

**GMS, INC.**  
CONSULTING ENGINEERS  
611 NORTH WEBER, SUITE 300  
COLORADO SPRINGS, COLORADO 80903-1074

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MARK A. MORTON, P.E.  
JASON D. MEYER, P.E.

March 14, 2013

Mr. Wes Weaver, President  
Weaver Construction Management, Inc.  
c/o Garney Construction  
7911 Shaffer Parkway  
Littleton, CO 80127

*Via Email to: wes@weavercm.com  
No Hard Copy to Follow*

Re: Harold D. Thompson Regional Water Reclamation Facility (HDTRWRF)  
Lower Fountain Metropolitan Sewage Disposal District (LFMSDD)

Dear Wes:

Reference is made to your shop submittal identified as follows:

|                        |                          |
|------------------------|--------------------------|
| Submittal No.:         | 14500-001                |
| Date of Submittal:     | March 8, 2013            |
| Title:                 | Sludge Belt Conveyor     |
| Specification Section: | 14500                    |
| Manufacturer:          | Serpentix Conveyor Corp. |

The referenced submittal has been stamped "**Revise and Resubmit**". Our comments are as follows:

1. The WCMI Additional Submittal Review Comments Letter included in this submittal contains five items requiring a response from the conveyor manufacturer. These items are summarized below. Please include responses to these items in the resubmittal package.
  - a. Verify conveyor motor enclosure type to be TEFC.
  - b. Conveyor motor is rated for elevation 3,300 feet. Verify motor will operate properly at site elevation of 5,430 feet.
  - c. Control panel did not include the required overtorque fault indication. Refer to subsequent comments of this letter regarding the overtorque protection and fault indication.
  - d. Verify colors of control panel pilot devices.
  - e. Conveyor manufacturer to provide details for the conveyor support connection to the supplemental building frame members. Refer to subsequent comments of this letter regarding the connection requirements.
2. The submittal documents do not appear to include detailed information on the clutch mechanism utilized in the drive station for overtorque protection. Please provide details on the overtorque protection system and the means by which an overtorque condition will be indicated to the operators.
3. The following items pertain to equipment submittal drawing 1 of 3.
  - a. In the Elevation View, the end drip pan of the drive station must be shortened in order to avoid interference with the screw conveyor inlet chute.

- b. Revise the length of skirt boards to be a minimum of 8' in order to properly contain all cake discharged from the belt filter press.
  - c. Revise the material of the weather seal assembly. Refer to subsequent comment No. 4.f.
  - d. Revise the Suspended Support Connection Note as necessary to address the conveyor support connection to the supplemental building frame members. Refer to subsequent comment No. 4.b.
4. The following items pertain to equipment submittal drawing 2 of 3.
- a. In Section A-A, the dimensions 3'-0<sup>1</sup>/<sub>8</sub>" and 1'-0<sup>1</sup>/<sub>16</sub>" for the supplemental building frame members varies from the Project Drawings by the fractional inch given. We take no exception to these dimensions. However, these dimensions must be closely coordinated with the building manufacturer to ensure the conveyor support connection to the supplemental building frame members is properly dimensioned and fabricated.
  - b. In Section A-A, the conveyor support connection to the supplemental building frame members indicates a field weld requirement. Please provide a bolted connection at this point as required by the Project Drawings in order to avoid field welding wherever possible.
  - c. The dimensions given on this drawing indicate a bottom of beam elevation of 5434.38 for the bottom of supplemental building frame members at their connections to the conveyor supports. That elevation is given for both supplemental building frame members and it differs from the Project Drawing elevations of 5434.56 and 5434.44. Minor adjustments to these elevations are acceptable. However, the exact connection elevation must be closely coordinated between the building manufacturer and the conveyor supplier to ensure proper fabrication and installation of all building members and conveyor supports.
  - d. The dimensions on this drawing indicate specific width and depth dimensions for the supplemental building frame members. These dimensions shall be coordinated and verified with the building manufacturer.
  - e. In the Weather Seal Detail, the 1'-8" dimension from datum point to edge of supplemental building frame member should be 1'-8<sup>1</sup>/<sub>16</sub>" according to the dimensions given in Section A-A and referenced in previous comment No. 4.a. Please verify and revise accordingly.
  - f. The weather seal proposed at the wall opening for the belt conveyor is submitted as a galvanized metal structure. Please provide the weather seal constructed from neoprene or other flexible elastomer sheet with stainless steel fastening plates in accordance with the Project Specifications.
  - g. The weather seal proposed does not provide clearance for the contents of the conveyor. Please provide the necessary open space in the weather seal to allow all conveyor contents to pass through the wall opening without being disrupted or dislodged from the conveyor belt pans. Field adjusting and/or trimming of the weather seal may be necessary to accomplish this requirement.

- h. In Section B-B, the conveyor manufacturer is recommending the use of an extension chute on the belt filter press to offset the cake discharge from the press frame and toward the center of the belt conveyor. The scraper blade and deflector shown at the discharge end of the belt filter press on the Project Drawings is intended to accomplish this same goal. WCMI shall coordinate with the belt press manufacturer to ensure the proper equipment is supplied to direct the cake discharge away from the press frame and toward the center of the belt conveyor.
  - i. In Section B-B, revise the outside skirt board of the belt conveyor to extend higher than the inside skirt board according to Section B/BH-8 of the Project Drawings.
  - j. In Section C-C, the containment curb notch-out for the drip pan is shown at a length of 2'-9". The Project Drawings require a notch length of 3'-0". Please revise accordingly.
- 5. Revise equipment submittal drawing 3 of 3 with regard to the skirt board length as described previously in comment No. 3.b.
  - 6. Revise control panel submittal drawings L01 and E01 as necessary to address the indication of an overtorque condition as previously described in comment No. 2.
  - 7. Revise control schematic drawing E01 as necessary to provide an analog output to indicate motor current draw for the belt conveyor as required by the Project Specifications. WCMI shall coordinate with their instrumentation and controls subcontractor as to who will provide the equipment for the current indication, as well as the means by which the current draw will be indicated in the facility's SCADA system.

Please call if you should have any questions.

Sincerely,



Mark A. Morton, P.E.

MAM/kmw

ec (letter only):

Mr. Jim Heckman, Manager, LFMSDD, [lfmanager@lfmsdd.org](mailto:lfmanager@lfmsdd.org)

Ms. Cindy Murray, Office Manager, Fountain Sanitation District, [fsdistrict@fsd901.org](mailto:fsdistrict@fsd901.org)

Mr. Jeff Burst, Project Supt., Weaver Construction Management, Inc., [jeff@weavercm.com](mailto:jeff@weavercm.com)

Mr. John Jacob, Project Mgr., Weaver Construction Management, Inc., [john@weavercm.com](mailto:john@weavercm.com)

Mr. Adam Roeder, Weaver Construction Management, Inc., [aroeder@weavercm.com](mailto:aroeder@weavercm.com)

Mr. Gerardo Gomez, Garney Construction, [ggomez@garney.com](mailto:ggomez@garney.com)

Ms. Solange Huggins, Project Engineer, Garney Construction, [shuggins@garney.com](mailto:shuggins@garney.com)

cc (letter only): Mr. Jerry Miller, Resident Project Representative, GMS, Inc.



**Weaver**

CONSTRUCTION MANAGEMENT

3679 S Huron Street, Suite 404 Englewood, Colorado 80110  
Phone: (303) 789-4111 FAX: (303) 789-4310

**SUBMITTAL TRANSMITTAL**

March 8, 2013

**Submittal No: 14500-001**

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

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

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

CONTRACTOR: **Serpentix Conveyor Corporation**  
9085 Marshall Ct.  
Westminster, CO 80031  
Robert D. Nusz, President  
  
Office: 303-430-8427  
Direct: 303-446-7973  
www.serpentixconveyor.com

SUBJECT: Belt Conveyor

SPEC SECTION: 14550

PREVIOUS SUBMISSION DATES:

DEVIATIONS FROM SPEC: \_\_\_ YES X NO

CONTRACTOR'S STAMP: This submittal has been reviewed by Weaver Construction Management and, unless indicated otherwise, has been found to be in conformance with the intent of the contract documents.

Contractor's Stamp:

Date: 3/8/13

Reviewed by: Solange Huggins

( ) Reviewed Without Comments

( x ) Reviewed With Comments

Engineer's Stamp:



ENGINEER'S  
COMMENTS:

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**Project: HDTWRF Project**

**Location: Fountain, CO**

**Supplier: Serpentix**

**Date: 3/7/13**

**Submittal: Belt Conveyor-14550-01**

**Additional Submittal Review Comments:**

- 1) Per 2.2 D. 2. c –Motor enclosure type is specified as TEFC, nameplate motor data sheet shows the enclosure as TE, but elsewhere in the submittal it is shown TEFC. Supplier to confirm that motor enclosure will be TEFC.
- 2) Per 1.5 B. 6- Job Conditions, site elevation is shown as 5,430'; rating on motor is at 3,300'. We have been told that because of the size of the motor, this should not be an issue.
- 3) Drawing L01 of the control panel is missing a button identified as "Overtorque Fault".
- 4) Supplier to verify that color of buttons on panel complies with specification.
- 5) Coordination with building manufacturer is required. In reference to the note from Serpentix on drawing P2-13-1099, sheet 1 of 3, Serpentix will be providing the support connections to the building frame for support of the belt conveyor. Engineered drawings are forthcoming by Serpentix.

**Reviewed by Solange Huggins**

**End of Review**



# SERPENTIX CONVEYOR CORP.

9085 Marshall Court | Westminster, CO 80031-2920 – USA  
Toll Free: 1.800.466.7979 | Direct: 303.430.8427 | Fax: 303.430.7337 | [serpentixconveyor.com](http://serpentixconveyor.com) | Email: [conveyors@serpentix.com](mailto:conveyors@serpentix.com)

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March 6, 2013

Weaver Construction Management, Inc.  
3679 South Huron St, Suite 404  
Englewood, CO 80110  
[john@weavercm.com](mailto:john@weavercm.com)  
Cell Phone: 303-917-4593  
Fax: 303-789-4310

Attention: Mr. John Jacob  
Project Manager

Reference: HDTWRF  
**Submittal No. 1**  
Your P.O. #9103-14550 Dated: 2-1-13  
Specification Section: 14550  
Our Job No.: P2-13-1099

Dear Mr. Jacob:

Enclosed is our submittal for the sludge conveyor. All equipment and materials comply with specification section 14550. Please verify all dimensions, and coordinate as necessary with all subcontractors and equipment suppliers to insure equipment compatibility.

Upon our receipt of all drawings and submittal data approved, we will require 14-16 weeks to fabricate and ship this equipment. Please schedule accordingly.

Please contact me if you have any questions regarding this equipment. Thank you.

Sincerely,

Robert D. Nusz  
Project Manager

Enc.: 2 sets of submittals / 1 electronic submittal copy

cc: Mr. Scott Marshall, Miscowater



Wednesday March 6<sup>th</sup>, 2013

## Serpentix Job Name: Lower Fountain, CO Submittal No. 1

- CONTRACTOR/PURCHASER: **Garney Companies, Inc.**
- PURCHASE ORDER NUMBER: **9103-14550**
- OUR JOB NUMBER: **P2-13-1099**
- SPECIFICATION SECTION: **14550**

### **STANDARD CATALOG DATA**

- Electric Motor Data Sheets
- Gear Reducer Data Sheets
- Safety Stop Switch Data Sheets
- Zero Motion Speed Switch Data
- Serpentix Data Sheets regarding main components  
(Drive Station, Scraper, Tension Station, Spare Parts)

### **GENERAL ARRANGEMENT DRAWINGS**

- **P2-13-1099-D Sheet 1 of 3** General Conveyor Configuration with Track, Support and Miscellaneous Bill of Material Call-Outs
- **P2-13-1099-D Sheet 2 of 3** End View Details and Control Panel
- **P2-13-1099-D Sheet 3 of 3** Standard Moving Parts and Standard Accessory Bill of Material Call-Outs



# Drive Station Motor



**SERPENTIX CONVEYOR CORP.®**

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**General Purpose**  
**Three Phase, Totally Enclosed Fan Cooled (TEFC)**  
**Hostile Duty®**  
**Premium Efficient**

**List Price:**  
**Discount Symbol: DS-3XE**  
**Weight: 50 lbs**  
**[Catalog Page \(PDF\)](#)**

**Catalog Number: H2P2D Model: AS73**

**Technical Data**

|  |                                      |                           |                  |
|--|--------------------------------------|---------------------------|------------------|
| <b>Hp:</b> 2                           | <b>Phase:</b> 3                      | <b>Volts:</b> 208-230/460 | <b>HZ:</b> 60/50 |
| <b>RPM:</b> 1750                       | <b>Amps:</b> 6-5.7/2.8               |                           |                  |
| <b>Insul Class:</b> F                  | <b>SF:</b> 1.15                      | <b>SFA:</b> 6.7-6.2/3.1   |                  |
| <b>Max Ambient:</b> 40                 | <b>NEMA Frame:</b> 145T              | <b>Encl:</b> TE           | <b>Code:</b> M   |
| <b>Shaft End Bearing:</b> 6205-2Z-J/C3 | <b>Opp End Bearing:</b> 6203-2Z-J/C3 |                           |                  |
| <b>NEMA Nom Eff:</b> 86.5              | <b>Thermally Protected:</b> N/A      | <b>Type:</b> CTE          |                  |

The information you have requested is currently not available electronically. Please contact your Nidec Customer Service Representative or call 1-888-637-7333.

**Motor Specifications**

|                     |                    |
|---------------------|--------------------|
| <b>Electrical</b>   |                    |
| Break Down Torque   | 506 PERCENT OF FLT |
| Locked Rotor Torque | 395 PERCENT OF FLT |
| Locked Rotor Amps   | 26.2               |
| <b>Mechanical</b>   |                    |
| Mounting            | HORZ-FOOTED        |

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The motor shown is representative of the product family and not specifically the individual rating.  
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# General Purpose Three Phase, Totally Enclosed Fan Cooled (TEFC) Hostile Duty NEMA Premium<sup>®†</sup> Efficient – IE3



GENERAL PURPOSE UNIMOUNT  
GENERAL PURPOSE HOSTILE DUTY  
GENERAL PURPOSE CORRO-DUTY  
GENERAL PURPOSE 841 PLUS  
GENERAL PURPOSE e-LINE  
GENERAL PURPOSE OPEN DRIPPROOF  
GENERAL PURPOSE HAZARDOUS LOCATION  
GENERAL PURPOSE AUTOMOTIVE DUTY  
COOLING TOWER DUTY  
HAZARDOUS LOCATION  
C-FACE MOTORS  
VARIABLE FREQUENCY

## APPLICATIONS:

For pulp & paper plants, saw mills, mines, foundries, chemical plants, waste management facilities, and other process-related industries requiring protection within harsh operating conditions.

## FEATURES:

- World Motor<sup>®</sup> Features, Except Where Noted
- Class F Insulation, Class B Rise At Full Load On 60 Hertz Sine Wave Power
- Cast Iron Frame (140: Rolled Steel), Cast Iron End Brackets
- Corrosion Resistant Mill & Chemical Duty Paint
- Stainless Steel Nameplate (with CE Mark) & Zinc Plated Hardware
- Shaft Slinger On Pulley End For IP54 Protection
- Dual Voltage 230/460 Volts (1-100 HP)
- 40°C Ambient, NEMA<sup>®†</sup> Design B Performance On 60 Hertz Sine Wave Power
- Regreasable Ball Bearings 250 Frame & Up, Lifting Provisions 180 Frame & Up
- Double Shielded Bearings 140-360, Open On 400-440
- 1.15 Service Factor @ 60 Hz
- Steel Fan Cover & Conduit Box
- Field Convertible To F2 Mounting 180 Frame & Larger
- Condensation Drains With Plastic Plugs
- Conversion Kits: All Cast Iron Upgrade, C&D Flanges, Drip Cover Kits (except 320-360), See Pages 260-266

| HP    | RPM  | Voltage     | Frame | Catalog Number | List    | Discount Symbol | "C" Dim. (inches) | Ship Wt. (lbs.) | Full Load Eff. | Full Load Amps | Notes   |
|-------|------|-------------|-------|----------------|---------|-----------------|-------------------|-----------------|----------------|----------------|---------|
| 1     | 1800 | 200         | 143T  | H1P2H          | \$969   | DS-3XE          | 13.1              | 45              | 85.5           | 3.4            |         |
|       | 1800 | 208-230/460 | 143T  | H1P2D          | \$969   | DS-3XE          | 13.1              | 45              | 85.5           | 3.2-3/1.5      | 03      |
|       | 1800 | 575         | 143T  | H1P2G          | \$969   | DS-3XE          | 13.1              | 45              | 86.5           | 1.1            |         |
|       | 1200 | 200         | 145T  | H1P3H          | \$1,083 | DS-3XE          | 13.1              | 70              | 82.5           | 4.1            |         |
|       | 1200 | 208-230/460 | 145T  | H1P3D          | \$1,083 | DS-3XE          | 13.1              | 50              | 82.5           | 3.6-3.5/1.8    | 03      |
|       | 1200 | 575         | 145T  | H1P3G          | \$1,083 | DS-3XE          | 13.1              | 50              | 82.5           | 1.4            |         |
| 1-1/2 | 3600 | 200         | 143T  | H32P1H         | \$884   | DS-3XE          | 13.1              | 50              | 84.0           | 4.4            |         |
|       | 3600 | 208-230/460 | 143T  | H32P1D         | \$884   | DS-3XE          | 13.1              | 45              | 84.0           | 4.2-3.9/1.9    | 03      |
|       | 3600 | 575         | 143T  | H32P1G         | \$884   | DS-3XE          | 13.1              | 45              | 84.0           | 1.5            |         |
|       | 1800 | 200         | 145T  | H32P2H         | \$1,002 | DS-3XE          | 13.1              | 70              | 86.5           | 4.7            |         |
|       | 1800 | 208-230/460 | 145T  | H32P2D         | \$1,002 | DS-3XE          | 13.1              | 50              | 86.5           | 4.5-4.3/2.1    | 03      |
|       | 1800 | 575         | 145T  | H32P2G         | \$1,002 | DS-3XE          | 13.1              | 50              | 86.5           | 1.7            |         |
|       | 1200 | 200         | 182T  | H32P3H         | \$1,290 | DS-3XE          | 15.5              | 100             | 87.5           | 5.4            |         |
|       | 1200 | 208-230/460 | 182T  | H32P3D         | \$1,290 | DS-3XE          | 14.5              | 138             | 87.5           | 4.7/2.3        | 03      |
|       | 1200 | 575         | 182T  | H32P3G         | \$1,290 | DS-3XE          | 14.5              | 85              | 87.5           | 1.8            |         |
| 2     | 3600 | 200         | 145T  | H2P1H          | \$1,004 | DS-3XE          | 13.1              | 70              | 86.5           | 5.6            |         |
|       | 3600 | 208-230/460 | 145T  | H2P1D          | \$1,004 | DS-3XE          | 13.1              | 50              | 86.5           | 5.4-4.9/2.4    | 03      |
|       | 3600 | 575         | 145T  | H2P1G          | \$1,004 | DS-3XE          | 13.1              | 50              | 86.5           | 2              |         |
|       | 1800 | 200         | 145T  | H2P2H          | \$1,051 | DS-3XE          | 13.1              | 70              | 86.5           | 6.2            |         |
|       | 1800 | 208-230/460 | 145T  | H2P2D          | \$1,051 | DS-3XE          | 13.1              | 50              | 86.5           | 5.7/2.8        | 03      |
|       | 1800 | 575         | 145T  | H2P2G          | \$1,051 | DS-3XE          | 13.1              | 50              | 86.5           | 2.3            |         |
|       | 1200 | 200         | 184T  | H2P3H          | \$1,311 | DS-3XE          | 15.5              | 110             | 88.5           | 7.2            |         |
|       | 1200 | 208-230/460 | 184T  | H2P3D          | \$1,311 | DS-3XE          | 15.5              | 95              | 88.5           | 6.4-6.2/3.1    | 03      |
|       | 1200 | 575         | 184T  | H2P3G          | \$1,311 | DS-3XE          | 15.5              | 95              | 88.5           | 2.5            |         |
|       | 900  | 200         | 213T  | H2E4H          | \$1,963 | DS-3FX          | 19.1              | 145             | 82.5           | 8.7            | NNP     |
|       | 900  | 230/460     | 213T  | H2E4E          | \$1,963 | DS-3FX          | 19.1              | 145             | 82.5           | 8.1-7.6/3.8    | 03, NNP |
|       | 900  | 575         | 213T  | H2E4G          | \$1,963 | DS-3FX          | 19.1              | 145             | 82.5           | 3              | NNP     |
| 3     | 3600 | 200         | 182T  | H3P1H          | \$1,162 | DS-3XE          | 15.5              | 75              | 86.5           | 8.8            |         |
|       | 3600 | 208-230/460 | 182T  | H3P1D          | \$1,162 | DS-3XE          | 15.5              | 85              | 86.5           | 8.4-7.6/3.8    | 03      |
|       | 3600 | 575         | 182T  | H3P1G          | \$1,162 | DS-3XE          | 15.5              | 85              | 86.5           | 3.1            |         |
|       | 1800 | 200         | 182T  | H3P2H          | \$1,132 | DS-3XE          | 15.5              | 100             | 89.5           | 9.1            |         |
|       | 1800 | 208-230/460 | 182T  | H3P2D          | \$1,132 | DS-3XE          | 15.5              | 85              | 89.5           | 8.4-7.8/3.9    | 03      |
|       | 1800 | 575         | 182T  | H3P2G          | \$1,132 | DS-3XE          | 15.5              | 85              | 89.5           | 3.2            |         |
|       | 1200 | 200         | 213T  | H3P3H          | \$1,634 | DS-3XE          | 19.1              | 140             | 89.5           | 10.1           |         |

Note 03 60/50 Hz rated with no derate on HP; 230/460 volt 60 Hz ratings operate on 190/380 volt 50 Hz, 460V 60 Hz ratings operate on 380V 50 Hz; Full 60 & 50 Hz data on Nameplate

Note NNP Non-NEMA Premium<sup>®†</sup> Rating

† All marks shown within this document are properties of their respective owners.



# NAMEPLATE DATA

|   |  |
|---|--|
| <p>CATALOG NUMBER: <input style="width: 150px;" type="text" value="H2P2D"/></p> <p>MODEL <input style="width: 60px;" type="text" value="AS73"/> FR <input style="width: 60px;" type="text" value="145T"/></p> <p>SHAFT END BRG <input style="width: 200px;" type="text" value="6205-2Z-J/C3 - QTY 1"/></p> <p>PH <input style="width: 40px;" type="text" value="3"/> MAX AMB <input style="width: 60px;" type="text" value="40 C"/></p> <p>INSUL CLASS <input style="width: 40px;" type="text" value="F"/> Asm. Pos. <input style="width: 150px;" type="text" value="F1"/></p> <p>HP <input style="width: 40px;" type="text" value="2"/> RPM <input style="width: 60px;" type="text" value="1750"/></p> <p>VOLTS <input style="width: 40px;" type="text" value="460"/> <input style="width: 40px;" type="text" value="230"/> <input style="width: 40px;" type="text" value="208"/></p> <p>FL AMPS <input style="width: 40px;" type="text" value="2.8"/> <input style="width: 40px;" type="text" value="5.7"/> <input style="width: 40px;" type="text" value="6.0"/></p> <p>SF AMPS <input style="width: 40px;" type="text" value="3.1"/> <input style="width: 40px;" type="text" value="6.2"/></p> <p>SF <input style="width: 40px;" type="text" value="1.15"/> DESIGN <input style="width: 40px;" type="text" value="B"/> CODE <input style="width: 40px;" type="text" value="M"/></p> <p>NEMA NOM EFFICIENCY <input style="width: 40px;" type="text" value="86.5"/> NOM PF <input style="width: 40px;" type="text" value="76.2"/> KiloWatt <input style="width: 40px;" type="text" value="1.5"/></p> <p>GUARANTEED EFFICIENCY <input style="width: 40px;" type="text" value="84.0"/> MAX KVAR <input style="width: 40px;" type="text" value="1.2"/> HZ <input style="width: 40px;" type="text" value="60"/></p> | <p>NAMEPLATE PART # <input style="width: 150px;" type="text" value="422697-002"/></p> <p>TYPE <input style="width: 60px;" type="text" value="CTE"/> ENCL <input style="width: 60px;" type="text" value="TE"/></p> <p>OPP END BRG <input style="width: 200px;" type="text" value="6203-2Z-J/C3 - QTY 1"/></p> <p>ID# <input style="width: 200px;" type="text"/></p> <p>DUTY <input style="width: 150px;" type="text" value="CONT"/></p> <p>HP <input style="width: 40px;" type="text" value="2"/> RPM <input style="width: 60px;" type="text" value="1430"/></p> <p>VOLTS <input style="width: 40px;" type="text" value="380"/> <input style="width: 40px;" type="text" value="190"/></p> <p>FL AMPS <input style="width: 40px;" type="text" value="3.3"/> <input style="width: 40px;" type="text" value="6.6"/></p> <p>SF AMPS <input style="width: 40px;" type="text" value="3.7"/> <input style="width: 40px;" type="text" value="7.4"/></p> <p>SF <input style="width: 40px;" type="text" value="1.15"/> DESIGN <input style="width: 40px;" type="text" value="B"/> CODE <input style="width: 40px;" type="text" value="J"/></p> <p>NEMA NOM EFFICIENCY <input style="width: 40px;" type="text" value="84.0"/> NOM PF <input style="width: 40px;" type="text" value="81.9"/></p> <p>GUARANTEED EFFICIENCY <input style="width: 40px;" type="text" value="81.5"/> MAX KVAR <input style="width: 40px;" type="text" value="1"/> HZ <input style="width: 40px;" type="text" value="50"/></p> |
|---|--|

**UL DATA (IF APPLICABLE):**

|  |   |   |
|--|---|---|
| DIVISION <input style="width: 100px;" type="text"/>  | CLASS I <input style="width: 100px;" type="text"/>  | GROUP I <input style="width: 100px;" type="text"/>  |
| TEMP CODE <input style="width: 100px;" type="text"/> | CLASS II <input style="width: 100px;" type="text"/> | GROUP II <input style="width: 100px;" type="text"/> |

**VFD DATA (IF APPLICABLE):**

|   |  |
|---|--|
| VOLTS <input style="width: 200px;" type="text"/>                      |  |
| AMPS <input style="width: 200px;" type="text"/>                       |  |
| TORQUE 1 <input style="width: 200px;" type="text"/>                   | TORQUE 2 <input style="width: 200px;" type="text"/>                    |
| VFD LOAD TYPE 1 <input style="width: 200px;" type="text"/>            | VFD LOAD TYPE 2 <input style="width: 200px;" type="text"/>             |
| VFD HERTZ RANGE 1 <input style="width: 200px;" type="text"/>          | VFD HERTZ RANGE 2 <input style="width: 200px;" type="text"/>           |
| VFD SPEED RANGE 1 <input style="width: 200px;" type="text"/>          | VFD SPEED RANGE 2 <input style="width: 200px;" type="text"/>           |
| SERVICE FACTOR <input style="width: 200px;" type="text"/>             | FL SLIP <input style="width: 200px;" type="text"/>                     |
| NO. POLES <input style="width: 60px;" type="text" value="4"/>         | MAGNETIZING AMPS <input style="width: 60px;" type="text" value="1.7"/> |
| VECTOR MAX RPM <input style="width: 200px;" type="text"/>             | Encoder PPR <input style="width: 200px;" type="text"/>                 |
| Radians / Seconds <input style="width: 60px;" type="text" value="1"/> | Encoder Volts <input style="width: 200px;" type="text"/>               |

**TEAO DATA (IF APPLICABLE):**

|   |   |   |   |
|---|---|---|---|
| HP (AIR OVER) <input style="width: 100px;" type="text"/>    | HP (AIR OVER M/S) <input style="width: 100px;" type="text"/>    | RPM (AIR OVER) <input style="width: 100px;" type="text"/>       | RPM (AIR OVER M/S) <input style="width: 100px;" type="text"/> |
| FPM AIR VELOCITY <input style="width: 100px;" type="text"/> | FPM AIR VELOCITY M/S <input style="width: 100px;" type="text"/> | FPM AIR VELOCITY SEC <input style="width: 100px;" type="text"/> |   |



## MOTOR PERFORMANCE

| MODEL NO. | CATALOG NO. | PHASE | TYPE | FRAME |
|-----------|-------------|-------|------|-------|
| AS73      | H2P2D       | 3     | CTE  | 145T  |

| ORDER NO. | 13536 | LINE NO. |
|-----------|-------|----------|
|-----------|-------|----------|

|                             |       |       |        |        |        |
|-----------------------------|-------|-------|--------|--------|--------|
| MPI:                        | 66784 | 66785 | 122890 | 122891 | 122892 |
| HP:                         | 2     | 2     | 2      | 2      | 2      |
| POLES:                      | 4     | 4     | 4      | 4      | 4      |
| VOLTS:                      | 460   | 230   | 208    | 380    | 190    |
| HZ:                         | 60    | 60    | 60     | 50     | 50     |
| SERVICE FACTOR:             | 1.15  | 1.15  | 1.15   | 1.15   | 1.15   |
| EFFICIENCY (%):             |       |       |        |        |        |
| S.F.                        | 86.7  | 86.7  | 85.3   | 82.7   | 82.7   |
| FULL                        | 86.5  | 86.5  | 85.5   | 84     | 84     |
| 3/4                         | 87    | 87    | 87.2   | 86.2   | 86.2   |
| 1/2                         | 84.7  | 84.7  | 86     | 85.6   | 85.6   |
| 1/4                         | 76.5  | 76.5  | 79.2   | 79.3   | 79.3   |
| POWER FACTOR (%):           |       |       |        |        |        |
| S.F.                        | 79.6  | 79.6  | 83.8   | 84.7   | 84.7   |
| FULL                        | 76.2  | 76.2  | 81.4   | 81.9   | 81.9   |
| 3/4                         | 67.8  | 67.8  | 74.5   | 74.7   | 74.7   |
| 1/2                         | 54.3  | 54.3  | 62.2   | 61.7   | 61.7   |
| 1/4                         | 34.3  | 34.3  | 40.7   | 39.4   | 39.4   |
| NO LOAD                     | 7.3   | 7.3   | 7.8    | 7.2    | 7.2    |
| LOCKED ROTOR                | 64.4  | 64.4  | 63.1   | 69.6   | 69.6   |
| AMPS:                       |       |       |        |        |        |
| S.F.                        | 3.1   | 6.2   | 6.7    | 3.7    | 7.4    |
| FULL                        | 2.8   | 5.7   | 6      | 3.3    | 6.6    |
| 3/4                         | 2.4   | 4.8   | 4.8    | 2.6    | 5.3    |
| 1/2                         | 2     | 4.1   | 3.9    | 2.1    | 4.3    |
| 1/4                         | 1.8   | 3.6   | 3.2    | 1.8    | 3.6    |
| NO LOAD                     | 1.7   | 3.5   | 3      | 1.7    | 3.4    |
| LOCKED ROTOR                | 26.2  | 52    | 46     | 23.5   | 47     |
| NEMA CODE LETTER            | M     | M     | K      | J      | J      |
| NEMA DESIGN LETTER          | B     | B     | B      | B      | B      |
| FULL LOAD RPM               | 1750  | 1750  | 1735   | 1430   | 1430   |
| NEMA NOMINAL EFFICIENCY (%) | 86.5  | 86.5  | 85.5   | 84     | 84     |
| GUARANTEED EFFICIENCY (%)   | 84    | 84    | 82.5   | 81.5   | 81.5   |
| MAX KVAR                    | 1.2   | 1.2   | 0.9    | 1      | 1      |
| AMBIENT (°C)                | 40    | 40    | 40     | 40     | 40     |
| ALTITUDE (FASL)             | 3300  | 3300  | 3300   | 3300   | 3300   |
| SAFE STALL TIME-HOT (SEC)   | 12    | 12    | 15     | 15     | 15     |
| SOUND PRESSURE (DBA @ 1M)   | 54    | 54    | 54     | 50     | 50     |
| TORQUES:                    |       |       |        |        |        |
| BREAKDOWN{% F.L.}           | 506   | 506   | 403    | 379    | 379    |
| LOCKED ROTOR{% F.L.}        | 395   | 395   | 309    | 314    | 314    |
| FULL LOAD{LB-FT}            | 6     | 6     | 6.1    | 7.3    | 7.3    |

The Above Data Is Typical. Sinewave Power Unless Noted Otherwise

**NIDEC MOTOR CORPORATION**  
ST. LOUIS, MO



Nidec trademarks followed by the ® symbol are registered with the U.S. Patent and Trademark Office.

