



WEAVER GENERAL CONSTRUCTION COMPANY
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 Englewood, CO 80110
 Phone: (303) 789-4111 FAX: (303) 789-4310

SUBMITTAL TRANSMITTAL

July 06, 2011
WGC Submittal No: 11331-001

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

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

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

CONTRACTOR: **Parkson Corporation**
 562 Bunker Court
 Vernon Hills, IL 60061-1831
 954-974-6610 Andrea Gonzales (Project Manager in FL)

SUBJECT: Aqua Guard® Units (2) Model AG-MN-A - TAGS 20119602 & 20119603

SPEC SECTION: 11331: Screening Equipment

PREVIOUS SUBMISSION DATES: None

DEVIATIONS FROM SPEC: ___ YES X NO

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

Contractor's Stamp:

Engineer's Stamp:

Date: 7/6/11
 Reviewed by: H.C. Myers
 (X) Reviewed Without Comments
 () Reviewed With Comments

**ENGINEER'S
 COMMENTS:** _____



SUBMITTAL

FOR

(2) MODEL AG-MN-A 75, 2.5' x 9', 3mm
AQUA GUARD® UNITS
PROJECT NUMBER 201196
SERIAL NUMBERS 20119602 AND 20119603

PROJECT NAME AND LOCATION:

HAROLD D. THOMPSON REGIONAL WATER RECLAMATION FACILITY
FOUNTAIN, COLORADO

YOUR LOCAL PRODUCT REPRESENTATIVE:

MISCO INTER MOUNTAIN
3033 S. PARKER ROAD
TOWER 1, SUITE 350
AURORA, CO 80014
PHONE: 303-309-6150
FAX: 303-468-6159

PARKSON
562 BUNKER COURT
VERNON HILLS, IL 60061-1831 • U.S.A.
PHONE: 847-816-3700
FAX: 847-816-3707
SERVICE: 1-888-PARKSON
PARTS (TOLL FREE): 1-800-249-2140
www.parkson.com
technology@parkson.com

Dated: July 1, 2011

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LETTER OF COMPLIANCE

July 1, 2011

This submittal package is complete and meets the intent of the specifications for the Harold D. Thompson Regional Water Reclamation Facility, Fountain, Colorado, Specification Section 11331, and entitled Screening Equipment.

Parkson will supply two (2) Aqua Guard[®] units, Model AG-MN-A 75, 2.5' x 9', 3mm and two (2) main control panels under Parkson assigned Project Number 201196 for the Harold D. Thompson Regional Water Reclamation Facility Project.

Clarifications and deviations are noted below:

Specification Sections 11331 1.1 A:

To clarify, Parkson will supply two (2) Aqua Guard screens and (2) Control panels. The manually cleaned Bar Screen and Rake shall be provided by others than Parkson. These items were specifically excluded in Parkson Quotation 201196R1 dated January 4, 2011.

Specification Sections 11331 1.4 B 3, drawing HW-3, and drawing HW-4:

To clarify, it will not be necessary to create a "baffle reduction" grout to reduce the channel width to 2'-6". The Aqua Guard units will be provided with baffle plates to prevent bypass thru the sides of the screens. The 2' x 1' overhang mounting pads shown on Sections 'C' and 'E' must to be removed. They are not required for mounting the screens.

Specification Sections 11331 2.1 A 7:

To clarify, the Aqua Guard screen has trash removal capacity of 0.972 cubic yards per hour.

Specification Sections 11331 2.2 A 5:

To clarify, as a standard, the cross members on Aqua Guard screen frames are constructed of 3/16" thick stainless steel channels.

Specification Sections 11331 2.4 C 1:

To clarify, SSAC current monitor is supplied as equal. See attached Motor Current Monitor Data cut-sheets for more information. A motor ampere readout is not being provided.

Specification Sections 11331 2.6 A 2 f & g:

To clarify, rotating brush elements refers to an obsolete design where 4 individual brush rows were fastened to a single shaft. The new design includes a single tufted core incorporating all four elements that is fastened to the brush shaft. One new tufted core assembly is provided as equal.

Specification Sections 11331 3.1 B:

To clarify, the units will be factory tested for a minimum of 1 hour prior to shipment. Parkson as a standard does not recommend running the unit dry for an excessive amount of time to avoid premature wear on the units.

No other Specifications are available.

Please confirm the dimensions highlighted with a hexagon bubble on submittal drawing 20119601.

For further clarification of these points, please consult the submittal package.

Sincerely,

PARKSON

Arturo Rusiana
Project Engineer-Aqua Guard unit

Affidavit of Compliance



1401 West Cypress Creek Road, Suite 100
Fort Lauderdale FL 33309-1969

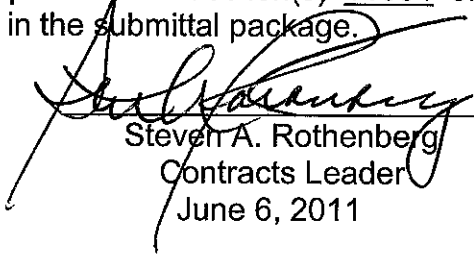
Phone 954.974.6610
Fax 954.974.6182

AFFIDAVIT OF COMPLIANCE

Addressed to: Weaver General Construction Co. and GMS, Inc.

Reference: **Project:** Harold D. Thompson Regional Water Reclamation Facility for the Lower Fountain Metropolitan Sewage Disposal District - Aeration Basins and Aerobic Digester Basin

Parkson Corporation has examined the Contract Documents and verified that the 'SCREENING EQUIPMENT meets in every way the performance requirements and design specifications set forth in Specification Section(s) 11331 of the Contract Documents except as may be noted in the submittal package.

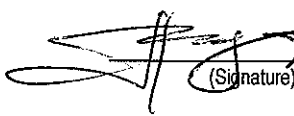

Steven A. Rothenberg
Contracts Leader
June 6, 2011

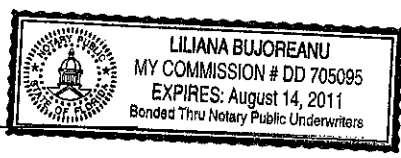
STATE OF FLORIDA }
COUNTY OF BROWARD }

The foregoing instrument was acknowledged before me this 06/06/11
(Date)

by Steven A. Rothenberg
(Name of officer or agent, title of officer or agent)
of Parkson Corporation
(Name of Corporation Acknowledging)

a Delaware corporation, on behalf of the corporation. He/she is personally known to me ~~or has produced~~
(Type of Identification)
as identification and did (did not) take an oath.


(Signature) Notary Public, Commission No. _____
(Name of Notary typed, printed or stamped)



Technical Specifications

**TECHNICAL SPECIFICATIONS
AQUA GUARD® BAR/FILTER SCREEN**

**Harold D. Thompson Regional Water Reclamation Facility
Fountain, Colorado
Project Number 201196
Serial Numbers 20119602 and 20119603**

1.0 GENERAL

- 1.1 There will be furnished (2) model AG-MN-A75, 2.5' x 9', 6mm Aqua Guard® Mechanical Bar/Filter Screen units, as supplied by Parkson Corporation, Vernon Hills, IL. The Aqua Guard® units will consist of a frame assembly, filter belt/screen assembly, drive assembly, rotating brush assembly, and controls.
- 1.2 The automatic bar/filter screen will be designed to positively clean and remove debris up to 3 inches in diameter from the influent stream by means of high impact plastic filter elements designed to retain and elevate debris to the discharge point of the unit where the rotating brush assembly cleans the elements.
- 1.3 The unit shall be suitable for installation and operation in a channel measuring 3.5 feet wide and 4.66 feet deep. There shall be a 3.36-inch recess (notch) in the channel bottom to accommodate the base of the screen. The angle of inclination shall be 75 degrees from horizontal. The opening from which the unit discharges screenings from its enclosure shall be at least 4.00 feet above the operating floor elevation at which the screen is supported. This is the available clearance for the container/compactor to collect the debris. The total discharge height of the screen, as measured from its base to the screenings discharge point, shall be 9 feet.
- 1.4 PERFORMANCE. The screens shall be capable of passing a maximum peak flow of 4.625 MGD based on a nominal unit width of 2.5 feet, with a downstream water level of 1.5 feet. The head loss at the maximum flow of clean water shall not exceed 13 inches. The calculated head loss is based on the assumption of a clean screen, clean water, and steady state flow conditions.
- 1.5 The screens shall be capable of presenting a clean filtration surface to the influent stream at all times during continuous operation. It shall be capable of intermittent operation in order to form a mat of material to provide maximum trash removal. Additionally, in order to maximize the capture of paper, rags, and other flexible debris, which tends to drape over and adhere to the filtration surfaces, the screen shall have 0.73 square feet of contact surface area per square foot of wetted filtration belt frontal surface.

- 1.6 The unit shall be capable of handling 0.972 cubic yards per hour of trash in order to ensure that the maximum amount captured by the screen can be transported out of the channel and into the waiting receptacle.

2.0 CONSTRUCTION AND MATERIALS

2.1 FRAME ASSEMBLY

- 2.1.1 The frame of the unit, which is stationary, shall be constructed from type 304 stainless steel with a thickness of 3/16 inch. It supports and locates all of the operating components. The unit shall rest at the bottom of the channel, and be anchored at the operating floor elevation. No mechanical mounting or fastening of the unit frame is required to the sidewalls or bottom of the channel.
- 2.1.2 The "A" frame unit shall be supported at the operating floor elevation by support legs constructed from type 304 stainless steel. The legs shall be designed to allow the unit to pivot the screen out of the channel without dewatering (e.g. for bypass purposes). Routine service of the unit is possible with the screen in the channel.
- 2.1.3 Guide rails shall be mounted to each side on the inside surface of the frame to direct the filter belt during its ascension out of the channel. The guide rails shall be 1/2 inch thick and will be constructed from type 304 stainless steel.
- 2.1.4 At the top of the screen, circular chain guides shall gently direct the filter belt from its ascending path out of the channel towards the drive sprockets. These circular guides shall be constructed from type 304 stainless steel and shall be welded to a type 304 stainless steel shaft. In order to reduce the wear on both the chain and chain guides, the shaft shall be secured to bearings on each side of the frame and free to rotate.
- 2.1.5 Chain guides shall also be provided to direct the filter belt from the drive sprockets to the descending path into the channel. These fixed rails shall be constructed of type 304 stainless steel and shall be 5/8 inch thick.
- 2.1.6 Lower return guides shall be provided at the base of the screen to direct the filter belt during its 180-degree turn from the descending to ascending paths. The lower guide rails shall be constructed from 1/2-inch thick type 304 stainless steel and shall be fixed in place as low as possible in the frame to optimize the submerged screen area. No submerged bearing or rotating guides are used that will require routine maintenance or that may become fouled by trash and debris.

- 2.1.7 Neoprene rubber seals with type 304 stainless steel backing plates shall be mounted along the upstream edges of the frame to seal the outer edge of the frame against the channel wall, and the area between the frame and filter belt side plates.
- 2.1.8 The bottom of the unit shall be sealed with two rows of nylon brushes, which allow the elements to pass through, but prevents trash from passing beneath the filter elements, ensuring capture of all solids and trash by the filter belt.
- 2.1.9 All shaft bearings are mounted externally to the side frame for ease of access and maintenance.
- 2.1.10 The portion of the screen above the channel shall be equipped with covers to help control the emission of odors and protect operators from contact with moving parts. The covers will also minimize misting and dripping. All enclosures shall be removable. There shall be hinged sections on the front and rear of the unit for access to the screen and rotating brush assembly for periodic maintenance. The covers shall be fabricated from 14 gauge type 304 stainless steel.

2.2 FILTER BELT/SCREEN ASSEMBLY

- 2.2.1 The screen shall provide dual filtration of all materials in order to minimize compaction of captured debris and minimize the head loss through the screen. This shall be accomplished by recessing the horizontal fine filtration opening in the face of the screen. The coarse horizontal openings formed by the upper or forward shank/arm of the elements shall be 8 millimeters and shall be the first opening the flow stream contacts as it passes through the screen. The lower or recessed shank/arm of the elements shall create a two dimensional grid which limits the maximum vertical opening to 15 millimeters and the fine horizontal opening of 3 millimeters. The elements are arranged in a staggered fashion to form an endless belt and to create a range of motion that allows the recessed shank/arm of one row of elements to pass through the plane of the forward arm of the next row of elements it meshes with. Each filter element shall be a single molded component with a rake integral to its shape. The filter belt shall form a row of these rakes spaced every 4 inches, capable of lifting material of up to 3 inches in diameter out of the channel. The elements are secured to two separate filter shafts that pass through individual bosses in the elements.
- 2.2.2 The side plates (or end plates) are mounted next to the outermost elements of each filter row, and overlap to form a continuous moving sidewall for the filter belt. This moving wall prevents captured trash and debris from spilling over the sides of the filter belt. The side plates shall be constructed from a high strength phenolic resin.

- 2.2.3 The tension of the moving screen/filter belt assembly shall be completely supported by a stainless steel link chain. The chain must connect the filter shaft ends on both sides of the belt assembly so that the elements are free of tension, and support no weight of the assembly. The chain shall be of closed link design with 2 link sidebars, chain rollers and pins per link. The chain assembly shall have a minimum cross sectional area of 0.144 square inches at the weakest point of any individual link sidebar.
- 2.2.4 Chains shall be supplied with hollow pin construction that allows for the removal and replacement of the filter shafts, side plates and filter elements without releasing the chain tension. The unit is designed to allow this function to take place at the operating floor elevation with the screen in the channel. Chain rollers shall have a diameter of 1-3/4 inches.
- 2.2.5 All chain components shall be corrosion resistant stainless steel. Sidebars shall be type 304 stainless steel. Pins, bushings and rollers shall be type 410 stainless steel. 400 series components shall be heat treated to a minimum hardness of 39 on the Rockwell C Scale.
- 2.2.6 The filter shafts shall have a maximum diameter of 3/4 inch and be spaced on 4-inch centers in the direction of travel of the filter belt. The shafts shall be constructed from type 316 stainless steel.

2.3 DRIVE ASSEMBLY

- 2.3.1 The drive assembly consists of a gear reducer, motor, drive shaft, and eccentric bearing. The drive mechanism shall be protected from the trash stream to ensure that the screen runs smoothly without jamming. The driving force is transmitted to clean, trash free components to avoid mis-tracking or binding, which could render the screen inoperable, requiring manual cleaning and realignment.
- 2.3.2 The gear reducer is of hollow shaft design by Sumitomo, mounted directly to the unit external to the side frame and connected directly to the drive shaft with a keyless tapered bushing. The reducer shall be designed in accordance with AGMA recommendations for Class II service based on the required horsepower for operation of the machine.
- 2.3.3 The motor shall be a squirrel cage induction motor, TEFC, 230/460 volt, 3- phase, 60 Hertz, 1800 RPM by Baldor. The motor Horsepower shall be 1/2. Motor shall be nameplate for use in a Class 1, Division 1, Group D environment.
- 2.3.4 Overload protection shall be provided by an electrical overload device that senses motor current draw (SSAC Current Monitor or equal)

2.3.5 The filter belt drive shaft is located in the head of the unit and is supported at each end by the hollow shaft reducer and eccentric bearing. The drive shaft sprockets that engage the filter belt chain rollers and transmit motion to the filter belt assembly are welded to the drive shaft. The drive shaft and sprockets shall be constructed from type 304 stainless steel.

2.4 ROTATING BRUSH ASSEMBLY

2.4.1 The filter belt assembly is cleaned by the interaction of the filter elements and the rotating brush assembly without requiring any water or other mechanical devices capable of jamming (i.e. doctor blade) to remove the captured material.

2.4.2 The rotating brush assembly is supported by bearings on each side of the machine mounted externally to the machine frame. The brush is chain driven by the filter belt drive shaft.

2.4.3 The brush is comprised of two separate components, the brush shaft, and the brush core. The shaft is made of type 304 stainless steel. The brush core is made of UHMW, with tufted nylon bristles. The core is split into two halves that are fastened with stainless steel hardware to the brush shaft. This allows the brush to be easily removed from the machine simply by removing the hardware, and separating the core pieces from the shaft. To install a new brush, the two new core pieces are placed over the shaft, and the hardware is inserted through the factory holes and tightened.

2.4.4 The brush shall be orientated in a paddlewheel design with rows of bristles located at 90, 180, 270, and 360 degrees.

2.5 DISCHARGE CHUTE

2.5.1 A discharge chute shall be provided integral to the machine, constructed from 14 gauge type 304 stainless steel and designed to direct the screenings to the collection equipment below.

2.5.2 The chute shall have a 1/4-inch thick flange that shall allow it to be connected to ancillary washing, compacting, and collection equipment.

2.6 LUBRICATION

2.6.1 Lubrication lines shall be extended from all bearing housings to a central point located on the respective side of the machine, accessible from the operating floor for ease of maintenance.

2.7 FASTENERS

2.7.1 All fasteners shall be type 316 stainless steel.

2.8 SURFACE FINISH

2.8.1 SURFACE TREATMENT OF STAINLESS STEEL COMPONENTS All frame and structural members will be mechanically cleaned using Dupont Starblast. Sheet metal components such as covers or the discharge chute will be furnished with a 2B finish.

2.8.2 All other appurtenances including roller chain, brush sprockets, bearing housings, motor, reducer, etc. shall be supplied with the manufacturer's standard finish.

3.0 **ELECTRICAL DEVICES AND CONTROLS**

3.1 ELECTRICAL DEVICES: Interconnecting conduit and wiring will be the responsibility of the installing contractor. In addition to the drive motor, the following electrical devices will be furnished with each unit:

3.1.1 EXPLOSION PROOF EMERGENCY STOP LOCAL PUSH BUTTON STATION. A NEMA 7 emergency stop push button station will be mounted to the frame of the unit with a 1/2 inch NPT conduit connection. The pushbutton shall be lockable in the depressed way.

3.1.2 INTRINSICALLY SAFE FLOAT SWITCH. A float switch of chemical resistant polypropylene construction will be provided with a 316 SST pipe mounting bracket, float mounting clamp and expansion anchors. The mounting bracket requires a suitable length of 1" nominal pipe to suspend the float in the channel, to be supplied by others. The float will have a 20-foot long integral cable. An intrinsically safe barrier relay shall be mounted in the main control panel

3.1.3 EXPLOSION PROOF ULTRASONIC DIFFERENTIAL LEVEL SENSORS. A Milltronics HydroRanger 200 ultrasonic level controller will be supplied with two (2) ST-H transducers, FM rated for Class 1, Division 1, Groups C and D. Each sensor is supplied with 33 feet of integral cable with a 1 inch NPT conduit connection. A type 316 stainless steel mounting bracket will be provided for each sensor.

3.2 CONTROLS: The following controls will be provided:

3.2.1 A 480 Volt primary U.L. listed and labeled control panel in a NEMA 4X 304 SST, enclosure suitable for wall mounting. It will contain the following logic devices for proper operation of the equipment:

1. Programmable relay to perform necessary logic functions and

- monitor equipment mounted electrical devices.
- 2. Emergency Stop push button.
- 3. Hand-Off-Auto selector switch for screen operation.
- 4. Control power and run indicating lights.
- 5. Motor current monitor and hour meter.
- 6. Fault indicating light and system reset pushbutton.
- 7. Run and fault auxiliary output contacts for customer use.

3.2.2 A step-down control transformer, motor starter and fused disconnect will be provided.

3.3 SEQUENCE OF OPERATION

3.3.1 HAND OPERATION. When the screen Hand mode is selected, the screen will run continuously. Placing the selector switch in the Off position will stop the screen.

3.3.2 AUTOMATIC OPERATION. When the Auto mode is selected, the unit will run via the water level sensor or repeat cycle timer. After the water level has lowered, the unit will continue to run for the length of time set on the off delay timer, typically set at 30 seconds.

3.3.3 EMERGENCY STOP. The unit can be deactivated at any time by pressing either the control panel or unit mounted Emergency Stop push buttons.

3.3.4 FAULT CONDITIONS. Motor overload or high motor current will stop the drive motor and illuminate the screen fault light.

4.0 SPARE PARTS

4.1 The following spare parts will be provided.

- 1. Twenty (20) Filter elements.
- 2. Ten (10) Side plates.
- 3. Twenty (20) Snap rings 3/4" diameter.
- 4. Ten (10) Snap rings 63/64" diameter.
- 5. One (1) Rotating brush core replacement assembly.
- 6. One (1) Bearing Kit: Consisting of (2) take-up bearings, (1) sprocket drive shaft flange bearing, and (2) rotating brush drive flange bearings.
- 7. Two (2) tubes of bearing lubricating grease-Shell Alvania EP-2 or equivalent.

5.0 ANCHOR BOLTS

5.1 The manufacturer will supply type 316 stainless steel 3/4"-10 UNC threaded rods for use with the HILTI HY-150MAX Adhesive Anchoring system. Adhesive to be provided by others.

6.0 FACTORY SERVICE

- 6.1 The manufacturer will provide a qualified service representative following installation for 1 trip for 2 days for inspection of installation, equipment startup and operator training.

7.0 FACTORY ASSEMBLY, TESTING, AND INSPECTION

- 7.1 The screen shall be factory assembled and tested prior to being shipped. The Engineer and/or Owner may, at their option and own expense, witness the factory test. The equipment will be shipped completely assembled other than the motor/reducer, discharge chute and support legs. It shall be capable of being set in place and field erected by the contractor with a minimum of field assembly.

8.0 INSTALLATION, OPERATION AND MAINTENANCE MANUAL

- 8.1 In addition to the normal Installation, Operation, and Maintenance manuals required by the contract, a spare manual will be shipped with the unit in order to allow for proper operation of the equipment prior to the release of all final Installation, Operation, and Maintenance manuals.

Equipment Data Sheet

PARKSON CORPORATION

Job Name/Location : Harold D. Thompson Regional WRF-Fountain, CO

Originator: RSS Date: 6/22/2011

Checked by: ADR Date: 6/27/11

Project Number: 201196 Revision:

Revised by: Date:

AQUAGUARD MECHANICAL BAR SCREEN

Aqua Guard Model	AG-MN-A
Aqua Guard Angle	75
Aqua Guard Width	2'-4 1/2"
Aqua Guard Discharge Height	9'-0"
Channel Width	3.5'
Channel Depth	4.66' w/ 3.36" Recess
Operating Floor	NA
No. of Aqua Guards	2
Filtration Opening	3 mm
Total Unit Weight	2236 Lbs
A.G. Frame	3/16" Thick, 304 SST
Drive Shaft and Sprocket	304 SST
Filter Shafts	3/4" Diameter, 304 SST
Rails	1/2" Thick, 304 SST
Screening Elements	High Impact Plastic
Side Plates	Phenolic
Side Seals	Neoprene w/ 304 SST Backing Plates
Front Seal	Nylon Bristles w/ 304 SST Support
Brush	Nylon Bristles w/ 304 SST Shaft
Chain Links	304 SST
Chain Rollers, Bushings & Pins	410 SST HRC 39-55 (1 3/4" Dia Rollers)
Discharge Chute	14 ga. 304 SST
Take Up Screws	316 SST
Take Up Nuts	Titanium
Hardware Material	316 SST
Gaskets	Neoprene
Covers	14 ga. 304 SST

Equipment Sizing

PARKSON CORPORATION

Job Name/Location : Harold D. Thompson Regional WRF-Fountain, CO

Originator: RSS Date: 6/22/2011

Checked by: ADR Date: 6/27/11

Project Number: 201196 Revision:

Revised by: Date:

AQUAGUARD MECHANICAL BAR SCREEN

Aqua Guard Model	AG-MN-A
Aqua Guard Angle	75
Aqua Guard Width	2'-4 1/2"
Aqua Guard Discharge Height	9'-0"
Channel Width	3.5'
Channel Depth	4.66' w/ 3.36" Recess
Operating Floor	NA
No. of Aqua Guards	2
Filtration Opening	3 mm
Total Unit Weight	2236 Lbs
A.G. Frame	3/16" Thick, 304 SST
Drive Shaft and Sprocket	304 SST
Filter Shafts	3/4" Diameter, 304 SST
Rails	1/2" Thick, 304 SST
Screening Elements	High Impact Plastic
Side Plates	Phenolic
Side Seals	Neoprene w/ 304 SST Backing Plates
Front Seal	Nylon Bristles w/ 304 SST Support
Brush	Nylon Bristles w/ 304 SST Shaft
Chain Links	304 SST
Chain Rollers, Bushings & Pins	410 SST HRC 39-55 (1 3/4" Dia Rollers)
Discharge Chute	14 ga. 304 SST
Take Up Screws	316 SST
Take Up Nuts	Titanium
Hardware Material	316 SST
Gaskets	Neoprene
Covers	14 ga. 304 SST

Screen Drive System Data

PARKSON PART NUMBER:	3007-286/M
MANUFACTURER:	Sumitomo
TYPE:	Cyclo HBB Helical Buddybox
MODEL NUMBER:	EHYJS-B612DBY-F3-809
TOTAL RATIO:	809:1
INPUT RPM:	1800
OUTPUT RPM:	2.16
MAX OUTPUT TORQUE:	12,747 in-lbs @ 1/2 Hp Input
ASSEMBLY:	F3, Flange mount Output Shaft Horizontal – Top
OUTPUT HOLLOW SHAFT DIA:	2 3/16", Bore Keyless Tapered Bushing
INPUT:	56 C-Face
UNIT WEIGHT:	169 lbs.

PRIMARY CYCLO/RATIO:
SECONDARY CYCLO/RATIO:
BUDDYBOX RATIO:

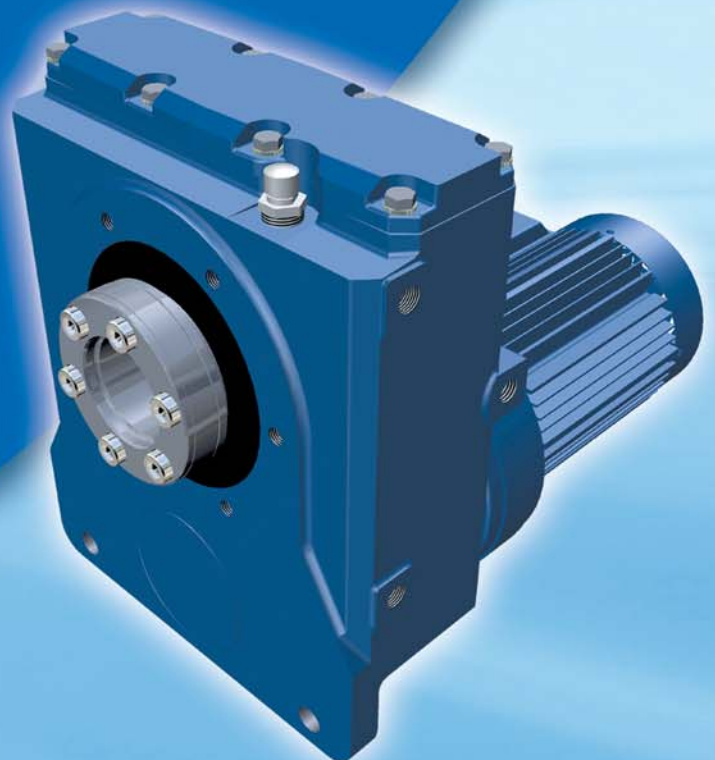
NOTES:

1. Unit to be C-Face input, hollow shaft with tapered bushing and flange mount.
2. Unit to be supplied with magnetic drain plugs on the Buddybox portion and galvanized steel drain plugs on the Cyclo portion.
3. Unit to be filled with grease on the Cyclo (input) portion and oil in the geared (output) portion per the manufacturer's recommendation.
4. Unit to be supplied with washdown duty steel-it paint, washdown breather, rust preventative on all exposed shafts.
5. Unit supplied with Lovejoy Coupling.

Sumitomo Drive Technologies
Always on the Move

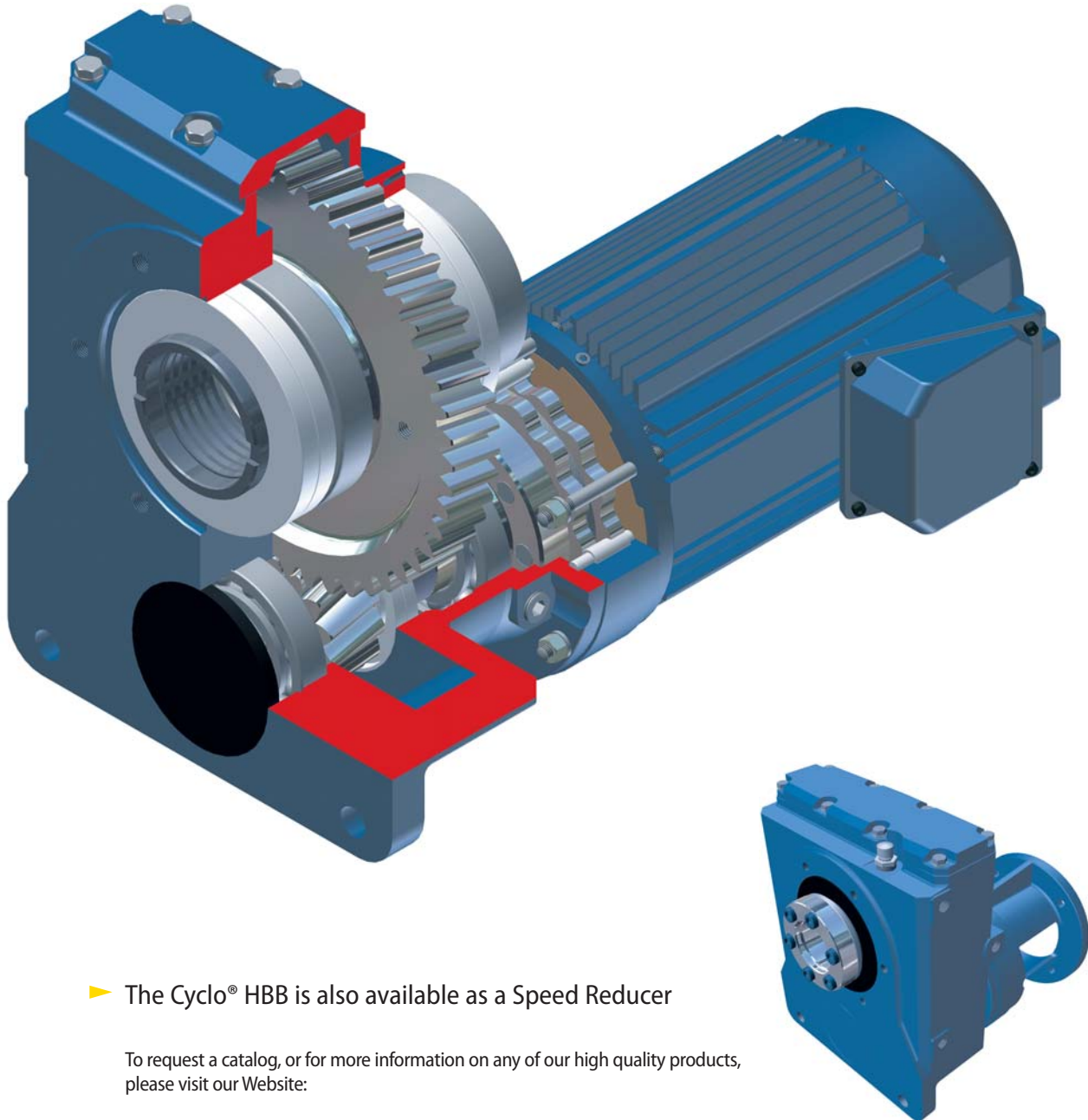
Cyclo[®] HBB HELICAL BUDDYBOX

Speed Reducers and Gearmotors
featuring Keyless Taper-Grip[®] Bushing



CATALOG 07.601.50.004

Rugged Helical Output, Modular Cyclo® Input, Compact Size



▶ The Cyclo® HBB is also available as a Speed Reducer

To request a catalog, or for more information on any of our high quality products, please visit our Website:

www.smcyclo.com

► Flexible configurations

- Shaft Options:
hollow
- Mounting Options:
flange
face

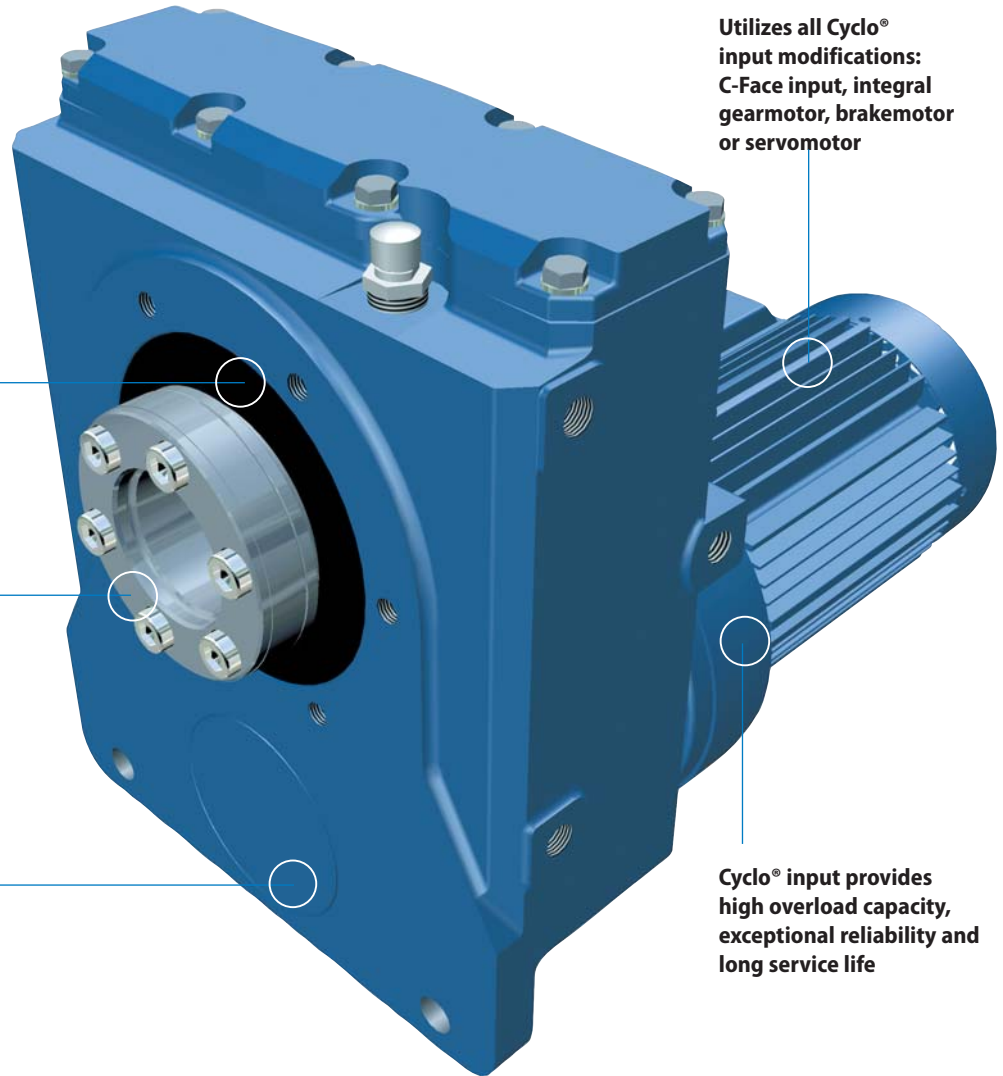
Double output seals prevent lubricant leaks and protect from contamination

Patented keyless, steel Taper-Grip[®] bushing allows for quick and easy mounting and removal. Installs from either side

Patented universal housing design

Utilizes all Cyclo[®] input modifications: C-Face input, integral gearmotor, brakemotor or servomotor

Cyclo[®] input provides high overload capacity, exceptional reliability and long service life



Cyclo[®] Quality and Reliability, Shaft Mount Design

- High performance steel gearing components deliver **85-90% efficiency**



Product Description

Sumitomo's Cyclo® Helical Buddybox (Cyclo® HBB) speed reducers and gearmotors provide **innovative shaft mounted drive solutions for demanding services**. The Cyclo® HBB combines the quiet, efficient and reliable performance of the Cyclo® technology input with the **rugged helical gear output**. The **modular design** provides a compact, efficient product and the most flexible range of output speed and torque combinations available. Sumitomo's patented Taper Grip® bushing system enhances the Cyclo® HBB value by offering a simple shaft-mounting device that provides **self-aligning, backlash-free torque transmission** to the driven shaft. The Cyclo® HBB design is flexible and easily adapts to CEMA Screw Conveyor Drive applications with a modular conversion kit.

Features & Benefits

- **Cycloidal speed reduction technology**
 - ~ Quiet, efficient and reliable operation with high torque density and compact size
- **Modular design**
 - ~ Interchangeable cast iron housings in foot, flanged or face mount configurations
- **Double output seals**
 - ~ Virtually leak-free operation and optimal protection from lubrication contamination
- **Taper Grip® Bushing**
 - ~ Simple, steel, keyless shaft mounting system resists fretting and eases unit installation and removal from driven shaft
- **CEMA Screw Conveyor Drive option**
 - ~ Quick and simple conversion for Cyclo® HBB units to fit CEMA standard dimensions

Specifications

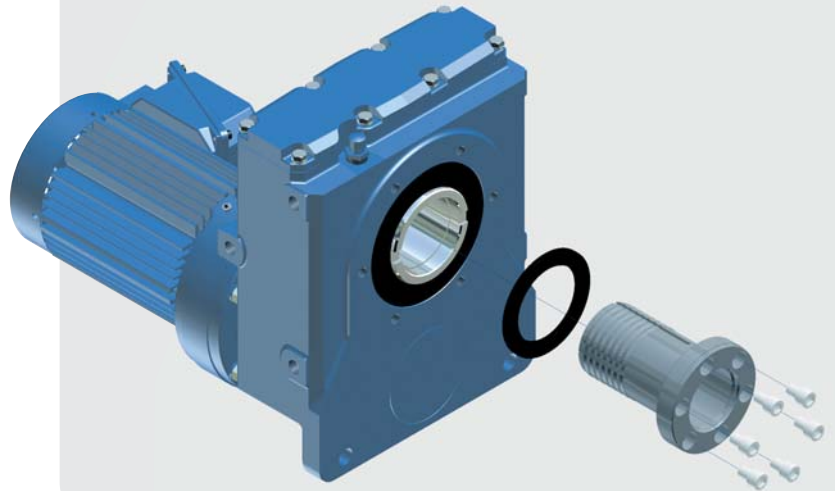
Ratios:	11:1 up to 26,000:1 and greater
Torque Capacity:	Up to 75,800 in. lbs.
HP:	1/8 to 40
Mounting:	Hollow Shaft, Flange, Face
Options:	Integral Motor, C-Face
Motor Standards:	NEMA, IEC, JIS, UL, CSA, CE

► Keyless, steel Taper-Grip® bushing makes mounting of hollow shaft units easy and economical

The Sumitomo **Taper-Grip®** bushing is a keyless, torque transmission device integrated into the shaft mounted, offset parallel Cyclo® HBB reducer and gearmotor product lines.

The **unique, patented design** has a number of benefits :

- Easy mounting and removal of the unit to and from the driven shaft
- Standard bore sizes require no shaft preparation such as a keyway, undercut, or keeper plate
- Backlash free torque transmission
- Works with standard shafting, no special tolerances required
- Automatic shaft center alignment
- Resistant to fretting and corrosion
- Multiple stock bore sizes for quick delivery.

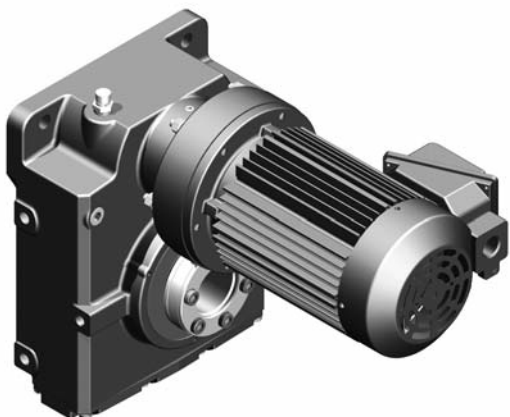
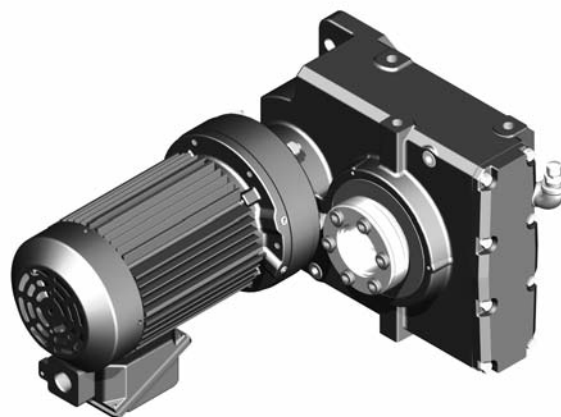
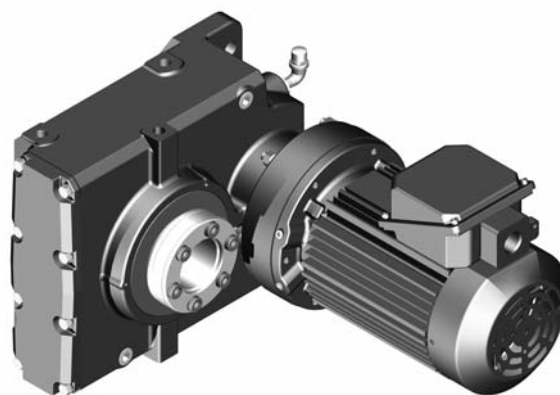
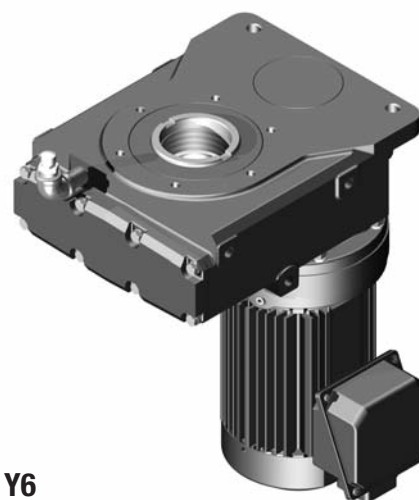


► Applications

- Material Handling
- Conveyors
- Baggage Handling
- Shredders
- Belt Filter Press
- Mixer/Blender
- Rolling Mill Table
- Screw Conveyors
- Elevators
- Hoist Drives
- Climber Screens
- Food Processing

Mounting Positions

Please see the Appendix (Section 5) for additional mounting configurations.

**Y1****Y2****Y3****Y4****Y5****Y6**

Configure a Model Number

Output Shaft Orientation

Type	Prefix
Horizontal	H
Vertical	V

Mounting Style

Type	Prefix
Shaft Mount (Hollow Shaft)	Y
Flange (Keyed Hollow Bore)	F

Input Connection

Input Connection	Prefix
C-Face Adapter	J
Hollow Input Shaft	X

Modification

	Prefix
Special	S
Standard	

Frame Size

Single Reduction		
Z6090	B6120	D6160
Z6095	B6125	D6165
A6100	C6140	E6170
A6105	C6145	E6175
Double Reduction		
Z609DA	C614DB	D616DC
A610DA	C614DC	E617DA
B612DA	D616DA	E617DB
B612DB	D616DB	E617DC
C614DA		

Include the following information when ordering:

- Motor Specification (230/460 VAC 60 Hz is supplied, unless otherwise specified)
- NEMA frame size for C-face adaptor
- Bushing Bore size (**must be supplied**)
- Optional conduit box positions must be specified, otherwise Y1 is supplied.

Speed Reducers

Nomenclature

E H Y J - Z6090

Y - Y1 - 21

Cyclo® HBB product code (always "E")

Output shaft orientation

Mounting style

Input connection

Modification (Special feature)

Frame size

Shaft specification

Reducer specification

Mounting position and optional specification (as required)

Ratio

Nomenclature

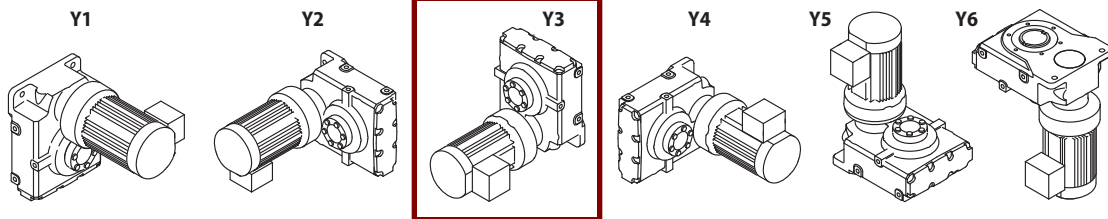
Shaft Specifications

Input Shaft	Hollow Output Shaft	Suffix
mm	Key (mm)	
DIN	Key (DIN)	E
Inch	Key (Inch)	K
mm	Taper-Grip®	M
DIN	Taper-Grip®	G
Inch	Taper-Grip®	Y

Reducer Specification

Type	Suffix
Standard	
High Capacity Bearing (Required for Screw Conveyor)	R1
Baseplate	BP
Shovel Base	SB
Top Mount	Center Right Left
	- PR PL
Low Backlash	LB
Torque Limiter	TL

Mounting Positions (Please see the Appendix, Section 5, for additional mounting positions.)



Single Reduction		Double Reduction	
Input Ratio	Total Ratio	Input Ratio	Total Ratio
3	11	104	364
5	18	121	424
6	21	143	501
8	28	165	578
11	39	195	683
13	46	231	809
15	53	273	956
17	60	319	1117
21	74	377	1320
25	88	473	1656
29	102	559	1957
35	123	649	2272
43	151	731	2559
51	179	841	2944
59	207	1003	3511
71	249	1247	4365
87	305	1479	5177
119	417	1849	6472
		2065	7228
		2537	8880
		3045	10658
		3481	12184
		4437	15530
		5133	17966
		6177	21620
		7569	26492

Nomenclature Example:

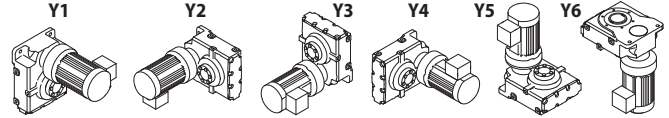
EHYJ – Z6090Y – Y1 – 21

E – Cyclo® Helical Buddybox
H – Horizontal O/P
Y – Shaft Mount (Hollow Shaft)
J – C-Face Input

Z6090 – Frame Size
Y – Inch Shaft Specification
Y1 – Installation Position
21 – Ratio

Frame Size Selection Tables 60 Hz, 1750 RPM

Double Reduction Y1, Y2, Y3, Y4, Y5, Y6 Mounting Positions



Dimensions on pages 2.18–2.21

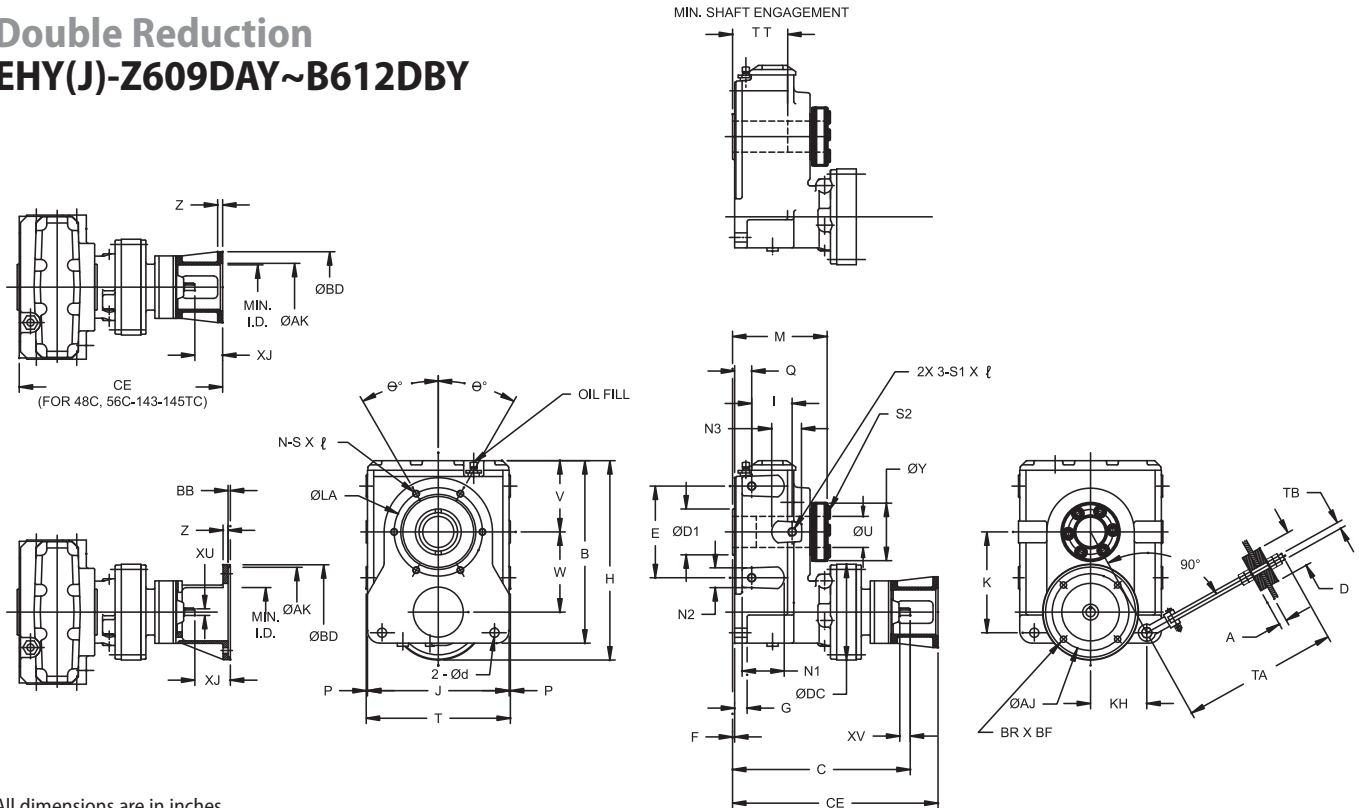
Output RPM	4.81	4.13	3.50	3.03	2.56	2.16	1.83	1.57	1.33	1.06	0.894	0.770	0.684	Frame
Ratio	364	424	501	578	683	809	956	1117	1320	1656	1957	2272	2559	Size
Input HP	0.337	0.290	0.245	0.212	0.180	0.152	0.125 breakaway HP required for cold temp. or high inertia applications ^[1]							Z609DA
Output Torque in lbs	3870	3870	3870	3870	3870	3870	3870	3870	3870	3870	3870	3870	3870	
Input HP	0.576	0.576	0.496	0.430	0.364	0.307	0.260	0.222	0.188	0.150	0.125 breakaway HP required for cold temp. or high inertia applications ^[1]			A610DA
Output Torque in lbs	6600	7680	7820	7820	7820	7820	7820	7820	7820	7820	7820	7820	7820	
Input HP	0.576	0.576	0.576	0.576	0.576	0.576	0.520	0.445	0.377	0.300	0.254	0.219	0.194	B612DA
Output Torque in lbs	6600	7680	9120	10400	12400	14700	15700	15700	15700	15700	15700	15700	15700	
Input HP	1.37	1.17	0.993	0.860	0.728	0.615	0.520	0.445	0.377	0.300	0.254	0.219	0.194	B612DB
Output Torque in lbs	15700	15700	15700	15700	15700	15700	15700	15700	15700	15700	15700	15700	15700	
Input HP	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.508	0.438	0.388	C614DA
Output Torque in lbs	6600	7680	9120	10400	12400	14700	17300	20300	24000	30000	31300	31300	31300	
Input HP	2.14	2.14	1.99	1.72	1.46	1.23	1.04	0.890	0.753	0.600	0.508	0.438	0.388	C614DB
Output Torque in lbs	24600	28600	31300	31300	31300	31300	31300	31300	31300	31300	31300	31300	31300	
Input HP	2.73	2.35	1.99	1.72	1.46	1.23	1.04	0.890	0.753	0.600	0.508	0.438	0.388	C614DC
Output Torque in lbs	31300	31300	31300	31300	31300	31300	31300	31300	31300	31300	31300	31300	31300	
Input HP	2.14	2.14	2.14	2.14	2.14	2.13	1.80	1.54	1.31	1.04	0.881	0.759	0.674	D616DA
Output Torque in lbs	24600	28600	33800	39000	46100	54300	54300	54300	54300	54300	54300	54300	54300	
Input HP	4.50	4.07	3.44	2.98	2.53	2.13	1.80	1.54	1.31	1.04	0.881	0.759	0.674	D616DB
Output Torque in lbs	51600	54300	54300	54300	54300	54300	54300	54300	54300	54300	54300	54300	54300	
Input HP	4.74	4.07	3.44	2.98	2.53	2.13	1.80	1.54	1.31	1.04	0.881	0.759	0.674	D616DC
Output Torque in lbs	54300	54300	54300	54300	54300	54300	54300	54300	54300	54300	54300	54300	54300	
Input HP	2.14	2.14	2.14	2.14	2.14	2.14	2.14	2.14	1.82	1.45	1.23	1.06	0.940	E617DA
Output Torque in lbs	24600	28600	33800	39000	46100	54600	64600	75500	75800	75800	75800	75800	75800	
Input HP	4.50	4.50	4.50	4.17	3.53	2.98	2.52	2.15	1.82	1.45	1.23	1.06	0.940	E617DB
Output Torque in lbs	51600	60100	71000	75800	75800	75800	75800	75800	75800	75800	75800	75800	75800	
Input HP	6.61	5.68	4.81	4.17	3.53	2.98	2.52	2.15	1.82	1.45	1.23	1.06	0.940	E617DC
Output Torque in lbs	75800	75800	75800	75800	75800	75800	75800	75800	75800	75800	75800	75800	75800	

Note: [1] A torque limiting device is recommended to protect the unit or driven machine.

Dimensions

Double Reduction EHY(J)-Z609DAY~B612DBY

Speed Reducers
Dimensions



All dimensions are in inches.

Model	NEMA C-FACE	B	C	E	F	G	H	I	J	K	M	P	Q	T	TT	U		
																Max (Std)	MIN	
Z609DA	42C						11.87											
	48C	11.02	10.73	5.51	0.20	0.79	11.87	2.20	8.3	6.18	6.06	0.12	1.06	8.54	4.43		1-7/16	1-3/16
	56C						12.26 ^[1]											
A610DA	42C						12.70											
	48C	11.83	11.87	5.91	0.2	0.79	12.70	2.60	9.17	6.44	6.61	0.12	1.14	9.41	4.96		2-3/16	1-11/16
	56C						13.09 ^[1]											
B612DA	42C																	
	48C	14.47	13.39	7.48	0.20	0.98	16.10	3.39	11.41	7.97	7.64	0.12	1.22	11.65	5.63		2-7/16	1-15/16
	56C																	
B612DB	48C	14.47	14.11	7.48	0.20	0.98	16.10	3.39	11.41	7.97	7.64	0.12	1.22	11.65	5.63		2-7/16	1-15/16
	56C~145TC																	

Model	NEMA C-FACE	V	W	ØY	Ød	ØD1	ØDC	KH	N1	N2	N3	S2	TA	A	D	TB
Z609DA	42C															
	48C	4.25	4.69	3.23	0.55	2.56	5.91	3.54	1.02	1.02	N/A	M10	17.50	0.63	2.36	M20
	56C															
A610DA	42C															
	48C	4.61	5.14	4.09	0.71	3.35	5.91	3.74	1.10	1.10	N/A	M12	17.50	0.63	2.36	M20
	56C															
B612DA	42C															
	48C	5.71	6.40	4.49	0.71	3.94	8.03	4.33	1.34	1.26	N/A	M12	17.87	0.63	2.36	M20
	56C															
B612DB	48C	5.71	6.40	4.49	0.71	3.94	8.03	4.33	1.34	1.26	N/A	M12	17.87	0.63	2.36	M20
	56C~145TC															

Note: [1] Dimension is to C, motor mounting flange.

Dimensions

Double Reduction EHY(J)-Z609DAY~B612DBY (cont.)

All dimensions are in inches.

Model	NEMA C-Face	ØLA	θ °	N	S x ℓ	S1 x ℓ	XU	XV	KEY	Unit Weight (lb)
Z609DA	42C	4.72	0	4	M10x0.79	M10x0.79	0.500	0.98	3/16 X 3/16 X .71	62
	48C									
	56C									
A610DA	42C	6.10	30	6	M12x0.79	M12x0.87	0.500	0.98	3/16 X 3/16 X .71	83
	48C									
	56C									
B612DA	42C	6.89	30	6	M12x0.87	M16x1.02	0.500	0.98	1/8 X 1/8 X .71	145
	48C									
	56C									
B612DB	48C 56C~145TC	6.89	30	6	M12x0.87	M16x1.02	0.625	0.98	3/16 X 3/16 X .75	152

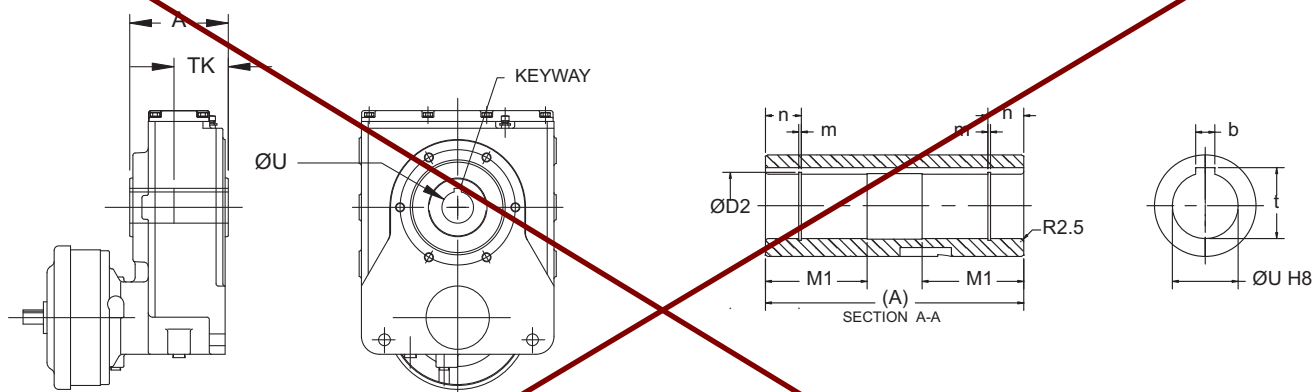
Speed Reducers

Dimensions

Model	NEMA C-Face	C-Face Dimensions										Unit + C-Face Weight (lb)
		ØAJ	ØAK	ØBD	BB	BF	BR	CE	XJ	Z	Min. ID	
Z609DA	42C	3.75	3.00	4.33	0.00	0.28	4	12.52	1.79	0.47	2.44	66
	48C	3.75	3.00	4.33	0.00	0.28	4	12.89	2.16	0.47	2.44	66
	56C	5.88	4.50	6.69	0.00	0.43	4	13.29	2.56	0.47	3.15	68
A610DA	42C	3.75	3.00	4.33	0.00	0.28	4	13.66	1.79	0.47	2.44	87
	48C	3.75	3.00	4.33	0.00	0.28	4	14.03	2.16	0.47	2.44	87
	56C	5.88	4.50	6.69	0.00	0.43	4	14.43	2.56	0.47	3.15	89
B612DA	42C	3.75	3.00	4.33	0.00	0.28	4	15.18	1.79	0.47	2.44	149
	48C	3.75	3.00	4.33	0.00	0.28	4	15.55	2.16	0.47	2.44	149
	56C	5.88	4.50	6.69	0.00	0.43	4	16.02	2.63	0.47	3.15	151
B612DB	48C	3.75	3.00	4.33	0.00	0.28	4	16.27	2.16	0.47	2.44	158
	56C~145TC	5.88	4.50	6.69	0.00	0.43	4	16.74	2.63	0.47	4.21	160

Options

Keyed Hollow Bore



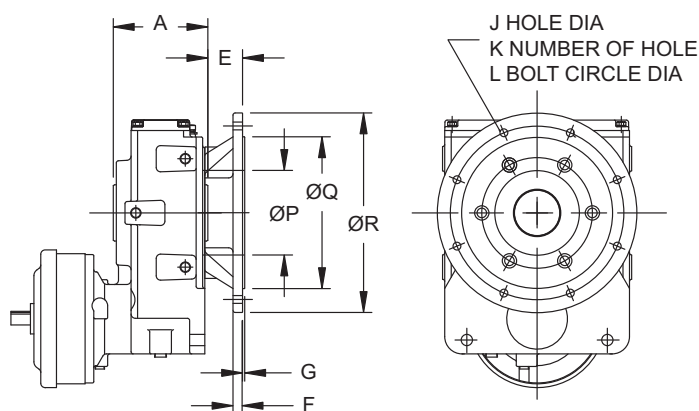
All dimensions are in millimeters.

Model	ØU	A	b	t	M1	ØD2	n	m	TK*
Z	40	120	12	43.3	57	42.5	24	1.95	76
A	55	134	16	59.3	63	58	30	2.20	84
B	65	160	18	69.4	75	68	30	2.70	98
C	75	192	20	79.9	90	78	37	2.70	140
D	85	218	22	90.4	100	88.5	37	3.20	194
E	100	238	28	106.4	110	103.5	37	3.20	195

Model	Available Bore Sizes			
	Inch		Metric (mm)	
	Min.	Max.	Min.	Max.
Z	1-3/16	1-1/2	30	40
A	1-3/4	2-3/16	45	55
B	2-3/16	2-5/8	55	65
C	2-7/16	3	60	75
D	2-3/4	3-7/16	70	85
E	3-3/16	3-15/16	80	110

*Recommended minimum shaft engagement for shaft material 1045 steel with hardness Hb 225 - 265

Output Flange



All dimensions are in inches.

Model	A	E	F	G	J	K	L	P	Q	R
Z	4.72	1.24	0.47	0.14	0.43	4	6.50	3.54	5.12	7.87
A	5.28	1.30	0.59	0.16	0.55	4	8.46	4.72	7.09	10.00
B	6.30	1.61	0.59	0.16	0.55	4	8.46	5.51	7.09	10.00
C	7.56	2.28	0.79	0.20	0.71	4	11.81	6.50	9.84	13.98
D	8.58	3.15	0.87	0.20	0.71	8	15.75	7.68	13.78	18.11
E	9.37	3.15	0.87	0.20	0.71	8	15.75	12.60	13.78	17.72

Taper Grip® Bushing Installation Guide

Introduction

The keyless Taper-Grip® bushing system provides simple and reliable shaft attachment for Sumitomo Speed reducers and gearmotors. This system allows bi-directional shaft rotation and stop-start operation with a powerful, slip-free grip. To assure peak performance of your equipment, please read, understand and follow these installation instructions.

