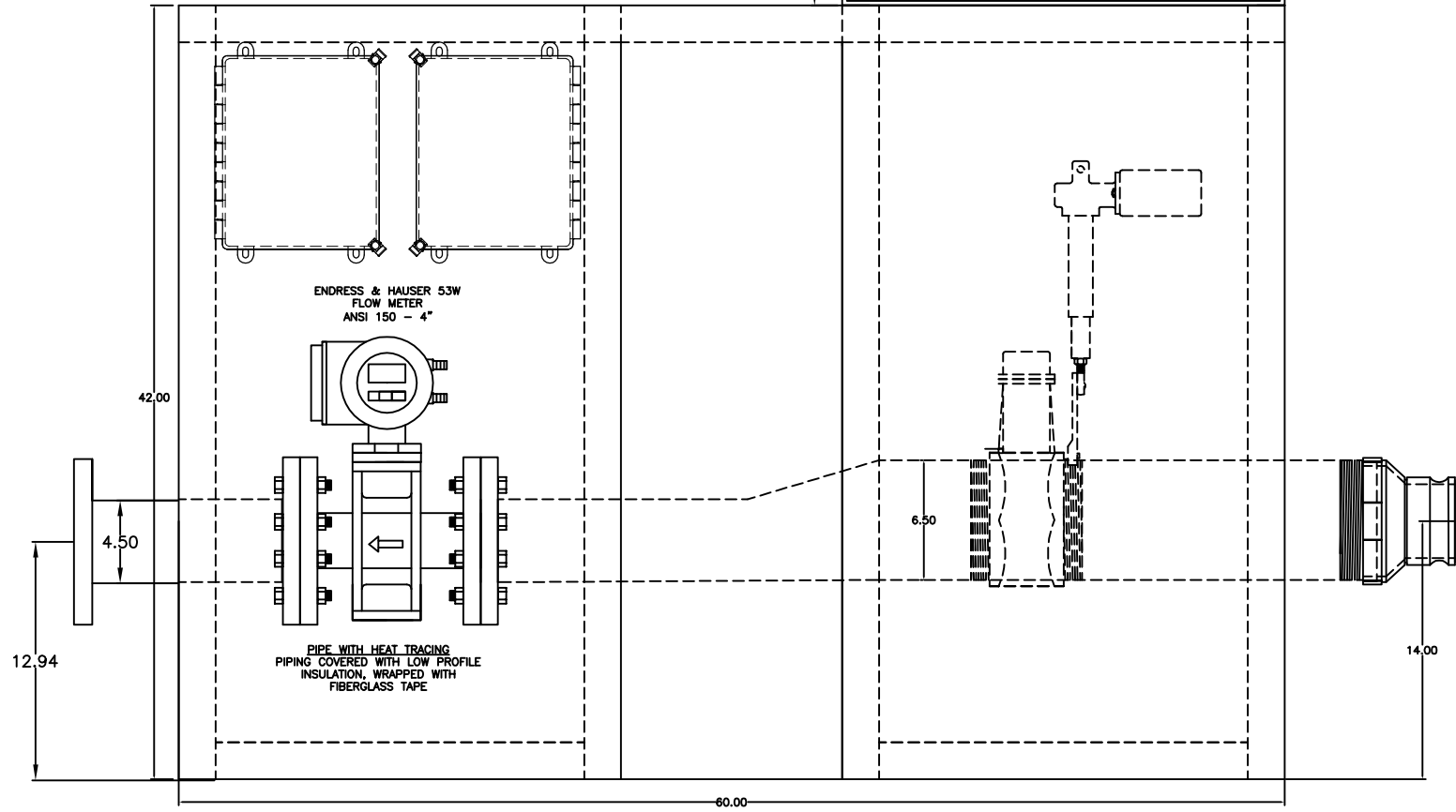
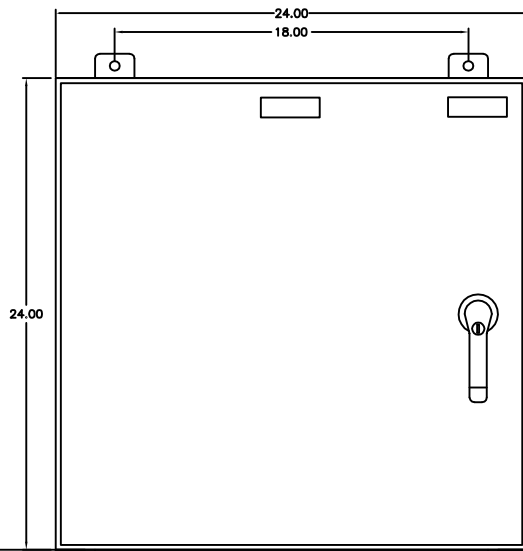
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1 OF 2

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NOTES:

1. ELECTRICAL CONNECTIONS AND ENCLOSURE STRUCTURAL COMPONENTS NOT SHOWN.
2. LAYOUT CONFIGURATION MAY BE SUBJECT TO CHANGE WITHOUT NOTICE TO OPTIMIZE DESIGN.
3. UNISTRUT BASE HAS BEEN PROVIDED. PROVISIONS FOR CONCRETE PAD ANCHORING SHALL BE PROVIDED.
4. ADDITIONAL ANGLED ATTACHMENTS ARE RECOMMENDED FOR THE INLET AND OUTLET OF THE PIPE.



SEPTAGE HAULER ACCESS STATION									
DESCRIPTION									
120VAC									
TYPE									
NONE									
DATE	STD. BY	STD. CHKD.	STD. APPVD	SCALE	DATE	PROJ. BY	PROJ. CHKD.	PROJ. APPVD	REV.
					06/02	DI	ALS	ALS	
DRAWING NUMBER					PROJECT NUMBER				
CPO4					WEC213223				
SHEET NO.									
2 OF 2									

REVISION	BY	CHKD	DATE	LTR



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