EFFECTIVE:  
**10-MAY-11**

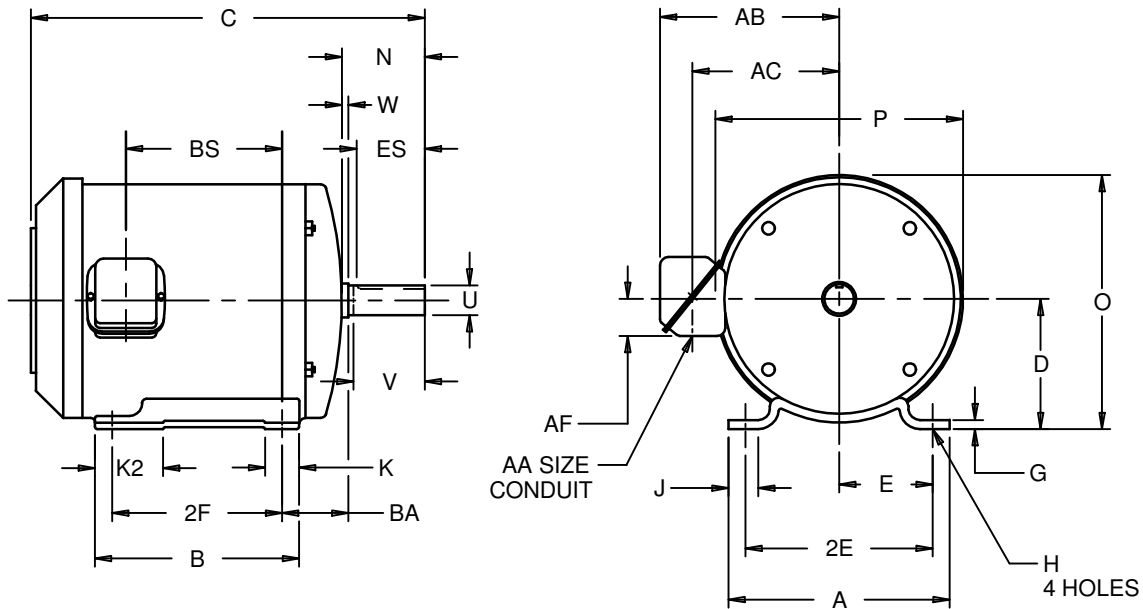
**HORIZONTAL MOTORS**  
TEFC 6.75" FRAME LENGTH  
FRAME: 140T  
BASIC TYPE: CT, CTE, CTI, FCT

PRINT:  
**07-2270**

SUPERSEDES:  
**03-JAN-03**

SHEET:  
**1 OF 1**

STANDARD F-1 ASSEMBLY



ALL DIMENSIONS ARE IN INCHES AND MILLIMETERS

| UNITS | A    | B    | C     | D<br>-.06 | E    | 2E<br>±.03 | G   | H<br>+.05 | J    | K   | K2   | N    | O    |
|-------|------|------|-------|-----------|------|------------|-----|-----------|------|-----|------|------|------|
| IN    | 6.50 | 6.00 | 13.13 | 3.50      | 2.75 | 5.50       | .13 | .34       | 1.00 | .94 | 1.88 | 2.38 | 7.38 |
| MM    | 165  | 152  | 334   | 89        | 70   | 140        | 3   | 9         | 25   | 24  | 48   | 60   | 187  |

| UNITS | P <sup>2</sup> | U<br>-.0005 | V<br>MIN | W   | AA  | AB   | AC   | AF   | BA   | BS   | ES<br>MIN | SQ<br>KEY |
|-------|----------------|-------------|----------|-----|-----|------|------|------|------|------|-----------|-----------|
| IN    | 7.75           | .8750       | 2.00     | .13 | .75 | 6.13 | 4.66 | 1.59 | 2.25 | 4.63 | 1.41      | .188      |
| MM    | 197            | 22.225      | 51       | 3   |     | 156  | 118  | 40   | 57   | 118  | 36        | 4.78      |

| FRAME | UNITS | 2F<br>±.03 |
|-------|-------|------------|
| 143T  | IN    | 4.00       |
|       | MM    | 102        |
| 145T  | IN    | 5.00       |
|       | MM    | 127        |

- 1: ALL ROUGH DIMENSIONS MAY VARY BY .25" DUE TO CASTING AND/OR FABRICATION VARIATIONS.
- 2: LARGEST MOTOR WIDTH.
- 3: CONDUIT BOX MAY BE LOCATED ON EITHER SIDE OF MOTOR. CONDUIT OPENINGS MAY BE LOCATED IN STEPS OF 180° REGARDLESS OF LOCATION. STANDARD AS SHOWN WITH CONDUIT OPENING DOWN.
- 4: TOLERANCE SHOWN ARE IN INCHES ONLY.

07-2270/A

**Nidec Motor Corporation**  
St. Louis, Missouri

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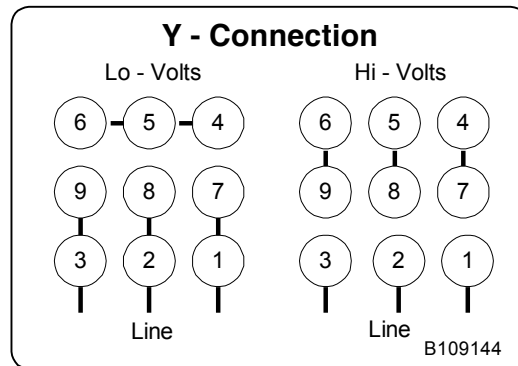
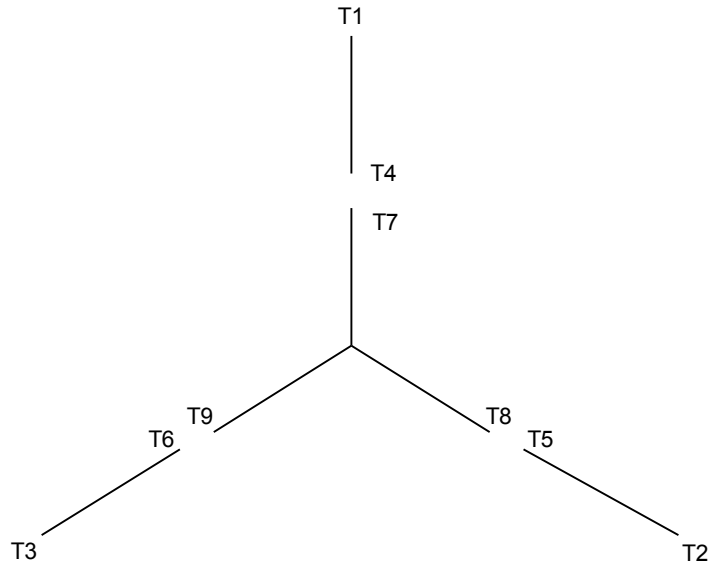
ISSUED BY  
**A. HINGANKAR**  
APPROVED BY  
**R. KING**

IHP\_DP\_NMCA (MAR-2011) SOLIDEDGE



**B109144**

### Motor Wiring Diagram 9 Lead, Dual Voltage (WYE Conn.)



To reverse direction of rotation interchange connections L1 and L2.

Each lead may have one or more cables comprising that lead.  
In such case each cable will be marked with the appropriate lead number.

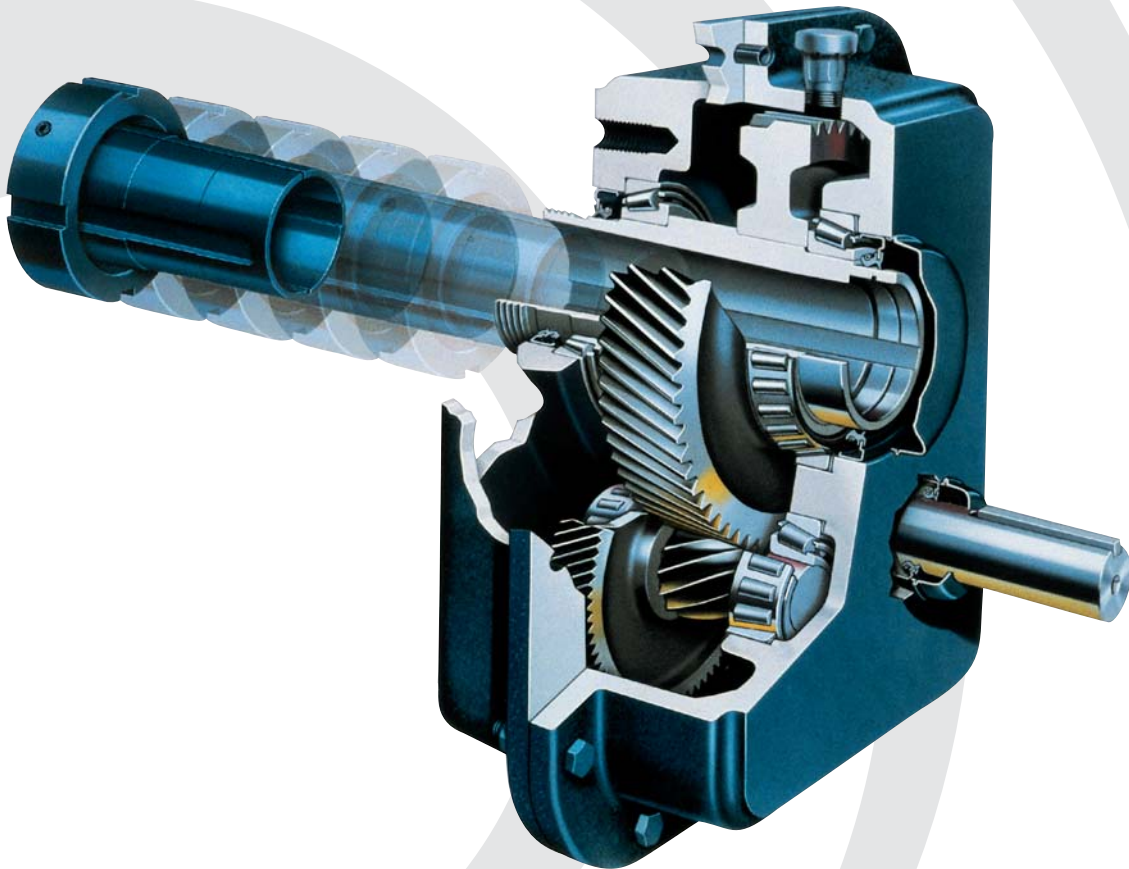
# Drive Station Gear Box



**SERPENTIX CONVEYOR CORP.®**

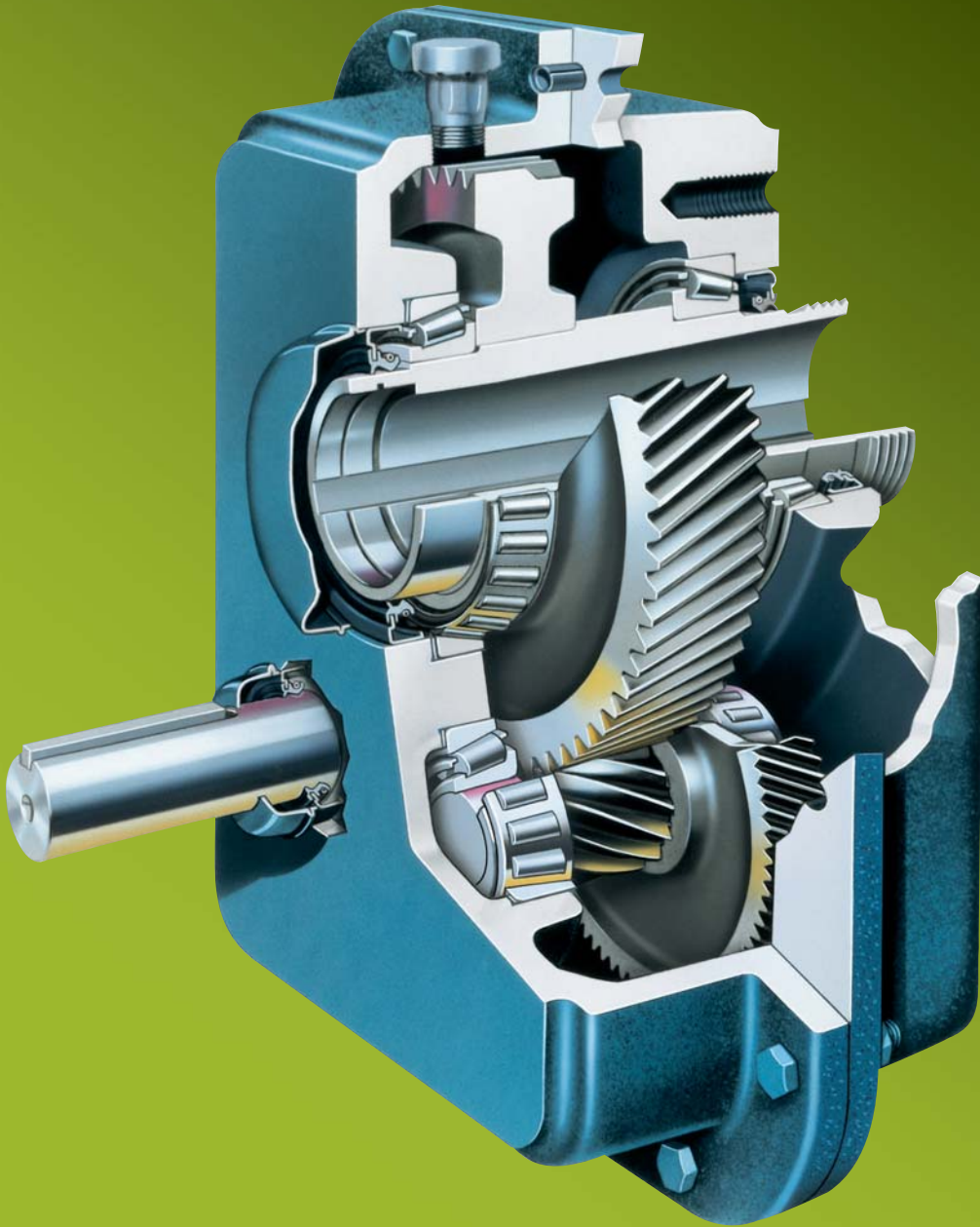


Falk™ Quadrive® Shaft Mounted Drive | Easiest Off, Easiest On, Guaranteed  
(Imperial-Inch)



**REXNORD**

# QUADRIVE Shaft-Mounted Drives Selection Guide



# Load Classifications \* . . . Electric Motor Driven Applications

Recommendations are minimum and normal conditions are assumed.

**TABLE 1**

| APPLICATION                                | Service          |              | APPLICATION                         | Service          |              | APPLICATION                        | Service          |              | APPLICATION                             | Service          |              |
|--|------------------|--------------|-------------------------------------|------------------|--------------|------------------------------------|------------------|--------------|---|------------------|--------------|
|  | 3 to 10 Hour     | Over 10 Hour |                                     | 3 to 10 Hour     | Over 10 Hour |                                    | 3 to 10 Hour     | Over 10 Hour |   | 3 to 10 Hour     | Over 10 Hour |
| <b>AGITATORS</b>                           |                  |              | Belt . . . . .                      |                  |              | <b>LINE SHAFTS</b>                 |                  |              | <b>PUMPS</b>                            |                  |              |
| Paper Mill (Mixers) . . . . .              |                  |              | Flight . . . . .                    |                  |              | Uniform Load . . . . .             | I                |              | Proportioning . . . . .                 | Refer to Factory |              |
| Pure Liquids . . . . .                     | I                |              | Oven . . . . .                      | I                |              | Heavy Load . . . . .               |                  |              | Reciprocating, open                     |                  |              |
| Semi-Liquids, Variable Density . . . . .   |                  |              | Live Roll (Package) . . . . .       | I                |              |                                    |                  |              | Discharge . . . . .                     | I                |              |
|  |                  |              | Screw . . . . .                     | I                |              | <b>LIVE ROLL CONVEYORS</b>         |                  |              | Double Acting                           |                  |              |
|  |                  |              | Table—See Metal Mills . . . . .     | ...              | ...          | Uniformly Loaded, Package          | I                |              | Multi-Cylinder . . . . .                |                  |              |
| <b>APRON CONVEYORS</b>                     |                  |              | <b>CONVEYORS—HEAVY DUTY</b>         |                  |              | Heavy Duty . . . . .               | Refer to Factory |              | Single Cylinder . . . . .               | Refer to Factory |              |
| Uniformly Loaded . . . . .                 | I                |              | <b>—NOT UNIFORMLY FED †</b>         |                  |              |                                    |                  |              | Rotary (Gear Type)                      |                  |              |
| Heavy Duty . . . . .                       |                  |              | Apron . . . . .                     |                  |              | <b>MACHINE TOOLS</b>               |                  |              | Constant Density . . . . .              | I                |              |
|  |                  |              | Assembly . . . . .                  |                  |              | Auxiliary Drives . . . . .         | I                |              | Variable Density . . . . .              |                  |              |
| <b>ASSEMBLY CONVEYORS</b>                  |                  |              | Belt . . . . .                      |                  |              | Main Drives Uniform Load . . . . . |                  |              |   |                  |              |
| Uniformly Loaded . . . . .                 | I                |              | Bucket or Pan . . . . .             |                  |              | Main Drives Heavy Load . . . . .   |                  |              | <b>RECIPROCATING</b>                    |                  |              |
| Heavy Duty . . . . .                       |                  |              | Flight . . . . .                    |                  |              |                                    |                  |              | Conveyors . . . . .                     |                  |              |
|  |                  |              | Live Roll . . . . .                 | Refer to Factory |              | <b>METAL MILLS</b>                 |                  |              | <b>RUBBER INDUSTRY</b>                  |                  |              |
| <b>BELT CONVEYORS</b>                      |                  |              | Oven . . . . .                      |                  |              | Table Conveyors,                   |                  |              | Tire Building Machines . . . . .        |                  |              |
| Uniformly Loaded . . . . .                 | I                |              | Reciprocating . . . . .             |                  |              | Non Reversing . . . . .            |                  |              | Tire & Tube Press Openers . . . . .     | I                | I            |
| Heavy Duty . . . . .                       |                  |              | Table—See Metal Mills . . . . .     | ...              | ...          | Reversing . . . . .                | Refer to Factory |              |   |                  |              |
|  |                  |              | <b>CRANES &amp; HOISTS †</b>        |                  |              | Wire Drawing & Flattening          |                  |              | <b>SCREENS</b>                          |                  |              |
| <b>BREWING &amp; DISTILLING</b>            |                  |              | Bridge and Trolley Drive . . . . .  |                  |              | Machines . . . . .                 |                  |              | Air Washing . . . . .                   | I                |              |
| Bottling Machinery . . . . .               | I                |              | <b>CUTTER HEAD DRIVES</b> . . . . . | Refer to Factory |              |                                    |                  |              | Rotary, Stone or Gravel . . . . .       |                  |              |
| Brew Kettles, Continuous . . . . .         | I                |              | <b>DRYERS &amp; COOLERS, ROTARY</b> |                  |              | <b>MILLS</b>                       |                  |              | Traveling Water Intake . . . . .        | I                |              |
| Can Filling Machines . . . . .             | I                |              |                                     |                  |              | (See Metal Mills)                  |                  |              | Shaker . . . . .                        |                  |              |
| Cookers, Continuous . . . . .              | ...              |              | <b>ELEVATORS</b>                    |                  |              | Pebble . . . . .                   |                  |              |   |                  |              |
| Mash Tubs, Continuous . . . . .            | ...              |              | Bucket—Uniform Load . . . . .       | I                |              | <b>MIXERS (See Agitators)</b>      |                  |              | <b>SCREW CONVEYORS</b>                  |                  |              |
| Scale Hoppers, Frequent Starts . . . . .   |                  |              | Bucket—Heavy Load . . . . .         |                  |              | Concrete, Continuous . . . . .     |                  |              | Uniformly Loaded . . . . .              | I                |              |
|  |                  |              | Escalators† . . . . .               | Not Approved     |              | Concrete, Intermittent . . . . .   |                  | ...          | Heavy Duty . . . . .                    |                  |              |
| <b>BUCKET</b>                              |                  |              | Freight† . . . . .                  | Not Approved     |              | Constant Density . . . . .         | I                |              | <b>SKI TOWS &amp; LIFTS †</b> . . . . . | Not Approved     |              |
| Conveyors Heavy Duty . . . . .             |                  |              | Man lifts, Passenger† . . . . .     | Not Approved     |              | Variable Density . . . . .         |                  |              | <b>SKIP HOISTS †</b> . . . . .          |                  | ...          |
| Elevators, Uniform Load . . . . .          | I                |              |                                     |                  |              | Liquid . . . . .                   |                  |              | <b>STOKERS</b> . . . . .                | ...              |              |
| Elevators, Heavy Duty . . . . .            |                  |              | <b>FLIGHT CONVEYORS</b>             |                  |              | Paper Mill (Agitators)             |                  |              | <b>TEXTILE INDUSTRY</b>                 |                  |              |
|  |                  |              | Uniformly Loaded . . . . .          |                  |              | Semi-Liquid . . . . .              |                  |              | Batchers . . . . .                      |                  |              |
| <b>CAN FILLING MACHINES</b>                |                  |              | Heavy Duty . . . . .                |                  |              | <b>OVEN CONVEYORS</b>              |                  |              | Calenders . . . . .                     |                  |              |
|  |                  |              |                                     |                  |              | Uniformly Loaded . . . . .         | I                |              | Card Machines . . . . .                 |                  |              |
| <b>CAR</b>                                 |                  |              | <b>FOOD INDUSTRY</b>                |                  |              | Heavy Duty . . . . .               |                  |              | Dry Cans . . . . .                      |                  |              |
| Dumpers . . . . .                          |                  | ...          | Beet Slicers . . . . .              |                  |              |                                    |                  |              | Dyeing Machinery . . . . .              |                  |              |
| Pullers . . . . .                          | Refer to Factory |              | Can Filling Machines . . . . .      | I                |              | <b>PAN CONVEYORS</b>               |                  |              | Looms . . . . .                         | Refer to Factory |              |
|  |                  |              | Cereal Cookers . . . . .            | I                |              | Heavy Duty . . . . .               |                  |              | Mangles, Nappers & Soapers . . . . .    |                  |              |
| <b>CLARIFIERS</b>                          |                  |              | Dough Mixers . . . . .              |                  |              |                                    |                  |              | Spinners . . . . .                      |                  |              |
|  |                  |              | Meat Grinders . . . . .             |                  |              | <b>PAPER MILLS</b>                 |                  |              | Tenter Frames . . . . .                 |                  |              |
| <b>CLASSIFIERS</b>                         |                  |              |                                     |                  |              | Agitators (Mixers) . . . . .       | I                |              |   |                  |              |
|  |                  |              | <b>LAUNDRY</b>                      |                  |              | Bleachers . . . . .                | I                |              | <b>TUMBLING BARRELS</b>                 |                  |              |
| <b>CLAY WORKING MACHINERY</b>              |                  |              | Washers, reversing . . . . .        | Refer to Factory |              | Calenders . . . . .                | ...              |              | <b>WINDLASS</b> . . . . .               |                  |              |
| Brick Presses . . . . .                    |                  |              | Tumblers . . . . .                  |                  |              | Cylinders . . . . .                | ...              |              |   |                  |              |
| Briquette Machines . . . . .               |                  |              |                                     |                  |              | Felt Stretchers . . . . .          | ...              |              |   |                  |              |
| Extruders & Mixers . . . . .               |                  |              |                                     |                  |              | Winders . . . . .                  | ...              |              |   |                  |              |
| <b>CONVEYORS—UNIFORMLY LOADED OR FED †</b> |                  |              |                                     |                  |              |                                    |                  |              |   |                  |              |
| Apron and Assembly . . . . .               | I                |              |                                     |                  |              | <b>PEBBLE MILLS</b>                |                  |              |   |                  |              |

\* **LOAD CLASSIFICATIONS FOR ENGINE-DRIVEN APPLICATIONS — Multi-Cylinder Engines:** Use the next higher Service Class than the one given in Table 1 for the same application when motor driven. (Example: A motor-driven uniformly loaded belt conveyor for 10 hour service is Class I; the same conveyor driven by a multi-cylinder engine would be Class II). For applications which require Class III when motor driven, Refer to Factory for recommendations on engine drives. **Single Cylinder Engines:** Refer to Factory.

† Selection of Falk products for applications whose primary purpose is the transportation of people is not approved. This includes such applications as freight or passenger elevators, escalators, man lifts, fork lift platforms and ski tows and ski lifts. If the primary purpose of the application is material conveyance and occasionally people are transported, the Falk warranty may remain in effect provided the design load conditions are not exceeded and certification to the appropriate safety codes and load conditions has been obtained by the system designer or end user from the appropriate enforcement authorities.

# Class II

Selections for ★ Shaft (JR) and Flange (JF) Mounted Drives — Sizes 5107 thru 5608  
Screw Conveyor (JSC) Drives — Sizes 5107 thru 5407