Safety

Disconnect all power sources from the equipment before beginning this installation procedure. Handle the components with care and avoid all sharp or machined edges to prevent personal injury or damage to the components.

Before Installing Unit on Driven Shaft (Steps 1-7)

Carefully inspect the driven equipment shaft. Remove all burrs, corrosion, lubricants, and foreign matter from the shaft surface. Verify the shaft diameter is within the dimensional tolerances shown in Table 1.

Table 1 Driven Shaft Tolerances

Shaft Diameter (inches)	Shaft Tolerance (inches)
3/4" – 1 1/8"	+0" – 0.005"
1 3/16" – 2"	+0" – 0.006"
2 1/16" – 3-1/8"	+0" – 0.007"
3 3/16" – 4 3/4"	+0" – 0.008"
4 13/16" – 6-1/2"	+0" – 0.009"

Clean all surfaces of the shaft, the bushing, the thrust collar and the unit bore with solvent to remove all grease and oil.

Step 1 – Remove the Taper-Grip® bushing safety cover (see Fig. 2).

Step 2 – Remove the cap screws from the bushing. Lightly oil the threads of the cap screws and partially re-insert them into the threaded holes in the bushing flange. The ends of the cap screws should not extend beyond the rear face of the bushing flange.

Step 3 – Slide the thrust collar onto the Taper-Grip® bushing (see Fig. 3).

Step 4 – Apply a thin layer of anti-seize paste to the male threads of the Taper-Grip® Bushing only (see Fig.4). Based on tests, Sumitomo recommends Bostik Never-Seez Regular Grade or equivalent. Ensure that anti-seize paste does not enter the Taper-Grip® Bushing bore. **Caution: Do not apply anti-seize paste to the female threads in the hub.**

Step 5 – Carefully thread the Taper-Grip® bushing into the hub of the speed reducer or gearmotor until the thrust collar solidly engages the unit hub surface and the bushing flange (see Fig. 5). **Caution: Do not cross-thread. Bushing should thread easily into hub.**

Step 6 – Unscrew the Taper-Grip® bushing to create a 1mm (0.04") gap between the thrust collar and the bushing flange.

Step 7 – Hand-tighten the cap screws until they firmly press the thrust collar against the unit hub surface. The unit is ready for installation on the driven shaft.



Fig. 1 Taper-Grip® Bushing Parts

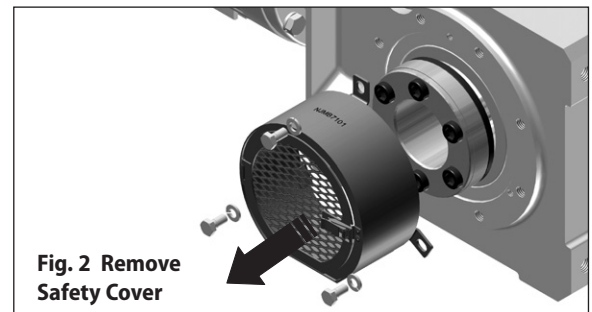


Fig. 2 Remove Safety Cover

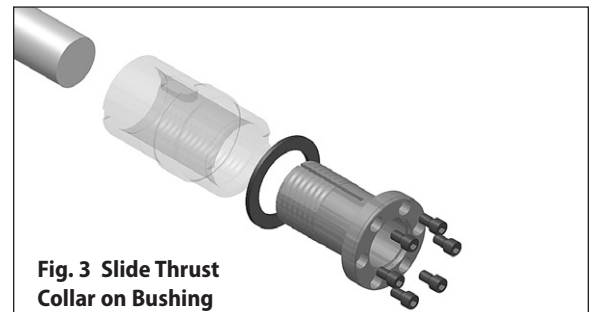


Fig. 3 Slide Thrust Collar on Bushing

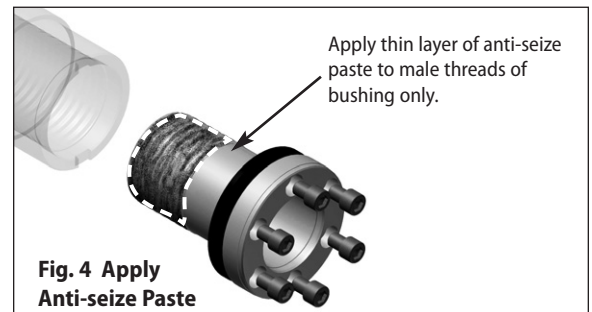


Fig. 4 Apply Anti-seize Paste

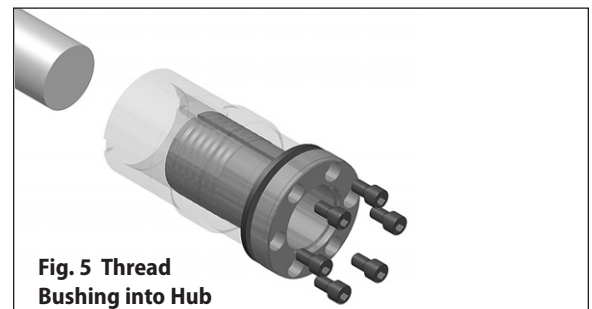


Fig. 5 Thread Bushing into Hub

Taper Grip® Bushing Installation Guide continued

Unit Installation

Step 8 – Position unit with the bushing flange located on the outboard side of the unit. Align the bushing with the driven shaft. Slide the unit onto the driven shaft as close to the driven shaft support bearing as possible. Ideally, the driven shaft should extend beyond the bushing flange face (see Fig. 7). Refer to Fig. 6 and Table 2 below for minimum shaft to bushing engagement. For maximum depth to the end of the shaft, refer to Fig. 6 and Table 3 below.

Table 2 Minimum Shaft to Bushing Engagement

Minimum Shaft Engagement (TT)								
HSM			Cyclo® HBB			Cyclo® BBB		
Model	mm	in.	Model	mm	in.	Model	mm	in.
107C	119.5	4.70	Z	113.5	4.47	3A, 2A	209	8.23
115D	127.5	5.02	A	127	5.00	3B, 2B	243	9.57
203E	136	5.35	B	144	5.67	3C, 2C	280	11.02
207F	153	6.02	C	187	7.36	3D, 2D	327	12.87
215G	183	7.20	D	205	8.07	3E, 2E	360	14.17
307H	205	8.07	E	225	8.86			
315J	215	8.46						
407S	219	8.62						
415K	217	8.54						
507L	285	11.22						
608M	335	13.19						

Table 3 Maximum Depth to Shaft End

Maximum Depth to Shaft End (TS)								
HSM			Cyclo® HBB			Cyclo® BBB		
Model	mm	in.	Model	mm	in.	Model	mm	in.
107C	31	1.22	Z	31	1.22	3A, 2A	35	1.38
115D	34	1.34	A	35	1.38	3B, 2B	45	1.77
203E	35	1.38	B	45	1.77	3C, 2C	40	1.57
207F	45	1.77	C	40	1.57	3D, 2D	50	1.97
215G	40	1.57	D	50	1.97	3E, 2E	51	2.01
307H	50	1.97	E	51	2.01			
315J	51	2.01						
407S	63	2.48						
415K	70	2.76						
507L	70	2.76						
608M	70	2.76						

Step 9 – With a torque wrench, tighten the cap screws in 20% increments to engage the bushing system. Use the appropriate tightening pattern ("star-pattern" see Fig. 7) to assure complete bushing engagement. Tighten each cap screw to the torque values shown in Table 4.

If the shaft is recessed in the bushing, fill the void with grease to prevent corrosion and fouling.

Step 10 – Please read, understand and follow the instructions shown in the reducer/gearmotor installation and operating manual to complete the unit installation and attach the torque arm.

Step 11 – After the reducer has been running for 20 to 30 hours, re-torque the screws to the values in Table 4. Screw torques should be subsequently checked at normal service intervals (i.e. every 6 months).

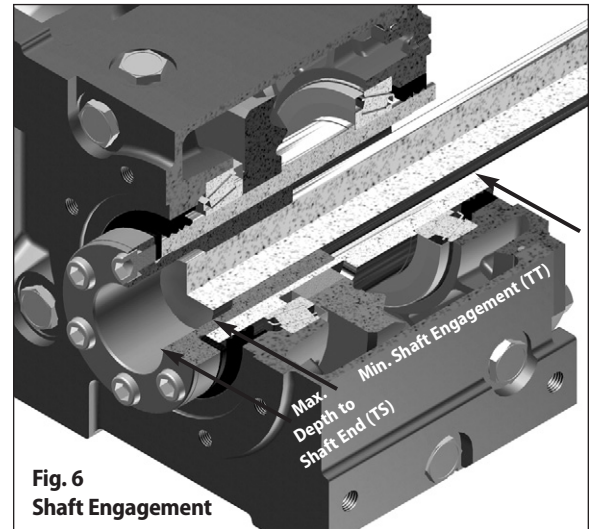


Fig. 6 Shaft Engagement

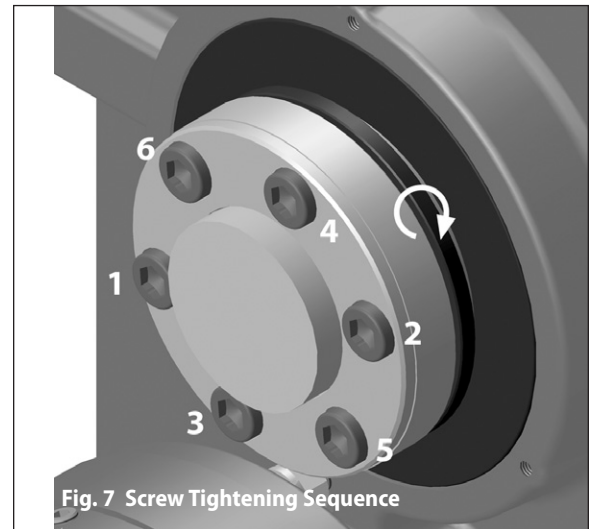


Fig. 7 Screw Tightening Sequence

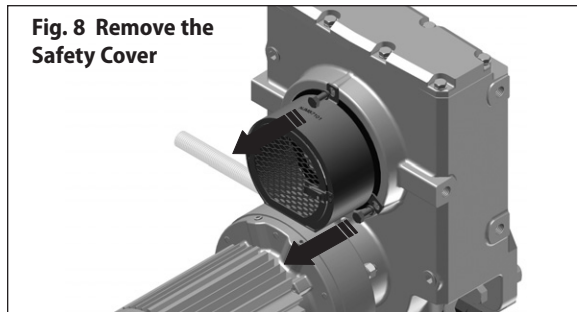
Table 4 Cap Screw Tightening Torques

HSM Model	Cyclo® HBB Model	Cyclo® BBB Model	Cap screws (JIS Grade 12.9)		Cap screw Torque	
			Qty.	Size	Nm	Lb.Ft.
107C	Z		6	M10x14	50	37
115D			6	M10x14	55	41
203E	A	3A, 2A	6	M12x16	75	56
207F	B	3B, 2B	6	M12x16	140	104
215G	C	3C, 2C	6	M16x20	250	185
307H	D	3D, 2D	6	M16x20	250	185
315J	E	3E, 2E	8	M16x20	250	185
407S			10	M16x20	250	185
415K			10	M16x35	300	223
507L			12	M16x35	300	223
608M			16	M16x35	300	223

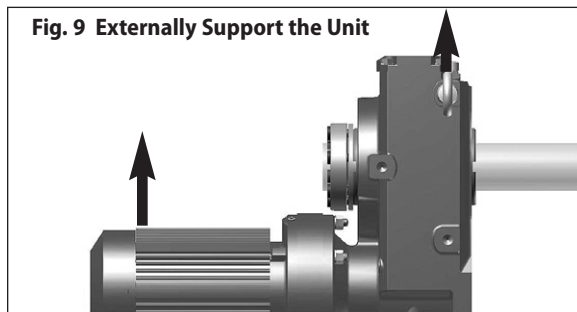
Taper Grip® Bushing Installation Guide continued

Removal Procedure

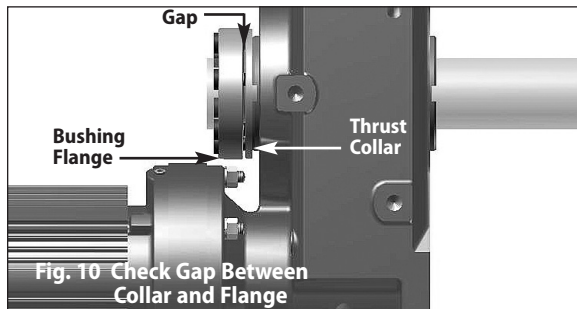
Step 1 – Remove the Taper-Grip® bushing safety cover (see Fig. 8).



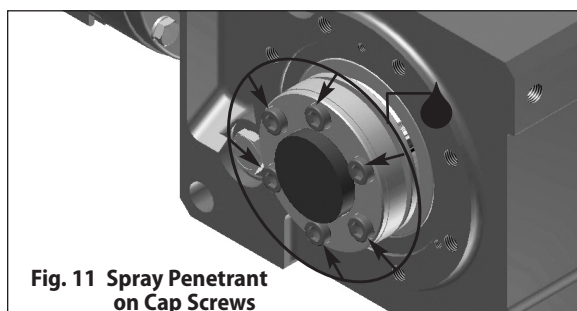
Step 2 – Before removing the reducer/gearmotor from the driven shaft, externally support the unit so that all its weight is removed from the driven shaft (see Fig. 9). **Caution: Do not raise the unit too high. It may cause the shaft to bind.**



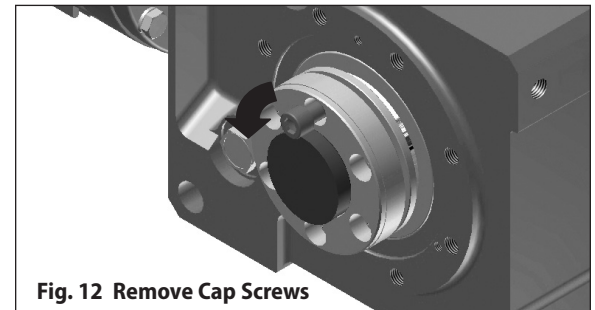
Step 3 – Check the Taper-Grip® Bushing to assure that there is a gap between the thrust collar and the bushing flange. If no gap exists, unit removal may be difficult (see Fig. 10).



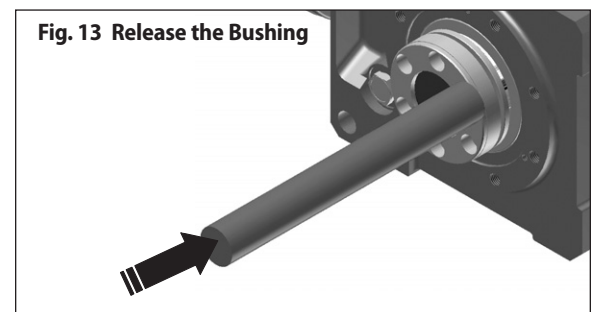
Step 4 – Spray a liquid penetrant onto each of the Taper-Grip® Bushing cap screws. Allow time for the penetrant to settle into the threads of the cap screws. (see Fig. 11).



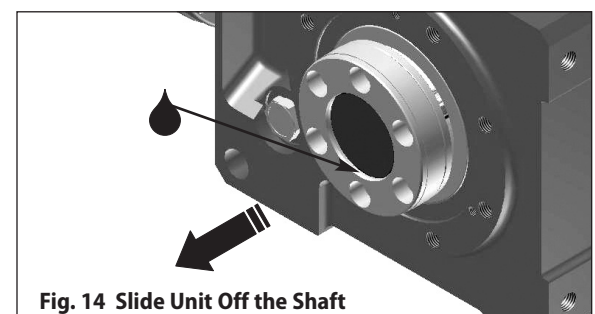
Step 5 – After the liquid penetrant has been allowed to settle, remove the cap screws one at a time (see Fig 12).



Step 6 – Place a copper or brass bar against the flange of the Taper-Grip® Bushing and carefully strike end of bar with a hammer to release bushing (see Fig 13).



Step 7 – After releasing the bushing, reinstall the cap screws by hand only. Stop tightening them once they touch the thrust collar. They will ensure the reducer will not slide against the bushing and clamp it against the shaft when the reducer is removed. Apply a liquid penetrant to the shaft where it contacts the bushing. Allow time for the liquid to penetrate between the bushing and the shaft, then carefully slide the unit off of the shaft. (see Fig 14). **Note: If the bushing releases, but the unit cannot be removed from the shaft, apply a puller to the bushing to push the shaft free.**



Parts List

General Construction Helical Gear Output Section

Figure 5.19 Helical Gear Output Section

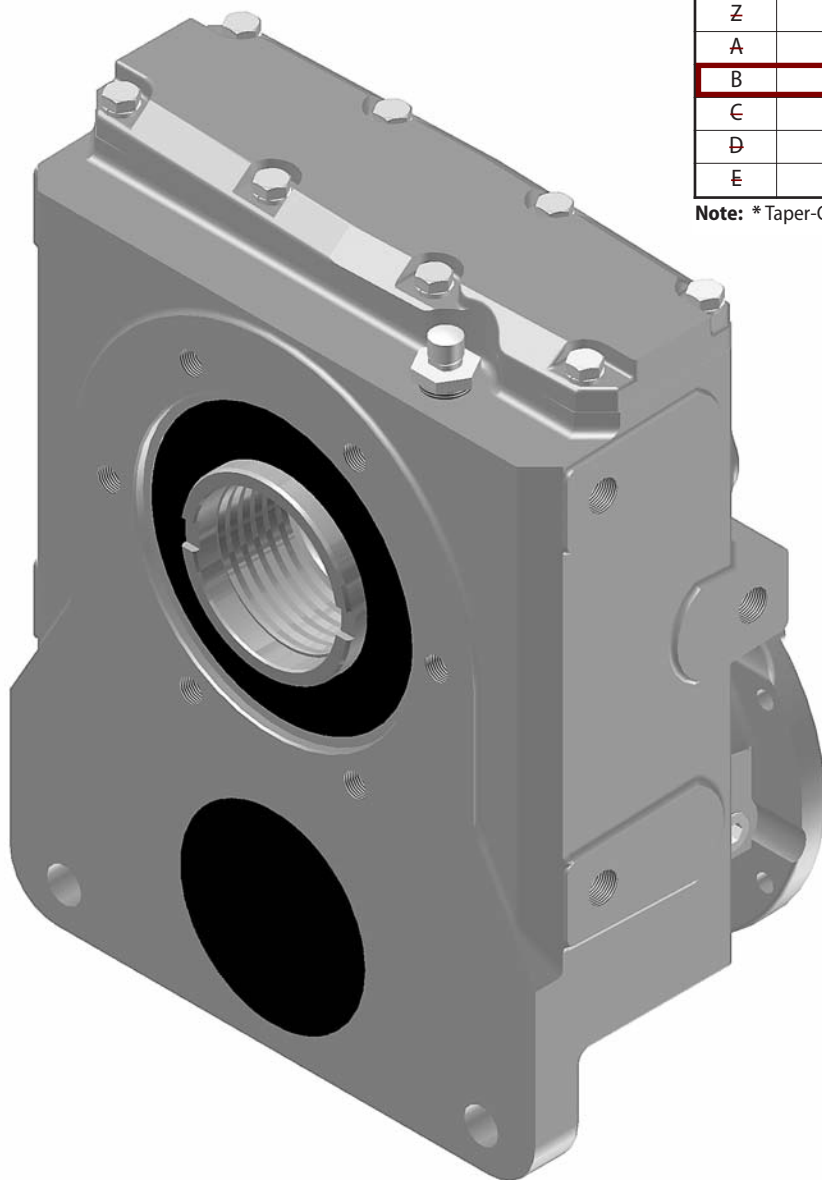


Table 5.18 Helical Gear Output Assembly Part Numbers

Unit Size	Output Assembly Part Number*
Z	037L0004
A	037A0004
B	037B0004
C	037C0004
D	037D0004
E	037E0004

Note: *Taper-Grip® Bushing not included.

Parts List continued

Cyclo Reducer Input Section Double Reduction

Figure 5.21

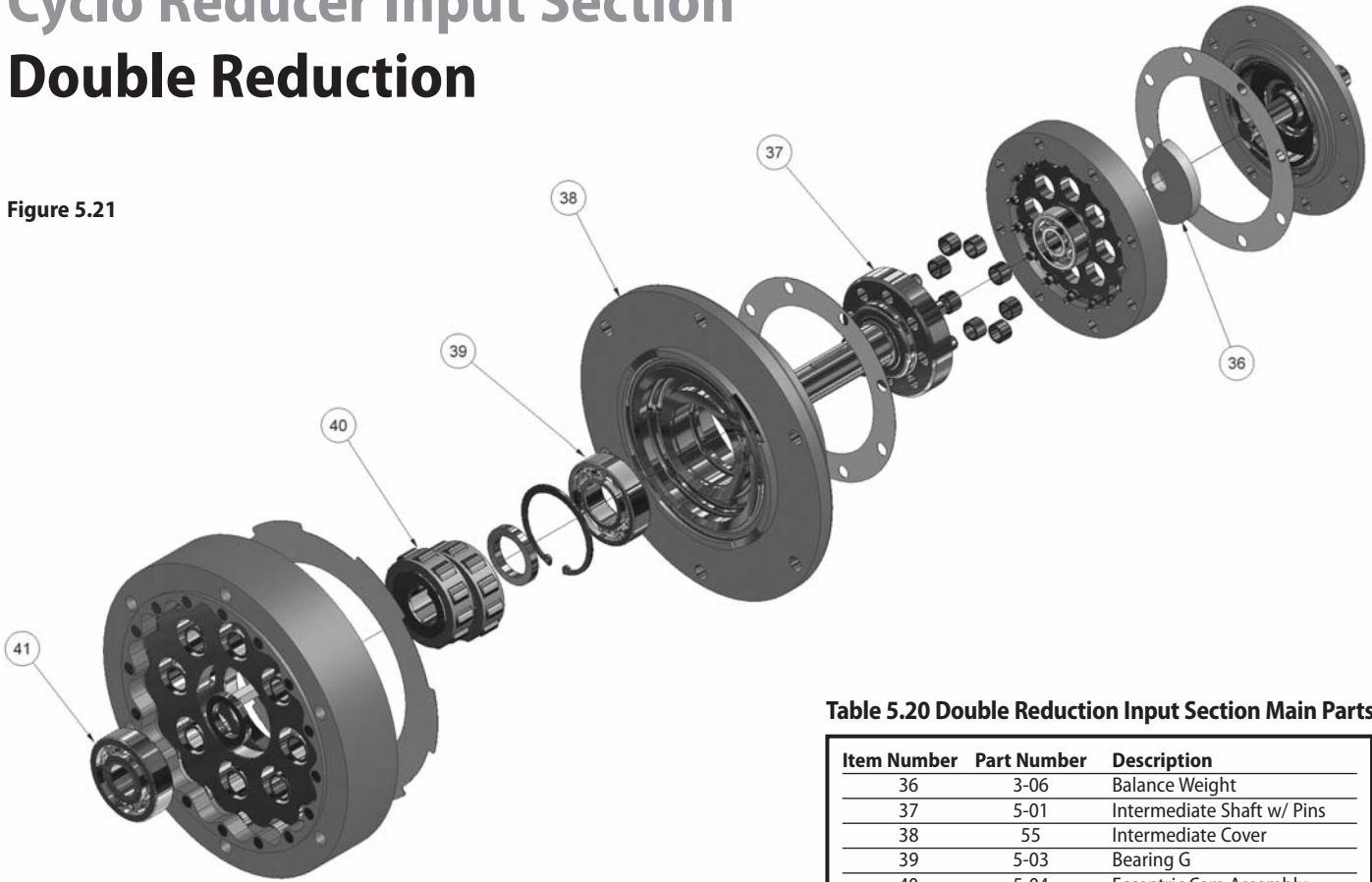


Table 5.20 Double Reduction Input Section Main Parts

Item Number	Part Number	Description
36	3-06	Balance Weight
37	5-01	Intermediate Shaft w/ Pins
38	55	Intermediate Cover
39	5-03	Bearing G
40	5-04	Eccentric Cam Assembly
41	5-02	Bearing F

Note: The parts listed are a general representation of the components found in a single and double reduction Cyclo.

Specific units may or may not contain all shown here.

Please consult the factory for specific part questions.

Lubrication

Oil lubricated models are not filled with oil prior to shipping.

Before operating, fill the unit with the appropriate amount of the correct lubricant for the mounting position (see Table 5.36 and 5.38). When operating in winter or other relatively low ambient temperatures, use the lower viscosity oil specified for each ambient temperature range. Please consult the factory if the unit will be operated consistently in ambient temperatures other than 32°F–104°F.

Table 5.36 Standard Oils

Ambient Temperature (°F)	ChevronTexaco	Exxon Oil	Mobil Oil	Shell Oil	BP Oil
14 to 41°	EP Gear Compound 68	Spartan EP 68	Mobilgear 600 XP 68 (ISO VG 68)	Omala Oil 68	Energol GR-XP 68
32 to 95°	EP Gear Compound 100, 150	Spartan EP 100 EP 150	Mobilgear 600 XP 100, 150 (ISO VG 100, 150)	Omala Oil 100, 150	Energol GR-XP 100 GR-XP 150
86 to 122°	EP Gear Compound 220, 320, 460	Spartan EP 220 EP 320 EP 460	Mobilgear 600 XP 220, 320, 460 (ISO VG 220–460)	Omala Oil 220, 320 460	Energol GR-XP 220 GR-XP 320 GR-XP 460

Grease lubricated models are lubricated with grease prior to shipment from the factory.

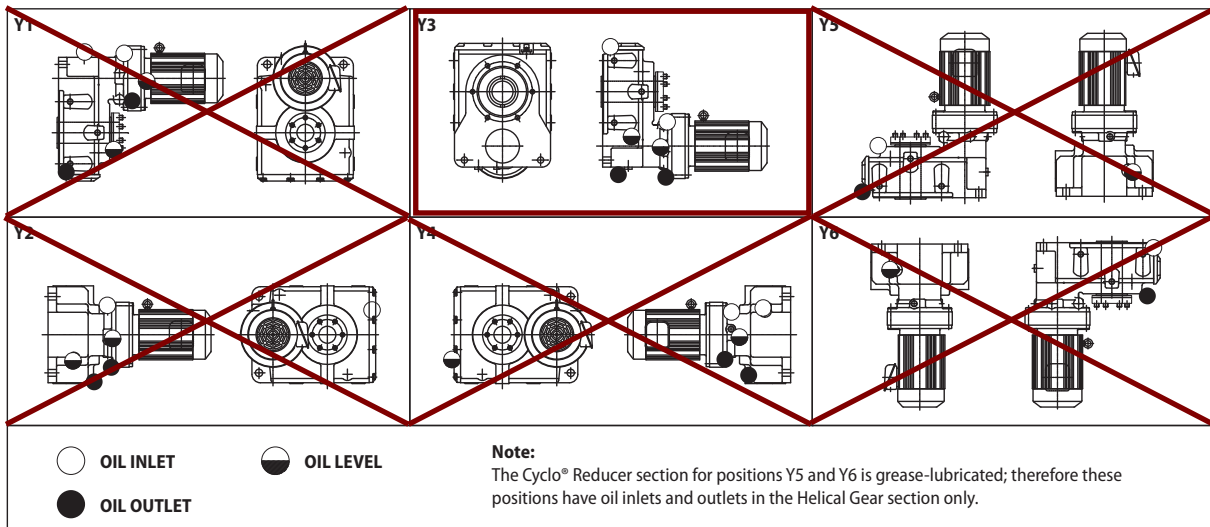
Adding grease prior to initial start-up is not required. If grease must be replenished or changed (see Grease Lubrication section), avoid using greases other than those shown in the Table 5.37. Please consult the factory when the units will be used in widely fluctuating temperatures, ambient temperatures other than those specified in Table 5.37, or when other special conditions exist for the application. When motors from another manufacturer will be used, please consult and adhere to the associated motor maintenance manual for the appropriate lubrication instructions.

Table 5.37 Standard Greases

Ambient Temperature (°F)	Reduction Ratio	Input (Cyclo Side)
14 to 122°	11, 18:1	Shell Alvania EP-0
	21:1 and higher	ExxonMobil Unirex N2 Grease

Figure 5.26

Oil Plug Locations



Cyclo HBB

Appendix

Lubrication continued

Table 5.38 Oil Fill Quantities

Unit: U.S. Gallons

*G = Grease

Model	Y1		Y2		Y3		Y4		Y5		Y6	
	Output	Input*	Output	Input*	Output	Input*	Output	Input*	Output	Input*	Output	Input*
Z6090/95	0.16	G	0.16	G	0.13	G	0.16	G	0.29	G	0.26	G
A6100/05	0.21	G	0.24	G	0.18	G	0.24	G	0.40	G	0.37	G
B6120/25	0.26	G	0.40	G	0.26	G	0.40	G	0.53	G	0.48	G
C6140/45	0.45	0.11	0.55	0.11	0.34	0.11	0.55	0.11	1.24	G	0.92	G
D6160/65	0.71	0.18	0.92	0.18	0.53	0.18	0.92	0.18	1.85	G	1.45	G
E6170/75	0.92	0.24	1.11	0.24	0.66	0.24	1.11	0.24	2.38	G	1.85	G

Oil lubricated units are shipped without oil. Prior to initial start-up, the unit must be filled with the correct amount of oil (see Table 5.38). For those units where both the gear and Cyclo® portions are oil lubricated, the oil must be filled in two separate locations, one on the gear housing and one on the Cyclo® housing.

- The helical (output) portion of all **double reduction units** is oil lubricated and must be filled by the customer with the correct amount of oil (see Table 5.38) prior to initial start-up.

Grease lubricated models are lubricated at the factory. Additional grease does not need to be added prior to initial start-up.

- The Cyclo® (input) portion of all **double reduction units** are grease lubricated at the factory. Additional grease does not need to be added prior to initial start-up.

Grease Replenishment and Change Interval

A. On single reduction Cyclo® Helical Buddybox (Cyclo® HBB) sizes Z6090/95, A6100/05 and B6120/25, the Cyclo® portion is grease lubricated as standard and therefore maintenance free. Consult the operations and maintenance manual for the grease change interval.

B. When mounting Cyclo® HBB sizes C6140/45, D6160/65 and E6170/75 in the Y5 and Y6 positions, please consult the maintenance and operations manual for the proper grease replenishment and change interval for the Cyclo® portion.

The helical (output) portion is filled with oil for long-term storage.

Oil Replenishment and Change Interval

- A. Maintain proper oil levels at all times.
- B. An oil change after the first 500 hours of operation is highly recommended.
- C. Sumitomo recommends an oil change every 2500 hours, or six months, whichever comes first. If a proper preventive maintenance program is implemented and maintained, a longer change period may be acceptable.
- D. If the unit is running in a high ambient, high humidity, or corrosive environment, the lubricant will have to be changed more frequently. Consult the factory for recommendations.
- E. Note: The Cyclo® portion and Helical portion, where applicable, must be filled with oil separately. Oil does not flow from one section to the other.

Warranty

Sumitomo warrants that its Cyclo® HBB Speed Reducers will deliver their continuous catalog ratings and up to 300% intermittent SHOCK LOAD CAPACITY, provided they are properly installed, maintained and operated within the limits of speed, torque or other load conditions under which they were sold. Sumitomo further states that Cyclo® HBB Speed Reducers are warranted to be free from defects in material or workmanship for a period of two years from the date of shipment. Sumitomo assumes no liability beyond product repair or replacement under this limited warranty.

For construction purposes, be sure to obtain certified dimension sheets or drawings. Although we take every precaution to include accurate data in our catalog, we cannot guarantee such accuracy. If performance guarantees are required, they should be obtained in writing from the factory. Full consideration will be given to such requests when complete details are given of the proposed installation.

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New Zealand

Sumitomo Drive Technologies

Long Term Storage Instructions

I. Oil Lubricated:

A. 6 Months to One Year Storage

1. Fill with rust preventative oil or circulating oil.
2. At approximately three-month intervals, rotate the input shaft a sufficient number of times to insure all internal components remain coated.

Note: The higher the ratio, the greater the amount needed for proper lubrication.

3. To return unit to operation
 - a. Completely drain the rust preventative, or circulating oil from the unit
 - b. Flush unit with the recommended operating oil.
 - c. After flushing, fill the unit to the proper oil level with the recommended lubricating oil.

B. One Year or Longer Storage

1. Treatment by Sumitomo before shipment
 - a. No-load running with a rust preventative oil NP-10, then the oil is drained.
 - b. Next NP-20 rust preventative lubricant is sprayed on the inside housing after draining the rust preventative lubricant or circulating oil.
 - c. The oil filler cap is covered with tape or a polyethylene bag.
2. Long Term Storage by customer after prepared by Sumitomo
 - a. After a period of one year and each year afterward, customer is required to fill the unit with Shell VSA Circulating oil 100 to the recommended oil level and re-cover the oil filler cap.
3. To return unit to operation
 - a. Drain the rust preventative or circulating oil.

Note: No operation with the rust preventative or circulating oil is permitted.
 - b. Flush twice with the recommended unit oil before putting into operation.
 - c. Fill to the proper level with the recommended oil.

II. Grease Lubricated:

- A. Within one year, no action is required before operation.
- B. For operation after storage longer than one year, it is recommended that the unit be disassembled and the grease changed. For single reduction maintenance free units, test run the unit with the grease filler plug removed, discharge excess grease, and put the plug back in place.

Special Note: Non-metallic parts such as oil seals, oil gauges, and oil filler plugs can be adversely affected by ambient conditions such as temperature, weather, and ultraviolet rays. After storing the unit for an extended period, carefully inspect the unit before starting operation. Replace all parts that have been affected.

PARKSON PART NUMBER:	0006456
MANUFACTURER:	Baldor
TYPE:	TEFC, Explosion Proof
MODEL NUMBER:	VM7006A
NEMA FRAME SIZE:	56C, C-Face, Footless, Rolled Steel
MOUNTING:	F1
HORSEPOWER:	1/2 Hp
POWER:	208-230/460 Volts, 3 Phase, 60 Hz
SERVICE FACTOR:	1.0
TIME RATING/DUTY:	Continuous, 40 deg C Ambient Temperature
INSULATION:	Class B
FULL LOAD AMPS:	1.0 Amps @ 460 V
LOCKED ROTAR KVA CODE:	L
NEMA DESIGN CODE:	B
EFFICIENCY:	74%
HAZARDOUS LOCATION	
CLASSIFICATION, UL & CSA:	Class 1, Group D, Class 2, Groups F & G
FRAME TEMPERATURE CODE:	T3C

NOTES:

1. Unit is supplied with automatic thermal overload device to ensure motor T code rating.

Single and Three Phase, C-Face, No Drip Cover

1/3 thru 50 Hp

NEMA 56C thru 326TC

Applications: Pumps, blowers, valves.

Features: Corrosion resistant epoxy finish. Positively locked drive end bearing. U.L. approved cast conduit box-standard. 1.00 S.F. U.L. and CSA approved for Class I, Group D or Class II, Group F & G.



General Information

Premium Efficient Super-E@ Motors

Single Phase Motors

General Purpose Industrial Motors

Severe Duty Motors

Washdown Duty Motors

Explosion Proof Motors

Pump Motors

Commercial Motors

HVAC Motors

Hp	RPM	NEMA Frame	Catalog Number	XP ^(a) Cls/Grp	List Price	Mult. Sym.	"C" Dim.	Aprx. Wt. (lb)	Full Load Efficiency	Voltage	Full Load Amps	Notes ^(b)
Single Phase, C-Face, Foot Mounted												
1/3	1800	56C	CL5001A	Ⓢ	696	K	13.22	30	60	115/208-230	3	
	3600	56C	CL5003A	Ⓢ	611	K	13.22	31	57	115/230	3.7	
1/2	1800	56C	CL5004A	Ⓢ	697	K	14.22	37	64	115/208-230	3.7	
	3600	56C	CL5007A	⑦	777	K	15.17	48	66	115/230	5.3	
3/4	1800	56C	CL5009A	⑦	693	K	15.17	49	66	115/230	6	
	3600	56C	CL5023A	①	883	K	15.17	48	67	115/230	6.5	
1 1/2	3600	143TC	CL5030T	Ⓢ	1,087	L1	15.23	54	70	115/208-230	7.5	
	1800	184C	CL5013	Ⓢ	1,764	L1	16.93	81	70	115/230	9.5	
2	3600	143TC	CL5031T	Ⓢ	1,242	L1	16.10	61	74	115/208-230	11.5	
	1800	182TC	CL5027T	①	1,820	L1	18.86	96	75	115/230	11	
3	3600	184TC	CL5028T	①	1,841	L1	18.86	96	76	115/230	14.5	
	1800	215C	CL5018	Ⓢ	2,825	L1	19.56	154	78	115/230	15	
5	1800	215C	CL5020	①	3,597	L1	20.69	170	84	230	21	
Single Phase, C-Face, Footless												
1/4	1800	56C	VL5000A	Ⓢ	616	K	12.25	30	60	115/230	3	
	3600	56C	VL4005A	Ⓢ	469	K	12.25	30	60	115/230	3	
1/3	1800	56C	VL5001A	Ⓢ	629	K	13.22	29	60	115/208-230	3	
	1200	56C	VL5002A	⑦	843	K	14.30	42	54	115/230	3.4	
1/2	3600	56C	VL5003A	Ⓢ	606	K	13.22	30	57	115/230	3.7	
	1800	56C	VL5004A	Ⓢ	695	K	14.22	36	64	115/208-230	3.7	
3/4	1200	56C	VL5005A	⑦	967	K	15.17	50	59	115/230	4	
	3600	56C	VL5006A	⑦	648	K	14.30	40	62	115/230	4.9	
1	1800	56C	VL5007A	⑦	774	K	15.17	47	66	115/230	5.3	
	3600	56C	VL5009A	⑦	695	K	15.17	49	66	115/230	6	
1 1/2	1800	56C	VL5023A	①	879	K	15.17	51	67	115/230	6.5	
	3600	56C	VL5030	①	1,001	K	14.39	54	75	115/230	8	
2	1800	184C	VL5024A	①	1,161	K	17.42	72	75	115/230	8	
	1800	184C	VL5027	①	1,847	L1	16.93	87	75	115/208-230	11	
Three Phase, C-Face, Foot Mounted												
1/2	3600	56C	CM7005A	Ⓢ	729	K	13.22	28	68	208-230/460	1.1	
	1800	56C	CM7006A	Ⓢ	790	K	13.22	30	74	208-230/460	1	
3/4	3600	56C	CM7009A	Ⓢ	753	K	13.22	30	75	208-230/460	1.3	
	1800	56C	CM7010A	Ⓢ	805	K	14.22	35	73	208-230/460	1.5	
1	3600	56C	CM7013	Ⓢ	788	K	13.22	31	75.5	208-230/460	1.8	
	1800	56C	CM7014	Ⓢ	858	K	14.30	41	77	208-230/460	1.7	19
1 1/2	3600	143TC	CM7014T	Ⓢ	858	L1	14.36	44	82.5	230/460	1.65	19
	1800	143TC	CM7018T	Ⓢ	893	L1	14.36	47	82.5	230/460	2.1	19
1 1/2	3600	56C	CM7034	Ⓢ	915	K	14.30	44	78.5	208-230/460	2.5	19
	1800	145TC	CM7034T	Ⓢ	915	L1	15.23	49	84	230/460	2.2	19

(a) See explosion proof symbols on inside back flap.
 (b) See notes on inside back flap and pages 5-6.

Single and Three Phase, C-Face, No Drip Cover

Hp	RPM	NEMA Frame	Catalog Number	XP (a) Cls/Grp	List Price	Mult. Sym.	"C" Dim.	Aprx. Wt. (lb)	Full Load Efficiency	Voltage	Full Load Amps	Notes (b)	
Three Phase, C-Face, Foot Mounted (continued)													
2	1800	145TC	CM7071T	Ⓢ	885	L1	15.23	52	84	230/460	2.6	19	
		56C	CM7037	Ⓢ	990	K	15.17	52	82.5	208-230/460	3.1	19	
		145TC	CM7037T	Ⓢ	990	L1	15.23	53	84	230/460	2.9	19	
3	3600	145TC	CM7075T	①	1,110	L1	17.48	69	85.5	230/460	3.7		
		182TC	CM7042T	Ⓢ	1,276	L1	18.86	92	87.5	230/460	4.1	19	
		L182TC	P18G1181	Ⓢ	1,431	L1	17.88	139	87.5	230/460	3.9		
5	3600	184TC	CM7072T	Ⓢ	1,485	L1	18.86	101	87.5	230/460	5.6	19	
		184TC	CM7044T	Ⓢ	1,535	L1	18.80	111	87.5	230/460	6.7	19	
		L184TC	P18G1182	Ⓢ	1,722	L1	17.88	144	87.5	230/460	6.5		
7 1/2	3600	184TC	CM7073T	①	1,674	L1	20.36	111	88.5	230/460	8.3		
		213TC	CM7045T	Ⓢ	1,963	L1	20.33	173	88.5	230/460	8.9	19	
	1800	213TC	CM7047T	Ⓢ	1,778	L1	21.08	183	89.5	230/460	10.1	19	
		213TC	P21G1156	Ⓢ	1,994	L1	20.00	183	89.5	230/460	9.5		
10	3600	215TC	CM7174T	Ⓢ	2,103	L1	20.65	215	89.5	230/460	11.6	19	
		215TC	CM7170T	Ⓢ	2,103	L1	20.65	232	89.5	230/460	13	19	
		215TC	P21G1157	Ⓢ	2,358	L1	20.00	196	89.5	230/460	12.2		
15	3600	254TC	CM7053T	Ⓢ	2,257	L1	26.00	345	90.2	230/460	17	19	
		254TC	CM7054T	Ⓢ	3,671	L1	26.00	386	91	230/460	18	19	
		254TC	P25G1146	Ⓢ	4,117	L1	25.06	357	91	230/460	19.5		
20	3600	256TC	CM7059T	Ⓢ	2,844	L1	26.00	372	90.2	230/460	23	19	
		256TC	CM7056T	Ⓢ	4,264	L1	26.00	362	91	230/460	24	19	
		256TC	P25G1147	Ⓢ	4,781	L1	25.06	371	91	230/460	25.4		
25	3600	286TSC	CM7063T	Ⓢ	3,714	L1	27.24	524	91	230/460	28.5	19	
		1800	284TC	CM7058T	Ⓢ	5,306	L1	28.61	532	92.4	230/460	30.8	19
30	1800	286TC	CM7060T	Ⓢ	5,998	L1	28.61	533	92.4	230/460	36	19	
40	1800	324TC	CM7062T	Ⓢ	8,108	L1	32.00	735	93	230/460	47	19	
50	1800	326TC	CM7064T	Ⓢ	9,170	L1	32.00	763	93	230/460	60	19	
Three Phase, C-Face, Footless													
1/4	1800	56C	VM7001A	Ⓢ	733	K	10.75	26	71	208-230/460	0.7	15	
1/3	1800	56C	VM7002A	Ⓢ	748	K	13.22	28	67	208-230/460	0.8		
1/2	3600	56C	VM7005A	Ⓢ	725	K	13.22	26	68	208-230/460	1.1		
	1800	56C	VM7006A	Ⓢ	788	K	13.22	30	74	208-230/460	1		
	1200	56C	VM7007A	Ⓢ	917	K	14.00	30	70	208-230/460	1.2		
3/4	3600	56C	VM7009A	Ⓢ	748	K	13.22	29	75	208-230/460	1.3		
		1800	56C	VM7010A	Ⓢ	802	K	14.22	33	73	208-230/460	1.5	
		1200	56C	VM7031A	⑦	962	K	15.17	44	77	208-230/460	1.4	
1	3600	56C	VM7013	Ⓢ	780	K	13.22	31	75.5	208-230/460	1.8		
		1800	56C	VM7014	Ⓢ	842	K	15.22	41	75.5	208-230/460	1.8	
		143TC	VM7014T	Ⓢ	842	L1	14.36	40	77	208-230/460	1.7	19	
1 1/2	3600	56C	VM7032	①	1,014	K	15.17	46	75.5	208-230/460	1.7		
		143TC	VM7018T	Ⓢ	887	L1	14.36	41	75.5	208-230/460	2.3	19	
		1800	56C	VM7034	Ⓢ	907	K	14.20	43	78.5	208-230/460	2.5	19
2	3600	145TC	VM7034T	Ⓢ	907	L1	14.36	43	78.5	208-230/460	2.5	19	
		1200	145TC	VM7035T	①	1,037	L1	16.10	58	80	230/460	2.6	
		145TC	VM7071T	Ⓢ	992	L1	15.23	47	78.5	208-230/460	2.7	19	
3	1800	56C	VM7037	Ⓢ	981	K	15.17	48	82.5	208-230/460	3.1	19	
		145TC	VM7037T	Ⓢ	981	L1	15.23	50	82.5	208-230/460	3.1	19	
		145TC	VM7075T	①	1,101	L1	15.23	54	82.5	208-230/460	3.8		
5	3600	182TC	VM7026T	Ⓢ	1,161	L1	17.49	74	81.5	208-230/460	3.9	19	
		1800	182TC	VM7042T	Ⓢ	1,258	L1	17.49	81	82.5	230/460	4.3	19
7 1/2	3600	184TC	VM7072T	Ⓢ	1,468	L1	18.06	97	85.5	208-230/460	6	19	
		184TC	VM7044T	Ⓢ	1,532	L1	18.80	111	86.5	230/460	6.5	19	
10	1800	184TC	VM7073T	①	1,657	L1	20.36	107	87.5	230/460	8.8	19	
		213TC	VM7045T	Ⓢ	1,930	L1	19.19	144	84	230/460	9.3	19	
10	1800	213TC	VM7047T	Ⓢ	1,774	L1	19.19	156	86.5	230/460	10.5	19	
		215TC	VM7170T	Ⓢ	2,152	L1	20.65	220	88.5	230/460	13.8	19	

(a) See explosion proof symbols on inside back flap.

(b) See notes on inside back flap and pages 5-6.

■ Cast Iron Frame

General Information

Premium Efficient Super-E® Motors

Single Phase Motors

General Purpose Industrial Motors

Severe Duty Motors

Washdown Duty Motors

Explosion Proof Motors

Pump Motors

Commercial Motors

HVAC Motors

Abbreviations: The Basic Baldor catalog number consists of a letter(s) prefix and several non-significant preceding numbers. A suffix letter(s) and/or number(s) may also be part of the catalog number. For example L3510 or L3510T. Following is a list of prefix and suffix definitions.

Catalog Number Prefix:

AEM	Automotive Motor (GM7EHQ)
AF	Aeration Fan Motor
AM	Automotive (Motor GM7EQ)
ANF	Auger Flange Motor
AO	Air-Over Motor
AP	Subfractional HP, PM Motor
AS	Arbor Saw Motor
B	Brake Motor
BC	DC Motor Speed Control
BK	Single Phase Gearmotor Kit
BLW	Blower Kit
BMC	Brushless DC Motor Control
BSM	Brushless Servo Motors
BTG	Tachometer Generator
BU	Bushing Kit
C	NEMA C-Face with Base
CBL	Cable Assembly
CD	Wound Field DC Motor NEMA C-Face with Base
CDP	PM SCR Drive Motor
CDPT	PM SCR Drive Motor with Integral Tachometer
CDPWD	Washdown PM SCR Drive Motor, NEMA C-Face
CDPSWD	PM Paint Free Washdown SCR Drive Motor C-Face with base
CDPX	PM Explosion Proof SCR Drive Motor - C-Face with base
CDX	Wound Field Explosion Proof DC Motor, NEMA C-Face
CESWDM	Paint Free Super-E Washdown - C-Face with base
CF	Condenser Fan Motor
CHC	Direct Drive Fan Motor with Resilient Base
CP	Severe Duty Motor
CR	Crusher Motor
CSC	Checkout Stand Motor
CSM	Baldor SmartMotor
CSSEWDM	All Stainless Super-E Washdown-C-Face with base
CSSWDM	All Stainless Washdown - C-Face with base
CSWDM	Paint Free Washdown - C-Face with base
CWAM	Dirty Duty Washdown - C-Face with base
CWDSM	Baldor Washdown SmartMotor
D	DC Shunt or Compound Motor or Definite Purpose Soft Start Control
DE	Vacuum Pump Motor
DG	Gate Operator Motor
DMG	Lifting Magnet Generator
DOC	Door Operator Motor
DR	Double Reduction
E	Super-E Premium Efficiency
EH3	Above - EPAct Efficiency HVAC Duty with Connection Box located on top of Motor
ECP	Super-E Premium Efficiency, Severe Duty Motor
EN	Encoder Kit
FM	F-2 Mount Motor
FCD	Drip Cover Kit
FD	Farm Duty Motor
FFC	Fan Cover/Conduit Box Kit
FL	Flange Kit
G	Subfractional HP Gear Motor
GC	Permanent Split Capacitor and Split Phase
GCP	Permanent Split Capacitor and Split Phase Parallel Shaft Gearmotor
GD	Centrifugal Fan Motor
GF	900 Series Reducers
GP	Subfractional HP PM Motor
GPP	PM Parallel Shaft Gear Motor
GSF	Universal Series Right Angle Gear Reducers

GS	Grain Stirring Motor
H	Definite Purpose HVAC Motors
H3	HVAC Duty with Connection Box located on top of Motor
HP	Hydraulic Pump Motor
ID	Inverter Control
IDM	Inverter Drive Motor-TEBC
IDNM	Inverter Drive Motor-TENV
IDWNM	Washdown Inverter Motors-TENV
IDXM	Explosion proof Inverter Drive Motors-TEFC
IM	Irrigation Drive Motor
IR	Instant Reversing Single Phase Farm Motor
J	NEMA 56J Stainless Steel Threaded Shaft with Dripcover
JM	NEMA JM Pump shaft & Face with Base
JP	NEMA JP Pump shaft & Face with Base
JSL	Square Flange Pump Motors with threaded shaft.
K	Model 34 Diameter Motor with 56 C-Face, less Base
KN	Model 34 Diameter TENV Motor with 56 C-Face, less Base
L	Single Phase
LRA	Line Reactor
M	Three Phase
M	Multipurpose Soft Start Control
MM	Metric Dimension Motor with Base
MPM	Three Phase Metering Pump
MVM	Metric Dimension Motor, Flange Mount less Base
N	Totally Enclosed Non ventilated
OF	Design D, High Slip Motor (Oil Field)
P15	Pre-Engineered Control Panel
PSC	Permanent Split Capacitor
R	Repulsion-Start, Induction-Run Motor
RBT	Roller Bearing Conversion Kit
RES	Resolver Feedback Kit
RG	Regeneration Resistor Assembly
RH	Definite Purpose HVAC Motors
RL&RM	Resilient Base(Cradle Mount)
RT	Dynamic Braking Resistor Assembly
S	Single Phase Soft Start
SD	Series 23H Servo Control
SS	All Stainless Washdown Duty
SWD	Stainless Washdown Duty
T	Torque Control
TA	Torque Arm
TM	Definite Purpose HVAC Motors with Terminal Panel Endplate
TK	Tachometer Mounting Kit
UIC	Universal Crop Dryer Motor
V	NEMA C-Face less Base
VH	Vertical Pump Motor, Normal Thrust
VJM	NEMA JM Pump Shaft and Face less Base
VLCP	Vertical Pump Motor, Medium Thrust
VP	PM SCR Drive Motor with Metric Face or Flange
VPCP	Vertical Pump Motor, High Thrust
WC	West Coast Fit NEMA TCZ
WD	Washdown Duty
WW	Woodworking Motor
ZD	Vector Control
ZDM	Vector Drive Motor-TEBC
ZDNM	Vector Drive Motor-TENV
ZDWNM	Washdown Vector Motors-TENV

Catalog Number Suffix:

-2	120/240V Field
-277	277 Volt Winding
-4	460 Volt Winding
-5	575 Volt Winding
-8	200 Volt Winding
-9	NEMA Design C High Torque Winding
-12	12 Leads
/35	Full 140 Frame Band Diameter
/36	Full 180 Frame Band Diameter
-50	Wound for 50 Hertz Service
2941	2880/4160 Volt Winding
A	Automatic Thermal Overload
bv	Blower vented
-C	Listing includes Class I, Group C
-CL	Open Chassis Enclosure, Line Regenerative
-CO	Open Chassis Enclosure, no internal braking
E	Electric Switch
-E	NEMA 1 Enclosure, built in Dynamic Braking
-EL	NEMA 1 Enclosure, Line Regenerative
-EO	NEMA 1 Enclosure, no internal braking
-ER	NEMA 1 Enclosure, built in Dynamic Braking Transistor
-I	Explosion-Proof, 1.15 Service Factor
M	Manual Thermal Overload
-MO	Protected Chassis Enclosure, no internal braking
P	Wound Field DC Motor NEMA "AT" Frame
-P	Partial AC Motor Excludes
R-	Roller Bearing
T	NEMA "T" Frame Dimension
TP	Feather Picker Motor
TR	NEMA "T" Frame-Roller Bearing
TS	NEMA "TS" Frame Short Shaft Pulley Endplate
-V12	12 Volt DC
-V24	24 Volt DC
-W	NEMA 4 Enclosure
-WR	Washdown Rating

Gear Reducer Suffix: 900 Series

A	56C Motor Flange
B	140TC Motor Flange
C	180TC Motor Flange
G	Left Hand Output Shaft
H	Double End Output Shaft
J	Right Hand Output Shaft

Gear Reducer Suffix: Universal Series

A	56C or Right Hand Output Shaft
B	140TC
C	180TC

Grinder Catalog Number Suffix:

D	Deluxe
E	Exhaust Guards
W	Wide Design

Other Abbreviations:

C	Permanent Split Capacitor
L	Capacitor-Start, Induction-Run Motor
LC	Capacitor-Start, Capacitor-Run Motor
S	Split Phase
X	Explosion-Proof

CATALOG NOTES:

- 1 Class F Insulated Motor with 1.15 Service Factor or higher that operates within Class "B" temperature limits at rated horsepower.
- 2 1.00 Service Factor.
- 3 Capacitor start, induction run.
- 4 Wye-start, delta-run.
- 5 Belted duty only, roller bearing.
- 6 F-2 Mounting
- 7 Companion voltages not available.
- 8 Class "H" Insulated.
- 9 Motors are not NAFTA qualified.
- 10 These motors meet the hardware requirements of IEEE 45/ABS and are not provided with Marine Plan Documentation.
- 11 F-3 Mounting
- 13 Furnished without conduit box. Order kit P/N K56G3230.
- 14 Type CH (Capacitor Start - Capacitor Run).
- 15 Motors rated 208-230/460 are operable to minimum 200 volts.
- 17 Capable of 100% thrust in either direction.
- 18 Capable of 100% thrust stated in downward direction (out of motor) and 40% upward thrust (into motor).
- 19 60/50 Hertz motor. 60 Hertz data shown, contact your local Baldor•Reliance office for 50 Hertz data.
- 20 Class F Insulation.
- 21 Double bolt.
- 22 Base used for NEMA & above NEMA frames, 445T.
- 23 Two piece slide rails.
- 24 DOL or Part Winding Start.
- 25 DOL or Wye Start, Delta Run
- 26 Non-standard "BA" due to drive end bearing cooling fan. Please refer to layout drawing.
- 27 Motors have ball bearing suitable for coupled loads. If load is belted, a roller bearing may be required, contact your local Baldor•Reliance office.
- 28 Usable at 200 volts.
- 29 V-dimension is 2.5".
- 30 Usable at 208 volts.
- 31 Suitable for 230/460, 60 Hz and 190-220/380-440 volts, 50 Hz.
- 32 Stearns brake.
- 33 Voltage at 60Hz.
- 34 Dodge D series brake.
- 35 Design A, also meets Design E inrush limits.
- 36 Can mount as 56, 143T & 145T frames with NEMA 56 shaft dimensions.
- 37 Can mount as 56, 143T & 145T frames with NEMA 143T-145T shaft dimensions.
- 38 Can mount as NEMA 56, 143T and 145T frames with NEMA 56 frame shaft dimensions.
- 39 Class F Rise
- 40 Brake motors may be mounted for vertical mounting with brake below motor.
- 41 Brake motors may be mounted for vertical mounting with brake above or below motor.
- 42 DODGE Short Series Brake.
- 43 Cannot be mounted vertically.
- 44 Shown as WPI enclosure.
- 45 Horizontal mount, no C-Face. May be converted to C-Face in Mod Express or built as custom motors.
- 46 Includes 1024 ppr encoder.
- 47 BA dimension does not meet NEMA standards.
- 48 Includes phase insulation. Suitable for inverter duty.
- 49 Includes vertical lifting provision.
- 50 Cast Iron 140 Frame.
- 51 BISSC Certified.
- 52 IP55 Enclosure.
- 53 Voltage at 50Hz.
- 54 Motors have NEMA standard BA dimensions.
- 55 Constant velocity fan: 115 volts, single phase.
- 57 Can mount as NEMA 145T frame with 145T frame shaft dimensions.
- 58 Can mount as NEMA 56, 143T and 145T frames with NEMA 143T-145T frame shaft dimensions.
- 59 Suitable for operation @ 415V, 50 Hz.
- 60 Totally-Enclosed, Non-Ventilated, Continuous Duty.
- 61 Copper bar rotor standard.
- 63 Foot also drilled for 447T frame mounting.
- 64 Motors include 100 ohm platinum winding RTDs and space heaters.
- 65 Capacitor start, capacitor run (two value capacitor).
- 66 Resilient mount single phase motors with moderate starting torque for fan applications.
- 67 Voltage at 50/60 Hz.
- 68 3 lead.
- 69 6 lead suitable for part winding start on 200 volts.
- 70 Constant velocity fan: 230/460 volts, three phase.
- 71 Nominal efficiency is based at the 1800 RPM (High RPM) and low speed efficiency is available just not published.
- 73 SCR Motors with a 3:1 constant torque speed range.
- 74 V-dimension is 3".
- 76 Flexible waterproof cover protects thermal overload reset button.
- 77 Inverter Duty.
- 78 Furnished without conduit box. Order Kit BKP2400.
- 80 Design criteria similar to motors in Commercial Duty Motors section.
- 81 5.5 inch frame – Aluminum end shield standard enclosure
- 82 6.3 inch frame – Aluminum end shield standard enclosure
- 84 Does not meet NEMA BA for C-face footed motors
- 85 Can only be used on motors 1800 RPM and slower with ball bearings
- 86 Cannot be operated at full nameplate rating on 50 Hz rectified power supply
- 87 Tach adaptable with Thermostat
- 88 Sleeve bearings - coupled loads only.
- 89 Cooling fan on each end.
- 90 Includes thermostat.
- 91 Blower on drive end.
- 92 Force vent with blower and filter. Full nameplate rating on 50 Hz rectified power, AC supply voltage must be same as 60 Hz supply.
- 93 Force vent with blower, full nameplate rating on 50 Hz rectified power. AC supply voltage must be same as 60 Hz supply, thermostats and tach provisions.
- 94 Force vent with blower, cannot run full nameplate on 50 Hz rectified power, thermostats and tach provisions.
- 95 Force vent with blower on drive end filter, thermostats and tach provisions.
- 106 Finned aluminum frame construction.

EXPLOSION-PROOF MOTOR SYMBOLS:

- ① Class I, Group D, T2C.
- ② Class I, Group C & D, Class II, Group F & G, T4.
- ③ Class I, Group D, Class II Group E, F & G, T3C
- ④ Class I, Group C & D, Class II, Group F & G, T3C
- ⑤ Class I, Group C & D, T3C.
- ⑥ Class I, Group D, T2A.
- ⑦ Class I, Group D, Class II, Group F & G, T4
- ⑧ Class I, Group D, Class II, Group F & G, T3C.
- ⑨ Class I, Group D, T2B



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Product Information Packet

VM7006A

.5HP,1725RPM,3PH,60HZ,56C,X3416M,XPFC,F1

Product Detail							
Revision:	N	Status:	PRD/A	Change #:		Proprietary:	No
Type:	AC	Prod Type:	3416M	Elec. Spec:	34WG1543	CD Diagram:	CD0007
Enclosure	XPFC	Mfg Plant:		Mech Spec:	34-5336	Layout:	34LY5336
Frame:	56C	Mounting:	F1	Poles:	04	Created Date:	
Base:	N	Rotation:	R	Insulation:	B	Eff. Date:	02-01-2005
Leads:	12#18	Literature:		Elec. Diagram:		Replaced By:	

Nameplate NP0016XP							
NO.		CC					
SER.							
SPEC.	34-5336-1543						
CAT.NO.	VM7006A						
HP	1/2	T. CODE	T3C				
VOLTS	208-230/460						
AMPS	2.1-2/1						
RPM	1725						
HZ	60	PH	3	CL	B		
SER.F.	1.00	DES	B	CODE	L		
RATING	40C AMB-CONT						
FRAME	56C	NEMA-NOM-EFF	74	PF	63		
USABLE AT 208V	2.1						

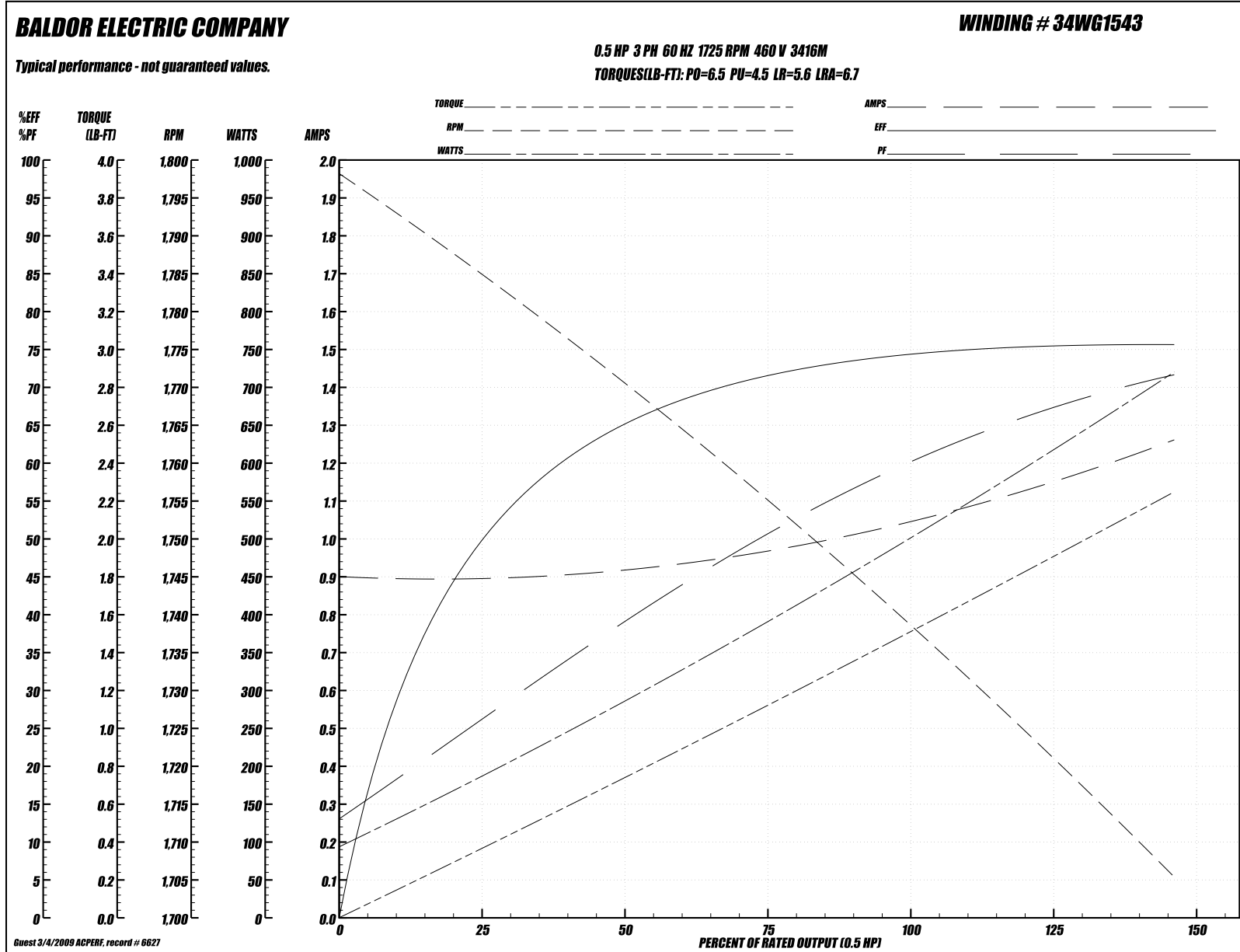
Parts List			
Product ID	Description	Quantity	List Price
SA009026	SA 34-5336-1543	1.000	473.00
RA005473	RA 34-5336-1543	1.000	394.00
35CB3001A01SP	EXPL CONDUIT BOX, MACH, 1/2" PIPE TAP LE	1.000	36.00
11XW1032G06	10-32 X .38, TAPTITE II, HEX WSHR SLTD U	1.000	4.00
HW3001A01	D3019 BRASS WASHER(STIMP)	1.000	3.00
34EP3703A01	FR ENDPLATE, MACH XP	1.000	70.00
MJ5000A01	SEALANT, CHICO A COMPOUND	0.050	
51XW0832A07	8-32 X .44, TAPTITE II, HEX WSHR SLTD SE	2.000	3.00
HW4002A02	1-11.5X2LG PIPE NIPPLE (F/S)	1.000	5.00
HA1025A13	WSHR,FELT, .38" THICK F-26 CLASS	1.000	2.00
HW3021E06	1/8 DIA X 5/8 ROLLPIN (F/S)	1.000	2.00
HW5100A03SP	WAVY WASHER (W1543-017)	1.000	3.00
34EP3705A01SP	PU ENDPLATE, MACH	1.000	76.00
34FN3002A01SP	EXTERNAL FAN, PLASTIC, .637/.639 HUB W/	1.000	17.00
34FH4002A01SP	IEC FH NO GREASER	1.000	28.00
51XW1032A06	10-32 X .38, TAPTITE II, HEX WSHR SLTD S	3.000	4.00
35CB3500A01SP	CONDUIT BOX LID, MACH	1.000	21.00
10XN2520A16	1/4-20 X 1 HEX HEAD CAP SCR, ZINC PLATED	4.000	4.00
HW1001A25	LOCKWASHER 1/4, ZINC PLT .493 OD, .255 I	4.000	3.00
HW2501D13SP	KEY, 3/16 SQ X 1.375	1.000	3.00
HA7000A04	KEY RETAINER 0.625 DIA SHAFTS	1.000	3.00
HA6001A01	THERMAL RETAINER (PLATED)	1.000	3.00
12XF0632A06	6-32X3/8 TY F HEX HD SLT	2.000	4.00
NS2500A05	INSULATOR, AUTO THER PROT	1.000	2.00

Parts List (continued)			
Product ID	Description	Quantity	List Price
WD1000A16	2-520128-2 AMP FLAG TERMINAL(4M/RL)	3.000	983.00
MG1025G05	PAINT DRK MET.GRAY,W/ACTIVATOR	0.014	218.00
85XU0407A04	#4-7 X 1/4 DRIVE PIN	6.000	3.00
NP0018	NP- XP CONDUIT BOX	1.000	3.20
TPMYJ70KX	THERMAL 3PH 0.75 AUT 120C	1.000	77.00
SP5037A01	TERMINAL PLATE ASS'Y MODEL 34 - 3 PHASE	1.000	20.00
HA3104A03	THRUBOLT 5/16-18 X 7.625 W QTE#457	4.000	3.00
WD1000A16	2-520128-2 AMP FLAG TERMINAL(4M/RL)	12.000	983.00
LC0007	CONN.DIAGRAM (3PHASE W/THERMAL)	1.000	3.00
LB1125C01	STD (STOCK) CARTON LABEL BALDOR WITH FLA	1.000	3.00
LB1118	LABEL,WARNING (ROLL LABEL)	1.000	3.00
NP0016XP	UL/CSA, CLI GP-D,CLII GP-F&G,CC,ATO	1.000	
34PA1005	PACKING GROUP, BALDOR	1.000	12.00

Performance Data at 460V, 60Hz, 0.5HP (Typical performance - Not guaranteed values)

General Characteristics							
Full Load Torque:	1.5 LB-FT			Start Configuration:	DOL		
No-Load Current:	0.89 Amps			Break-Down Torque:	6.5 LB-FT		
Line-line Res. @ 25°C.:	33.0 Ohms A Ph / 0.0 Ohms B Ph			Pull-Up Torque:	4.5 LB-FT		
Temp. Rise @ Rated Load:	59°C			Locked-Rotor Torque:	5.6 LB-FT		
Temp. Rise @ S.F. Load:	0°C			Starting Current:	6.7 Amps		
Load Characteristics							
% of Rated Load:	25	50	75	100	125	150	S.F.
Power Factor:	27.0	39.0	51.0	60.0	67.0	72.0	0.0
Efficiency:	49.8	65.0	71.7	74.5	75.6	75.5	0.0
Speed:	1785.0	1770.0	1756.0	1737.0	1724.0	1705.0	0.0
Line Amperes:	0.9	0.94	0.98	1.0	1.15	1.27	0.0

Performance Graph at 460V, 60Hz, 0.5HP (Typical performance - Not guaranteed values)



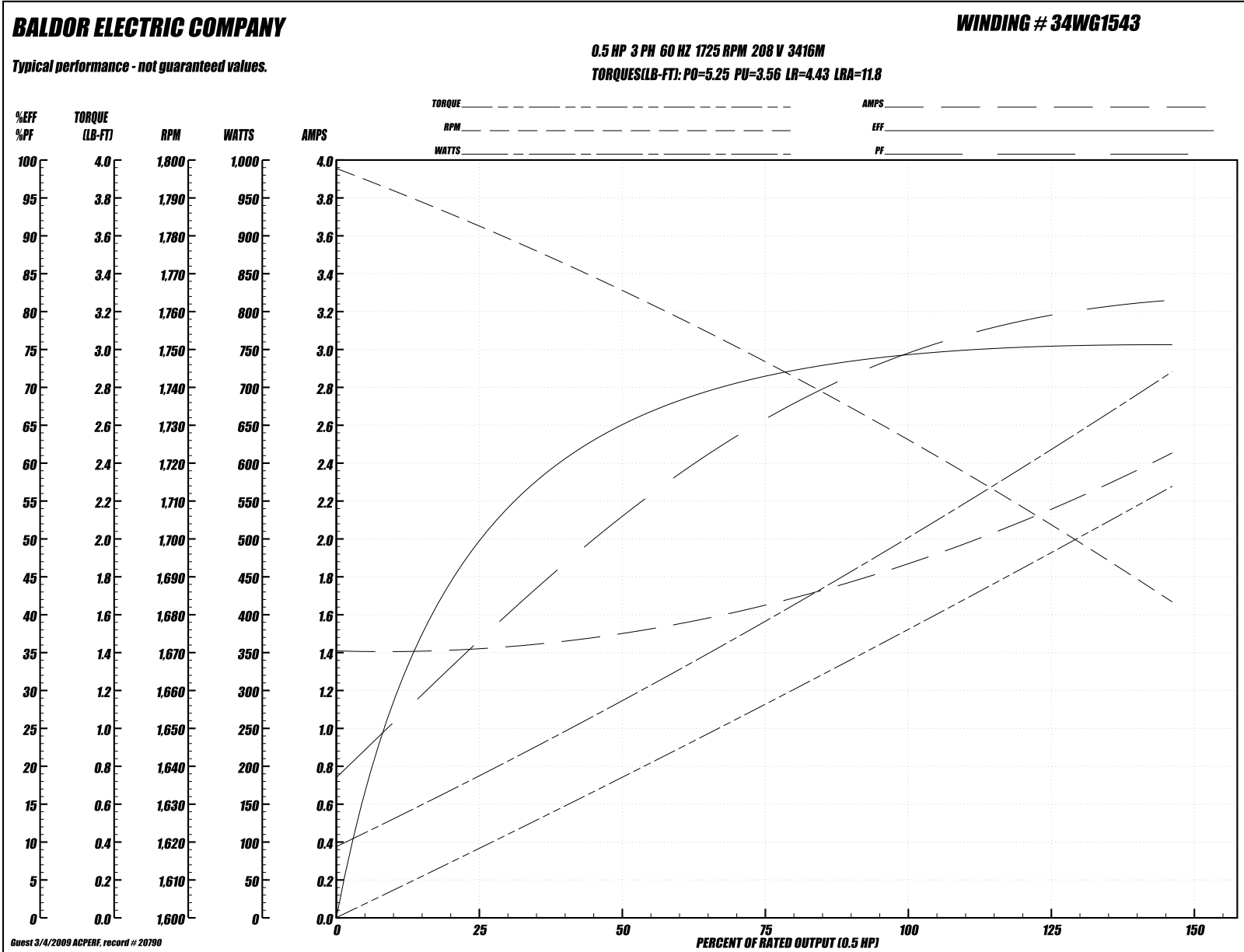
Performance Data at 208V, 60Hz, 0.5HP (Typical performance - Not guaranteed values)
General Characteristics

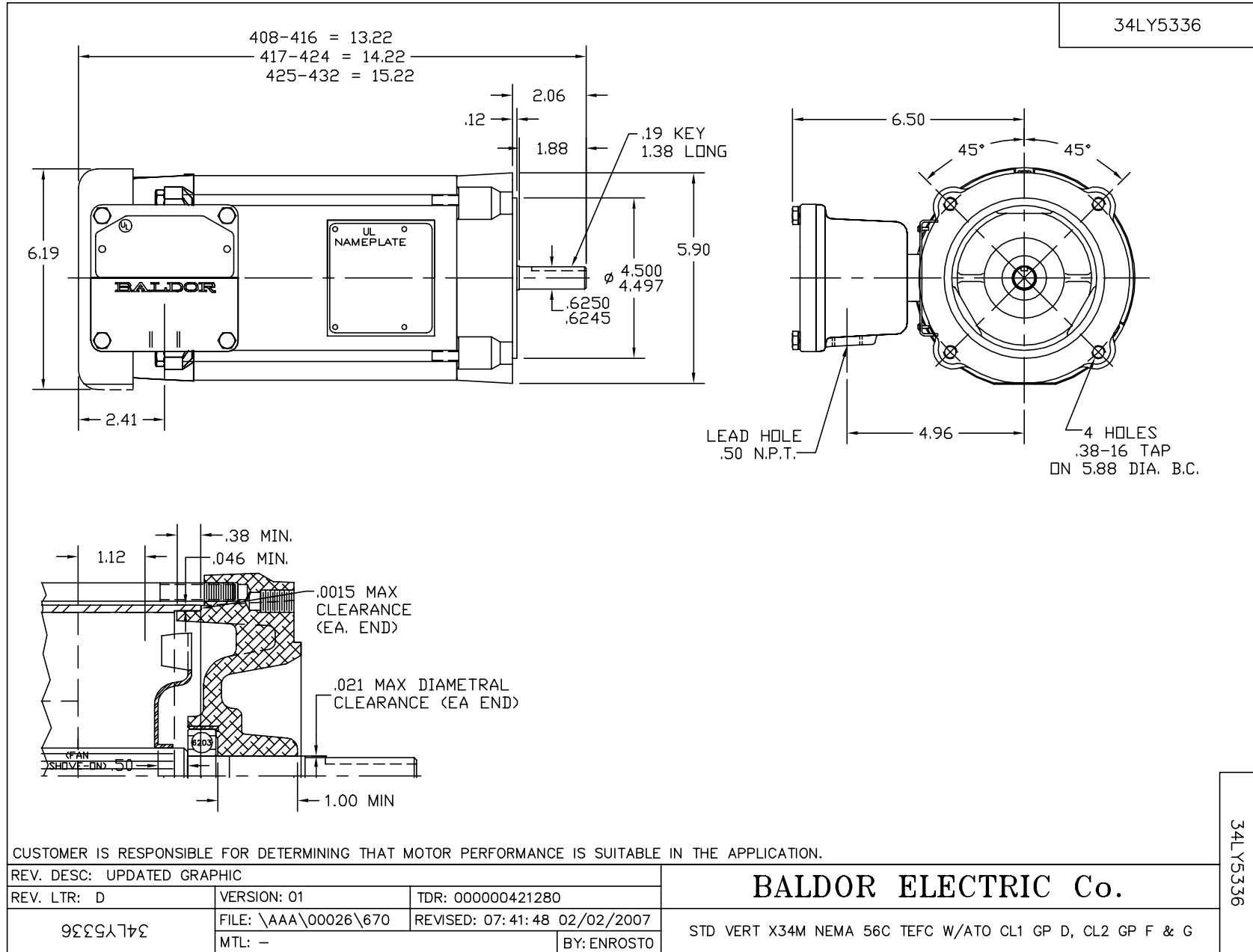
Full Load Torque:	1.51 LB-FT	Start Configuration:	DOL
No-Load Current:	1.39 Amps	Break-Down Torque:	5.25 LB-FT
Line-line Res. @ 25°C.:	8.35 Ohms A Ph / 0.0 Ohms B Ph	Pull-Up Torque:	3.56 LB-FT
Temp. Rise @ Rated Load:	50°C	Locked-Rotor Torque:	4.43 LB-FT
Temp. Rise @ S.F. Load:	0°C	Starting Current:	11.8 Amps

Load Characteristics

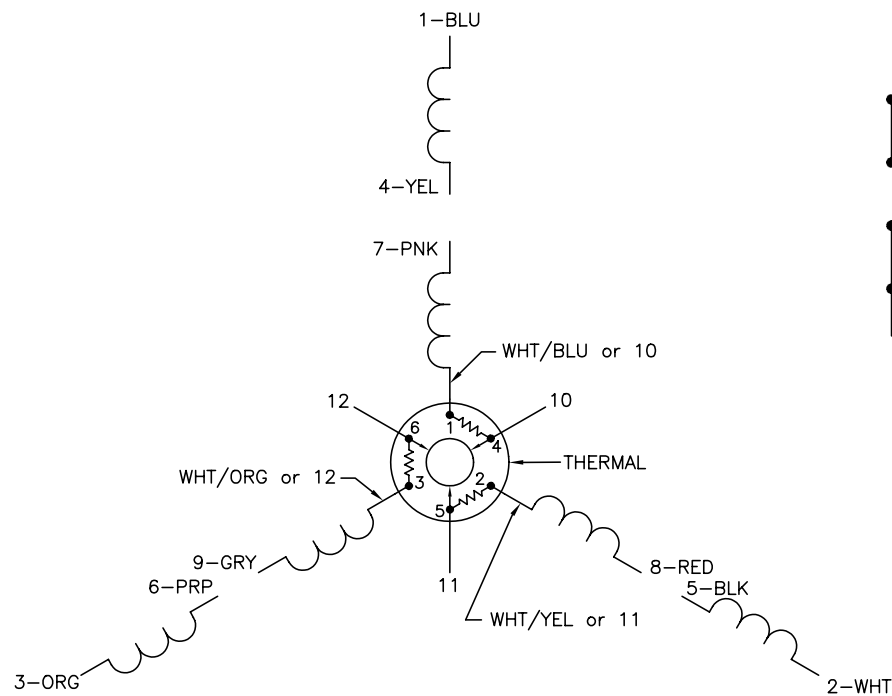
% of Rated Load:	25	50	75	100	125	150	S.F.
Power Factor:	37.0	52.0	65.0	77.0	79.0	81.0	0.0
Efficiency:	49.3	64.9	71.8	74.4	75.5	75.5	0.0
Speed:	1782.0	1765.0	1748.0	1725.0	1707.0	1683.0	0.0
Line Amperes:	1.43	1.54	1.67	1.79	2.14	2.47	0.0

Performance Graph at 208V, 60Hz, 0.5HP (Typical performance - Not guaranteed values)

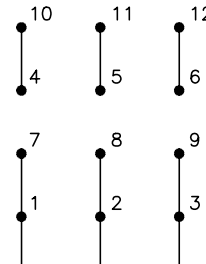




CD0007

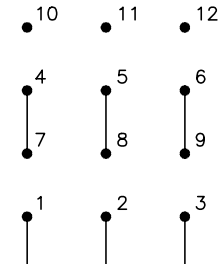


LOW VOLTAGE
(2Y)



LINE

HIGH VOLTAGE
(1Y)



LINE

NOTES:

1. INTERCHANGE ANY TWO LINE LEADS TO REVERSE ROTATION.
2. ACTUAL NUMBER OF INTERNAL PARALLEL CIRCUITS MAY VARY.
3. LEAD COLORS ARE OPTIONAL. LEADS MUST ALWAYS BE NUMBERED AS SHOWN.

REV. DESC: ADDED "CK" PLANT CODE			
REV. LTR: E	BY: EAH	REVISED: 05/06/99 17:1	TDR: 0181040
L00000		FILE: AAA00008370	MDL: -
		MTL: -	

BALDOR ELECTRIC Co.

3PH, DV, THERMAL, 12 LEADS

CD0007

Motor Current Monitor Data

Over/Under Current Sensing

ECS Series

Current Sensor



- Toroidal Through Hole Wiring
- 0.5...50 A Trip Point
- Adjustable or Factory Fixed Trip Delays
- 10 A SPDT Isolated Output Contacts
- 5% Trip Point Hysteresis (Dead Band)

Approvals:

Description

The ECS Series of Single Phase AC Current Sensors is a universal, overcurrent or undercurrent sensing control. Its built-in toroidal sensor eliminates the inconvenience of installing a stand-alone current transformer. Includes onboard adjustments for current sensing mode, trip point, and trip delay. Detects over or under current events like locked rotor, loss of load, an open heater or lamp load, or proves an operation is taking place or has ended.

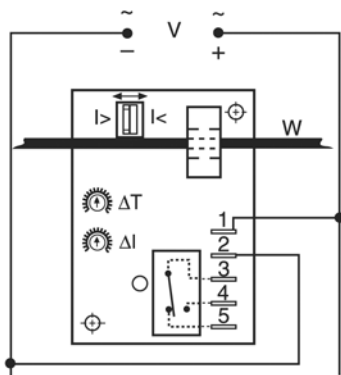
Operation

Input voltage must be supplied at all times for proper operation. When a fault is sensed throughout the trip delay, the output relay is energized. When the current returns to the normal run condition, the output and the delay are reset. If a fault is sensed and then corrected before the trip delay is completed, the relay will not energize and the trip delay is reset to zero.

Adjustment

Select the desired function, over or under current sensing. Set the trip point and trip delay to approximate settings. Apply power to the ECS and the monitored load. Turn adjustment and watch the LED. LED will light; turn slightly in opposite direction until LED is off. Adjustment can be done while connected to the control circuitry if the trip delay is set at maximum.

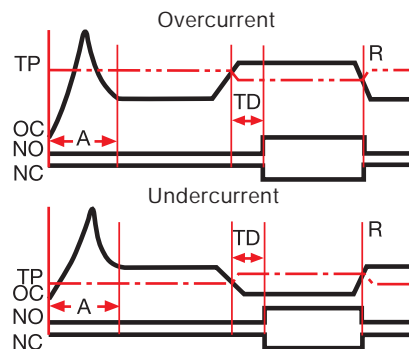
Connection



Relay contacts are isolated.
Dashed lines are internal connections.

V = Voltage I> = Overcurrent I< = Undercurrent
W = Insulated Wire Carrying Monitored Current

Function



TP = Trip Point R = Reset OC = Monitored Current
NO = Normally Open Contact NC = Normally Closed Contact
A = Sensing Delay On Start Up TD = Trip Delay

Accessories



Female quick connect P/Ns:
P1015-13 (AWG 10/12)
P1015-64 (AWG 14/16)
P1015-14 (AWG 18/22)

See accessory pages for specifications.

Ordering Table

Series	Input	Trip Point	Trip Delay	Sensing Delay on Start up
ECS (selectable over or under current sensing)	1 - 12 V DC	Fixed	F Factory Fixed:	Blank 0 s
ECSH (overcurrent sensing)	2 - 24 V AC	Specify 2 ... 50 A	Specify .08 ... 50 s	C 1 s
ECSL (undercurrent sensing)	3 - 24 V DC	in 1 A increments	Adjustable Ranges	D 2 s
	4 - 120 V AC	Adjustable Ranges	A 0.150 ... 7 s	E 3 s
	6 - 230 V AC	0 0.5 ... 5 A	B 0.5 ... 50 s	F 4 s
		1 2 ... 20 A		G 5 s
		H 5 ... 50 A		H 6 s

Example P/N: **ECS41AC** Fixed - **ECSH610AD**

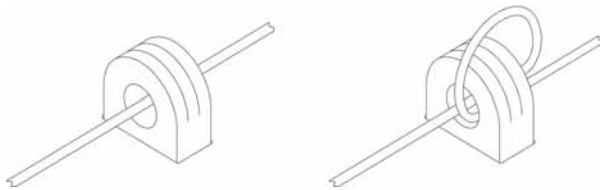
Over/Under Current Sensing

ECS Series

Current Sensor

Technical Data

Sensor	
Type	Toroidal, through hole wiring
Mode	Over or under current, switch selectable on the unit or factory fixed
Trip Point Range	0.5 ... 50 A in 3 adjustable ranges or fixed
Tolerance:	Adjustable Fixed
Maximum Allowable Current	Guaranteed range 0.5 ... 25 A; 0.5 A or +/-5% whichever is less; 26 ... 50 A; +/-2.5%
Trip Point Hysteresis	Steady – 50 A turns; Inrush – 300 A turns for 10 s
Trip Point vs. Temperature	≅ +/-5%
Response Time	+/-5%
Frequency	≤ 75 ms
Type of Detection	45 ... 500 Hz
Trip Delay	Peak detection
Type	Analog
Range:	Adjustable Factory Fixed
Delay vs. Temperature	0.150 ... 7 s; 0.5 ... 50 s (Guaranteed ranges)
Sensing Delay on Startup	0.08 ... 50 s (+/-10%) +/-15% Factory fixed 0 ... 6 s: +40% ... 0%
Input	
Voltage	24 , 120, or 230 V AC; 12 or 24 V DC
Tolerance	12 V DC & 24 V DC/AC 15% ... +20% 120 & 230 V AC -20% ... +10%
Line Frequency	50 ... 60 Hz
Output	
Type	Electromechanical relay
Form	Isolated single pole double throw (SPDT)
Rating	10 A resistive at 240 V AC; 1/4 hp at 125 V AC; 1/2 hp at 250 V AC
Life	Mechanical – 1 x 10 ⁶ ; Electrical – 1 x 10 ⁵
Protection	
Circuitry	Encapsulated
Isolation Voltage	≥ 2500 V RMS input to output
Insulation Resistance	≥ 100 MΩ
Mechanical	
Mounting	Surface mount with two #6 (M3.5 x 0.6) screws
Termination	0.25 in. (6.35 mm) male quick connect terminals (5)
Humidity	95% relative, non-condensing
Operating/Storage Temperature	-40°C ... +60°C / -40°C ... +85°C
Weight	≅ 6.4 oz (181 g)



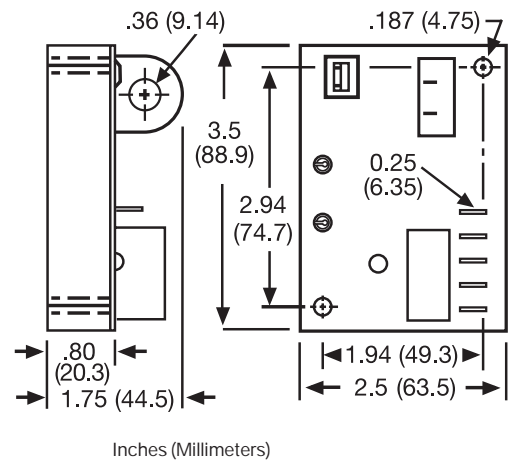
Multiple Turns To Increase Sensitivity

To increase sensitivity, multiple turns may be made through the ECS's toroidal sensor. The trip point range is divided by the number of turns through the toroidal sensor to create a new range.

~~Using an External Current Transformer (CT)~~

~~Select a 2 VA, 0 to 5 A output CT rated for the current to be monitored. Select ECS adjustment range 0. Pass the CT's secondary wire lead through the ECS's toroid and connect both ends together.~~

Mechanical View



Float Switch Data

(Intrinsically Safe)



The FT series cable suspended floats are designed for high or low level indication. The FT series is a miniature switch actuated design ideally suited to operate pumps, valves and similar equipment used in municipal wastewater treatment facilities.

Standard cable lengths are 20 ft. (6 m), and are available up to 30 ft. (9 m). The switch operating levels are easily adjustable by altering the height of the cable fixing point.

■ **Operational Description**

This narrow angle sensing device is used to accurately monitor liquid levels in potable water, water and sewage applications.

The FT-300 is not sensitive to rotation.

Normally Open Model (high level)

The control switch turns on (closes) when the float tips slightly above horizontal, signaling a high level. It turns off (opens) when the float drops slightly below horizontal.

Normally Closed Model (low level)

The control switch turns on (closes) when the float drops slightly below horizontal, signaling a low level. It turns off (opens) when the float tips slightly above horizontal.



Liquid level sensing

FT-300

Mechanically Activated, Narrow Angle Float Switch

- Passed NSF Standard 61 protocol by an approved Water Quality Association laboratory
- Mechanically activated, snap action contacts
- High impact, corrosion resistant, polypropylene float housing
- Not sensitive to rotation
- Control differential of 1.5 in. (4 cm) above or below horizontal

APG is a registered trademark of Automation Products Group, Inc.

■ Specifications

Cable: Flexible 18 gauge, 2 conductor (UL, CSA) SJOW, water resistant (CPE)

Float: 2.74 in. dia. x 4.83 in. long (7.0 cm x 12.3 cm), high impact, corrosion resistant, polypropylene housing for use in sewage and water up to 140°F (60°C)

Maximum Water Depth: 30 ft. (9 m), 13 psi (90 kPa)

Electrical

125 VAC:

Maximum Electrical Load: 0.1 A

Minimum Electrical Load: 0.160 mA

30 VDC:

Maximum Electrical Load: 0.1 A

Minimum Electrical Load: 0.160 mA

5 VDC:

Minimum Electrical Load: 1 mA

■ Ordering Information

Configuration

A (NO) Normally Open

B (NC) Normally Closed

Cable Length

(null) 6 m

 m (Optional cable length designation)

FT-300 [] - []



liquid level sensing

Note: This switch can be used in hazardous locations provided they are operated in conjunction with appropriately rated and installed intrinsically safe barriers. Specifications are subject to change without notice.

• Introduction

This narrow angle sensing device is used to accurately monitor liquid levels in potable water, water and sewage applications. The FT-300 is not sensitive to rotation.

Normally Open Model (high level)

The control switch turns on (closes) when the float tips slightly above horizontal, signaling a high level. It turns off (opens) when the float drops slightly below horizontal.

~~Normally Closed Model (low level)~~

~~The control switch turns on (closes) when the float drops slightly below horizontal, signaling a low level. It turns off (opens) when the float tips slightly above horizontal.~~

• Specifications

Operational Version:	FT-300A Normally Open FT-300B Normally Closed
Float:	PP housing; 2.74 in. dia. x 4.83 in. long
Max. Water Depth:	30 ft. (9 m)
Max. Temperature:	140°F (60°C)
Max. Pressure:	30 psi
Cable:	18 AWG, 2 or 3 conductor (UL, CSA), SJOW, water resistant CPE jacket
Contact Rating:	125 VAC Maximum Electrical Load: 0.1 A Minimum Electrical Load: 0.160 mA 30 VDC Maximum Electrical Load: 0.1 A Minimum Electrical Load: 0.160 mA 5 VDC Minimum Electrical Load: 1 mA

Note: This switch can be used in hazardous locations provided they are operated in conjunction with appropriately rated and installed intrinsically safe barriers.



Automation Products Group, Inc.
APG...Providing tailored solutions for measurement applications

• Installation WITH INTRINSICALLY SAFE

Warning! – Electrical Shock Hazard

Disconnect power before installing or servicing this product. A qualified service person must install and service this product according to applicable electrical and plumbing codes.

Warning! – Explosion or Fire Hazard

Do not use this product with flammable liquids. Do not install in hazardous locations as defined by National Electrical Code ANSI/NFPA 70.

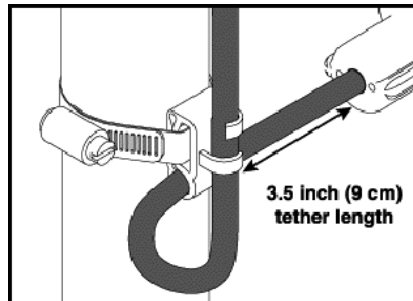
Failure to follow these precautions could result in serious injury or death. Replace product immediately if switch cable becomes damaged or severed. Keep these instructions with warranty after installation. This product must be installed in accordance with National Electrical Code ANSI/NFPA 70 so as to prevent moisture from entering or accumulating within boxes, conduit bodies, fittings, float housing or cable.

Mounting Clamp

1. Place the cord into the clamp as shown in Figure A.
2. Locate the clamp at the desired activation level and secure the clamp to the discharge pipe as shown in Figure A. **Note:** Do not install cord under hose clamp.
3. Tighten the hose clamp using a screwdriver. Over tightening may result in damage to the plastic clamp. Make sure the float cable is not allowed to touch the excess hose clamp band during operation.
4. Bring cable leads back to control device and wire according to Figure B.
5. Check installation. Allow system to cycle to ensure proper operation.

Note: All hose clamp components are made of 18-8 stainless steel material.

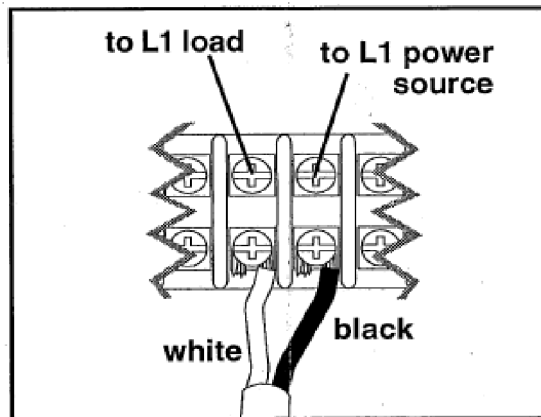
Figure A

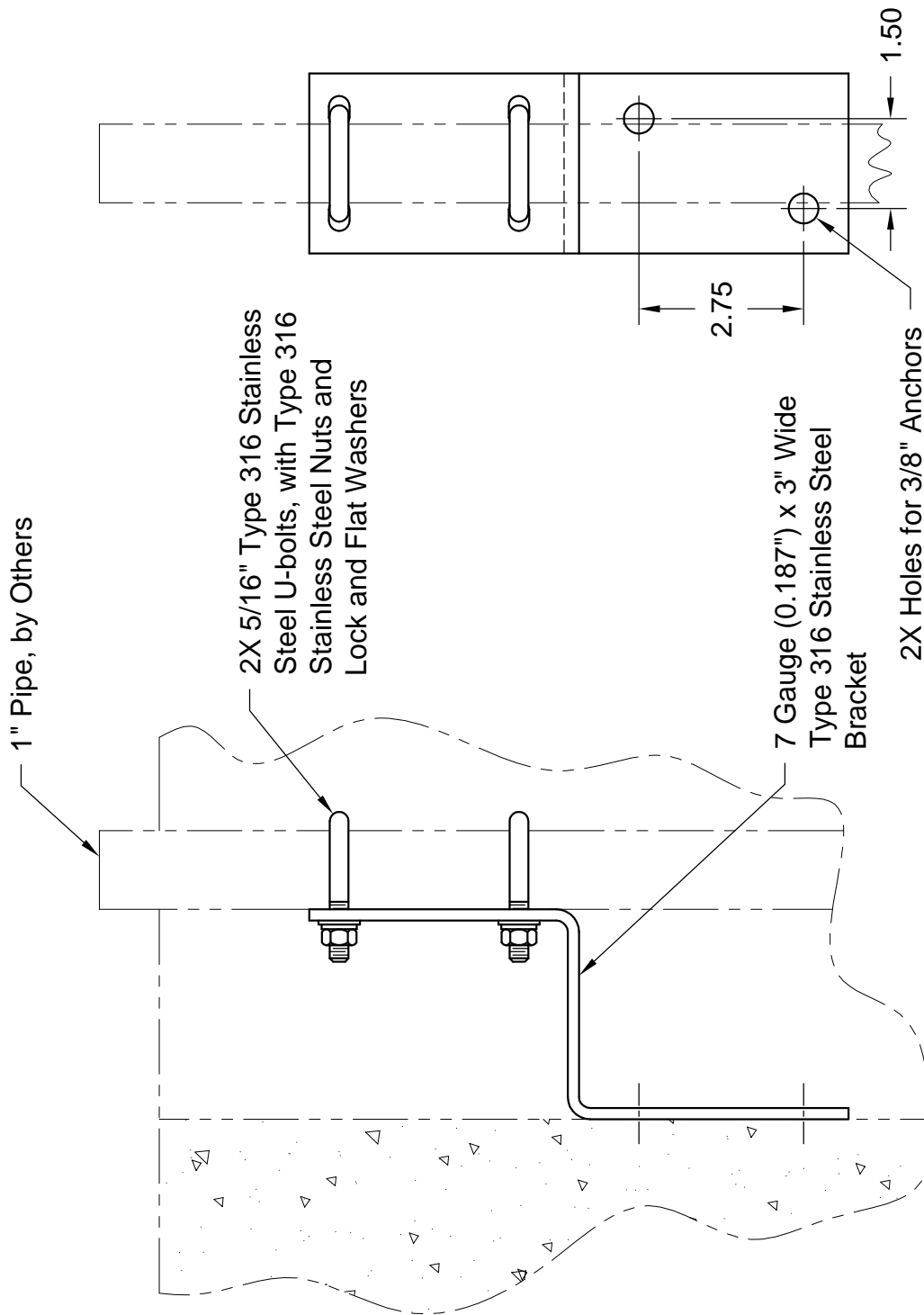


Wiring Diagram

1. For the FT-300A ~~or FT-300B~~ connect cable leads directly into control device as shown in Figure B.

Figure B





Float Switch Mounting Bracket Detail

Ultrasonic Level Controller Data

Level instruments

Continuous level measurement - Ultrasonic controllers

HydroRanger 200

Overview



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

Benefits

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

Application

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

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

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

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

Level instruments

Continuous level measurement - Ultrasonic controllers

HydroRanger 200

Technical specifications

Mode of Operation

Measuring principle	Ultrasonic level measurement
Measuring range	0.3 to 15 m (1 to 50 ft), transducer dependent
Measuring points	1 or 2

Input

Analogue	0 to 20 mA or 4 to 20 mA, from alternate device, scaleable (6 relay model)
Discrete	10 to 50 V DC switching level Logical 0 = < 0.5 V DC Logical 1 = 10 to 50 V DC Max. 3 mA

Output

Echomax [®] transducer	44 kHz
Ultrasonic transducer	Compatible transducers: ST-H and Echomax series XPS-10/10F, XPS 15/15F, XCT-8, XCT-12 and XRS-5
Relays ¹⁾	Rating 5 A at 250 V AC, non-inductive
- Model with 1 relay ²⁾	1 SPST Form A
- Model with 3 relays ²⁾	2 SPST Form A/1 SPDT Form C
- Model with 6 relays	4 SPST Form A/2 SPDT Form C
mA output	0 to 20 mA or 4 to 20 mA
• Max. load	750 Ω , isolated
• Resolution	0.1 % of range

Accuracy

Error in measurement	0.25% of range or 6 mm (0.24"), whichever is greater
Resolution	0.1% of measuring range or 2 mm (0.08"), whichever is greater ³⁾
Temperature compensation	<ul style="list-style-type: none"> -50 to +150 °C (-58 to +302 °F) • Integral temperature sensor in transducer • External TS-3 temperature sensor (optional) • Programmable fixed temperature values

Rated operating conditions

<u>Installation conditions</u>	
Location	indoor / outdoor
Installation category	II
Pollution degree	4
<u>Ambient conditions</u>	
Ambient temperature (enclosure)	-20 to +50 °C (-4 to +122 °F)

Design

Weight	
• Wall mount	1.37 kg (3.02 lbs)
• Panel mount	1.50 kg (3.31 lbs)
Material (enclosure)	Polycarbonate
Degree of protection (enclosure)	
• Wall mount	IP65/Type 4X/NEMA 4X
• Panel mount	IP54/Type 3/NEMA 3
<u>Cable</u>	
Transducer and mA output signal	2-core copper conductor, twisted, shielded, 300 Vrms, 0.82 mm ² (18 AWG), Belden [®] 8760 or equivalent is acceptable
Max. separation between transducer and transceiver	365 m (1200 ft)

Displays and controls

Displays and controls	100 x 40 mm (4 x 1.5") multi-block LCD with backlighting
Programming	Programming using handheld programmer or via PC with SIMATIC PDM software

Power supply⁴⁾

AC version	100 to 230 V AC \pm 15%, 50/60 Hz, 36 VA (17 W)
DC version	12 to 30 V DC (20 W)

Certificates and approvals

- CE, C-TICK⁵⁾
- Lloyd's Register of Shipping
- ABS Type Approval
- FM, CSA_{NRTL/C}, UL listed
- CSA Class I, Div. 2, Groups A, B, C and D, Class II, Div. 2, Groups F and G, Class III (wall mount only)
- MCERTS Class 1 approved for Open Channel Flow

Communication

- RS-232 with Modbus RTU or ASCII via RJ-11 connector
- RS-485 with Modbus RTU or ASCII via terminal blocks
- Optional: SmartLinx[®] cards for
 - PROFIBUS DP
 - DeviceNet[™]
 - Allen-Bradley[®] Remote I/O

¹⁾ All relays certified for use with equipment that fails in a state at or under the rated maximums of the relays

²⁾ This model is level control only; no open channel flow, differential level or volume conversion functions

³⁾ Program range is defined as the empty distance to the face of the transducer plus any range extension

⁴⁾ Maximum power consumption is listed

⁵⁾ EMC performance available upon request

Level instruments

Continuous level measurement - Ultrasonic controllers

HydroRanger 200

Selection and Ordering data	Order No.
Siemens HydroRanger 200 Ultrasonic level controller for up to six pumps that provides control, differential control and open channel flow monitoring. The HydroRanger 200 is also available as a level measurement controller only. Select option from model code below.	C) 7ML5034-
Mounting Wall mount, standard enclosure Wall mount, 4 entries, 4 M20 cable glands included Panel mount ¹⁾	1 2 3
Power supply 100 to 230 V AC 12 to 30 V DC	A B
Number of measurement points Single point model, 6 relays Dual point model, 6 relays Single point model, level only, 1 relay ²⁾ Single point model, level only, 3 relays ²⁾	A B C D
Communication (SmartLinx) Without module SmartLinx [®] Allen-Bradley [®] Remote I/O module SmartLinx PROFIBUS DP module SmartLinx DeviceNet [™] module See SmartLinx product page 5/260 for more information.	0 1 2 3
Approvals General Purpose CE, FM, CSAus/c, UL listed, C-TICK CSA Class I, Div. 2, Groups A, B, C and D; Class II, Div 2, Groups F and G; Class III (for wall mount applications only)	1 2
Further designs Please add "-Z" to Order No. and specify Order code(s). Stainless steel tag [69 mm x 50 mm (2.71 x 1.97")]: Measuring-point number/identification (max. 16 characters) specify in plain text	Order code Y15
Instruction manual English French German Note: The instruction manual should be ordered as a separate line on the order. This device is shipped with the Siemens Milltronics manual CD containing the complete ATEX Quick Start and instruction manual library.	Order No. C) 7ML1998-5FC03 C) 7ML1998-5FC11 C) 7ML1998-5FC32
Other instruction manuals SmartLinx Allen-Bradley Remote I/O, English SmartLinx PROFIBUS DP, English SmartLinx PROFIBUS DP, German SmartLinx PROFIBUS DP, French SmartLinx DeviceNet, English Note: The appropriate SmartLinx instruction manual should be ordered as a separate line on the order.	C) 7ML1998-1AP03 C) 7ML1998-1AQ03 C) 7ML1998-1AQ33 C) 7ML1998-1AQ12 C) 7ML1998-1BH02

Selection and Ordering data	Order No.
Siemens HydroRanger 200 Ultrasonic level controller for up to six pumps that provides control, differential control and open channel flow monitoring. The HydroRanger 200 is also available as a level measurement controller only. Select option from model code below.	C) 7ML5034-
Accessories Handheld programmer Tag, stainless steel, 12 x 45 mm (0.47 x 1.77"), one text line, suitable for enclosure TS-3 Temperature Sensor - see TS-3 on page 5/147 SITRANS RD100 Remote display - see RD100 on page 5/263 SITRANS RD200 Remote display - see RD200 on page 5/265	7ML1830-2AK 7ML1930-1AC
Spare parts Power Supply Board (100 to 230 V AC) Power Supply Board (12 to 30 V DC) Display Board See SmartLinx product page 5/260 for more information.	C) 7ML1830-1MD C) 7ML1830-1ME C) 7ML1830-1MF
1) Available with approval option 1 only 2) This model is level control only; no open channel flow, differential level, or volume conversion functions C) Subject to export regulations AL: N, ECCN: EAR99	

Level instruments

Continuous level measurement - Ultrasonic controllers

HydroRanger 200

Selection and Ordering data

	Order No.
Milltronics HydroRanger 200 Ultrasonic level controller for up to six pumps that provides control, differential control and open channel flow monitoring. The HydroRanger 200 is also available as a level measurement controller only. Select option from model code below.	C) 7ML1034-
Mounting Wall mount, standard enclosure Wall mount, 4 entries, 4 M20 cable glands included Panel mount ¹⁾	1 2 3
Power supply 100 to 230 V AC 12 to 30 V DC	A B
Communication (SmartLinx) Without module SmartLinx [®] Allen-Bradley [®] Remote I/O module SmartLinx PROFIBUS DP module SmartLinx DeviceNet [™] module See SmartLinx product page 5/260 for more information.	A B C D
Approvals General Purpose CE, FM, CSAUs/c, UL listed, C-TICK CSA Class I, Div. 2, Groups A, B, C and D; Class II, Div 2, Groups F and G; Class III (for wall mount applications only)	1 2
Number of measurement points Single point model, 6 relays Dual point model, 6 relays Single point model, level only, 1 relay ²⁾ Single point model, level only, 3 relays ²⁾	1 2 3 4
Further designs Please add "-Z" to Order No. and specify Order code(s).	Order code
Stainless steel tag [69 mm x 50 mm (2.71 x 1.97")]: Measuring-point number/identification (max. 16 characters) specify in plain text	Y15
Instruction manual English French German Note: The instruction manual should be ordered as a separate line on the order. This device is shipped with the Siemens Milltronics manual CD containing the complete ATEX Quick Start and instruction manual library.	Order No. C) 7ML1998-1FC06 C) 7ML1998-1FC14 C) 7ML1998-1FC34
Other instruction manuals SmartLinx Allen-Bradley Remote I/O, English SmartLinx PROFIBUS DP, English SmartLinx PROFIBUS DP, German SmartLinx PROFIBUS DP, French SmartLinx DeviceNet, English Note: The appropriate SmartLinx instruction manual should be ordered as a separate line on the order.	C) 7ML1998-1AP03 C) 7ML1998-1AQ03 C) 7ML1998-1AQ33 C) 7ML1998-1AQ12 C) 7ML1998-1BH02

Selection and Ordering data

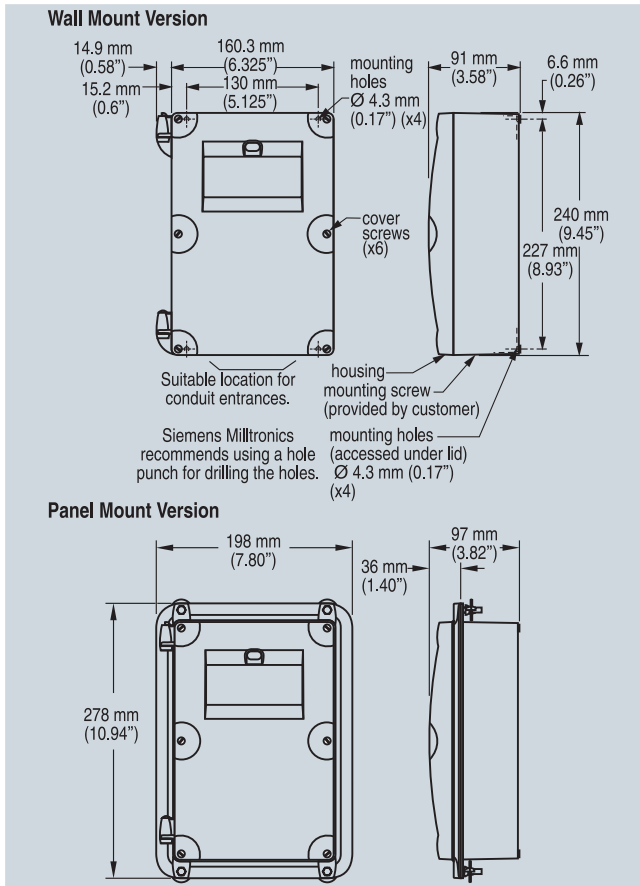
	Order No.
Milltronics HydroRanger 200 Ultrasonic level controller for up to six pumps that provides control, differential control and open channel flow monitoring. The HydroRanger 200 is also available as a level measurement controller only. Select option from model code below.	C) 7ML1034-
Accessories Handheld programmer Tag, stainless steel, 12 x 45 mm (0.47 x 1.77"), one text line, suitable for enclosure TS-3 Temperature Sensor - see TS-3 on page 5/147 SITRANS RD100 Remote display - see RD100 on page 5/263 SITRANS RD200 Remote display - see RD200 on page 5/265	7ML1830-2AK 7ML1930-1AC
Spare parts Power Supply Board (100 to 230 V AC) Power Supply Board (12 to 30 V DC) Display Board See SmartLinx product page 5/260 for more information.	C) 7ML1830-1MD C) 7ML1830-1ME C) 7ML1830-1MF
1) Available with approval option 1 only 2) This model is level control only; no open channel flow, differential level, or volume conversion functions C) Subject to export regulations AL: N, ECCN: EAR99 ®Modbus is a registered trademark of Schneider Electric. ®Belden is a registered trademark of Belden Wire and Cable Company. ®Allen-Bradley is a registered trademark of Rockwell Automation. ™DeviceNet is a trademark of Open DeviceNet Vendor Association (ODVA)	

Level instruments

Continuous level measurement - Ultrasonic controllers

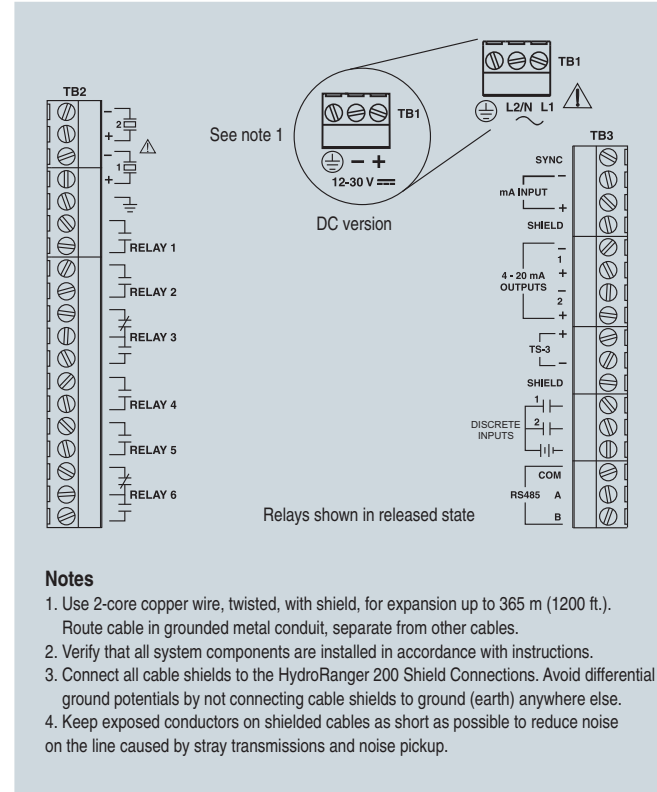
HydroRanger 200

Dimensional drawings



HydroRanger 200 dimensions

Schematics



HydroRanger 200 connections

Ultrasonic Transducer Data

SITRANS L Level instruments

Continuous measurement - Ultrasonic transducers

ST-H

Overview



ST-H transducers use ultrasonic technology to measure level in chemical storage and liquid tanks.

Benefits

- Can be mounted on a 2" (50.8 mm) standpipe
- Immune to corrosive and harsh environments
- Integral temperature sensor

Application

The narrow design of the ST-H allows the transducer to be mounted on a 2" (50.8 mm) standpipe. When mounted correctly, it is completely protected from the process and can even be used in harsh, corrosive environments.

During operation, the ultrasonic transducer emits acoustic pulses in a narrow beam perpendicular to the transducer face. The level transceiver measures the propagation time between pulse emission and reception of the echo to calculate the distance from the transducer to the material. Variations in sound velocity due to changes in temperature within the permissible range are automatically compensated by the integral temperature sensor.

- Key Applications: chemical storage, liquid tanks

Technical specifications

Mode of operation

Measuring principle Ultrasonic transducer

Input

Measuring range 0.3 to 10 m (1 to 33 ft)

Output

Frequency 44 kHz

Beam angle 12°

Accuracy

Temperature compensation Compensated by integral temperature sensor

Rated operating conditions

Pressure Normal atmospheric pressure

Ambient conditions

- Ambient temperature -20 to +60 °C (-5 to +140 °F) (ATEX approved model)
-40 to +73 °C (-40 to +163 °F) (CSA/FM approved model)

Design

Weight¹⁾ 1.4 kg (3 lbs)

Material (enclosure)	Base and lid made of ETFE (epoxy fitted joint) ²⁾
Process connection	2" NPT [(Taper), ANSI/ASME B1.20.1], R 2" [(BSPT), EN 10226] or G 2" [(BSPP), EN ISO 228-1]
Degree of protection	IP68
Cable connection	2-core shielded/twisted, 0.5 mm ² (20 AWG), PVC sheath
Cable (max. length)	365 m (1200 ft) with RG 62 A/U coaxial cable

Options

- Flange adapter 3" Universal (fits DN 65, PN 10 and 3" ASME)
- Submergence coupling For maintaining high level readings while the transducer is submerged

Certificates and approvals

CE³⁾, CSA, FM Class 1, Div. 1, ATEX II 2G

¹⁾ Approximate shipping weight of transducer with standard cable length

²⁾ When measuring chemicals, check compatibility of ETFE and epoxy, or mount joint external to process.

³⁾ EMC certificate available on request

Selection and Ordering data

Echomax® ST-H ultrasonic transducer

Level measurement in chemical storage and liquid tanks

The narrow design of the ST-H allows the transducer to be mounted on a 2" standpipe.
measuring range: min. 0.3 m (1 ft), max. 10 m (33 ft)

Process connection

- 2" NPT [(Taper), ANSI/ASME B1.20.1]
- R 2" [(BSPT), EN 10226]
- G 2" [(BSPP), EN ISO 228-1]

Cable length

- 5 m (16.40 ft)
- 10 m (32.81 ft)
- 30 m (98.43 ft)
- 50 m (164.04 ft)
- 100 m (328.08 ft)

Approvals

FM Class I, Div. 1 [only with 2" NPT (Taper), ANSI/ASME B1.20.1 process connection]
ATEX II 2G, CSA

Instruction manual

Quick Start Manual, multi-language C) **7ML1998-5QK81**
Applications Guidelines, multi-language C) **7ML1998-5HV61**

Note: The Applications Guidelines should be ordered as a separate line item on the order.

This device is shipped with the Siemens Milltronics manual CD containing the complete ATEX Quick Start and instruction manual library.

Accessories

ST-H universal submergence shield **7ML1830-1CF**
Universal box bracket, mounting kit **7ML1830-1BK**
3" ASME, DIN 65 PN 10, JIS 10K 3B ETFE flange adapter for 2" NPT **7ML1830-1BT**

3" ASME, DIN 65 PN 10, JIS 10K 3B ETFE flange adapter for 2" BSPT **7ML1830-1BU**

Easy Aimer 2, NPT with 3/4" x 1" PVC coupling **7ML1830-1AQ**
Easy Aimer 2, aluminum with M20 adapter and 1" and 1 1/2" BSPT aluminum couplings **7ML1830-1AX**

Easy Aimer 304, with stainless steel coupling **7ML1830-1AU**
Easy Aimer 304, with M20 adapter and 1" and 1 1/2" BSPT 304 SS couplings **7ML1830-1GN**

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

Order No.

C) **7ML1100-****A 0****0 1 2****A B C D E****2****3**

Control Panel Bill of Materials

20119604/05 REV -

BILL OF MATERIALS
ELEMECH S.O. PAR4732

PARKSON CORPORATION
PROJECT 201196
AG, NEMA 4X, 480V
FOUNTAIN, COLORADO

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6/30/2011

Item No	Component	Description	Manufacturer Part Number	QTY	Device
Aqua Guard Control Panel (Quantity: 2)					
1	00-000-000	Wire, Hardware, Wire labels, etc.	EleMech: Miscellaneous	1	
2	10-069-001	Wireway Duct Cover, 1"W, 6 Ft. Section, w/Panduit F Series	Panduit: C1WH6	6	
3	10-069-007	Wireway Duct, 1"Wx3"H, 6 Foot Section	Panduit: F1X3WH6	6	
4	25-000-A001	Legendplate Assembly, Yellow E-Stop, Standard Encl.	EleMech: 25-000-A001 Assembly	1	
5	25-000-A002	Legendplate Assembly, White, Black Text, Standard Encl.	EleMech: 25-000-A002 Assembly	7	
6	25-000-A019	Nameplate Assembly, White: Power Supply - 3/60/480VAC	EleMech: 25-000-A019 Assembly	1	
7	42-063-007	Terminal Block, Din Rail, 35MM Wide, 15 High, 2 Meters Long	Wieland: 98.370.1000	1	
8	52-000-003	Label, Underwriters Laboratories 698A, w/Decal Set	EleMech: 698A	1	
9	18-000-002	Steel Barrier, 14 Ga., White Finish, 0.5"Wx10.0"x6.0"D	EleMech: 18-000-002	1	BAR1
10	03-001-A008	Circuit Breaker Assembly, 3 Pole, 480VAC, 15A, T1, 8" Depth	ABB: T1N015TL Assembly	1	CB1
11	03-056-024	Circuit Breaker, 1 Pole, 240VAC, 2A, 14kA, UL489, Type C	Siemens: 5SJ4102-7HG40	1	CB4
12	04-078-000	Current Monitor, Over-Current, SPST, 120V ,2-20A, w/Delay	SSAC: ECSH41AD	1	CM1
13	06-058-011	Control Relay, 3PDT,120VAC, 11Pin Spade, Indicator, Operator	Square D: RXM3AB2F7	3	CR1-3
14	06-058-012	Control Relay, Bus Jumper, 2-Pole, w/Telemec. RXM Relay	Square D: RXZ S2	2	CR1-3
15	38-058-003	Socket, 11 Pin Spade, Din, Screw Term., 3Tier, 250V w/3-Pole	Square D: RXZE2S111M	3	CR1-3
16	07-063-000	Distribution Block, End Cover, 4 Pole, 300V,10A, w/WK4E\VB	Wieland: 07.311.4053.1	1	DB1
17	07-063-001	Distribution Block, Jumper, 4 Pole, 300V,10A, w/WK4E\VB	Wieland: Z7.210.3427	3	DB1
18	07-063-002	Distribution Block, Single Pole, 10A, 300V, WK4E\VB	Wieland: 57.404.6955.1	8	DB1
19	42-063-004	Terminal Block, Ground, 30A, 600V, 6MM Wide, w/WK4/U	Wieland: 57.504.9053.0	2	DB1, TB1
20	11-035-026	Enclosure, NEMA 4X, 304SS, 24"Hx24"Wx8"D, C. Hinge	Hoffman: A-24H2408SSLP	1	EN1
21	11-035-133	Sub-Panel, Painted Steel, w/24"Hx24"W C. Hinge Encl	Hoffman: A-24P24	1	EN1
22	15-011-000	Ground Lug	Blackburn: L70	2	GND
23	16-052-005	Elapsed Time Meter, 6 Digit, Round, 3-Hole, NEMA 4X	Redington: 722-0004	1	HM1
24	16-052-006	Elapsed Time Meter, Gasket, NEMA 4X (Use w/722-0004)	Redington: 5003-011	1	HM1
25	17-062-001	Heater, Silicone Rubber, Flat, 120VAC, 75 Watts, w/12" Leads	Watlow: 030050C1-A001B	1	HTR1
26	52-137-003	Label, Caution: Heater Element, 1.5"Wx0.75"H, White/Red	Nameplate Tech: 52-137-003	1	HTR1
27	52-137-002	Label, Multiple Supply Sources, Warning, 2.5"Wx1.5"H, Yellow	Nameplate Tech: 52-137-002	1	LBL1
28	52-137-000	Label, High Voltage, Danger, 2.25"Wx4.0"H, White/Black/Red	Nameplate Tech: 52-137-000	1	LBL2
29	32-005-046	Lens, Pilot Light, White, NEMA 4X, Standard, w/A-B 800H	Allen-Bradley: 800T-N26W	1	LT1
30	32-005-048	Pilot light, NEMA 4X, 120VAC, Transformer, No Lens	Allen-Bradley: 800H-PR16	4	LT1-4
31	32-005-044	Lens, Pilot Light, Green, NEMA 4X, Standard, w/A-B 800H	Allen-Bradley: 800T-N26G	1	LT2

20119604/05 REV -

BILL OF MATERIALS
ELEMACH S.O. PAR4732

PARKSON CORPORATION
PROJECT 201196
AG, NEMA 4X, 480V
FOUNTAIN, COLORADO

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6/30/2011

Item No	Component	Description	Manufacturer Part Number	QTY	Device
32	32-005-045	Lens, Pilot Light, Red, NEMA 4X, Standard, w/A-B 800H	Allen-Bradley: 800T-N26R	2	LT3,4
33	22-018-000	Motor Starter, Non-Rev., NEMA 0, 1 NO Aux, 120VAC Coil, w/OL	Cutler-Hammer: AN16BNOAC	1	M1
34	22-018-006	Aux. Contact, Top mounted, 4NO, w/C-H Freedom	Cutler-Hammer: C320KGT13	1	M1
35	25-000-A010	Nameplate Assembly, White, Black Text, 1"Hx3"W	EleMech: 25-000-A010 Assembly	2	NP1,2
36	25-000-A013	Nameplate Assembly, Yellow: Intrinsically Safe Circuits P&F	EleMech: 25-000-A013 Assembly	1	NP3
37	28-018-003	Overload Relay Heater Pack, 3PH, 0.814-1.32A, w/Freedom, C20	Cutler-Hammer: H2004B-3	1	OL1
38	29-005-010	Pushbutton E-Stop, NEMA 4X, Oper+1NCLB, Twist Rel. Red Head	Allen-Bradley: 800H-FRXT6D4	1	PB1
39	02-005-000	Contact Block, 1NO/1NC, w/A-B 800 Series	Allen-Bradley: 800T-XA	1	PB3
40	29-005-037	Pushbutton, NEMA 4X, Oper+1NC, Flush Head, Black	Allen-Bradley: 800H-AR2D2	1	PB3
41	33-183-010	PR, Zelio, 120VAC, 8)120VAC In, 4)Relay Out	Telemecanique: SR2B121FU	1	PR1
42	PAR-26-P005	Program, PR, Zelio SR2B121FU, Standard	EleMech: PAR-26-P005	1	PR1
43	13-000-A000	Spare Parts Box Assembly, Din Rail Mount	EleMech: 13-000-A000 Assembly	1	SP1
44	39-005-009	Selector Switch, NEMA 4X, 3 Pos. Maintained, 1NO-1NC	Allen-Bradley: 800H-JR2A	1	SS1
45	41-018-A026	Control Transformer Assembly, 480-120VAC, 300VA, w/C-Breaker	Cutler-Hammer: C0300E2A Assembly	1	T1,CB2,CB3
46	42-063-000	Terminal Block, Labels, Custom Printed, w/WK4/U	Wieland: 04.242.6353-CUSTOM	56	TB,DB
47	42-063-009	Terminal Block, End Clamp, w/WKN10/U	Wieland: Z5.522.8553	7	TB,DB
48	42-063-008	Terminal Block, Labels, Blank, w/WK4/U	Wieland: Z4.242.6353	22	TB1
49	42-063-010	Terminal Block, Jumper, w/WK4/U	Wieland: Z7.281.0027.0	1	TB1
50	42-063-033	Terminal Block, Single Pole, 30A, 600V, WK4/U, Spring Clamp	Wieland: 56.704.0055	30	TB1-3
51	42-063-034	Terminal Block, End Plate, Beige, w/WKFN 4/U	Wieland: 07.312.9255	3	TB1-3
52	18-049-000	Transformer Isolated Barrier, Single Channel, 120VAC	P&F: KFA5-SR2/EX1.W	1	TIB1
53	46-034-000	Thermostat, for heater control, N.C.contact, 6 amp,30-140 F.	Stego: 01140.9-00	1	TS1
LCS, 1 Hole, Nema 4/7/9, E-Stop (Quantity: 2)					
54	25-000-A005	Legendplate Assembly, Yellow E-Stop, LCS Encl.	EleMech: 25-000-A005 Assembly	1	
55	53-053-003	Conduit, Lockwasher, 3/4", Use w/3/4" Nipple	Steel City: LN102	1	
56	11-004-004	Local Control Station, NEMA 4/7/9, 1 Hole, 3/4"NPT Holes	Akron Electric: CXI-333-X1-N4-N5-2RF	1	LCS1
57	29-005-009	Pushbutton E-Stop, NEMA 7/9, Oper+1NCLB, Push-Pull Red Head	Allen-Bradley: 800H-FPX6D4	1	PB2
58	29-005-063	Pushbutton, Padlocking Cover, w/ 800T/H 30.5mm only	Allen-Bradley: 800H-N140	1	PB2
ULC, Hydroranger200, NEMA 4X FRP, Enclosure w/Win, Non-Haz (Quantity: 2)					
59	11-035-126	Sub-Panel, Painted Steel, w/12"Hx10"W Junction Box	Hoffman: A-12P10	1	EN
60	11-035-176	Enclosure Mounting Feet, Fiberglass, J box	Hoffman: A-50MFKR	1	EN
61	11-035-273	Enclosure, Nema 4X, Fiberglass, 13.53"Hx10"Wx7"D, w/Window	Hoffman: A-14107JFGQRPWR	1	EN

20119604/05 REV -

BILL OF MATERIALS
ELEMech S.O. PAR4732

PARKSON CORPORATION
PROJECT 201196
AG, NEMA 4X, 480V
FOUNTAIN, COLORADO

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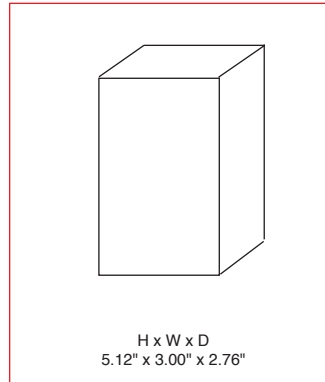
Item No	Component	Description	Manufacturer Part Number	QTY	Device
62	25-000-A023	Nameplate Assembly, White: Ultrasonic Level Controller	EleMech: 25-000-A023 Assembly	1	NPL
63	49-043-024	ULC, Hydro 200, 120VAC, 4-SPST, 2-SPDT, 4-20mA, Non-Haz	Milltronics: 7ML50341AA01	1	ULC
Spare Parts / Ship Loose (Total Quantity Provided)					
64	12-356-003	Float Switch, Mech., Mercury-Free, N.O., 20' Cable,w/ TIB	APG: FT-300A	2	FLOAT
65	49-043-008	ULS, STH, 2"NPT, 10M Cable, FM Class 1 Div. 1	Milltronics: 7ML1100-0BA20	4	ULC
66	49-043-027	ULC, Hydroranger 200 Hand Held Programmer	Milltronics: 7ML1830-2AM	2	ULC

Control Component Data

T1

100A, 480V

Standard thermal-magnetic



General

The T1 breaker family ranges from 15 through 100 amperes. The T1 trip units are non-interchangeable and use the very latest technology in electromagnetic relays for overcurrent trip protection. Thermal overload protection is provided by heat sensitive bimetals. Short circuit protection for the breaker is accomplished using a precise magnetic coil. State of the art construction in contacts and arcing chambers aid in limiting damaging fault currents through the protected circuits.