TABLE 3

| HP    | Output rpm | Drive Size | Min H.S.S. Sheave Pitch Dia † | HP            | Output rpm | Drive Size | Min H.S.S. Sheave Pitch Dia † | HP       | Output rpm | Drive Size | Min H.S.S. Sheave Pitch Dia † | HP      | Output rpm | Drive Size | Min H.S.S. Sheave Pitch Dia † |          |           |      |         |           |      |
|-------|------------|------------|-------------------------------|---------------|------------|------------|-------------------------------|----------|------------|------------|-------------------------------|---------|------------|------------|-------------------------------|----------|-----------|------|---------|-----------|------|
| 1/4   | 350-191    | 5107J_05   | 1.7                           | 7-1/2<br>Cont | 70-44      | 5302J_25   | 4.0                           | 30       | 350-301    | 5207J_05   | 6.7                           | 100     | 350-296    | 5315J_05†  | 9.6                           |          |           |      |         |           |      |
|       | 190-126    | 5107J_09   | 1.7                           |               | 43-28      | 5207J_25   | 5.0                           |          | 300-260    | 5207J_05   | 11.9                          |         | 295-251    | 5315J_05   | 10.6                          |          |           |      |         |           |      |
|       | 125-71     | 5107J_14   | 1.7                           |               | 27-17      | 5215J_25   | 6.0                           |          | 259-191    | 5215J_05   | 6.0                           |         | 250-221    | 5315J_05   | 14.5                          |          |           |      |         |           |      |
|       | 70-5       | 5107J_25   | 1.7                           |               | 16-11      | 5307J_25   | 7.0                           |          | 190-150    | 5207J_09   | 9.2                           |         | 220-166    | 5315J_09*  | 11.3                          |          |           |      |         |           |      |
| 1/3   | 350-191    | 5107J_05   | 1.7                           |               | 10         | 10-8       | 5315J_25                      |          | 7.0        | 40         | 149-126                       |         | 5215J_09   | 6.0        | 125                           | 165-141  | 5315J_09* | 16.5 |         |           |      |
|       | 190-126    | 5107J_09   | 1.7                           |               |            | 7-6        | 5407J_25                      |          | 7.0        |            | 125-71                        |         | 5215J_14   | 6.0        |                               | 220-126  | 5407J_05  | 9.4  |         |           |      |
|       | 125-71     | 5107J_14   | 1.7                           |               |            | 5          | 5415J_25                      |          | 8.0        |            | 70-66                         |         | 5215J_25   | 6.0        |                               | 125-117  | 5315J_14* | 13.9 |         |           |      |
|       | 70-6       | 5107J_25   | 1.9                           |               |            | 350-297    | 5107J_05                      |          | 3.2        |            | 65-41                         |         | 5307J_25   | 7.0        |                               | 116-77   | 5407J_14* | 7.0  |         |           |      |
| 1/2   | 350-191    | 5107J_05   | 1.7                           |               |            | 15         | 296-191                       |          | 5115J_05   |            | 3.5                           |         | 50         | 40-32      |                               | 5315J_25 | 7.0       | 150  | 76-71   | 5415J_14  | 9.5  |
|       | 190-126    | 5107J_09   | 1.7                           |               |            |            | 190-177                       |          | 5107J_09   |            | 2.4                           |         |            | 31-22      |                               | 5407J_25 | 7.0       |      | 70-55   | 5415J_25* | 8.0  |
|       | 125-71     | 5107J_14   | 1.7                           |               |            |            | 176-126                       |          | 5115J_09   |            | 2.0                           |         |            | 21-17      |                               | 5415J_25 | 8.0       |      | 54-35   | 5507J_25† | 8.0  |
|       | 70-9       | 5107J_25   | 1.9                           |               |            |            | 125-95                        |          | 5115J_14   |            | 2.0                           |         |            | 16-11      |                               | 5507J_25 | 8.0       |      | 34-24   | 5608J_25  | 9.5  |
| 3/4   | 350-191    | 5107J_05   | 1.7                           | 20            |            |            | 94-71                         | 5203J_14 | 4.0        |            | 60                            | 10-7    |            | 5608J_25   |                               | 9.5      | 200       |      | 350-311 | 5407J_05† | 7.4  |
|       | 190-126    | 5107J_09   | 1.7                           |               |            |            | 70-63                         | 5203J_25 | 4.0        |            |                               | 350-225 |            | 5215J_05   |                               | 7.0      |           |      | 310-181 | 5407J_05† | 12.7 |
|       | 125-71     | 5107J_14   | 1.7                           |               |            |            | 62-37                         | 5207J_25 | 5.0        |            |                               | 224-191 |            | 5307J_05   |                               | 7.0      |           |      | 180-156 | 5407J_05  | 10.9 |
|       | 70-9       | 5107J_25   | 1.9                           |               |            |            | 36-22                         | 5215J_25 | 6.0        |            |                               | 270-191 |            | 5307J_05   |                               | 7.0      |           |      | 155-136 | 5407J_05  | 13.6 |
| 1     | 350-191    | 5107J_05   | 1.7                           |               | 25         |            | 21-14                         | 5307J_25 | 7.0        | 75         |                               | 190-126 |            | 5215J_09   | 6.0                           | 250      |           |      | 135-126 | 5407J_05  | 15.7 |
|       | 190-126    | 5107J_09   | 1.7                           |               |            |            | 13-11                         | 5315J_25 | 7.0        |            |                               | 125-88  |            | 5215J_14†  | 7.7                           |          |           |      | 125-96  | 5407J_14* | 7.0  |
|       | 125-71     | 5107J_14   | 1.7                           |               |            |            | 10-8                          | 5407J_25 | 7.0        |            |                               | 87-71   |            | 5307J_14   | 7.0                           |          |           |      | 95-71   | 5415J_14* | 8.0  |
|       | 70-9       | 5107J_25   | 1.9                           |               |            |            | 7-6                           | 5415J_25 | 8.0        |            |                               | 70-54   |            | 5307J_25   | 7.0                           |          |           |      | 70-67   | 5415J_25* | 8.0  |
| 1-1/2 | 350-191    | 5107J_05   | 1.7                           |               |            | 30         | 350-301                       | 5115J_05 | 4.1        |            |                               | 80      | 53-43      | 5315J_25   | 7.0                           |          |           | 300  | 66-44   | 5507J_25† | 8.0  |
|       | 190-126    | 5107J_09   | 1.7                           |               |            |            | 300-251                       | 5115J_05 | 5.3        |            |                               |         | 42-29      | 5407J_25   | 7.0                           |          |           |      | 43-30   | 5608J_25† | 9.9  |
|       | 125-71     | 5107J_14   | 1.7                           |               |            |            | 251-210                       | 5115J_05 | 7.1        |            |                               |         | 28-22      | 5415J_25   | 8.0                           |          |           |      | 350-301 | 5407J_05† | 9.2  |
|       | 70-13      | 5107J_25   | 2.0                           |               |            |            | 209-191                       | 5207J_05 | 5.0        |            |                               |         | 21-14      | 5507J_25   | 8.0                           |          |           |      | 300-221 | 5407J_05† | 12.5 |
| 2     | 350-191    | 5107J_05   | 1.7                           | 40            |            |            | 190-153                       | 5115J_09 | 2.8        |            | 100                           |         | 13-10      | 5608J_25   | 9.5                           |          | 150       |      | 220-176 | 5407J_05† | 17.4 |
|       | 190-126    | 5107J_09   | 1.7                           |               |            |            | 152-126                       | 5203J_09 | 5.1        |            |                               |         | 350-300    | 5215J_05   | 8.0                           |          |           |      | 175-156 | 5415J_05† | 17.4 |
|       | 125-71     | 5107J_14   | 1.7                           |               |            |            | 125-90                        | 5203J_14 | 4.5        |            |                               |         | 300-191    | 5307J_05   | 7.0                           |          |           |      | 155-146 | 5415J_05† | 18.6 |
|       | 70-17      | 5107J_25   | 2.1                           |               |            |            | 89-71                         | 5207J_14 | 5.0        |            |                               |         | 190-126    | 5215J_09†  | 8.7                           |          |           |      | 145-136 | 5415J_05† | 20.0 |
| 3     | 350-191    | 5107J_05   | 1.7                           |               | 50         |            | 70-55                         | 5207J_25 | 5.0        | 150        |                               |         | 125-110    | 5215J_14†  | 9.6                           | 200      |           |      | 135-126 | 5415J_05† | 21.6 |
|       | 190-126    | 5107J_09   | 1.7                           |               |            |            | 54-33                         | 5215J_25 | 6.0        |            |                               |         | 109-88     | 5307J_14†  | 9.7                           |          |           |      | 125-84  | 5415J_14* | 8.0  |
|       | 125-71     | 5107J_14   | 1.7                           |               |            |            | 32-21                         | 5307J_25 | 7.0        |            |                               |         | 87-71      | 5307J_14   | 7.0                           |          |           |      | 83-71   | 5507J_14* | 8.0  |
|       | 70-26      | 5107J_25   | 2.0                           |               |            |            | 20-16                         | 5315J_25 | 7.0        |            |                               |         | 70-68      | 5307J_25†  | 7.0                           |          |           |      | 70-53   | 5507J_25* | 8.0  |
| 5     | 350-191    | 5107J_05   | 1.7                           |               |            | 60         | 15-11                         | 5407J_25 | 7.0        |            |                               | 200     | 67-54      | 5315J_25†  | 7.0                           |          |           | 250  | 52-36   | 5608J_25* | 9.9  |
|       | 190-126    | 5107J_09   | 1.7                           |               |            |            | 10-9                          | 5407J_25 | 8.0        |            |                               |         | 53-36      | 5407J_25†  | 7.0                           |          |           |      | 350-271 | 5407J_05* | 13.2 |
|       | 125-71     | 5107J_14   | 1.7                           |               |            |            | 8-6                           | 5507J_25 | 8.0        |            |                               |         | 35-28      | 5415J_25   | 8.0                           |          |           |      | 270-231 | 5407J_05* | 17.8 |
|       | 70-26      | 5107J_25   | 2.0                           |               |            |            | 5                             | 5608J_25 | 9.5        |            |                               |         | 27-18      | 5507J_25   | 8.0                           |          |           |      | 230-176 | 5415J_05† | 20.7 |
| 7-1/2 | 350-191    | 5107J_05   | 1.7                           | 75            |            |            | 350-300                       | 5115J_05 | 8.8        |            | 250                           |         | 17-12      | 5608J_25   | 9.5                           |          | 300       |      | 175-166 | 5415J_05† | 23.2 |
|       | 190-126    | 5107J_09   | 1.7                           |               |            |            | 299-259                       | 5203J_05 | 12.1       |            |                               |         | 350-301    | 5307J_05   | 7.0                           |          |           |      | 165-156 | 5415J_05* | 21.8 |
|       | 125-71     | 5107J_14   | 1.7                           |               |            |            | 258-191                       | 5207J_05 | 5.0        |            |                               |         | 300-191    | 5307J_05   | 10.6                          |          |           |      | 155-71  | 5507J_14* | 8.1  |
|       | 70-34      | 5107J_25   | 2.0                           |               |            |            | 190-146                       | 5203J_09 | 11.2       |            |                               |         | 190-126    | 5315J_09†  | 7.0                           |          |           |      | 70-48   | 5608J_25* | 9.5  |
| 10    | 350-191    | 5107J_05   | 1.7                           |               | 100        |            | 145-126                       | 5207J_09 | 5.0        | 150        |                               |         | 175-155    | 5307J_09*  | 6.3                           | 200      |           |      | 350-271 | 5407J_05* | 13.2 |
|       | 190-126    | 5107J_09   | 1.7                           |               |            |            | 125-74                        | 5207J_14 | 6.5        |            |                               |         | 155-126    | 5307J_09†  | 15.7                          |          |           |      | 270-231 | 5407J_05* | 17.8 |
|       | 125-71     | 5107J_14   | 1.7                           |               |            |            | 73-71                         | 5215J_14 | 6.0        |            |                               |         | 125-81     | 5307J_14†  | 8.6                           |          |           |      | 230-176 | 5415J_05† | 20.7 |
|       | 70-34      | 5107J_25   | 2.0                           |               |            |            | 70-44                         | 5215J_25 | 6.0        |            |                               |         | 80-71      | 5315J_14†  | 10.0                          |          |           |      | 175-166 | 5415J_05† | 23.2 |
| 15    | 350-191    | 5107J_05   | 1.7                           |               |            | 150        | 43-27                         | 5307J_25 | 7.0        |            |                               | 200     | 80-71      | 5315J_14†  | 10.0                          |          |           | 250  | 165-156 | 5415J_05* | 21.8 |
|       | 190-126    | 5107J_09   | 1.7                           |               |            |            | 26-22                         | 5315J_25 | 7.0        |            |                               |         | 70-65      | 5315J_25†  | 7.0                           |          |           |      | 155-71  | 5507J_14* | 8.1  |
|       | 125-71     | 5107J_14   | 1.7                           |               |            |            | 21-15                         | 5407J_25 | 7.0        |            |                               |         | 64-43      | 5407J_25†  | 7.0                           |          |           |      | 70-48   | 5608J_25* | 9.5  |
|       | 70-51      | 5107J_25   | 2.1                           |               |            |            | 14-11                         | 5415J_25 | 8.0        |            |                               |         | 42-33      | 5415J_25†  | 8.0                           |          |           |      | 350-301 | 5307J_05  | 8.1  |
| 20    | 350-191    | 5107J_05   | 1.7                           | 200           |            |            | 10-7                          | 5507J_25 | 8.0        |            | 250                           |         | 32-21      | 5507J_25   | 9.6                           |          | 300       |      | 300-251 | 5307J_05  | 11.9 |
|       | 190-126    | 5107J_09   | 1.7                           |               |            |            | 6-5                           | 5608J_25 | 9.5        |            |                               |         | 20-15      | 5608J_25   | 9.5                           |          |           |      | 250-225 | 5307J_05  | 16.8 |
|       | 125-71     | 5107J_14   | 1.7                           |               |            |            | 350-321                       | 5207J_05 | 5.0        |            |                               |         | 350-301    | 5307J_05   | 8.1                           |          |           |      | 224-191 | 5315J_05  | 8.2  |
|       | 70-51      | 5107J_25   | 2.1                           |               |            |            | 320-230                       | 5207J_05 | 6.9        |            |                               |         | 300-251    | 5307J_05   | 11.9                          |          |           |      | 190-166 | 5307J_09* | 13.8 |
| 30    | 350-191    | 5107J_05   | 1.7                           |               | 250        |            | 229-205                       | 5207J_05 | 10.5       | 300        |                               |         | 165-126    | 5315J_09*  | 8.9                           | 350      |           |      | 220-176 | 5407J_05† | 17.4 |
|       | 190-126    | 5107J_09   | 1.7                           |               |            |            | 205-191                       | 5215J_05 | 6.0        |            |                               |         | 125-102    | 5307J_14*  | 7.7                           |          |           |      | 175-156 | 5415J_05† | 18.6 |
|       | 125-71     | 5107J_14   | 1.7                           |               |            |            | 190-126                       | 5207J_09 | 7.3        |            |                               |         | 101-81     | 5315J_14*  | 12.3                          |          |           |      | 155-146 | 5415J_05† | 20.0 |
|       | 70-51      | 5107J_25   | 2.1                           |               |            |            | 125-96                        | 5207J_14 | 7.6        |            |                               |         | 80-71      | 5407J_14†  | 7.0                           |          |           |      | 145-136 | 5415J_05† | 20.0 |
| 40    | 350-191    | 5107J_05   | 1.7                           |               |            | 300        | 95-71                         | 5215J_14 | 6.0        |            |                               | 350     | 70-55      | 5215J_25   | 6.0                           |          |           | 400  | 135-126 | 5407J_05  | 15.7 |
|       | 190-126    | 5107J_09   | 1.7                           |               |            |            | 54-34                         | 5307J_25 | 7.0        |            |                               |         | 33-27      | 5315J_25   | 7.0                           |          |           |      | 125-96  | 5407J_14* | 7.0  |
|       | 125-71     | 5107J_14   | 1.7                           |               |            |            | 26-18                         | 5407J_25 | 7.0        |            |                               |         | 26-18      | 5407J_25   | 7.0                           |          |           |      | 101-81  | 5315J_14* | 12.3 |
|       | 70-47      | 5115J_25   | 2.6                           |               |            |            | 17-14                         | 5415J_25 | 8.0        |            |                               |         | 17-14      | 5415J_25   | 8.0                           |          |           |      | 80-71   | 5407J_14† | 7.0  |
| 60    | 350-191    | 5107J_05   | 1.7                           | 400           |            |            | 13-9                          | 5507J_25 | 8.0        |            | 450                           |         | 70-55      | 5407J_25†  | 7.0                           |          | 500       |      | 70-53   | 5507J_25* | 8.0  |
|       | 190-126    | 5107J_09   | 1.7                           |               |            |            | 8-6                           | 5608J_25 | 9.5        |            |                               |         | 40-27      | 5507J_25   | 8.0                           |          |           |      | 52-36   | 5608J_25* | 9.9  |
|       | 125-71     | 5107J_14   | 1.7                           |               |            |            | 350-301                       | 5115J_05 | 4.1        |            |                               |         | 26-18      | 5608J_25   | 9.5                           |          |           |      | 350-271 | 5407J_05* | 13.2 |
|       | 70-9       | 5107J_25   | 1.9                           |               |            |            | 299-259                       | 5203J_05 | 12.1       |            |                               |         | 300-191    | 5307J_05   | 10.6                          |          |           |      | 270-231 | 5407J_05* | 17.8 |
| 80    | 350-191    | 5107J_05   | 1.7                           |               | 500        |            | 258-191                       | 5207J_05 | 5.0        | 550        |                               |         | 17-12      | 5608J_25   | 9.5                           | 600      |           |      | 230-176 | 5415J_05† | 20.7 |
|       | 190-126    | 5107J_09   | 1.7                           |               |            |            | 190-146                       | 5203J_09 | 11.2       |            |                               |         | 350-301    | 5307J_05   | 8.1                           |          |           |      | 175-166 | 5415J_05† | 23.2 |
|       | 125-71     | 5107J_14   | 1.7                           |               |            |            | 145-126                       | 5207J_09 | 5.0        |            |                               |         | 300-251    | 5307J_05   | 11.9                          |          |           |      | 165-156 | 5415J_05* | 21.8 |
|       | 70-34      | 5107J_25   | 2.0                           |               |            |            | 125-74                        | 5207J_14 | 6.5        |            |                               |         | 250-225    | 5307J_05   | 16.8                          |          |           |      | 155-71  | 5507J_14* | 8.1  |
| 100   | 350-191    | 5107J_05   | 1.7                           |               |            | 600        | 73-71                         | 5215J_14 | 6.0        |            |                               | 650     | 224-191    | 5315J_05   | 8.2                           |          |           | 700  | 350-271 | 5407J_05* | 13.2 |
|       | 190-126    | 5107J_09   | 1.7                           |               |            |            | 70-44                         | 5215J_25 | 6.0        |            |                               |         | 190-166    | 5307J_09*  | 13.8                          |          |           |      | 270-231 | 5407J_05* | 17.8 |
|       | 125-71     | 5107J_14   | 1.7                           |               |            |            | 43-27                         | 5307J_25 | 7.0        |            |                               |         | 165-126    | 5315J_09*  | 8.9                           |          |           |      | 230-176 | 5415J_05† | 20.7 |
|       | 70-34      | 5107J_25   | 2.0                           |               |            |            | 26-22                         | 5315J_25 | 7.0        |            |                               |         | 125-102    | 5307J_14*  | 7.7                           |          |           |      | 175-166 | 5415J_05† | 23.2 |
| 150   | 350-191    | 5107J_05   | 1.7                           | 700           |            |            | 21-15                         | 5407J_25 | 7.0        |            | 750                           |         | 101-81     | 5315J_14*  | 12.3                          |          | 800       |      | 165-156 | 5415J_05* | 21.8 |
|       | 190-126    | 5107J_09   | 1.7                           |               |            |            | 14-11                         | 5415J_25 | 8.0        |            |                               |         | 80-71      | 5407J_14†  | 7.0                           |          |           |      | 155-71  | 5507J_14* | 8.1  |
|       | 125-71     | 5107J_14   | 1.7                           |               |            |            | 10-7                          | 5507J_25 | 8.0        |            |                               |         |            |            |                               |          |           |      |         |           |      |

# Stop Switch

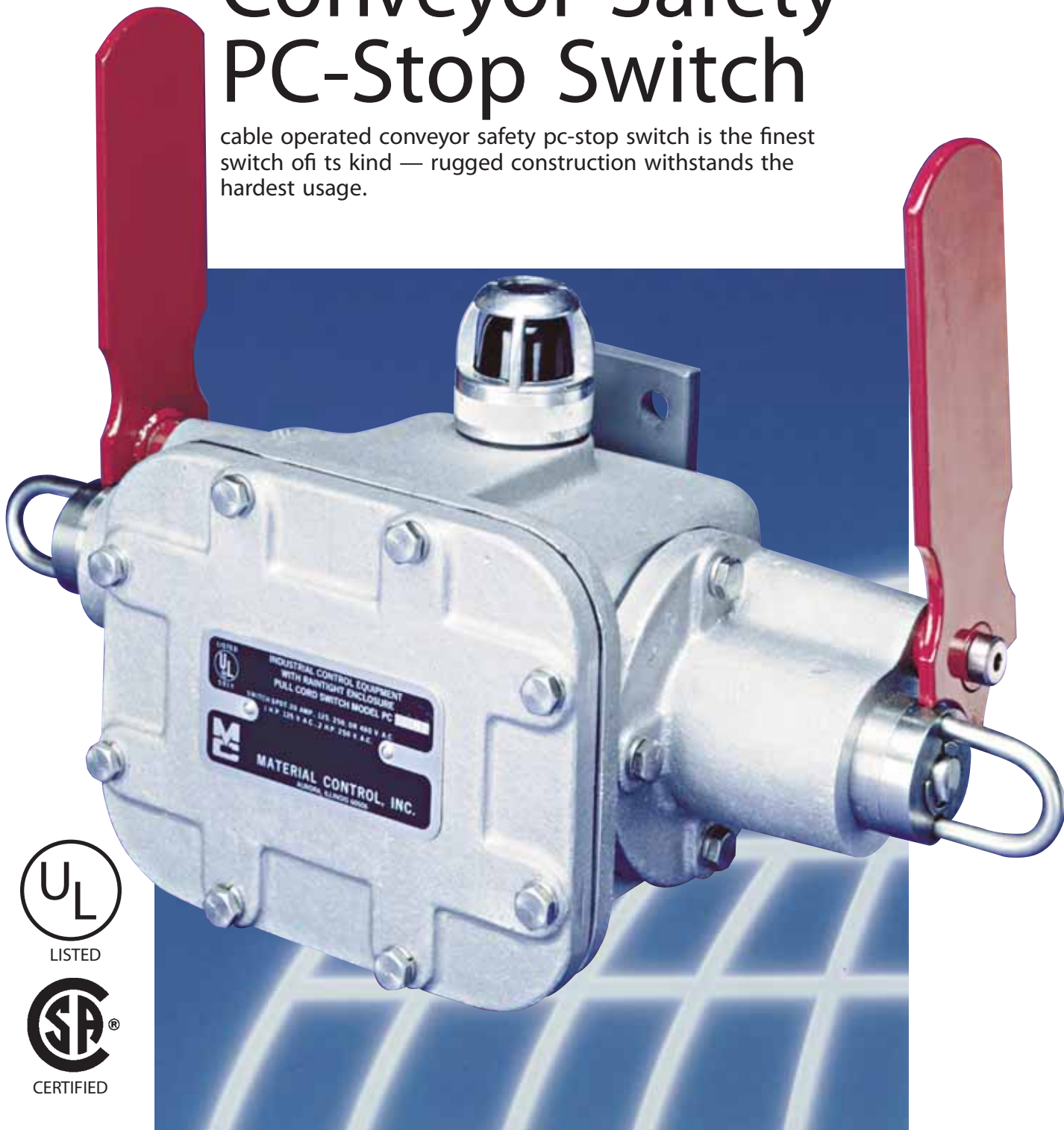


**SERPENTIX CONVEYOR CORP.®**



# Conveyor Safety PC-Stop Switch

cable operated conveyor safety pc-stop switch is the finest switch of its kind — rugged construction withstands the hardest usage.



LISTED



CERTIFIED



**MATERIAL CONTROL, INC.**

197 POPLAR PL. • UNIT 3

P.O. BOX 308

NORTH AURORA, IL 60542-0308

800-926-0376 • 630-892-4274 • FAX 630-892-4931

WWW.MATERIALCONTROLINC.COM • EMAIL: SALES@MATERIALCONTROLINC.COM

# OPERATION INFORMATION:

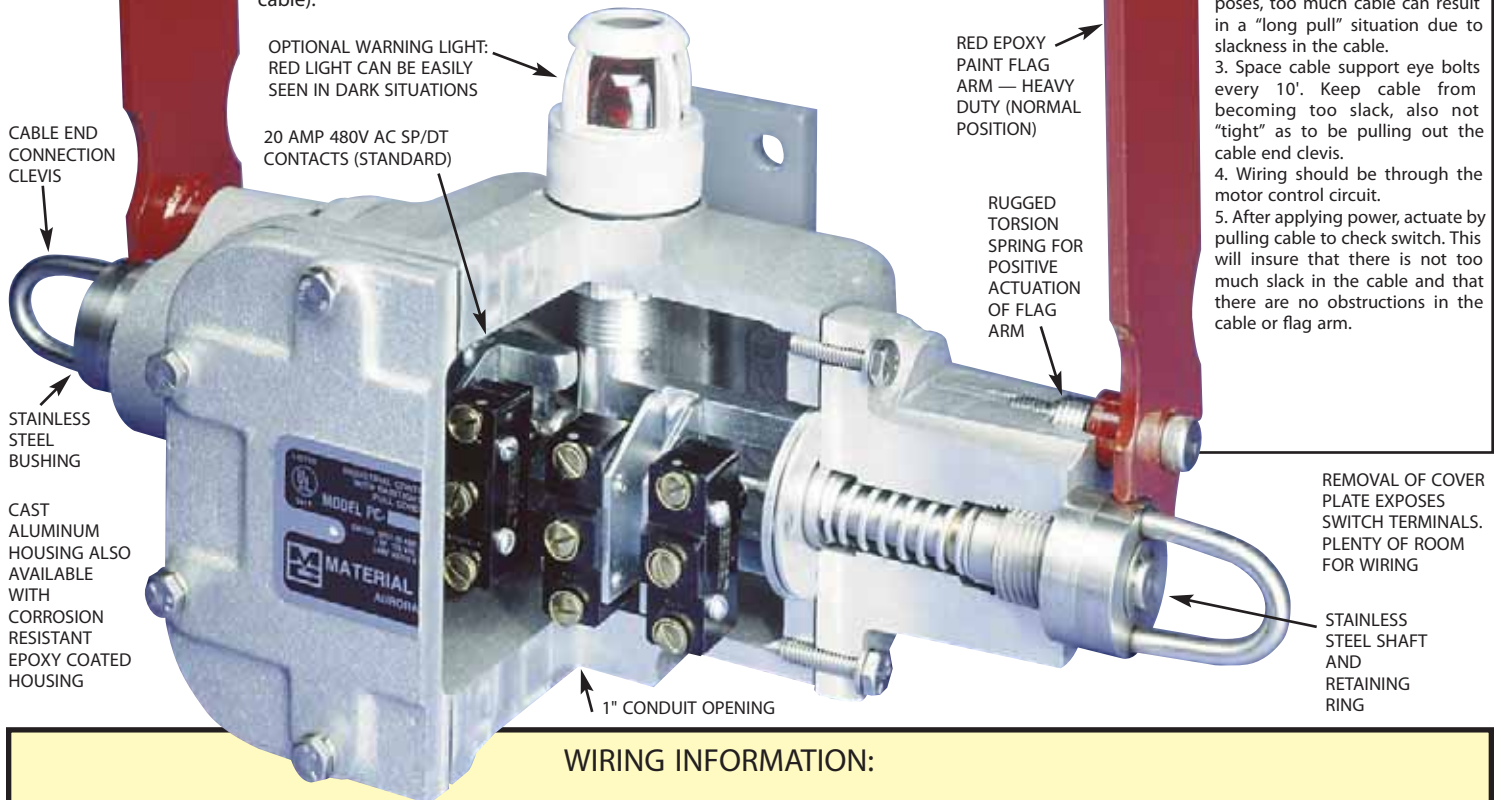
A cable is connected from a fixed point to the cable end connection clevis. A pull on the cable with a movement of approximately 1/2" will actuate the switch and trip the flag arm down, into the walkway, and lock the switch and flag arm in the actuated position. Unit is reset by returning the flag arm to the normal up position.

## ACTUATION FORCE:

Standard unit is supplied with an actuation (pull) force of 16 lbs. We can supply (at no extra charge) units factory set at 25 lbs. actuating force. The standard 16 lbs. actuation force will allow the use of as much cable, per switch, as would ever be required (over 500 ft. of unsupported cable).

# INSTALLATION INSTRUCTIONS

1. Switch should be mounted on a flat surface using mounting holes provided. One fastener in each end of mounting bar will be sufficient.
2. Distance between switches should not exceed 200'. Use no more than 100' of cable per switch end. This is for safety purposes, too much cable can result in a "long pull" situation due to slackness in the cable.
3. Space cable support eye bolts every 10'. Keep cable from becoming too slack, also not "tight" as to be pulling out the cable end clevis.
4. Wiring should be through the motor control circuit.
5. After applying power, actuate by pulling cable to check switch. This will insure that there is not too much slack in the cable and that there are no obstructions in the cable or flag arm.



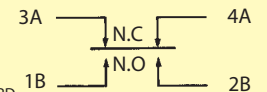
# WIRING INFORMATION:

**STANDARD SWITCH** — One SP/DT switch per end (extra switch per end avail.)  
 • 20 AMPS, 125, 250 or 480 VAC • 10 AMPS, 125 VAC "L" (tungsten lamp load)  
 • 1 HP, 125 VAC • 2 HP, 250 VAC • 1/2 AMP, 125 VDC • 1/4 amp, 250 VDC

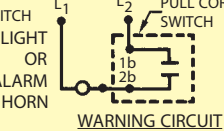
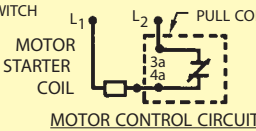
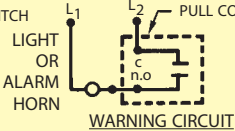
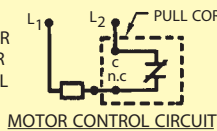
**OPTIONAL SWITCH** — One two circuit double break switch per end (extra switch per end available.) • 15 AMPS, 120, 240, 480 or 600 VAC 1/2 HP, 120 VAC  
 • 1 HP, 240 VAC • 0.8 AMPS, 115 VDC • 0.4 AMP, 230 VDC

## SINGLE POLE, DOUBLE THROW CIRCUIT

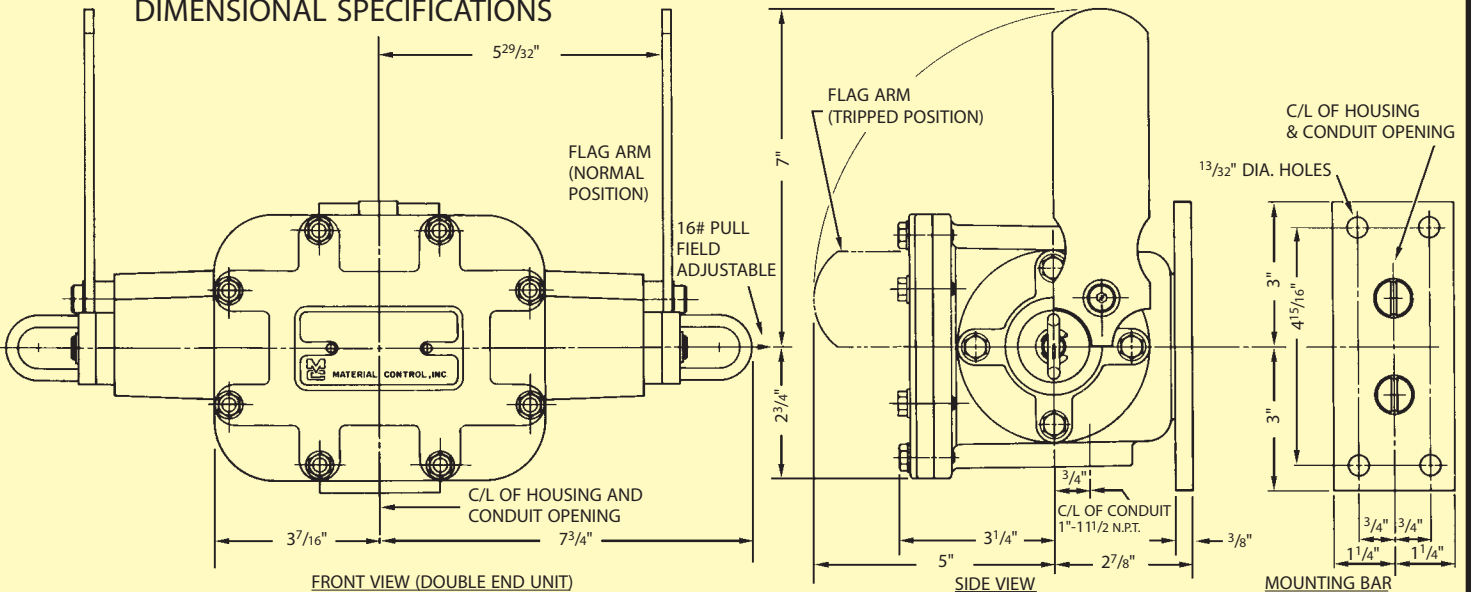
## TWO CIRCUIT, DOUBLE BREAK CIRCUIT



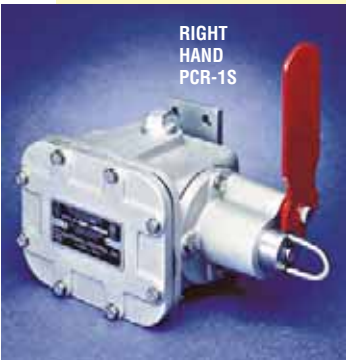
NOTE: Two circuit double break switches must be wired to equal voltage sources and the same polarity. Loads should be on the same side of the lines. 1B has the same polarity as 3A.



# DIMENSIONAL SPECIFICATIONS



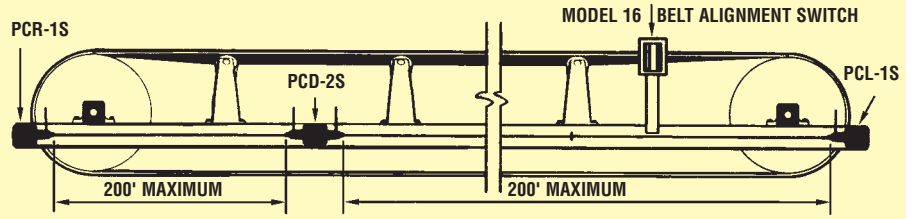




RIGHT HAND  
PCR-1S



LEFT HAND  
PCL-1S



**TECHNICAL INFORMATION:**  
 Enclosure sealed for outside applications • Standard unit meets NEMA 1,3,4,4X and 12 requirements • Housing: cast aluminum • Flag arm: steel with red epoxy paint coating.

## SELECTION AND MODEL INFORMATION

**1-SINGLE POLE:**  
 double throw micro switch  
**PCL-1S** ..... LEFT HAND  
**PCR-1S** ..... RIGHT HAND  
**TYPICAL USE:**  
 Emergency shutdown of conveyors or other machinery.  
**AVAILABLE OPTIONS:**

- Hazardous locations
- Corrosive locations

**1-TWO CIRCUIT:**  
 double throw micro switch for D.C circuits  
**PCL-1T** ..... LEFT HAND  
**PCR-1T** ..... RIGHT HAND  
**TYPICAL USE:**  
 Emergency shutdown of conveyors and other machinery.  
**AVAILABLE OPTIONS:**

- Hazardous locations
- Corrosive locations

**1-SINGLE POLE:**  
 double throw micro switch at each end  
**PCD-2S** ..... DOUBLE ENDED  
**TYPICAL USE:**  
 Emergency shutdown of conveyors and other machinery.  
**AVAILABLE OPTIONS:**

- Hazardous locations
- Corrosive locations
- Remote or dark locations

**1-TWO CIRCUIT:**  
 double throw micro switch at each end for D.C circuits  
**PCD-2T** ..... DOUBLE ENDED  
**TYPICAL USE:**  
 Emergency shutdown of conveyors or other machinery.  
**AVAILABLE OPTIONS:**

- Hazardous locations
- Corrosive locations
- Remote or dark locations
- Pennsylvania B.O.T.E. approved

**2-SINGLE POLE:**  
 Double throw micro switch  
**PCL-2S** ..... LEFT HAND  
**PCR-2S** ..... RIGHT HAND  
**TYPICAL USE:**  
 Emergency shutdown of conveyors or other machinery — with alarm or computer interface capability.  
**AVAILABLE OPTIONS:**

- Hazardous locations
- Corrosive locations
- Remote or dark locations

**2-TWO CIRCUIT:**  
 Double throw micro switch for D.C circuits  
**PCL-2T** ..... LEFT HAND  
**PCR-2T** ..... RIGHT HAND  
**TYPICAL USE:**  
 Emergency shutdown of conveyors or other machinery — with alarm or computer interface cap.  
**AVAILABLE OPTIONS:**

- Hazardous locations
- Corrosive locations
- Remote or dark locations

**2-SINGLE POLE:**  
 Double throw micro switches at each end  
**PCD-4S** ..... DOUBLE ENDED  
**TYPICAL USE:**  
 Emergency shutdown of conveyors or other machinery — with alarm or computer interface capability.  
**AVAILABLE OPTIONS:**

- Hazardous locations
- Corrosive locations
- Remote or dark locations

**2-TWO CIRCUIT:**  
 Double throw micro switches at each end for D.C circuits  
**PCD-4T** ..... DOUBLE ENDED  
**TYPICAL USE:**  
 Emergency shutdown of conveyors or other machinery — with alarm or computer interface capability  
**AVAILABLE OPTIONS:**

- Hazardous locations
- Corrosive locations
- Remote or dark locations

| MODELS |          |
|--------|----------|
| →      | PCL-1S   |
| →      | PCR-1S   |
| →      | PCL-2S X |
| →      | PCR-2S X |

| MODELS |        |
|--------|--------|
|        | PCL-1T |
|        | PCR-1T |
|        | PCL-2T |
|        | PCR-2T |

| MODELS |        |
|--------|--------|
|        | PCD-2S |
|        | PCD-4S |

| MODELS |        |
|--------|--------|
|        | PCD-2T |
|        | PCD-4T |

## SPECIAL APPLICATION OPTIONS:

**HAZARDOUS LOCATIONS:**  
 Explosion proof units meet NEMA 7 — class 1, Groups C and D  
 • NEMA 9 — class II, Groups E, F and G for hazardous locations. Add "X" to model number, **NO ADDITIONAL CHARGE.**

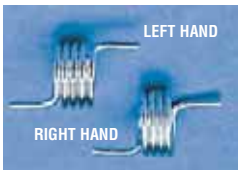
**REMOTE OR DARK LOCATIONS:**  
 Use or red warning light in dark and remote areas (requires two micro switches per end of housing). 125V AC.  
**NOTE:** Available in rain tight, dust tight and explosion proof. Add prefix "L" to model number.

**CORROSIVE LOCATIONS:**  
 Epoxy coated switches with standard flag arms and plated torsion springs. Please add "EPOXY" to model number.

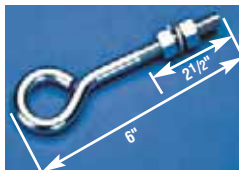
**PENNSYLVANIA B.O.T.E. APPROVED:**  
**PCD-27-B.O.T.E.**

SEE PRICE SHEET FOR PRICES

## ACCESSORIES:



**TORSION SPRINGS**  
 Right or left hand replacement torsion springs for all PC switches. **PC-31 RH or LH**



**CABLE SUPPORT EYE BOLTS**  
 Plated 1/2" N.C. thread - two nuts and one lock-washer included. **PC-27**



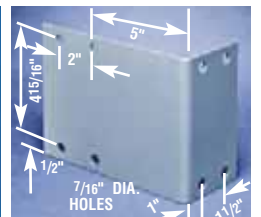
**CABLE END FITTINGS**  
 Forged steel saddle and steel U-bolt. Cadmium plated bolts and nuts. **PC-28**



**CABLE WITH ORANGE PROTECTIVE COATING**  
 3/32 7x7 preformed galvanized aircraft cable 3/16" O.D. Vinyl coated. **PC-25**  
 Nylon coated. **PC-26**



**CONDUIT PLUG**  
 1" metal conduit plug. **PC-29**



**PC MOUNTING BRACKET. PC-30**

# Zero Motion Speed Switch



**SERPENTIX CONVEYOR CORP.®**



### SCP 1000 Presettable Speed Switch

- Single or double relay set point protection.
- 1-100 and 10-1000 RPM set point ranges (others available).
- Built-in start delay and signal loss protection.
- ETL® approved to applicable UL and CSA standards.
- Explosionproof housing is dirt, dust, grease and waterproof.
- Switch selectable overspeed or underspeed sensing.
- Dial in set point adjustment with digital accuracy.