Versions

The T1 frame is available in two versions:

- T = Thermal-magnetic, fixed
- D = Molded case switch

Performance levels

The T1 breaker has two performance levels available:

- B = 277V Single pole
- N = 480V Three pole

Number of poles

The UL/CSA version of the T1 is available in single, three and four pole versions. IEC versions of the T1 are also available with the same dimensions up to 160 amperes.

Accessory mounting

The T1 frame is double insulated allowing for UL/CSA factory or field installation of internal accessories. No extra control cables are required for field installation. Shunt trips or UVR's mount in the left cavity and auxiliary contacts with bell alarm mount in the right cavity.

Reverse feeding

All versions of the T1 family are suitable for reverse feed applications.

Molded case switches

UL489 switches include no overcurrent protection except for a high instantaneous trip mechanism for self protection.

UL489 / CSA C22.2 Interrupting capacity (kA RMS)

Voltage	Continuous rating	B (1 pole)	N
240VAC	15 – 100A	—	50
277VAC	15A	10	—
	20 – 100A	18	—
480VAC	15A	—	14
	20 – 100A	—	22
250VDC 2 pole series	15 – 100A	—	25
500VDC 3 pole series	15 – 100A	—	25

IEC-947 Interrupting capacity (kA RMS)

Voltage	Continuous rating	B (1 pole)	N
230V	15 – 100A	25	50
415V	15 – 100A	—	36
440V	15 – 100A	—	22
500V	15 – 100A	—	15
690V	15 – 100A	—	6
250VDC 2 pole series	15 – 100A	—	36
500VDC 3 pole series	15 – 100A	—	36

T1

100A, 480V

Standard thermal-magnetic



T1N TMF

Breaker	IC at 480VAC	Rating	Magnetic trip	3 pole, 480VAC/500VDC catalog number	List price
T1N	14kA	15A	1000A	T1N015TL ^①	\$ 402
		20A	1000A	T1N020TL	402
	22kA	25A	1000A	T1N025TL	402
		30A	1000A	T1N030TL	402
		40A	1000A	T1N040TL	402
		50A	1500A	T1N050TL	402
		60A	1500A	T1N060TL	402
		70A	1500A	T1N070TL	479
		80A	1500A	T1N080TL	479
		90A	1500A	T1N090TL	479
		100A	1500A	T1N100TL	479

T1B TMF — Single pole

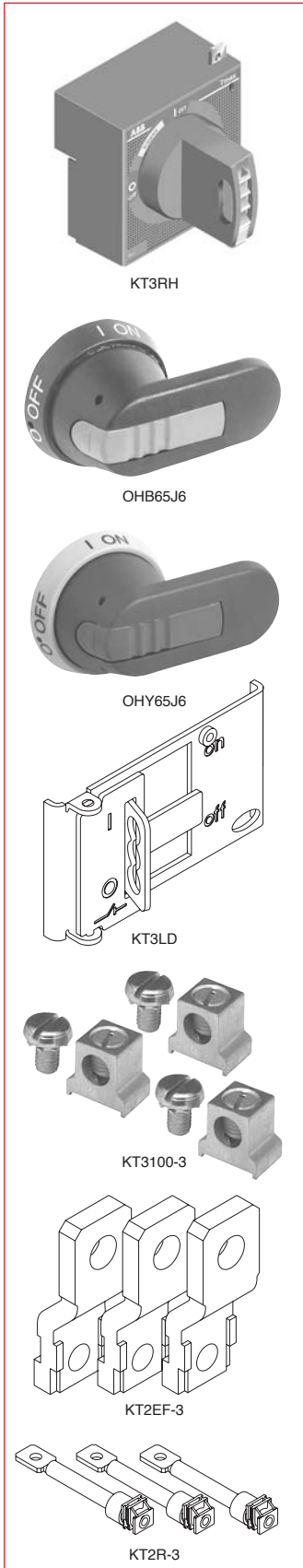
Breaker	IC at 277VAC	Rating	Magnetic trip	1 pole, 277VAC catalog number	List price
T1B	18kA	15A	1000A	T1B015TL-1	\$ 230
		20A	1000A	T1B020TL-1	230
		25A	1000A	T1B025TL-1	230
		30A	1000A	T1B030TL-1	230
		40A	1000A	T1B040TL-1	230
		50A	1500A	T1B050TL-1	230
		60A	1500A	T1B060TL-1	230
		70A	1500A	T1B070TL-1	262
		80A	1500A	T1B080TL-1	262
		90A	1500A	T1B090TL-1	262
		100A	1500A	T1B100TL-1	262

T1N-D — Molded case switch

Breaker	Interrupting capacity ^②	Rating	Magnetic trip	480VAC/500VDC catalog number	List price
T1-D	240V, 50kA	100A	1000A	T1N100DL	\$ 431

^① Rated 277/480Y for 15A.
^② With fuse or MCCB protected circuit.

Accessories Mechanical



Direct mount rotary operator handle

	Catalog number	List price
Direct mount rotary	KT3RH	\$ 146

Variable depth rotary handles

Frame	Mechanism catalog number	List price	Shaft catalog number	List price	Handle catalog number	List price
NEMA 1, 3R, 12						
Tmax	KT3VD-M	\$ 72	OXp6X430 ①	\$ 22	OHY65J6 ① OHB65J6 ①	\$ 80
NEMA 4, 4X						
Tmax	KT3VD-M	72	OXp6X430 ①	22	OHY80L6 ① OHB80L6 ①	130
NEMA 1						
Tmax	KT3VD-M	72	KT3VD-S	35	KT3VD-H	87

Tmax locking device

	Catalog number	List price
Locking device	KT3LD	\$ 21

Lugs

For breakers	Amps	Wire size	Set of 2 catalog number	List price	Set of 3 catalog number	List price	Set of 4 catalog number	List price
Standard cable lugs								
T2	100	14AWG-1/0	KT2100-2	\$ 6	KT2100-3	\$ 9	KT2100-4	\$ 12
T3	60	14AWG -2AWG	KT3060-2	6	KT3060-3	9	KT3060-4	12
	100	14AWG -1/0	KT3100-2	6	KT3100-3	9	KT3100-4	12
	150	2AWG-4/0	KT3150-2	6	KT3150-3	12	KT3150-4	18
	225	4AWG-350kcmil	KT3225-2	12	KT3225-3	18	KT3225-4	24

Extended front terminals

For breakers	Amps	Set of 3		Set of 4	
		Catalog number	List price adder	Catalog number	List Price
T2	100	KT2EF-3	\$ 26	KT2EF-4	\$ 35
T3	225	KT3EF-3	33	KT3EF-4	44

Rear terminals




For breakers	Amps	Set of 3		Set of 3	
		Catalog number	List price adder	Catalog number	List Price
T2	100	KT2R-3	\$ 78	KT2R-4	\$ 105
T3	225	KT3R-3	98	KT3R-4	131

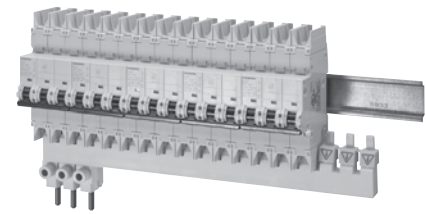
OHB 65 J 6



① Use Discount Schedule H6.

Selection and ordering data

5SJ4 Miniature Circuit Breaker Guide			
	Catalog Series → 5SJ41...-HG40	5SJ4...-HG41	5SJ4...-HG42
Rated Voltage	240, 120 VAC 60 VDC Same Polarity	240 VAC 60/125 VDC	480Y/277 VAC 60/125 VDC
Number of Poles	1-Pole	1-, 2- and 3-Poles	
Trip Characteristics	B, C, D	C, D	
Rated Current	B Characteristic: 6 to 63 A C and D Characteristic: 0.3 to 63 A		C Characteristic: 0.3 to 40 A D Characteristic: 0.3 to 32 A
Interrupting Ratings¹⁾	B Characteristic: 14 kA (6 to 63 A)	—	—
	C Characteristic: 14 kA (0.3 to 40 A) 10 kA (45 to 63 A)	C Characteristic: 10 kA (0.3 to 40 A) ²⁾	
	D Characteristic: 14 kA (0.3 to 20 A) 10 kA (25 to 63 A)	D Characteristic: 10 kA (0.3 to 32 A) ²⁾	



5SJ4...-HG41 Miniature Circuit Breakers

Certifications:

CE
UL Listed and Certified to Canadian Standards
HACR Rated

1) 14 kA = Type HSJ; 10 kA = Type NSJ.

2) At 240 VAC the Interrupting Rating is the same as the 5SJ4...-HG40 and .HG41.

Features

Features – UL 489

- Suitable for Branch Circuit Protection Applications up to 277 VAC and 60 VDC (1-pole); and, up to 480Y VAC and 125 VDC (2- and 3-pole)
- UL Listed and Certified to Canadian Standards, File E243414
- HACR Rated
- High AC Interrupting Ratings of up to 14,000 (Type HSJ) or 10,000 (Type NSJ) Maximum RMS Symmetrical Amps and, DC interrupting ratings of 10,000 Amps
- 40°C Calibration Base (Industrial Applications)
- Can be used for "field wiring" applications; AWG 14 to AWG 4, Copper (Cu) Only
- Suitable for "reverse feed" applications

Features – EN/IEC 60 898

- 30°C Calibration Base
- Trip Characteristic B, C and D
B: Designed for the protection of computers and electronic equipment. Magnetic trip point is 3 to 5 times the MCB rating.
C: Designed for general device protection in control circuits and all other miniature circuit breaker systems. Magnetic trip point is 5 to 10 times the MCB rating.
D: Designed for high inrush loads. Magnetic trip point is 10 to 20 times the MCB rating.
- Rated voltage of 24 VAC minimum, 440 VAC Maximum and 60 VDC per pole
- High Interrupting Rating (I_{cn}) of up to 10,000 Amps
- 0.75 to 35 mm² solid and stranded conductors

Features – Common

- Depending on the device selected
- Available with 1-, 2- or 3-poles
- Available from 0.3 to 63 amps
- Visible Indicator for ON and OFF/Trip
- Touch Protection to EN50274
- DIN Rail Mounting (Standard 35 mm)
- Identical Wire Screw Connections on Line and Load Sides
- Smaller Size than traditional MCCB's

Auxiliary Circuit Switches (AS) are available with One Normally Open + One Normally Closed, Two Normally Open or Two Normally Closed contacts. They are primarily used to signal the miniature circuit breaker's trip mechanism position.

Fault Signal Contacts (FC) are available with One Normally Open + One Normally Closed, Two Normally Open or Two Normally Closed contacts. They are primarily used to signal the automatic tripping of the miniature circuit breaker's trip mechanism; and, trip position.

Shunt Trip Switches (ST) are available in voltages of 110 to 480 VAC and 24 to 60 V AC/DC. They are used for remote tripping of a miniature circuit breaker.

5ST366...-HG busbars, touch protection covers and terminal connectors are intended for use with Siemens lines of 5SJ4...-HG4. UL 489 Miniature Circuit Breakers. They are UL Recognized (File E32159) with a rating of 115 Amps maximum at 480Y/277 VAC. Busbars are available in 1-, 2- or 3-pole versions.

Touch Protection Covers are used to cover any unused busbar terminals. They are intended to protect a user from live electrical parts.

Terminal Connectors are used to connect electrical conductors up to 1 AWG (50mm²) to the busbar terminals. Two versions are available; connect directly to the miniature circuit breaker or direct connection to the busbar.

SIEMENS

Circuit Breaker Catalog Number Nomenclature

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

SIEMENS

Product Selection – 5SJ41...-HG40



Type HSJ: Interrupting rating:
 240 VAC: 14,000 Maximum RMS Symmetrical Amps
 60 VDC: 10,000 Amps

Type NSJ: Interrupting rating:
 240 VAC: 10,000 Maximum RMS Symmetrical Amps
 60 VDC (1-pole) / 125 VDC (2- & 3-pole): 10,000 Amps

TYPE →		HSJ	HSJ	NSJ	HSJ	NSJ
No. of Poles	I_n (A)	Characteristic B Order No.	Characteristic C Order No.	Characteristic C Order No.	Characteristic D Order No.	Characteristic D Order No.
1	0.3	---	5SJ4114-7HG40		5SJ4114-8HG40	
1	0.5	---	5SJ4105-7HG40		5SJ4105-8HG40	
1	1	---	5SJ4101-7HG40		5SJ4101-8HG40	
1	1.6	---	5SJ4115-7HG40		5SJ4115-8HG40	
1	2	---	5SJ4102-7HG40	←	5SJ4102-8HG40	
1	3	---	5SJ4103-7HG40		5SJ4103-8HG40	
1	4	---	5SJ4104-7HG40	↙	5SJ4104-8HG40	
1	5	---	5SJ4111-7HG40		5SJ4111-8HG40	
1	6	5SJ4106-6HG40	5SJ4106-7HG40		5SJ4106-8HG40	
1	8	---	5SJ4108-7HG40		5SJ4108-8HG40	
1	10	5SJ4110-6HG40	5SJ4110-7HG40		5SJ4110-8HG40	
1	13	5SJ4113-6HG40	5SJ4113-7HG40		5SJ4113-8HG40	
1	15	5SJ4118-6HG40	5SJ4118-7HG40		5SJ4118-8HG40	
1	16	5SJ4116-6HG40	5SJ4116-7HG40		5SJ4116-8HG40	
1	20	5SJ4120-6HG40	5SJ4120-7HG40		5SJ4120-8HG40	
1	25	5SJ4125-6HG40	5SJ4125-7HG40			5SJ4125-8HG40
1	30	5SJ4130-6HG40	5SJ4130-7HG40			5SJ4130-8HG40
1	32	5SJ4132-6HG40	5SJ4132-7HG40			5SJ4132-8HG40
1	35	5SJ4135-6HG40	5SJ4135-7HG40			5SJ4135-8HG40
1	40	5SJ4140-6HG40	5SJ4140-7HG40			5SJ4140-8HG40
1	45	5SJ4145-6HG40		5SJ4145-7HG40		5SJ4145-8HG40
1	50	5SJ4150-6HG40		5SJ4150-7HG40		5SJ4150-8HG40
1	60	5SJ4160-6HG40		5SJ4160-7HG40		5SJ4160-8HG40
1	63	5SJ4163-6HG40		5SJ4163-7HG40		5SJ4163-8HG40

SIEMENS

Product Selection – 5SJ4...-HG41



Type HSJ: Interrupting rating:
 240 VAC: 14 kA Maximum RMS Symmetrical
 60 VDC (1-pole) / 125 VDC (2- & 3-pole):
 10,000 A

Type NSJ: Interrupting rating:
 240 VAC: 10kA Maximum RMS Symmetrical
 60 VDC (1-pole)/125 VDC (2- & 3-pole):
 10,000 kA

TYPE →		HSJ	NSJ	HSJ	NSJ
No. of Poles ¹⁾	I_n (A)	Characteristic C Order No.	Characteristic C Order No.	Characteristic D Order No.	Characteristic D Order No.
*	0.3	5SJ4*14-7HG41		5SJ4*14-8HG41	
*	0.5	5SJ4*05-7HG41		5SJ4*05-8HG41	
*	1	5SJ4*01-7HG41		5SJ4*01-8HG41	
*	1.6	5SJ4*15-7HG41		5SJ4*15-8HG41	
*	2	5SJ4*02-7HG41		5SJ4*02-8HG41	
*	3	5SJ4*03-7HG41		5SJ4*03-8HG41	
*	4	5SJ4*04-7HG41		5SJ4*04-8HG41	
*	5	5SJ4*11-7HG41		5SJ4*11-8HG41	
*	6	5SJ4*06-7HG41		5SJ4*06-8HG41	
*	8	5SJ4*08-7HG41		5SJ4*08-8HG41	
*	10	5SJ4*10-7HG41		5SJ4*10-8HG41	
*	13	5SJ4*13-7HG41		5SJ4*13-8HG41	
*	15	5SJ4*18-7HG41		5SJ4*18-8HG41	
*	16	5SJ4*16-7HG41		5SJ4*16-8HG41	
*	20	5SJ4*20-7HG41		5SJ4*20-8HG41	
*	25	5SJ4*25-7HG41			5SJ4*25-8HG41
*	30	5SJ4*30-7HG41			5SJ4*30-8HG41
*	32	5SJ4*32-7HG41			5SJ4*32-8HG41
*	35	5SJ4*35-7HG41			5SJ4*35-8HG41
*	40	5SJ4*40-7HG41			5SJ4*40-8HG41
*	45		5SJ4*45-7HG41		5SJ4*45-8HG41
*	50		5SJ4*50-7HG41		5SJ4*50-8HG41
*	60		5SJ4*60-7HG41		5SJ4*60-8HG41
*	63		5SJ4*63-7HG41		5SJ4*63-8HG41

¹⁾ Substitute the "*" with:

- 1 for 1-pole mCBs
- 2 for 2-pole mCBs
- 3 for 3-pole mCBs

SIEMENS

Product Selection – 5SJ4...-HG42



Type NSJ: Interrupting rating:

- 480Y/277 VAC 10,000 Maximum RMS Symmetrical Amps
- 60 VDC (1-pole) / 125 VDC (2- & 3-pole) 10,000 Amps

TYPE →		HSJ	NSJ	HSJ	NSJ
No. of Poles ¹⁾	I_n (A)	Characteristic C Order No.	Characteristic C Order No.	Characteristic D Order No.	Characteristic D Order No.
*	0.3	---	5SJ4*14-7HG42	---	5SJ4*14-8HG42
*	0.5	---	5SJ4*05-7HG42	---	5SJ4*05-8HG42
*	1	---	5SJ4*01-7HG42	---	5SJ4*01-8HG42
*	1.6	---	5SJ4*15-7HG42	---	5SJ4*15-8HG42
*	2	---	5SJ4*02-7HG42	---	5SJ4*02-8HG42
*	3	---	5SJ4*03-7HG42	---	5SJ4*03-8HG42
*	4	---	5SJ4*04-7HG42	---	5SJ4*04-8HG42
*	5	---	5SJ4*11-7HG42	---	5SJ4*11-8HG42
*	6	---	5SJ4*06-7HG42	---	5SJ4*06-8HG42
*	8	---	5SJ4*08-7HG42	---	5SJ4*08-8HG42
*	10	---	5SJ4*10-7HG42	---	5SJ4*10-8HG42
*	13	---	5SJ4*13-7HG42	---	5SJ4*13-8HG42
*	15	---	5SJ4*18-7HG42	---	5SJ4*18-8HG42
*	16	---	5SJ4*16-7HG42	---	5SJ4*16-8HG42
*	20	---	5SJ4*20-7HG42	---	5SJ4*20-8HG42
*	25	---	5SJ4*25-7HG42	---	5SJ4*25-8HG42
*	30	---	5SJ4*30-7HG42	---	5SJ4*30-8HG42
*	32	---	5SJ4*32-7HG42	---	5SJ4*32-8HG42
*	35	---	5SJ4*35-7HG42	---	---
*	40	---	5SJ4*40-7HG42	---	---
*	45	---	---	---	---
*	50	---	---	---	---
*	60	---	---	---	---
*	63	---	---	---	---

¹⁾ Substitute the “*” with:

- 1 for 1-pole mCBs
- 2 for 2-pole mCBs
- 3 for 3-pole mCBs

Control Circuit Protection

General Data

5SJ4 Branch Circuit Protection

Technical data

		5SJ41...HG40	5SJ4...HG41	5SJ4...HG42
Standards Certifications		EN 60898; EN 60947-2; UL 489; CSA C22.2 No. 5-02 CE; cULus, UL File No. E243414		
Tripping characteristic		B, C, D	C, D	
Number of poles		1	1, 2 & 3	
Operating voltage	Min. V AC/DC	24		
- IEC 60898	Max. V DC/pole	60		
	Max. V AC	440		
- UL 489 and CSA C22.2 No. 5-02	Max. V AC	240 Same Polarity	240	480Y/277
	V DC/1P	60	60	60
	V DC/2P, 3P	-	125	125
Interrupting rating ¹⁾		10		
- I _{cn} to IEC 60898-1	kA AC	Type NSJ: 10kA		
- UL 489 and CSA C22.2 No. 5-02		Type HSJ: 14kA		
AC: Max. RMS Symmetrical	kA AC	Type NSJ: 10kA		
Touch protection to EN 50274		Yes		
Degree of protection to EN 60529		IP20, with connected conductors		
CFC and silicone free		Yes		
Mounting		On standard mounting rail (DIN 35 mm)		
Device depth	mm	70		
Terminals		Yes		
- Identical screw terminals on both line and load sides		31		
- Terminal tightening torque	lb. in.	3.5		
	Nm			
Conductor cross sections	mm ²	Solid and Stranded: 0.75 to 35		
	mm ²	Finely Stranded, with end sleeve: 0.75 to 25		
	AWG	14 to 4, 60/75°C, Cu Only		
Calibration Base	°C	40 (UL 489) 30 (EN 60898)		
Average service life, with rated load		20,000 actuations		
Ambient temperature	°C	-25 to 45, occasionally +55, max. 95% humidity		
Storage Temperature	°C	-40 to +75		
Resistance to vibration to IEC 60068-2-6	m/s ²	60 at 10 Hz to 150 Hz		

1) See Selection and ordering data for specific device interrupting rating

Busbar & Connecting Terminals

Material Version		Busbars 5ST3663 5ST3664 5ST3665	Connecting Terminals 5ST3666-0HG 5ST3666-2HG	
Standards Certifications		UL 489 UL Listed, File No. E243414		
Operating voltage		690		
- IEC 60898	VAC	480Y/277 and 240		
- UL 489	VAC			
Rated current to 40°C	A	115		
Busbar cross section	mm ²	16 (Copper)		
Conductor cross sections	Solid and Stranded mm ²	-	2.5 to 35	2.5 to 50
	AWG	-	14 to 2	14 to 1
Terminal tightening torque	lb. in.	-	30	30
	Nm	-	3.3	3.3
Temperature Resistance	°C	200 - UL 94-V0/0.4mm		

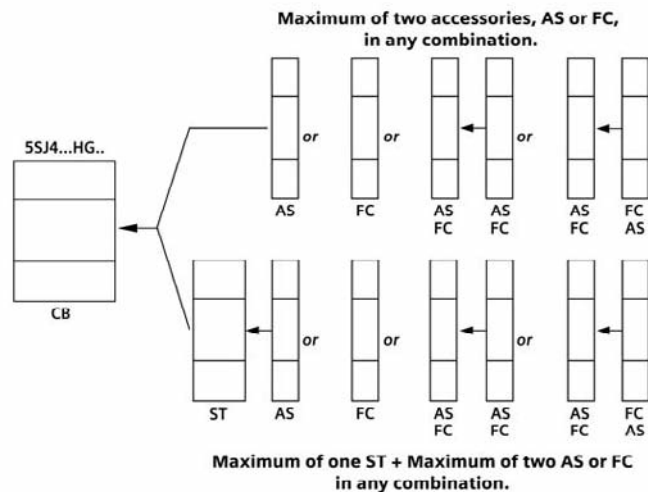
Technical data

Auxiliary Switch (AS), Fault Signal Contacts (FC) and Shunt Trip (ST)

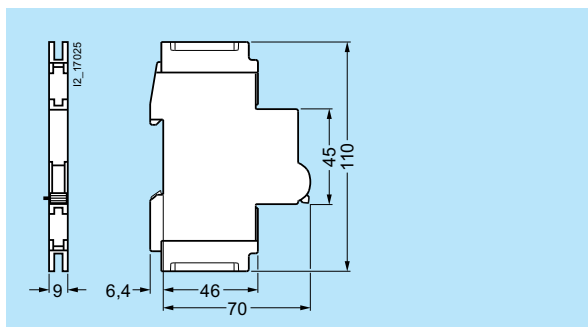
Material Version	AS		FC		ST	
	5ST301-0HG		5ST302-0HG		5ST3030-0HG	5ST3032-0HG
Standards	UL 489; CSA C22.2 No. 5-02 IEC/EN 62019, IEC/EN 60947-5-1				IEC/EN 60947-1	
Certifications	CE, UL 489, CSA, UL File No. E321559					
Rated voltages/-load	IEC AC V 400 230				110 to 415	24 to 60
	AC A 2 6 (NC:AC13, NO: AC14)				-	-
	DC V 220 110 60 24				110	24 to 60
	DC A 1 1 3 6 (DC 13)				-	-
	UL AC V 480 277 240 120				110 to 480	24 to 60
	AC A 1.5 3 4 6				-	-
Contact load	min. 50 mA, 24 V				-	-
	Conductor cross-sections	AWG	22 ... 14		22 ... 14	
		mm ²	0.5 ... 2.5		0.5 ... 2.5	
Terminals - terminal tightening torque	Nm	0.5 max.		0.8 max.		
	lb/in.	4.5		6.8		

Applications

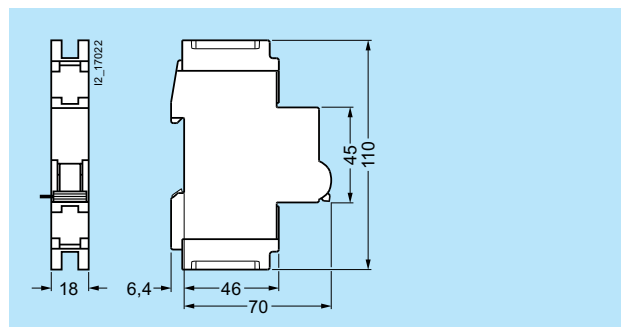
Auxiliary Switch (AS), Fault Signal Contact (FC) and Shunt Trip (ST) accessories are used with 5SJ4...-HG4. miniature circuit breakers (CB) and are mounted to the right of them.



Dimensions



5ST3 010-0HG 5ST3 011-0HG 5ST3 012-0HG
5ST3 020-0HG 5ST3 021-0HG 5ST3 022-0HG

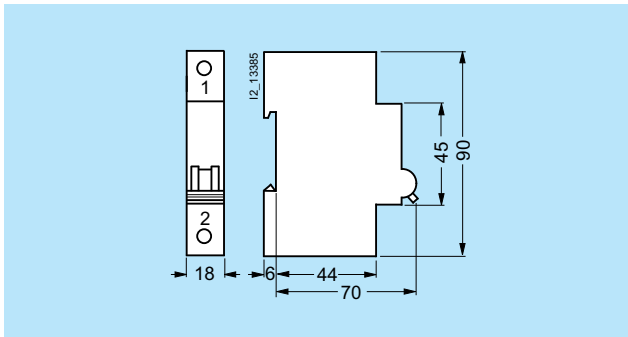


5ST3 030-0HG 5ST3 031-0HG

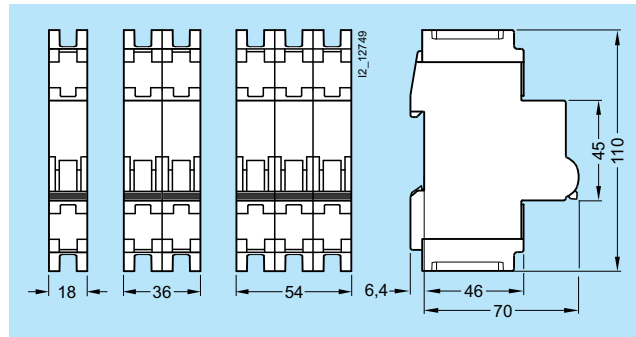
Control Circuit Protection

General Data

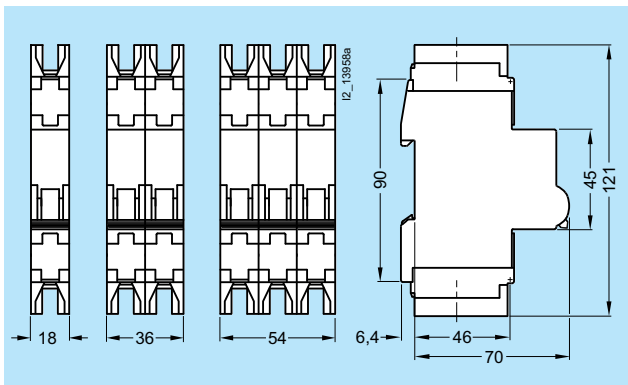
Dimensions



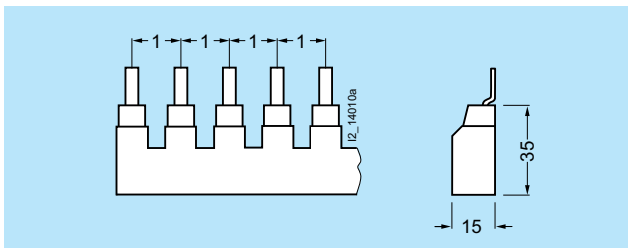
5SJ4...-HG40



5SJ4...-HG41



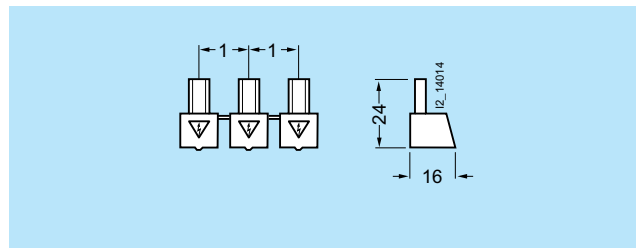
5SJ4...-HG42



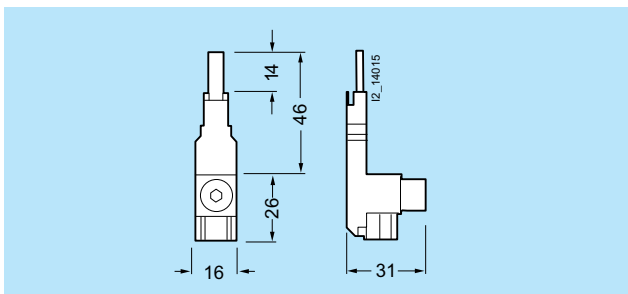
5ST3 663-0HG
5ST3 663-1HG
5ST3 663-2HG

5ST3 664-0HG
5ST3 664-1HG
5ST3 664-2HG

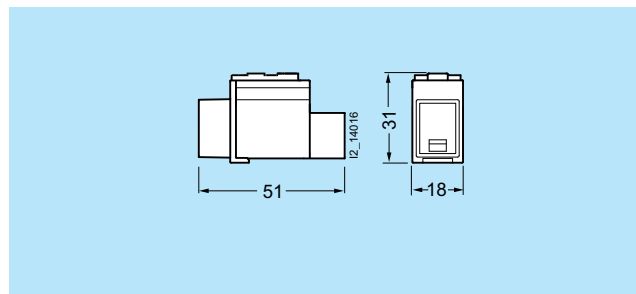
5ST3 665-0HG
5ST3 665-1HG
5ST3 665-2HG



5ST3 666-1HG



5ST3 666-0HG



5ST3 666-2HG

Over/Under Current Sensing ECS Series Current Sensor



TEN YEAR
WARRANTY
10

- Toroidal Through Hole Wiring
- 0.5...50 A Trip Point
- Adjustable or Factory Fixed Trip Delays
- 10 A SPDT Isolated Output Contacts
- 5% Trip Point Hysteresis (Dead Band)

Description

The ECS Series of Single Phase AC Current Sensors is a universal, overcurrent or undercurrent sensing control. Its built-in toroidal sensor eliminates the inconvenience of installing a stand-alone current transformer. Includes onboard adjustments for current sensing mode, trip point, and trip delay. Detects over or under current events like locked rotor, loss of load, an open heater or lamp load, or proves an operation is taking place or has ended.

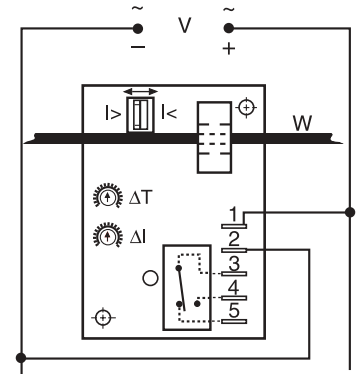
Adjustment

Select the desired function, over or under current sensing. Set the trip point and trip delay to approximate settings. Apply power to the ECS and the monitored load. Turn adjustment and watch the LED. LED will light; turn slightly in opposite direction until LED is off. Adjustment can be done while connected to the control circuitry if the trip delay is set at maximum.

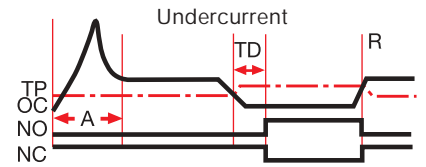
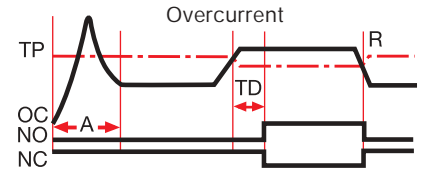
Operation

When a fault is sensed throughout the trip delay, the output relay is energized. When the current returns to the normal run condition, the output and the delay are reset. If a fault is sensed and then corrected before the trip delay is completed, the relay will not energize and the trip delay is reset to zero.

■ Approvals:



Relay contacts are isolated. Dashed lines are internal connections.



V = Voltage W = Insulated Wire Carrying Monitored Current I> = Overcurrent I< = Undercurrent TP = Trip Point R = Reset OC = Monitored Current NO = Normally Open Contact NC = Normally Closed Contact A = Sensing Delay On Start Up TD = Trip Delay

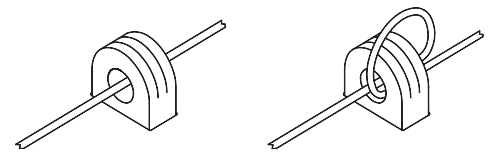
Ordering Table

X Series	X Input	X Trip Point	X Trip Delay	X Sensing Delay on Start up
- ECS - (selectable over or undercurrent sensing)	- 1 - 12 V DC	Fixed - Specify 2 ... 50 A in 1 A increments	- F - Factory Fixed: Specify .08 ... 50 s	Blank - 0
- ECSH - (overcurrent sensing)	- 2 - 24 V AC	Adjustable Ranges - 0 - 0.5 ... 5 A - 1 - 2 ... 20 A - H - 5 ... 50 A	Adjustable Ranges - A - 0.150 ... 7 s - B - 0.5 ... 50 s	- C - 1 s
- ECSL - (undercurrent sensing)	- 3 - 24 V DC			- D - 2 s
	- 4 - 120 V AC			- E - 3 s
	- 6 - 230 V AC			- F - 4 s
				- G - 5 s
				- H - 6 s

Example P/N: ECS41AC Fixed - ECSH610AD

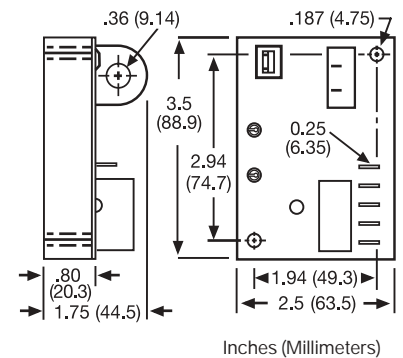
Technical Data

Sensor	
Type	Toroidal, through hole wiring
Mode	Over or undercurrent, switch selectable on the unit or factory fixed
Trip Point Range	0.5 ... 50 A in 3 adjustable ranges or fixed
Tolerance: Adjustable	Guaranteed range
Fixed	0.5 ... 25 A: 0.5 A or +/-5% whichever is less; 26 ... 50 A: +/-2.5%
Maximum Allowable Current	Steady - 50 A turns; Inrush - 300 A turns for 10 s
Trip Point Hysteresis	≅ +/-5%
Trip Point vs. Temperature	+/-5%
Response Time	≤75 ms
Frequency	45 ... 500 Hz
Type of Detection	Peak detection
Trip Delay	
Type	Analogue
Range: Adjustable	0.150 ... 7 s; 0.5 ... 50 s (Guaranteed ranges)
Factory Fixed	0.08 ... 50 s (+/-10%)
Delay vs. Temperature	+/-15%
Sensing Delay on Startup	Factory fixed 0 ... 6 s +40% ... 0%
Input	
Voltage	24, 120, or 230 V AC; 12 or 24 V DC
Tolerance	12 V DC & 24 V DC/AC: -15% ... +20% 120 & 230 V AC: -20% ... +10%
Line Frequency	50 ... 60 Hz
Output	
Type	Electromechanical relay
Form	Isolated single pole double throw (SPDT)
Rating	10 A resistive at 240 V AC; 1/4 hp at 125 V AC; 1/2 hp at 250 V AC
Life	Mechanical - 1 x 10 ⁶ ; Electrical - 1 x 10 ⁵
Protection	
Circuitry	Encapsulated
Isolation Voltage	≥ 2500 V RMS input to output
Insulation Resistance	≥ 100 MΩ
Mechanical	
Mounting	Surface mount with two #6 (M3.5 x 0.6) screws
Termination	0.25 in. (6.35 mm) male quick connect terminals (5)
Humidity	95% relative, non-condensing
Operating/Storage Temperature	-40°C ... +60°C / -40°C ... +85°C
Weight	≅ 6.4 oz (181 g)



Multiple Turns To Increase Sensitivity
To increase sensitivity, multiple turns may be made through the ECS's toroidal sensor. The trip point range is divided by the number of turns through the toroidal sensor to create a new range.

Using an External Current Transformer (CT)
Select a 2 VA, 0 to 5 A output CT, rated for the current to be monitored. Select ECS adjustment range 0. Pass the CT's secondary wire lead through the ECS's toroid.



Accessories

Female quick connect P/Ns:
P1015-13 (AWG 10/12)
P1015-64 (AWG 14/16)
P1015-14 (AWG 18/22)



See accessory page at the end of this section.



RXM ●AB2F7

RXM Miniature Relays (page 4)

2 pole relays; 12A
3 pole relays; 10A
4 pole relays; 6A
4 pole relays; 3A (low level)

- Mechanical “relay status” indicator on all relays
- Pilot light option available
- Manual operator on all relays
- Built-in marking area



RPM 32F7

RPM Miniature Power Relays (page 12)

1 pole relays; 15A
2 pole relays; 15A
3 pole relays; 15A
4 pole relays; 15A

- Mechanical “relay status” indicator on all relays
- Pilot light option available
- Manual operator on all relays
- Built-in marking area



RUM ●●AB2B7

RUM Universal Relays (page 20)

2 pole relays; 8-pin, tube type; 10A
3 pole relays; 11-pin, tube type; 10A
2 pole relays; 8 blade type; 10A
3 pole relays; 11 blade type; 10A

- Mechanical “relay status” indicator on all relays
- Pilot light option available
- Manual operator on all relays
- Built-in marking area



RPF 2B●●

RPF Power Relays (page 28)

Two Form C contacts; 30A
Two Normally Open contacts; 30A

- DIN track mountable
- Can be mounted directly to a panel



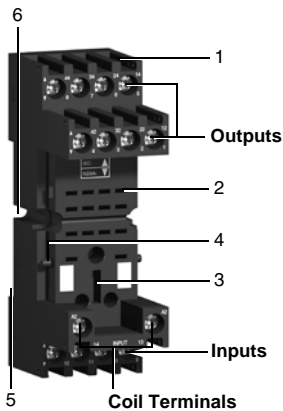
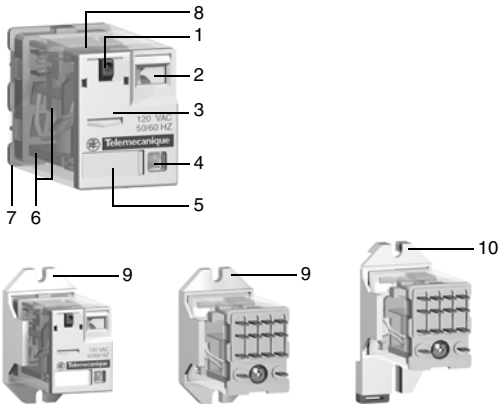
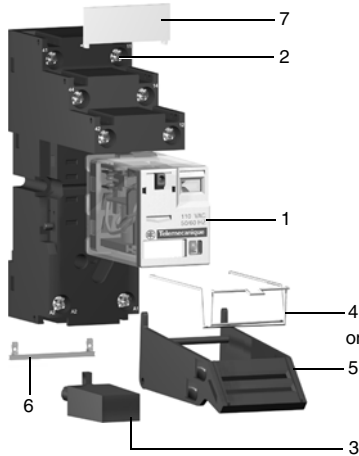
RSB 1A160BD
+ RSZ E1S48M

RSB Interface Relays (page 31)

Two Form C contacts; 8A
One Form C contact; 12A
One Form C contact; 16A

General Technical Information (page 36)

Relay contact types
Utilization categories
Protection categories
Protection modules



Product Description

The RXM miniature relay range consists of:

1. 12 A relays with 2 C/O contacts, 10 A relays with 3 C/O contacts, 6 A relays with 4 C/O contacts, and 3 A "low level" relays with 4 C/O contacts. All these relays have the same dimensions.
2. Sockets with mixed or separate contact terminals.
3. Protection modules (diode, RC circuit or varistor). All these modules are common to all sockets.
4. A metal hold-down clip for all sockets.
5. A plastic hold-down clip for all sockets.
6. A 2-pole bus jumper that can be used on sockets with separate contact terminals to simplify wiring when creating a jumper between the coil terminals.
7. Clip-in markers for all the sockets except RXZ E2M114.

Relay Description

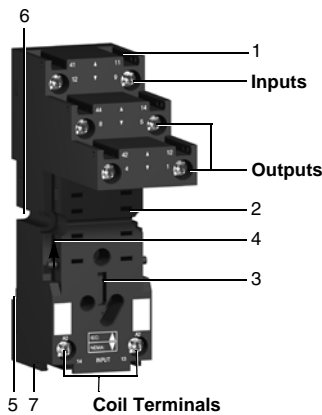
1. Spring return push button for testing the contacts (green: DC, red: AC).
2. Mechanical "relay status" indicator.
3. Removable lock-down door enabling forced maintaining of the contacts for test or maintenance purposes. During operation, this lock-down door must always be in the closed position.
4. Bipolar LED (depending on version) indicating the relay status.
5. Removable marker for relay identification.
6. Four notches for DIN rail mounting adapter or panel mounting adapter.
7. Eight, eleven, or fourteen pins.
8. Area by which the product can be easily gripped.
9. Mounting adapter enabling direct mounting of the relay on a panel.
10. Mounting adapter enabling direct mounting of the relay on a DIN rail.

Socket Description

Sockets with Mixed Contact Terminals

1. Connection by screw clamp terminals or box lug connector.
2. Fourteen female contacts for the relay pins.
3. Location for protection modules.
4. Locking components for plastic and metal hold-down clips.
5. Locating slot for mounting on DIN rail.
6. Two or four mounting holes for panel mounting.

NOTE: The inputs are mixed with the relay coil terminals, with the outputs being located on the opposite side of the socket.



Sockets with Separate Contact Terminals

1. Box lug connector.
2. Eight, eleven, or fourteen female contacts for the relay pins.
3. Location for protection modules.
4. Locking components for plastic and metal hold-down clips.
5. Locating slot for mounting on DIN rail.
6. Two mounting holes for panel mounting.
7. Location for bus jumpers (see mounting on sockets on page 10).

NOTE: The inputs and outputs are separated from the relay coil terminals.

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 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

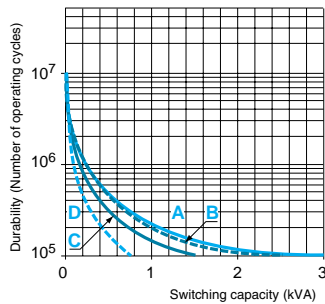
Rated insulation voltage (Ui)		250 V (IEC), 300 V (UL, CSA)
Rated impulse withstand voltage (Uimp)		3.6 kV (1.2/50 μs)
Dielectric strength (rms voltage)	Between coil and contact	2,500 Vac
	Between poles	2,500 Vac
	Between contacts	1,500 Vac

Contact characteristics

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
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			

Electrical Durability of Contacts

Resistive load AC



A=RXM 2A●●● B=RXM 3A●●● C=RXM 4A●●● D=RXM 4B●●●

Coil characteristics

Average consumption	AC	1.2 VA									
	DC	0.9 W									
Drop-out voltage threshold	AC	≥ 0.15 Uc									
	DC	≥ 0.1 Uc									
Operating time (response time)	Between coil energization and making of the N/O contact	AC	20 ms								
		DC	20 ms								
	Between coil de-energization and making of the N/C contact	AC	20 ms								
		DC	20 ms								
Coil voltage Uc	12 V	24 V	48 V	110 V	120 V	125 V	220 V	230 V	240 V		
Relay coil voltage codes	JD	BD	ED	FD	–	GD	MD	–	–		
DC	Average resistance at 68 °F (20 °C) ± 10%	160 Ω	650 Ω	2,600 Ω	11,000 Ω	–	11,000 Ω	14,000 Ω	–	–	
	Operating voltage limits	Min.	9.6 V	19.2 V	38.4 V	88 V	–	100 V	176 V	–	–
		Max.	13.2 V	26.4 V	52.8 V	121 V	–	138 V	242 V	–	–
Relay coil voltage codes	–	B7	E7	–	F7	–	M7	P7	U7		
AC	Average resistance at 68 °F (20 °C) ± 15%	–	180 Ω	770 Ω	–	4,430 Ω	–	15,000 Ω	15,000 Ω	15,500 Ω	
	Operating voltage limits	Min.	–	19.2 V	38.4 V	–	96 V	–	176 V	184 V	192 V
		Max.	–	26.4 V	52.8 V	–	132 V	–	242 V	253 V	264 V

Socket characteristics



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	

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



RXM ●AB2F7

Miniature relays without LED (sold in lots of 10)

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



RXM 4GB2F7

Miniature relays with low level contacts, without LED (sold in lots of 10)

Coil Voltage	Number and type of contacts - Thermal current (Ith)		
	Catalog Number	Weight	
		lb.	kg
12 Vdc	RXM 4GB1JD	0.08	0.036
24 Vdc	RXM 4GB1BD	0.08	0.036
48 Vdc	RXM 4GB1ED	0.08	0.036
110 Vdc	RXM 4GB1FD	0.08	0.036
24 Vac	RXM 4GB1B7	0.08	0.036
48 Vac	RXM 4GB1E7	0.08	0.036
120 Vac	RXM 4GB1F7	0.08	0.036
230 Vac	RXM 4GB1P7	0.08	0.036

Miniature relays with low level contacts, with LED (sold in lots of 10)

Coil Voltage	Number and type of contacts - Thermal current (Ith)		
	Catalog Number	Weight	
		lb.	kg
12 Vdc	RXM 4GB2JD	0.08	0.036
24 Vdc	RXM 4GB2BD	0.08	0.036
48 Vdc	RXM 4GB2ED	0.08	0.036
110 Vdc	RXM 4GB2FD	0.08	0.036
24 Vac	RXM 4GB2B7	0.08	0.036
48 Vac	RXM 4GB2E7	0.08	0.036
120 Vac	RXM 4GB2F7	0.08	0.036
230 Vac	RXM 4GB2P7	0.08	0.036
240 Vac	RXM 4GB2U7	0.08	0.036

See page 8 for sockets and accessories.



RXZ E2M114M with relay RXM 4AB2P7TQ



RXZ E2S114M with relay RXM 4AB2F7TQ



RXM 041



RE XL4



RXZ 400

Miniature relays without LED (sold in lots of 100)

Coil Voltage	Number and type of contacts - Thermal current (Ith)					
	2 C/O - 12 A			4 C/O - 6 A		
	Catalog Number	Weight		Catalog Number	Weight	
		lb.	kg		lb.	kg
12 Vdc	—	—	—	RXM 4AB1JDTQ	0.08	0.036
24 Vdc	RXM 2AB1BDTQ	0.08	0.037	RXM 4AB1BDTQ	0.08	0.036
48 Vdc	—	—	—	RXM 4AB1EDTQ	0.08	0.036
110 Vdc	—	—	—	RXM 4AB1FDTQ	0.08	0.036
220 Vdc	—	—	—	RXM 4AB1MDTQ	0.08	0.036
24 Vac	RXM 2AB1B7TQ	0.08	0.037	RXM 4AB1B7TQ	0.08	0.036
48 Vac	—	—	—	RXM 4AB1E7TQ	0.08	0.036
120 Vac	RXM 2AB1F7TQ	0.08	0.037	RXM 4AB1F7TQ	0.08	0.036
230 Vac	RXM 2AB1P7TQ	0.08	0.037	RXM 4AB1P7TQ	0.08	0.036

Miniature relays with LED (sold in lots of 100)

24 Vdc	—	—	—	RXM 4AB2BDTQ	0.08	0.036
24 Vac	RXM 2AB2B7TQ	0.08	0.037	RXM 4AB2B7TQ	0.08	0.036
230 Vac	RXM 2AB2P7TQ	0.08	0.037	RXM 4AB2P7TQ	0.08	0.036

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●●●● ³	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

Protection modules (sold in lots of 20)

Description	Voltage	For use with	Catalog Number	Weight	
				oz.	g
Diode	6–250 Vdc	All sockets	RXM 040W	0.11	3.0
RC circuit	24–60 Vac	All sockets	RXM 041BN7	0.35	10.0
	110–240 Vac	All sockets	RXM 041FU7	0.35	10.0
Varistor	6–24 Vac/Vdc	All sockets	RXM 021RB	1.06	30.0
	24–60 Vac/Vdc	All sockets	RXM 021BN	1.06	30.0
	110–240 Vac/Vdc	All sockets	RXM 021FP	1.06	30.0

Timing relays

Description	For use with	Catalog Number	Weight	
			lb.	kg
2 timed C/O contacts (function A—On-delay)	Sockets RXZ E●●●●●	RE XL2●● ⁴	0.09	0.042
4 timed C/O contacts (function A—On-delay)		RE XL4●● ⁴	0.09	0.042

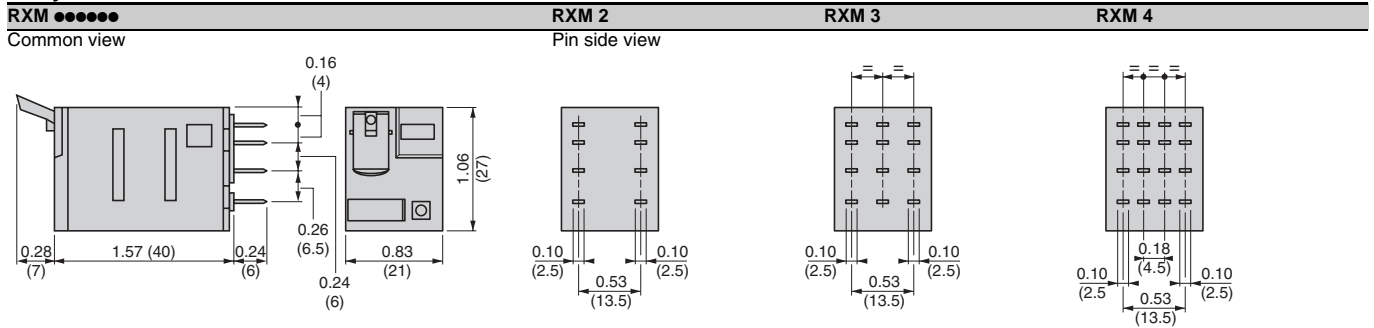
⁴ Please refer to the Zelio® Time - Timers catalog (9050CT0001R2/05).

Accessories (sold in lots of 10)

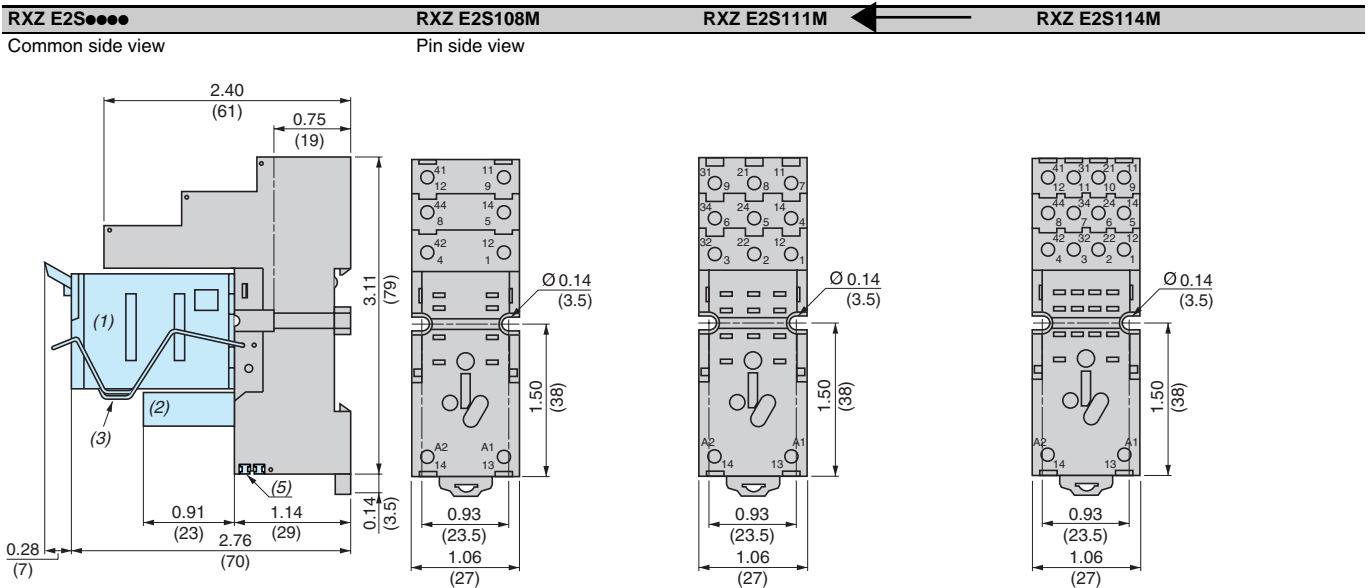
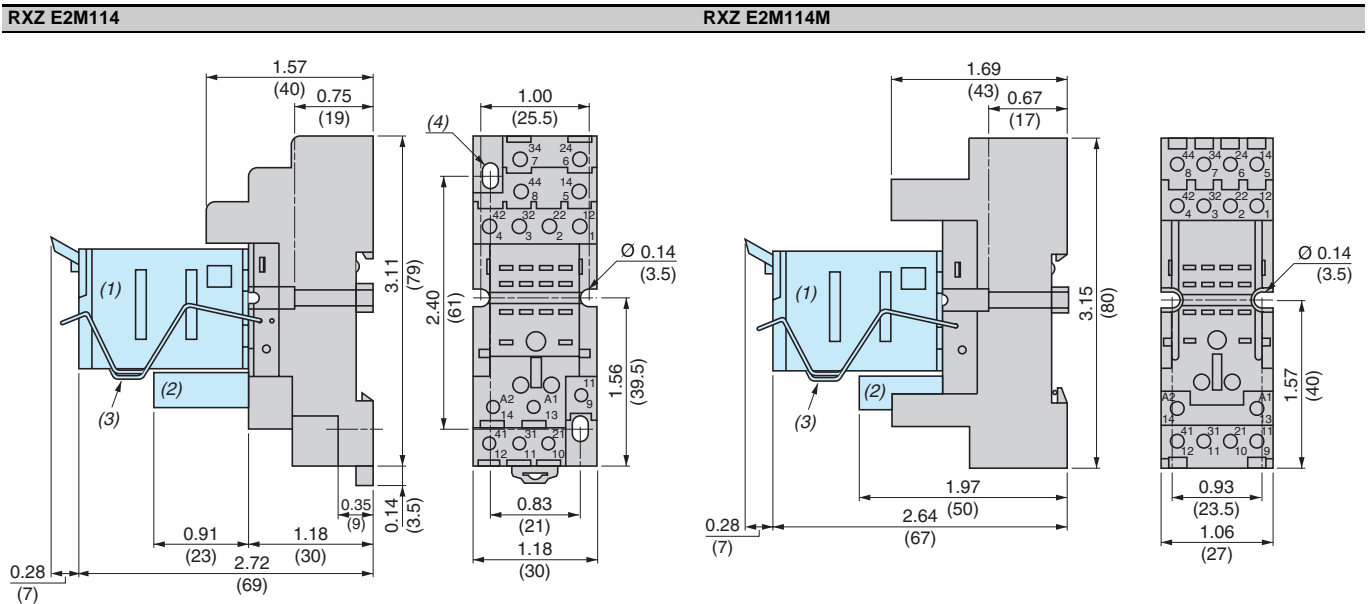
Description	For use with	Catalog Number	Weight	
			oz.	g
Metal hold-down clip	All sockets	RXZ 400	0.04	1.0
Plastic hold-down clip	All sockets	RXZ R335	0.18	5.0
Bus jumper, 2-pole (Ith: 5 A)	All sockets with separate contacts	RXZ S2	0.18	5.0
Mounting adapter for DIN rail ⁵	All relays	RXZ E2DA	0.14	4.0
Mounting adapter for mounting directly to a panel	All relays	RXZ E2FA	0.07	2.0
Clip-in markers	All relays (sheet of 108 markers)	RXZ L520	2.82	80.0
	All sockets except RXZ E2M114	RXZ L420	0.04	1.0

⁵ Test button becomes inaccessible.

Relays



Sockets

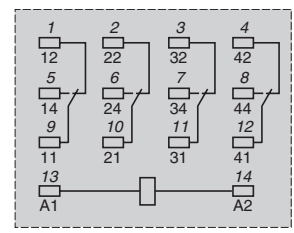
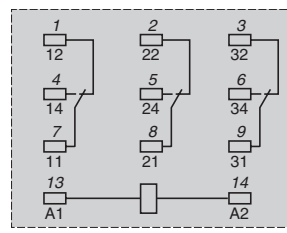
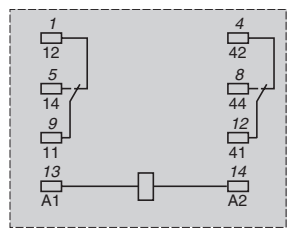
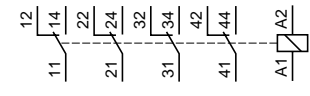
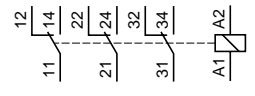
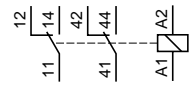


- (1) Relays
- (2) Add-on protection module
- (3) Hold-down clip
- (4) 2 elongated holes $\varnothing 0.14 \times 0.26$ (3.5 x 6.5)
- (5) 2 bus jumpers

Dimensions = Inches
(mm)

Miniature relays

RXM 2●●●●●	RXM 3●●●●●	RXM 4●●●●●
------------	------------	------------



Numbers shown in *italics* correspond to NEMA marking. Viewed from pin end.