## Product Information

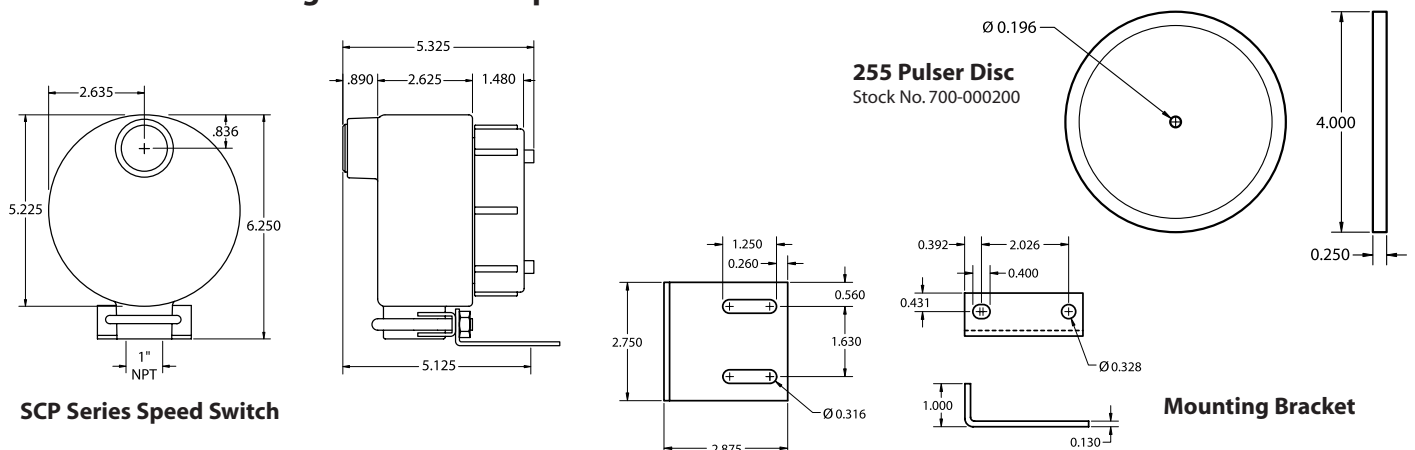
### Description

SCP series presettable speed switches are self-contained shaft rotation monitoring systems providing one or two individually adjustable relay set points. They are ideal for use in hazardous and wet locations where speed indication for alarm or machinery shutdown is critical for safe operation. SCP series switches are an excellent choice for overspeed and/or underspeed protection of bucket elevators, fans/blowers, screw conveyors, rotary airlocks or virtually any rotating shaft. SCP series switches are offered as standard in two configurations: a single relay output (SCP-1000). While many applications require only one set point (SCP-1000). If the shaft continues to slow down and reaches the second set point, the primary process can be wired for shutdown, maintaining the efficiency and safety of operations by preventing machine damage, product waste and costly downtime. SCP series switches feature visual set point adjustment via rotary dials for ease and accuracy, and all calibration can be done with the machinery at rest.

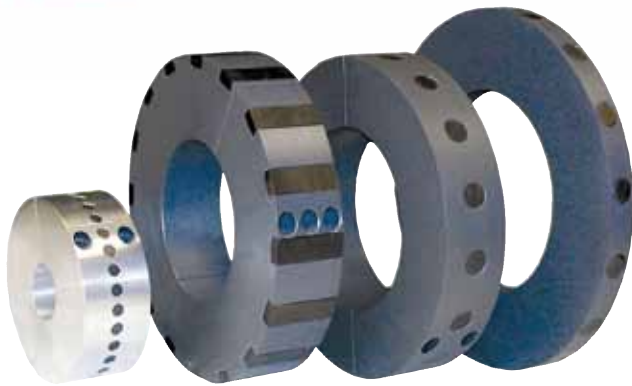
### Principle of Operation

SCP series switches have an internal Hall-Effect sensor and are supplied with a shaft-end mounted Pulser Disc (or optional split collar or Pulser Wrap), which generates an alternating magnetic field picked up by the SCP's large-gap, non-contact sensor. The SCP decodes this frequency signal to determine shaft speed, and compares it to the pre-adjusted set point(s). The relay output(s) can then be used for equipment shutdown or to provide an alarm, assuring machine protection and process integrity. SCP series speed switches are fail-safe; any malfunction during operation will de-energize the control circuit.

### Dimensional Drawings • SCP Series Speed Switches







### Split Collar Pulser Wraps

Custom made for your application, built to your specifications

- No machinery tear-down required for mounting
- Five types of wraps fit most applications
- Custom number of pulses per revolution
- PVC, aluminum, or stainless steel
- High temperature wraps available

## Product Information

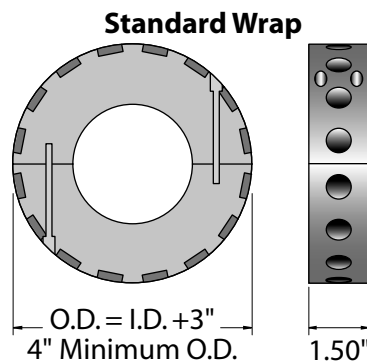
### Description

Pulser Wraps are PVC, aluminum, or stainless steel split collars with magnets mounted on the outside circumference. The magnets serve as targets for Hall-Effect and Magneto-resistive sensors that switch when exposed to magnetic fields. All wraps are custom machined to the diameter of the monitored shaft and are split into halves. This splitting process allows the wrap to clamp tightly onto the shaft without tearing down any equipment to install them. The halves are secured around the shaft with recessed Allen-head socket screws supplied. Pulser Wraps provide magnetic targets that are strong enough to allow large gap distances (up to 1/2 -inch) between the wrap and the sensor. The wrap and sensor system forgives slight misalignment of the sensor, machinery vibration, dirty, wet, or greasy environments, and shaft end-play.

### Special Wraps

Wraps purchased for use with standard Electro-Sensors systems are typically provided with 16 magnets of alternating polarity. Using a standard Hall-Effect sensing system, this provides 8 pulses per revolution from the sensor. Special wraps can be provided to suit particular application requirements. This often includes adding magnets to the wraps to increase the number of pulses per revolution generated by the sensing system. Adding magnets will usually require an increase in the outside diameter of the wrap. Standard and miniature wraps are typically selected when more magnets are required because the magnets may be added without large increases in the outside diameter, particularly if the 1/4" diameter magnets are used. Wraps can be manufactured from PVC, aluminum, or stainless steel, and have the option of a keyway where required. **Steel inserts can be substituted for magnets when using proximity or mag sensors.** An Electro-Sensors Application Specialist can assist in the design of wraps to meet specific or special needs.

### Dimensional Drawing

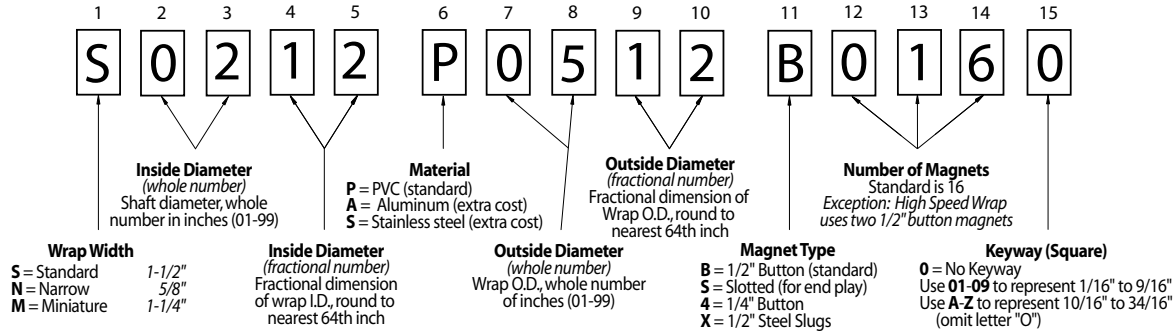




## Installation

Pulser Wraps are custom manufactured to fit the shaft they will be mounted on. When the wrap is shipped, four Allen-head cap screws hold the two halves of the wrap together. These screws must be removed so that the wrap is in two halves. Place the halves around the shaft, reinsert the screws and torque them evenly to 5 foot pounds. After installation, a small gap between the two halves is normal.

**Use the following chart to create a part number for any wrap.  
Please state the exact shaft diameter and maximum RPM when ordering.**



### Examples

|   |                       |              |              |
|---|-----------------------|--------------|--------------|
| 1. Standard PVC Wrap for 3-1/2" shaft, 1,750 RPM, with 16 magnets                 | Part No. <b>S0332</b> | <b>P0632</b> | <b>B0160</b> |
| 2. Narrow Aluminum Wrap for 1-5/8" shaft, 1,200 RPM, 1/4" keyway, with 16 magnets | Part No. <b>N0140</b> | <b>A0700</b> | <b>B0164</b> |
| 3. High Speed Aluminum Wrap for 6-1/4" shaft, 6,000 RPM, with 2 magnets           | Part No. <b>S0616</b> | <b>A0716</b> | <b>B0020</b> |
| 4. Miniature PVC Wrap for 1-1/8" shaft, 3,000 RPM, with max. no. of 1/4" magnets  | Part No. <b>M0108</b> | <b>P0400</b> | <b>40310</b> |

The formulas below show the maximum number of magnets that can be mounted on the Standard or Miniature Wraps with respect to magnet diameter and the outside diameter of the Wrap.

**1/2" Magnets**  

$$\frac{(\text{Wrap Outside Diameter} - 1/2") \times 3.14}{0.65}$$

**1/4" Magnets**  

$$\frac{(\text{Wrap Outside Diameter} - 1/2") \times 3.14}{0.35}$$

## Specifications • Split Collar Pulser Wraps

### All Wraps - Temperature Range

|                         |            |
|-------------------------|------------|
| PVC Material .....      | 60°C max.  |
| Aluminum Material ..... | 150°C max. |
| Stainless Steel .....   | 150°C max. |

*Consult factory for higher temperature ranges.*

### Wrap Types

#### Standard - Under 3,000 rpm

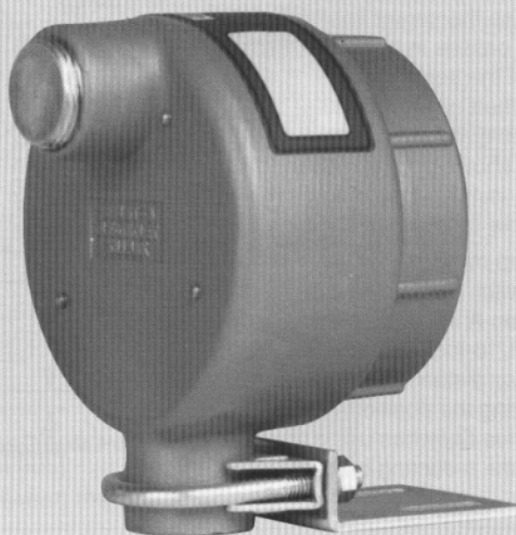
|                               |                                |
|-------------------------------|--------------------------------|
| Width .....                   | 1-1/2"                         |
| Inside diameter .....         | Custom to shaft size           |
| Outside diameter .....        | I.D. + 3"                      |
| Min. outside diameter .....   | 4"                             |
| Material .....                | PVC std., aluminum optional    |
| Standard magnet size .....    | 1/2" diameter                  |
| Standard no. of magnets ..... | 16 (8 or 16 pulses/revolution) |

*Specifications subject to change without notice.*

# Presettable Speed Switch



**SCP1000/2000** ©1998



## Features:

- **Single or Double Relay Set Point Protection**
- **Positive Visual Set Point Adjustment w/Digital Accuracy**
- **Built-in Start Delay**
- **Switch Selectable Underspeed or Overspeed Sensing**
- **1-100 and 10-1000 rpm Set Point Ranges**
- **Dustproof, Dirtproof, Greaseproof and Waterproof**
- **ETL® Approved to UL® 508 Standard**
- **Explosion-proof Housing, UL, CSA Approved**

## Description:

The SCP-Series Presettable Machine Switches are complete systems for providing one or two individually adjustable relay set points, while monitoring a single rotating shaft. The SCP-Series Switches are ideal for applications where speed indication for alarm and shutdown purposes is critical for safe and efficient operation of your equipment. The SCP-Series are the "Installers Choice" for protecting bucket elevators, fans, airlocks, mixers, or virtually any rotating shaft, including overspeed sensing requirements.

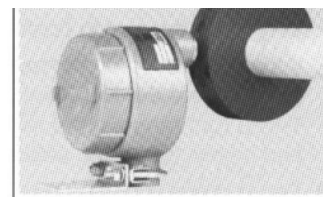
The SCP-Series Speed Switches are offered with a single relay output (Model SCP-1000).

Another control function, commonly used in the grain industry, employs both relays set in the Underspeed Mode. The first relay provides warning of a slowdown, and also permits interlock wiring to shut down auxiliary machinery. If the shaft continues to slow down and reaches the second set point speed, the primary process can be wired for shutdown to prevent equipment damage and product loss.

Both models feature visual set point adjustment for "dial in" ease and accuracy of set point settings. The SCP-Series Switches can be completely adjusted with the machinery at rest. There is no need to run the shaft. Precision digital circuitry provides high accuracy, repeatability, and reliability.

## Shaft Monitoring:

The SCP-Series Switches have an internal Hall-Effect Sensor which is used to monitor a magnetic target, such as a Pulser Disc or the optional Pulser Wrap, mounted on the monitored shaft. As the Disc or Wrap rotates in front of the Hall-Effect Sensor, a digital signal proportional to the speed of the monitored shaft is produced. The signal is used by the unit's electronics to determine shaft speed and relay set point actuation.



**SCP Switch and Optional Pulser wrap**

## Pulser Wrap

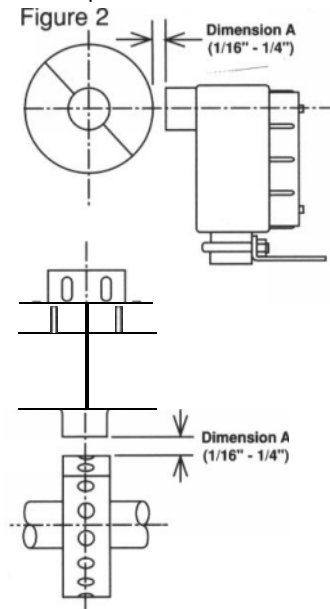
Pulser Wraps are custom manufactured to fit the shaft they will be mounted on. When the wrap is shipped, four head cap screws hold the two halves of the wrap together. These screws must be removed so that the wrap is in two halves. Place the halves around the shaft, reinsert the screws and torque them to 8 foot pounds.

**SCP-Series Installation:**

The SCP-Series Switches are supplied with a mounting bracket assembly. The speed switch must be installed so the center line of the magnets passes in front of the center portion of the sensing head as they rotate.

The gap distance between the speed switch and the wrap (dimension A in the diagrams) can be from 1/16-inch to 1/4-inch. The proper gap distance is achieved by adjusting the position of the SCP-Series Switches using the slots on the mounting bracket.

**Sensing Head and Wrap:**



**SCP-Series Calibration:**

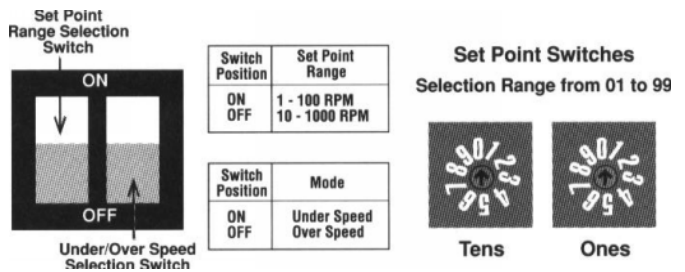
See Figure 3 for Switch Locations

**Four Steps to Calibrating the SCP-Series Switches:**

1. Determine your monitoring requirement. The Model SCP-1000 provides a single relay set point, while the Model SCP-2000 has two independent relay set points Double Set Point Protection.
2. Determine whether the relay(s) should deenergize when the shaft speed drops below the set point speed (Underspeed Operation), or when the shaft speed goes above the set point speed (Over Speed Protection). Adjust the Under/Over Speed Selection switch(es) to set the SCP-Series Switch in the desired Mode. (See the diagram at right for the switch positions).
3. If the required relay trip point (set point speed) is below 100 rpm, set the Set Point Range Selection Switch to the 1-100 rpm range. If the relay trip set point is above 100 rpm and below 1000 rpm, select the 10-1000 rpm range.
4. Set the corresponding rotary Set Point switches to the desired set point RPM. The switches can be set to any number from 01-99. A setting of 00 will read as though it was entered as 01.

**Calibration Example:** If the Set Point Range Selection Switch was set in the 1-100 rpm range, and the desired set point speed is 50 rpm, the Set Point switches should be set to 50. In the 10-1000 rpm range, the set point is 10-times the switch setting (i.e. a switch setting of 60 results in a set point of 600 rpm).

*Note: Calibration should be done with power to the SCP turned off. If a change is made to the calibration while power is on (not recommended), cycle power to the unit. This will store the new set point, and restart the 10-second start delay.*



**Signal Loss Protection:**

In Underspeed Mode, a loss of sensor signal will be detected immediately, and the relay(s) will deenergize. In Overspeed Mode, the loss of signal will be detected immediately, but the SCP-Series Switch will wait 30-seconds for the signal to resume. This prevents unwanted shutdown when monitoring very slow-moving shafts. After the 30-seconds have elapsed with no incoming signal, the relay(s) will deenergize.

**Start Delay:**

A 10-second start delay is built into the SCP-Series Switches. In Underspeed Mode, the start delay holds the relay(s) in an energized state for 10-seconds, allowing monitored shaft to reach a speed above the set point(s)

before monitoring begins. The start delay begins when power is applied to the SCP-Series Switch. If additional start delay time is required, an external time delay relay can be used, or consult the factory for more options.

**Special Options:**

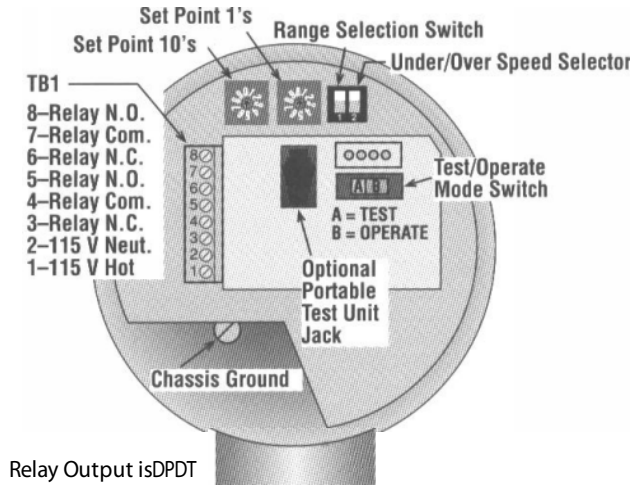
Special options are available from the factory to modify the standard functions of the SCP-Series Switches. Options include: Increased or Decreased Start Delay Interval, No Start Delay, Reduced or Enlarged Set Point Hysteresis, Set Point Over 1000 RPM, Calibration in Percent of Speed, and Signal Loss Protection Inactivation in Overspeed Mode.



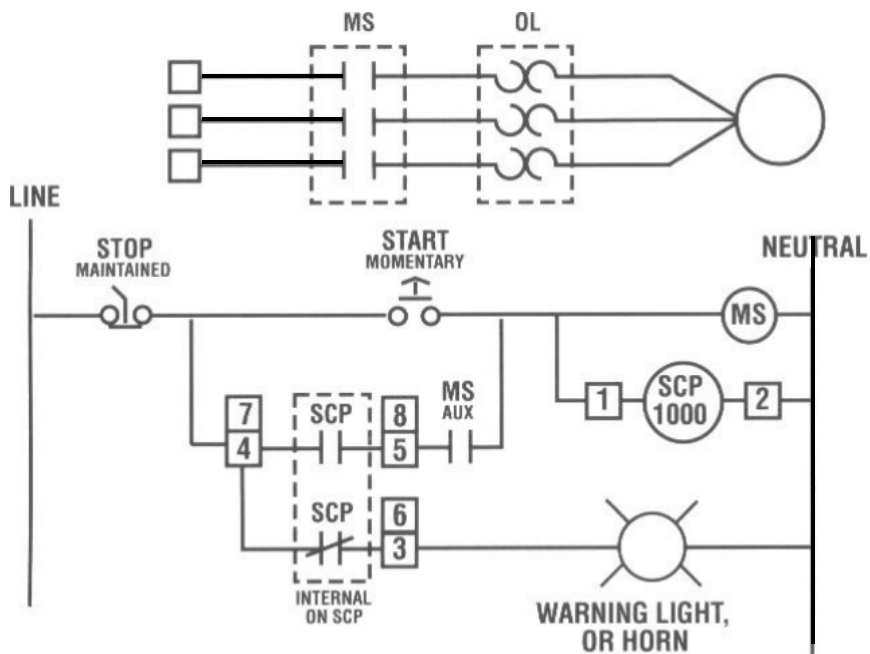
Wiring Connections:

Figure 3

SCP-1000



Motor Shutdown with Alarm



**This Wiring Configuration Will Disable the Alarm on a Stop Command. To Maintain the Alarm, Replace the Maintained Stop Switch with a Momentary Normally Closed Switch.**

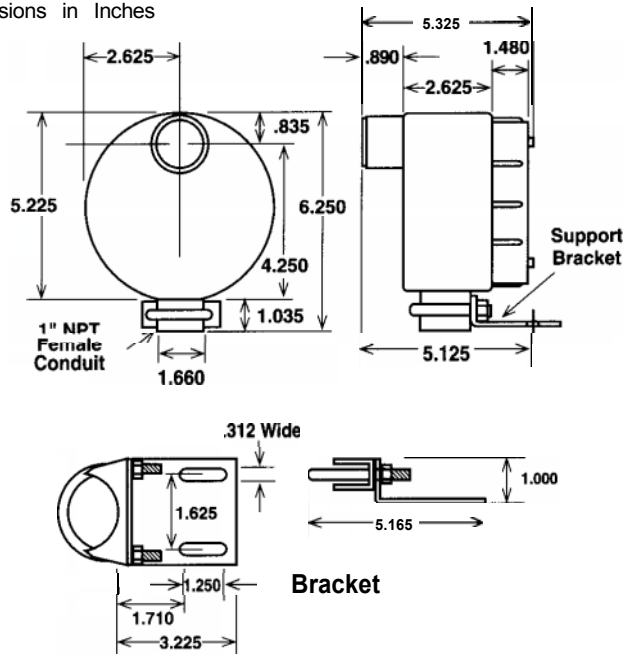
Wiring Diagram Key:

- MS Motor Starter (not supplied)
- OL Overload contacts
- n.o. Normally open (relay is in a deenergized state).
- TDR Time Delay "OFF" Relay (not supplied)
- If the shaft being monitored comes up to speed slowly, a TDF can be used so the operator will not have to hold the START button in.

WARNING

During a stopped condition, even a slight movement of the shaft or magnetic disc could energize the control relay and start the motor if the Motor Auxiliary Normally Open Contact (MS n.o.) is not wired in series as shown in these typical wiring diagrams. This situation could cause equipment damage or PERSONAL INJURY! To prevent starting the motor accidentally, ALWAYS USE PROPER LOCK-OUT-TAG-OUT PROCEDURES.

SCP-Series Dimensional Drawings:  
Dimensions in Inches



**SCP-Series Switch General Specifications:**

|                        |  |
|------------------------|--|
| <b>Power:</b>          |  |
| Voltage .....          | 115 + 10%, Standard,<br>230 Vac Optional                               |
| Frequency .....        | 50 - 60 Hz   |
| Wattage .....          | 1.1 VA   |
| <b>Input Signal:</b>   |  |
| Type                   | Open Collector/Logic   |
| Amplitude              | 5V Pull-Up, 4.7 K Ohms   |
| Impedance              | 2200 Ohms to 15V   |
| Pulse Width            | 15 m/sec. Min.   |
| Maximum Frequency      | 266.66 Hz  |
| Minimum Pulse Width    | One m/sec.   |
| <b>Set Point Data:</b> |  |
| Number Available ....  | One or Two   |
| Actuation State .....  | Overspeed or Underspeed  |
| Adjustments .....      | Rotary Switches (Tens and<br>Ones Digit)                               |
| Hysteresis .....       | 6%   |
| Range .....            | 1-100rpm, 10-1000rpm   |
| Mode .....             | Selectable - Over or Under   |
| Accuracy .....         | 0.005% at Bottom of Range<br>0.25% at Midrange<br>0.5% at Top of Range |
| Relay Contact Rating   | SCP-1000/SCP-2000: Isolated, 5A<br>250 Vac, 30 Vdc Resistive           |
| Contact Arrangement    | SCP-1000: One Form C, D.P.D.T.<br>SCP-2000: Two Form C, S.P.D.T.       |

|                                    |  |
|------------------------------------|--|
| <b>Physical/Environmental:</b>     |  |
| Housing and Cover.                 | Cast Aluminum, C.S.A. & FM<br>Approved. Meets NEMA 1, 3, 12, 13<br>and NEMA 7, 9. Hazardous<br>Location. U.L. Rated: Class I Group<br>D; Class II Groups E, F, G. NEMA 4<br>8-Position Removable Terminal<br>Block |
| Electrical Connections             | Bracket, 1-inch NPT Conduit<br>Opening   |
| Mounting                           | Operating Temperature<br>Maximum Speed Range.<br>Shipping Weight (System)  |
|                                    | -40°C to 60°C*<br>Consult Factory<br>4 lb.   |
| Pulser Disc:                       |  |
| Material                           | Nylon 12 (with Ferrite Material)   |
| Dimensions                         | 4-in. Dia. x 1/4-in. Thick   |
| Operating Temperature              | -40°C to 60°C*   |
| Maximum speed Range.               | Consult Factory  |
| Pulser Wrap (optional):            |  |
| Material                           | PVC (Standard) Aluminum (Optional)   |
| Operating Temperature.             | -40°C to 60°C*   |
| Maximum Speed                      | Consult Factory  |
| <b>Spare Parts List:</b>           |  |
|                                    | <u>Stock No.</u> <u>Part No.</u>   |
| 4-inch Dia. Pulser Disc (Nylon 12) | 700-000200      255  |
| 4-inch Dia. Pulser Disc (Aluminum) | 700-001500      255-A  |
| SCP1000 internal Electronics       | 770-020100   |
| Waterproofing Gasket               | 295-000200   |

\*Higher Temperature Ranges Available. Consult Factory

Specifications Subject to Change Without Notice.



6111 Blue Circle Drive • Minnetonka, MN • 55343 U<sub>SA</sub>

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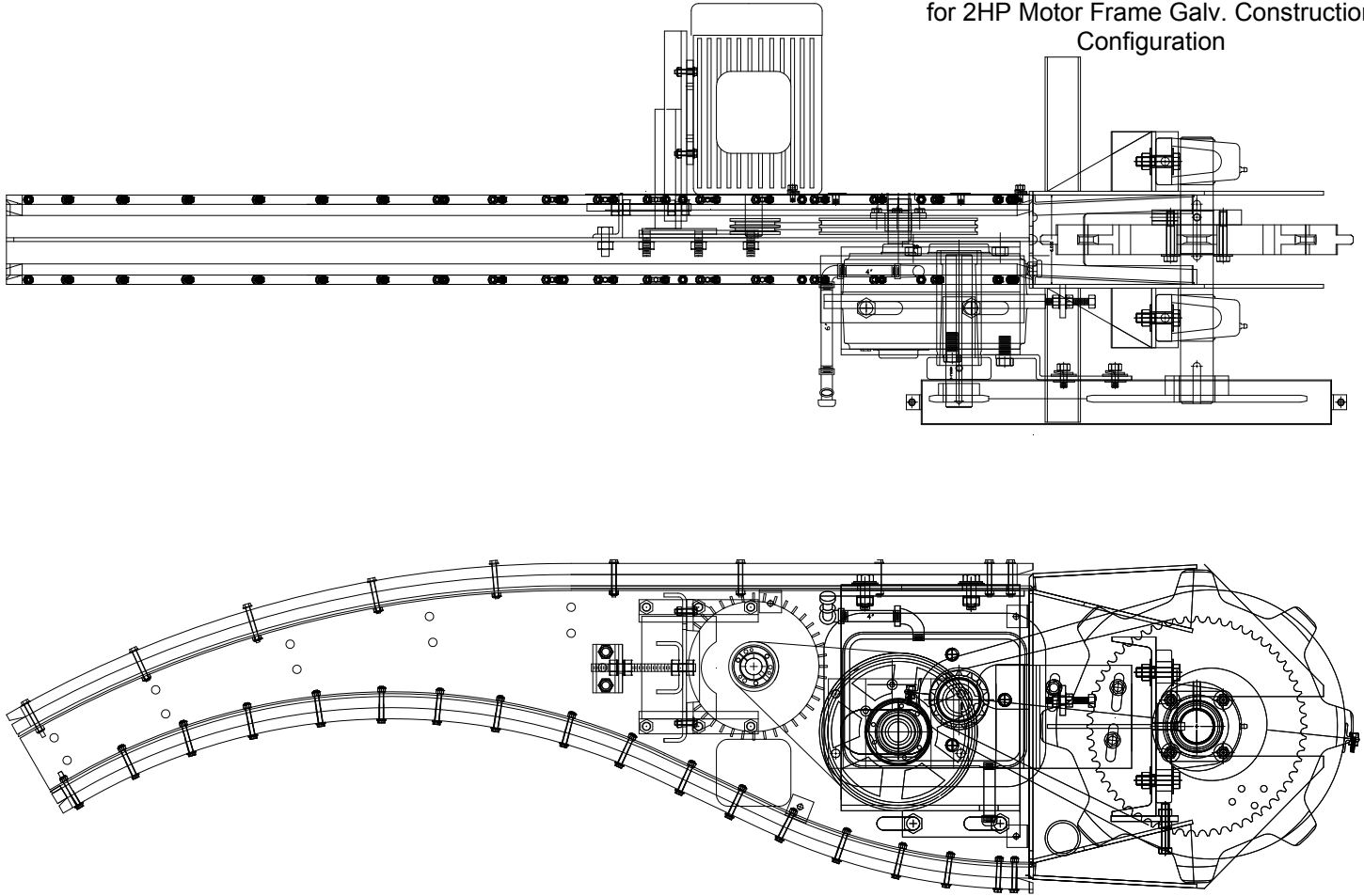


**SERPENTIX CONVEYOR CORP.®**



## 3'-6" LG. x 30° CURVE DRIVE STATION BILL OF MATERIAL

P2-0115-0051-D: Right Hand Mounting for 2HP Motor Frame Galv. Construction Configuration



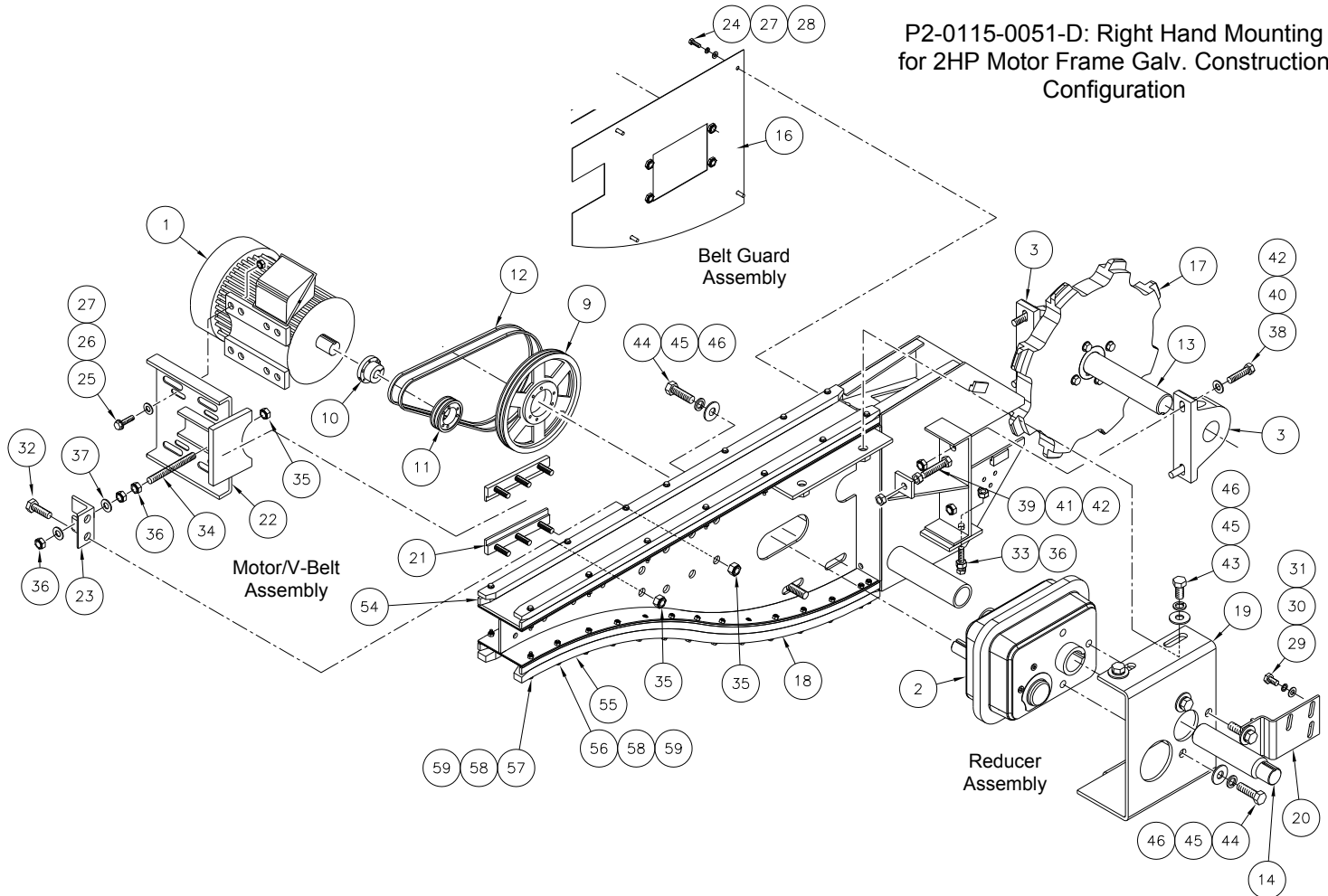
| ITEM NO. | PART NO.       | DESCRIPTION   | MAT'L | QTY. |
|----------|----------------|---|-------|------|
| 1        | US Motor H2P2D | 2-HP, 1750 RPM, TEFC, 3-Phase, 60 Hz, 208 230/460 VAC, Frame-Cast Iron 145T, Service Factor-1.15, Insulation-F, Ambient Temp. -40 Degrees C, Mounting - RH<br><b>Motor Special-</b> | Cast  | 1    |
| 2        | 5203J25C       | Helical Speed Reducer - Falk w/ Bushing #BU5203J-1.750  | Cast  | 1    |
| 3        | MP-35-3-23     | 2 3/16" Pillow Block Bearing  | Steel | 2    |
| 4        |                | Sprocket, No 60 BS 60, 2 3/16" Bore   | Steel | 1    |
| 5        |                | Sprocket, No. 60 FB 15, 1 3/4" Bore   | Steel | 1    |
| 6        |                | Single Strand Roller Chain-ANSI #60- 83 Pitch x 62.5"Lg.  | Steel | 1    |
| 7        |                | Single Strand Roller Chain Connector Link-ANSI #60  | Steel | 1    |
| 8        |                | - blank -   | -     | -    |
| 9        | S180           | Aunspach Torque Limiting Sheave   | Cast  | 1    |
| 10       |                | QD Bushing, No. JA, 7/8" Bore   | Steel | 1    |
| 11       |                | QD Sheave, 3V- Ø2.65 - 2 Groove (22 FPM)  | Cast  | 1    |
| 12       |                | V-Belt, Super HC, No. 3VX-425   | Belt  | 2    |
| 13       | PW-0108-0001-A | Ø2 3/16" Drive Shaft with Keys  | 416SS | 1    |

|           |  |               |   |
|-----------|--|---------------|---|
| JOB NAME: | Harold D. Thompson WRF, Lower Fountain, CO | CONVEYOR NO.: | 1 |
| JOB NO.:  | P2-13-1099                                 |               |   |



## 3'-6" LG. x 30° CURVE DRIVE STATION BILL OF MATERIAL

P2-0115-0051-D: Right Hand Mounting for 2HP Motor Frame Galv. Construction Configuration



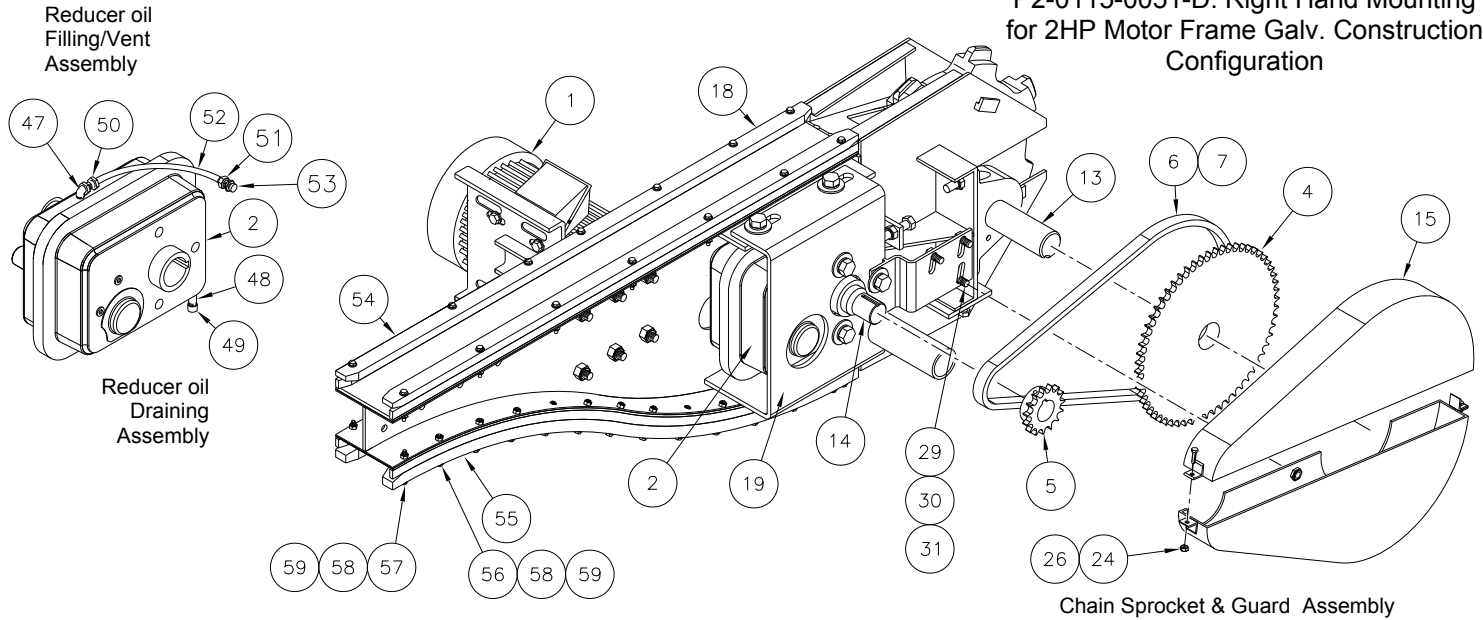
| ITEM NO. | PART NO.             | DESCRIPTION (2HP RH Configuration)                 | MAT'L      | QTY. |
|----------|----------------------|--|------------|------|
| 14       | PW-0108-0009-A       | Ø1 3/4" Reducer Shaft with Key                     | MS-1045    | 1    |
| 15       | PW-0141-0042-D,Rev.A | Chain Guard, Assy                                  | Electro PI | 1    |
| 16       | P2-0141-0002-D,Rev.B | Belt Guard w/ Clutch Cover (H-0141-0075-D), Assy   | Galv.      | 1    |
| 17       | PW-0107-0004-D       | Drive Sprocket- 8 Tooth w/Hub                      | UHMWPE     | 1    |
| 18       | P2-0115-0017-D,Rev.B | Right-Hand Drive Structure x 3'-6" lg. x 30° Curve | Galv.      | 1    |
| 19       | PW-0115-0062-D,Rev.E | Reducer Bracket-Formed                             | Galv.      | 1    |
| 20       | PW-0115-0067-D,Rev.D | Chain Guard Bracket                                | Galv.      | 1    |
| 21       | PW-0115-0021-A       | Motor Mount Slide/Clamp Bracket                    | Galv.      | 2    |
| 22       | P2-0115-0008-D,Rev.B | Motor Mount Plate                                  | Galv.      | 1    |
| 23       | PW-0115-0023-A       | Motor All-Thread Bracket                           | Galv.      | 1    |
| 24       |                      | 5/16"-18NC x 1" Lg. Hx. Hd. Bolt                   | 304SS      | 6    |
| 25       |                      | 5/16"-18NC x 1 1/4" Lg. Hx. Hd. Bolt               | 304SS      | 4    |
| 26       |                      | 5/16"-18NC Hx. Nut - ESNA                          | 304SS      | 6    |
| 27       |                      | 5/16" Flat Washer                                  | 304SS      | 8    |
| 28       |                      | 5/16" Lock Washer                                  | 304SS      | 4    |
| 29       |                      | 3/8"-16NC x 1" Lg. Hx. Hd. Bolt                    | 304SS      | 7    |
| 30       |                      | 3/8" Flat Washer                                   | 304SS      | 11   |
| 31       |                      | 3/8" Lock Washer                                   | 304SS      | 11   |
| 32       |                      | 1/2"-13NC x 1 1/2" Lg. Hx. Hd. Bolt                | 304SS      | 2    |

|           |  |               |   |
|-----------|--|---------------|---|
| JOB NAME: | Harold D. Thompson WRF, Lower Fountain, CO | CONVEYOR NO.: | 1 |
| JOB NO.:  | P2-13-1099                                 |               |   |



## 3'-6" LG. x 30° CURVE DRIVE STATION BILL OF MATERIAL

P2-0115-0051-D: Right Hand Mounting for 2HP Motor Frame Galv. Construction Configuration



| ITEM NO. | PART NO.       | DESCRIPTION (2HP RH Configuration)                              | MAT'L  | QTY. |
|----------|----------------|---|--------|------|
| 33       |                | 1/2"-13NC x 2 1/2" Lg. Hx. Hd. Bolt                             | 304SS  | 2    |
| 34       |                | 1/2"-13NC x 7" Lg. All-Thread                                   | 304SS  | 1    |
| 35       |                | 1/2"-13NC Hx. Nut - ESNA  | 304SS  | 8    |
| 36       |                | 1/2"-13NC Hx. Nut   | 304SS  | 8    |
| 37       |                | 1/2" Flat Washer  | 304SS  | 2    |
| 38       |                | 5/8"-11NC x 2 1/2" Lg. Hx. Hd. Bolt                             | 304SS  | 4    |
| 39       |                | 5/8"-11NC x 3 1/2" Lg. Hx. Hd. Bolt (All-Thread)                | 304SS  | 1    |
| 40       |                | 5/8"-11NC Hx. Nut - ESNA  | 304SS  | 4    |
| 41       |                | 5/8"-11NC Hx. Nut   | 304SS  | 2    |
| 42       |                | 5/8" Flat Washer  | 304SS  | 4    |
| 43       |                | 3/4"-10NC x 1 1/2" Lg. Hx. Hd. Bolt                             | 304SS  | 2    |
| 44       |                | 3/4"-10NC x 2" Lg. Hx. Hd. Bolt                                 | 304SS  | 5    |
| 45       |                | 3/4" Lock Washer  | 304SS  | 7    |
| 46       |                | 3/4" Flat Washer  | 304SS  | 7    |
| 47       |                | 3/8"NPT Pipe Street Elbow 90 Degrees —McMaster-Carr #4638K222   | Galv.  | 1    |
| 48       |                | 3/8"NPT Pipe Nipple x 4"Lg.—McMaster-Carr #4549K557             | Galv.  | 1    |
| 49       |                | 3/8"NPT Pipe Cap—McMaster-Carr #7739K163                        | Galv.  | 1    |
| 50       |                | 3/8"NPT Barbed Male Pipe Connector—McMaster-Carr #91465K93      | Brass  | 1    |
| 51       |                | 3/8"NPT Barbed Female Pipe Connector - McMaster-Carr #91465K961 | Brass  | 1    |
| 52       |                | 3/8" Blue Push-On Hose x 2'-0"Lg.—McMaster-Carr #5288K12        | Buna-N | 1    |
| 53       |                | 3/8"NPT Breather Cap (Supplied w/Reducer)                       | Galv.  | 1    |
| 54       | P2-0109-0044-D | Upper Poly Guide Channel Assembly                               | UHMWPE | 1    |
| 55       | P2-0109-0048-D | Lower Poly Guide Channel Assembly                               | UHMWPE | 1    |
| 56       |                | 1/4"-20NC x 2 1/2" Lg. Hx. Hd. Bolt                             | 304SS  | 52   |
| 57       |                | 1/4"-20NC x 3" Lg. Hx. Hd. Bolt                                 | 304SS  | 4    |
| 58       |                | 1/4"-20NC Hx. Nut - ESNA  | 304SS  | 56   |
| 59       |                | 1/4" Flat Washer  | 304SS  | 56   |

|           |  |               |   |
|-----------|--|---------------|---|
| JOB NAME: | Harold D. Thompson WRF, Lower Fountain, CO | CONVEYOR NO.: | 1 |
| JOB NO.:  | P2-13-1099                                 |               |   |

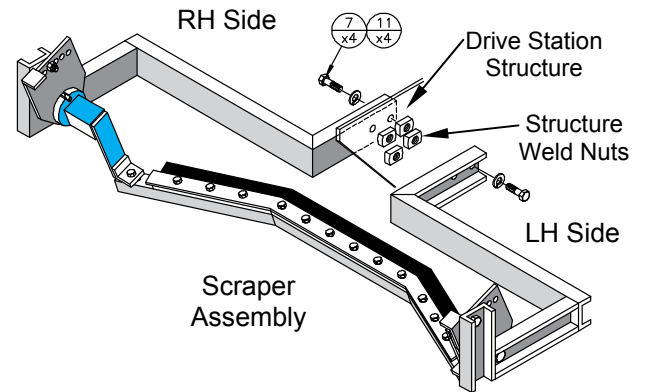
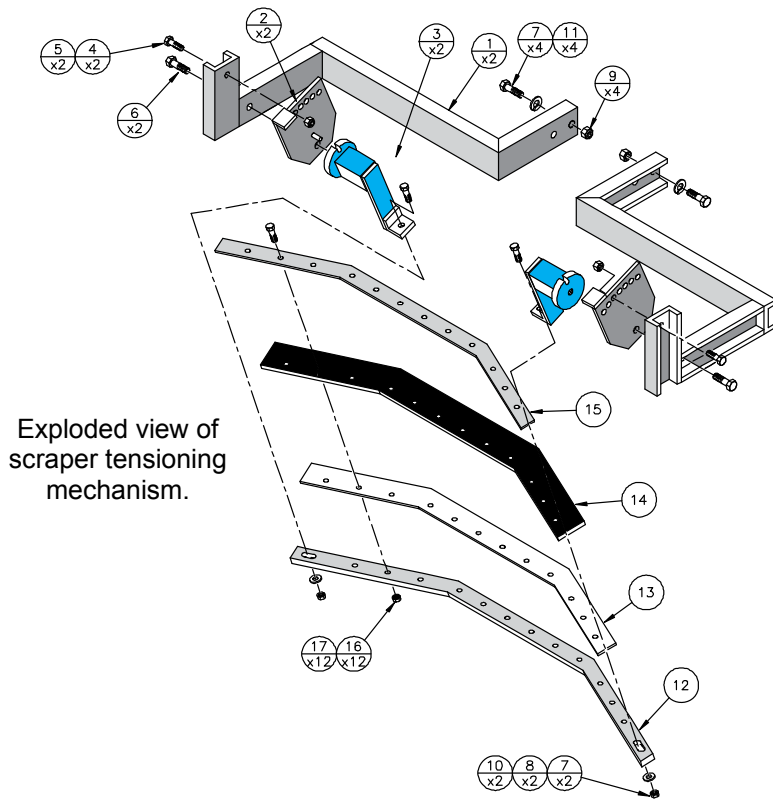




## 26" STANDARD SCRAPER MECHANISM

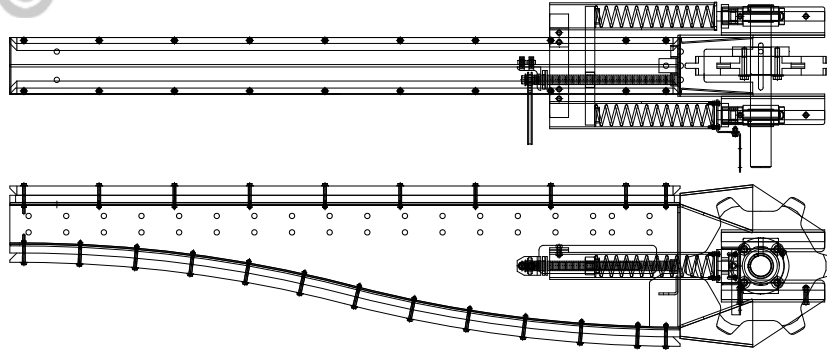
Dwg. No.: PW-0137-0036

Please Note: The items above are also located on the general arrangement drawing in the bill of material as an assembly item.



| ITEM NO. | PARTS NO.           | DESCRIPTION                                | MATERIAL           | NO. REQ'D. |
|----------|---------------------|--|--------------------|------------|
| 1        | PW-0137-0065-A RevE | 26" Single Scraper Mounting Bracket        | Galv.              | 1PR        |
| 2        | PW-0137-0031-A RevC | 20"/26"/32" Lovejoy Adjusting Plate        | Galv.              | 2          |
| 3        | PW-0137-0032-A      | 20"/26"/32" Lovejoy Elastometric Tensioner | Manuf. Prime/Paint | 2          |
| 4        |                     | 5/16"-18NC x 1" LG. HX. HD. Bolt           | 304SS              | 2          |
| 5        |                     | 5/16"-18NC HX. Nut-ESNA                    | 304SS              | 2          |
| 6        |                     | 3/8"-16NC x 1" LG. HX. HD. Bolt            | 304SS              | 2          |
| 7        |                     | 3/8"-16NC x 1 1/4" LG. HX. HD. Bolt        | 304SS              | 6          |
| 8        |                     | 3/8"-16NC HX. Nut-ESNA                     | 304SS              | 2          |
| 9        |                     | 3/8"-16NC HX. Nut-Shipping                 | Zinc               | 4          |
| 10       |                     | 3/8"-Flat Washer                           | 304SS              | 2          |
| 11       |                     | 3/8"-Lock Washer                           | 304SS              | 4          |
| 12       | PW-0137-0023-A RevA | Scraper Mount Bar                          | 304SS              | 1          |
| 13       | PW-0137-0103-A      | Backing Plate (1/8" Thick)                 | UHMWPE             | 1          |
| 14       | PW-0137-0095-A      | Blade (1/4" Thick)                         | Neoprene           | 1          |
| 15       | PW-0137-0023-A RevA | Clamp Plate                                | Galv.              | 1          |
| 16       |                     | 1/4"-20NC x 1 1/4" LG. HX. HD. Bolt        | 304SS              | 12         |
| 17       |                     | 1/4"-20NC HX. Nut-ESNA                     | 304SS              | 12         |

|           |  |               |   |
|-----------|--|---------------|---|
| JOB NAME: | Harold D. Thompson WRF, Lower Fountain, CO | CONVEYOR NO.: | 1 |
| JOB NO.:  | P2-13-1099                                 |               |   |

**6'-8" LG. LH TENSION STATION**


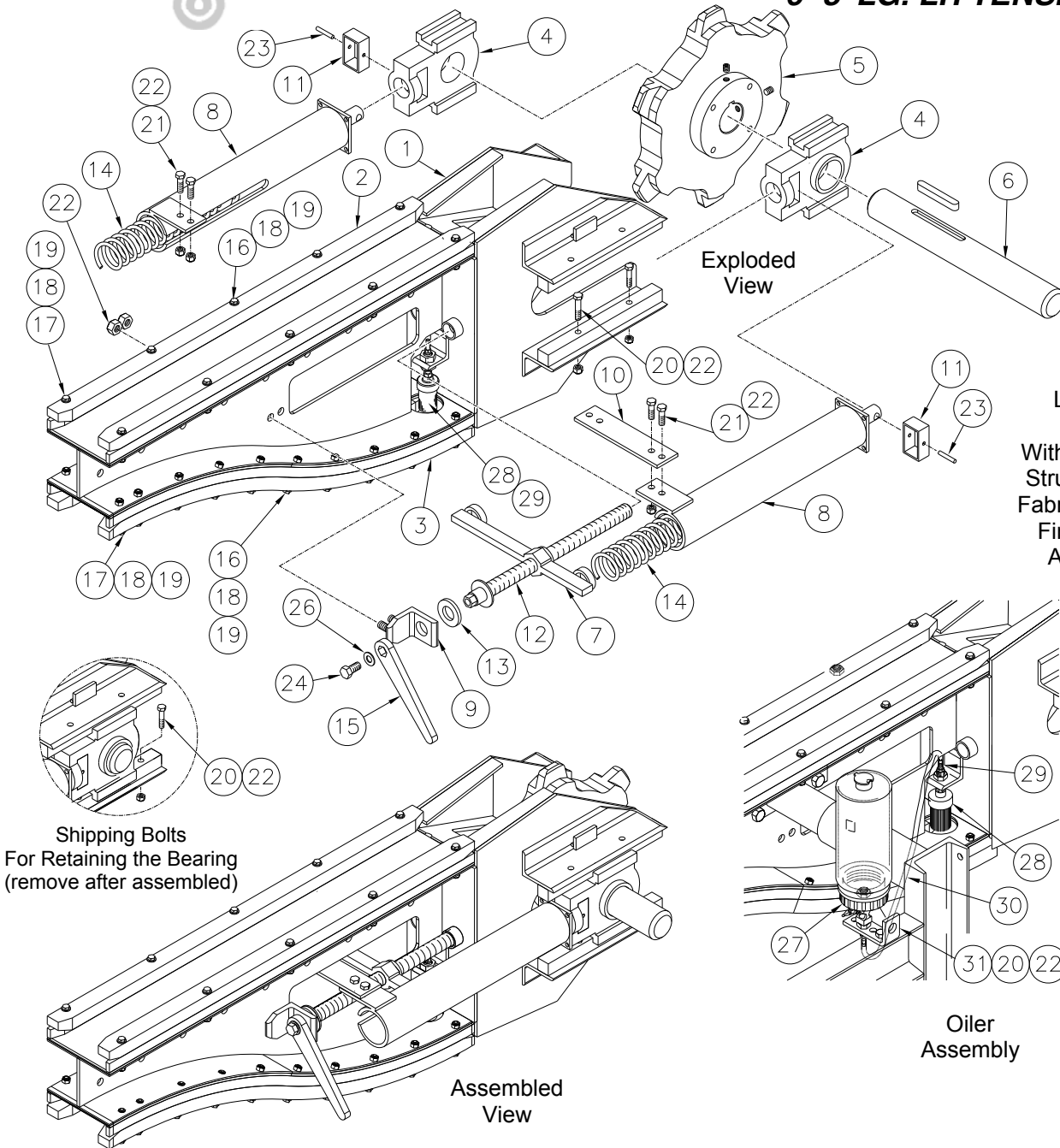
P2-116-0005-D  
 Left Hand Mounted  
 Tension Station  
 With Spring Compression  
 Structure & Components  
 Fabricated with A36 Steel.  
 Finish is Hot Dip Galv.  
 ASTM 123-80 Spec.

| ITEM NO. | PARTS NO.           | TENSION STATION DESCRIPTION                            | MATERIAL      | NO. REQ'D. |
|----------|---------------------|--|---------------|------------|
| 1        | P2-116-0004-D,Rev.B | 6'-8" LG. Tension Structure                            | Galv.         | 1          |
| 2        | P2-109-0020-D       | Upper Guide Channel Assembly                           | UHMWPE        | 1          |
| 3        | P2-109-0024-D       | Lower Guide Channel Assembly                           | UHMWPE        | 1          |
| 4        | #WSTUSC203          | Tension Wide Slot Bearing 2 3/16" Bore— Dodge          | OEM Cast      | 2          |
| 5        | PW-107-0003-D       | 6-Tooth Sprocket w/Hub Assembly                        | UHMWPE        | 1          |
| 6        | PW-108-0004-A,Rev.D | Sprocket Shaft 2 3/16" OD. w/1/2" SQ. x 3 3/4" lg. Key | 416SS         | 1          |
| 7        | PW-116-0020-A,Rev.H | Tension Spring Push Bar                                | Galv.         | 1          |
| 8        | PW-116-0022-A,Rev.C | Tension Spring Housing Cylinder                        | Galv.         | 1PR.       |
| 9        | PW-116-0023-A,Rev.B | Tension Adjusting Screw Mounting Bracket               | Galv.         | 1          |
| 10       | PW-116-0033-A       | Spring Housing Cylinder Stiffener Bar                  | Galv.         | 1          |
| 11       | I-116-0088-A        | Bearing Adjusting Rod Container                        | Galv.         | 2          |
| 12       | PW-116-0031-A,Rev.C | Tension Adjusting Screw                                | 304SS         | 1          |
| 13       | I-116-0149-A        | Tension Screw Washer Bushing                           | UHMWPE        | 1          |
| 14       | I-144-0001-A        | Compression Spring – 57 #/inch Spring Rate             | Spring 5150   | 2          |
| 15       | 101-3/4" Hex.       | Reversing Ratchet—Lowell                               | Nickel Plated | 1          |
| 16       |                     | 1/4"-20NC x 2 1/2" LG. Hx. Hd. Bolt                    | 304SS         | 26         |
| 17       |                     | 1/4"-20NC x 3" LG. Hx. Hd. Bolt                        | 304SS         | 4          |
| 18       |                     | 1/4"-Flat Washer                                       | 304SS         | 30         |
| 19       |                     | 1/4"-20NC Hx. Hd. Nut—ESNA                             | 304SS         | 30         |
| 20       |                     | 3/8"-16NC x 1 3/4" LG. Hx. Hd. Bolt                    | 304SS         | 5          |
| 21       |                     | 3/8"-16NC x 1" LG. Hx. Hd. Bolt                        | 304SS         | 4          |
| 22       |                     | 3/8"-16NC Hx. Hd. Nut—ESNA                             | 304SS         | 9          |
| 23       |                     | 7/16" Dia. Spring Pin x 1 3/4" LG.                     | CRS 1070      | 2          |
| 24       |                     | 1/2"-13NC x 3/4" LG. Hx. Hd. Bolt                      | 304SS         | 1          |
| 25       |                     | 1/2"-13NC Hx. Hd. Nut—ESNA                             | 304SS         | 2          |

|           |  |               |   |
|-----------|--|---------------|---|
| JOB NAME: | Harold D. Thompson WRF, Lower Fountain, CO | CONVEYOR NO.: | 1 |
| JOB NO.:  | P2-13-1099                                 |               |   |



**6'-8" LG. LH TENSION STATION**



**P2-116-0005-D**  
**Left Hand Mounted**  
**Tension Station**  
 With Spring Compression  
 Structure & Components  
 Fabricated with A36 Steel.  
 Finish is Hot Dip Galv.  
 ASTM 123-80 Spec.

Shipping Bolts  
 For Retaining the Bearing  
 (remove after assembled)

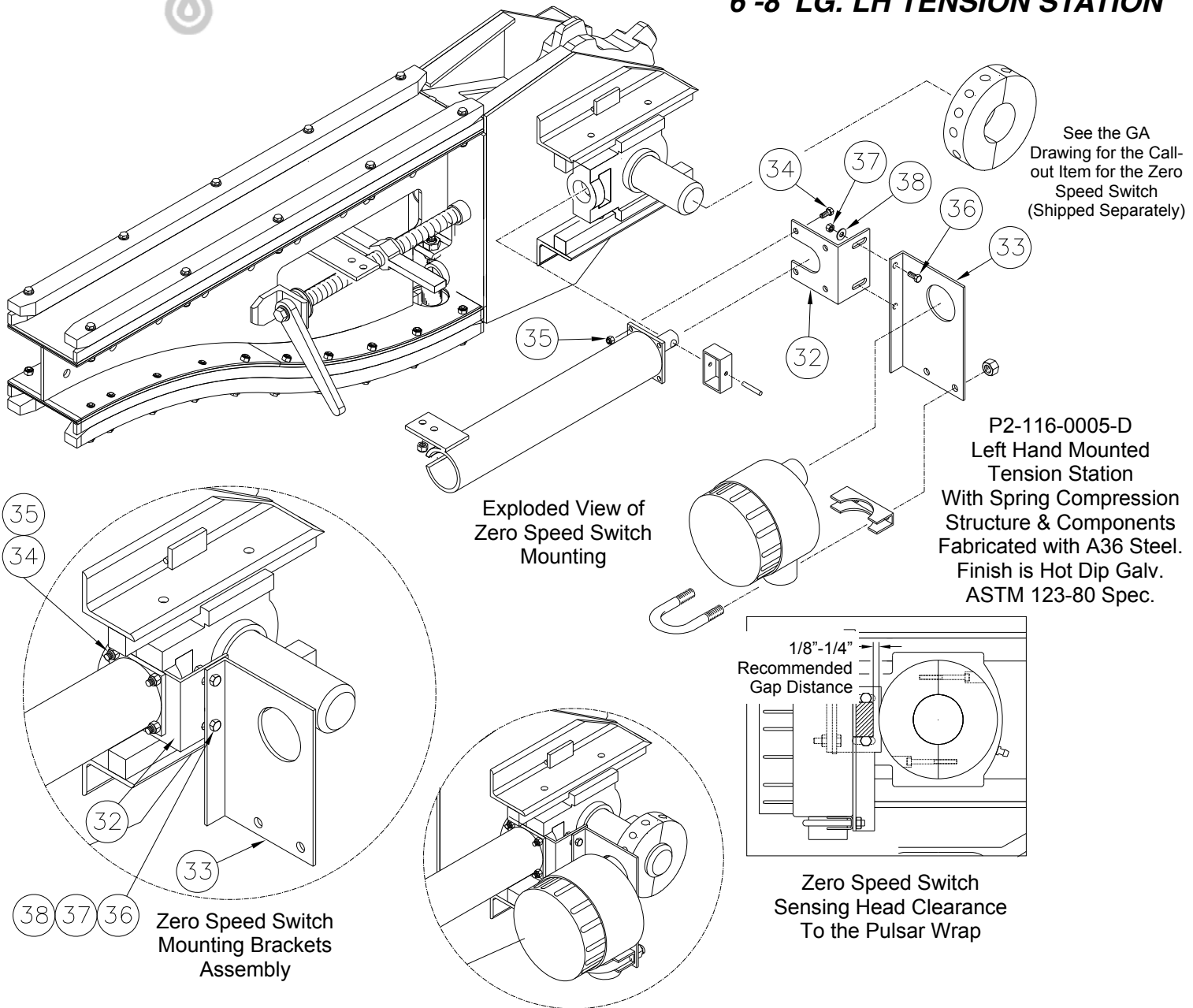
Oiler  
 Assembly

Assembled  
 View

| ITEM NO. | PARTS NO.           | OILER DESCRIPTION   | Mat'l.  | NO. REQ'D. |
|----------|---------------------|---|---------|------------|
| 26       |                     | 1/2"-Flat Washer  | 304SS   | 1          |
| 27       | #B16826             | Oiler Bottle-1 Quart-Oil-Rite (Shipped Unassembled)                     | Acrylic | 1          |
| 28       | #A22564             | Oiler Brush- Oil-Rite (Shipped Unassembled)                             | Nylon   | 1          |
| 29       |                     | Male Pipe Adapter 1/8" Barbed x 1/8"-27NPT (Shipped Unassembled)        | Bronze  | 2          |
| 30       |                     | Flex Tubing 3/16" x 1/4"OD. x 2'-0"LG. (Shipped Unassembled/Cut To Fit) | Plastic | 1          |
| 31       | PW-116-0032-A,Rev.B | Oiler Mounting Bracket  | Galv.   | 1          |

|           |  |               |   |
|-----------|--|---------------|---|
| JOB NAME: | Harold D. Thompson WRF, Lower Fountain, CO | CONVEYOR NO.: | 1 |
| JOB NO.:  | P2-13-1099                                 |               |   |

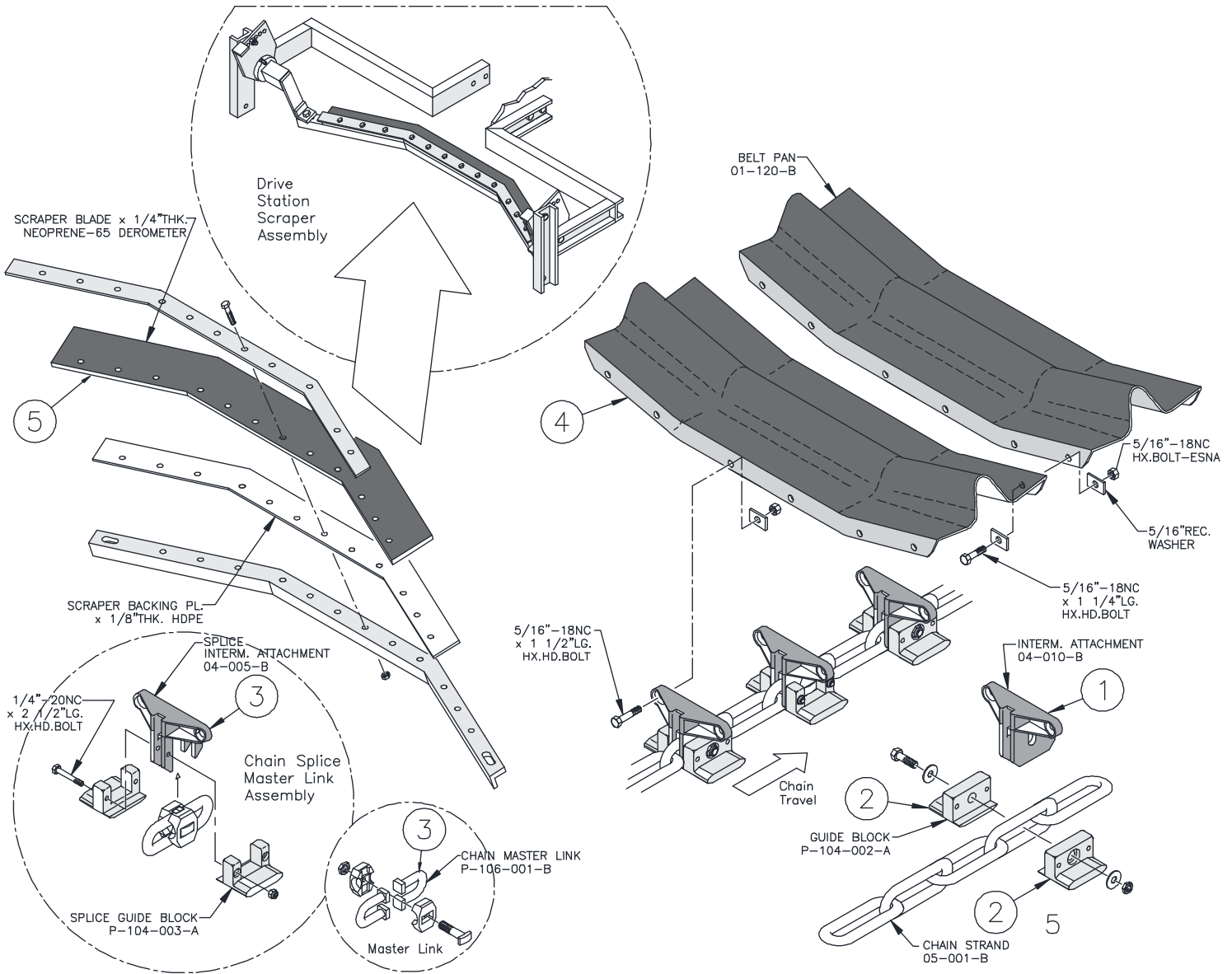
### 6'-8" LG. LH TENSION STATION



Zero Speed Switch Assembled

| ITEM NO. | PARTS NO.           | ZEROSPEED SWITCH DESCRIPTION                          | Mat'l. | NO. REQ'D. |
|----------|---------------------|---|--------|------------|
| 32       | PW-116-0057-A,Rev.D | RH- Zero Speed Switch Housing Bracket– Electro Sensor | 304SS  | 1          |
| 33       | PW-116-0057-A,Rev.D | RH- Zero Speed Switch Sliding Bracket– Electro Sensor | 304SS  | 1          |
| 34       |                     | 1/4"-20NC x 1"LG. Hx. Hd. Bolt                        | 304SS  | 4          |
| 35       |                     | 1/4"-20NC Hx. Hd. Nut-ESNA                            | 304SS  | 4          |
| 36       |                     | 5/16"-18NC x 3/4"LG. Hx. Hd. Tap Bolt                 | 304SS  | 2          |
| 37       |                     | 5/16"-18NC Hx. Hd. Nut-ESNA                           | 304SS  | 2          |
| 38       |                     | 5/16"-Flat Washer                                     | 304SS  | 2          |

|           |  |               |   |
|-----------|--|---------------|---|
| JOB NAME: | Harold D. Thompson WRF, Lower Fountain, CO | CONVEYOR NO.: | 1 |
| JOB NO.:  | P2-13-1099                                 |               |   |