Description: Multi Tier Terminal Block

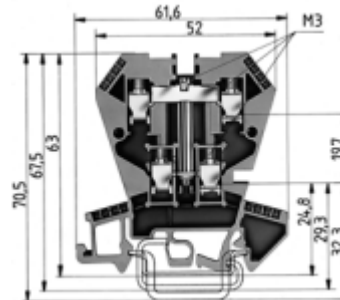
→ Part Number: 57.404.6955.1

Type Number: WK 4 E/V/ V/B

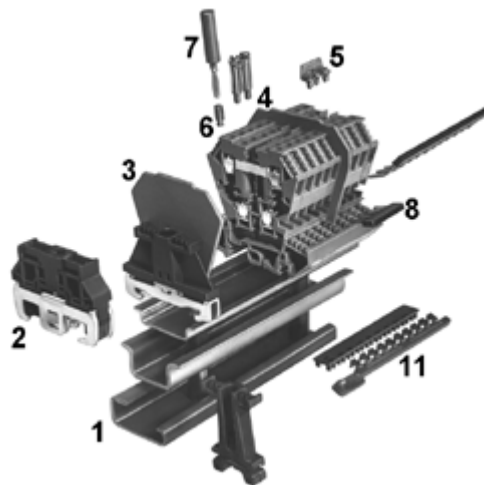
Block width: **6.0mm**

Wire Strip Length: **9.0mm**

Screw Size: **3.0mm**



	UL	CSA	VDE	
Wire (AWG/MCM)	22-10	20-12	Solid (mm ²):	0.5-4.0
			Stranded (mm ²):	-
			F-Stranded (mm ²):	0.5-4.0
Current (amps):	20.0/20.0 (field/factory)	10.0	35.0	
Voltage:	300	300	500/600 AC/DC	



1. TS 35 DIN rail 35x27x7.5 [98.300.0000.0](#)

1. TS 32 DIN rail [98.190.0000.0](#)

2. End bracket for TS 35 [Z5.522.8553.0](#)



Description: Mini Ground Block

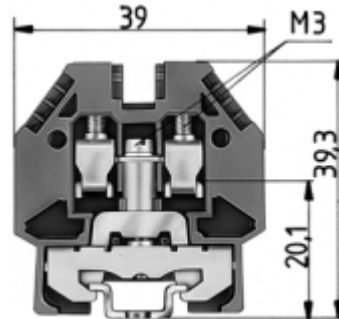
→ **Part Number: 55.504.9053.0**

Type Number: WK 4/15 SL

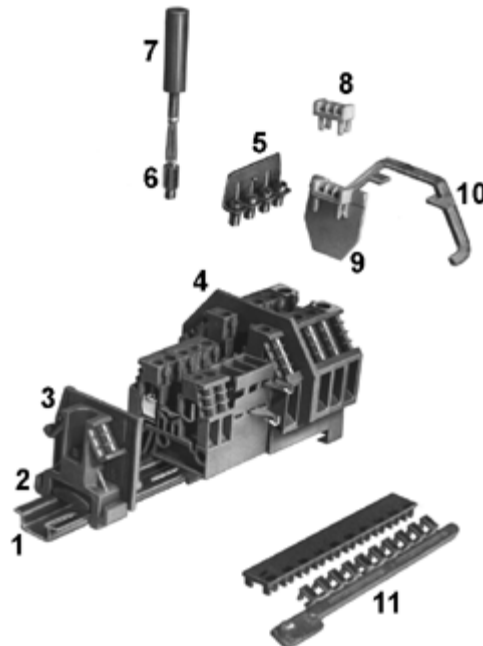
Block width: **6.0mm**

Wire Strip Length: **9.0mm**

Screw Size: **3.0mm**



	UL	CSA	VDE	
Wire (AWG/MCM)	22-10	20-10	Solid (mm ²):	0.5-6.0
			Stranded (mm ²):	-
			F-Stranded (mm ²):	0.5-4.0
Current (amps):	10.0/10.0 (field/factory)	0.0	35.0	
Voltage:	600	0	750/900 AC/DC	



Wall-Mount Enclosures and Accessories

Continuous Hinge with Clamps, Type 4X



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. 42186: Type 4, 4X, 12
IEC 60529, IP66
Meets NEMA Type 3RX requirements

Standard Product

Catalog Number	AxBxC in./mm	Stainless Steel Type	Steel Panel	Conductive Steel Panel	Stainless Steel Panel	Panel Size D x E in./mm	F in./mm	Clamps Qty.	Data Pocket
A16H1206SSLP	16.00 x 12.00 x 6.00 406 x 305 x 152	304	A16P12	A16P12G	A16P12SS6	13.00 x 9.00 330 x 229	1.25 32	4	Small
A16H1206SS6LP	16.00 x 12.00 x 6.00 406 x 305 x 152	316L	A16P12	A16P12G	A16P12SS6	13.00 x 9.00 330 x 229	1.25 32	4	Small
A16H1606SSLP	16.00 x 16.00 x 6.00 406 x 406 x 152	304	A16P16	A16P16G	A16P16SS6	13.00 x 13.00 330 x 330	3.00 76	4	Small
A16H1606SS6LP	16.00 x 16.00 x 6.00 406 x 406 x 152	316L	A16P16	A16P16G	A16P16SS6	13.00 x 13.00 330 x 330	3.00 76	4	Small
A16H2006SSLP	16.00 x 20.00 x 6.00 406 x 508 x 152	304	A20P16	A20P16G	A20P16SS6	17.00 x 13.00 432 x 330	3.00 76	4	Small
A16H2006SS6LP	16.00 x 20.00 x 6.00 406 x 508 x 152	316L	A20P16	A20P16G	A20P16SS6	17.00 x 13.00 432 x 330	3.00 76	4	Small
A20H1606SSLP	20.00 x 16.00 x 6.00 508 x 406 x 152	304	A20P16	A20P16G	A20P16SS6	17.00 x 13.00 432 x 330	3.00 76	4	Small
A20H1606SS6LP	20.00 x 16.00 x 6.00 508 x 406 x 152	316L	A20P16	A20P16G	A20P16SS6	17.00 x 13.00 432 x 330	3.00 76	4	Small
A20H2006SSLP	20.00 x 20.00 x 6.00 508 x 508 x 152	304	A20P20	A20P20G	A20P20SS6	17.00 x 17.00 432 x 432	3.00 76	4	Small
A20H2006SS6LP	20.00 x 20.00 x 6.00 508 x 508 x 152	316L	A20P20	A20P20G	A20P20SS6	17.00 x 17.00 432 x 432	3.00 76	4	Small
A24H2006SSLP	24.00 x 20.00 x 6.00 610 x 508 x 152	304	A24P20	A24P20G	A24P20SS6	21.00 x 17.00 533 x 432	3.00 76	5	Small
A24H2006SS6LP	24.00 x 20.00 x 6.00 610 x 508 x 152	316L	A24P20	A24P20G	A24P20SS6	21.00 x 17.00 533 x 432	3.00 76	5	Small
A24H2406SSLP	24.00 x 24.00 x 6.00 610 x 610 x 203	304	A24P24	A24P24G	A24P24SS6	21.00 x 21.00 533 x 533	3.00 76	5	Small
A24H2406SS6LP	24.00 x 24.00 x 6.00 610 x 610 x 152	316L	A24P24	A24P24G	A24P24SS6	21.00 x 21.00 533 x 533	3.00 76	5	Small
A16H1208SSLP	16.00 x 12.00 x 8.00 406 x 305 x 203	304	A16P12	A16P12G	A16P12SS6	13.00 x 9.00 330 x 229	1.25 32	4	Small

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

Wall-Mount Enclosures and Accessories

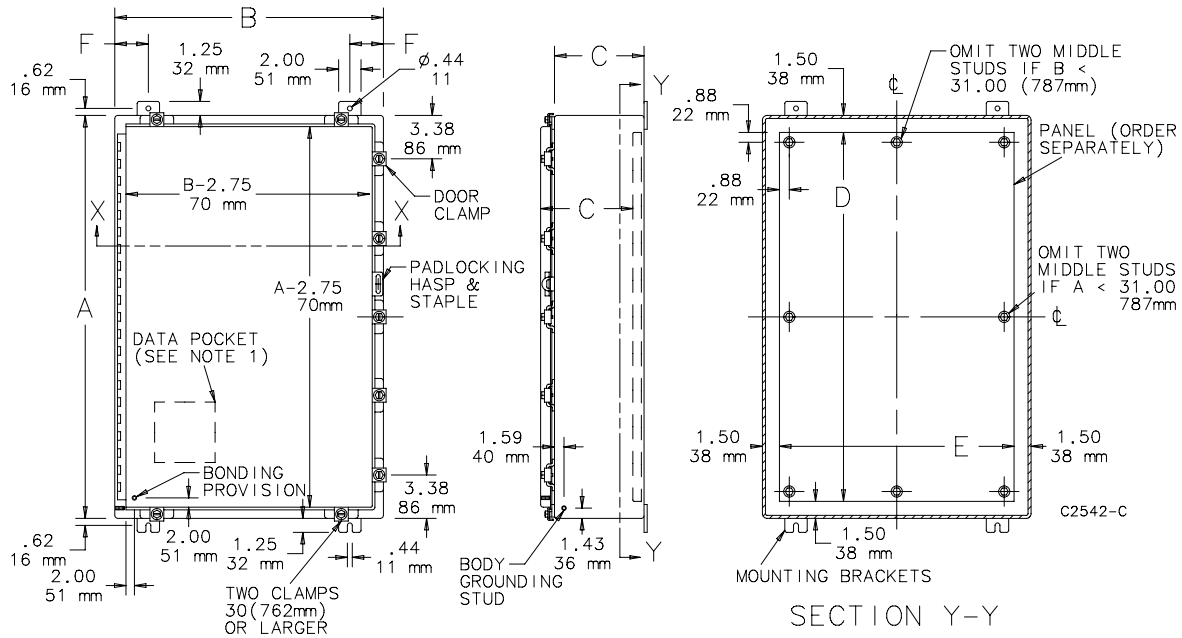
Catalog Number	AxBxC in./mm	Stainless Steel Type	Steel Panel	Conductive Steel Panel	Stainless Steel Panel	Panel Size D x E in./mm	F in./mm	Clamps Qty.	Data Pocket
A16H1208SS6LP	16.00 x 12.00 x 8.00 406 x 305 x 203	316L	A16P12	A16P12G	A16P12SS6	13.00 x 9.00 330 x 229	1.25 32	4	Small
A20H1608SSLP	20.00 x 16.00 x 8.00 508 x 406 x 203	304	A20P16	A20P16G	A20P16SS6	17.00 x 13.00 432 x 330	3.00 76	4	Small
A20H1608SS6LP	20.00 x 16.00 x 8.00 508 x 406 x 203	316L	A20P16	A20P16G	A20P16SS6	17.00 x 13.00 432 x 330	3.00 76	4	Small
A20H2008SSLP	20.00 x 20.00 x 8.00 508 x 508 x 203	304	A20P20	A20P20G	A20P20SS6	17.00 x 17.00 432 x 432	3.00 76	4	Small
A20H2008SS6LP	20.00 x 20.00 x 8.00 508 x 508 x 203	316L	A20P20	A20P20G	A20P20SS6	17.00 x 17.00 432 x 432	3.00 76	4	Small
A20H2408SSLP	20.00 x 24.00 x 8.00 508 x 610 x 203	304	A24P20	A24P20G	A24P20SS6	21.00 x 17.00 533 x 432	3.00 76	5	Small
A20H2408SS6LP	20.00 x 24.00 x 8.00 508 x 610 x 203	316L	A24P20	A24P20G	A24P20SS6	21.00 x 17.00 533 x 432	3.00 76	5	Small
A24H1608SSLP	24.00 x 16.00 x 8.00 610 x 406 x 203	304	A24P16	A24P16G	A24P16SS6	21.00 x 13.00 533 x 330	3.00 76	4	Small
A24H1608SS6LP	24.00 x 16.00 x 8.00 610 x 406 x 203	316L	A24P16	A24P16G	A24P16SS6	21.00 x 13.00 533 x 330	3.00 76	4	Small
A24H2008SSLP	24.00 x 20.00 x 8.00 610 x 508 x 203	304	A24P20	A24P20G	A24P20SS6	21.00 x 17.00 533 x 432	3.00 76	5	Small
A24H2008SS6LP	24.00 x 20.00 x 8.00 610 x 508 x 203	316L	A24P20	A24P20G	A24P20SS6	21.00 x 17.00 533 x 432	3.00 76	5	Small
A24H2408SSLP	24.00 x 24.00 x 8.00 610 x 610 x 203	304	A24P24	A24P24G	A24P24SS6	21.00 x 21.00 533 x 533	3.00 76	5	Small
A24H2408SS6LP	24.00 x 24.00 x 8.00 610 x 610 x 203	316L	A24P24	A24P24G	A24P24SS6	21.00 x 21.00 533 x 533	3.00 76	5	Small
A24H3008SSLP	24.00 x 30.00 x 8.00 610 x 762 x 203	304	A30P24	A30P24G	A30P24SS6	27.00 x 21.00 686 x 533	3.00 76	7	Large
A24H3008SS6LP	24.00 x 30.00 x 8.00 610 x 762 x 203	316L	A30P24	A30P24G	A30P24SS6	27.00 x 21.00 686 x 533	3.00 76	7	Large
A30H2008SSLP	30.00 x 20.00 x 8.00 762 x 508 x 203	304	A30P20	A30P20G	A30P20SS6	27.00 x 17.00 686 x 432	3.00 76	5	Small
A30H2008SS6LP	30.00 x 20.00 x 8.00 762 x 508 x 203	316L	A30P20	A30P20G	A30P20SS6	27.00 x 17.00 686 x 432	3.00 76	5	Small
A30H2408SSLP	30.00 x 24.00 x 8.00 762 x 610 x 203	304	A30P24	A30P24G	A30P24SS6	27.00 x 21.00 686 x 533	3.00 76	5	Large
A30H2408SS6LP	30.00 x 24.00 x 8.00 762 x 610 x 203	316L	A30P24	A30P24G	A30P24SS6	27.00 x 21.00 686 x 533	3.00 76	5	Large
A30H3008SSLP	30.00 x 30.00 x 8.00 762 x 762 x 203	304	A30P30	A30P30G	A30P30SS6	27.00 x 27.00 686 x 686	3.00 76	7	Large
A30H3008SS6LP	30.00 x 30.00 x 8.00 762 x 762 x 203	316L	A30P30	A30P30G	A30P30SS6	27.00 x 27.00 686 x 686	3.00 76	7	Large
A36H2408SSLP	36.00 x 24.00 x 8.00 914 x 610 x 203	304	A36P24	A36P24G	A36P24SS6	33.00 x 21.00 838 x 533	3.00 76	5	Large
A36H2408SS6LP	36.00 x 24.00 x 8.00 914 x 610 x 203	316L	A36P24	A36P24G	A36P24SS6	33.00 x 21.00 838 x 533	3.00 76	5	Large
A36H3008SSLP	36.00 x 30.00 x 8.00 914 x 762 x 203	304	A36P30	A36P30G	A36P30SS6	33.00 x 27.00 838 x 686	3.00 76	7	Large
A36H3008SS6LP	36.00 x 30.00 x 8.00 914 x 762 x 203	316L	A36P30	A36P30G	A36P30SS6	33.00 x 27.00 838 x 686	3.00 76	7	Large
A42H3608SSLP	42.00 x 36.00 x 8.00 1067 x 914 x 203	304	A42P36	A42P36G	A42P36SS6	39.00 x 33.00 991 x 838	3.00 76	8	Large
A42H3608SS6LP	42.00 x 36.00 x 8.00 1067 x 914 x 203	316L	A42P36	A42P36G	A42P36SS6	39.00 x 33.00 991 x 838	3.00 76	8	Large
A48H3608SSLP	48.00 x 36.00 x 8.00 1219 x 914 x 203	304	A48P36	A48P36G	A48P36SS6	45.00 x 33.00 1143 x 838	3.00 76	8	Large
A48H3608SS6LP	48.00 x 36.00 x 8.00 1219 x 914 x 203	316L	A48P36	A48P36G	A48P36SS6	45.00 x 33.00 1143 x 838	3.00 76	8	Large
A20H1610SSLP	20.00 x 16.00 x 10.00 508 x 406 x 254	304	A20P16	A20P16G	A20P16SS6	17.00 x 13.00 432 x 330	3.00 76	4	Small
A20H1610SS6LP	20.00 x 16.00 x 10.00 508 x 406 x 254	316L	A20P16	A20P16G	A20P16SS6	17.00 x 13.00 432 x 330	3.00 76	4	Small
A24H2010SSLP	24.00 x 20.00 x 10.00 610 x 508 x 254	304	A24P20	A24P20G	A24P20SS6	21.00 x 17.00 533 x 432	3.00 76	5	Small
A24H2010SS6LP	24.00 x 20.00 x 10.00 610 x 508 x 254	316L	A24P20	A24P20G	A24P20SS6	21.00 x 17.00 533 x 432	3.00 76	5	Small
A30H2410SSLP	30.00 x 24.00 x 10.00 762 x 610 x 254	304	A30P24	A30P24G	A30P24SS6	27.00 x 21.00 686 x 533	3.00 76	5	Large
A30H2410SS6LP	30.00 x 24.00 x 10.00 762 x 610 x 254	316L	A30P24	A30P24G	A30P24SS6	27.00 x 21.00 686 x 533	3.00 76	5	Large
A36H2410SSLP	36.00 x 24.00 x 10.00 914 x 610 x 254	304	A36P24	A36P24G	A36P24SS6	33.00 x 21.00 838 x 533	3.00 76	5	Large
A36H2410SS6LP	36.00 x 24.00 x 10.00 914 x 610 x 254	316L	A36P24	A36P24G	A36P24SS6	33.00 x 21.00 838 x 533	3.00 76	5	Large
A36H3010SSLP	36.00 x 30.00 x 10.00 914 x 762 x 254	304	A36P30	A36P30G	A36P30SS6	33.00 x 27.00 838 x 686	3.00 76	7	Large

Wall-Mount Enclosures and Accessories

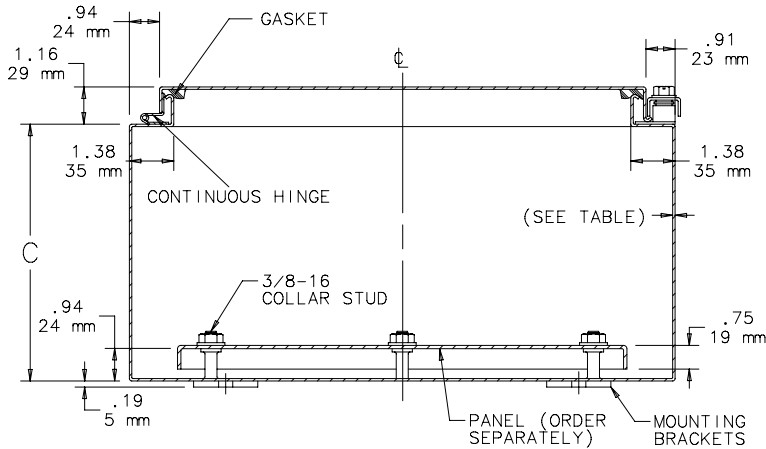
Catalog Number	AxBxC in./mm	Stainless Steel Type	Steel Panel	Conductive Steel Panel	Stainless Steel Panel	Panel Size		Clamps Qty.	Data Pocket
						D x E in./mm	F in./mm		
A36H3010SS6LP	36.00 x 30.00 x 10.00 914 x 762 x 254	316L	A36P30	A36P30G	A36P30SS6	33.00 x 27.00 838 x 686	3.00 76	7	Large
A42H3010SSLP	42.00 x 30.00 x 10.00 1067 x 762 x 254	304	A42P30	A42P30G	A42P30SS6	39.00 x 27.00 991 x 686	3.00 76	8	Large
A42H3010SS6LP	42.00 x 30.00 x 10.00 1067 x 762 x 254	316L	A42P30	A42P30G	A42P30SS6	39.00 x 27.00 991 x 686	3.00 76	8	Large
A48H3610SSLP	48.00 x 36.00 x 10.00 1219 x 914 x 254	304	A48P36	A48P36G	A48P36SS6	45.00 x 33.00 1143 x 838	3.00 76	8	Large
A48H3610SS6LP	48.00 x 36.00 x 10.00 1219 x 914 x 254	316L	A48P36	A48P36G	A48P36SS6	45.00 x 33.00 1143 x 838	3.00 76	8	Large
A24H2412SSLP	24.00 x 24.00 x 12.00 610 x 610 x 305	304	A24P24	A24P24G	A24P24SS6	21.00 x 21.00 533 x 533	3.00 76	5	Small
A24H2412SS6LP	24.00 x 24.00 x 12.00 610 x 610 x 305	316L	A24P24	A24P24G	A24P24SS6	21.00 x 21.00 533 x 533	3.00 76	5	Small
A30H2412SSLP	30.00 x 24.00 x 12.00 762 x 610 x 305	304	A30P24	A30P24G	A30P24SS6	27.00 x 21.00 686 x 533	3.00 76	5	Large
A30H2412SS6LP	30.00 x 24.00 x 12.00 762 x 610 x 305	316L	A30P24	A30P24G	A30P24SS6	27.00 x 21.00 686 x 533	3.00 76	5	Large
A36H3012SSLP	36.00 x 30.00 x 12.00 914 x 762 x 305	304	A36P30	A36P30G	A36P30SS6	33.00 x 27.00 838 x 686	3.00 76	7	Large
A36H3012SS6LP	36.00 x 30.00 x 12.00 914 x 762 x 305	316L	A36P30	A36P30G	A36P30SS6	33.00 x 27.00 838 x 686	3.00 76	7	Large
A36H3612SSLP	36.00 x 36.00 x 12.00 914 x 914 x 305	304	A36P36	A36P36G	A36P36SS6	33.00 x 33.00 838 x 838	3.00 76	7	Large
A36H3612SS6LP	36.00 x 36.00 x 12.00 914 x 914 x 305	316L	A36P36	A36P36G	A36P36SS6	33.00 x 33.00 838 x 838	3.00 76	7	Large
A48H3612SSLP	48.00 x 36.00 x 12.00 1219 x 914 x 305	304	A48P36	A48P36G	A48P36SS6	45.00 x 33.00 1143 x 838	3.00 76	8	Large
A48H3612SS6LP	48.00 x 36.00 x 12.00 1219 x 914 x 305	316L	A48P36	A48P36G	A48P36SS6	45.00 x 33.00 1143 x 838	3.00 76	8	Large
A60H3612SSLP	60.00 x 36.00 x 12.00 1524 x 914 x 305	304	A60P36	A60P36G	A60P36SS6	57.00 x 33.00 1448 x 838	3.00 76	9	Large
A60H3612SS6LP	60.00 x 36.00 x 12.00 1524 x 914 x 305	316L	A60P36	A60P36G	A60P36SS6	57.00 x 33.00 1448 x 838	3.00 76	9	Large
A30H2416SSLP	30.00 x 24.00 x 16.00 762 x 610 x 406	304	A30P24	A30P24G	A30P24SS6	27.00 x 21.00 686 x 533	3.00 76	5	Large
A30H2416SS6LP	30.00 x 24.00 x 16.00 762 x 610 x 406	316L	A30P24	A30P24G	A30P24SS6	27.00 x 21.00 686 x 533	3.00 76	5	Large
A36H3016SSLP	36.00 x 30.00 x 16.00 914 x 762 x 406	304	A36P30	A36P30G	A36P30SS6	33.00 x 27.00 838 x 686	3.00 76	7	Large
A36H3016SS6LP	36.00 x 30.00 x 16.00 914 x 762 x 406	316L	A36P30	A36P30G	A36P30SS6	33.00 x 27.00 838 x 686	3.00 76	7	Large
A48H3616SSLP	48.00 x 36.00 x 16.00 1219 x 914 x 406	304	A48P36	A48P36G	A48P36SS6	45.00 x 33.00 1143 x 838	3.00 76	8	Large
A48H3616SS6LP	48.00 x 36.00 x 16.00 1219 x 914 x 406	316L	A48P36	A48P36G	A48P36SS6	45.00 x 33.00 1143 x 838	3.00 76	8	Large
A60H3616SSLP	60.00 x 36.00 x 16.00 1524 x 914 x 406	304	A60P36	A60P36G	A60P36SS6	57.00 x 33.00 1448 x 838	3.00 76	9	Large
A60H3616SS6LP	60.00 x 36.00 x 16.00 1524 x 914 x 406	316L	A60P36	A60P36G	A60P36SS6	57.00 x 33.00 1448 x 838	3.00 76	9	Large

Purchase panels separately. Optional composite and aluminum panels are available for most sizes.

Wall-Mount Enclosures and Accessories



SECTION Y-Y



SECTION X-X

- NOTE:
1. Removable data pocket included (see table for size). Large data pocket 12.00 x 12.00 (305mm x 305mm); small data pocket 6.00 x 6.00 (152mm x 152mm).
 2. Maximum spacing between door clamps is 15.00 (382mm)



Description

The Redington Model 722 provides an AC Hour Meter with an operating range of 90-264VAC 50/60 Hz. You no longer require two separate meters, one for 115VAC and one for 230VAC. Models are available in the standard industry housings, 2-Hole Rectangular, Flush-Rectangular, Flush-Round and 3-Hole Round. Its quartz time base insures accurate long-term time keeping. The Totally Sealed case protects against the environment and provides years of reliable service. All models are NEMA 4X,12 rated when mounted with optional gasket.

Features

- Operating voltage 90-264VAC 50/60Hz
- Totally Sealed
- UL/cUL Recognized, CE & RoHS Compliant
- 6 Figure, 99999.9
- Quartz accuracy

Options

- Wire leads
- Gasket kit (for NEMA 4X, 12 rating)
- Custom lens
- Terminals up, down, straight

Specifications

Figures: 6 - digits, 0.14" [3.6mm] 99999.9
Hours and indicator - white on black
Decimal - black on white

Reset: Non-reset

Voltage: 90-264VAC

Frequency: 50/60Hz

Power: 1 watt max.

Mounting: Clip or mounting holes

Termination: ¼" [6.3mm] spade terminals

Weight: ~2 oz [57 g]

Accuracy: ± 0.02% over entire range

Case Material: Black polymer

Lens Material: Polymer

Agency Approvals: UL/cUL Recognized, CE & RoHS Compliant, SAE & NEMA 4X, 12 Compliant

Environmental: Totally Sealed

Front Panel: NEMA 4X, 12 rated with optional gasket

Temperature: -40°F to +185°F [-40°C to + 85°C]

Humidity: 95% (SAE J1378)

Vibration: 10-80 Hz, 20g max. (SAE J1378)

Shock: 55g @ 9 - 13msec (SAE J1378)

Models

Description

722-0001	2-Hole Rectangular, 90-264VAC 50/60Hz, ¼" [6.3mm] spade terminals, hours & 1/10's
722-0002	Flush-Rectangular, 90-264VAC 50/60Hz, ¼" [6.3mm] spade terminals, hours & 1/10's
722-0003	Flush-Round, 90-264VAC 50/60Hz, ¼" [6.3mm] spade terminals, hours & 1/10's
722-0004	3-Hole Round, 90-264VAC 50/60Hz, ¼" [6.3mm] spade terminals, hours & 1/10's

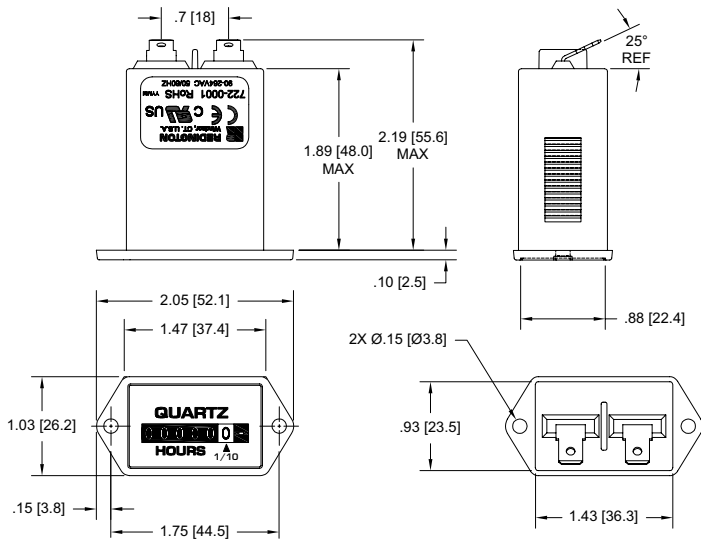
5003-009	NEMA 4X, 12 Gasket for Model 722-0002
5003-010	NEMA 4X, 12 Gasket for Model 722-0001
5003-011	NEMA 4X, 12 Gasket for Model 722-0004
5003-012	NEMA 4X, 12 Gasket for Model 722-0003

* All items are normally in factory stock



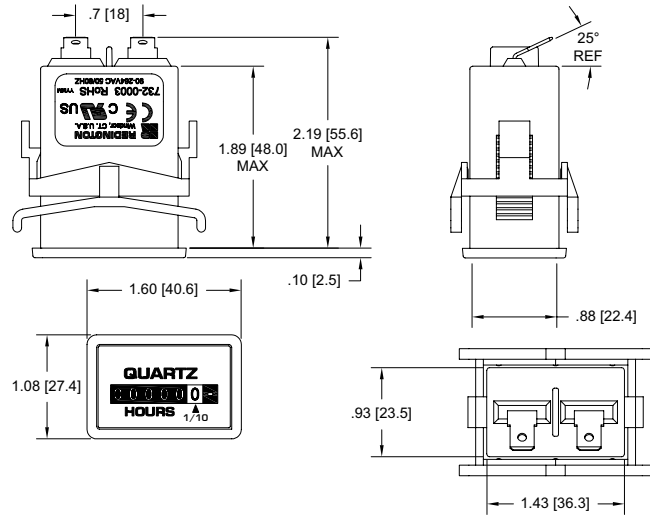
Dimensions

2-Hole



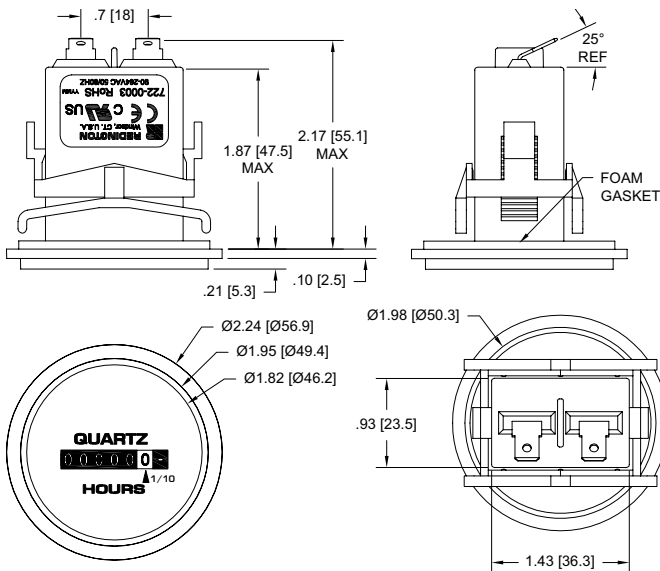
Panel Opening: 1.45" X 0.95" [36.8 X 24.1]

Flush-Rectangular



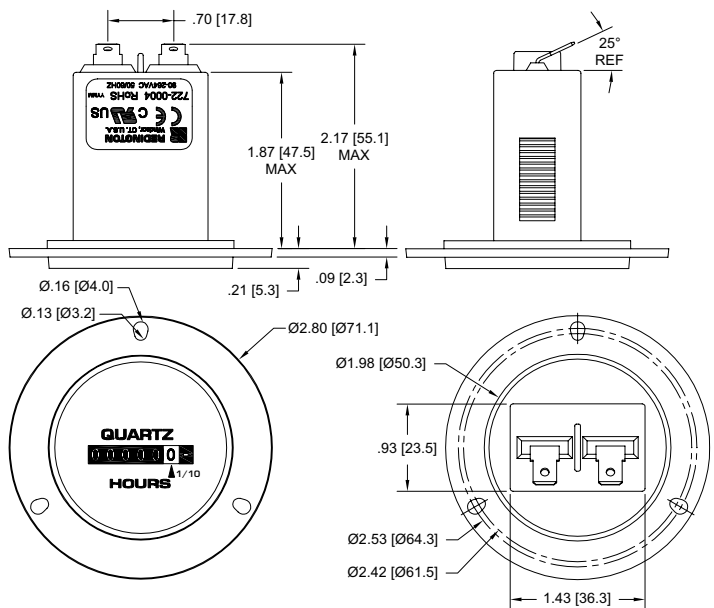
Panel Opening: 1.45" X 0.95" [36.8 X 24.1]
Panel Thickness: 0.03 to 0.63 [0.76 to 16.00]

Flush-Round



Panel Opening: 2.0" [50.6]
Panel Thickness: 0.40 [10.2] Max.

3-Hole Round



Panel Opening: 2.0" [50.6]

Applications

Medical Equipment

Control Panels

Test Equipment

Generators

Office Equipment



Quick Ship

- Same day shipment on stock units with orders received by 11:00 a.m.

Flexible Heaters

Silicone Rubber

Rugged, yet thin, lightweight and flexible ... the use of Watlow silicone rubber heaters is limited only by your imagination. With these heaters, you can put the heat where it's needed and, in the process, improve heat transfer, speed warm-ups and decrease wattage requirements.

Fiberglass-reinforced silicone rubber gives your heater dimensional stability without sacrificing flexibility. Because very little material separates the element from the part, heat transfer is rapid and efficient.

Performance Capabilities

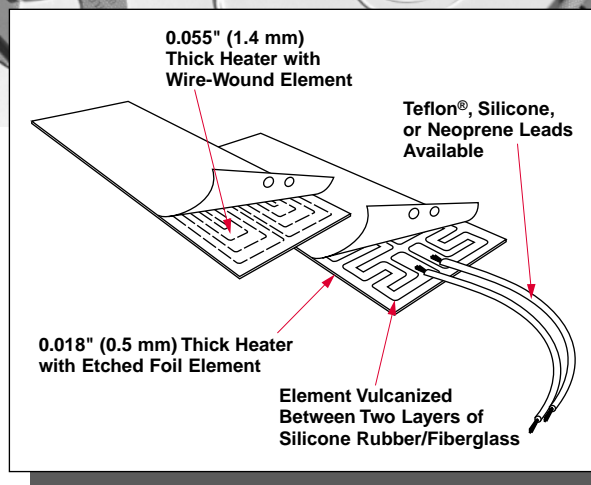
- Operating temperatures to 500°F (260°C)
- Watt densities to 80 W/in² (12.5 W/cm²) dependent upon application temperature
- 0.055 inch (1.4 mm) thick with a wire-wound element; only 0.018 inch (0.5 mm) with an etched foil element

Features and Benefits

- **Designed in the exact shape and size**, including 3-D geometries, to conform to your equipment.
- **More than 80 designs** available immediately from stock.
- **UR®, cUR® and VDE** recognitions are available on many designs.
- **Moisture and chemical-resistant** silicone rubber material provides longer heater life.
- **Easy to bond or attach** to your part through the use of vulcanizing, adhesives, or fasteners.

Applications

- Freeze protection and condensation prevention for many types of instrumentation and equipment
- Medical equipment such as blood analyzers, test tube heaters, etc.
- Computer peripherals such as laser printers
- Curing of plastic laminates
- Photo processing equipment



Teflon® is a registered trademark of the E.I. du Pont de Nemours & Company.

UR® and cUR® are registered trademarks of Underwriter's Laboratories, Inc.

Flexible Heaters

Silicone Rubber

Wire-Wound Element

Width in (mm)	Length in (mm)	Watts	Availability	120V~(ac) Code No.	240V~(ac) Code No.	
3 (75)	3 (75)	45	Stock	030030C1		
	5 (125)	75	Stock	030050C1		
	5 (125)	75	Stock		030050C2	
	10 (255)	150	Stock	030100C1		
	10 (255)	150	Stock		030100C2	
	15 (380)	225	Stock	030150C1		
	15 (380)	225	Stock		030150C2	
	20 (510)	300	Stock	030200C1		
	20 (510)	300	Stock		030200C2	
	25 (635)	375	Stock	030250C1		
	30 (760)	450	Stock	030300C1		
	35 (890)	525	Stock	030350C1		
	40 (1015)	600	Stock	030400C1		
	4 (100)	4 (100)	80	Stock	040040C1	
5 (125)		100	Stock	040050C1		
5 (125)		100	Stock		040050C2	
10 (255)		200	Stock	040100C1		
10 (255)		200	Stock		040100C2	
15 (380)		300	Stock	040150C1		
15 (380)		300	Stock		040150C2	
20 (510)		400	Stock	040200C1		
20 (510)		400	Stock		040200C2	
25 (635)		500	Stock	040250C1		
30 (760)		600	Stock	040300C1		
35 (890)		700	Stock	040350C1		
40 (1015)		800	Stock	040400C1		
5 (125)		5 (125)	125	Stock	050050C1	
	5 (125)	125	Stock		050050C2	
	10 (255)	250	Stock	050100C1		
	10 (255)	250	Stock		050100C2	
	15 (380)	375	Stock	050150C1		
	15 (380)	375	Stock		050150C2	
	20 (510)	500	Stock	050200C1		
	20 (510)	500	Stock		050200C2	
	25 (635)	625	Stock	050250C1		
	30 (760)	750	Stock	050300C1		
	35 (890)	875	Stock	050350C1		
	40 (1015)	1000	Stock	050400C1		
	6 (150)	5 (125)	150	Stock	060050C1	
		5 (125)	150	Stock		060050C2
10 (255)		300	Stock	060100C1		
10 (255)		300	Stock		060100C2	
15 (380)		450	Stock	060150C1		
15 (380)		450	Stock		060150C2	
20 (510)		600	Stock	060200C1		
20 (510)		600	Stock		060200C2	
25 (635)		750	Stock	060250C1		
30 (760)		900	Stock	060300C1		
35 (889)		1050	Stock	060350C1		
40 (1016)		1200	Stock	060400C1		

Flexible Heaters

Approx. net weight: 8 ounces/ft² (0.24 g/cm²). Standard thickness: 0.055 inch. Standard lead length: 12 inches UL 1180 Teflon®. Silicone rubber wire-wound elements rated at 5 W/in². UL® Component Recognition (UR®).

Flexible Heaters

Silicone Rubber

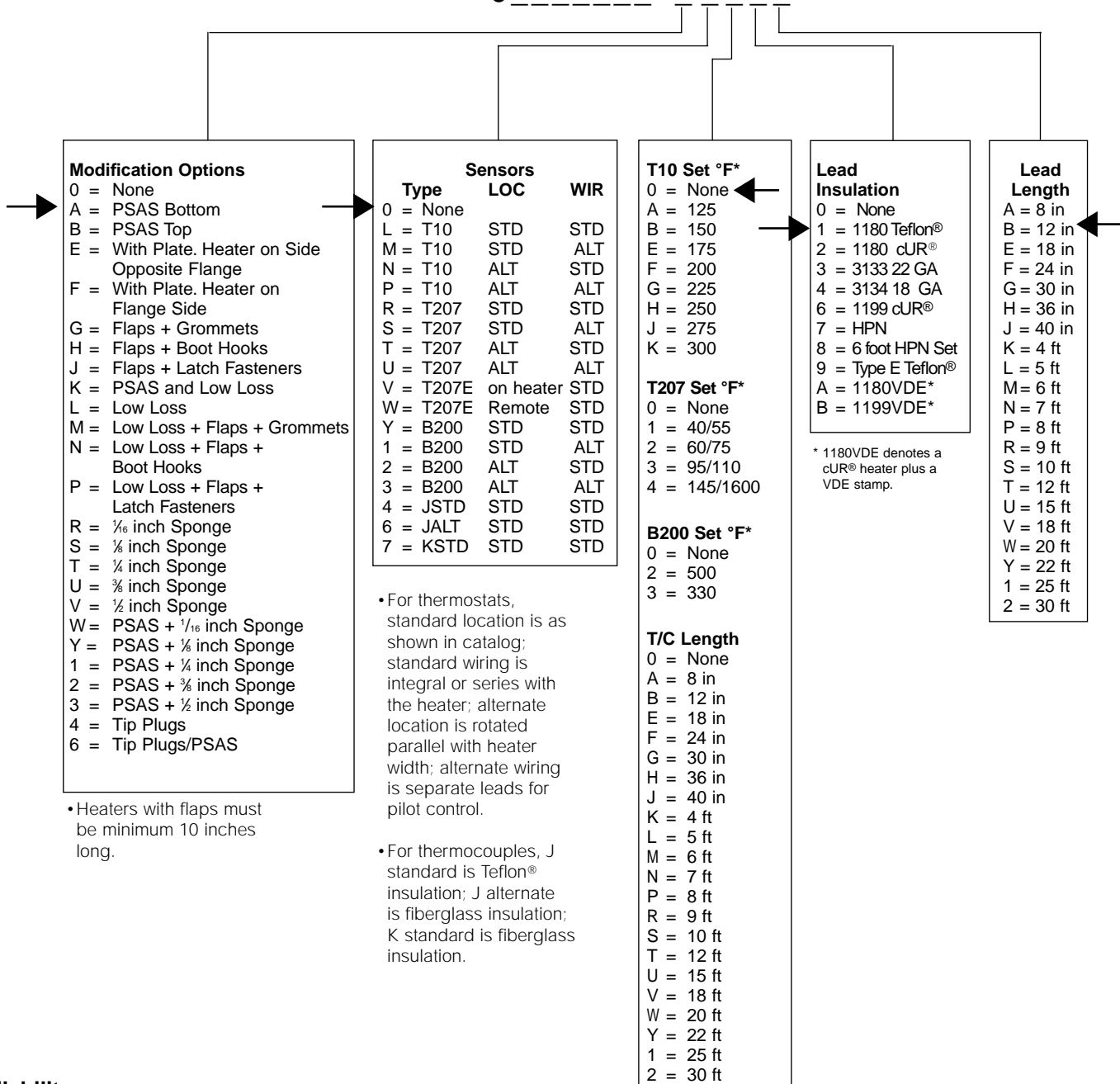
Wire-Wound Stock Heater Coding Configured Options

How to order

To order, complete the code number with the information below:

Wire wound (p. 172-173)

0



Availability:

Modified Stock: Shipment within five working days

30.5 mm Push Buttons

Type 4/4X/13, Corrosion-Resistant/Watertight/Oiltight



Bulletin 800H

- 30.5 mm Mounting Hole
- Type 4/4X/13
Corrosion-Resistant/
Watertight/Oiltight
- Heavy Industrial
Stations and Operators

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30.5 mm Push Buttons

Type 4/4X/13, Corrosion-Resistant/Watertight/Oiltight

Specifications ①

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)
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)

① Performance Data — See page Important-2.

Contact Ratings

Maximum thermal continuous current I_{th} 10 A AC/2.5 A DC.
Bulletin 800H units with 800T-XA contacts have ratings as follows:

Max. Opertnl. Volts Ue	Utilization Category		Rated Operational Currents		
	IEC	NEMA	Volts Ue	Make	Break
AC 600	AC-15	A600	120...600	7200 VA	720 VA
			72...120	60 A	720 VA
			24...72	60 A	10 A
DC 600	DC-13	Q600	28...600	69 VA	
			24...28	2.5 A	

② For applications below 24V/24 mA, PenTUFF™ or Logic Reed contacts are recommended.

Sealed Switch Contact Ratings

Maximum continuous current I_{th} 5 A. Bulletin 800H units have control circuit ratings with sealed switch contact blocks as follows:

Max. Opertnl. Volts Ue	Utilization Category		Rated Operational Currents		
	IEC	NEMA	Volts Ue	Make	Break
AC 600	AC-15	B600	120...600	3600 VA	360 VA
			0...120	30 A	3 A
DC 300	DC-13	P300	24...300	138 VA	
			0...24	5.0 A	

Stackable Sealed Switch Contact Ratings

Maximum continuous current I_{th} 2.5 A.

Logic Reed Contact Ratings

Maximum DC: 30V, 0.06 A, AC: 150V, 0.15 A
Should only be used with resistive loads.

PenTUFF™ (Low Voltage) Contact Ratings

Minimum DC: 5V, 1 mA

Maximum thermal continuous current I_{th} 2.5 A AC/1.0 A DC.
Bulletin 800H units with 800T-XAV contacts have ratings as follows:

Max. Opertnl. Volts Ue	Utilization Category		Rated Operational Currents		
	IEC	NEMA	Volts Ue	Make	Break
AC 300	AC-15	C300	120...300	1800 VA	180 VA
			0...120	15 A	1.5 A
DC 150	DC-13	R150	24...150	28 VA	
			0...24	1.0 A	

Approvals

UL Listed — File: E14840, E10314
Guide: NKCR, NOIV
CSA Certified: LR1234, LR11924
CE compliant IEC: 60947-5

Materials Used in 800H Type 4X Operators

Thermoplastic Polyester (Fiberglass Reinforced)

- Bushings
- Mounting rings
- Sockets

Thermoplastic Polyester

- Non-illuminated button caps

Transparent Amorphous Nylon

- Pilot light lens cap
- Illuminated button caps

Glass Filled Crystalline Nylon

- Thrust washer

Mineral Filled Nylon

- Trim washer

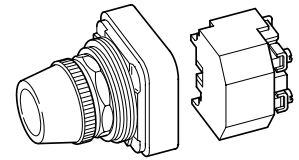
Nitrile (Synthetic Rubber)

- Gaskets and internal seals

Pilot Light Units

800H - QR 24 (Pilot Lights)
 a b c d e f

800H - PR T 16 R (Push-to-Test)
 a b c d e f g

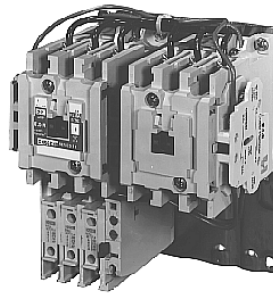


a	d	e	f																																																																																																																																																																										
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QR	Full Voltage (or Resistor)																																																																																																																																																																												
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- ① Neon is only available in amber or clear.
- ② Diode type dual input provides circuit isolation via opposing diodes. Not recommended for use with solid-state outputs and neon indicators.
- ③ Flashing lamps are only available in 6V full voltage units and all transformer units.
- ④ LEDs available in red, green, amber, blue, and white. White LEDs only available in 6V and 24V full voltage and all transformer units. LED color must match lens color, except clear lens supplied with white LED and white lens supplied with amber LED. All LEDs except 120V have an internal shunt resistor for use with solid-state outputs.
- ⑤ 32V and 130V are LED only. 240V is incandescent only.
- ⑥ 120V LED is AC only and does not contain internal shunt resistor. For AC/DC and internal shunt resistor, order 130V AC/DC LED (Code 13).
- ⑦ Dual input diode only.

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NEMA Size 1 — Cat. No. AN56DN0AB

Reversing

Three-phase, full voltage magnetic starters are used primarily for reversing of 3-phase squirrel cage motors. They consist of two contactors and a single overload relay assembled together. The contactors are mechanically and electrically interlocked to prevent line shorts and energization of both contactors simultaneously.

Features

- Bimetallic Ambient Compensated Overload relays — available in three basic sizes covering applications up to 900 hp — reducing number of different contactor/overload relay combinations that have to be stocked.
- These overload relays feature:
- Selectable Manual or Automatic Reset operation.
 - Interchangeable heater packs adjustable $\pm 24\%$ to match motor FLA and calibrated for 1.0 and 1.15 service factors. Heater packs for smaller overload relay will mount in larger overload relay — useful in derating applications such as jogging.
 - Load lugs built into relay base.
 - Single-phase protection, Class 20 or Class 10 trip time.
 - Overload trip indication.
 - Electrically isolated NO-NC contacts (pull RESET button to test).

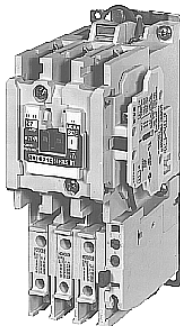
- Long life twin break, silver cadmium oxide contacts — provide excellent conductivity and superior resistance to welding and arc erosion. Generously sized for low resistance and cool operation.
- Designed to 3,000,000 electrical operations at maximum hp ratings up through 25 hp at 600V.
- Steel mounting plate standard on all open type starters.
- Wired for separate or common control.

Non-reversing

- Holding circuit contact(s) supplied as standard:
 - Sizes 00 – 3 have a NO auxiliary contact block mounted on right-hand side (on Size 00, contact occupies 4th power pole position — no increase in width).
 - Sizes 4 – 5 have a NO contact block mounted on left side.
 - Sizes 6 – 7 have a 2NO/2NC contact block on top left.
 - Size 8 has a NO/NC contact block on top left back and a NO on top right back.

Reversing

- Each contactor (Size 00 – 8) supplied with one NO-NC side mounted contact block as standard. NC contacts are wired as electrical interlocks.



NEMA Size 1 — Cat. No. AN16BN0AB

Product Description

Non-reversing

Three-phase, full voltage magnetic starters are most commonly used to switch AC motor loads. Starters consist of a magnetically actuated switch (contactor) and an overload relay assembled together.

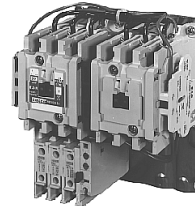
Product Selection

When Ordering Supply

- Catalog Number
- Heater pack number (see selection table, Pages 33-36 – 33-37 or full load current.



Size 0
Non-reversing Starter



Size 1
Reversing Starter



Size 3 Vertical
Reversing Starter

Table 33-10. Type AN16/AN56 NEMA — Manual or Automatic Reset Overload Relay — Non-reversing and Reversing

NEMA Size	Continuous Ampere Rating	Service-Limit Current Rating (Amperes) ②	Maximum UL Horsepower ①										Price U.S. \$	3-Pole Reversing	Vertical Reversing	Price U.S. \$
			1-Phase		3-Phase				3-Pole Non-reversing							
			115V	230V	208V	240V	480V	600V								
00	9	11	1/3	1	1-1/2	1-1/2	2	2	AN16AN0_C	182.	AN56AN0_C	—	435.			
0	18	21	1	2	3	3	5	5	AN16BN0_C	229.	AN56BN0_C	AN56BNV0_	515.			
1	27	32	2	3	7-1/2	7-1/2	10	10	AN16DN0_B	262.	AN56DN0_B	AN56DNV0_	585.			
2	45	52	3	7-1/2	10	15	25	25	AN16GN0_B	476.	AN56GN0_B	AN56GNV0_	1,110.			
3	90	104	—	—	25	30	50	50	AN16KN0_	775.	AN56KN0_	AN56KNV0_	1,835.			
4	135	156	—	—	40	50	100	100	AN16NN0_	1,760.	AN56NN0_	AN56NNV0_	4,475.			
5	270	311	—	—	75	100	200	200	AN16SN0_B	4,300.	AN56SN0_B	—	8,590.			
6	540	621	—	—	150	200	400	400	AN16TN0_C	9,930.	AN56TN0_C	—	19,990.			
7	810	932	—	—	200	300	600	600	AN16UN0_B	14,160.	AN56UN0_B	—	28,995.			
8 ③	1215	1400	—	—	400	450	900	900	AN16VN0_B	22,010.	AN56VN0_B	—	42,614.			

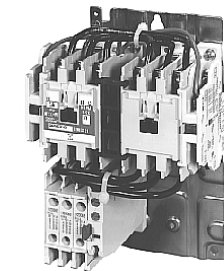
Note: Starter Catalog Numbers do not include heater packs. Select one carton of three heater packs. Heater pack selection, Pages 33-36 – 33-37.

① Maximum horsepower rating of starters for 380V 50 Hz applications:

NEMA Size	00	0	1	2	3	4	5	6	7	8
Horsepower	1-1/2	5	10	25	50	75	150	300	600	900

② The service-limit current ratings represent the maximum rms current, in amperes, which the controller shall be permitted to carry for protracted periods in normal service. At service-limit current ratings, temperature rises shall be permitted to exceed those obtained by testing the controller at its continuous current rating. The current rating of overload relays or trip current of other motor protective devices used shall not exceed the service-limit current rating of the controller.

③ Common control. For separate 120V control, insert letter **D** in 7th position of listed Catalog Number. EXAMPLE: AN56VND0CB.



NEMA Size 0
Cat. No. AN56BN0AC

Magnet Coils — AC or DC

Starter coils listed in this section also have a 50 Hz rating as shown in the adjacent table. Select required starter by Catalog Number and replace the magnet coil alpha designation in the Catalog Number () with the proper Code Suffix from the adjacent table.

For Sizes 00 – 2 and 5 – 8, the magnet coil alpha designation will be the next to last digit of the listed Catalog Number. EXAMPLE: For a 380V, 50 Hz coil, change AN16BN0_C to AN16BN0LC. For all other sizes, the magnet coil alpha designation will be the last digit of the listed Catalog Number.

For **DC Magnet Coils**, see Accessories, Pages 33-21 – 33-22.

Table 33-11. AC Suffix Code

Coil Volts and Hertz	Code Suffix
120/60 or 110/50	A
240/60 or 220/50	B
480/60 or 440/50	C
600/60 or 550/50	D
208/60	E
277/60	H
208 – 240/60 ④	J
240/50	K
380 – 415/50	L
550/50	N
24/60, 24/50 ⑤	T
24/50	U
32/50	V
48/60	W
48/50	Y

④ NEMA Sizes 00 and 0 only.

⑤ NEMA Sizes 00 and 0 only. Sizes 1 – 8 are 24/60 only.

Technical Data Pages 33-12 – 33-14
 Dimensions Pages 33-28 – 33-30
 Special Modifications Page 33-23
 Accessories Pages 33-15 – 33-23
 Heater Packs Pages 33-36 – 33-37
 Discount Symbol 1CD1

Auxiliary Contacts

NEMA Sizes 00 – 2 — IEC Sizes A – K

The auxiliary contacts listed below are designed for installation on Freedom Series starters and contactors. Snap-on design facilitates quick, easy installation.

These bifurcated design contact blocks, featuring silver cadmium alloy contacts, are well suited for use in very low energy (logic level) circuits.



Side Mounted



Top Mounted

Table 33-39. Product Selection

Description	Catalog Number	Contact Configuration Code ^①	Price U.S. \$
Side Mounted			
1NO	C320KGS1	10	20.10
1NC	C320KGS2	01	20.10
1NO-1NC	C320KGS3	11	27.00
2NO	C320KGS4	20	27.00
2NC	C320KGS5	02	27.00
1NO-1NCI	C320KGS6	N/A	27.00
1NO (EC)-1NC (LO)	C320KGS7	N/A	27.00
1NCI	C320KGS8	N/A	27.00
Top Mounted			
1NO	C320KGT1	10	20.10
1NC	C320KGT2	01	20.10
1NO-1NC	C320KGT3	11	27.00
2NO	C320KGT4	20	27.00
2NC	C320KGT5	02	27.00
1NO-1NCI	C320KGT6	N/A	27.00
1NO (EC)-1NC (LO)	C320KGT7	N/A	27.00
1NCI	C320KGT8	N/A	27.00
3NO	C320KGT9	30	54.50
2NO-1NC	C320KGT10	21	54.50
1NO-2NC	C320KGT11	12	54.50
3NC	C320KGT12	03	54.50
4NO	C320KGT13	40	54.50
3NO-1NC	C320KGT14	31	54.50
2NO-2NC	C320KGT15	22	54.50
1NO-3NC	C320KGT16	13	54.50
4NC	C320KGT17	04	54.50
3NO-1NCI	C320KGT18	N/A	54.50
2NO-1NCI-1NC	C320KGT19	N/A	54.50
2NO-1NO (EC)-1NC (LO)	C320KGT20	N/A	54.50
1NO-1NC-1NO (EC)-1NC (LO)	C320KGT21	N/A	54.50

Note: NCI = Normally Closed early opening designed for use in reversing applications. EC = Early Closing. LO = Late Opening.

^① For reference only — not part of Catalog Number. See below.

Contact Configuration Code

This two-digit code is found on the auxiliary contact to assist in identifying the specific contact configuration. The first digit indicates the quantity of NO contacts and the second indicates the quantity of NC contacts.

NEMA Sizes 3 – 8 — IEC Sizes L – Z

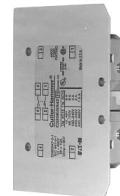
Table 33-40. Product Selection

Circuit	Catalog Number	Contact Configuration Code ^②	Price U.S. \$
Base Auxiliary Contacts — NEMA Sizes 3 – 5, IEC Sizes L – S			
	NEMA Size 3 IEC Sizes L – N	NEMA Sizes 4 – 5 IEC Sizes P – S	
NO	C320KGS31	C320KGS41	10
NO-NC	C320KGS32	C320KGS42	11
			40.25
			54.50
Auxiliary Contacts — NEMA Sizes 3 – 5, IEC Sizes L – S			
	Catalog Number		
NO	C320KGS20	10	40.25
NC	C320KGS21	01	40.25
NO-NC ^③	C320KGS22	11	54.50
Auxiliary Contacts — NEMA Sizes 6 – 8, IEC Sizes T – Z			
	Size	Catalog Number	
NO-NC	NEMA 8, IEC Z	C320KA5	11
2NO-2NC	NEMA 6 – 7	C320KA6	22
2NO-2NC	IEC T – X	C320KA8	22
			149.00
			149.00
			149.00

^② For reference only — not part of Catalog Number. See below left.

^③ NO-NC occupies two positions — L2 and L3, or R2 and R3.

See Figure 33-7 on Page 33-20.



Base Auxiliary Contact
Cat. No. C320KGS42



Auxiliary Contact
Cat. No. C320KGS22

Auxiliary Contact Ratings (Amperes)

Table 33-41. Ratings — NEMA A600

Current	AC Volts			
	120V	240V	480V	600V
Make and Interrupting	60	30	15	12
Break	6	3	1.5	1
Continuous	10	10	10	10

Table 33-42. Ratings — NEMA P300

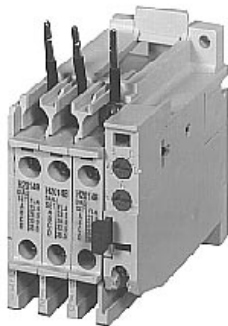
Continuous Thermal Rating: 5A	
DC Volts	Make/Break Amperes
125	1.10
250	.55

Table 33-43. Ratings — Logic Level

Minimum Ratings for Logic Level and Hostile Atmosphere Application	
Minimum Amperes	20 mA
Minimum Volts	24V AC/DC

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Factory Modifications	33-34
Accessories	33-34
Replacement Parts	33-34
Dimensions	33-35
Product Selection	33-36
Heater Pack Selection	33-36



32A Overload
Cat. No. C306DN3B

Product Description

C306 Overload Relays are designed for use with CE or CN non-reversing and reversing contactors. Four sizes are available for overload protection up to 144A.

Features

- Selectable Manual or Automatic Reset operation.
- Interchangeable Heater Packs adjustable $\pm 24\%$ to match motor FLA and calibrated for use with 1.0 and 1.15 service factor motors. Heater packs for 32A overload relay will mount in 75A overload relay — useful in derating applications such as jogging.
- Class 10 or 20 heater packs.
- Load lugs built into relay base.
- Bimetallic, ambient compensated operated. Trip free mechanism.
- Electrically isolated NO-NC contacts (pull RESET button to test).
- Overload trip indication.

- Shrouded or fingerproof terminals to reduce possibility of electrical shock.
- Meets UL 508 single-phasing requirements.
- UL listed, CSA certified, NEMA compliance and CE mark.

Operation

C306 Overload Relay Setting

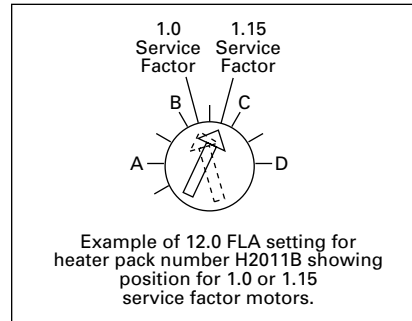


Figure 33-17. FLA Dial Adjustment

For motors having a 1.15 service factor, rotate the FLA adjustment dial to correspond to the motor's FLA rating.

Estimate the dial position when the motor FLA falls between two letter values as shown in the example.

For motors having a 1.0 service factor, rotate the FLA dial one-half position counterclockwise (CCW).

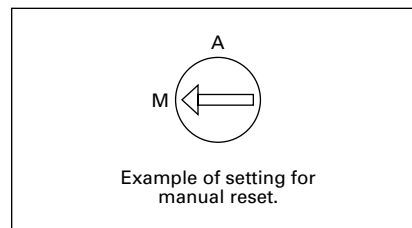


Figure 33-18. Manual/Automatic Reset

The overload relay is factory set at M for manual reset operation. For automatic reset operation, turn the reset adjustment dial to the A position as shown in the illustration.

Automatic reset is not intended for two-wire control devices.

Test for Trip Indication

To test overload relay for trip indication when in manual reset, pull out the blue reset button. An orange flag will appear indicating that the device has tripped. Push reset button in to reset.

Warning — To provide continued protection against fire or shock hazard, the complete overload relay must be replaced if burnout of the heater element occurs.

Technical Information

General

"Overload relays are provided to protect motors, motor control apparatus and motor-branch circuit conductors against excessive heating due to motor overloads and failure to start. This definition does not include:

- 1) motor circuits over 600V,
- 2) short circuits,
- 3) ground faults and
- 4) fire pump control." (NEC Art. 430-31)

Time Current Characteristics

The time-current characteristics of an overload relay is an expression of performance which defines its operating time at various multiples of its current setting. Tests are run at Underwriters Laboratories (UL) in accordance with NEMA Standards and the NEC. UL requires:

- When tested at 100 percent of its current rating, the overload relay shall trip ultimately.
- When tested at 200 percent of its current rating, the overload relay shall trip in not more than 8 minutes.
- When tested at 600 percent of the current rating, the overload relay shall trip in not more than 10 or 20 seconds, depending on the Class of the relay.

"Current Rating" is defined as the minimum current at which the relay will trip. Per NEC, an overload must ultimately trip at 125% of FLA current (heater) setting for a 1.15 service factor motor and 115% FLA for a 1.0 service factor motor.

"Current Setting" is defined as the FLA (Full Load Amperes) of the motor and thus the overload heater pack setting.

Example: 600% of current rating is defined as 750% (600×1.25) of FLA current (heater) setting for a 1.15 service factor motor. A 10A heater setting must trip in 20 seconds or less at 75A motor current for a Class 20 relay.

Table 33-74. Standard Trip — Class 20 Heater Selection

Overload Relay Size	Motor Full Load Ampere Rating				Catalog Number (Includes 3 Heater Packs) ①	Price U.S. \$
	Dial Position					
	A	B	C	D		

For Use with NEMA Sizes 00 – 0 Series C, NEMA Sizes 1 – 2 Series B; IEC Sizes A – F Series C, IEC Sizes G – K Series B

32A or 75A	.254	.306	.359	.411	H2001B-3	30.50
	.375	.452	.530	.607	H2002B-3	30.50
	.560	.676	.791	.907	H2003B-3	30.50
	.814	.983	1.15	1.32	H2004B-3	30.50
	1.20	1.45	1.71	1.96	H2005B-3	30.50
	1.79	2.16	2.53	2.90	H2006B-3	30.50
	2.15	2.60	3.04	3.49	H2007B-3	30.50
	3.23	3.90	4.56	5.23	H2008B-3	30.50
	4.55	5.50	6.45	7.40	H2009B-3	30.50
	6.75	8.17	9.58	11.0	H2010B-3	30.50
9.14	10.8	12.4	14.0	H2011B-3	30.50	
14.0	16.9	19.9	22.8	H2012B-3	30.50	
18.7	22.7	26.7	30.7	H2013B-3	30.50	
23.5	28.5	33.5	38.5	H2014B-3	30.50	

For Use with NEMA Size 2, IEC Sizes G – K Only — Series B

75A	29.0	34.0	39.1	44.1	H2015B-3	30.50
	39.6	45.5	51.5	57.4	H2016B-3	30.50
	53.9	60.9	67.9	74.9	H2017B-3	30.50

For Use with NEMA Sizes 3 – 4, IEC Sizes L – N Only — Series A

105A or 144A	8.0	9.2	10.3	11.5	H2025-3	30.50
	11.4	12.8	14.3	15.7	H2026-3	30.50
	14.3	15.7	17.4	19.0	H2027-3	30.50
	18.0	20.2	22.3	24.5	H2018-3	30.50
	24.6	27.6	30.5	33.4	H2019-3	30.50
	33.5	37.5	41.5	45.6	H2020-3	30.50
	45.7	51.2	56.7	62.1	H2021-3	30.50
	62.2	69.7	77.1	84.6	H2022-3	30.50
	84.7	95.0	105.0	115.0	H2023-3	30.50
	106.0	118.0	131.0	144.0	H2024-3	30.50

For Use with Size 5 Starters — Series B and IEC P, R and S with 300/5 CT

32A ②	49	59	69	79	H2004B-3	30.50
	72	87	103	118	H2005B-3	30.50
	107	130	152	174	H2006B-3	30.50
	129	156	182	209	H2007B-3	30.50
	194	234	274	—	H2008B-3	30.50

For Use with Size 6 Starters Only — Series B and IEC T – V with 600/5 CT

32A ②	144	174	205	235	H2005B-3	30.50
	215	259	304	348	H2006B-3	30.50
	258	312	365	419	H2007B-3	30.50
	388	468	547	627	H2008B-3	30.50

For Use with Size 7 Starters Only — Series B and IEC W – X with 1000/5 CT

32A ②	163	197	230	264	H2004B-3	30.50
	240	290	342	392	H2005B-3	30.50
	358	432	506	580	H2006B-3	30.50
	430	520	608	698	H2007B-3	30.50
	646	780	912	—	H2008B-3	30.50

For Use with Size 8 Starters Only — Series B and IEC Z with 1500/5 CT

32A ②	244	295	345	396	H2004B-3	30.50
	360	435	513	588	H2005B-3	30.50
	537	648	759	870	H2006B-3	30.50
	645	780	912	1047	H2007B-3	30.50
	969	1170	1368	—	H2008B-3	30.50

① Heater packs are shipped 3 to a carton. Catalog Numbers and prices are for 3 heater packs.

② Sizes 5 – 8 and IEC P – Z use the 32A overload relay with current transformers.

Table 33-75. Fast Trip — Class 10 Heater Selection

Overload Relay Size	Motor Full Load Ampere Rating				Catalog Number (Includes 3 Heater Packs) ③	Price U.S. \$
	Dial Position					
	A	B	C	D		

For Use with NEMA Sizes 00 – 0 Series C, NEMA Sizes 1 – 2 Series B; IEC Sizes A – F Series C, IEC Sizes G – K Series B

32A or 75A	.260	.313	.367	.420	H2101B-3	30.50
	.384	.464	.543	.623	H2102B-3	30.50
	.570	.688	.806	.924	H2103B-3	30.50
	.846	1.02	1.20	1.37	H2104B-3	30.50
	1.28	1.55	1.83	2.10	H2105B-3	30.50
	1.92	2.33	2.74	3.15	H2106B-3	30.50
	2.30	2.79	3.28	3.77	H2107B-3	30.50
	3.38	4.10	4.82	5.54	H2108B-3	30.50
	4.96	6.03	7.09	8.16	H2109B-3	30.50
	7.07	8.58	10.1	11.6	H2110B-3	30.50
9.60	11.2	12.8	14.4	H2111B-3	30.50	
14.4	17.5	20.7	23.8	H2112B-3	30.50	
18.7	21.8	25.0	28.1	H2113B-3	30.50	
23.5	27.3	31.0	34.8	H2114B-3	30.50	

For Use with NEMA Size 2, IEC Sizes G – K Only — Series B

75A	28.3	32.6	37.0	41.3	H2115B-3	30.50
	36.6	42.3	48.1	53.8	H2116B-3	30.50
	53.8	60.8	67.9	74.9	H2117B-3	30.50

For Use with Size 5 Starters Only — Series B and IEC P, R and S with 300/5 CT

32A ④	51	61	72	82	H2104B-3	30.50
	77	93	110	126	H2105B-3	30.50
	115	140	164	189	H2106B-3	30.50
	138	167	197	226	H2107B-3	30.50
	203	246	289	—	H2108B-3	30.50

For Use with Size 6 Starters Only — Series B and IEC T – V with 600/5 CT

32A ④	154	186	220	252	H2105B-3	30.50
	230	280	329	378	H2106B-3	30.50
	276	335	394	452	H2107B-3	30.50
	406	492	578	—	H2108B-3	30.50

For Use with Size 7 Starters Only — Series B and IEC W – X with 1000/5 CT

32A ④	169	204	240	274	H2104B-3	30.50
	256	310	366	420	H2105B-3	30.50
	384	466	543	630	H2106B-3	30.50
	460	558	656	754	H2107B-3	30.50
	676	820	—	—	H2108B-3	30.50

For Use with Size 8 Starters Only — Series B and IEC Z with 1500/5 CT

32A ④	254	306	360	411	H2104B-3	30.50
	384	465	549	630	H2105B-3	30.50
	576	699	822	945	H2106B-3	30.50
	690	837	984	1131	H2107B-3	30.50
	1014	1230	—	—	H2108B-3	30.50

③ Heater packs are shipped 3 to a carton. Catalog Numbers and prices are for 3 heater packs.

④ Sizes 5 – 8 and IEC P – Z use the 32A overload relay with current transformers.

30.5 mm Push Buttons

Type 4/4X/13, Corrosion-Resistant/Watertight/Oiltight



Bulletin 800H

- 30.5 mm Mounting Hole
- Type 4/4X/13
Corrosion-Resistant/
Watertight/Oiltight
- Heavy Industrial
Stations and Operators

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30.5 mm Push Buttons

Type 4/4X/13, Corrosion-Resistant/Watertight/Oiltight

Specifications ①

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)

① Performance Data — See page Important-2.

Contact Ratings

Maximum thermal continuous current I_{th} 10 A AC/2.5 A DC.
Bulletin 800H units with 800T-XA contacts have ratings as follows:

Max. Opertnl. Volts Ue	Utilization Category		Rated Operational Currents		
	IEC	NEMA	Volts Ue	Make	Break
AC 600	AC-15	A600	120...600	7200 VA	720 VA
			72...120	60 A	720 VA
			24...72	60 A	10 A
DC 600	DC-13	Q600	28...600	69 VA	
			24...28	2.5 A	

② For applications below 24V/24 mA, PenTUFF™ or Logic Reed contacts are recommended.

Sealed Switch Contact Ratings

Maximum continuous current I_{th} 5 A. Bulletin 800H units have control circuit ratings with sealed switch contact blocks as follows:

Max. Opertnl. Volts Ue	Utilization Category		Rated Operational Currents		
	IEC	NEMA	Volts Ue	Make	Break
AC 600	AC-15	B600	120...600	3600 VA	360 VA
			0...120	30 A	3 A
DC 300	DC-13	P300	24...300	138 VA	
			0...24	5.0 A	

Stackable Sealed Switch Contact Ratings

Maximum continuous current I_{th} 2.5 A.

Logic Reed Contact Ratings

Maximum DC: 30V, 0.06 A, AC: 150V, 0.15 A
Should only be used with resistive loads.

PenTUFF™ (Low Voltage) Contact Ratings

Minimum DC: 5V, 1 mA

Maximum thermal continuous current I_{th} 2.5 A AC/1.0 A DC.
Bulletin 800H units with 800T-XAV contacts have ratings as follows:

Max. Opertnl. Volts Ue	Utilization Category		Rated Operational Currents		
	IEC	NEMA	Volts Ue	Make	Break
AC 300	AC-15	C300	120...300	1800 VA	180 VA
			0...120	15 A	1.5 A
DC 150	DC-13	R150	24...150	28 VA	
			0...24	1.0 A	

Approvals

UL Listed — File: E14840, E10314
Guide: NKCR, NOIV
CSA Certified: LR1234, LR11924
CE compliant IEC: 60947-5

Materials Used in 800H Type 4X Operators

Thermoplastic Polyester (Fiberglass Reinforced)

- Bushings
- Mounting rings
- Sockets

Thermoplastic Polyester

- Non-illuminated button caps

Transparent Amorphous Nylon

- Pilot light lens cap
- Illuminated button caps

Glass Filled Crystalline Nylon

- Thrust washer

Mineral Filled Nylon

- Trim washer

Nitrile (Synthetic Rubber)

- Gaskets and internal seals






30.5 mm Push Buttons

Emergency Stop Operators — Type 4/4X/13 Corrosion-Resistant/Watertight/Oiltight

2-Position Push-Pull/Twist Release, Non-Illuminated



2-Position Push-Pull/Twist
Cat. No. 800H-FRXT6D4

Contact Type	Operator Position		Button Color	Push-Pull/Twist Release
	 Maintained	 Maintained		Cat. No.
	Out	In		
 N.C.L.B. ①	X	O	Red	800H-FRXT6D4 ←
 N.O. - N.C.L.B. ①	O X	X O	Red	800H-FRXT6A1
 N.C.L.B. - N.C.L.B. ①	X X	O O	Red	800H-FRXT6A5

Note: X = Closed/O = Open

Note: A jumbo or large legend plate is recommended, if space allows.

Note: Emergency stop push buttons are compliant with EN-418 and IEC 60947-5-5 Standards when using N.C.L.B. contact blocks.

- ① Normally closed late break contact. When button is pushed from the OUT to IN position, the mechanical detent action of the operator occurs before electrical contacts change state. When the button is pulled from the IN to the OUT position, the electrical contacts change state before the mechanical detent occurs.

Modifications and Accessories

Contact Blocks

Packaged in kit form for field installation. All necessary mounting hardware is provided with each contact block kit. **Contact ratings are listed on page 10-59. Note:** It is not recommended to mount more than four contact blocks on any one Non-Illuminated operator, (maximum two blocks deep). Contact blocks cannot be stacked onto power modules, so illuminated operators are limited to two contact blocks. Sealed switch contact blocks are not stackable, and are limited to two blocks per operator. Time delay contacts are only available as one circuit per operator.



Shallow Block



PenTUFF (Low Voltage) Contact Block



Logic Reed Block



Sealed Switch Block



Stackable Sealed Switch Block

Number of Contacts	Shallow Block ①	PenTUFF (Low Voltage) Block ①	Logic Reed Block ②	Sealed Switch Block ③	Stackable Sealed Switch Block ④
	Cat. No.	Cat. No.	Cat. No.	Cat. No.	Cat. No.
1 N.O.	800T-XD1	800T-XD1V	800T-XD1R	800T-XD1P	800T-XD1Y
1 N.C.	800T-XD2	800T-XD2V	800T-XD2R	800T-XD2P	800T-XD2Y
1 N.O. (Early Make)	800T-XD3	800T-XD3V	—	—	—
1 N.C. (Late Break)	800T-XD4	800T-XD4V	—	—	—
1 N.O. - 1 N.C.	800T-XA	800T-XAV	800T-XAR	800T-XAP	800T-XAY
2 N.O.	800T-XA2 ⑤	—	800T-XA2R ⑤	—	800T-XA2Y
2 N.C.	800T-XA4	—	800T-XA4R	—	800T-XA4Y
1 N.C. (Late Break) 1 N.O.	800T-XA1	—	—	—	—
1 N.C. (Late Break) 1 N.C.	800T-XA7	—	—	—	—



Mini Block



Time Delay Block

Number of Contacts	Mini Block ①	Time Delay Block ②
	Cat. No.	Cat. No.
1 N.O.	800T-XD5	800T-XT
1 N.C.	800T-XD6	800T-XS

- ① Contact blocks with normally closed contacts meet direct drive positive opening standard requirements when properly fused to IEC 269-1 and 269-2. Shallow/mini contacts: 10 A gl or N type cartridge fuse. PenTUFF contacts: 6 A gl or N type cartridge fuse.
- ② Specify Bulletin 800TC for finger-safe contact blocks. Example: **800TC-XA**.
- ③ 800T operator using sealed switch and logic reed contact blocks and installed in a suitable enclosure are UL Listed as suitable for use in Class I, Division 2/Zone 2 hazardous locations.
- ④ Additional contacts cannot be stacked on XA2 and XA2R contact blocks.
- ⑤ For contact ratings, see page 10-5.



Shallow Contact Block Hardware

Description	Cat. No.
⑥ Contact Block Mounting Screw	800T-N335
⑦ Screw Retainer	800T-N336
⑧ Actuator Extender	800T-N337

30.5 mm Push Buttons

Type 4/4X/13, Corrosion-Resistant/Watertight/Oiltight



Bulletin 800H

- 30.5 mm Mounting Hole
- Type 4/4X/13
Corrosion-Resistant/
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30.5 mm Push Buttons

Type 4/4X/13, Corrosion-Resistant/Watertight/Oiltight

Specifications ①

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)

① Performance Data — See page Important-2.

Contact Ratings

Maximum thermal continuous current I_{th} 10 A AC/2.5 A DC.
Bulletin 800H units with 800T-XA contacts have ratings as follows:

Max. Opertnl. Volts Ue	Utilization Category		Rated Operational Currents		
	IEC	NEMA	Volts Ue	Make	Break
AC 600	AC-15	A600	120...600	7200 VA	720 VA
			72...120	60 A	720 VA
			24...72	60 A	10 A
DC 600	DC-13	Q600	28...600	69 VA	
			24...28	2.5 A	

② For applications below 24V/24 mA, PenTUFF™ or Logic Reed contacts are recommended.

Sealed Switch Contact Ratings

Maximum continuous current I_{th} 5 A. Bulletin 800H units have control circuit ratings with sealed switch contact blocks as follows:

Max. Opertnl. Volts Ue	Utilization Category		Rated Operational Currents		
	IEC	NEMA	Volts Ue	Make	Break
AC 600	AC-15	B600	120...600	3600 VA	360 VA
			0...120	30 A	3 A
DC 300	DC-13	P300	24...300	138 VA	
			0...24	5.0 A	

Stackable Sealed Switch Contact Ratings

Maximum continuous current I_{th} 2.5 A.

Logic Reed Contact Ratings

Maximum DC: 30V, 0.06 A, AC: 150V, 0.15 A
Should only be used with resistive loads.

PenTUFF™ (Low Voltage) Contact Ratings

Minimum DC: 5V, 1 mA

Maximum thermal continuous current I_{th} 2.5 A AC/1.0 A DC.
Bulletin 800H units with 800T-XAV contacts have ratings as follows:

Max. Opertnl. Volts Ue	Utilization Category		Rated Operational Currents		
	IEC	NEMA	Volts Ue	Make	Break
AC 300	AC-15	C300	120...300	1800 VA	180 VA
			0...120	15 A	1.5 A
DC 150	DC-13	R150	24...150	28 VA	
			0...24	1.0 A	

Approvals

UL Listed — File: E14840, E10314
Guide: NKCR, NOIV
CSA Certified: LR1234, LR11924
CE compliant IEC: 60947-5

Materials Used in 800H Type 4X Operators

Thermoplastic Polyester (Fiberglass Reinforced)

- Bushings
- Mounting rings
- Sockets

Thermoplastic Polyester

- Non-illuminated button caps

Transparent Amorphous Nylon

- Pilot light lens cap
- Illuminated button caps

Glass Filled Crystalline Nylon

- Thrust washer

Mineral Filled Nylon

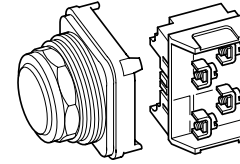
- Trim washer

Nitrile (Synthetic Rubber)

- Gaskets and internal seals

Momentary Contact Push Button Units, Non-Illuminated

800H - AR 1 A
a *b* *c* *d* *e*




<i>a</i>		<i>c</i>		<i>e</i>		<i>e (cont'd)</i>	
Finger-Safe Guards		Color Cap		Contact Block(s)		Contact Block(s)	
Code	Description	Code	Description	Code	Description	Code	Description
Blank	No Guards	Blank	Used only when ordering Operator Type DRX	Blank	No Contacts on operator	Blank	No Contacts on operator
C	Guards on Terminals	1	Green	Standard		Time Delay	
Operator Type		2	Black	D1	1 N.O.	T	1 N.O. Depress to close, release to initiate delayed opening
Code	Description	3	Orange ❶	D2	1 N.C.	S	1 N.C. Depress to open, release to initiate delayed closure
AR	Flush Head	4	Gray ❷	D3	1 N.O.E.M.	Class I, Div. 2/Zone 2	
BR	Extended Head	5	White ❸	D4	1 N.C.L.B.	Logic Reed	
DR	Mushroom Head	6	Red	D5	1 N.O. (Mini)	D1R	1 N.O.
DRX	Mushroom Head less Color Cap	7	Blue	D6	1 N.C. (Mini)	D2R	1 N.C.
R	Booted Head ❶	9	Yellow	A1	1 N.C.L.B. - 1 N.O.	A2R❸	2 N.O.
GR	Bootless Guarded Head	Special Mushroom Head		A4	2 N.C.	A4R❸	2 N.C.
		Code	Description	A7	1 N.C.L.B. - 1 N.C.	AR	1 N.O. - 1 N.C.
		Blank	No Special Head	A	1 N.O. - 1 N.C.	BR	2 N.O. - 2 N.C.
		J	Jumbo Mushroom Head — Plastic	B	2 N.O. - 2 N.C.	HR	3 N.O. - 3 N.C.
		Note: Special Mushroom Head options only apply to Mushroom Head operator Type Code DR .		H	3 N.O. - 3 N.C.	CR	4 N.O. - 4 N.C.
				C	4 N.O. - 4 N.C.	Sealed Switch	
				Pen TUFF (Low Voltage)		D1P	1 N.O.
				D1V	1 N.O.	D2P	1 N.C.
				D2V	1 N.C.	A2P	2 N.O.
				D3V	1 N.O.E.M.	A4P	2 N.C.
				D4V	1 N.C.L.B.	AP	1 N.O. - 1 N.C.
				AV	1 N.O. - 1 N.C.	BP	2 N.O. - 2 N.C.
				BV	2 N.O. - 2 N.C.	Stackable Sealed Switch	
				HV	3 N.O. - 3 N.C.	D1Y	1 N.O.
				CV	4 N.O. - 4 N.C.	D2Y	1 N.C.
						A2Y	2 N.O.
						A4Y	2 N.C.
						AY	1 N.O. - 1 N.C.
						BY	2 N.O. - 2 N.C.
						HY	3 N.O. - 3 N.C.
						CY	4 N.O. - 4 N.C.
						Time Delay Contacts	
						Series C field installable kits can only be used with Series T or later operators. Adjustable range of 0.5...15 sec ±25%. Maximum continuous current I_{th} 5 A.	

- ❶ Green and black operators are flush underneath boots; red operators are extended.
- ❷ Not available for booted operators.
- ❸ **XA2** and **XA2R** contact blocks cannot be stacked upon, but they can stack on other contact blocks.

Zelio Logic smart relays

Compact and modular smart relays

Smart relay type	Compact smart relays				
					
Number of I/O	10	12	20		
Number of discrete inputs (of which analogue inputs)	6 (0)	8 (4)	12 (2)	12 (6)	
Number of "relay" or "transistor" outputs	4	4	8		
Supply voltage	= 24 V, ~ 100...240 V		= 12 V, = 24 V, ~ 24 V, ~ 100...240 V		
I/O extensions	No				
Modbus communication module ▲	No				
Clock	No	Yes	Depends on model		
Display and programming buttons	Depends on model				
Programming language LADDER / FBD	LADDER	LADDER / FBD (1)	LADDER	LADDER/FBD (1)	
References	SR2 ●101●●	SR2 ●121●●	SR2 B122BD	SR2 A201●●	SR2 B20●●● SR2 E201●●
Pages	14102/12	14102/12	14102/12	14102/12	14102/12

(1) FBD: Function Block Diagram
 ▲ Available: 1st quarter 2004.

Modular smart relays



10

26

6 (4)

16 (6)

4

10

≡ 24 V, ~ 24 V, ~ 100...240 V

Yes (6, 10 or 14 I/O)

Yes

Yes

Yes

LADDER / FBD (1)

SR3 B10●●●

SR3 B26●●●

14102/13

14102/13

(1) FBD: Function Block Diagram

Environment characteristics			
Product certifications			UL, CSA, GL, C-TICK
Conformity with the low voltage directive	Conforming to 73/23/EEC		EN 61131-2 (open equipment)
Conformity with the EMC directive	Conforming to 89/336/EEC		EN 61131-2 (Zone B) EN 61000-6-2, EN 61000-6-3 and EN 61000-6-4
Degree of protection	Conforming to IEC 60529		IP 20
Overvoltage category	Conforming to IEC 60664-1		3
Degree of pollution	Conforming to IEC/EN 61131-2		2
Ambient air temperature around the device	Operation	°C	-20... +55 (+40 in enclosure), conforming to IEC 60068-2-1 and IEC 60068-2-2
	Storage	°C	-40... +70
Maximum relative humidity			95 % without condensation or dripping water
Maximum operating altitude	Operation	m	2000
	Transport	m	3048
Mechanical resistance	Immunity to vibrations		IEC 60068-2-6, test Fc
	Immunity to mechanical shock		IEC 60068-2-27, test Ea
Resistance to electrostatic discharge	Immunity to electrostatic discharge		IEC 61000-4-2, level 3
Resistance to HF interference (Immunity)	Immunity to electromagnetic radiated fields		IEC 61000-4-3, level 3
	Immunity to fast transients in bursts		IEC 61000-4-4, level 3
	Immunity to shock waves		IEC 61000-4-5
	Radio frequency in common mode		IEC 61000-4-6, level 3
	Voltage dips and breaks (~)		IEC 61000-4-11
	Immunity to damped oscillation wave		IEC 61000-4-12
	Conducted and radiated emissions	Conforming to EN 55022/11 (Group 1)	
Connection to screw terminals (Tightened using Ø 3.5 screwdriver)	Flexible cable with cable end	mm ²	1 conductor: 0.25...2.5, cable: AWG 24... AWG14 2 conductors: 0.25...0.75, cable: AWG 24... AWG18
	Semi-solid cable	mm ²	1 conductor: 0.2...2.5, cable: AWG 25... AWG14
	Solid cable	mm ²	1 conductor: 0.2...2.5, cable: AWG 25... AWG14 2 conductors: 0.2...1.5, cable: AWG 24... AWG16
	Tightening torque	N.m	0.5

12 V supply characteristics				
Smart relay type			SR2 B121JD	SR2 B201JD
Primary	Nominal voltage	V	12	12
Voltage limits	Including ripple	V	10.4...14.4	10.4...14.4
Nominal input current		mA	120	200
Nominal input current with extensions		mA	144	250
Power dissipated		W	1.5	2.5
Micro-breaks	Permissible duration	ms	≤ 1 (repeated 20 times)	
Protection			Against polarity inversion	

24 V supply characteristics											
Smart relay type			SR2 11BD	SR2 12BD	SR2 21BD	SR2 22BD	SR3 B101BD	SR3 B102BD	SR3 B261BD	SR3 B262BD	
Primary	Nominal voltage	V	24	24	24	24	24	24	24	24	
Voltage limits	Including ripple	V	19.2...30	19.2...30	19.2...30	19.2...30	19.2...30	19.2...30	19.2...30	19.2...30	
Nominal input current		mA	100	100	100	100	100	50	190	70	
Nominal input current with extensions		mA	–	–	–	–	100	160	300	180	
Power dissipated		W	3	3	6	3	3	4	6	5	
Power dissipated with extensions		W	–	–	–	–	8	8	10	10	
Micro-breaks	Permissible duration	ms	≤ 1 (repeated 20 times)								
Protection			Against polarity inversion								

24 V supply characteristics						
Smart relay type			SR2 11B	SR2 21B	SR3 B101B	SR3 B261B
Primary	Nominal voltage	V	24	24	24	24
Voltage limits		V	20.4...28.8	20.4...28.8	20.4...28.8	20.4...28.8
Nominal frequency		Hz	50-60	50-60	50-60	50-60
Nominal input current		mA	145	233	160	280
Nominal input current with extensions		mA	–	–	280	415
Power dissipated		VA	4	6	4	7.5
Power dissipated with extensions		VA	–	–	7,5	10
Micro-breaks	Permissible duration	ms	≤ 10 (repeated 20 times)			
rms insulation voltage		V	1780 (50-60 Hz)			

~ 100...240 V supply characteristics

Smart relay type			SR2 ●101FU	SR2 ●121FU	SR2 ●201FU	SR3 B101FU	SR3 B261FU
Primary	Nominal voltage	V	100...240	100...240	100...240	100...240	100...240
Voltage limits		V	85...264	85...264	85...264	85...264	85...264
Nominal input current		mA	80/30	80/30	100/50	80/30	100/50
Nominal input current with extensions		mA	–	–	–	80/40	80/60
Power dissipated		VA	7	7	11	7	12
Power dissipated with extensions		VA	–	–	–	12	17
Micro-breaks	Permissible duration	ms	10	10	10	10	10
rms insulation voltage		V	1780	1780	1780	1780	1780

Processing characteristics

Smart relay type			SR2/SR3
Number of control scheme lines	With LADDER programming		120
Number of function blocks	With FBD programming		Up to 200
Cycle time		ms	10...50
Response time		ms	20
Back-up time (in the event of power failure)	Day/time		10 years (lithium battery) at 25 °C
	Program and settings		10 years (EEPROM memory)
Program memory checking			At each power-up
Clock drift			12 min/year (0 to 55 °C) 6 sec/month (at 25 °C and calibration)
Timer block accuracy			1 % ± 2 of the cycle time

Discrete = 24 V input characteristics

Smart relay type			SR2/SR3
Connection			Screw terminal block
Nominal value of inputs	Voltage	V	24
	Current	mA	4
Input switching limit values	At state 1	Voltage	V ≥ 15
		Current	mA ≥ 2.20
	At state 0	Voltage	V ≤ 5
		Current	mA < 0.75
Input impedance at state 1		KΩ	7.4
Configurable response time	State 0 to 1	ms	0.2
	State 1 to 0	ms	0.3
Conformity to IEC 61131-2			Type 1
Sensor compatibility	3-wire		Yes PNP
	2-wire		No
Input type			Resistive
Isolation	Between supply and inputs		None
	Between inputs		None
Maximum counting frequency		kHz	1
Protection		Against inversion of terminals	Control instructions not executed

Discrete ~ 100...240 V input characteristics

Smart relay type			SR2/SR3
Connection			Screw terminal block
Nominal value of inputs	Voltage	V	100... 240
	Current	mA	0.6
	Frequency	Hz	47... 63
Input switching limit values	At state 1	Voltage	V ≥ 79
		Current	mA > 0.1750
	At state 0	Voltage	V ≤ 40
		Current	mA < 0.05
Input impedance at state 1		KΩ	350
Configurable response time	State 0 to 1 (50/60 Hz)	ms	50
	State 1 to 0 (50/60 Hz)	ms	50
Isolation	Between supply and inputs		None
	Between inputs		None
Protection		Against inversion of terminals	Control instructions not executed

Integral analogue input characteristics

Smart relay type		SR2/SR3	
Analogue inputs	Input range	V	0...10 or 0...24
	Input impedance	KΩ	12
	Maximum non destructive voltage	V	30
	Value of LSB		39 mV, 4 mA
	Input type		Common mode
Conversion	Resolution		8 bit
	Conversion time		Smart relay cycle time
	Precision	at 25 °C	± 5 %
		at 55 °C	± 6.2 %
	Repeat accuracy	at 55 °C	± 2 %
Isolation	Between analogue channel and supply		None
Cabling distance		m	10 maximum, with screened cable (sensor not isolated)
Protection	Against inversion of terminals		Control instructions not executed

Relay output characteristics

Smart relay type			SR2●●●/ SR3 B101●●	SR3 B261●●, SR3 XT141●●	
Operating limit values		V	≐ 5...150. ~ 24...250	≐ 5...150. ~ 24...250	
Contact type			N/O	N/O	
Thermal current		A	8	8 outputs: 8 A 2 outputs: 5 A	
Electrical durability for 500 000 operating cycles	Utilisation category	DC-12	V	24	
			A	1.5	
	DC-13	V	24 (L/R = 10 ms)		
		A	0.6		
		V	230		
		A	1.5		
	AC-15	V	230		
		A	0.9		
	Minimum switching capacity	At minimum voltage of 12 V	mA	10	10
	Low power switching reliability of contact			12 V - 10 mA	12 V - 10 mA
Maximum operating rate	No-load	Hz	10	10	
	At I _e (operational current)	Hz	0.1	0.1	
Mechanical life	In millions of operating cycles		10	10	
Rated impulse withstand voltage	Conforming to IEC 60947-1 and 60664-1	kV	4	4	
Response time	Trip	ms	10	10	
	Reset	ms	5	5	
Built-in protection	Short-circuit		None		
	Against overvoltage and overload		None		

Transistor output characteristics

Smart relay type		SR2/SR3	
Operating limit values		V	19.2...30
Load	Nominal voltage	V	≐ 24
	Nominal current	A	0.5
	Maximum current	A	0.625 at 30 V
Drop out voltage	At state 1	V	≤ 2 for I=0.5 A
Response time	Trip	ms	≤ 1
	Reset	ms	≤ 1
Built-in protection	Against overload and short-circuits		Yes
	Against overvoltage (1)		Yes
	Against inversions of power supply		Yes

(1) If there is no volt-free contact between the relay output and the load.

Zelio Logic smart relays

Compact smart relays



SR2 A201BD



SR2 E121BD



SR2 PACK...

Compact smart relays with display

Number of I/O	Discrete inputs	Of which 0-10 V analogue inputs	Relay outputs	Transistor outputs	Clock	Reference	Weight kg
Supply = 12 V							
12	8	4	4	0	Yes	SR2 B121JD	0.250
20	12	6	8	0	Yes	SR2 B201JD	0.250

Supply = 24 V							
10	6	0	4	0	No	SR2 A101BD (1)	0.250
12	8	4	4	0	Yes	SR2 B121BD	0.250
	8	4	0	4	Yes	SR2 B122BD	0.220
20	12	2	8	0	No	SR2 A201BD (1)	0.380
	12	6	8	0	Yes	SR2 B201BD	0.380
	12	6	0	8	Yes	SR2 B202BD	0.280

Supply ~ 24 V							
12	8	0	4	0	Yes	SR2 B121B	0.250
20	12	0	8	0	Yes	SR2 B201B	0.380

Supply ~ 100...240 V							
10	6	0	4	0	No	SR2 A101FU (1)	0.250
12	8	0	4	0	Yes	SR2 B121FU	0.250
20	12	0	8	0	No	SR2 A201FU (1)	0.380
	12	0	8	0	Yes	SR2 B201FU	0.380

Compact smart relays without display

Number of I/O	Discrete inputs	Of which 0-10 V analogue inputs	Relay outputs	Transistor outputs	Clock	Reference	Weight kg
Supply = 24 V							
10	6	0	4	0	No	SR2 D101BD (1)	0.220
12	8	4	4	0	Yes	SR2 E121BD	0.220
20	12	2	8	0	No	SR2 D201BD (1)	0.350
	12	6	8	0	Yes	SR2 E201BD	0.350

Supply ~ 24 V							
12	8	0	4	0	Yes	SR2 E121B	0.220
20	12	0	8	0	Yes	SR2 E201B	0.350

Supply ~ 100...240 V							
10	6	0	4	0	No	SR2 D101FU (1)	0.220
12	8	0	4	0	Yes	SR2 E121FU	0.220
20	12	0	8	0	No	SR2 D201FU (1)	0.350
	12	0	8	0	Yes	SR2 E201FU	0.350

Compact "discovery" packs

Number of I/O	Pack contents	Reference	Weight kg
Supply = 24 V			
12	An SR2 B121BD compact smart relay with display, a connecting cable and "Zelio Soft" programming software supplied on CD-Rom.	SR2 PACKBD	0.700
20	An SR2 B201BD, compact smart relay with display, a connecting cable and "Zelio Soft" programming software supplied on CD-Rom.	SR2 PACK2BD	0.850
Supply ~ 100...240 V			
12	An SR2 B121FU, compact smart relay with display, a connecting cable and "Zelio Soft" programming software supplied on CD-Rom.	SR2 PACKFU	0.700
20	An SR2 B201FU, compact smart relay with display, a connecting cable and "Zelio Soft" programming software supplied on CD-Rom.	SR2 PACK2FU	0.850

(1) Programming on smart relay in LADDER language only.

30.5 mm Push Buttons

Type 4/4X/13, Corrosion-Resistant/Watertight/Oiltight



Bulletin 800H

- 30.5 mm Mounting Hole
- Type 4/4X/13
Corrosion-Resistant/
Watertight/Oiltight
- Heavy Industrial
Stations and Operators

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30.5 mm Push Buttons

Type 4/4X/13, Corrosion-Resistant/Watertight/Oiltight

Specifications ①

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)

① Performance Data — See page Important-2.

Contact Ratings

Maximum thermal continuous current I_{th} 10 A AC/2.5 A DC.
Bulletin 800H units with 800T-XA contacts have ratings as follows:

Max. Opertnl. Volts Ue	Utilization Category		Rated Operational Currents		
	IEC	NEMA	Volts Ue	Make	Break
AC 600	AC-15	A600	120...600	7200 VA	720 VA
			72...120	60 A	720 VA
			24...72	60 A	10 A
DC 600	DC-13	Q600	28...600	69 VA	
			24...28	2.5 A	

② For applications below 24V/24 mA, PenTUFF™ or Logic Reed contacts are recommended.

Sealed Switch Contact Ratings

Maximum continuous current I_{th} 5 A. Bulletin 800H units have control circuit ratings with sealed switch contact blocks as follows:

Max. Opertnl. Volts Ue	Utilization Category		Rated Operational Currents		
	IEC	NEMA	Volts Ue	Make	Break
AC 600	AC-15	B600	120...600	3600 VA	360 VA
			0...120	30 A	3 A
DC 300	DC-13	P300	24...300	138 VA	
			0...24	5.0 A	

Stackable Sealed Switch Contact Ratings

Maximum continuous current I_{th} 2.5 A.

Logic Reed Contact Ratings

Maximum DC: 30V, 0.06 A, AC: 150V, 0.15 A
Should only be used with resistive loads.

PenTUFF™ (Low Voltage) Contact Ratings

Minimum DC: 5V, 1 mA

Maximum thermal continuous current I_{th} 2.5 A AC/1.0 A DC.
Bulletin 800H units with 800T-XAV contacts have ratings as follows:

Max. Opertnl. Volts Ue	Utilization Category		Rated Operational Currents		
	IEC	NEMA	Volts Ue	Make	Break
AC 300	AC-15	C300	120...300	1800 VA	180 VA
			0...120	15 A	1.5 A
DC 150	DC-13	R150	24...150	28 VA	
			0...24	1.0 A	

Approvals

UL Listed — File: E14840, E10314
Guide: NKCR, NOIV
CSA Certified: LR1234, LR11924
CE compliant IEC: 60947-5

Materials Used in 800H Type 4X Operators

Thermoplastic Polyester (Fiberglass Reinforced)

- Bushings
- Mounting rings
- Sockets

Thermoplastic Polyester

- Non-illuminated button caps

Transparent Amorphous Nylon

- Pilot light lens cap
- Illuminated button caps

Glass Filled Crystalline Nylon

- Thrust washer

Mineral Filled Nylon

- Trim washer

Nitrile (Synthetic Rubber)

- Gaskets and internal seals

Cutler-Hammer

Control Power Transformers



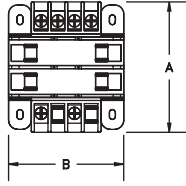
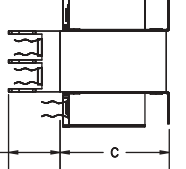
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Control Power Transformers Type MTE

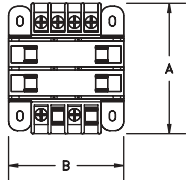
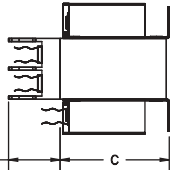
Technical Data

Type	Epoxy encapsulated windings	Standards	ANSI/NEMA ST-1
Frequency	50/60 Hz	Approvals	UL 506
Insulation	Class 105, 55°C temperature rise		UL, file E46323
Terminals	Pressure plate		CSA, file LR27533

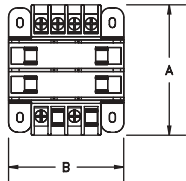
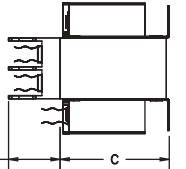
Transformers 240/480 V Primary, 120 V Secondary see note 1, 2, 3, 4, 5, 6, 7

Power VA	Catalogue numbers		Schematic	Dimensions, mm				Weight/ea kg	
	Without primary fuseholder	With primary fuseholder		A	B	C	D		
50	C0050E2A	C0050E2AFB	1		76	76	65	35	1,2
75	C0075E2A	C0075E2AFB	1		89	76	65	35	1,6
100	C0100E2A	C0100E2AFB	1		86	86	73	35	1,9
150	C0150E2A	C0150E2AFB	1		102	95	81	35	3
200	C0200E2A	C0200E2AFB	1		102	114	97	35	3,9
250	C0250E2A	C0250E2AFB	1		111	114	97	35	4,5
300	C0300E2A	C0300E2AFB	1		121	114	97	35	5,1
350	C0350E2A	C0350E2AFB	1		133	114	97	35	6,2
500	C0500E2A	C0500E2AFB	1		140	133	121	35	8,7
750	C0750E2A	C0750E2AFB	1		178	133	121	35	12,8
1000	C1000E2A	C1000E2AFB	1	164	171	144	35	13,4	
1500	C1500E2A	C1500E2AFB	1	187	191	162	35	18,1	

Transformers 240/480 V Primary, 24 V Secondary see note 1, 2, 3, 4, 5, 6, 8

50	C0050E2B	C0050E2BFB	2		76	76	65	35	1,2
75	C0075E2B	C0075E2BFB	2		89	76	65	35	1,6
100	C0100E2B	C0100E2BFB	2		86	86	73	35	1,9
150	C0150E2B	C0150E2BFB	2		102	95	81	35	3
200	C0200E2B	C0200E2BFB	2		102	114	97	35	3,9
250	C0250E2B	C0250E2BFB	2		111	114	97	35	4,5
300	C0300E2B	C0300E2BFB	2		121	114	97	35	5,1
350	C0350E2B	C0350E2BFB	2		133	114	97	35	6,2
500	C0500E2B	C0500E2BFB	2		143	133	121	35	8,7
750	C0750E2B	C0750E2BFB	2		178	133	121	35	12,8

Transformers 230/460/575 V Primary, 95/115 V Secondary see note 1, 2, 3, 4, 5, 6, 9

50	C0050E3C	C0050E3CFB	3		76	76	65	35	1,6
75	C0075E3C	C0075E3CFB	3		86	86	65	35	2
100	C0100E3C	C0100E3CFB	3		98	86	73	35	2,7
150	C0150E3C	C0150E3CFB	3		108	95	81	35	3,5
200	C0200E3C	C0200E3CFB	3		108	114	97	35	4,1
250	C0250E3C	C0250E3CFB	3		121	114	97	35	4,4
300	C0300E3C	C0300E3CFB	3		130	114	97	35	5,3
350	C0350E3C	C0350E3CFB	3		127	133	97	35	7,5
500	C0500E3C	C0500E3CFB	3		143	133	121	35	9,8
750	C0750E3C	C0750E3CFB	3		178	133	121	35	12,7

Transformers 600 V Primary, 24 V Secondary see note 1, 2, 3, 4, 5, 6, 10

Power VA	Catalogue numbers		Schematic	Dimensions, mm				Weight/ea kg	
	Without primary fuseholder	With primary fuseholder		A	B	C	D		
50	C0050E4W	C0050E4WFB	4		76	76	65	35	1,1
75	C0075E4W	C0075E4WFB	4		89	76	65	35	1,6
100	C0100E4W	C0100E4WFB	4		86	86	73	35	1,8
150	C0150E4W	C0150E4WFB	4		102	95	81	35	3
200	C0200E4W	C0200E4WFB	4		102	114	97	35	3,7
250	C0250E4W	C0250E4WFB	4		111	114	97	35	4,5
300	C0300E4W		4		121	114	97		5
350	C0350E4W		4		133	114	97		6,2
500	C0500E4W		4		140	133	121		8
750	C0750E4WXX		4		187	133	114		12,7

Control Power Transformers Type MTK

Technical Data

Type	Epoxy encapsulated windings	Standards	ANSI/NEMA ST-1
Frequency	50/60 Hz	Approvals	UL 506
Insulation	Class 180, 115°C temperature rise		UL, file E46323
Terminals	Screw		CSA, file LR27533

Transformers 240/480 V Primary, 120 V Secondary see note 1, 2, 7

Power VA	Catalogue numbers		Schematic	Dimensions, mm			Weight/ea kg
	Without fuseholders			A	B	C	
1000	C1000K2A	1		200	133	113	13,6
1500	C1500K2A	1		171	171	144	13,6
2000	C2000K2A	1		178	171	144	17,3
3000	C3000K2A	1		191	229	192	24,1
5000	C5000K2A	1		197	229	192	40,5

Transformers 230/460/575 V Primary, 115 V Secondary see note 1, 2, 9

1000	C1000K3C	3		181	162	137	13,1
1500	C1500K3C	3		191	171	144	15
2000	C2000K3C	3		210	171	144	19,5
3000	C3000K3C	3		210	229	194	29
5000	C5000K3C	3		267	229	259	46,3

Notes

- Contact CHS Controls for other power ratings or voltage levels.
- See page 4 for recommended overcurrent protection according to NEC/UL and schematic diagrams.
- MTE transformers with primary fuseholder is for 2 pcs Class CC fuses, for example Ferraz Shawmut ATQR. Fuses are ordered separately.
- MTE transformers except C0750E2B and C0750E4WXX are equipped with fuse clips for secondary fuse for 1 pc Midget fuse, for example Ferraz Shawmut TRM. Fuse is ordered separately. The fuse clips can be disconnected.
- Dimension D is valid for transformer with primary fuseholder.
- Stated weight apply for transformer without primary fuseholder. For transformer with primary fuseholder, add 0,15 kg.
- Can also be used for 230/460 respectively 220/440 V primary, secondary voltage will be 115 respectively 110 V.
- Can also be used for 460 respectively 440 V primary, secondary voltage will be 23 respectively 22 V.
- Can also be used for 220/440/550 V respectively 240/480/600 V primary, secondary voltage will be 91/110 respectively 99/120 V.
- Can also be used for 575 respectively 550 V primary, secondary voltage will be 23 respectively 22 V.

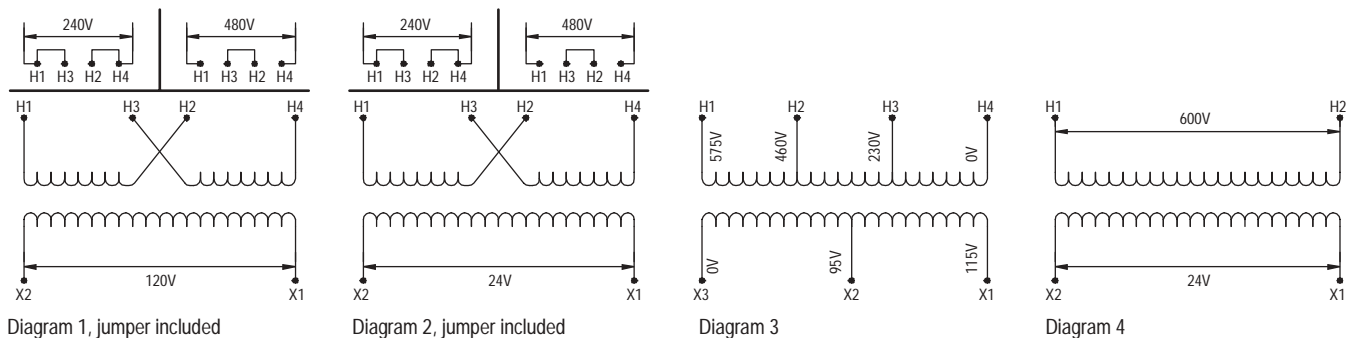
Accessories

Description	Catalogue numbers	Weight/ea, kg
Terminal covers, MTE transformers with 4 terminals, kit for 1 transformer	FSK4	0,01
Primary fuse covers, 2 pcs, MTE transformer with primary fuseholder	FSKFB	0,02
Separately mounted fuseholder for primary fuses, 2 pole class CC, max 30 A see note 11	GSUSCC2	0,1
Separately mounted fuseholder for primary fuses, 2-pole class J, 35-60 A see note 11	GSUS6J2	0,18
Separately mounted fuseholder for secondary fuse, 1 pole Midget, max 30 A see note 11	GSUSM1	0,05
Separately mounted fuseholder for secondary fuse, 1 pole class J, 35-60 A see note 11	GSUS6J1	0,09

Recommended Overcurrent Protection, Ferraz Shawmut Fuses see note 12, 13, 14

Power VA	Recommended primary fuses			Recommended secondary fuse	
	240 V	480 V	600 V	24 V	120 V
50	GSATQR4/10	GSATQR1/4	GSATQR1/4	GSTRM32/10	GSTRM6/10
75	GSATQR4/10	GSATQR3/10	GSATQR1/4	GSTRM5	GSTRM1
100	GSATQR6/10	GSATQR4/10	GSATQR3/10	GSTRM61/4	GSTRM11/4
150	GSATQR1	GSATQR1/2	GSATQR1/2	GSTRM10	GSTRM2
200	GSATQR11/2	GSATQR6/10	GSATQR1/2	GSTRM12	GSTRM21/2
250	GSATQR2	GSATQR8/10	GSATQR6/10	GSTRM15	GSTRM32/10
300	GSATQR21/2	GSATQR11/2	GSATQR1	GSTRM20	GSTRM4
350	GSATQR3	GSATQR11/2	GSATQR11/4	GSTRM20	GSTRM41/2
500	GSATQR4	GSATQR2	GSATQR11/2	GSTRM30	GSTRM61/4
750	GSATQR7	GSATQR3	GSATQR21/2	GSAJT40	GSTRM10
1000	GSATQR10	GSATQR4	GSATQR3		GSTRM12
1500	GSATQR15	GSATQR7	GSATQR5		GSTRM20
2000	GSATQR20	GSATQR10*	GSATQR8		GSTRM25
3000	GSATQR30	GSATQR15**	GSATQR12		GSAJT35
5000	GSAJT50**	GSATQR25	GSATQR20		GSAJT60

Schematic Diagrams



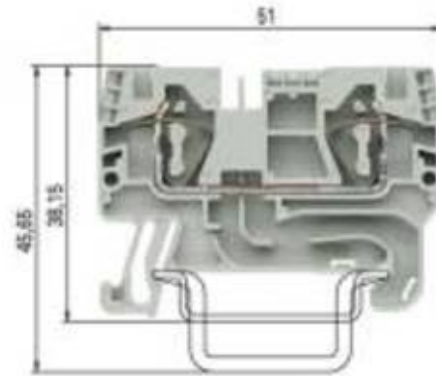
- Notes**
- For fuseholders with lamp trip indication, add I last in the catalogue number. Example: GSUSCC2 will be GSUSCC2I.
 - Recommended primary fuse size is based on use of secondary fuse and that primary fuse withstand 40 x full load current for 0,1 s. Ratings marked * withstand 30 x full load current for 0,1 s, ratings marked with ** withstand 35 x full load current for 0,1 s. Max acceptable rating of primary fuse for control power circuits according to NEC 430-72, 450-3, UL 508 32.7 and UL 845. If rated primary current is less than 2 A, the maximum rating of the overcurrent protection device is 500% of rated current. If the rated primary current is 2 A or more, the maximum rating of the overcurrent protective device is 250% of rated current.
 - Max acceptable rating of the overcurrent protective device on the secondary side according to NEC 430-72, 450-3, UL 508 32.7 and UL 845. If the rated secondary current is less than 9 A, max rating of the overcurrent protective device is 167% of rated current. If rated secondary current is 9 A or more, max rating of the overcurrent protective device is 125% of rated current or next highest standard rating may be used.
 - GSATQR is a time delay class CC fuse. GSAJT is a time delay class J fuse. GSTRM is a time delay Midget fuse.

Datasheet

Item No. 56.704.0055.0 ←

Feed-through terminal WKFN 4 /35

Feed-through DIN rail terminal block with spring clamp connection for mounting on TS 35, nominal cross section 4 mm², width 6 mm, color gray



Item No.	56.704.0055.0
EAN	4015573767096
order unit	100 Piece(s)

Approvals



Technical data

General

Nominal cross section	4 mm ²
Colour	Grey
Number of levels	1
Number of clamp positions per level	2
Width/grid dimension	6 mm
Insulating housing	PA666
Inflammability class of insulation material acc. with UL94	V0
Explosion-tested version "EEx e"	Yes
Mounting method	DIN rail (top hat rail) 35/7.5 mm
Terminal blocks for electrical installations	Yes

Technical data

Rated current	32 A
Rated voltage	800 V
Rated impulse voltage	8 kV
Pollution degree	3
Closing plate required	Yes
Length	51 mm
Type of insulation material	Thermoplastic

Connection Data

Connection type 1	Tension clamp connection
Connection type 2	Tension clamp connection

Minimum cross section solid	0.13 mm ²
Maximum cross section solid	6 mm ²
Minimum cross section fine stranded	0.13 mm ²
Maximum cross section fine stranded	4 mm ²
Wire strip length	11 mm

Technical Data UL/CSA

Cross section UL	24-10 AWG
Voltage UL	600
Current factory wiring	30 A
Current field wiring	30 A
Cross section CSA	24-10 AWG
Voltage CSA	600 V
Current CSA	32 A

Accessories

Remark to rated voltage	UL+CSA 300V/600V
-------------------------	------------------

Accessories

Item. No.	Typ:	Description:
04.343.6153.8	Warning cover ADF 4/4 YELLOW	Cover with warning symbol for DIN rail terminal blocks type WKF ...
98.300.0000.0	Mounting rail 35x27x7,5EN60715 2000MM	Mounting rail TS 35, unslotted, size 7,5 mm, length 2 m, material steel. galv. zinc-plated and dichromated
98.300.1000.0	Mounting rail 35x27x7,5EN60715 2000MM	Mounting rail TS 35, slotted, size 7,5 mm, length 2 m, material steel. galv. zinc-plated and dichromated
98.300.1900.0	Mounting rail 35x27x7,5EN60715 2000MM	Mounting rail TS 35, slotted, size 7,5 mm, length 2 m, material steel. galv. zinc-plated and dichromated
98.360.0000.0	Mounting rail 35x24x15 EN60715 2000MM	Mounting rail TS 35, unslotted, size 15 mm, length 2 m, material steel. galv. zinc-plated and dichromated
98.360.0004.0	Mounting rail 35x24x15 EN60715 2000MM	Mounting rail TS 35, unslotted, size 15 mm, length 2 m, material steel, hot galvanized
98.370.0000.0	Mounting rail 35x27x15(EN60715)2000MM	Mounting rail TS 35, unslotted, size 15 mm, length 2 m, material steel. galv. zinc-plated and dichromated
98.370.1000.0	Mounting rail 35x27x15(EN60715)2000MM	Mounting rail TS 35, slotted, size 15 mm, length 2 m, material steel. galv. zinc-plated and dichromated
98.380.0000.0	Mounting rail 35x24x15 EN60715 2000MM	Mounting rail TS 35, unslotted, size 15 mm, length 2 m, material E copper
Z5.553.2921.0	Test plug ST 2 / 2.3 RED	Test plug 2,3 mm color red
Z7.261.1227.0	Jumper bar IVBWK 4 - 2	Cross connector, insulated for DIN rail terminal blocks type WKF..., 2 -pole
Z7.261.1327.0	Jumper bar IVBWK 4 - 3	Cross connector, insulated for DIN rail terminal blocks type WKF..., 3 -pole
Z7.261.1427.0	Jumper bar IVBWK 4 - 4	Cross connector, insulated for DIN rail terminal blocks type WKF..., 4 -pole
Z7.261.1527.0	Jumper bar IVBWK 4 - 5	Cross connector, insulated for DIN rail terminal blocks type WKF..., 5 -pole
Z7.261.1627.0	Jumper bar IVBWK 4 - 6	Cross connector, insulated for DIN rail terminal blocks type WKF..., 6 -pole
Z7.261.1727.0	Jumper bar IVBWK 4 - 7	Cross connector, insulated for DIN rail terminal blocks type WKF..., 7 -pole
Z7.261.1827.0	Jumper bar IVBWK 4 - 8	Cross connector, insulated for DIN rail terminal blocks type WKF..., 8 -pole
Z7.261.1927.0	Jumper bar IVBWK 4 - 9	Cross connector, insulated for DIN rail terminal blocks type WKF..., 9 -pole
Z7.261.2027.0	Jumper bar IVBWK 4 - 10	Cross connector, insulated for DIN rail terminal blocks type WKF..., 10 -pole

Technical Data

Power Supply	Terminals 14, 15
Nominal voltage	103.5-126 VAC, 45-65 Hz
Power consumption	≤ 1 W

Inputs (intrinsically safe)	Terminals 1+, 2-
Nominal data	per NAMUR, ≈ 8 VDC / ≈ 8 mA
Input pulse length / interval	≥ 20 ms
Lead breakage (LB) monitoring	≤ 0.1 mA

Output (not intrinsically safe)	
Output 1 (contacts SPDT)	Terminals 7, 8, 9
Contact load	253 VAC / 2 A / cos φ > 0.7 40 VDC / 2 A resistive load
Mechanical life	10 ⁷ operations
Energizing / de-energizing delay	≈ 20 ms

Transfer Characteristics	
Switching frequency	< 10 Hz

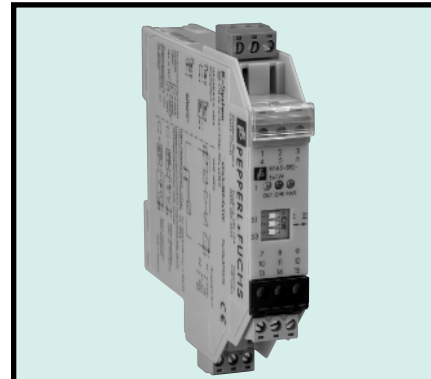
Entity Parameters	Terminals 1+, 3-
FM control drawing no.	116-0035
Voltage V _{oc}	12.9 V
Current I _{sc}	19.8 mA
Explosion group	A & B C & E D, F & G
Max. external capacitance (C _a)	1.2 μF 3.8 μF 10.1 μF
Max. external inductance (L _a)	84.8 mH 254.4 mH 678.4 mH

Mechanical	
Housing	Type C (see page 301)
Dimensions (mm)	118 x 20 x 115
Weight	5.3 oz. (150 g)

Ambient Temperature	-4°F to +140°F (-20°C to +60°C)
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**Switch Isolators
Relay Output**



**Model Number
KFA5-SR2-Ex1.W**

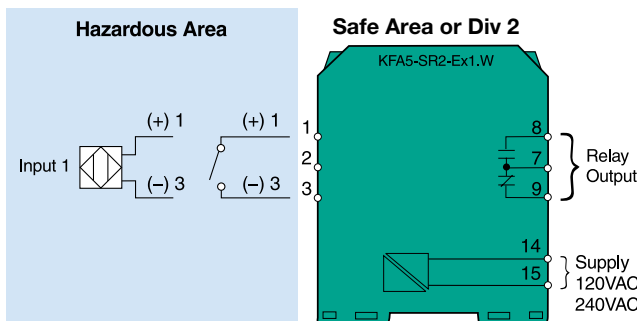
- Single-channel / 120 VAC supply
- 1 signal output with 1 form C relay
- Optional lead breakage (LB) monitoring
- Suitable for Division 2 mounting

This device is a single-channel, galvanically isolated intrinsic safety barrier that transfers discrete signals (NAMUR sensors/mechanical contacts) from a hazardous area to a safe area. The proximity sensor or switch controls a form C relay contact for the safe area load. The barrier output changes state when the input signal changes state. This output state can be reversed through the mode of operation switch S1.

Lead breakage (LB) monitoring can be selected or disabled by placing external resistors and by positioning switches on the barrier. NAMUR proximity sensors, however, are designed with the LB function (switch S3 in position I) making external resistors unnecessary. For a mechanical contact, LB monitoring can be selected by placing a 10 kΩ resistor across the mechanical contact in the field and by positioning switch S3 in position I on the barrier. In the case of an LB fault, the signal output relay reverts to the de-energized state. LB monitoring can be disabled with switch S3 in position II. This unit features removable terminals for easy installation.

Connection Diagram

Class I, Div 1, Group A-G, Zone 0, IIC

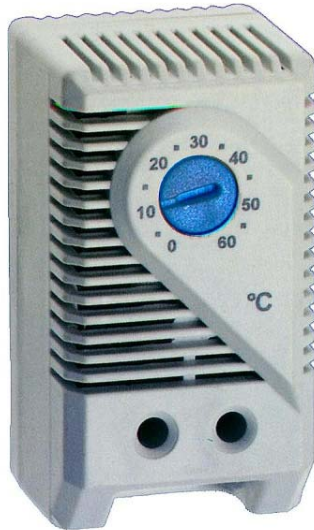




Small Thermostat KT 011



Actual size -
shown with °C scale



- Compact design
- Wide adjustment range
- Available with °F or °C scale
- Color coded temperature dials
- DIN rail mountable

Thermostat “NC” (normally closed):
Thermostat opens at temperature rise.
Comes with a **red** temperature dial.

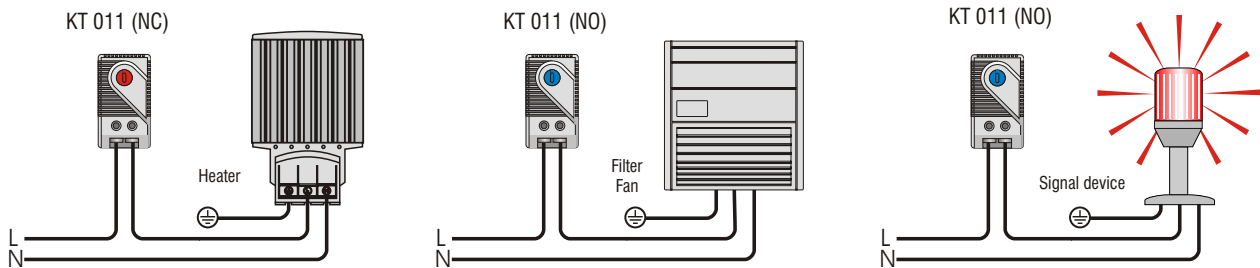
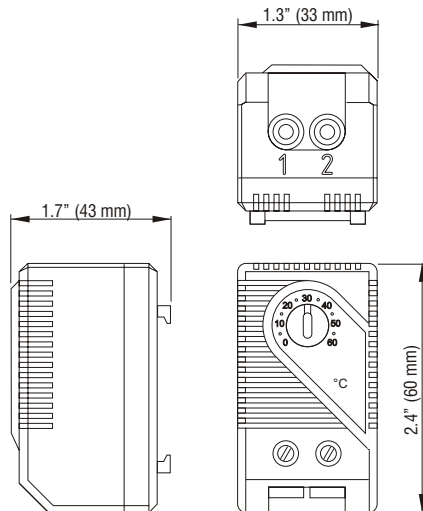
Thermostat “NO” (normally open):
Thermostat closes at temperature rise.
Comes with a **blue** temperature dial.



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



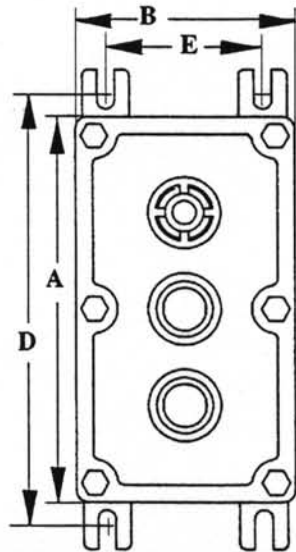
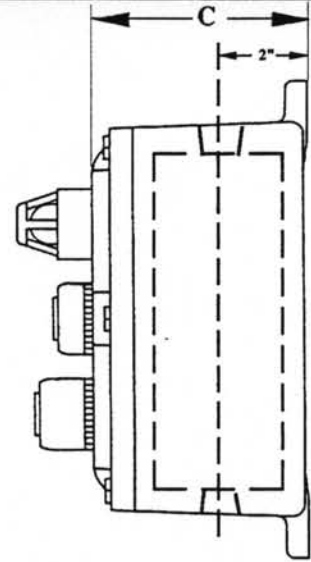
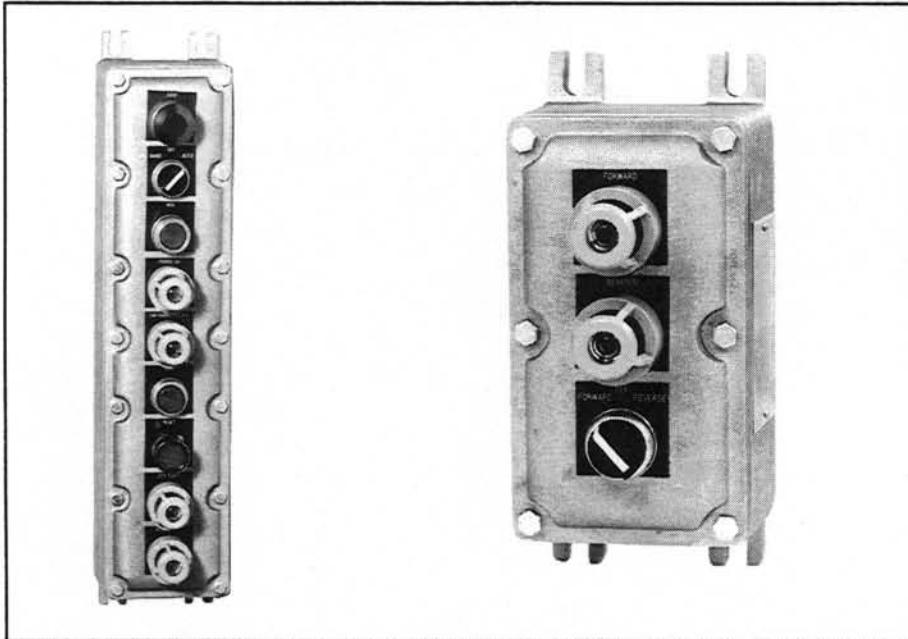
Wiring examples

Specifications are subject to change without notice. Suitability of this product for its intended use and any associated risks must be determined by the end customer/buyer in its final application.