**26"-STANDARD SPARE PARTS**


| ITEM NO. | PARTS NO.      | DESCRIPTION (Packed Separately)        | MATERIAL      | NO. REQ'D. |
|----------|----------------|--|---------------|------------|
| S1       | H-0104-0010-B  | Intermediate Attachment                | Nylon         | 5          |
| S2       | PW-0104-0007-A | Guide Block- Grey Injected (Wide)      | Urethane      | 10         |
| S3       | PW-0106-0004-A | Chain Splice Master Link Full Assembly | Case Hardened | 1          |
| S4       | H-0101-0122-B  | Belt Pans 26"                          | MPR           | 5          |
| S5       | PW-0137-0095-A | Scraper Blade 26" (1/4" Thk. 65 Duro)  | Neoprene      | 2          |

|           |  |               |   |
|-----------|--|---------------|---|
| JOB NAME: | Harold D. Thompson WRF, Lower Fountain, CO | CONVEYOR NO.: | 1 |
| JOB NO.:  | P2-13-1099                                 |               |   |

# General Arrangement Drawings



**SERPENTIX CONVEYOR CORP.®**

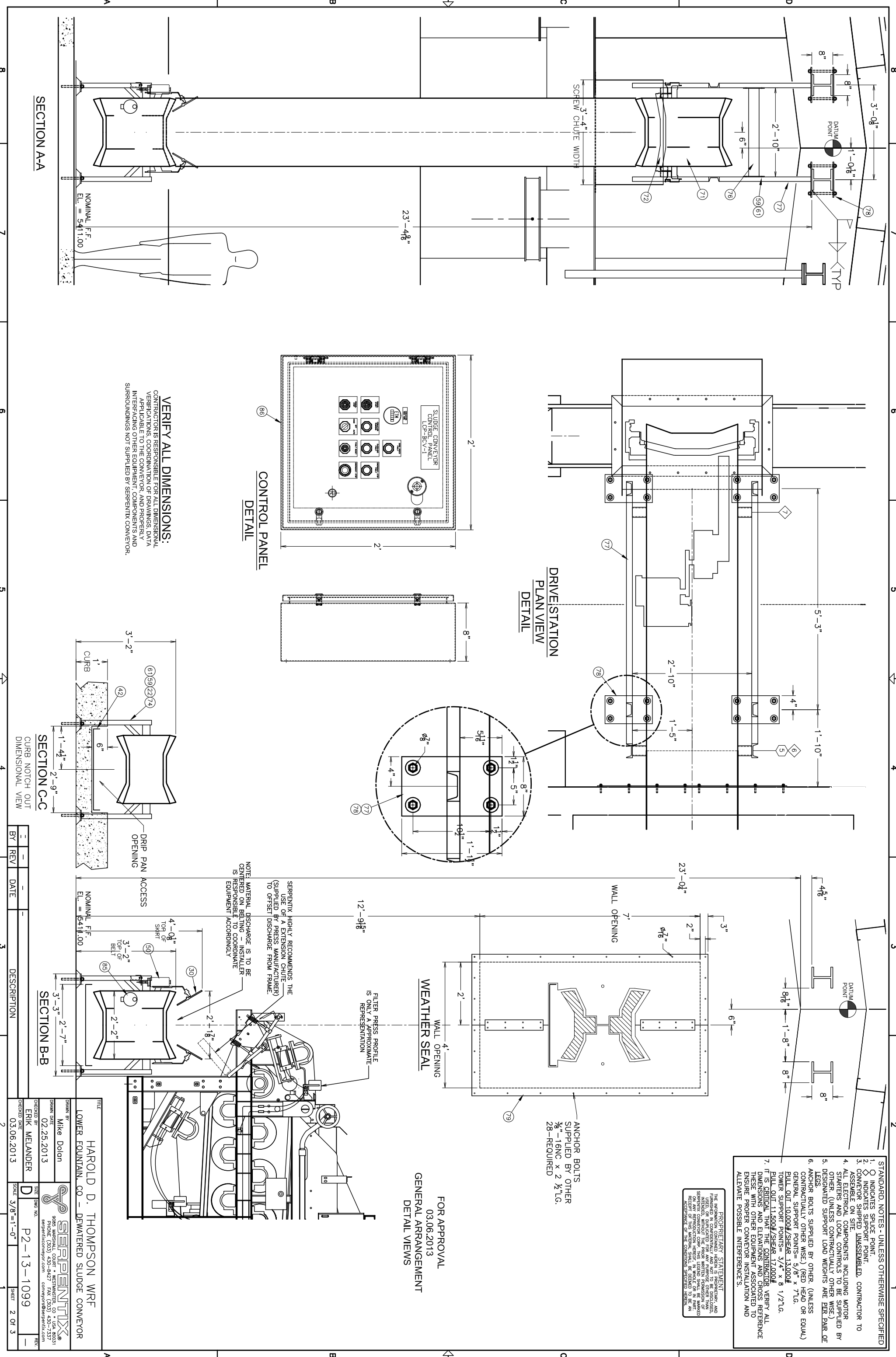


- STANDARD NOTES - UNLESS OTHERWISE SPECIFIED
1. INDICATES SPICE POINT.
  2. CONVEYOR SUPPORT POINT ASSEMBLY. CONTRACTOR TO ASSEMBLE ON SITE.
  3. CONVEYOR SUPPORT POINT ASSEMBLY. CONTRACTOR TO ASSEMBLE ON SITE.
  4. ALL ELECTRICAL COMPONENTS INCLUDING MOTOR STARTERS AND LOCAL CONTROLS TO BE SUPPLIED BY OTHER. (UNLESS CONTRACTUALLY OTHER WISE.)
  5. DESIGNATED SUPPORT LOAD WEIGHTS ARE PER PAIR OF LESS.
  6. ANCHOR BOLTS SUPPLIED BY OTHER (UNLESS CONTRACTUALLY OTHER WISE.) (RED HEAD OR EQUAL) GENERAL SUPPORT POINTS= 5/8" x 7" LG. PULL OUT 10,000#/SHEAR 13,000#/TOWER SUPPORT POINTS= 3/4" x 8 1/2" LG. PULL OUT 11,500#/SHEAR 17,000#.
  7. IT IS CRITICAL THAT THE CONTRACTOR VERIFY ALL DIMENSIONS AND ELEVATIONS AND CROSS REFERENCE THESE WITH OTHER EQUIPMENT ASSOCIATED TO ENSURE PROPER CONVEYOR INSTALLATION AND ADEQUATE POSSIBLE INTERFERENCES.

PROPRIETARY STATEMENT  
 THE INFORMATION CONTAINED HEREIN IS PROPRIETARY AND NOT BE LOANED, REPRODUCED, COPIED, REPRODUCED, OR USED FOR ANY PURPOSE OTHER THAN THAT INTENDED WITHOUT THE PRIOR WRITTEN PERMISSION OF SERPENTIX. THIS DOCUMENT IS THE PROPERTY OF SERPENTIX AND IS TO BE KEPT IN CONFIDENCE. ANY REPRODUCTION HEREIN, IN WHOLE OR IN PART, WITHOUT THE WRITTEN PERMISSION OF SERPENTIX, IS STRICTLY PROHIBITED. ACCEPTANCE OF THE CONDITIONS SPECIFIED HEREIN.

ANCHOR BOLTS SUPPLIED BY OTHER 3/8"-16NC x 2 1/2" LG. 28"-REQUIRED

FOR APPROVAL  
 03.06.2013  
 GENERAL ARRANGEMENT  
 DETAIL VIEWS



**VERIFY ALL DIMENSIONS:**  
 CONTRACTOR IS RESPONSIBLE FOR ALL DIMENSIONAL VERIFICATIONS. COORDINATION OF DRAWINGS, DATA APPLICABLE TO THE CONVEYOR, AND PROPERLY INTERFACING OTHER EQUIPMENT COMPONENTS AND SURROUNDINGS NOT SUPPLIED BY SERPENTIX CONVEYOR.

SERPENTIX HIGHLY RECOMMENDS THE USE OF AN EXTENSION CHUTE (SUPPLIED BY PRESS MANUFACTURER) TO OFFSET DISCHARGE FROM FRAME.  
 NOTE MATERIAL DISCHARGE IS TO BE CENTERED ON BELTING - INSTALLER IS RESPONSIBLE TO COORDINATE EQUIPMENT ACCORDINGLY.

FILTER PRESS PROFILE IS ONLY A APPROXIMATE REPRESENTATION

| BY | REV | DATE | DESCRIPTION |
|----|-----|------|-------------|
|    |     |      |             |
|    |     |      |             |
|    |     |      |             |

TITLE  
**HAROLD D. THOMPSON WRF**  
**LOWER FOUNTAIN, CO. - DEMATERED SLUDGE CONVEYOR**

DRAWN BY  
 Mike Doan

DATE  
 02.25.2013

CHECKED BY  
 ERIK MELANDER

DATE  
 03.06.2013

SCALE  
 3/8"=1'-0"

SHEET  
 2 OF 3

**SERPENTIX**  
 9055 MARSHALL COURT • WESTMINSTER, CO • USA 80031  
 PHONE (303) 430-8427 FAX (303) 430-7337  
 serpentinixconveyor.com conveyor@serpentinix.com

SIZE  
 P2-13-1099



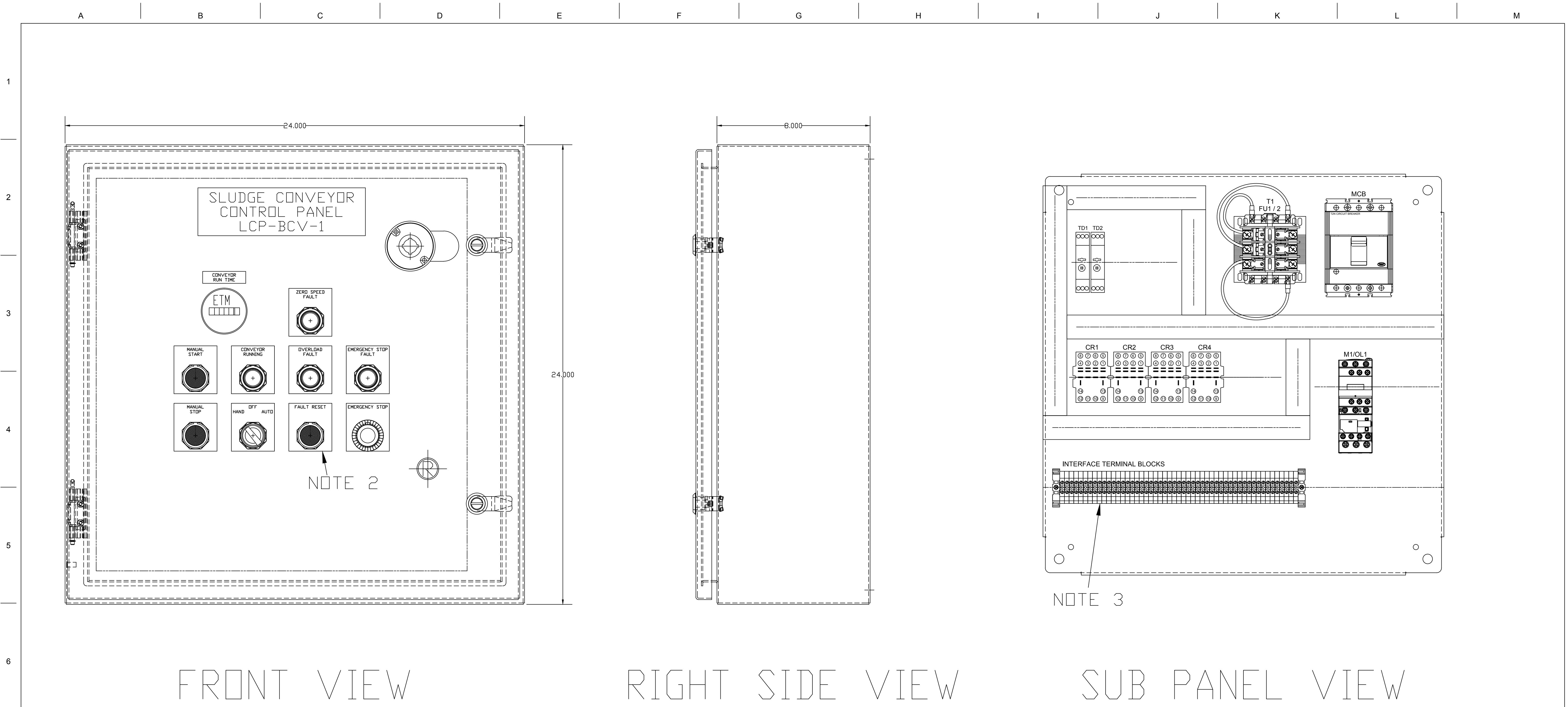


# Control Panel



**SERPENTIX CONVEYOR CORP.®**





FRONT VIEW

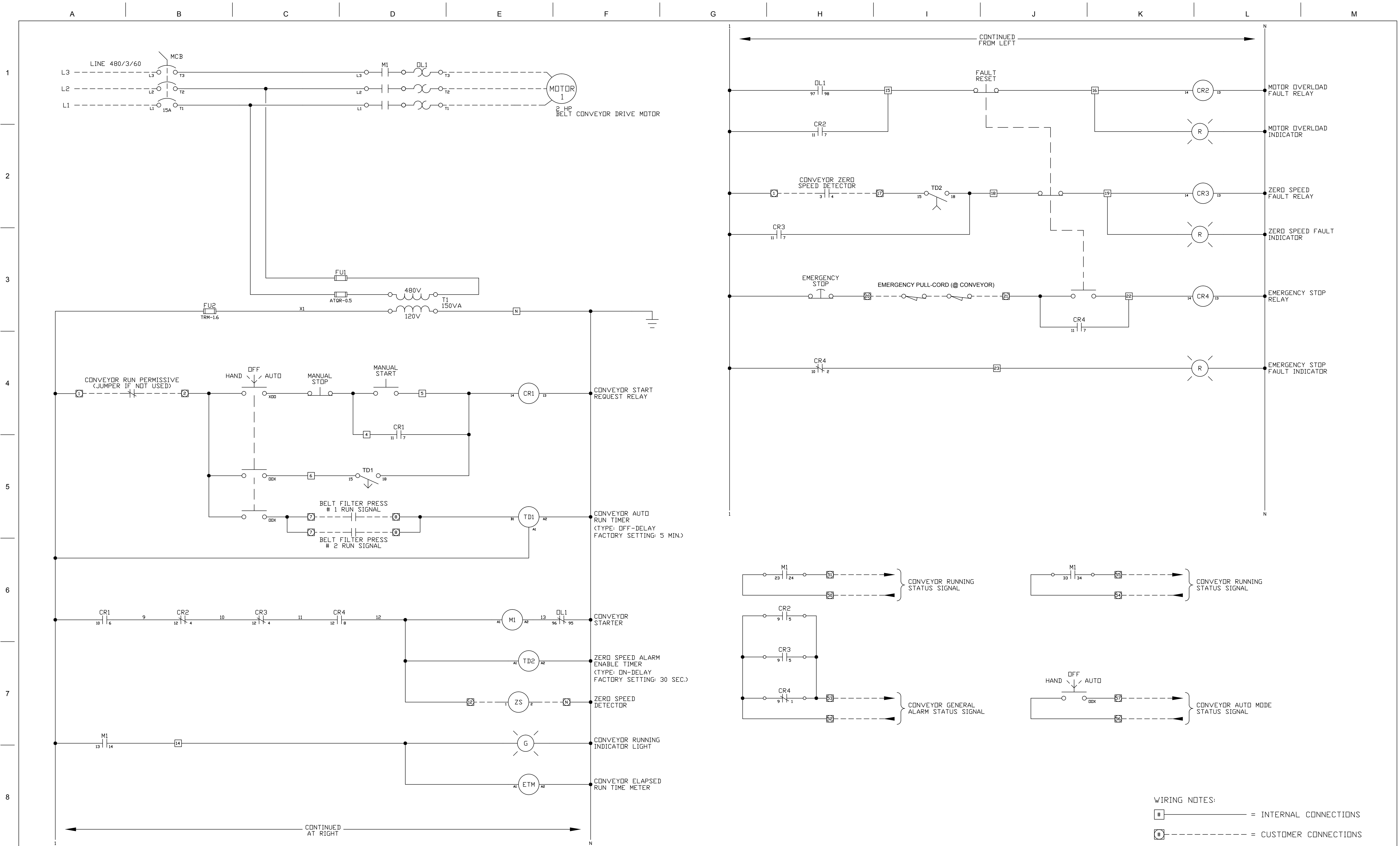
RIGHT SIDE VIEW

SUB PANEL VIEW

NOTES:

1. ENCLOSURE RATING: NEMA 4X (304 STAINLESS STEEL).
2. ALL NAMEPLATES TO BE WHITE WITH BLACK TEXT & ENGRAVED AS SHOWN.
3. 20% SPARE TERMINAL BLOCKS TO BE SUPPLIED.
4. PANEL TO BE UL508A LISTED. SCCR RATING: 10KAIC MINIMUM.

|          |  |                                     |  |               |             |                    |  |  |  |                               |  |
|----------|--|-------------------------------------|--|---------------|-------------|--------------------|--|--|--|-------------------------------|--|
|          |  | VERIFY SCALE                        |  | DATE 02/16/13 | W.O. W----  | CUSTOMER           |  | LAYOUT                                 |  |                               |  |
|          |  | BAR IS ONE INCH ON ORIGINAL DRAWING |  | DRWN ARJ      | S.O. S----- | SERPENTIX CONVEYOR |  | HAROLD THOMPSON WRF                    |  | DWG L01                       |  |
| A        |  | 02/19/13 DRAWING SUBMITTAL          |  | ENGR ARJ      | REV A       | TBD                |  | FOUNTAIN, COLORADO                     |  | SHEET 1 OF 2                  |  |
| NO. DATE |  | REVISION                            |  | APRVD ARJ     | SCALE NTS   | CONTRACT #         |  | PALMER DCS                             |  | CONVEYOR SYSTEM CONTROL PANEL |  |
|          |  |                                     |  |               |             |                    |  | PALMER DRIVES CONTROLS & SYSTEMS, INC. |  |                               |  |
|          |  |                                     |  |               |             |                    |  | 2498 SOUTH TEJON                       |  |                               |  |
|          |  |                                     |  |               |             |                    |  | ENGLEWOOD, CO 80110                    |  |                               |  |
|          |  |                                     |  |               |             |                    |  | 720-484-8547                           |  |                               |  |



WIRING NOTES:  
 [Solid line with box] = INTERNAL CONNECTIONS  
 [Dashed line with box] = CUSTOMER CONNECTIONS

|     |          |                   |     |      |
|-----|----------|-------------------|-----|------|
| NO. | DATE     | REVISION          | BY  | APVD |
| A   | 02/19/13 | DRAWING SUBMITTAL | ARJ | ARJ  |

|                                     |       |          |       |        |
|-------------------------------------|-------|----------|-------|--------|
| VERIFY SCALE                        | DATE  | 02/16/13 | W.O.  | W----  |
| BAR IS ONE INCH ON ORIGINAL DRAWING | DRWN  | ARJ      | S.O.  | S----- |
| 0                                   | ENGR  | ARJ      | REV   | A      |
|                                     | APRVD | ARJ      | SCALE | NTS    |

|            |                    |
|------------|--------------------|
| CUSTOMER   | SERPENTIX CONVEYOR |
| CUST PO#   | TBD                |
| CONTRACT # |                    |

HAROLD THOMPSON WRF  
 FOUNTAIN, COLORADO



PALMER DRIVES  
 CONTROLS & SYSTEMS, INC.  
 2498 SOUTH TEJON  
 ENGLEWOOD, CO 80110  
 720-484-8547

SCHMATIC  
 CONVEYOR SYSTEM  
 CONTROL PANEL

DWG E01  
 SHEET 2 OF 2

**Conveyor Control Panel - Component Submittal**  
**Project: Harold Thompson WRF - Fountain, Colorado**

Palmer DCS, Inc.  
 2498 South Tejon Street  
 Englewood, CO 80110  
 Tel: 720-484-8547

To: Serpentix Conveyor Company  
 Attn: Rob Nusz  
 9085 Marshall Court  
 Westminster, CO 80030

| Quantities / Items for Submittal Only |     |                                       |                  |                 |                        |
|---------------------------------------|-----|---------------------------------------|------------------|-----------------|------------------------|
| Item                                  | Qty | Description                           | Part Number      | Manufacturer    | Attached Document      |
| <b>1</b>                              |     | <b>Enclosures / Accessories</b>       |                  |                 |                        |
|                                       | 1   | Enclosure                             | SCE-24EL2408SSLP | Saginaw         | Catalog Page & Drawing |
|                                       | 1   | Sub Panel                             | SCE-24P24        | Saginaw         | Catalog Page & Drawing |
| <b>2</b>                              |     | <b>Circuit Breakers / Accessories</b> |                  |                 |                        |
|                                       | 1   | Circuit Breaker                       | T2S015TW         | ABB Controls    | Catalog Page           |
|                                       | 1   | Operating Handle                      | OHB80L6          | ABB Controls    | Catalog Page           |
|                                       | 1   | Operating Shaft                       | KT3VD-S          | ABB Controls    | Catalog Page           |
|                                       | 1   | Operating Mechanism                   | KT3VD-M          | ABB Controls    | Catalog Page           |
|                                       | 2   | Lug Kit                               | KT2100-3         | ABB Controls    | Catalog Page           |
| <b>3</b>                              |     | <b>Motor Starters</b>                 |                  |                 |                        |
|                                       | 1   | Contactora                            | LC1D09G7         | Square D        | Catalog Page           |
|                                       | 1   | Overload Relay                        | LRD08            | Square D        | Catalog Page           |
|                                       | 1   | Auxiliary Contact Block               | DN20             | Square D        | Catalog Page           |
| <b>4</b>                              |     | <b>Control Transformers</b>           |                  |                 |                        |
|                                       | 1   | Transformer                           | B150BTZ13RBF     | Micron          | Catalog Page           |
| <b>5</b>                              |     | <b>Fuses</b>                          |                  |                 |                        |
|                                       | 2   | Class CC Fuse                         | ATQR-0.5         | Ferraz-Shawmut  | Catalog Page           |
|                                       | 1   | Midget Fuse                           | TRM-1.6          | Ferraz-Shawmut  | Catalog Page           |
| <b>6</b>                              |     | <b>Control Relays</b>                 |                  |                 |                        |
|                                       | 4   | Relay                                 | RH4B-UL-AC120    | Idec            | Catalog Page           |
|                                       | 4   | Socket                                | SH4B-05          | Idec            | Catalog Page           |
|                                       | 1   | Time Delay Relay                      | RZ7-FEA3TU23     | Sprecher-Schuh  | Catalog Page           |
|                                       | 1   | Time Delay Relay                      | RZ7-FEB3TU23     | Sprecher-Schuh  | Catalog Page           |
| <b>7</b>                              |     | <b>Pilot Devices</b>                  |                  |                 |                        |
|                                       | 1   | Indicator Light                       | 9001SKP1G31      | Square D        | Catalog Page           |
|                                       | 3   | Indicator Light                       | 9001SKP1R31      | Square D        | Catalog Page           |
|                                       | 1   | Pushbutton                            | 9001SKR9RH13     | Square D        | Catalog Page           |
|                                       | 1   | Selector Switch                       | 9001SKS43BH13    | Square D        | Catalog Page           |
|                                       | 1   | Pushbutton                            | 9001SKR1BH13     | Square D        | Catalog Page           |
|                                       | 1   | Pushbutton                            | 9001SKR1GH13     | Square D        | Catalog Page           |
|                                       | 1   | Pushbutton                            | 9001SKR1RH13     | Square D        | Catalog Page           |
|                                       | 2   | Auxiliary Contact Block               | 9001-KA1         | Square D        | Catalog Page           |
| <b>8</b>                              |     | <b>Terminal Blocks / Accessories</b>  |                  |                 |                        |
|                                       | 35  | Terminal Block                        | 3044102          | Phoenix Contact | Catalog Page           |
|                                       | 1   | End Barrier                           | 3047028          | Phoenix Contact | Catalog Page           |
|                                       | 2   | End Clamp                             | 0800886          | Phoenix Contact | Catalog Page           |

# **SECTION 1**

## **ENCLOSURES / ACCESSORIES**

# Type 4X S.S. Enclosures

## Type 4X S.S. Enclosures

Saginaw Control & Engineering's Type 4X Stainless Steel Enclosures are designed to work in a wide range of environments indoors or outdoors, and house electronic controls, instruments, and components.

These enclosures provide protection from corrosion, wind blown dust, rain, spraying water, hose directed water and ice formation on the enclosure.

### Product Attributes

- 304 & 316 stainless steel with #4 brushed finish.
- Exclusive SCE concealed hinges on Enviroline® Series Enclosures.
- Memory retaining oil resistant urethane gasket.
- Many of the standard SCE quarter turn replacement latches and handles can be used on Enviroline® Series Enclosures.

### Product Overview

- Stainless Steel Pushbutton Enclosures
- Stainless Steel Extra Large Pushbutton Enclosures
- Stainless Steel Continuous Hinge Enclosures
- Stainless Steel Single-Door Enclosures
- Stainless Steel Enviroline® Series Enclosures
- Two-Door Stainless Steel Enclosures
- Stainless Steel Enviroline® Series Two-Door Enclosures
- Stainless Steel Enviroline® Series Free-Standing Enclosures
- Stainless Steel Enviroline® Junction Enclosures
- Stainless Steel Enviroline® Junction Enclosures with window
- Stainless Steel Enviroline® Sloping Top Enclosures



# TYPE 4X

## 304 Stainless Steel

### EnviroLine® Series

### Enclosures

#### Application -

Designed to house electrical and electronic controls, instruments and components in areas which may be regularly hosed down or are in very wet conditions. Provides protection from dust, dirt, oil, and water. For outdoor application a drip shield is recommended.

#### Construction -

- 0.075" stainless steel Type 304.
- Seams continuously welded and ground smooth.
- Flange trough collar around all sides of door opening.
- Oil-resistant gasket.
- Collar studs provided for mounting optional panels.
- Stainless Steel concealed hinge.
- Removable and interchangeable doors.
- Black quarter turn latches.
- Latches are opened or closed with a screwdriver (optional tamper-resistant inserts are available).
- Mounting holes in back of enclosure.
- Mounting hardware, sealing washer and hole plug included.
- Removable print pocket.
- Ground studs on door and body.

#### Options -

- Optional mounting feet available.
- Door hardware available.
- Panels can be special ordered in stainless steel up to 48P36 size.

#### Finish -

#4 brushed finish on all exterior surfaces. Optional panels are powder coated white.

#### Industry Standards -

NEMA Type 4, 4X, 12 & 13  
 UL Listed Type 4, 4X, & 12  
 CSA Type 4, 4X & 12  
 IEC 60529 IP 66

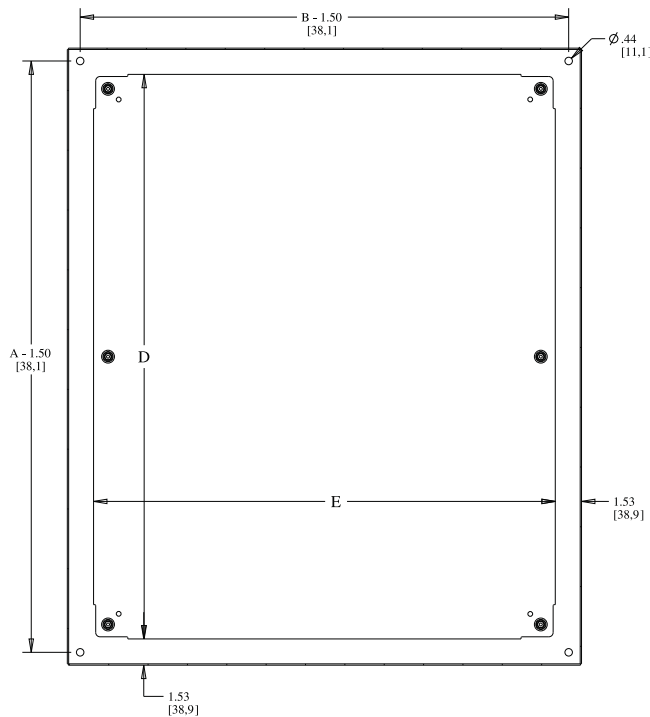
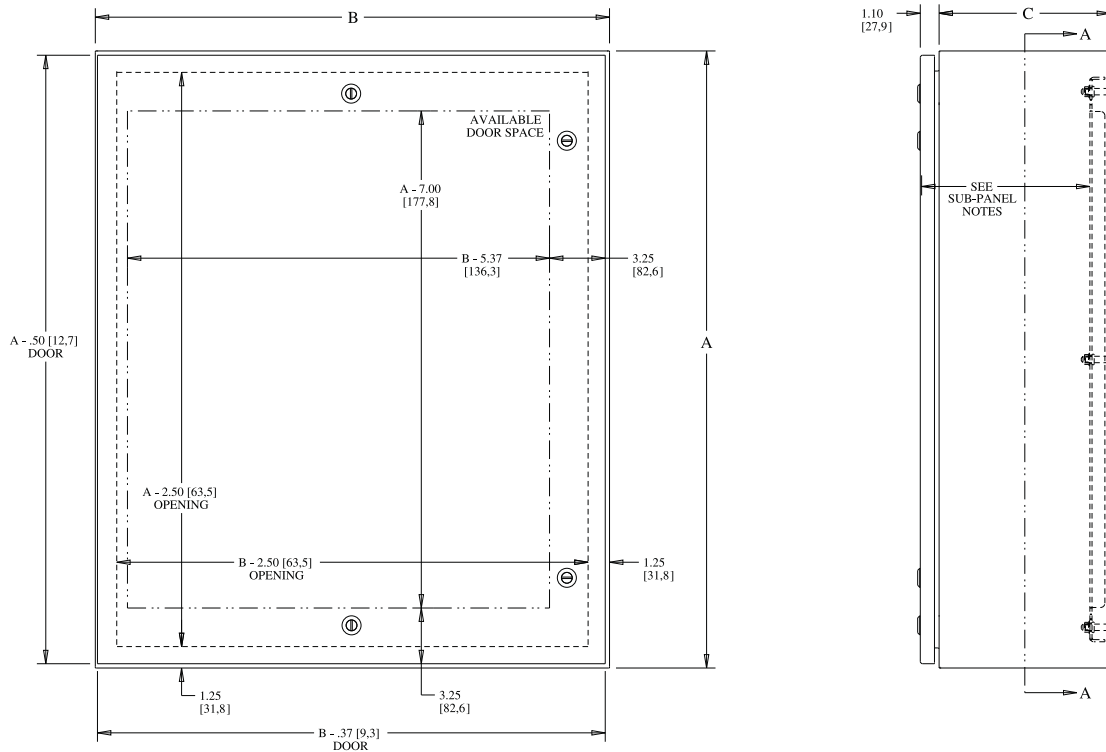