AKRON ELECTRIC, INC.

EXPLOSION-PROOF PUSHBUTTON STATIONS "CXI" SERIES



FEATURES

- All enclosures are available with NEMA 4X with neoprene gasket for watertight applications.
- All enclosures are suitable for surface or panel mounting.
- Light weight corrosion resistant copper-free aluminum construction.
- Attractive sand blast finish.
- Durable cast mounting feet and easily accessible grounding screw.
- Factory assembled with Allen Bradley operators available when specified.

ORDERING INSTRUCTIONS

- All "CXI" Series enclosures are machined with operator (3/4" NPSM in cover) and standard conduit holes as specified in the chart below.
- To order NEMA-4 Gasket, add suffix -N4 to part number (CXI333-X1-N4).
- For panel mount applications (3/4" NPSM operator holes in base instead of cover), use prefix "CXP" instead of "CXI" (CXP333-X1).
- To order blank enclosures, order "AXI" Series enclosures. (See page A7)
- Spacing constraints may apply when using some operators (Mushroom Head P.B.s, Illum. P.B.s, Push to Test Pilot Lights, ect.), consult factory for special spacing requirements.
- Consult factory to order Allen Bradley operators with enclosures.
- Consult factory for custom layouts of operator and conduit holes.

COMPLIANCES

- NEC - CLASS I, Groups C & D
CLASS II, GROUPS E, F & G
CLASS III
- NEMA 3, 4X (Optional), 7 & 9

APPROVALS

- UL Classified Standard 1203
- CSA Certified Std. C22.2-30-M1984

DIMENSIONS

Catalog Number	Nominal Inside Dimensions	Number of Operators Vertically	Dimensions in Inches					Est. Wgt. (lbs.)	Std. Conduit Size	Mtg. Bolt Size
			A	B	C	D	E			
CXI 333-X1	3 1/2 x 3 x 3	1	4 9/16	4 9/16	4 1/2	5 1/2	3 3/4	5	3/4	1/4
CXI 363-X2	3 1/2 x 6 x 3	2	7 1/16	4 9/16	4 1/2	8	3 3/4	6	3/4	1/4
CXI 373-X3	3 1/2 x 7 x 3	3	8 1/16	4 9/16	4 1/2	9	3 3/4	7	3/4	1/4
CXI 393-X4	3 1/2 x 9 x 3	4	10 1/16	4 9/16	4 1/2	11	3 3/4	8	1	1/4
CXI 3113-X5	3 1/2 x 11 x 3	5	12 1/16	4 9/16	4 1/2	13	3 3/4	10	1 1/4	1/4
CXI 3133-X6	3 1/2 x 13 x 3	6	14 1/16	4 9/16	4 1/2	15	3 3/4	11	1 1/4	1/4
CXI 3153-X7	3 1/2 x 15 x 3	7	16 1/16	4 9/16	4 1/2	17	3 3/4	12	1 1/4	1/4
CXI 3183-X8/X9	3 1/2 x 18 x 3	8 or 9	19 1/16	4 9/16	4 1/2	20	3 3/4	14	1 1/4	1/4



AKRON ELECTRIC, INC.

ORDERING INFORMATION

TABLE III - MODIFICATIONS

- BD - Breather/Drain Unit
- E1 - Corrosion Resistant Coating - Outside Only
- E2 - Corrosion Resistant Coating - Inside & Out
- E3 - S.S. (316) Captive Quick Thread Cover Bolts
- H1 - Stainless Steel Modular Hinge Set
- H2 - Medium Duty Cast Aluminum Hinge Set
- H3 - Heavy Duty Cast Aluminum Hinge Set
- K - Terminal Block, 600 Volt, 20 Amp. Standard
- N1 - Aluminum Mounting Pan ^{3/16}" Thick Standard
- N2 - Galvanized Mounting Pan
- N3 - Phenolic Mounting Pan
- N4 - "O - Ring" Gasket for NEMA 4X Application
- N5 - Corrosion Resistant Stainless Steel Cover Bolts

TABLE IV - OPERATORS & WINDOWS

- B1 - START, Green Push Button (flush head)
- B2 - START, Green Push Button (raised head)
- B3 - STOP, Red Push Button (flush head)
- B4 - STOP, Red Push Button (raised head)
- B5 - START-STOP Green-Red Dual Push Button
- B6 - RED Mushroom Head Moment. Push Button
- B7 - RED Mushroom Head Maintain Push Button
- B8 - BLACK Push Button with N.O. Contact
- B9 - BLACK Push Button with N.C. Contact
- C1 - Circuit Breaker Handle, 100 AMP.
- C2 - Circuit Breaker Handle, 225 AMP.
- C3 - Circuit Breaker Handle, 400 AMP.
- E8 - Custom Mounting Bracket For Meters
- G1 - 1" Diameter Round Window Glass
- G2 - 2" Diameter Round Window Glass
- G3 - 3" Diameter Round Window Glass
- G4 - 4" Diameter Round Window Glass
- G5 - 5 1/4" Diameter Round Window Glass
- G6 - 6 3/4" Diameter Round Window Glass
- G7 - 7 5/8" Diameter Round Window Glass
- G8 - Custom Square or Rectangular Window Glass
- N6 - Metallic Nameplate
- N7 - Phenolic Nameplate
- N8 - Custom Nameplate (anodized, stainless steel)
- P+* - Pilot Lights
- PL+* - Illuminated Push Button
- + = lense color code; 1-red, 2-green, 3-amber, 4-blue, 5-white
- * = voltage code; 0-6 v, 1-120 v, 2-240 v, 4-480 v, 6-600 v
- R1 - Reset Push Button
- R2 - Potentiometer
- R3 - Close Up Plug (3/4" NPSM)
- S1 - 2-Pos. Selector Switch, Maintained
- S2 - 2-Pos. Selector Switch, Spr. Retd. from Left
- S3 - 2-Pos. Selector Switch, Spr. Retd. from Right
- S4 - 3-Pos. Selector Switch, Maintained
- S5 - 3-Pos. Selector Switch, Spr. Retd. from Left
- S6 - 3-Pos. Selector Switch, Spr. Retd. from Right
- S7 - 3-Pos. Selector Switch, Spr. Retd. from L & R
- S8 - 2-Pos. Selector Switch, Key Operated
- S9 - 3-Pos. Selector Switch, Key Operated

TABLE V - CONDUIT SPACING

OUTLET CODE	TRADE SIZE OF CONDUIT (NPT)	MINIMUM CENTER TO CENTER CONDUIT SEPARATIONS (INCHES)									
		4	3 1/2	3	2 1/2	2	1 1/2	1 1/4	1	3/4	1/2
1	1/2	3 5/8	3 3/8	3	2 5/8	2 3/8	2	2	1 3/4	1 5/8	1 1/2
2	3/4	3 3/4	3 1/2	3 1/8	2 3/4	2 1/2	2 1/8	2 1/8	1 7/8	1 3/4	
3	1	4	3 5/8	3 1/4	3	2 5/8	2 3/8	2 3/8	2		
4	1 1/4	4 1/4	4	3 5/8	3 1/4	3	2 5/8	2 5/8			
5	1 1/2	4 1/4	4	3 5/8	3 1/4	3	2 5/8				
6	2	4 5/8	4 1/4	3 7/8	3 5/8	3 1/4					
7	2 1/2	4 7/8	4 5/8	4 1/4	3 7/8						
8	3	5 3/8	5	4 5/8							
9	3 1/2	5 5/8	5 1/4								
10	4	5 7/8									

• If seals are used, additional clearance may be required. Check dimensions of seals and fittings to determine required spacing. Consult factory for assistance.

TRADE SIZE OF CONDUIT (NPT)	THREADS PER IN.	MINIMUM WALL THICKNESS (IN.)
1/2 - 3/4	14	.357
1 - 2	11 1/2	.435
2 1/2 - 4	8	.625

Specifications 1

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 max. rated load, 200,000 at max. rated load (Logic Reed)
Mechanical Ratings	
Vibration	10...2000 Hz 1.52 mm displacement (peak-to-peak) Max./10 G Max. (except Logic Reed)
Shock	1/2 cycle sine wave for 11 ms ≥ 25 G (contact fragility) and no damage at 100 G
Degree of Protection	Type 7 & 9 Explosion Proof (Type 3 and Type 4 ratings available with accessories)
Mechanical Design Life Cycles	
Push Buttons	250,000 minimum
Potentiometers	100,000 minimum
All other devices	200,000 minimum
Contact Operation	Shallow and Mini Contact Blocks: Slow double make and break Logic Reed & Sealed Switch Contact Blocks: Snap-action
Typical Operating Forces	
Operators without contact blocks:	Flush, Extended, Standard Mushroom, Jumbo Mushroom: 2.9 lbs Max. Jumbo and Extended Aluminum Mushroom Head: 3.95 lbs maximum Maintained Selector Switch: 4.0 in.-lbs maximum
Spring Return Selector Switches:	5 in.-lbs to stop, 0.2 in.-lbs to return
Illuminated Push Buttons and Push-to-Test Pilot Lights	5.6 lbs maximum
2-Position Push-Pull	9 lbs maximum push or pull
3-Position Push-Pull	12 lbs maximum push to in position or pull to center position (15 lbs maximum pull to out position)
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: -4...+131°F (-20...+55°C) Storage: -40...+185°F (-40...+85°C)
Note: Operating temperatures below freezing are based on the absence of freezing moisture and liquids.	
Humidity	50% at +104°F (+40°C)

1 Performance Data — See Page Important-2.

Standard Contact Ratings

Maximum thermal continuous current I_{th} 10 A AC/2.5 A DC. Bulletin 800H Type 7 & 9 units with 800T-XA contacts have ratings as follows:

Max. Oprtnl. Volts Ue	Utilization Category		Rated Operational Currents		
	IEC	NEMA	Volts Ue	Make	Break
AC 600	AC-15	A600	120...600	7200 VA	720 VA
			72...120	60 A	720 VA
			24...28 ②	60 A	10 A
DC 600	DC-13	Q600	28...600	69 VA	
			24...28 ②	2.5 A	

② For applications below 24V and 24 mA, Pen TUFF™, Logic Reed or stackable sealed switch contacts are recommended.

Sealed Switch Contact Ratings

Maximum continuous current I_{th} 2.5 A.

Max. Oprtnl. Volts Ue	Utilization Category		Rated Operational Currents		
	IEC	NEMA	Volts Ue	Make	Break
AC 600	AC-15	B600	120...600	3600 VA	360 VA
			0...120	30 A	3 A
DC 300	DC-13	P300	24...300	138 VA	
			0...24	5.0 A	

Stackable Sealed Switch Contact Ratings

Maximum continuous current I_{th} 3 A. Bulletin 800T units have control circuit ratings with sealed switch contact blocks as follows:

Max. Oprtnl. Volts Ue	Utilization Category		Rated Operational Currents		
	IEC	NEMA	Volts Ue	Make	Break
AC 300	AC-15	C300	120...300	1800 VA	180 VA
			0...120	15 A	1.5 A
DC 150	DC-13	Q150	24...150	69 VA	
			0...24	2.5 A	

Logic Reed Contact Ratings

Maximum: 150V AC, 0.15 A, 8 VA and 30V DC, 0.06 A, 1.8 VA. Should only be used with resistive loads.

Pen TUFF™ (Low Voltage) Contact Ratings

Minimum DC: 5V, 1 mA
Maximum thermal continuous current I_{th} 2.5 A AC/1.0 A DC. Bulletin 800H units with 800T-XAV contacts have ratings as follows:

Max. Oprtnl. Volts Ue	Utilization Category		Rated Operational Currents		
	IEC	NEMA	Volts Ue	Make	Break
AC 300	AC-15	C300	120...300	1800 VA	180 VA
			0...120	15 A	1.5 A
DC 150	DC-13	R150	24...150	28 VA	
			0...24	1.0 A	

Approvals

Enclosures:
UL Listed — File: E71673
Guide: NNNY

Devices:
UL Listed — File: E10314
Guide: NOIV

Stations:
CSA — File: LR11924






Hazardous Location Push Buttons

Type 7 & 9, for Divisions 1 & 2

2-Position Push-Pull Units, Non-Illuminated



2-Position Push-Pull
Cat. No. 800H-FPX6A5





Contact Type	Operator Position			Button Color	Push-Pull
	 Maintained	 Maintained			
	Out	In			Cat. No.
 N.C.L.B.	X	O		Red	800H-FPX6D4 ←
 N.O.- N.C.L.B.	O	X		Red	800H-FPX6A1
 N.C.L.B.- N.C.L.B.	X	O		Red	800H-FPX6A5





Note: X = Closed/O = Open

3-Position Push-Pull Units, Non-Illuminated









3-Position Push-Pull
Cat. No. 800H-FPXM6A7

Contact Type	Operator Position			Button Color	Push-Pull
	 Momentary	 Maintained	 Maintained		
	Out	Center	In		Cat. No.
 N.C.- N.C.L.B.	X X	O X	O O	Red	800H-FPXM6A7

Contact Type	Operator Position			Button Color	Push-Pull
	 Momentary	 Maintained	 Momentary		
	Out	Center	In		Cat. No.
 N.C.- N.C.L.B.	X X	O X	O O	Red	800H-FPXM6A7

Note: X = Closed/O = Open

Locking Attachments, Continued

	Description	Cat. No.																								
 <p>Padlocking Cover Cat. No. 800H-N140 (Padlock not included)</p>	<p>800T/H Padlocking Cover Guards against unauthorized operation. For push buttons, 2-position push-pull or twist-release units. When applying Cat. No. 800H-N140 on 2-position maintained push-pull units, cover will lock only when the button is in depressed position. Padlocking cover includes blank legend plate for customer marking. Note: A pre-marked legend plate is available. The words OPEN COVER TO OPERATE are on the front and PULL-TO-START-PUSH-TO-STOP are on the rear. To order legend plate only, specify Cat. No. 800H-W174L.</p>	<p>800H-N140</p>																								
 <p>Selector Switch Unit with Padlocking Attachment Cat. No. 800T-NX446 (Padlock not included)</p>	<p>800T 2- and 3-Position Non-illuminated Selector Switch Padlocking Attachment — Standard Knob Padlocking guard for 2- and 3-position selector switches with standard knob operators only. Locks selector switch in any maintained position.</p>	<p>800T-NX446</p>																								
 <p>Selector Switch Padlocking Guard Cat. No. 800H-N141R (Padlock not included)</p>	<table border="1"> <thead> <tr> <th>Description</th> <th>Position</th> <th>Cat. No.</th> </tr> </thead> <tbody> <tr> <td rowspan="2"> <p>800H 2- and 3-Position Selector Switch with Padlocking Guards Padlocking guard for 2- and 3-position selector switches with standard knob operators only.</p> </td> <td>Left</td> <td>800H-N141L</td> </tr> <tr> <td>Center</td> <td>800H-N141C</td> </tr> <tr> <td rowspan="2"> <p>800H 2- and 3-Position Selector Switch with Padlocking Guards Padlocking guard for 2- and 3-position selector switches with standard knob operators only.</p> </td> <td>Right</td> <td>800H-N141R</td> </tr> <tr> <td>All</td> <td>800H-N141A</td> </tr> </tbody> </table>	Description	Position	Cat. No.	<p>800H 2- and 3-Position Selector Switch with Padlocking Guards Padlocking guard for 2- and 3-position selector switches with standard knob operators only.</p>	Left	800H-N141L	Center	800H-N141C	<p>800H 2- and 3-Position Selector Switch with Padlocking Guards Padlocking guard for 2- and 3-position selector switches with standard knob operators only.</p>	Right	800H-N141R	All	800H-N141A												
Description	Position	Cat. No.																								
<p>800H 2- and 3-Position Selector Switch with Padlocking Guards Padlocking guard for 2- and 3-position selector switches with standard knob operators only.</p>	Left	800H-N141L																								
	Center	800H-N141C																								
<p>800H 2- and 3-Position Selector Switch with Padlocking Guards Padlocking guard for 2- and 3-position selector switches with standard knob operators only.</p>	Right	800H-N141R																								
	All	800H-N141A																								
 <p>Cat. No. 800T-NX446A (Padlock not included)</p>	<p>800T 4-Position Selector Switch Attachment — Standard Knob Kit includes selector switch and guard (padlock not included). Padlocking Guard for 4-position selector switches with standard knob operators only. Locks selector switch in any maintained position.</p>	<p>800T-NX446A</p>																								
 <p>Non-Illuminated Selector Switch Padlocking Attachment Cat. No. 800H-N316J (Padlock not included)</p>	<p>800T/H Non-Illuminated Selector Switch Padlocking Attachment 2-, 3-, and 4-position selector switch padlocking attachments. Can be used to lock operators in a desired position. For 3-position selector switches, this device can also be used to lock out a left or right position as shown in the photo to the left.</p>	<table border="1"> <thead> <tr> <th>Position</th> <th>Cat. No.</th> </tr> </thead> <tbody> <tr> <td colspan="2">For 2- and 3-Position Selector Switches</td> </tr> <tr> <td>Left</td> <td>800T-N316L</td> </tr> <tr> <td>Center</td> <td>800T-N316C</td> </tr> <tr> <td>Right</td> <td>800T-N316R</td> </tr> <tr> <td>Window Center through Right - Prevent Left Operation</td> <td>800T-N316J</td> </tr> <tr> <td>Window Center through Left - Prevent Right Operation</td> <td>800T-N316K</td> </tr> <tr> <td colspan="2">For 4-Position Selector Switches</td> </tr> <tr> <td>Left (Pos. 1)</td> <td>800T-N317L</td> </tr> <tr> <td>Center Left (Pos. 2)</td> <td>800T-N317CL</td> </tr> <tr> <td>Center Right (Pos. 3)</td> <td>800T-N317CR</td> </tr> <tr> <td>Right (Pos. 4)</td> <td>800T-N317R</td> </tr> </tbody> </table>	Position	Cat. No.	For 2- and 3-Position Selector Switches		Left	800T-N316L	Center	800T-N316C	Right	800T-N316R	Window Center through Right - Prevent Left Operation	800T-N316J	Window Center through Left - Prevent Right Operation	800T-N316K	For 4-Position Selector Switches		Left (Pos. 1)	800T-N317L	Center Left (Pos. 2)	800T-N317CL	Center Right (Pos. 3)	800T-N317CR	Right (Pos. 4)	800T-N317R
Position	Cat. No.																									
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Right	800T-N316R																									
Window Center through Right - Prevent Left Operation	800T-N316J																									
Window Center through Left - Prevent Right Operation	800T-N316K																									
For 4-Position Selector Switches																										
Left (Pos. 1)	800T-N317L																									
Center Left (Pos. 2)	800T-N317CL																									
Center Right (Pos. 3)	800T-N317CR																									
Right (Pos. 4)	800T-N317R																									
 <p>Illuminated Selector Switch Padlocking Attachment Cat. No. 800H-N4162L (Padlock not included)</p>	<p>800T/H Illuminated Selector Switch Padlocking Attachment 2- and 3-position selector switch padlocking attachments for illuminated selector switches.</p> <p>Stainless steel material</p>	<table border="1"> <thead> <tr> <th>Position</th> <th>Cat. No.</th> </tr> </thead> <tbody> <tr> <td colspan="2">For 2-Position Selector Switches</td> </tr> <tr> <td>Left</td> <td>800T-N4162L</td> </tr> <tr> <td>Right</td> <td>800T-N4162R</td> </tr> <tr> <td colspan="2">For 3-Position Selector Switches</td> </tr> <tr> <td>Left</td> <td>800T-N4163L</td> </tr> <tr> <td>Center</td> <td>800T-N4163C</td> </tr> <tr> <td>Right</td> <td>800T-N4163R</td> </tr> <tr> <td>Window Center through Right - Prevent Left Operation</td> <td>800T-N4163J</td> </tr> <tr> <td>Window Center through Left - Prevent Right Operation</td> <td>800T-N4163K</td> </tr> </tbody> </table>	Position	Cat. No.	For 2-Position Selector Switches		Left	800T-N4162L	Right	800T-N4162R	For 3-Position Selector Switches		Left	800T-N4163L	Center	800T-N4163C	Right	800T-N4163R	Window Center through Right - Prevent Left Operation	800T-N4163J	Window Center through Left - Prevent Right Operation	800T-N4163K				
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Window Center through Right - Prevent Left Operation	800T-N4163J																									
Window Center through Left - Prevent Right Operation	800T-N4163K																									

Fiberglass Type 4X Small Enclosures



Application

Designed for use as a junction box or instrument housing in both indoor and outdoor settings. The enclosure is used in highly-corrosive environments typically found in oil refineries, chemical processing plants, waste water treatment, marine installations, pulp and paper processing, and electroplating plants.

Construction

- Molded fiberglass polyester material has excellent temperature and chemical resistance qualities and exhibits outstanding physical properties
- Fiberglass material is easily punched, drilled, filed, or sawed
- Seamless foam-in-place gasket assures watertight and dusttight seal
- Threaded internal bosses provided for mounting optional panels and terminal block kits
- Scratch-resistant polycarbonate windows are permanently bonded in place
- Screw cover enclosures have easily removable covers attached to body with internal plated steel hinges. Cover securely fastens to the body with four captivated Type 316 stainless steel cover screws.
- Enclosures with quick-release latches have corrosion-resistant polyester hinges and polyester latches with a Type 316L stainless steel bail. Attached with Type 316 stainless steel screws. A Type 316L stainless steel padlock hasp is furnished with each enclosure.
- Sealing washers are furnished with enclosure

Finish

Fiberglass material is light gray inside and out. Optional steel panels are painted white. Optional stainless steel, aluminum, and composite panels are unpainted.

Industry Standards

Mounting brackets required to meet UL/CSA external mounting requirements.
 UL 508A, File No. E61997: Type 3, 3R, 4, 4X, 12, and 13
 NEMA/EEMAC Type 3, 3R, 4, 4X, 12, and 13
 Enclosure flammability rating per UL 508A
 Window flammability rating per UL 508A
 CSA File No. 42186: Type 3R, 4, 4X, and 12
 IEC 60529, IP66
 Meets Type 3RX requirements

Accessories

Frameless Window Kit
 Panels
 Stainless Steel Window Kit
 Terminal Block Kit Assembly
 Ventilators
 Standard Accessories

Modification Services Program

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

- Holes and cutouts in body, doors, panels
- Tapped holes, fasteners in subpanel
- Mounting Brackets
- Panels
- Thermal Accessories
- Threaded Panel Extenders
- Windows Kits
- Standard accessories

To order, contact your local Hoffman sales representative.

NOTE: For information about modifications outside the scope of the Modification Services program, contact your Hoffman sales representative.

Fiberglass Mounting Bracket Kit



Bracket is molded from fiberglass reinforced polyester. Kit includes four brackets, hardware, and installation instructions. Mounting hole dimensions with mounting brackets installed are $[G + 2.50(64\text{mm})] \times [H + .50(13\text{mm})]$.

See tables for *G* and *H* dimensions.

Catalog Number	Bulletin Number
A50MFKR	A50Y

Threaded Panel Extenders



Threaded Panel Extenders are made of plated steel and designed to raise the panel mounting surface. Extenders attach to threaded internal pads. Male and female thread size is #10. Each kit contains 4 extenders.

Bulletin Number: A80

Catalog Number	Length (inch)	Length (mm)
APE050	0.50	13
APE100	1.00	25

Fiberglass Type 4X Small Enclosures

Corrosion-Resistant Enclosures

Standard Sizes Fiberglass Type 4X Small Solid Screw Cover

Catalog Number	Inside Dimensions A x B x C in. (mm)	Panel Catalog Number	Aluminum Panel Catalog Number	Panel Size D x E in. (mm)	Mounting G x H in. (mm)	Overall L x W in. (mm)	F in. (mm)	J in. (mm)	K in. (mm)	V in. (mm)	X in. (mm)	Y in. (mm)
A645JFGR	5.50 x 4.00 x 4.94 (140 x 102 x 125)	No Panel	No Panel	No Panel	4.75 x 2.00 (121 x 51)	6.00 x 4.50 (152 x 114)	4.41 (112)	4.13 (105)	1.00 (25)	—	4.22 (107)	3.59 (91)
A845JFGR	7.50 x 4.00 x 4.94 (191 x 102 x 125)	A6P4	A6P4AL	4.88 x 2.88 (124 x 73)	6.75 x 2.00 (171 x 51)	8.00 x 4.50 (203 x 114)	4.41 (112)	4.13 (105)	1.00 (25)	0.31 (8)	6.22 (158)	3.59 (91)
A865JFGR	7.50 x 6.00 x 5.19 (191 x 152 x 132)	A6P6	A6P6AL	4.88 x 4.88 (124 x 124)	6.75 x 4.00 (171 x 102)	8.00 x 6.50 (203 x 165)	4.66 (118)	4.38 (111)	1.00 (25)	0.31 (8)	6.22 (158)	5.59 (142)
A1066JFGR	9.50 x 6.00 x 5.69 (241 x 152 x 145)	A8P6	A8P6AL	6.75 x 4.88 (171 x 124)	8.75 x 4.00 (222 x 102)	10.00 x 6.50 (254 x 165)	5.16 (131)	4.63 (118)	1.25 (32)	0.25 (6)	8.12 (206)	5.50 (140)
A1287JFGR	11.50 x 8.00 x 6.69 (292 x 203 x 170)	A10P8	A10P8AL	8.75 x 6.88 (222 x 175)	10.75 x 6.00 (273 x 152)	12.00 x 8.50 (305 x 216)	6.16 (156)	5.13 (130)	1.75 (44)	0.25 (6)	9.97 (253)	7.34 (186)
A14107JFGR	13.50 x 10.00 x 7.19 (343 x 254 x 183)	A12P10	A12P10AL	10.75 x 8.88 (273 x 226)	12.75 x 8.00 (324 x 203)	14.00 x 10.50 (356 x 267)	6.66 (169)	5.63 (143)	1.75 (44)	0.25 (6)	11.97 (304)	9.34 (237)
A16128JFGR	15.50 x 12.00 x 8.19 (394 x 305 x 208)	A14P12	A14P12AL	12.75 x 10.88 (324 x 276)	14.75 x 10.00 (375 x 254)	16.00 x 12.50 (406 x 318)	7.66 (195)	6.13 (156)	2.25 (57)	0.25 (6)	13.78 (350)	11.16 (283)
A18149JFGR	17.50 x 14.00 x 8.69 (445 x 356 x 221)	A16P14	A16P14AL	14.75 x 12.88 (375 x 327)	16.75 x 12.00 (425 x 305)	18.00 x 14.50 (457 x 368)	8.16 (207)	6.63 (168)	2.25 (57)	0.25 (6)	15.78 (401)	13.16 (334)

Purchase panels separately. Optional stainless steel, aluminum, and composite material panels available for most sizes.

Standard Sizes Fiberglass Type 4X Small Solid Cover with Quick-Release Latches

Catalog Number	Inside Dimensions A x B x C in. (mm)	Panel Catalog Number	Aluminum Panel Catalog Number	Panel Size D x E in. (mm)	Mounting G x H in. (mm)	Overall L x W in. (mm)	F in. (mm)	J in. (mm)	K in. (mm)	V in. (mm)	X in. (mm)	Y in. (mm)	No. of Latches
A645JFGQRR	5.50 x 4.00 x 5.02 (140 x 102 x 128)	No Panel	No Panel	No Panel	4.75 x 2.00 (121 x 51)	6.00 x 5.39 (152 x 137)	4.50 (114)	4.13 (105)	1.00 (25)	—	4.22 (107)	3.59 (91)	1
A845JFGQRR	7.50 x 4.00 x 5.02 (191 x 102 x 128)	A6P4	A6P4AL	4.88 x 2.88 (124 x 73)	6.75 x 2.00 (171 x 51)	8.00 x 5.39 (203 x 137)	4.50 (114)	4.13 (105)	1.00 (25)	.31 (8)	6.22 (158)	3.59 (91)	1
A865JFGQRR	7.50 x 6.00 x 5.28 (191 x 152 x 134)	A6P6	A6P6AL	4.88 x 4.88 (124 x 124)	6.75 x 4.00 (171 x 102)	8.00 x 7.39 (203 x 188)	4.75 (121)	4.38 (111)	1.00 (25)	.31 (8)	6.22 (158)	5.59 (142)	2
A1066JFGQRR	9.50 x 6.00 x 5.78 (241 x 152 x 147)	A8P6	A8P6AL	6.75 x 4.88 (171 x 124)	8.75 x 4.00 (222 x 102)	10.00 x 7.39 (254 x 188)	5.25 (133)	4.63 (118)	1.25 (32)	0.25 (6)	8.12 (206)	5.50 (140)	2
A1287JFGQRR	11.50 x 8.00 x 6.78 (292 x 203 x 172)	A10P8	A10P8AL	8.75 x 6.88 (222 x 175)	10.75 x 6.00 (273 x 152)	12.00 x 9.39 (305 x 239)	6.25 (159)	5.13 (130)	1.75 (44)	0.25 (6)	9.97 (253)	7.34 (186)	2
A14107JFGQRR	13.50 x 10.00 x 7.28 (343 x 254 x 185)	A12P10	A12P10AL	10.75 x 8.88 (273 x 226)	12.75 x 8.00 (324 x 203)	14.00 x 11.39 (256 x 289)	6.75 (171)	5.63 (143)	1.75 (44)	0.25 (6)	11.97 (304)	9.34 (237)	2
A16128JFGQRR	15.50 x 12.00 x 8.28 (394 x 305 x 210)	A14P12	A14P12AL	12.75 x 10.88 (324 x 276)	14.75 x 10.00 (375 x 254)	16.00 x 13.39 (406 x 340)	7.75 (197)	6.13 (156)	2.25 (57)	0.25 (6)	13.78 (350)	11.16 (283)	2
A18149JFGQRR	17.50 x 14.00 x 8.78 (445 x 356 x 223)	A16P14	A16P14AL	14.75 x 12.88 (375 x 327)	16.75 x 12.00 (425 x 305)	18.00 x 15.39 (457 x 391)	8.25 (210)	6.63 (168)	2.25 (57)	0.25 (6)	15.78 (401)	13.16 (334)	2

Purchase panels separately. Optional stainless steel, aluminum, and composite material panels available for most sizes.

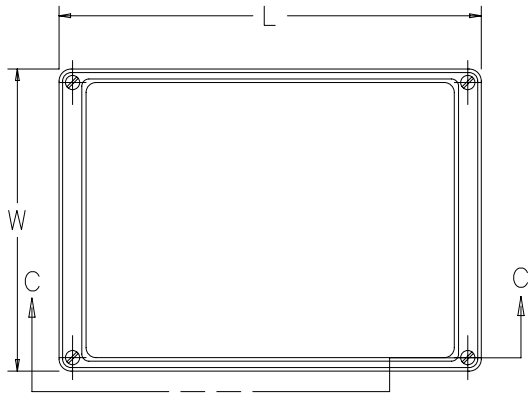
Standard Sizes Fiberglass Type 4X Small Enclosures with Windows

Catalog Number	Inside Dimensions A x B x C in. (mm)	Panel Catalog Number	Aluminum Panel Catalog Number	Panel Size D x E in. (mm)	Mounting G x H in. (mm)	Overall L x W in. (mm)	Window Size M x N in. (mm)	F in. (mm)	J in. (mm)	K in. (mm)	V in. (mm)	No. of Latches
A865JFGQRPWR	7.50 x 6.00 x 5.03 (191 x 152 x 128)	A6P6	A6P6AL	4.88 x 4.88 (124 x 124)	6.75 x 4.00 (171 x 102)	8.00 x 7.39 (203 x 188)	4.55 x 4.00 (116 x 102)	4.52 (115)	4.38 (111)	1.00 (25)	0.31 (8)	1
A1066JFGQRPWR	9.50 x 6.00 x 5.53 (241 x 152 x 140)	A8P6	A8P6AL	6.75 x 4.88 (171 x 124)	8.75 x 4.00 (222 x 102)	10.00 x 7.39 (254 x 188)	6.55 x 4.00 (166 x 102)	5.00 (127)	4.63 (118)	1.25 (32)	0.25 (6)	2
A1287JFGQRPWR	11.50 x 8.00 x 6.53 (292 x 203 x 166)	A10P8	A10P8AL	8.75 x 6.88 (222 x 175)	10.75 x 6.00 (273 x 152)	12.00 x 9.39 (305 x 239)	8.25 x 5.84 (210 x 148)	6.00 (152)	5.13 (130)	1.75 (44)	0.25 (6)	2
A14107JFGQRPWR	13.50 x 10.00 x 7.03 (343 x 254 x 179)	A12P10	A12P10AL	10.75 x 8.88 (273 x 226)	12.75 x 8.00 (324 x 203)	14.00 x 11.39 (253 x 289)	10.28 x 6.84 (261 x 174)	6.52 (166)	5.63 (143)	1.75 (44)	0.25 (6)	2
A16128JFGQRPWR	15.50 x 12.00 x 8.03 (394 x 305 x 204)	A14P12	A14P12AL	12.75 x 10.88 (324 x 276)	14.75 x 10.00 (375 x 254)	16.00 x 13.39 (406 x 340)	12.34 x 9.10 (313 x 231)	7.52 (191)	6.13 (156)	2.25 (57)	0.25 (6)	2
A18149JFGQRPWR	17.50 x 14.00 x 8.53 (445 x 356 x 217)	A16P14	A16P14AL	14.75 x 12.88 (375 x 327)	16.75 x 12.00 (425 x 305)	18.00 x 15.39 (457 x 391)	14.45 x 11.06 (367 x 281)	8.00 (203)	6.63 (168)	2.25 (57)	0.25 (6)	2

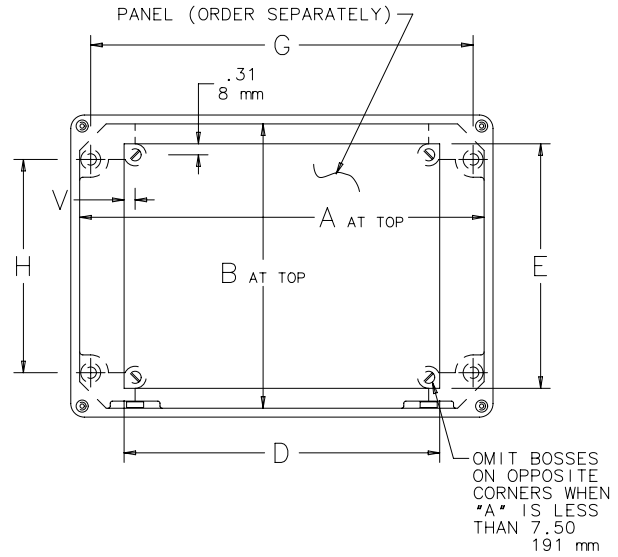
Purchase panels separately. Optional stainless steel, aluminum, and composite material panels available for most sizes.

Fiberglass Type 4X Small Enclosures

Solid Screw Cover Enclosure

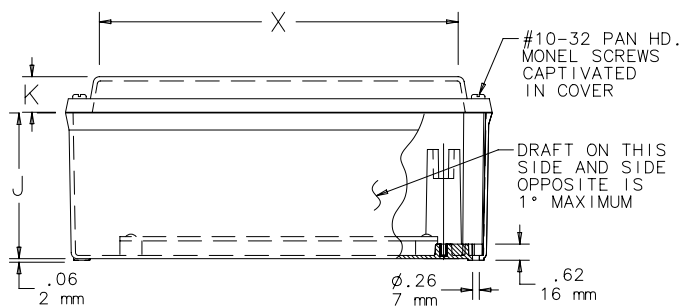


TOP VIEW WITH COVER

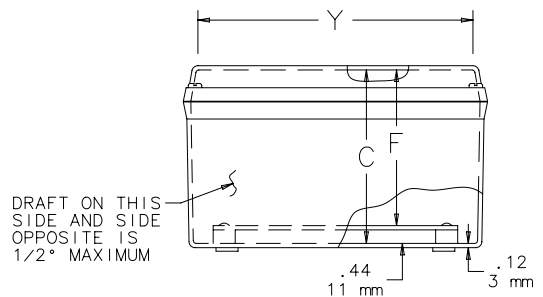


TOP VIEW WITH COVER REMOVED

NOTE: Panel screws have #10-32 threads.



SECTION C-C



END VIEW

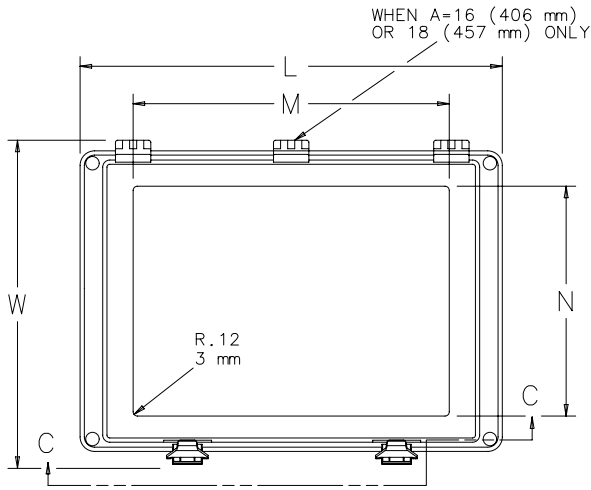
C2549-C

Fiberglass Type 4X Small Enclosures

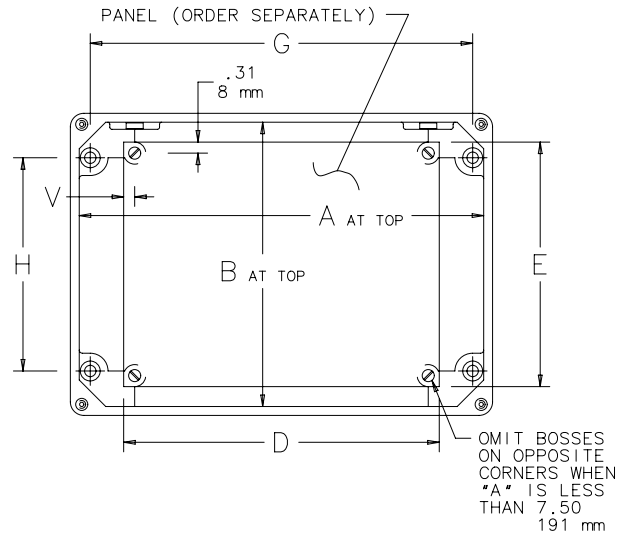
Bulletin
A50

Corrosion-Resistant Enclosures

Quick-Release Solid Cover Enclosure and Window Cover Enclosure

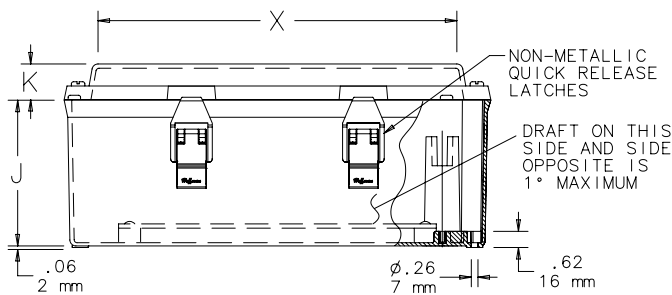


TOP VIEW WITH COVER

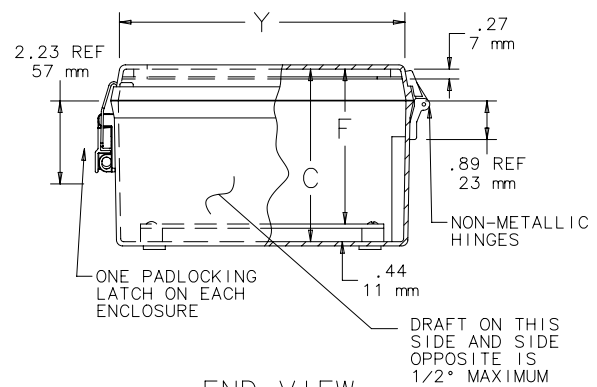


TOP VIEW WITH COVER REMOVED

- NOTE: 1. Panel screws have #10-32 threads.
2. Hinged cover opens 200° maximum.



SECTION C-C



END VIEW

C2550-C

Level instruments

Continuous level measurement - Ultrasonic controllers

HydroRanger 200

Overview



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

Benefits

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

Application

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

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

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

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

Level instruments

Continuous level measurement - Ultrasonic controllers

HydroRanger 200

Technical specifications

Mode of Operation

Measuring principle	Ultrasonic level measurement
Measuring range	0.3 to 15 m (1 to 50 ft), transducer dependent
Measuring points	1 or 2

Input

Analogue	0 to 20 mA or 4 to 20 mA, from alternate device, scaleable (6 relay model)
Discrete	10 to 50 V DC switching level Logical 0 = < 0.5 V DC Logical 1 = 10 to 50 V DC Max. 3 mA

Output

Echomax® transducer	44 kHz
Ultrasonic transducer	Compatible transducers: ST-H and Echomax series XPS-10/10F, XPS 15/15F, XCT-8, XCT-12 and XRS-5
Relays ¹⁾	Rating 5 A at 250 V AC, non-inductive
- Model with 1 relay ²⁾	1 SPST Form A
- Model with 3 relays ²⁾	2 SPST Form A/1 SPDT Form C
- Model with 6 relays	4 SPST Form A/2 SPDT Form C
mA output	0 to 20 mA or 4 to 20 mA
• Max. load	750 Ω, isolated
• Resolution	0.1 % of range

Accuracy

Error in measurement	0.25% of range or 6 mm (0.24"), whichever is greater
Resolution	0.1% of measuring range or 2 mm (0.08"), whichever is greater ³⁾
Temperature compensation	<ul style="list-style-type: none"> -50 to +150 °C (-58 to +302 °F) • Integral temperature sensor in transducer • External TS-3 temperature sensor (optional) • Programmable fixed temperature values

Rated operating conditions

<u>Installation conditions</u>	
Location	indoor / outdoor
Installation category	II
Pollution degree	4
<u>Ambient conditions</u>	
Ambient temperature (enclosure)	-20 to +50 °C (-4 to +122 °F)

Design

Weight	
• Wall mount	1.37 kg (3.02 lbs)
• Panel mount	1.50 kg (3.31 lbs)
Material (enclosure)	Polycarbonate
Degree of protection (enclosure)	
• Wall mount	IP65/Type 4X/NEMA 4X
• Panel mount	IP54/Type 3/NEMA 3
<u>Cable</u>	
Transducer and mA output signal	2-core copper conductor, twisted, shielded, 300 Vrms, 0.82 mm ² (18 AWG), Belden® 8760 or equivalent is acceptable
Max. separation between transducer and transceiver	365 m (1200 ft)

Displays and controls

Displays and controls	100 x 40 mm (4 x 1.5") multi-block LCD with backlighting
Programming	Programming using handheld programmer or via PC with SIMATIC PDM software

Power supply⁴⁾

AC version	100 to 230 V AC ± 15%, 50/60 Hz, 36 VA (17 W)
DC version	12 to 30 V DC (20 W)

Certificates and approvals

- CE, C-TICK⁵⁾
- Lloyd's Register of Shipping
- ABS Type Approval
- FM, CSA_{NRTL/C}, UL listed
- CSA Class I, Div. 2, Groups A, B, C and D, Class II, Div. 2, Groups F and G, Class III (wall mount only)
- MCERTS Class 1 approved for Open Channel Flow

Communication

- RS-232 with Modbus RTU or ASCII via RJ-11 connector
- RS-485 with Modbus RTU or ASCII via terminal blocks
- Optional: SmartLinX® cards for
 - PROFIBUS DP
 - DeviceNet™
 - Allen-Bradley® Remote I/O

¹⁾ All relays certified for use with equipment that fails in a state at or under the rated maximums of the relays

²⁾ This model is level control only; no open channel flow, differential level or volume conversion functions

³⁾ Program range is defined as the empty distance to the face of the transducer plus any range extension

⁴⁾ Maximum power consumption is listed

⁵⁾ EMC performance available upon request

Level instruments

Continuous level measurement - Ultrasonic controllers

HydroRanger 200

Selection and Ordering data	Order No.
Siemens HydroRanger 200 Ultrasonic level controller for up to six pumps that provides control, differential control and open channel flow monitoring. The HydroRanger 200 is also available as a level measurement controller only. Select option from model code below.	C) 7ML5034-
Mounting Wall mount, standard enclosure Wall mount, 4 entries, 4 M20 cable glands included Panel mount ¹⁾	1 2 3
Power supply 100 to 230 V AC 12 to 30 V DC	A B
Number of measurement points Single point model, 6 relays Dual point model, 6 relays Single point model, level only, 1 relay ²⁾ Single point model, level only, 3 relays ²⁾	A B C D
Communication (SmartLinx) Without module SmartLinx [®] Allen-Bradley [®] Remote I/O module SmartLinx PROFIBUS DP module SmartLinx DeviceNet [™] module See SmartLinx product page 5/260 for more information.	0 1 2 3
Approvals General Purpose CE, FM, CSAus/c, UL listed, C-TICK CSA Class I, Div. 2, Groups A, B, C and D; Class II, Div 2, Groups F and G; Class III (for wall mount applications only)	1 2
Further designs Please add "-Z" to Order No. and specify Order code(s). Stainless steel tag [69 mm x 50 mm (2.71 x 1.97")]: Measuring-point number/identification (max. 16 characters) specify in plain text	Order code Y15
Instruction manual English French German Note: The instruction manual should be ordered as a separate line on the order. This device is shipped with the Siemens Milltronics manual CD containing the complete ATEX Quick Start and instruction manual library.	Order No. C) 7ML1998-5FC03 C) 7ML1998-5FC11 C) 7ML1998-5FC32
Other instruction manuals SmartLinx Allen-Bradley Remote I/O, English SmartLinx PROFIBUS DP, English SmartLinx PROFIBUS DP, German SmartLinx PROFIBUS DP, French SmartLinx DeviceNet, English Note: The appropriate SmartLinx instruction manual should be ordered as a separate line on the order.	C) 7ML1998-1AP03 C) 7ML1998-1AQ03 C) 7ML1998-1AQ33 C) 7ML1998-1AQ12 C) 7ML1998-1BH02

Selection and Ordering data	Order No.
Siemens HydroRanger 200 Ultrasonic level controller for up to six pumps that provides control, differential control and open channel flow monitoring. The HydroRanger 200 is also available as a level measurement controller only. Select option from model code below.	C) 7ML5034-
Accessories Handheld programmer Tag, stainless steel, 12 x 45 mm (0.47 x 1.77"), one text line, suitable for enclosure TS-3 Temperature Sensor - see TS-3 on page 5/147 SITRANS RD100 Remote display - see RD100 on page 5/263 SITRANS RD200 Remote display - see RD200 on page 5/265	7ML1830-2AK 7ML1930-1AC
Spare parts Power Supply Board (100 to 230 V AC) Power Supply Board (12 to 30 V DC) Display Board See SmartLinx product page 5/260 for more information.	C) 7ML1830-1MD C) 7ML1830-1ME C) 7ML1830-1MF
1) Available with approval option 1 only 2) This model is level control only; no open channel flow, differential level, or volume conversion functions C) Subject to export regulations AL: N, ECCN: EAR99	

Level instruments

Continuous level measurement - Ultrasonic controllers

HydroRanger 200

Selection and Ordering data	Order No.
Milltronics HydroRanger 200 Ultrasonic level controller for up to six pumps that provides control, differential control and open channel flow monitoring. The HydroRanger 200 is also available as a level measurement controller only. Select option from model code below.	C) 7ML1034-
Mounting Wall mount, standard enclosure Wall mount, 4 entries, 4 M20 cable glands included Panel mount ¹⁾	1 2 3
Power supply 100 to 230 V AC 12 to 30 V DC	A B
Communication (SmartLinx) Without module SmartLinx® Allen-Bradley® Remote I/O module SmartLinx PROFIBUS DP module SmartLinx DeviceNet™ module See SmartLinx product page 5/260 for more information.	A B C D
Approvals General Purpose CE, FM, CSAUs/c, UL listed, C-TICK CSA Class I, Div. 2, Groups A, B, C and D; Class II, Div 2, Groups F and G; Class III (for wall mount applications only)	1 2
Number of measurement points Single point model, 6 relays Dual point model, 6 relays Single point model, level only, 1 relay ²⁾ Single point model, level only, 3 relays ²⁾	1 2 3 4
Further designs Please add "-Z" to Order No. and specify Order code(s).	Order code
Stainless steel tag [69 mm x 50 mm (2.71 x 1.97")]: Measuring-point number/identification (max. 16 characters) specify in plain text	Y15
Instruction manual English French German Note: The instruction manual should be ordered as a separate line on the order.	Order No. C) 7ML1998-1FC06 C) 7ML1998-1FC14 C) 7ML1998-1FC34
This device is shipped with the Siemens Milltronics manual CD containing the complete ATEX Quick Start and instruction manual library.	
Other instruction manuals SmartLinx Allen-Bradley Remote I/O, English SmartLinx PROFIBUS DP, English SmartLinx PROFIBUS DP, German SmartLinx PROFIBUS DP, French SmartLinx DeviceNet, English Note: The appropriate SmartLinx instruction manual should be ordered as a separate line on the order.	C) 7ML1998-1AP03 C) 7ML1998-1AQ03 C) 7ML1998-1AQ33 C) 7ML1998-1AQ12 C) 7ML1998-1BH02

Selection and Ordering data	Order No.
Milltronics HydroRanger 200 Ultrasonic level controller for up to six pumps that provides control, differential control and open channel flow monitoring. The HydroRanger 200 is also available as a level measurement controller only. Select option from model code below.	C) 7ML1034-
Accessories Handheld programmer Tag, stainless steel, 12 x 45 mm (0.47 x 1.77"), one text line, suitable for enclosure TS-3 Temperature Sensor - see TS-3 on page 5/147 SITRANS RD100 Remote display - see RD100 on page 5/263 SITRANS RD200 Remote display - see RD200 on page 5/265	7ML1830-2AK 7ML1930-1AC
Spare parts Power Supply Board (100 to 230 V AC) Power Supply Board (12 to 30 V DC) Display Board See SmartLinx product page 5/260 for more information.	C) 7ML1830-1MD C) 7ML1830-1ME C) 7ML1830-1MF

1) Available with approval option 1 only

2) This model is level control only; no open channel flow, differential level, or volume conversion functions

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

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®Belden is a registered trademark of Belden Wire and Cable Company.

®Allen-Bradley is a registered trademark of Rockwell Automation.

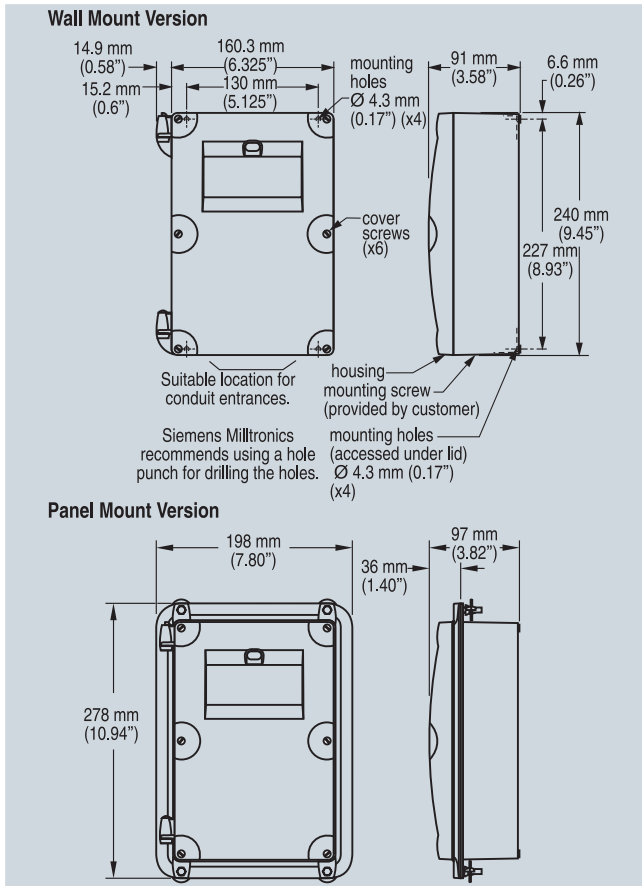
™DeviceNet is a trademark of Open DeviceNet Vendor Association (ODVA)

Level instruments

Continuous level measurement - Ultrasonic controllers

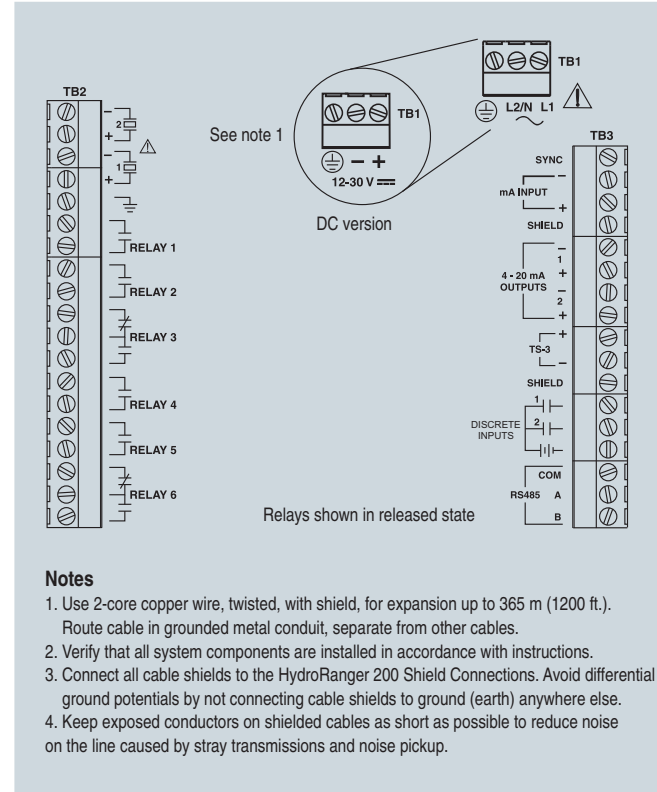
HydroRanger 200

Dimensional drawings



HydroRanger 200 dimensions

Schematics



Notes

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

HydroRanger 200 connections

SITRANS L Level instruments

Continuous measurement - Ultrasonic transducers

ST-H

Overview



ST-H transducers use ultrasonic technology to measure level in chemical storage and liquid tanks.

Benefits

- Can be mounted on a 2" (50.8 mm) standpipe
- Immune to corrosive and harsh environments
- Integral temperature sensor

Application

The narrow design of the ST-H allows the transducer to be mounted on a 2" (50.8 mm) standpipe. When mounted correctly, it is completely protected from the process and can even be used in harsh, corrosive environments.

During operation, the ultrasonic transducer emits acoustic pulses in a narrow beam perpendicular to the transducer face. The level transceiver measures the propagation time between pulse emission and reception of the echo to calculate the distance from the transducer to the material. Variations in sound velocity due to changes in temperature within the permissible range are automatically compensated by the integral temperature sensor.

- Key Applications: chemical storage, liquid tanks

Technical specifications

Mode of operation

Measuring principle Ultrasonic transducer

Input

Measuring range 0.3 to 10 m (1 to 33 ft)

Output

Frequency 44 kHz

Beam angle 12°

Accuracy

Temperature compensation Compensated by integral temperature sensor

Rated operating conditions

Pressure Normal atmospheric pressure

Ambient conditions

- Ambient temperature -20 to +60 °C (-5 to +140 °F) (ATEX approved model)
-40 to +73 °C (-40 to +163 °F) (CSA/FM approved model)

Design

Weight¹⁾ 1.4 kg (3 lbs)

Material (enclosure)	Base and lid made of ETFE (epoxy fitted joint) ²⁾
Process connection	2" NPT [(Taper), ANSI/ASME B1.20.1], R 2" [(BSPT), EN 10226] or G 2" [(BSPP), EN ISO 228-1]
Degree of protection	IP68
Cable connection	2-core shielded/twisted, 0.5 mm ² (20 AWG), PVC sheath
Cable (max. length)	365 m (1200 ft) with RG 62 A/U coaxial cable

Options

- Flange adapter 3" Universal (fits DN 65, PN 10 and 3" ASME)
- Submergence coupling For maintaining high level readings while the transducer is submerged

Certificates and approvals

CE³⁾, CSA, FM Class 1, Div. 1, ATEX II 2G

¹⁾ Approximate shipping weight of transducer with standard cable length

²⁾ When measuring chemicals, check compatibility of ETFE and epoxy, or mount joint external to process.

³⁾ EMC certificate available on request

Selection and Ordering data

Echomax® ST-H ultrasonic transducer

Level measurement in chemical storage and liquid tanks

The narrow design of the ST-H allows the transducer to be mounted on a 2" standpipe.
measuring range: min. 0.3 m (1 ft), max. 10 m (33 ft)

Process connection

- 2" NPT [(Taper), ANSI/ASME B1.20.1]
- R 2" [(BSPT), EN 10226]
- G 2" [(BSPP), EN ISO 228-1]

Cable length

- 5 m (16.40 ft)
- 10 m (32.81 ft)
- 30 m (98.43 ft)
- 50 m (164.04 ft)
- 100 m (328.08 ft)

Approvals

FM Class I, Div. 1 [only with 2" NPT (Taper), ANSI/ASME B1.20.1 process connection]
ATEX II 2G, CSA

Instruction manual

Quick Start Manual, multi-language C) **7ML1998-5QK81**
Applications Guidelines, multi-language C) **7ML1998-5HV61**

Note: The Applications Guidelines should be ordered as a separate line item on the order.

This device is shipped with the Siemens Milltronics manual CD containing the complete ATEX Quick Start and instruction manual library.

Accessories

ST-H universal submergence shield **7ML1830-1CF**
Universal box bracket, mounting kit **7ML1830-1BK**
3" ASME, DIN 65 PN 10, JIS 10K 3B ETFE flange adapter for 2" NPT **7ML1830-1BT**

3" ASME, DIN 65 PN 10, JIS 10K 3B ETFE flange adapter for 2" BSPT **7ML1830-1BU**

Easy Aimer 2, NPT with 3/4" x 1" PVC coupling **7ML1830-1AQ**
Easy Aimer 2, aluminum with M20 adapter and 1" and 1 1/2" BSPT aluminum couplings **7ML1830-1AX**

Easy Aimer 304, with stainless steel coupling **7ML1830-1AU**
Easy Aimer 304, with M20 adapter and 1" and 1 1/2" BSPT 304 SS couplings **7ML1830-1GN**

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

Order No.

C) **7ML1100-****A 0****0****1****2****A****B****C****D****E****2****3****2****3****2****3****2****3****2****3**

→ FT-300



Mechanically-activated control switch designed to activate low current control panels and alarms.

This wide-angle or narrow-angle control switch offers reliable low current control for AC and DC applications in potable water, wastewater, and sewage. The internal switching mechanism has sealed gold cross-point contacts for reliable low current operation. Common applications include PLC (programmable logic controller) panels, IS panels with intrinsically safe barriers, low current solar applications, and other low current control panels and alarms applications.

The wide-angle version activates/deactivates approximately 4" above and below horizontal with a 3.5" tether. The narrow angle version activates/deactivates at approximately 1.5" above and below horizontal with a 3.5" tether.

Normally Open Model (high level)

The control switch turns on (closes) when the float tips **above** horizontal signaling a high level, and turns off (opens) when the float drops below horizontal.

Normally Closed Model (low level)

The control switch turns on (closes) when the float drops **below** horizontal signaling a low level, and turns off (opens) when the float tips above horizontal.

FEATURES

- Passed NSF Standard 61 protocol by an approved Water Quality Association laboratory.
- Low current, non-arching applications down to 0.160 mA at 125 VAC.
- Mechanically-activated, snap action contacts.
- High impact, corrosion resistant polypropylene float housing.
- Not sensitive to rotation.
- UL Listed for use in non-potable water and sewage.
- CSA Certified.
- Three-year limited warranty.



OPTIONS

This switch is available:

- for normally open (high level) applications or normally closed (low level) applications.
- with narrow or wide-angle pumping ranges.
- in standard cable lengths of 10, 15, 20, or 30 feet.
- with two mounting options that allow for flexibility in installation:

Mounting Clamp: for applications where the switch can be attached to a discharge pipe or similar mounting device.

Externally Weighted: for applications where the switch can be suspended from above.