### TYPE 4X 304 STAINLESS STEEL ENVIROLINE® SERIES ENCLOSURES

| ENCLOSURES       |            |           |           |              |            | SUB-PANEL   |                  |                 |              |            |
|------------------|------------|-----------|-----------|--------------|------------|-------------|------------------|-----------------|--------------|------------|
| Catalog No.      | Height (A) | Width (B) | Depth (C) | Product Code | List Price | Catalog No. | Panel Height (D) | Panel Width (E) | Product Code | List Price |
| SCE-12EL1206SSLP | 12.00      | 12.00     | 6.00      | S5           | 536.16     | SCE-12DLP12 | 9.00             | 9.00            | P3           | 13.67      |
| SCE-12EL2406SSLP | 12.00      | 24.00     | 6.00      | S5           | 712.62     | SCE-12P24   | 9.00             | 21.00           | P3           | 27.86      |
| SCE-16EL1206SSLP | 16.00      | 12.00     | 6.00      | S5           | 590.45     | SCE-16P12   | 13.00            | 9.00            | P3           | 14.81      |
| SCE-16EL1208SSLP | 16.00      | 12.00     | 8.00      | S5           | 631.18     | SCE-16P12   | 13.00            | 9.00            | P3           | 14.81      |
| SCE-16EL1606SSLP | 16.00      | 16.00     | 6.00      | S5           | 654.26     | SCE-16P16   | 13.00            | 13.00           | P3           | 24.57      |
| SCE-16EL1608SSLP | 16.00      | 16.00     | 8.00      | S5           | 688.19     | SCE-16P16   | 13.00            | 13.00           | P3           | 24.57      |
| SCE-16EL2008SSLP | 16.00      | 20.00     | 8.00      | S5           | 770.98     | SCE-20P16   | 17.00            | 13.00           | P3           | 30.37      |
| SCE-20EL1606SSLP | 20.00      | 16.00     | 6.00      | S5           | 726.19     | SCE-20P16   | 17.00            | 13.00           | P3           | 30.37      |
| SCE-20EL1608SSLP | 20.00      | 16.00     | 8.00      | S5           | 770.98     | SCE-20P16   | 17.00            | 13.00           | P3           | 30.37      |
| SCE-20EL1610SSLP | 20.00      | 16.00     | 10.00     | S5           | 822.57     | SCE-20P16   | 17.00            | 13.00           | P3           | 30.37      |
| SCE-20EL2006SSLP | 20.00      | 20.00     | 6.00      | S5           | 794.06     | SCE-20P20   | 17.00            | 17.00           | P3           | 35.44      |
| SCE-20EL2008SSLP | 20.00      | 20.00     | 8.00      | S5           | 853.79     | SCE-20P20   | 17.00            | 17.00           | P3           | 35.44      |
| SCE-20EL2010SSLP | 20.00      | 20.00     | 10.00     | S5           | 909.44     | SCE-20P20   | 17.00            | 17.00           | P3           | 35.44      |
| SCE-20EL2408SSLP | 20.00      | 24.00     | 8.00      | S5           | 933.87     | SCE-24P20   | 21.00            | 17.00           | P3           | 45.57      |
| SCE-24EL1608SSLP | 24.00      | 16.00     | 8.00      | S5           | 840.20     | SCE-24P16   | 21.00            | 13.00           | P3           | 32.92      |
| SCE-24EL2006SSLP | 24.00      | 20.00     | 6.00      | S5           | 890.43     | SCE-24P20   | 21.00            | 17.00           | P3           | 45.57      |
| SCE-24EL2008SSLP | 24.00      | 20.00     | 8.00      | S5           | 933.87     | SCE-24P20   | 21.00            | 17.00           | P3           | 45.57      |
| SCE-24EL2010SSLP | 24.00      | 20.00     | 10.00     | S5           | 997.67     | SCE-24P20   | 21.00            | 17.00           | P3           | 45.57      |
| SCE-24EL2012SSLP | 24.00      | 20.00     | 12.00     | S5           | 1,058.74   | SCE-24P20   | 21.00            | 17.00           | P3           | 45.57      |
| SCE-24EL2408SSLP | 24.00      | 24.00     | 8.00      | S5           | 1,026.17   | SCE-24P24   | 21.00            | 21.00           | P3           | 53.18      |
| SCE-24EL2410SSLP | 24.00      | 24.00     | 10.00     | S5           | 1,096.74   | SCE-24P24   | 21.00            | 21.00           | P3           | 53.18      |
| SCE-24EL2412SSLP | 24.00      | 24.00     | 12.00     | S5           | 1,167.34   | SCE-24P24   | 21.00            | 21.00           | P3           | 53.18      |
| SCE-24EL2416SSLP | 24.00      | 24.00     | 16.00     | S5           | 1,323.43   | SCE-24P24   | 21.00            | 21.00           | P3           | 53.18      |
| SCE-24EL3008SSLP | 24.00      | 30.00     | 8.00      | S5           | 1,165.97   | SCE-30P24   | 27.00            | 21.00           | P3           | 63.29      |
| SCE-24EL3010SSLP | 24.00      | 30.00     | 10.00     | S5           | 1,254.20   | SCE-30P24   | 27.00            | 21.00           | P3           | 63.29      |
| SCE-30EL1606SSLP | 30.00      | 16.00     | 6.00      | S5           | 977.30     | SCE-30P16   | 27.00            | 13.00           | P3           | 45.57      |
| SCE-30EL2008SSLP | 30.00      | 20.00     | 8.00      | S5           | 1,058.74   | SCE-30P20   | 27.00            | 17.00           | P3           | 55.70      |
| SCE-30EL2010SSLP | 30.00      | 20.00     | 10.00     | S5           | 1,146.97   | SCE-30P20   | 27.00            | 17.00           | P3           | 55.70      |
| SCE-30EL2408SSLP | 30.00      | 24.00     | 8.00      | S5           | 1,167.34   | SCE-30P24   | 27.00            | 21.00           | P3           | 63.29      |
| SCE-30EL2410SSLP | 30.00      | 24.00     | 10.00     | S5           | 1,255.56   | SCE-30P24   | 27.00            | 21.00           | P3           | 63.29      |
| SCE-30EL2412SSLP | 30.00      | 24.00     | 12.00     | S5           | 1,330.21   | SCE-30P24   | 27.00            | 21.00           | P3           | 63.29      |
| SCE-30EL2416SSLP | 30.00      | 24.00     | 16.00     | S5           | 1,465.95   | SCE-30P24   | 27.00            | 21.00           | P3           | 63.29      |
| SCE-30EL3008SSLP | 30.00      | 30.00     | 8.00      | S5           | 1,337.00   | SCE-30P30   | 27.00            | 27.00           | P3           | 83.55      |
| SCE-30EL3010SSLP | 30.00      | 30.00     | 10.00     | S5           | 1,418.45   | SCE-30P30   | 27.00            | 27.00           | P3           | 83.55      |
| SCE-30EL3012SSLP | 30.00      | 30.00     | 12.00     | S5           | 1,506.67   | SCE-30P30   | 27.00            | 27.00           | P3           | 83.55      |
| SCE-30EL3608SSLP | 30.00      | 36.00     | 8.00      | S5           | 1,495.82   | SCE-36P30   | 33.00            | 27.00           | P3           | 101.27     |
| SCE-36EL2408SSLP | 36.00      | 24.00     | 8.00      | S5           | 1,316.64   | SCE-36P24   | 33.00            | 21.00           | P3           | 75.96      |
| SCE-36EL2410SSLP | 36.00      | 24.00     | 10.00     | S5           | 1,404.88   | SCE-36P24   | 33.00            | 21.00           | P3           | 75.96      |
| SCE-36EL3008SSLP | 36.00      | 30.00     | 8.00      | S5           | 1,495.82   | SCE-36P30   | 33.00            | 27.00           | P3           | 101.27     |
| SCE-36EL3010SSLP | 36.00      | 30.00     | 10.00     | S5           | 1,607.12   | SCE-36P30   | 33.00            | 27.00           | P3           | 101.27     |
| SCE-36EL3012SSLP | 36.00      | 30.00     | 12.00     | S5           | 1,703.48   | SCE-36P30   | 33.00            | 27.00           | P3           | 101.27     |
| SCE-36EL3608SSLP | 36.00      | 36.00     | 8.00      | S5           | 1,723.86   | SCE-36P36   | 33.00            | 33.00           | P3           | 118.99     |
| SCE-36EL3612SSLP | 36.00      | 36.00     | 12.00     | S5           | 1,913.89   | SCE-36P36   | 33.00            | 33.00           | P3           | 118.99     |
| SCE-42EL2410SSLP | 42.00      | 24.00     | 10.00     | S5           | 1,628.84   | SCE-42P24   | 39.00            | 21.00           | P3           | 91.14      |
| SCE-42EL3010SSLP | 42.00      | 30.00     | 10.00     | S5           | 1,783.57   | SCE-42P30   | 39.00            | 27.00           | P3           | 116.47     |
| SCE-42EL3612SSLP | 42.00      | 36.00     | 12.00     | S5           | 2,106.63   | SCE-42P36   | 39.00            | 33.00           | P3           | 136.72     |
| SCE-42EL3616SSLP | 42.00      | 36.00     | 16.00     | S5           | 2,236.93   | SCE-42P36   | 39.00            | 33.00           | P3           | 136.72     |
| SCE-48EL3612SSLP | 48.00      | 36.00     | 12.00     | S5           | 2,334.67   | SCE-48P36   | 45.00            | 33.00           | P3           | 154.46     |
| SCE-48EL3616SSLP | 48.00      | 36.00     | 16.00     | S5           | 2,545.05   | SCE-48P36   | 45.00            | 33.00           | P3           | 154.46     |
| SCE-60EL3612SSLP | 60.00      | 36.00     | 12.00     | S5           | 2,755.44   | SCE-60P36   | 57.00            | 33.00           | P3           | 189.89     |
| SCE-60EL3616SSLP | 60.00      | 36.00     | 16.00     | S5           | 2,972.63   | SCE-60P36   | 57.00            | 33.00           | P3           | 189.89     |
| SCE-72EL3016SSLP | 72.00      | 30.00     | 16.00     | S5           | 3,189.81   | SCE-72P30   | 69.00            | 27.00           | P3           | 210.15     |
| SCE-72EL3612SSLP | 72.00      | 36.00     | 12.00     | S5           | 3,278.03   | SCE-72P36   | 69.00            | 33.00           | P3           | 225.33     |
| SCE-72EL3616SSLP | 72.00      | 36.00     | 16.00     | S5           | 3,461.27   | SCE-72P36   | 69.00            | 33.00           | P3           | 225.33     |



# TYPE 4X STAINLESS STEEL ENVIROLINE® SERIES ENCLOSURES TECHNICAL DATA



**SUB-PANEL NOTES:**  
 Dimensions are from the inside of the door  
 C + 0.32 [8,1] for flat sub-panels  
 C - 0.18 [4,5] for bent sub-panels

**LATCH NOTES:**  
 Enclosures < 24.00" [609,6] in height require only one latch centered on door.  
 Enclosures >= 24.00" [609,6] and < 40.00" [1016] in height require two latches on door.  
 Enclosures >= 40.00" [1016] require three latches on door.  
 Omit center latch top and bottom of door when door width is <= 30.00' [762]

Type 4X S.S. Enclosures



Phone (989) 799-6871  
 Fax (989) 799-4524

## **SECTION 2**

# **CIRCUIT BREAKERS / ACCESSORIES & SURGE PROTECTION DEVICES**

# T2

## 100A, 480V $\Delta$

### Thermal-magnetic/electronic/current limiting



T2

**Dimensions** 3P Fixed Version 5.12H x 3.54W x 2.76D

**Weight** 2.84 (lbs)

#### General

The T2 breaker family ranges from 15 through 100 amperes. The T2 trip units are non-interchangeable and use the very latest technology in electromagnetic relays for overcurrent trip protection as well as a version with microprocessor-based electronic trip unit. Thermal overload protection is provided by heat sensitive bimetals. State of the art construction in contacts and arcing chambers aid in limiting damaging fault currents through the protected circuits.

#### Standards

The UL489/CSA 22.2 version of T2 also carries an IEC-947 rating.

#### Versions

The T2 frame is available in four versions:

- T = Thermal-magnetic, fixed
- B = Adjustable LS/I electronic
- M = Magnetic only (MCP)
- E5 = Electronic instantaneous only (MCP)

#### Trip functions

These tripping functions are available:

- L = Long time
- S = Short time
- I = Instantaneous

#### Performance levels

The T2 breaker has two performance levels available:

- S = Standard
- H = High - UL Current Limiting

#### Number of poles

The T2 current limiting breaker is available in three and four pole versions. Estimate 4 pole pricing by adding 35% to the 3 pole price and contact your ABB sales person for details.

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

| Voltage         | Continuous rating | S  | H   |
|-----------------|-------------------|----|-----|
| 240VAC          | 15 – 100A         | 65 | 100 |
| 480VAC $\Delta$ | 15 – 100A         | 35 | 65  |



## T2

### 100A, 480V Δ

### Thermal-magnetic/current limiting

#### T2 – 100A TMF thermal magnetic fixed

| Breaker | IC at 480VAC | Rating | Magnetic trip | 3 pole, 480VAC catalog number | List price    |
|---------|--------------|--------|---------------|-------------------------------|---------------|
| T2S     | 35kA         | 15A    | 500A          | T2S015TW                      | <b>\$ 690</b> |
|         |              | 20A    | 500A          | T2S020TW                      |               |
|         |              | 25A    | 500A          | T2S025TW                      |               |
|         |              | 30A    | 500A          | T2S030TW                      |               |
|         |              | 40A    | 500A          | T2S040TW                      |               |
|         |              | 50A    | 500A          | T2S050TW                      |               |
|         |              | 60A    | 600A          | T2S060TW                      |               |
|         |              | 70A    | 700A          | T2S070TW                      |               |
|         |              | 80A    | 800A          | T2S080TW                      |               |
|         |              | 90A    | 900A          | T2S090TW                      |               |
|         |              | 100A   | 1000A         | T2S100TW                      |               |

| Breaker                       | IC at 480VAC | Rating | Magnetic trip | 3 pole, 480VAC catalog number | List price    |
|-------------------------------|--------------|--------|---------------|-------------------------------|---------------|
| T2H<br>UL Current<br>Limiting | 65kA         | 15A    | 500A          | T2H015TW                      | <b>\$ 942</b> |
|                               |              | 20A    | 500A          | T2H020TW                      |               |
|                               |              | 25A    | 500A          | T2H025TW                      |               |
|                               |              | 30A    | 500A          | T2H030TW                      |               |
|                               |              | 40A    | 500A          | T2H040TW                      |               |
|                               |              | 50A    | 500A          | T2H050TW                      |               |
|                               |              | 60A    | 600A          | T2H060TW                      |               |
|                               |              | 70A    | 700A          | T2H070TW                      |               |
|                               |              | 80A    | 800A          | T2H080TW                      |               |
|                               |              | 90A    | 900A          | T2H090TW                      |               |
|                               |              | 100A   | 1000A         | T2H100TW                      |               |

#### T2 – 100A TMF, 100% rated thermal magnetic fixed

| Breaker | IC at 480VAC | Rating | Magnetic trip | 3 pole, 480VAC catalog number | List price    |
|---------|--------------|--------|---------------|-------------------------------|---------------|
| T2S     | 35kA         | 15A    | 500A          | T2SQ015TW                     | <b>\$ 760</b> |
|         |              | 20A    | 500A          | T2SQ020TW                     |               |
|         |              | 25A    | 500A          | T2SQ025TW                     |               |
|         |              | 30A    | 500A          | T2SQ030TW                     |               |
|         |              | 40A    | 500A          | T2SQ040TW                     |               |
|         |              | 50A    | 500A          | T2SQ050TW                     |               |
|         |              | 60A    | 600A          | T2SQ060TW                     |               |
|         |              | 70A    | 700A          | T2SQ070TW                     | <b>872</b>    |
|         |              | 80A    | 800A          | T2SQ080TW                     |               |
|         |              | 90A    | 900A          | T2SQ090TW                     |               |
|         |              | 100A   | 1000A         | T2SQ100TW                     |               |

| Breaker                       | IC at 480VAC | Rating | Magnetic trip | 3 pole, 480VAC catalog number | List price     |
|-------------------------------|--------------|--------|---------------|-------------------------------|----------------|
| T2H<br>UL Current<br>Limiting | 65kA         | 15A    | 500A          | T2HQ015TW                     | <b>\$ 1025</b> |
|                               |              | 20A    | 500A          | T2HQ020TW                     |                |
|                               |              | 25A    | 500A          | T2HQ025TW                     |                |
|                               |              | 30A    | 500A          | T2HQ030TW                     |                |
|                               |              | 40A    | 500A          | T2HQ040TW                     |                |
|                               |              | 50A    | 500A          | T2HQ050TW                     |                |
|                               |              | 60A    | 600A          | T2HQ060TW                     |                |
|                               |              | 70A    | 700A          | T2HQ070TW                     | <b>1268</b>    |
|                               |              | 80A    | 800A          | T2HQ080TW                     |                |
|                               |              | 90A    | 900A          | T2HQ090TW                     |                |
|                               |              | 100A   | 1000A         | T2HQ100TW                     |                |

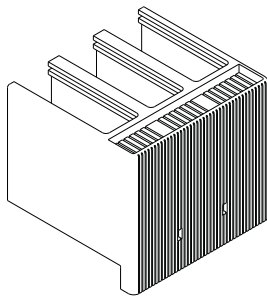
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# Accessories Mechanical T1 - T7

Tmax  
MCCBs



KT3100-3



KT1HTC-3



KT4LTC-3

## Standard cable terminal

| Frame | Wire Size         | Catalog number (set of 2) | List Price   | Catalog number (set of 3) | List Price  | Catalog number (set of 4) | List Price   |
|-------|-------------------|---------------------------|--------------|---------------------------|-------------|---------------------------|--------------|
| T1    | 14AWG-1/0         | —                         | —            | Integral                  | —           | Integral                  | —            |
| T2    | 14AWG-1/0         | —                         | —            | KT2100-3                  | <b>\$ 9</b> | KT2100-4                  | <b>\$ 12</b> |
| T3    | 14AWG - 1/0       | —                         | —            | KT3100-3                  | <b>9</b>    | KT3100-4                  | <b>12</b>    |
|       | 4AWG - 300kcmil   | —                         | —            | KT3225-3                  | <b>18</b>   | KT3225-4                  | <b>24</b>    |
| Ts3   | 14AWG-2AWG        | KTS3060-2                 | <b>\$ 19</b> | KTS3060-3                 | <b>27</b>   | KTS3060-4                 | <b>36</b>    |
|       | 14AWG-1/0         | KTS3100-2                 | <b>19</b>    | KTS3100-3                 | <b>27</b>   | KTS3100-4                 | <b>36</b>    |
|       | 2AWG-4/0          | KTS3150-2                 | <b>26</b>    | KTS3150-3                 | <b>36</b>   | KTS3150-4                 | <b>54</b>    |
|       | 4AWG-300kcmil     | KTS3225-2                 | <b>26</b>    | KTS3225-3                 | <b>36</b>   | KTS3225-4                 | <b>72</b>    |
| T4    | 14AWG-1/0         | KT4100-2                  | <b>18</b>    | KT4100-3                  | <b>9</b>    | KT4100-4                  | <b>12</b>    |
|       | 6AWG-350kcmil     | KT4250-2                  | <b>60</b>    | KT4250-3                  | <b>30</b>   | KT4250-4                  | <b>40</b>    |
| T5    | 250kcmil-500kcmil | KT5300-2                  | <b>90</b>    | KT5300-3                  | <b>45</b>   | KT5300-4                  | <b>60</b>    |
| T5 ①  | (2) 3/0-250kcmil  | KT5400-2                  | <b>90</b>    | KT5400-3                  | <b>45</b>   | KT5400-4                  | <b>60</b>    |
| T5 ②  | (2) 3/0-500kcmil  | —                         | —            | KT5600-3                  | <b>225</b>  | —                         | —            |
| T6    | (2) 250-500kcmil  | —                         | —            | KT6600-3                  | <b>270</b>  | KT6600-4                  | <b>360</b>   |
| T6 ①  | (3) 2/0-400kcmil  | —                         | —            | KT6800-3                  | <b>350</b>  | KT6800-4                  | <b>470</b>   |
| T7 ①  | (4) 4/0-500kcmil  | —                         | —            | KT7X1200-3                | <b>560</b>  | KT7X1200-4                | <b>747</b>   |

## Standard cable lug kits with power control taps

| Frame | Wire Size         | Catalog number (set of 2) | List Price   | Catalog number (set of 3) | List Price   | Catalog number (set of 4) | List Price   |
|-------|-------------------|---------------------------|--------------|---------------------------|--------------|---------------------------|--------------|
| T3    | 14AWG - 1/0       | —                         | —            | KT3100-3C                 | <b>\$ 16</b> | KT3100-4C                 | <b>\$ 19</b> |
|       | 4AWG - 300kcmil   | —                         | —            | KT3225-3C                 | <b>18</b>    | KT3225-4C                 | <b>31</b>    |
| Ts3   | 14AWG-1/0         | KTS3100-2C                | <b>\$ 34</b> | KTS3100-3C                | <b>48</b>    | KTS3100-4C                | <b>57</b>    |
|       | 2AWG-4/0          | KTS3150-2C                | <b>34</b>    | KTS3150-3C                | <b>48</b>    | KTS3150-4C                | <b>57</b>    |
|       | 4AWG-300kcmil     | KTS3225-2C                | <b>53</b>    | KTS3225-3C                | <b>75</b>    | KTS3225-4C                | <b>93</b>    |
| T4    | 14AWG-1/0         | KT4100-2C                 | <b>30</b>    | KT4100-3C                 | <b>15</b>    | KT4100-4C                 | <b>15</b>    |
|       | 6AWG-350kcmil     | KT4250-2C                 | <b>72</b>    | KT4250-3C                 | <b>36</b>    | KT4250-4C                 | <b>48</b>    |
| T5    | 250kcmil-500kcmil | KT5300-2C                 | <b>102</b>   | KT5300-3C                 | <b>51</b>    | KT5300-4C                 | <b>68</b>    |
| T5 ①  | (2) 3/0-250kcmil  | KT5400-2C                 | <b>102</b>   | KT5400-3C                 | <b>51</b>    | KT5400-4C                 | <b>68</b>    |
| T6    | (2) 250-500 kcmil | —                         | —            | KT6600-3C                 | <b>310</b>   | KT6600-4C                 | <b>414</b>   |
| T6 ②  | (3) 2/0-400kcmil  | —                         | —            | KT6800-3C                 | <b>403</b>   | KT6800-4C                 | <b>541</b>   |

## Terminal covers for fixed breakers - Low profile-kit includes two pieces

| Frame | Catalog number (3 pole) | List Price   | Catalog number (4 pole) | List Price   |
|-------|-------------------------|--------------|-------------------------|--------------|
| T1    | KT1LTC-3                | <b>\$ 35</b> | KT1LTC-4                | <b>\$ 47</b> |
| T2    | KT2LTC-3                | <b>40</b>    | KT2LTC-4                | <b>54</b>    |
| T3    | KT3LTC-3                | <b>50</b>    | KT3LTC-4                | <b>68</b>    |
| Ts3   | KTS3LTC-3               | <b>50</b>    | KTS3LTC-4               | <b>68</b>    |
| T4    | KT4LTC-3                | <b>55</b>    | KT4LTC-4                | <b>74</b>    |
| T5    | KT5LTC-3                | <b>60</b>    | KT5LTC-4                | <b>81</b>    |
| T6    | KT6LTC-3                | <b>66</b>    | KT6LTC-4                | <b>88</b>    |
| T7 ③  | KT7LTC-3                | <b>70</b>    | KT7LTC-4                | <b>93</b>    |

## Terminal covers for fixed breakers - High profile-kit includes two pieces

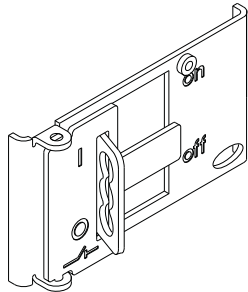
| Frame | Catalog number (3 pole) | List Price   | Catalog number (4 pole) | List price   |
|-------|-------------------------|--------------|-------------------------|--------------|
| T1    | KT1HTC-3                | <b>\$ 37</b> | KT1HTC-4                | <b>\$ 50</b> |
| T2    | KT2HTC-3                | <b>43</b>    | KT2HTC-4                | <b>58</b>    |
| T3    | KT3HTC-3                | <b>53</b>    | KT3HTC-4                | <b>72</b>    |
| Ts3   | KTS3HTC-3               | <b>53</b>    | KTS3HTC-4               | <b>72</b>    |
| T4    | KT4HTC-3                | <b>58</b>    | KT4HTC-4                | <b>78</b>    |
| T5    | KT5HTC-3                | <b>63</b>    | KT5HTC-4                | <b>85</b>    |
| T6    | KT6HTC-3                | <b>66</b>    | KT6HTC-4                | <b>88</b>    |
| T7    | KT7XHTC-3               | <b>77</b>    | KT7XHTC-4               | <b>104</b>   |

- ① Comes standard with high profile terminal covers.
- ② Uses front extended spreaded terminals-refer to technical catalog.
- ③ Fixed breaker only.

# Accessories

## Mechanical, T1 - T7

### Locking devices and handle operators



KT3LD

#### Padlock locking device

| Frame    | Style | Locking Position    | Breaker Mounting           | Catalog number     | List Price             |
|----------|-------|---------------------|----------------------------|--------------------|------------------------|
| T1,T2,T3 | PLL   | OPEN/CLOSED<br>OPEN | Fixed                      | KT3LD<br>KT3LDO    | <b>\$ 35</b>           |
| Ts3      | FLD   | OPEN                | Fixed, Plug-In<br>Draw-Out | KTS3FLD<br>KTS3LDW | <b>50</b><br><b>55</b> |
| T4-T5    | FLD   | OPEN                | Fixed, Plug-In<br>Draw-out | KT5FLD<br>KT5FLDW  | <b>40</b><br><b>55</b> |
| T6       | FLD   | OPEN                | Fixed, Plug-In<br>Draw-out | KT6FLD<br>KT6FLDW  | <b>40</b><br><b>55</b> |
| T7       | PLL   | OPEN                | Fixed, Drawout             | KT7LD              | <b>55</b>              |

#### Keylocks-Rotary handle mechanism

| Frame    | Style | Locking Position | Keys      | Catalog number | List Price   |
|----------|-------|------------------|-----------|----------------|--------------|
| T1,T2,T3 | RHL   | OPEN/CLOSED      | Different | KT3RHL3        | <b>\$ 94</b> |
| Ts3      | -     | OPEN             | Different | KT53KL-2       | <b>58</b>    |
| T4-T5    | KLF-D | OPEN             | Different | KT5KLF-D       | <b>58</b>    |
| T6       | KLF-D | OPEN             | Different | KT6KLF-D       | <b>79</b>    |
| T7       | KLF-D | OPEN             | Different | KT7KLF-D       | <b>79</b>    |



KT5RH

#### Direct mount rotary operator handle

| Frame    | Breaker Mounting | Catalog number | List Price    |
|----------|------------------|----------------|---------------|
| T1,T2,T3 | Fixed, Plug-In   | KT3RH          | <b>\$ 146</b> |
| Ts3      | Fixed, Plug-In   | KTS3RH         | <b>146</b>    |
| Ts3      | Draw-out         | KTS3RHW        | <b>146</b>    |
| T5       | Fixed, Plug-In   | KT5RH          | <b>275</b>    |
| T5       | Draw-Out         | KT5RHW         | <b>275</b>    |
| T6       | Fixed, Plug-In   | KT6RH          | <b>310</b>    |
| T6       | Draw-out         | KT6RHW         | <b>310</b>    |
| T7       | Fixed, Plug-In   | KT7RH          | <b>348</b>    |
| T7       | Draw-out         | KT7RHW         | <b>348</b>    |

#### Variable depth handle operators

| Frame | NEMA rating | Mechanism catalog number | List Price   | Shaft catalog number                  | List Price             | Handle catalog number    | List Price   |
|-------|-------------|--------------------------|--------------|---------------------------------------|------------------------|--------------------------|--------------|
| T1-T3 | 1,3R,12     | -                        | -            | -                                     | -                      | OHB65J6 ①<br>OHY65J6 ①   | <b>\$ 80</b> |
|       | 4, 4X       | KT3VD-M                  | <b>\$ 72</b> | OXp6X430 (16.9)                       | <b>\$ 28</b>           | OHB80L6 ①<br>OHY80L6 ①   | <b>130</b>   |
|       | 1           | -                        | -            | KT3VD-S (11.8)                        | <b>35</b>              | KT3VD-H                  | <b>87</b>    |
| Ts3   | 1,3R,12     | -                        | -            | OXp10X148 (5.8")                      | <b>24</b>              | OHB95J10 ①<br>OHY95J10   | <b>80</b>    |
|       | 4,4X        | KTS3VD-M                 | <b>72</b>    | OXp10X225 (8.9")                      | <b>26</b>              | OHB95L10 ①<br>OHY95L10   | <b>120</b>   |
|       | -           | -                        | -            | OXp10X500 (19.7")                     | <b>32</b>              | -                        | -            |
|       | 1           | -                        | -            | KTS3VD-S12 (11.8)<br>KTS3VD-S20 (20") | <b>24</b><br><b>28</b> | KTS3VD-H                 | <b>87</b>    |
| T4-T5 | 1,3R,12     | -                        | -            | OXp10X148 (5.8")                      | <b>24</b>              | OHB95J10 ①<br>OHY95J10   | <b>80</b>    |
|       | 4,4X        | KT5VD-M                  | <b>65</b>    | OXp10X225 (8.9")                      | <b>26</b>              | OHB95L10 ①<br>OHY95L10   | <b>120</b>   |
|       | -           | -                        | -            | OXp10X500 (19.7")                     | <b>32</b>              | -                        | -            |
|       | 1           | -                        | -            | KT5VD-S (19.7")                       | <b>36</b>              | KT5VD-H                  | <b>87</b>    |
| T6    | 1,3R,12     | -                        | -            | OXp10X148 (5.8")                      | <b>24</b>              | OHB125J10 ①<br>OHY125J10 | <b>90</b>    |
|       | 4,4X        | KT6VD-M                  | <b>90</b>    | OXp10X225 (8.9")                      | <b>26</b>              | OHB125L10 ①<br>OHY125L10 | <b>130</b>   |
|       | -           | -                        | -            | OXp10X500 (19.7")                     | <b>32</b>              | -                        | -            |
|       | 1           | -                        | -            | KT5VD-S (19.7")                       | <b>36</b>              | KT6VD-H                  | <b>87</b>    |
| T7    | 1,3R,12     | -                        | -            | OXp10X148 (5.8")                      | <b>24</b>              | OHB175J10 ①<br>OHY175J10 | <b>100</b>   |
|       | -           | KT7VD-M                  | <b>95</b>    | OXp10X225 (8.9")                      | <b>26</b>              | OHB175L10 ①<br>OHY175L10 | <b>140</b>   |
|       | -           | -                        | -            | OXp10X500 (19.7")                     | <b>32</b>              | -                        | -            |
|       | 1           | -                        | -            | KT7VD-S (19.7")                       | <b>100</b>             | KT7VD-H                  | <b>100</b>   |



OHB65J6



OHB125J10

① Discount schedule



**SECTION 3**

**MOTOR STARTERS**

Table 18.1: 3- or 4-Pole Screw Terminal Connections

| Maximum Horsepower Ratings |          |             |          |          |          | Maximum Current Utilization Categories |                       | No of Poles |      | Instantaneous Auxiliary Contacts |      | Catalog Number ▲ | \$ Price |          |
|----------------------------|----------|-------------|----------|----------|----------|--|-----------------------|-------------|------|----------------------------------|------|------------------|----------|----------|
| Single Phase               |          | Three Phase |          |          |          | Inductive AC3 Amperes                  | Resistive AC1 Amperes | N.O.        | N.C. | N.O.                             | N.C. |                  | AC Coils | DC Coils |
| 115 V hp                   | 230 V hp | 200 V hp    | 230 V hp | 460 V hp | 575 V hp |  |                       |             |      |                                  |      |                  |          |          |
| 0.5                        | 1        | 2           | 2        | 5        | 7.5      | 9                                      | 20                    | 3           | 0    | 1                                | 1    | LC1D09 ◆◆◆       | 94.00    | 119.00   |
| —                          | —        | —           | —        | —        | —        | —                                      |                       | 4           | 0    |                                  |      | —                | —        | —        |
| —                          | —        | —           | —        | —        | —        | —                                      | 25                    | 2           | 2    | 1                                | 1    | LC1D098 ◆        | 94.00    | 119.00   |
| 1                          | 2        | 3           | 3        | 7.5      | 10       | 12                                     |                       | 3           | 0    |                                  |      | —                | —        | —        |
| —                          | —        | —           | —        | —        | —        | —                                      | 32                    | 4           | 0    | 1                                | 1    | LC1DT25 ◆        | 119.00   | 149.00   |
| —                          | —        | —           | —        | —        | —        | —                                      |                       | 2           | 2    |                                  |      | —                | —        | —        |
| 1                          | 3        | 5           | 5        | 10       | 15       | 18                                     | 40                    | 3           | 0    | 1                                | 1    | LC1D18 ◆◆        | 136.00   | 160.00   |
| —                          | —        | —           | —        | —        | —        | —                                      |                       | 4           | 0    |                                  |      | —                | —        | —        |
| —                          | —        | —           | —        | —        | —        | —                                      | 50                    | 2           | 2    | 1                                | 1    | LC1D188 ◆        | 149.00   | 183.00   |
| 2                          | 3        | 7.5         | 7.5      | 15       | 20       | 25                                     |                       | 3           | 0    |                                  |      | —                | —        | —        |
| —                          | —        | —           | —        | —        | —        | —                                      | 60                    | 4           | 0    | 1                                | 1    | LC1DT40 ◆        | 193.00   | 240.00   |
| —                          | —        | —           | —        | —        | —        | —                                      |                       | 2           | 2    |                                  |      | —                | —        | —        |
| 2                          | 5        | 10          | 10       | 20       | 30       | 32                                     | 80                    | 3           | 0    | 1                                | 1    | LC1D258 ◆        | 193.00   | 240.00   |
| 3                          | 5        | 10          | 10       | 30       | 30       | 40                                     |                       | 4           | 0    |                                  |      | —                | —        | —        |
| —                          | —        | —           | —        | —        | —        | —                                      | 125                   | 3           | 0    | 1                                | 1    | LC1D40A          | 218.00   | 275.00   |
| 3                          | 5        | 10          | 10       | 30       | 30       | 40                                     |                       | 4           | 0    |                                  |      | 0                | 0        | 0        |
| —                          | —        | —           | —        | —        | —        | —                                      | 200                   | 3           | 0    | 1                                | 1    | LC1D50A          | 234.00   | 291.00   |
| 3                          | 7.5      | 15          | 15       | 40       | 40       | 50                                     |                       | 3           | 0    |                                  |      | 1                | 1        | —        |
| 5                          | 10       | 20          | 20       | 40       | 50       | 65                                     | 400                   | 4           | 0    | 1                                | 1    | LC1D80A          | 446.00   | 503.00   |
| —                          | —        | —           | —        | —        | —        | —                                      |                       | 3           | 0    |                                  |      | 1                | 1        | —        |
| 7.5                        | 15       | 25          | 30       | 60       | 60       | 80                                     | 600                   | 4           | 0    | 1                                | 1    | LC1D80004 ■      | 489.00   | 524.00   |
| —                          | —        | —           | —        | —        | —        | —                                      |                       | 2           | 2    |                                  |      | 0                | 0        | —        |
| —                          | —        | 30          | 40       | 75       | 100      | 115                                    | 800                   | 3           | 0    | 1                                | 1    | LC1D115          | 479.00   | 479.00   |
| —                          | —        | 40          | 50       | 100      | 125      | 150                                    |                       | 3           | 0    |                                  |      | —                | —        | —        |
| —                          | —        | —           | —        | —        | —        | —                                      | 4                     | 0           | 0    | —                                | —    | LC1D115004       | 630.00   | 630.00   |

- ▲ Complete catalog number with coil voltage code from table on page 18-6; example, LC1D09G7.
- For DC version of these devices replace the 'C' with 'P' (ex. LC1D80004\*\* becomes LP1D80004\*\*). This applies only to 80A 4 pole devices.
- ◆ On LC1D09 - LC1D65A and LC1DT20 through LC1DT80A, for ring tongue versions add '6' to the catalog number prior to adding the voltage code (ex. LC1D09G7 becomes LC1D096G7 and LC1D50AG7 becomes LC1D50A6G7). No price adder for this modification.
- ★ On LC1D09 - LC1D65A, for spring terminals versions add '3' to the catalog number prior to adding the voltage code (ex. LC1D12G7 becomes LC1D123G7 and LC1D40AG7 becomes LC1D40A3G7 - Note that 40A to 65A spring terminals are only on the control terminations and not on power terminations). No price adder for this modification.
- ▼ On LC1D09 and LC1D12 only, for slip-on connector versions add '9' to the catalog number prior to adding the voltage code (ex. LC1D09G7 becomes LC1D099G7). No price adder for this modification.