SPECIFICATIONS

CABLE: flexible 18 gauge, 2 conductor (UL,CSA) SJOW, water-resistant (CPE) jacket

FLOAT: 2.74 inch diameter x 4.83 inch long (7.0 cm x 12.3 cm), high-impact, corrosion resistant, polypropylene housing for use in sewage and water up to 140°F (60°C)

MAXIMUM WATER DEPTH: 30 feet (9 meters), 13 psi

ELECTRICAL:

125 VAC

Maximum Electrical Load:
0.1 amps

Minimum Electrical Load:
0.160 milliamps

30 VDC

Maximum Electrical Load:
0.1 amps

Minimum Electrical Load:
0.160 milliamps

5 VDC

Minimum Electrical Load:
1 milliamps

CONTROL SWITCHES
(MECHANICAL)

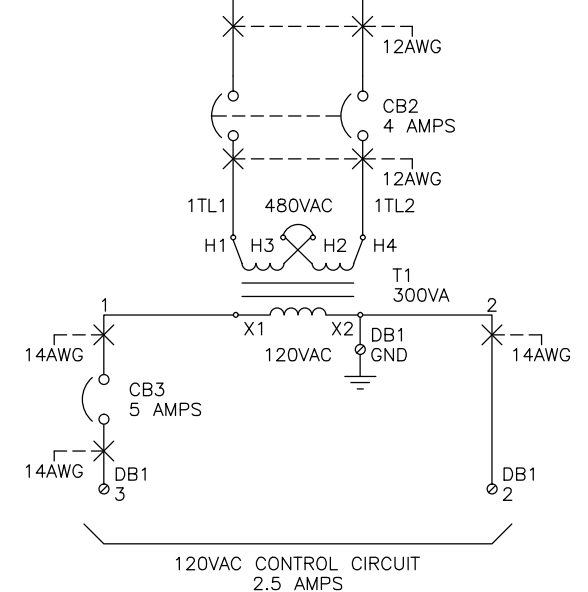
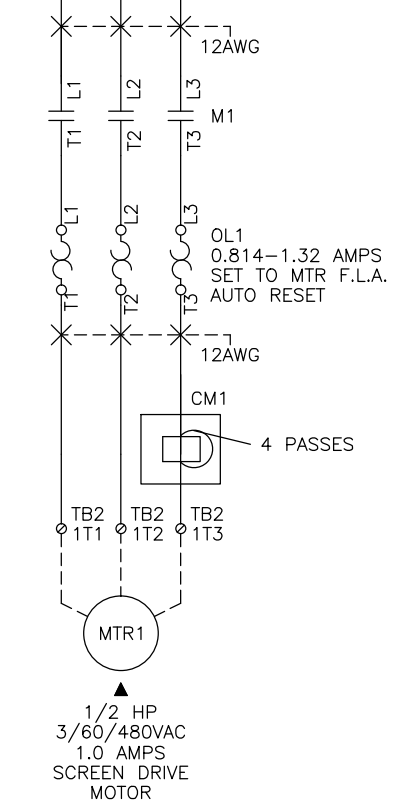
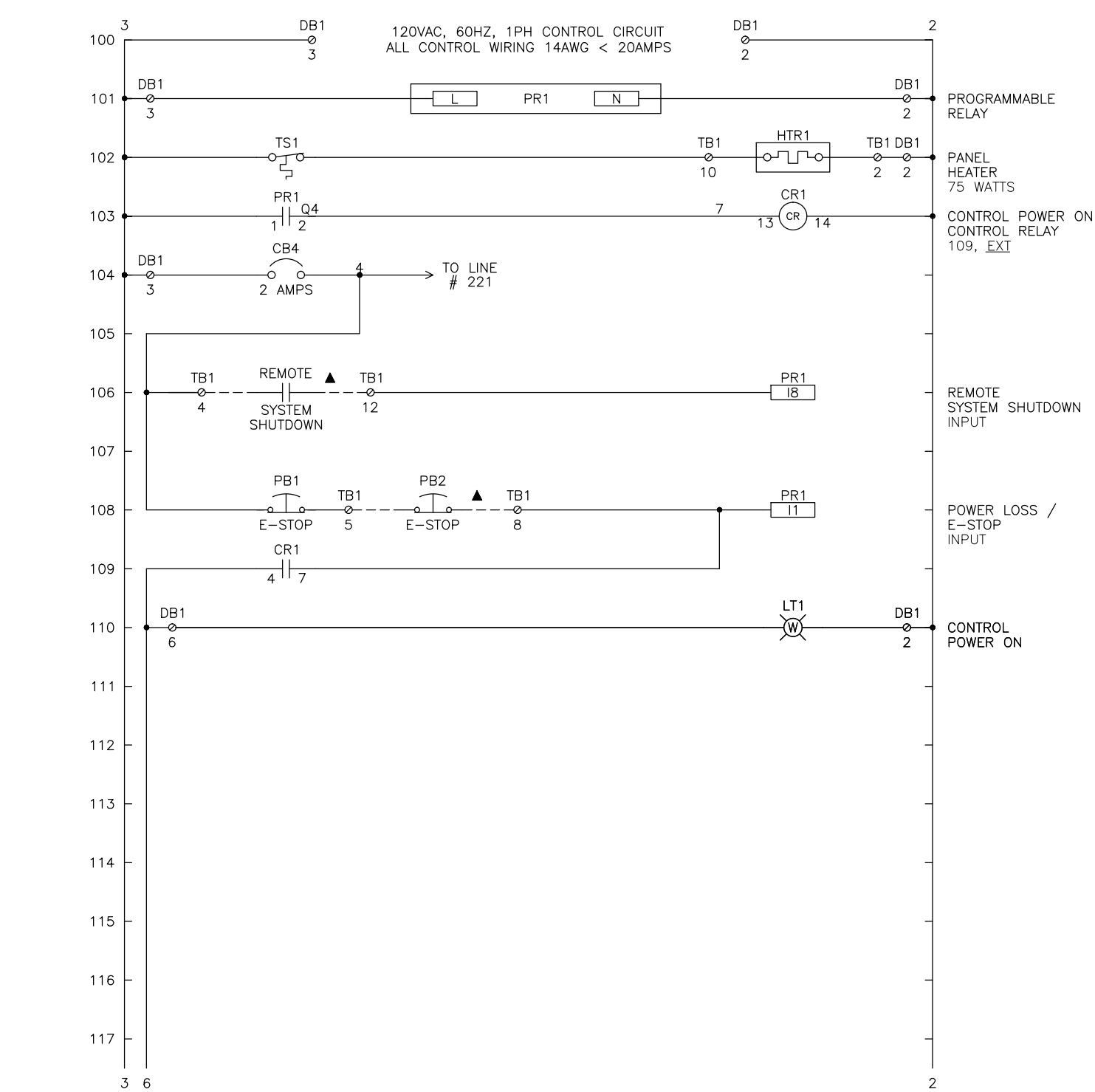
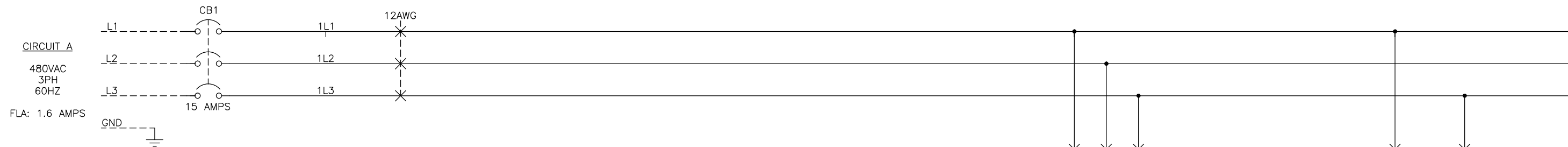
SJE
Rhombus
APG

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Control Panel Drawings



- NOTES:**
- ▲ DEVICES LOCATED OUTSIDE CONTROL PANEL.
 - ⊙ TERMINAL BLOCK (TB) OR DISTRIBUTION BLOCK (DB) LOCATED IN CONTROL PANEL.
 - FIELD WIRING.
 - NAMEPLATES SHALL BE WHITE WITH BLACK LETTERS.
 - ELEMECH RESERVES THE RIGHT TO CHANGE, AS NECESSARY, THE SPACING, ORIENTATION, AND PHYSICAL LOCATION OF DEVICES IN ORDER TO OPTIMIZE THE DESIGN.
 - LOCAL MOTOR DISCONNECT SWITCHES SHALL BE PROVIDED BY OTHERS IF REQUIRED BY LOCAL REGULATIONS.
 - JUNCTION BOXES ARE NOT SHOWN AND SHALL BE PROVIDED BY OTHERS AS NECESSARY.
 - DRAWINGS ARE TYPICAL OF (2) CONTROL PANELS.

WIRE COLORS:

BLK	-	POWER
BLK	-	120VAC HOT
WHT	-	120VAC NEUTRAL
RED	-	120VAC CONTROL
YEL	-	REMOTE
GRN	-	GROUND
BLU	-	DC POSITIVE/CONTROL
GRY	-	DC NEUTRAL

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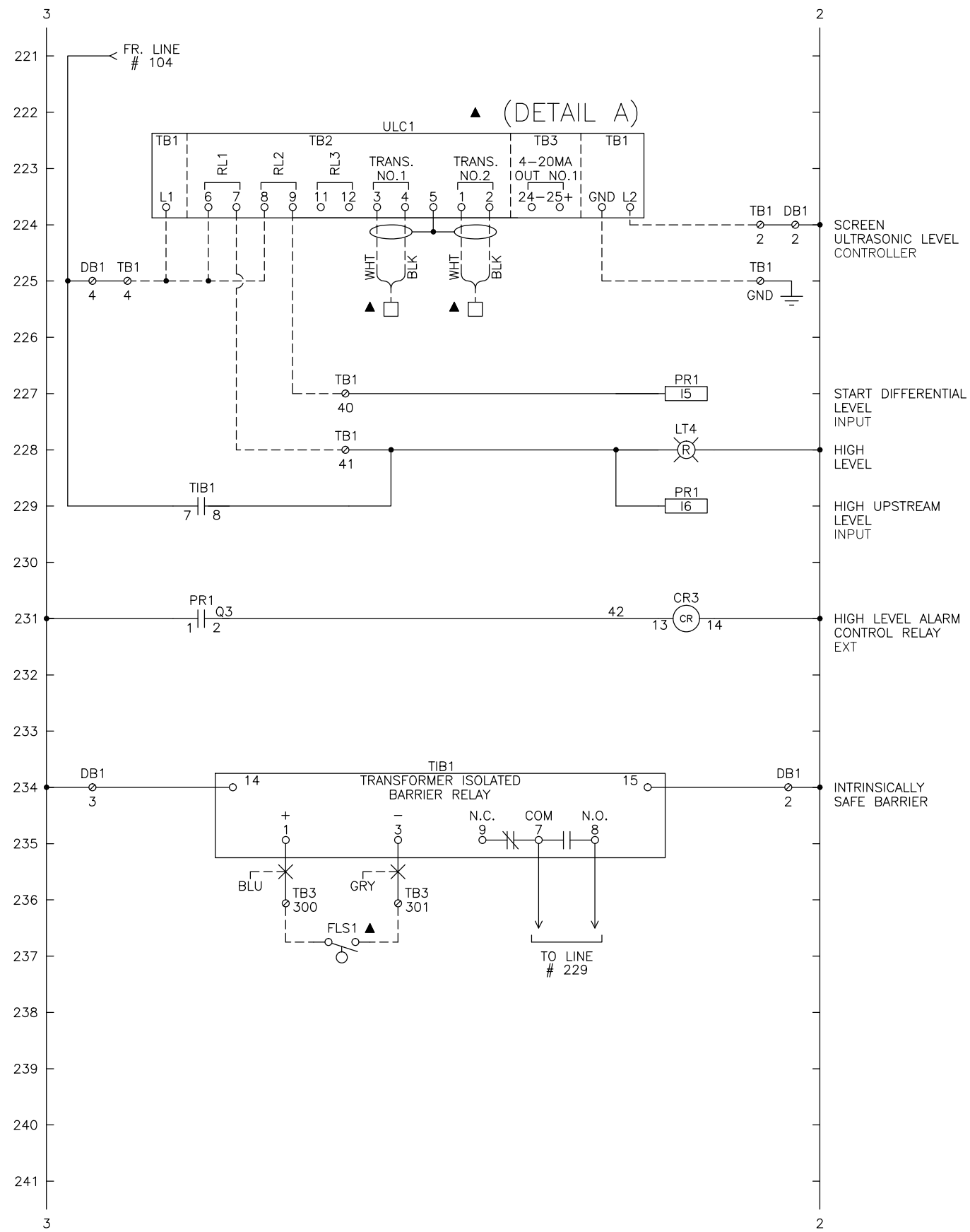
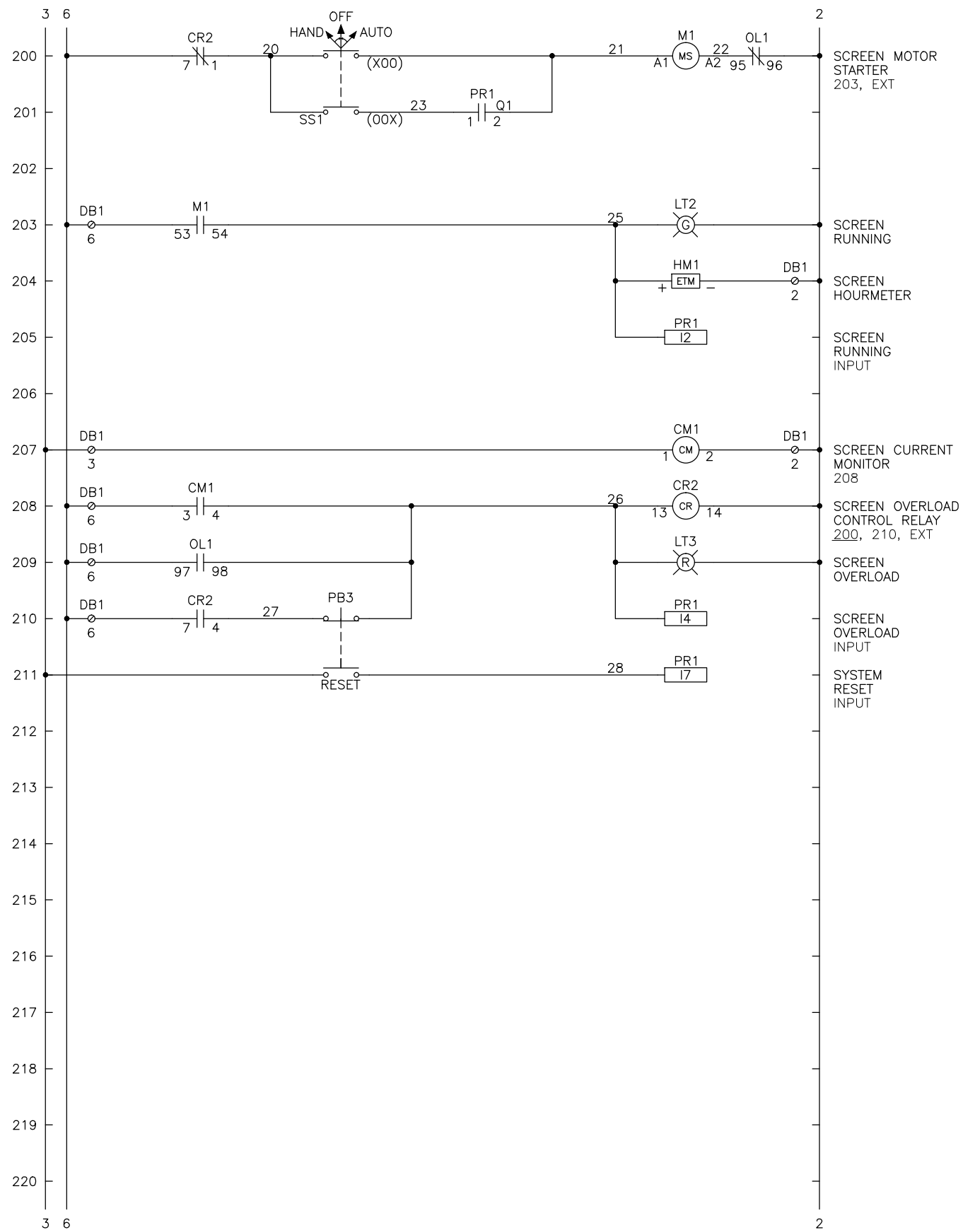
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PROJECT NAME	PROJECT NUMBER 201196 FOUNTAIN, CO
REFERENCE INFORMATION	ELEMECH REF: PAR4732A1

TITLE	AQUA GUARD CONTROL PANEL
DRAWING NO	20119604/05
REV	SHEET 1 OF 4



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PROJECT NAME
 PROJECT NUMBER 201196
 FOUNTAIN, CO
 REFERENCE INFORMATION
 ELEMECH REF: PAR4732A2

TITLE
 AQUA GUARD
 CONTROL PANEL
 DRAWING NO
20119604/05
 SHEET 2 OF 4

SEQUENCE OF OPERATION

CONTROL POWER ON-DELAY:

EACH TIME THE CONTROL PANEL POWER SUPPLY IS CYCLED, THE PROGRAMMABLE RELAY WILL ALLOW ALL SOLID STATE DEVICES TO BECOME FULLY ENERGIZED BEFORE ENABLING THE CONTROL POWER CIRCUIT.

SCREEN MODES OF OPERATION:

HAND: WHEN THE SCREEN SELECTOR IS IN THE HAND POSITION THE SCREEN WILL RUN CONTINUOUSLY.
AUTO: WHEN THE SCREEN SELECTOR IS IN THE AUTO POSITION THE SCREEN WILL RUN WHEN THE MATERIAL REACHES THE START DIFFERENTIAL LEVEL SETPOINT OF ULC1. THE UNIT WILL CONTINUE TO RUN AFTER THE LEVEL OF MATERIAL DROPS BELOW THE START LEVEL DIFFERENTIAL SETPOINT FOR A TIME DELAY SET IN THE PROGRAMMABLE RELAY. THE SCREEN WILL ALSO CYCLE OFF AND ON, OFF TIME FIRST, PER THE SCREEN REPEAT CYCLE TIMERS IN THE PROGRAMMABLE RELAY.

NOTE: ANY RUN OF THE SCREEN WILL RESET THE SCREENS REPEAT CYCLE OFF TIMER.

EMERGENCY STOP:

WHEN ANY OF THE E-STOP PUSHBUTTONS ARE PRESSED, THE SCREEN WILL STOP IMMEDIATELY AND THE CONTROL POWER ON LIGHT WILL DE-ENERGIZE. TO RESET, ENSURE ALL E-STOPS ARE ENABLED, AND PRESS THE SYSTEM RESET PUSHBUTTON.

REMOTE SYSTEM SHUTDOWN:

WHEN THE REMOTE SYSTEM SHUTDOWN SIGNAL IS RECEIVED THE SCREEN WILL STOP IMMEDIATELY AND THE CONTROL POWER ON LIGHT WILL DE-ENERGIZE. THE SYSTEM WILL RESET WHEN THE REMOTE SYSTEM SHUTDOWN SIGNAL IS REMOVED. A MANUAL RESET WILL NOT BE REQUIRED.

HIGH LEVEL ALARM:

WHEN THE UPSTREAM LEVEL REMAINS ABOVE THE HIGH UPSTREAM LEVEL SETPOINT OF ULC1 OR THE HIGH LEVEL FLOAT SWITCH FOR THE TIME SET IN THE HIGH LEVEL ON DELAY TIMER, THE HIGH LEVEL ALARM LIGHT WILL BE ILLUMINATED AND THE SCREEN WILL START TO RUN.

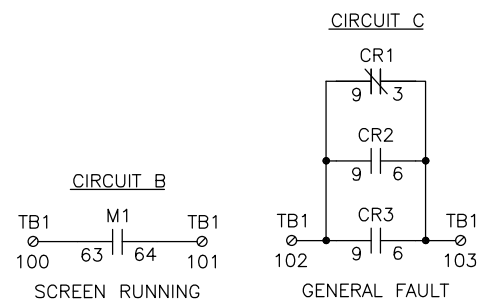
NOTE: THE SCREEN REPEAT CYCLE OFF TIMER WILL NOT RESET WHEN THE SCREEN IS CALLED TO RUN DUE TO A HIGH LEVEL CONDITION

FAULTS:

1. A FAULT OCCURS WHEN THE SCREEN CURRENT MONITOR IS TRIPPED.
 2. A FAULT OCCURS WHEN THE SCREEN MOTOR THERMAL OVERLOAD IS TRIPPED.
- WHEN FAULTS 1 OR 2 OCCUR, THE SCREEN WILL STOP IMMEDIATELY, AND THE SCREEN OVERLOAD LIGHT WILL BE ILLUMINATED.
 - FAULTS 1 AND 2 CAN BE RESET BY PRESSING THE SYSTEM RESET PUSHBUTTON.

NOTE: THE GENERAL FAULT CONTACT WILL CLOSE DUE TO ANY OF THE FOLLOWING CONDITIONS:

- FAULTS 1 OR 2 OCCUR
- HIGH UPSTREAM LEVEL ALARM
- ANY OF THE E-STOP PUSHBUTTONS ARE PRESSED
- THE REMOTE SHUTDOWN SIGNAL IS RECEIVED.
- INPUT POWER IS LOST



MAX. CONTROLLED LOAD: 10A @ 120VAC

NOTE: BRANCH CIRCUIT PROTECTION PROVIDED BY OTHERS PER N.E.C.

DEVICE SETTINGS

ULC1 - HYDRORANGER 200 W/DIFFERENTIAL LEVEL CONTROL

FUNCTION NUMBER	FUNCTION DESCRIPTION	DEFAULT	FACTORY SETTING
P000	LOCK	1954	
P001	OPERATION	3	4
P002	MATERIAL	1	
P003	01 MEASUREMENT RESPONSE	2	2
	02 MEASUREMENT RESPONSE	2	2
P004	01 TRANSDUCER	0	100
	02 TRANSDUCER	0	100
P005	UNITS	1	5
P006	01 EMPTY	26.2	*
	02 EMPTY	26.2	*
P007	01 SPAN	26.2	*
	02 SPAN	26.2	*
P060	01 DECIMAL POSITION	2	
	02 DECIMAL POSITION	2	
P070	FAIL SAFE TIMER	10.0 MIN	0.5 MIN
P071	01 FAIL SAFE LEVEL	HOLD	HI
	02 FAIL SAFE LEVEL	HOLD	LO
P100	RELAY CONFIGURATIONS	0	0
P110	01 RELAY 1 LEVEL SOURCE	1	1
	02 RELAY 2 LEVEL SOURCE	0	3
	03 RELAY 3 LEVEL SOURCE	0	1
P111	01 RELAY 1 FUNCTION	0	1
	02 RELAY 2 FUNCTION	0	1
	03 RELAY 3 FUNCTION	0	1
P112	01 RELAY 1 ON SETPOINT	0	*
	02 RELAY 2 ON SETPOINT	0	*
	03 RELAY 3 ON SETPOINT	0	*
P113	01 RELAY 1 OFF SETPOINT	0	*
	02 RELAY 2 OFF SETPOINT	0	*
	03 RELAY 3 OFF SETPOINT	0	*
P118	01 RELAY 1 LOGIC TYPE	2	3
	02 RELAY 2 LOGIC TYPE	2	3
	03 RELAY 3 LOGIC TYPE	2	3
P129	01 RELAY 1 RELAY FAILSAFE	OFF	DE
	02 RELAY 2 RELAY FAILSAFE	OFF	DE
	03 RELAY 3 RELAY FAILSAFE	OFF	DE

NOTES:

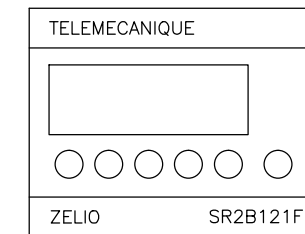
1. FACTORY SETTING "*" NOTES PARAMETERS SET IN THE FIELD.
2. "*" P210 IS THE DIFFERENTIAL LEVEL AT WHICH THE VFD WILL RUN AT LSP.
3. "*" P211 IS THE DIFFERENTIAL LEVEL AT WHICH THE VFD WILL RUN AT HSP.
3. THE ABOVE IS A PARTIAL LISTING OF SETPOINTS. REFER TO THE INSTRUCTION MANUAL FOR A COMPLETE PARAMETER LISTING.
4. ULC RELAYS WILL NOT CHANGE STATE ON POWER-UP WHEN P118 IS SET TO 3.

TIB1

DIP SWITCH	SET AT
S1	I
S2	I
S3	II

DEVICE SETTINGS

PR1 - I/O



PR INPUTS

11	POWER LOSS/ E-STOP
12	SCREEN RUNNING
13	SPARE
14	SCREEN OVERLOAD
15	START DIFF. LEVEL
16	HIGH LEVEL
17	SYSTEM RESET
18	REMOTE SYSTEM SHUTDOWN

PR OUTPUTS

Q1	SCREEN CALL TO RUN
Q2	SPARE
Q3	HIGH LEVEL ALARM
Q4	CONTROL POWER ENABLE

PR1 - SETTINGS

BIT REF.	DESCRIPTION	TIMER RESOLUTION	FACTORY SETTINGS
TT1-t	SCREEN LEVEL OFF DELAY TIMER	MIN:SEC	00:30
TT2-t	SCREEN REPEAT CYCLE OFF TIME	HR:MIN	01:00
TT3-t	SCREEN REPEAT CYCLE ON TIME	MIN:SEC	00:30
TT4-t	SCREEN HIGH LEVEL ON DELAY TIMER	MIN:SEC	00:30

NOTES:

1. ABOVE IS A LISTING OF ALL THE FIELD SELECTABLE SETTINGS IN THE CONTROLLER.

PR1 - SETPOINT CHANGE INSTRUCTIONS

TO ALTER THE VALUE OF A TIMER OR COUNTER:

1. PRESS THE GREEN "MENU/OK", PRESS ARROW DOWN TO "PARAMETER". PRESS "MENU/OK"
2. TO ACCESS THE REQUIRED TIMER PRESS THE "UP" ARROW KEY UNTIL THE DESIRED TIMER IS DISPLAYED.
3. PRESS THE "RIGHT" ARROW UNTIL TIME VALUE FLASHES.
4. MODIFY THE TIME VALUE USING THE "UP" OR "DOWN" ARROW KEYS.
5. VALIDATE THE CHANGES BY PRESSING THE "MENU/OK", PRESS "MENU/OK" AGAIN WHEN ASKED TO CONFIRM CHANGES.
6. PRESS "MENU/OK" TO RETURN TO MAIN SCREEN.

CM1 - CURRENT MONITOR

DIAL	SETTING
TRIP POINT	MIN
TRIP DELAY	MIN

NOTES:

1. THE CURRENT MONITOR DIAL SHALL BE SET TO MINIMUM FROM THE FACTORY.
2. FIELD CONFIGURATION SHALL BE PERFORMED BY THE STARTUP TECHNICIAN PER THE APPROPRIATE TECHNICAL DOCUMENT.

HTR1

HEATER ON/OFF	40 °F
---------------	-------

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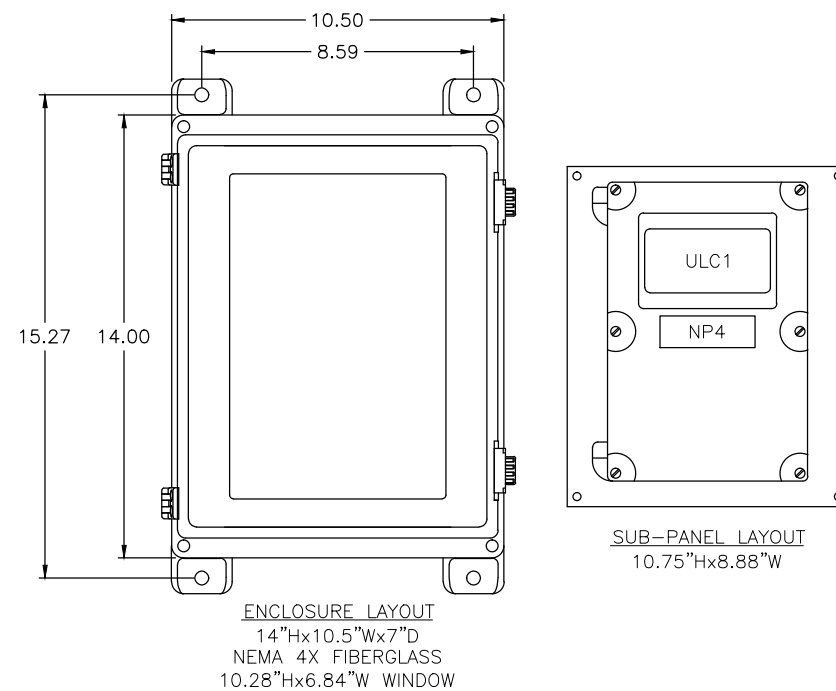
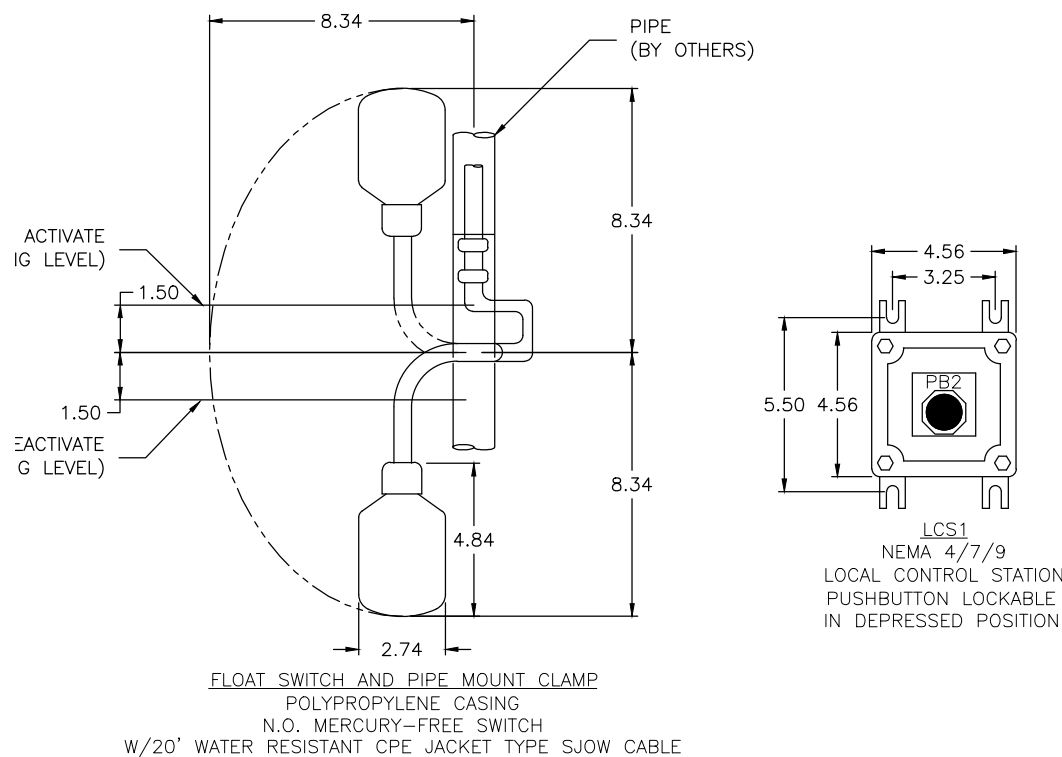
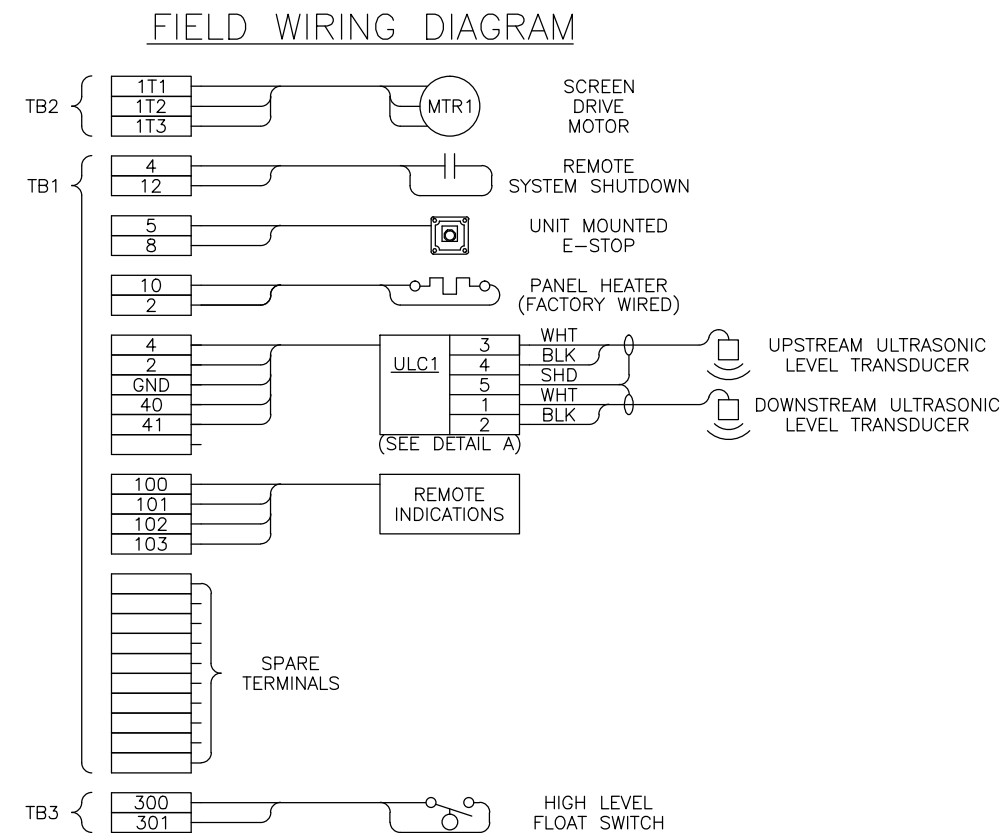
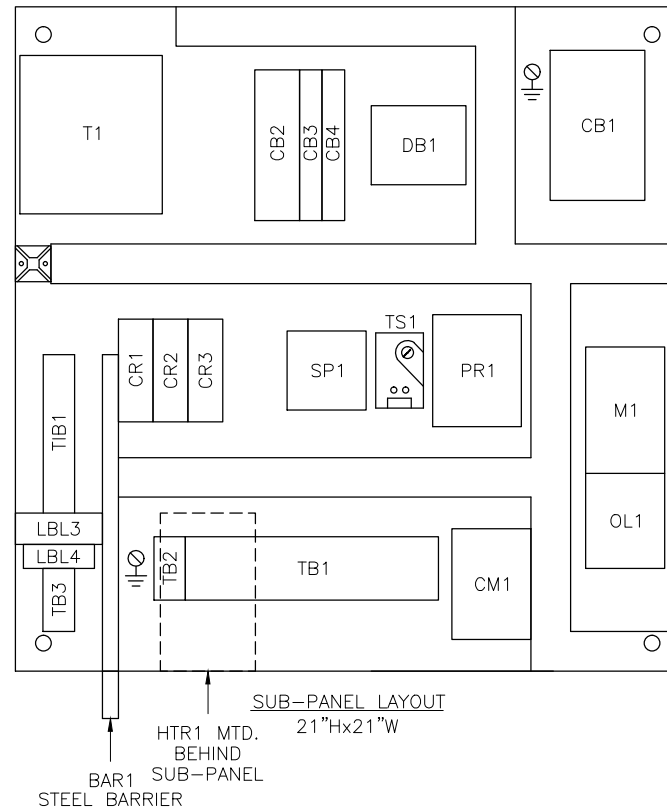
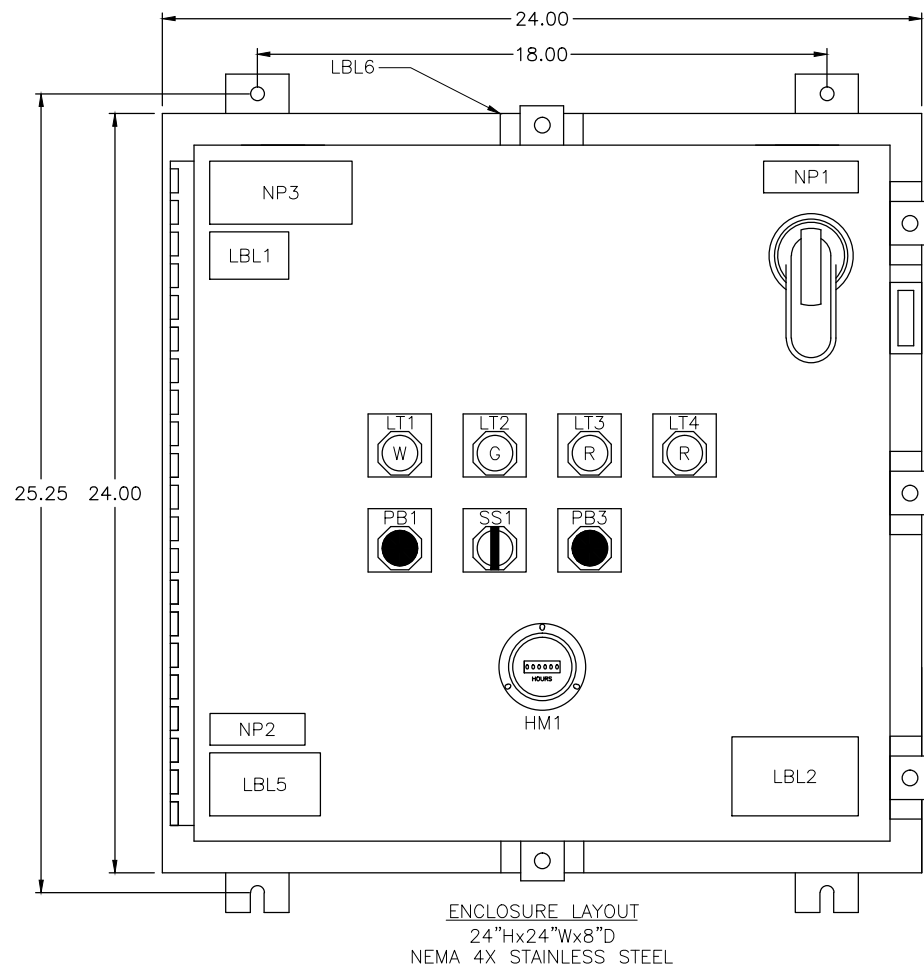
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PROJECT NAME	PROJECT NUMBER 201196
	FOUNTAIN, CO
REFERENCE INFORMATION	ELEMECH REF: PAR4732A3

TITLE	AQUA GUARD CONTROL PANEL
DRAWING NO	20119604/05
REV	



- PILOT DEVICE LEGEND PLATES:
- LT1 - CONTROL POWER ON
 - LT2 - SCREEN RUNNING
 - LT3 - SCREEN OVERLOAD
 - LT4 - HIGH LEVEL
 - PB1 - EMERGENCY STOP
 - PB2 - EMERGENCY STOP
 - PB3 - SYSTEM RESET
 - SS1 - SCREEN HAND-OFF-AUTO
- NAMEPLATES:
- NP1 - 480VAC-3PH-60HZ
 - NP2 - INTRINSICALLY SAFE CIRCUITS
 - NP3 - CONTROL PANEL PROVIDES INTRINSICALLY SAFE CIRCUIT EXTENSIONS FOR USE IN CLASS I, GROUPS A, B, C, D; CLASS II, GROUPS E, F, G; CLASS III HAZARDOUS LOCATIONS WHEN CONNECTED PER PEPPERL & FUCHS INSTALLATION DRAWING NO. 116-0145
 - NP4 - ULTRASONIC LEVEL CONTROLLER
- LABEL DESCRIPTION:
- LBL1 - WARNING: MULTIPLE SUPPLY SOURCES OPEN ALL DISCONNECTS BEFORE SERVICING EQUIPMENT OR OTHER UNIT WIRING.
 - LBL2 - DANGER HIGH VOLTAGE ENTRY BY QUALIFIED PERSON ONLY
 - LBL3 - WARNING SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY
 - LBL4 - INTRINSICALLY SAFE FIELD WIRING TERMINALS
 - LBL5 - ELEMCH ELECTRICAL CONTROL SYSTEMS
 - LBL6 - NOTICE:
- PENETRATIONS TO CONTROL CABINETS MUST BE FITTED WITH TYPE 4 FITTINGS, MYERS BRAND OR EQUAL
- ALL INTERIOR DEVICES MUST BE PROTECTED FROM INSTALLATION DEBRIS
- FAILURE TO ADHERE TO INSTRUCTIONS WILL VOID WARRANTY

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PROJECT NAME	TITLE
PROJECT NUMBER 201196 FOUNTAIN, CO	AQUA GUARD CONTROL PANEL
REFERENCE INFORMATION	DRAWING NO
ELEMCH REF: PAR4732A4	20119604/05

Equipment Bill of Materials

Material List

Date : 06-30-11 [13:20]		Mat'l LIST			Page: 1				
Parkson Live Data									
Project : 201196 Lower Fountain MSDD									
E-Item : 20119601 2AGMNA75/4,2.5X9,3mm									
(2) AQUA GUARD SCREEN									
W/ CONTROLS									
E-Item Revision: 0 INITIAL RELEASE									
Drawing/Spec Reference: 20119601-.DWG									
Pos.	Item	Rev	Drawing/Spec	Dwg Size	Description	Mat'l	Qty	Unit	
10	20119602	0	20119602-.DWG	B	MAIN ASSY #1,AGMNA75,304,RH MODEL: MN FRAME STYLE: A ANGLE: 75 MACHINE WIDTH "A": 2'-4 1/2" DISCHARGE HEIGHT: 9' ELEMENT SIZE: 3mm DRIVE SIDE: RIGHT HAND	304	1	ea	
					1) STAMP NAMEPLATE WITH THE FOLLOWING INFORMATION IN 3/16" HIGH LETTERS: (PRODUCT) AQUAGUARD (MODEL) AGMNA75,2.5X9,3 (SERIAL) 20119602 (1ST BLANK LINE) PROJECT 201196 (2ND BLANK LINE) SC-1				
					2) MOUNT DRIVE ASSY TO UPSTREAM HOLES IN UPPER FRAME.				
20	20119603	0	20119602-.DWG	B	MAIN ASSY #2,AGMNA75,304,RH MODEL: MN	304	1	ea	

Material List

Date : 06-30-11 [13:20]		Mat'l LIST			Page: 3				
Parkson Live Data									
E-Item : 20119601		2AGMNA75/4,2.5X9,3mm							
Pos.	Item	Rev	Drawing/Spec	Dwg Size	Description	Mat'l	Qty	Unit	
					DIM A=33.25				
					DIM B=28.25				
					DIM C=3				
					DIM D=10.375				
					DIM E=31.125				
					DIM F=10				
100	0000115	0			Bolt,Hex,3/8-16x1 1/4,316	316	20	ea	
110	0000690	0			Washer,Flat,3/8,316	316	20	ea	
120	20119614	0	2952-001-004-.DWG	B	ANGLE,FLANGE,DISCHARGE	304	2	ea	
130	1107-346-004/6	0	1107-346-004.DWG		PLATE,MOUNTING,LEVEL SENSOR	316	4	ea	
140	3540-019/P	0	3540-019-.DWG	A	ADAPTOR,FEMALE,2 FNPTX2 SOC	Plasti	8	ea	
150	0002649	5	A00591A.DWG	B	SERVICE FIXTURE SET	A-36	(2	set	
					Set consists of one (1) AS part and one (1) OH part.				
160	20119604	0	20119604-.DWG	B	CONTROL PANEL #1	304	1	ea	
170	20119605	0	20119605-.DWG	B	CONTROL PANEL #2	304	1	ea	
180	20119699	0			SPARE PARTS		1	ea	
					NOTE:				
					1. Pack the spare parts in a wooden box; label with manufacturer's name and local representative's name, address, and telephone number; and attach list of Mat'ls contained therein.				

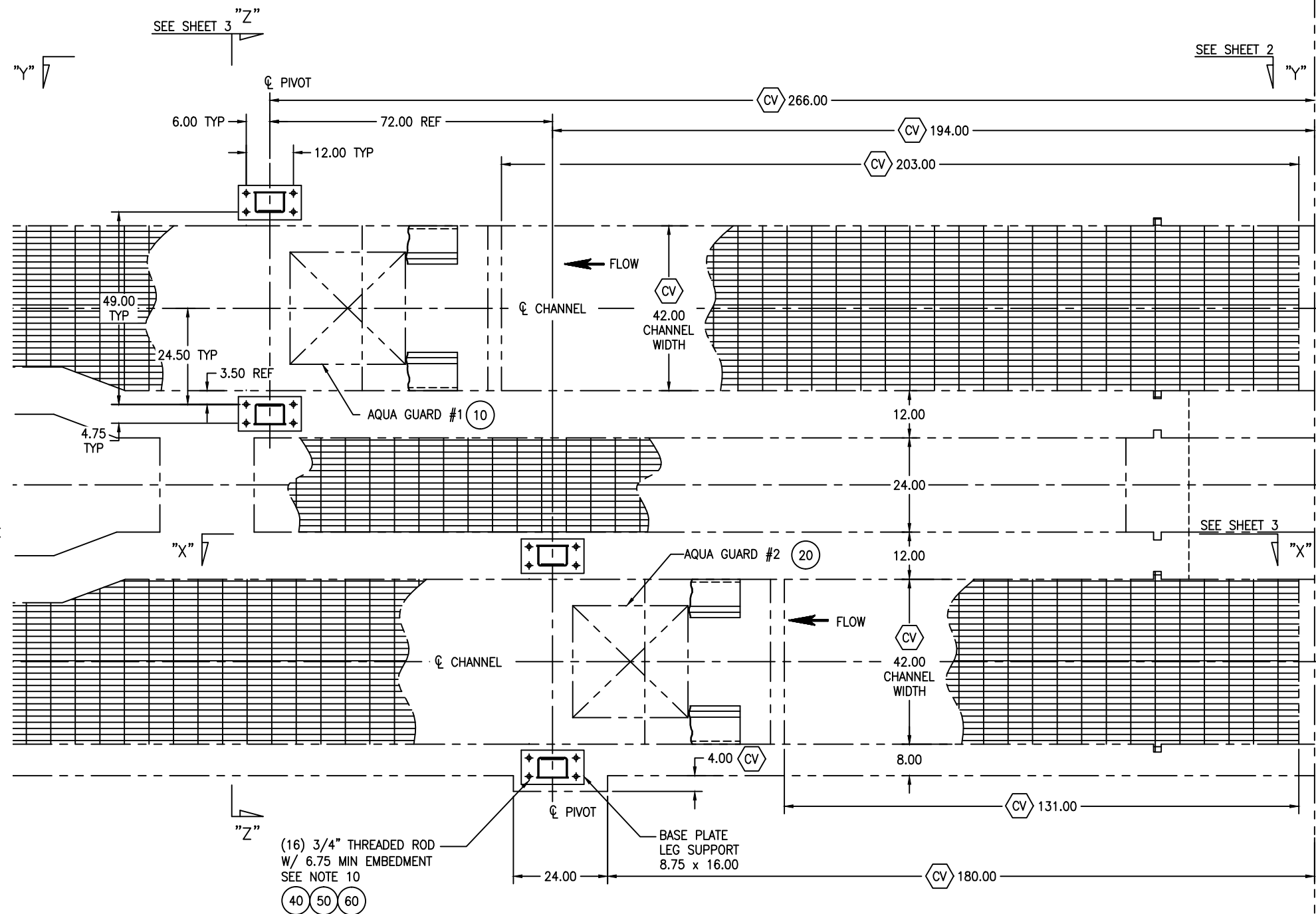
Equipment Drawings

NOTE:

1. SCREEN SPEED 6 FPM.
UNIT WEIGHT: 2236 LBS. EACH
2. OVERLOAD PROTECTION - SSAC CURRENT MONITOR.
3. 2'-6" CLEARANCE REQUIRED ON ONE SIDE OF MACHINE TO DISASSEMBLE SCREEN. USE SERVICE FIXTURE (ITEM #150) TO HOLD SCREEN IN PLACE WHEN DISASSEMBLING.
4. MOUNT LEVEL SENSORS TO SUIT. LEVEL SENSORS SUPPLIED WITH CONTROL PANEL. 1" NOMINAL PIPE SUPPLIED BY OTHERS THAN PARKSON.
5. ITEMS 130 THROUGH 180 ARE NOT SHOWN. SEE MATERIAL LIST FOR DESCRIPTION AND QUANTITY OF ALL NUMBERED ITEMS.
6. PROVIDE INTERCONNECTING WIRING TO ALLOW PIVOTING OF MACHINE (BY OTHERS THAN PARKSON).
7. MINIMUM DISTANCE REQUIRED TO PIVOT MACHINE OUT OF CHANNEL. FLOORING, AND CONNECTING CHUTE MUST BE REMOVED TO ALLOW PIVOTING OF MACHINE OUT OF CHANNEL (BY OTHERS THAN PARKSON).
8. CONTRACTOR TO FIELD VERIFY ALL DIMENSIONS PRIOR TO INSTALLATION.
9. LOCAL CONTROL STATION SHIPPED LOOSE WITH CONTROL STATION. CUSTOMER TO MOUNT IN THE FIELD TO AN APPROPRIATE LOCATION.
10. MINIMUM EMBEDMENT DEPTHS SHOWN ON ANCHOR DETAIL (SHEET 1) IS FOR USE WITH HILTI HY-150MAX ADHESIVE SYSTEM (EPOXY BY OTHERS).
11. UNIT IS SUPPORTED AT THE OPERATING ELEVATION AND AT THE UNIT'S BASE. UNIT BASE PLATE SHALL REST FLUSH TO THE BOTTOM OF THE CHANNEL OVER THE WIDTH AND DEPTH OF THE FRAME. GROUT UNDER FRAME AND SUPPORT LEG AT THE OPERATING ELEVATION AS REQUIRED.
12. REFERENCE INFORMATION

AQUA GUARD #1 (SC-1)	P/N 20119602
AQUA GUARD #2 (SC-2)	P/N 20119603
CONTROL PANEL #1	P/N 20119604
CONTROL PANEL #2	P/N 20119605

CV CONTRACTOR TO VERIFY DIMENSION FOR APPROVAL.



PLAN VIEW

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REV	DESCRIPTION	DATE	BY

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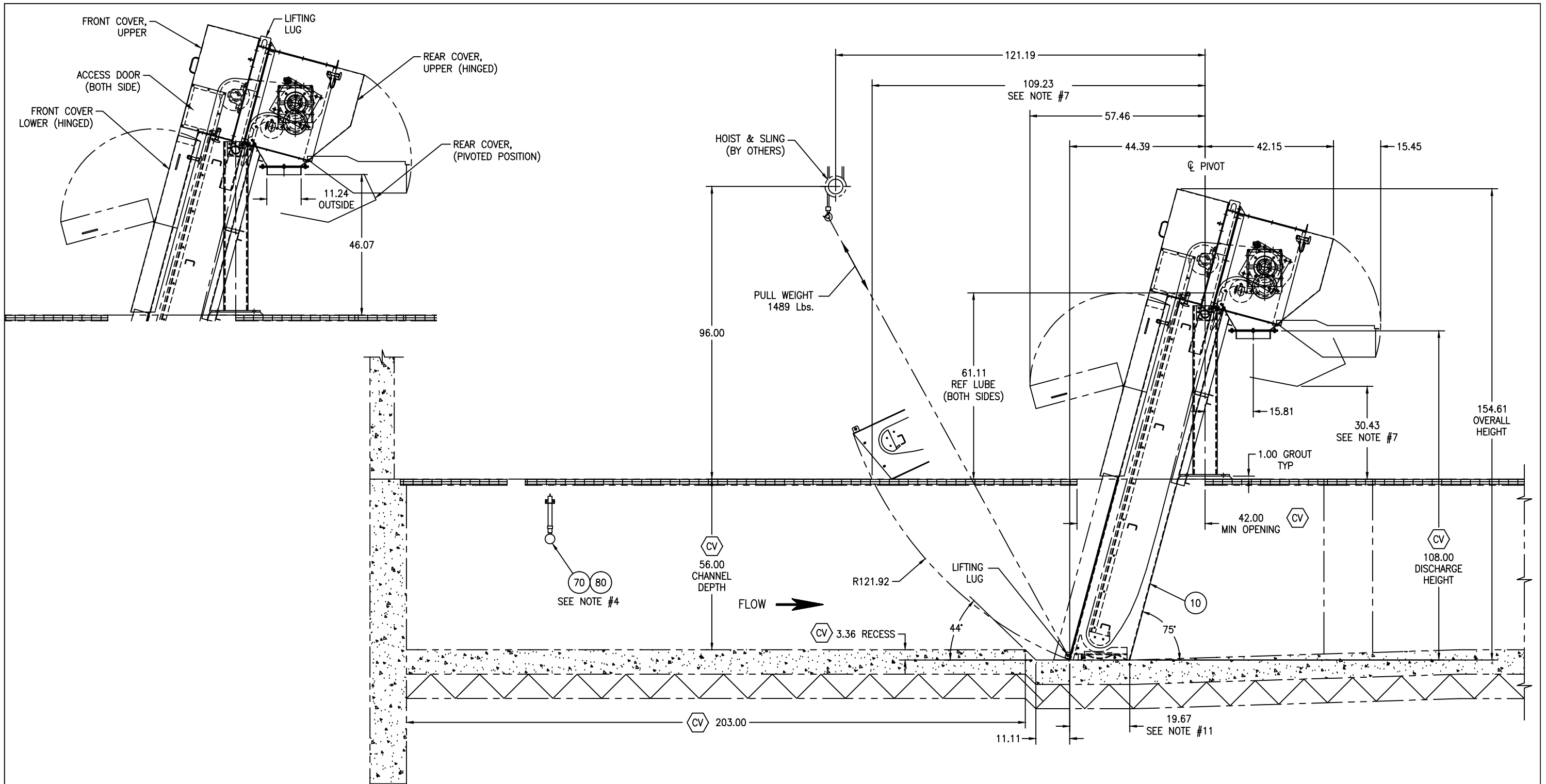
DRAWN BY	DATE
RSS	06/16/11
CHECKED BY	DATE
ADR	06/23/11
SCALE	SIZE
3/8"=1'	B



PROJECT NAME
 PROJECT NUMBER 201196
 HAROLD D. THOMPSON REGIONAL
 WATER RECLAMATION FACILITY
 FOUNTAIN, CO

REFERENCE INFORMATION
 SPECIFICATION SECTION: 11331
 SEE NOTE #12

TITLE AQUA GUARD® SCREEN GENERAL ARRANGEMENT AG-MN-A 75', 2.5'(W) X 9'(DH), 3mm	DRAWING NO 20119601	REV



AQUA GUARD #1
SECTION Y-Y
DRIVE SIDE SHOWN

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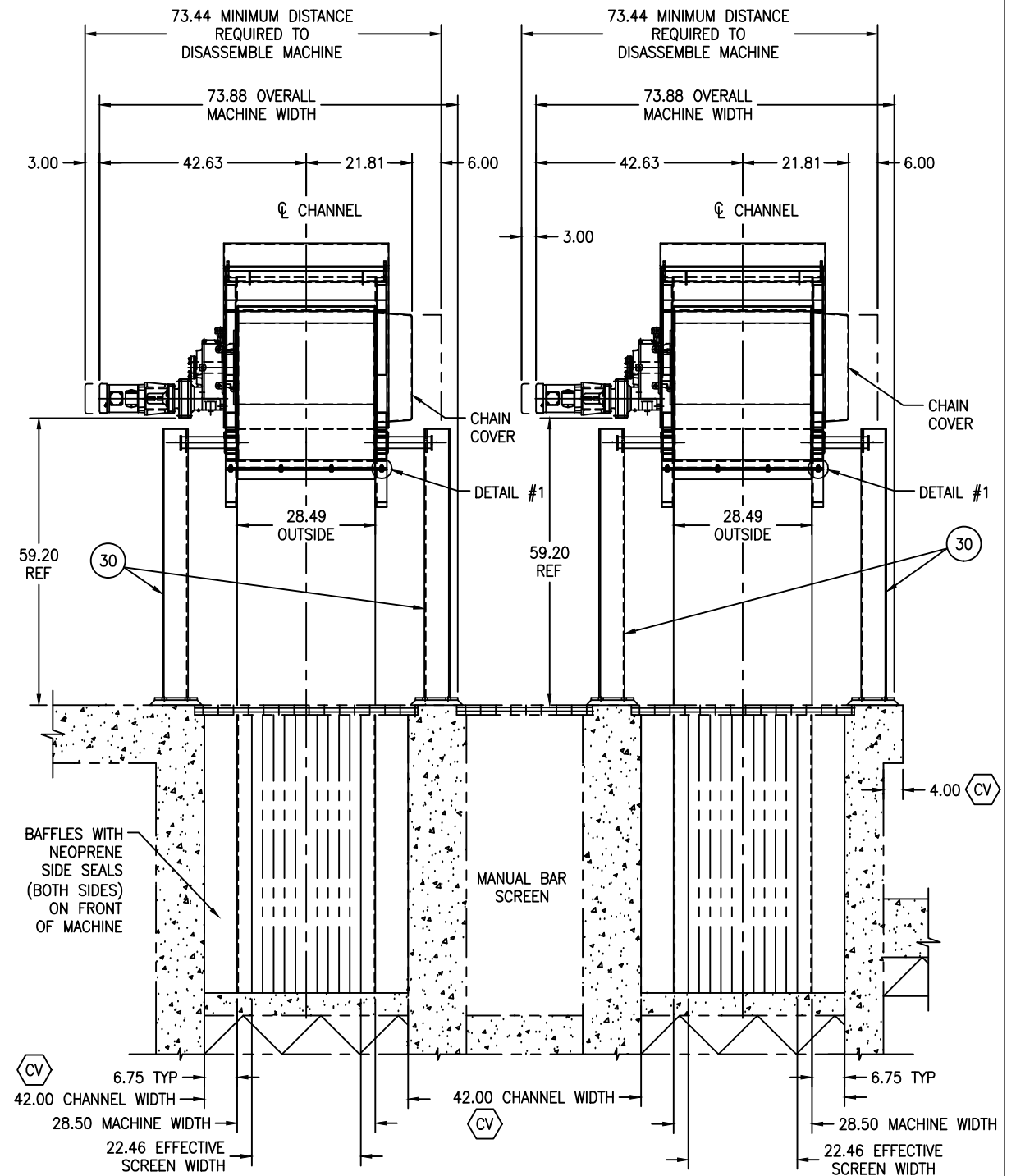
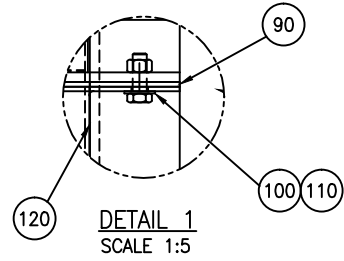
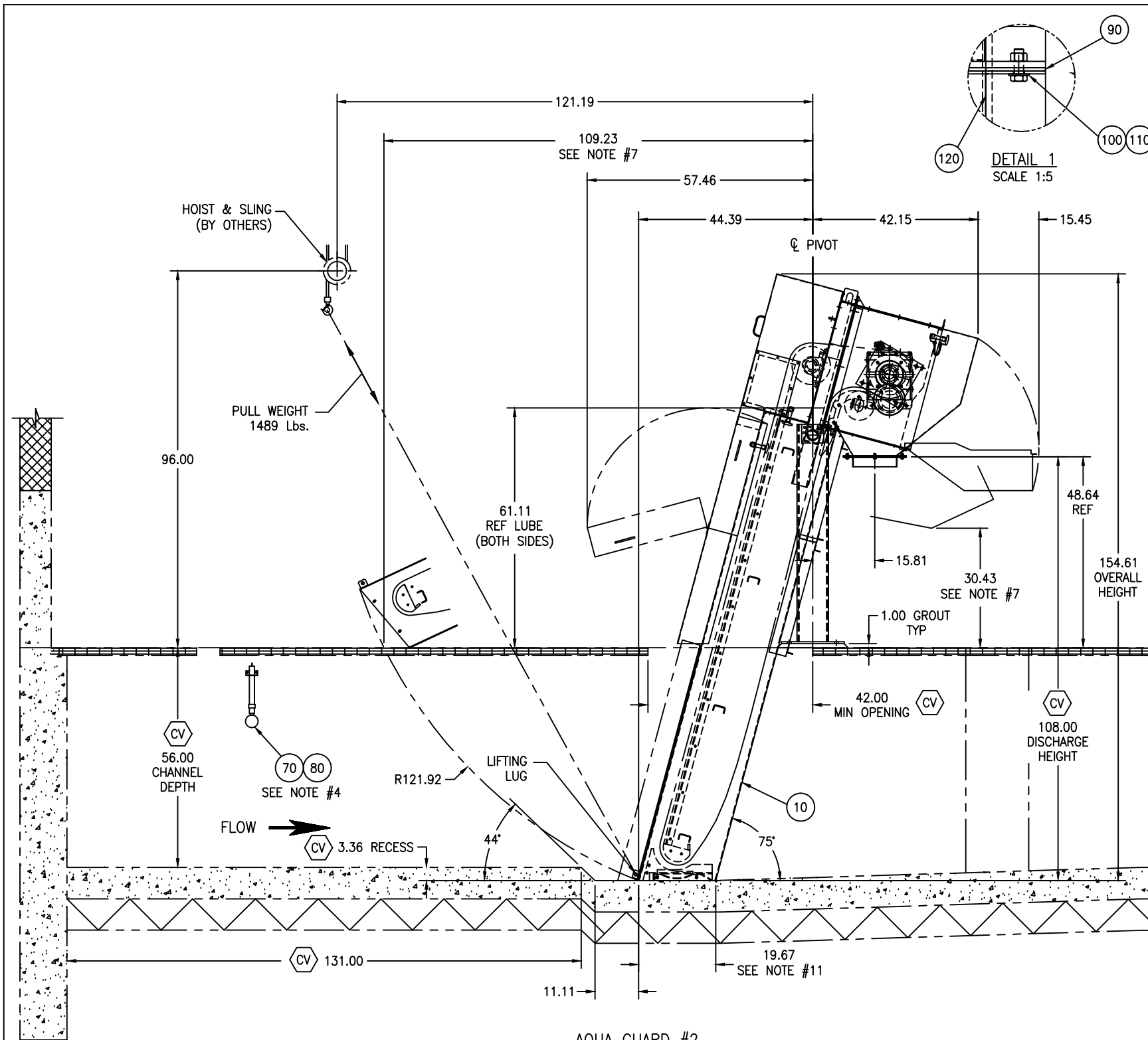
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PROJECT NAME
PROJECT NUMBER 201196
HAROLD D. THOMPSON REGIONAL WATER RECLAMATION FACILITY
FOUNTAIN, CO
REFERENCE INFORMATION
SPECIFICATION SECTION: 11331
SEE NOTE #12

TITLE	AQUA GUARD® SCREEN
GENERAL ARRANGEMENT	AG-MN-A 75°, 2.5'(W) X 9'(DH), 3mm
DRAWING NO	20119601
REV	SHEET 2 OF 3



AQUA GUARD #2
SECTION X-X
DRIVE SIDE SHOWN

SECTION Z-Z
REAR ELEVATION

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REV	DESCRIPTION	DATE	BY

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3/8"=1'	B



PROJECT NAME
PROJECT NUMBER 201196
HAROLD D. THOMPSON REGIONAL
WATER RECLAMATION FACILITY
FOUNTAIN, CO

REFERENCE INFORMATION
SPECIFICATION SECTION: 11331
SEE NOTE #12

TITLE	REV
AQUA GUARD® SCREEN GENERAL ARRANGEMENT AG-MN-A 75', 2.5'(W) X 9'(DH), 3mm	
DRAWING NO	
20119601	
SHEET 3 OF 3	