Table 18.2: TeSys D Overload Relays — Ambient Compensated, Bi-Metallic Direct Mount

| Current Setting Range Amperes | For Direct Mounting to LC1... | Class 10 with Single Phase Sensitivity | Class 10 without Single Phase Sensitivity | Class 20 with Single Phase Sensitivity | Class 20 without Single Phase Sensitivity | \$ Price |
|-------------------------------|-------------------------------|--|---|--|---|----------|
| 0.10-0.16                     | D09-D32                       | LRD01                                  | LR3D01                                    | —                                      | —   | 60.00    |
| 0.16-0.25                     |                               | LRD02                                  | LR3D02                                    | —                                      | —   |          |
| 0.25-0.40                     |                               | LRD03                                  | LR3D03                                    | —                                      | —   |          |
| 0.40-0.63                     |                               | LRD04                                  | LR3D04                                    | —                                      | —   |          |
| 0.63-1                        |                               | LRD05                                  | LR3D05                                    | —                                      | —   |          |
| 1-1.6                         |                               | LRD06                                  | LR3D06                                    | —                                      | —   |          |
| 1.6-2.5                       |                               | LRD07                                  | LR3D07                                    | —                                      | —   |          |
| 2.5-4                         |                               | LRD08                                  | LR3D08                                    | LRD1508                                | LR3D1508A1                                |          |
| 4-6                           |                               | LRD10                                  | LR3D10                                    | LRD1510                                | LR3D1510A1                                |          |
| 5.5-8                         |                               | D09-D32                                | LRD12                                     | LR3D12                                 | LRD1512                                   |          |
| 7-10                          | D09-D32                       | LRD14                                  | LR3D14                                    | LRD1514                                | LR3D1514A1                                |          |
| 9-13                          | D12-D32                       | LRD16                                  | LR3D16                                    | LRD1516                                | LR3D1516A1                                |          |
| 12-18                         | D18-D32                       | LRD21                                  | LR3D21                                    | LRD1521                                | LR3D1521A1                                |          |
| 16-24                         | D25-D32                       | LRD22                                  | LR3D22                                    | —                                      | —   |          |
| 17-25                         | D25-D32                       | —                                      | —   | LRD1522                                | LR3D1522A1                                |          |
| 23-32                         | D25-D32                       | LRD32                                  | LR3D32                                    | —                                      | —   | 73.00    |
| 23-28                         | D25-D32                       | —                                      | —   | LRD1530                                | LR3D1530A1                                |          |
| 25-32                         | D25-D32                       | —                                      | —   | LRD1532                                | LR3D1532A1                                |          |
| 30-38                         | D32                           | LRD35                                  | LR3D35                                    | —                                      | —   | 107.00   |
| 9-13                          | D40A-D65A Δ                   | LRD313                                 | LR3D313                                   | LRD313L                                | —   |          |
| 12-18                         | D40A-D65A Δ                   | LRD318                                 | LR3D318                                   | LRD318L                                | —   |          |
| 16-25                         | D40A-D65A Δ                   | LRD325                                 | LR3D325                                   | LRD325L                                | —   |          |
| 23-32                         | D40A-D65A Δ                   | LRD332                                 | LR3D332                                   | LRD332L                                | —   |          |
| 30-40                         | D40A-D65A Δ                   | LRD340                                 | LR3D340                                   | LRD340L                                | —   |          |
| 37-50                         | D40A-D65A Δ                   | LRD350                                 | LR3D350                                   | LRD350L                                | —   | 107.00   |
| 48-65                         | D40A-D65A Δ                   | LRD365                                 | LR3D365                                   | LRD365L                                | —   |          |
| 17-25                         | D40-D80 □                     | LRD3322                                | LR3D3322                                  | LRD23522                               | LR3D3522                                  |          |
| 23-32                         | D40-D80 □                     | LRD3353                                | LR3D3353                                  | LRD23553                               | LR3D3553                                  |          |
| 30-40                         | D40-D80 □                     | LRD3355                                | LR3D3355                                  | LRD23555                               | LR3D3555                                  |          |
| 37-50                         | D50-D80 □                     | LRD3357                                | LR3D3357                                  | LRD23557                               | LR3D3557                                  |          |
| 48-65                         | D50-D80 □                     | LRD3359                                | LR3D3359                                  | LRD23559                               | LR3D3559                                  | 127.00   |
| 55-70                         | D65-D80                       | LRD3361                                | LR3D3361                                  | LRD23561                               | LR3D3561                                  |          |
| 63-80                         | D65-D80                       | LRD3363                                | LR3D3363                                  | LRD23563                               | LR3D3563                                  |          |
| 80-104                        | D80                           | LRD3365                                | —   | —                                      | —   |          |
| 80-104                        | D115-D150                     | LRD4365                                | —   | —                                      | —   | 362.00   |
| 95-120                        | D115-D150                     | LRD4367                                | —   | —                                      | —   |          |
| 110-140                       | D150                          | LRD4369                                | —   | —                                      | —   |          |

- Δ Overload relays with Everlink termination - direct mount to D40A to D65A only.
- Direct mount to old D2 style D40 to D65 (no Everlink terminations) and to D80 only.
- TeSys D contactor accessories . . . . . pages 18-8 to 18-11
- TeSys D overload relay accessories . . . . . page 18-16
- TeSys D replacement coils . . . . . pages 18-17 to 18-19
- Dimensions . . . . . pages 18-40 to 18-46
- TeSys T . . . . . pages 16-91

18 IEC CONTACTORS AND STARTERS



LC1D09



LC1D093



LC1D40A



LC1D115



LRD22



LRD3



E164862  
CCN NLDX



LR43364  
Class 3211 04



Each 3-pole device is pre-wired with line and load side power wiring for reversing applications.  
Each 4-pole device is pre-wired with load side power wiring



LC2D09

Table 18.8: 3-Pole & 4-Pole Mechanically Interlocked Contactors

| Maximum Horsepower Ratings |          |             |          |          |          | Maximum Current       |                       | No. of N.O. Power Poles | Built In Auxiliary Contacts (per contactor) |      | Catalog Number ▲■ | \$ Price     |            |
|----------------------------|----------|-------------|----------|----------|----------|-----------------------|-----------------------|-------------------------|---|------|-------------------|--------------|------------|
| Single Phase               |          | Three Phase |          |          |          | Inductive AC3 Amperes | Resistive AC1 Amperes |                         | N.O.  | N.C. |                   | AC Control   | DC Control |
| 115 V hp                   | 230 V hp | 200 V hp    | 230 V hp | 460 V hp | 575 V hp |                       |                       |                         |   |      |                   |              |            |
| 0.5                        | 1        | 2           | 2        | 5        | 7.5      | 9                     | 20                    | 3                       | 1   | 1    | LC2D09♦           | 234.00       | 317.00     |
| —                          | —        | —           | —        | —        | —        | —                     |                       | 4                       | 1   | 1    | LC2DT20           | 234.00       | 317.00     |
| 1                          | 2        | 3           | 3        | 7.5      | 10       | 12                    | 25                    | 3                       | 1   | 1    | LC2D12♦           | 317.00       | 368.00     |
| —                          | —        | —           | —        | —        | —        | —                     |                       | 4                       | 1   | 1    | LC2DT25           | 317.00       | 368.00     |
| 1                          | 3        | 5           | 5        | 10       | 15       | 18                    | 35                    | 3                       | 1   | 1    | LC2D18♦           | 344.00       | 400.00     |
| —                          | —        | —           | —        | —        | —        | —                     |                       | 4                       | 1   | 1    | LC2DT32           | 419.00       | 443.00     |
| 2                          | 3        | 7.5         | 7.5      | 15       | 20       | 25                    | 40                    | 3                       | 1   | 1    | LC2D25♦           | 374.00       | 436.00     |
| —                          | —        | —           | —        | —        | —        | —                     |                       | 4                       | 1   | 1    | LC2DT40           | 456.00       | 477.00     |
| 2                          | 5        | 10          | 10       | 20       | 30       | 32                    | 50                    | 3                       | 1   | 1    | LC2D32♦           | 415.00       | 503.00     |
| 3                          | 5        | 10          | 10       | 30       | 30       | 40                    |                       | 3                       | 1   | 1    | LC2D40A           | 565.00       | 650.00     |
| 3                          | 7.5      | 15          | 15       | 40       | 40       | 50                    | 70                    | 3                       | 1   | 1    | LC2D50A           | 596.00       | 680.00     |
| 5                          | 10       | 20          | 20       | 50       | 50       | 65                    |                       | 3                       | 1   | 1    | LC2D65A           | 778.00       | 857.00     |
| 7.5                        | 15       | 30          | 30       | 60       | 60       | 80                    | 125                   | 3                       | 1   | 1    | ★                 | —            | —          |
| —                          | —        | —           | —        | —        | —        | —                     |                       | 4                       | —   | —    | ★                 | —            | —          |
| —                          | —        | 30          | 40       | 75       | 100      | 115                   | 200                   | 3                       | 1   | 1    | LC2D115 ▼         | 1165.00      | 1165.00    |
| —                          | —        | —           | —        | —        | —        | —                     |                       | 4                       | —   | —    | —                 | LC2D115004 ▼ | 1391.00    |
| —                          | —        | 40          | 50       | 100      | 125      | 150                   | 200                   | 3                       | 1   | 1    | LC2D150 ▼         | 1598.00      | 1598.00    |

- ▲ Use voltage codes from the "Voltage Codes" table below to complete the catalog number. For example: LC2D09G7
- Includes mechanical interlock without electrical contacts. Installer to complete wiring for electronically interlocking contactor operating coils by utilizing a N.C. auxiliary contact integrated in the contactor or optional LADN or LAD8N auxiliary contact block.
- ♦ For LC2D09–LC2D32, electrical interlock can be included by adding a "V" to the end of the catalog number (ex: LC2D09B7V). List price adder: \$5.00.
- ★ For these items, order two non-reversing contactors and one mechanical interlock separately. See page 18-4 and 18-14 for selection.
- ▼ Includes mechanical interlock (Type LA9D11502) with pre-wired electrical contacts for interlocking contactor operating coils.

Table 18.9: Coil Voltage Codes ☆

| Contactors                         | Hz        | 24 V | 48 V | 110 V | 120 V | 125 V | 208 V | 220 V | 240 V | 250 V | 440 V | 480 V | 600 V  |
|------------------------------------|-----------|------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
| AC                                 |           |      |      |       |       |       |       |       |       |       |       |       |        |
| D09–D150                           | 50/60     | B7   | E7   | F7    | G7    | —     | LE7   | M7    | U7    | —     | —     | T7 Δ  | X7 Δ   |
| LC1D80–LC1D150                     | 50        | B5   | E5   | F5    | —     | —     | —     | M5 Δ  | U5    | —     | —     | —     | —      |
|                                    | 60        | B6   | E6   | F6    | G6    | —     | L6    | M6    | U6    | —     | —     | T6    | X6 □ Δ |
| F115, F150, F185                   | 50 Hz     | B5   | E5   | F5    | —     | —     | —     | M5    | U5    | —     | —     | —     | —      |
|                                    | 60 Hz     | B6   | E6   | F6    | G6    | —     | L6    | M6    | U6    | —     | —     | Q5    | SC     |
| F265, F330                         | 40–400 Hz | B7   | E7   | F7    | G7    | —     | L7    | M7    | U7    | —     | —     | S7 ▽  | X7     |
| F400–F780                          | 40–400 Hz | —    | E7   | F7    | F7    | —     | L7    | M7    | U7    | —     | —     | N7    | X7 ♦   |
| DC                                 |           |      |      |       |       |       |       |       |       |       |       |       |        |
| D09–D32, DT20–D258 Low Consumption | —         | BL   | EL   | FL    | —     | —     | —     | ML    | —     | UL    | —     | —     | —      |
| D09–D150                           | —         | BD   | ED   | FD    | —     | GD    | —     | MD    | —     | UD    | RD    | —     | —      |
| F115–F330                          | —         | BD   | ED   | FD    | —     | GD    | —     | MD    | —     | UD    | RD    | —     | —      |
| F400–F780                          | —         | —    | ED   | FD    | —     | GD    | —     | MD    | —     | UD    | RD    | —     | —      |

- Δ Not available for LC1D80 - LC1D150.
- Not available for LC1D115 or LC1D150.
- ♦ Not available for LC1F780. The 600 V coils for the LC1F400 - LC1F630 do not include an auxiliary contact for holding circuits.
- ☆ For additional voltage codes refer to the IEC Contactor and Starter Catalog 8502CT9901.
- ▽ For use with F265–F330 only.

Table 18.10: Coil Voltage Codes for AC and DC Coil Voltages for F800 (includes built-in surge suppressor)

| Volts AC/DC | 24 | 48 | 110 | 120 | 127 | 208 | 220 | 240 | 277 | 380 | 415 | 440 | 480 | 575 | 600 | 660 |
|-------------|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 50/60 Hz    | —  | —  | FW  | FW  | FW  | —   | MW  | MW  | —   | QW  | QW  | QW  | —   | —   | —   | —   |

TeSys D contactor accessories . . . . . pages 18-8 to 18-11  
 TeSys D overload relay accessories . . . . . page 18-16  
 TeSys D replacement coils. . . . . pages 18-17 to 18-19  
 Dimensions. . . . . pages 18-40 to 18-46

18 IEC CONTACTORS AND STARTERS



E164862  
CCN NLDX



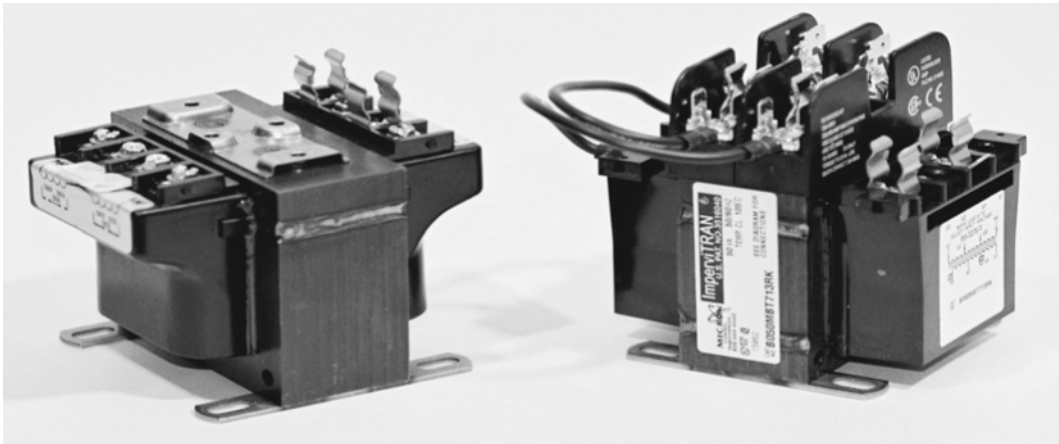
LR43364  
Class 3211 04



**SECTION 4**

**CONTROL TRANSFORMERS**

# IMPERVITRAN



## SIMPLY – THE MOST VERSATILE AVAILABLE

ImperviTRAN's feature-laden New Generation design. Developed to address **ALL** customer needs with a product designed in a highly efficient manner. ImperviTRAN designs span over 35 years of market leadership.

### **UL/CSA Family Listing**

- Absolute flexibility of design for 600 volt class product

### **Fully encapsulated coil**

- Tough environment-proof construction
- Eases wire routing around the transformer

### **Fusion-welded coil terminations instead of solder joints**

- Eliminates cold solder joint breakage, improves conductivity
- Provides a lead-free RoHS compliant construction

### **Face-on terminal labels with large schematic indicators**

- Terminal designations clearly visible to the installer and technician
- Indicators aligned with terminal screws for clarity

### **SEMS screw terminal strips as an integral part of the coil bobbin**

- Allows bare wire and terminal connection methods
- Easily adaptable to slot, Phillips and hex driver tools
- Robust physical support instead of “floating” terminal strips

### **Integral accessory mounting plate on transformer top**

- Allows field modification to block-style primary fusing without clip kits
- Reduces SKU count for fused/non-fused applications
- Provides mounting platform for additional items (DIN rail, terminal strips)

### **Standard strap brackets or optional mounting plate with angled slots**

- Features a superior weld result for vibration-resistant stability
- Offers common mounting template across a wide range of VA sizes
- Alternate plates available for OEM volumes

### **IP-20 cover kits available**

- Quickly convertible to an IP-20 safety level

**CONTROL TRANSFORMERS**

**GENERAL SPECIFICATIONS:**

STYLE: SERIES 2 IMPERVITRAN  
 APPROVALS: UL/Cul FILE# E46323  
 TEMP CLASS: 105°C/130°C  
 VA SIZES: 50-1500

**STYLE: IMPERVITRAN**

APPROVALS: UL LISTED FILE# E46323/ CSA APPROVED FILE# LR27533  
 TEMP CLASS: 105°C/130°C/180°C  
 VA SIZES: 1000-5000

**SUFFIX DESCRIPTION:**

"R" IN SUFFIX DENOTES INSTALLED CLASS "CC" PRIMARY FUSE BLOCK  
 TWO LETTER SUFFIX = TEMP CLASS 105C  
 THREE LETTER SUFFIX ENDING "F" = TEMP CLASS 130C  
 THREE LETTER SUFFIX ENDING "H" = TEMP CLASS 180C

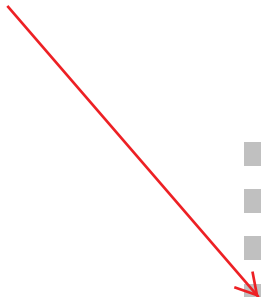
| CATALOG NUMBER | VOLTAGE:                       |       |
|----------------|--------------------------------|-------|
| GROUP "A"      | VA                             | AMPS  |
|                | PRI: 220x440, 230x460, 240x480 |       |
|                | SEC: 110/115/120               |       |
| B050BTZ13JK    | 50                             | 0.43  |
| B050BTZ13RB    |                                |       |
| B075BTZ13JK    | 75                             | 0.65  |
| B075BTZ13RB    |                                |       |
| B100BTZ13JK    | 100                            | 0.87  |
| B100BTZ13RB    |                                |       |
| B150BTZ13JKF   | 150                            | 1.30  |
| B150BTZ13RBF   |                                |       |
| B200BTZ13JKF   | 200                            | 1.74  |
| B200BTZ13RBF   |                                |       |
| B250BTZ13JKF   | 250                            | 2.17  |
| B250BTZ13RBF   |                                |       |
| B300BTZ13JKF   | 300                            | 2.61  |
| B300BTZ13RBF   |                                |       |
| B350BTZ13JKF   | 350                            | 3.04  |
| B350BTZ13RBF   |                                |       |
| B500BTZ13JKF   | 500                            | 4.35  |
| B500BTZ13RBF   |                                |       |
| B750BTZ13JKF   | 750                            | 6.52  |
| B750BTZ13RBF   |                                |       |
| B1K0BTZ13JKF   | 1000                           | 8.70  |
| B1K0BTZ13RBF   |                                |       |
| B1K5BTZ13JKH   | 1500                           | 13.04 |
| B1K5BTZ13RBH   |                                |       |
| B2K0BTZ13JKH   | 2000                           | 17.39 |
| B2K0BTZ13RBH   |                                |       |
| B3K0BTZ13JXH   | 3000                           | 26.09 |
| B5K0BTZ13JXH   | 5000                           | 43.48 |

| CATALOG NUMBER | VOLTAGE:     |       |
|----------------|--------------|-------|
| GROUP "B"      | VA           | AMPS  |
|                | PRI: 240x480 |       |
|                | SEC: 24      |       |
| B050PU7JK      | 50           | 2.08  |
| B050PU7RB      |              |       |
| B075PU7JK      | 75           | 3.13  |
| B075PU7RB      |              |       |
| B100PU7JK      | 100          | 4.17  |
| B100PU7RB      |              |       |
| B150PU7JKF     | 150          | 6.25  |
| B150PU7RBF     |              |       |
| B200PU7JKF     | 200          | 8.33  |
| B200PU7RBF     |              |       |
| B250PU7JKF     | 250          | 10.42 |
| B250PU7RBF     |              |       |
| B300PU7JKF     | 300          | 12.50 |
| B300PU7RBF     |              |       |
| B350PU7JKF     | 350          | 14.58 |
| B350PU7RBF     |              |       |
| B500PU7JKF     | 500          | 20.83 |
| B500PU7RBF     |              |       |
| B750PU7JXF     | 750          | 31.25 |
| B750PU7RCF     |              |       |

| CATALOG NUMBER | VOLTAGE:     |       |
|----------------|--------------|-------|
| GROUP "C"      | VA           | AMPS  |
|                | PRI: 120x240 |       |
|                | SEC: 24      |       |
| B050LP7JK      | 50           | 2.08  |
| B050LP7RB      |              |       |
| B075LP7JK      | 75           | 3.13  |
| B075LP7RB      |              |       |
| B100LP7JK      | 100          | 4.17  |
| B100LP7RB      |              |       |
| B150LP7JKF     | 150          | 6.25  |
| B150LP7RBF     |              |       |
| B200LP7JKF     | 200          | 8.33  |
| B200LP7RBF     |              |       |
| B250LP7JKF     | 250          | 10.42 |
| B250LP7RBF     |              |       |
| B300LP7JKF     | 300          | 12.50 |
| B300LP7RBF     |              |       |
| B350LP7JKF     | 350          | 14.58 |
| B350LP7RBF     |              |       |
| B500LP7JKF     | 500          | 20.83 |
| B500LP7RBF     |              |       |
| B750LP7JXF     | 750          | 31.25 |
| B750LP7RCF     |              |       |

| CATALOG NUMBER | VOLTAGE:     |      |
|----------------|--------------|------|
| GROUP "F"      | VA           | AMPS |
|                | PRI: 208/277 |      |
|                | SEC: 120     |      |
| B050MQ15XK     | 50           | 0.42 |
| B050MQ15RK     |              |      |
| B075MQ15XK     | 75           | 0.63 |
| B075MQ15RK     |              |      |
| B100MQ15XK     | 100          | 0.83 |
| B100MQ15RK     |              |      |
| B150MQ15XKF    | 150          | 1.25 |
| B150MQ15RKF    |              |      |
| B200MQ15XKF    | 200          | 1.67 |
| B200MQ15RKF    |              |      |
| B250MQ15XKF    | 250          | 2.08 |
| B250MQ15RKF    |              |      |
| B300MQ15XKF    | 300          | 2.50 |
| B300MQ15RKF    |              |      |
| B350MQ15XKF    | 350          | 2.92 |
| B350MQ15RKF    |              |      |
| B500MQ15XKF    | 500          | 4.17 |
| B500MQ15RKF    |              |      |
| B750MQ15XKF    | 750          | 6.25 |
| B750MQ15RKF    |              |      |

| CATALOG NUMBER | VOLTAGE:         |       |
|----------------|------------------|-------|
| GROUP "G"      | VA               | AMPS  |
|                | PRI: 208/230/460 |       |
|                | SEC: 115         |       |
| B050MBT13XK    | 50               | 0.43  |
| B050MBT13RK    |                  |       |
| B075MBT13XK    | 75               | 0.65  |
| B075MBT13RK    |                  |       |
| B100MBT13XK    | 100              | 0.87  |
| B100MBT13RK    |                  |       |
| B150MBT13XKF   | 150              | 1.30  |
| B150MBT13RKF   |                  |       |
| B200MBT13XKF   | 200              | 1.74  |
| B200MBT13RKF   |                  |       |
| B250MBT13XKF   | 250              | 2.17  |
| B250MBT13RKF   |                  |       |
| B300MBT13XKF   | 300              | 2.61  |
| B300MBT13RKF   |                  |       |
| B350MBT13XKF   | 350              | 3.04  |
| B350MBT13RKF   |                  |       |
| B500MBT13XKF   | 500              | 4.35  |
| B500MBT13RKF   |                  |       |
| B750MBT13XKF   | 750              | 6.52  |
| B750MBT13RKF   |                  |       |
| B1K0MBT13XKF   | 1000             | 8.70  |
| B1K0MBT13RKF   |                  |       |
| B1K5MBT13XXH   | 1500             | 13.04 |
| B1K5MBT13RKH   |                  |       |
| B2K0MBT13XXH   | 2000             | 17.39 |
| B2K0MBT13RKH   |                  |       |
| B3K0MBT13XXH   | 3000             | 26.09 |
| B5K0MBT13XXH   | 5000             | 43.48 |





# **SECTION 5**

## **FUSES**

# ATQR

## TIME DELAY/CLASS CC



### TAKE *CONTROL* OF FAULT CURRENTS HEADED FOR YOUR *CONTROL* TRANSFORMER

ATQR small-dimension fuses feature time delay characteristics ideally suited for the high inrush currents of control transformers, solenoids, and similar inductive loads. The newest member of our Amp-trap 2000® family of fuses - ATQR fuses provide superior protection for the branch circuits of electrical distribution systems.

#### Features/Benefits

- **Time delay** for control transformer inrush loads without nuisance opening
- **Highly current limiting** for low peak let-thru current
- **Rejection-style design** prevents replacement errors (when used with recommended fuse blocks)
- **High-visibility orange label** ensures instant recognition, and simplifies replacement
- **Metal-embossed date and catalog number** for traceability and lasting identification
- **Fiberglass body** provides dimensional stability in harsh industrial settings
- **High-grade silica filler** ensures fast arc quenching and high current limitation

#### HIGHLIGHTS:

- Time Delay
- Best Choice for Small Transformer Protection
- Most Current-Limiting

#### APPLICATIONS:

- Control Transformers
- Solenoids
- Inductive Loads
- Lighting, Heating & General-purpose Loads

#### Ratings

- **AC:** 1/10 to 30A 600VAC, 200kA I.R.
- **DC:** 1/10 to 30A300VDC, 100kA I.R.

#### Approvals

- UL Listed to Standard 248-4
- DC Listed to UL Standard 248
- CSA Certified to Standard C22.2 No. 248.4



# TIME DELAY/CLASS CC FUSES

ATQR

## Standard Fuse Ampere Ratings, Catalog Numbers

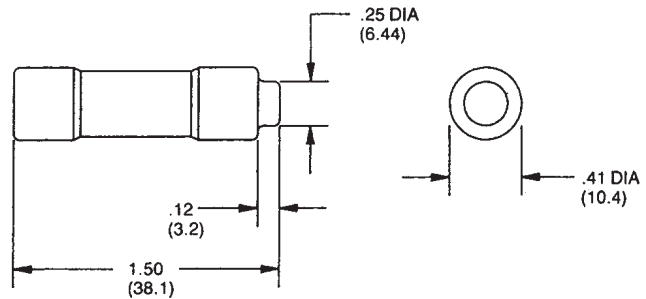
| AMPERE RATING | CATALOG NUMBER | AMPERE RATING | CATALOG NUMBER | AMPERE RATING | CATALOG NUMBER | AMPERE RATING | CATALOG NUMBER |
|---------------|----------------|---------------|----------------|---------------|----------------|---------------|----------------|
| 1/10          | ATQR1/10       | 8/10          | ATQR8/10       | 2-8/10        | ATQR2-8/10     | 7-1/2         | ATQR7-1/2      |
| 1/8           | ATQR1/8        | 1             | ATQR1          | 3             | ATQR3          | 8             | ATQR8          |
| 3/16          | ATQR3/16       | 1-1/8         | ATQR1-1/8      | 3-2/10        | ATQR3-2/10     | 9             | ATQR9          |
| 2/10          | ATQR2/10       | 1-1/4         | ATQR1-1/4      | 3-1/2         | ATQR3-1/2      | 10            | ATQR10         |
| 1/4           | ATQR1/4        | 1-4/10        | ATQR1-4/10     | 4             | ATQR4          | 12            | ATQR12         |
| 3/10          | ATQR3/10       | 1-1/2         | ATQR1-1/2      | 4-1/2         | ATQR4-1/2      | 15            | ATQR15         |
| 4/10          | ATQR4/10       | 1-6/10        | ATQR1-6/10     | 5             | ATQR5          | 17-1/2        | ATQR17-1/2     |
| 1/2           | ATQR1/2        | 1-8/10        | ATQR1-8/10     | 5-6/10        | ATQR5-6/10     | 20            | ATQR20         |
| 6/10          | ATQR6/10       | 2             | ATQR2          | 6             | ATQR6          | 25            | ATQR25         |
| 3/4           | ATQR3/4        | 2-1/4         | ATQR2-1/4      | 6-1/4         | ATQR6-1/4      | 30            | ATQR30         |
|               |                | 2-1/2         | ATQR2-1/2      | 7             | ATQR7          |               |                |



## Recommended ATQR Class CC Primary Fuses For Single Phase Control Transformers

| TRANS VA | PRIMARY |      | ATQR AMPS | TRANS VA | PRIMARY |      | ATQR AMPS |
|----------|---------|------|-----------|----------|---------|------|-----------|
|          | VOLTS   | FLA  |           |          | VOLTS   | FLA  |           |
| 25       | 600     | 0.04 | 1/10      | 300      | 600     | 0.50 | 1-1/8     |
|          | 480     | 0.05 | 1/10      |          | 480     | 0.63 | 1-1/2     |
|          | 240     | 0.10 | 2/10      |          | 240     | 1.25 | 2-1/2     |
|          | 208     | 0.12 | 1/4       |          | 208     | 1.44 | 3         |
|          | 120     | 0.21 | 4/10      |          | 120     | 2.5  | 5*        |
| 50       | 600     | 0.08 | 1/4       | 500      | 600     | 0.83 | 1-1/2     |
|          | 480     | 0.10 | 1/4       |          | 480     | 1.04 | 2         |
|          | 240     | 0.21 | 4/10      |          | 240     | 2.08 | 4*        |
|          | 208     | 0.24 | 1/2       |          | 208     | 2.40 | 6*        |
|          | 120     | 0.42 | 6/10      |          | 120     | 4.17 | 10*       |
| 75       | 600     | 0.13 | 1/4       | 750      | 600     | 1.25 | 2-1/2     |
|          | 480     | 0.16 | 3/10      |          | 480     | 1.56 | 3         |
|          | 240     | 0.31 | 1/2       |          | 240     | 3.13 | 7*        |
|          | 208     | 0.36 | 3/4       |          | 208     | 3.61 | 8*        |
|          | 120     | 0.63 | 1         |          | 120     | 6.25 | 15*       |
| 100      | 600     | 0.17 | 3/10      | 1000     | 600     | 1.67 | 3         |
|          | 480     | 0.21 | 4/10      |          | 480     | 2.08 | 4*        |
|          | 240     | 0.42 | 6/10      |          | 240     | 4.16 | 10*       |
|          | 208     | 0.48 | 1         |          | 208     | 4.81 | 12*       |
|          | 120     | 0.83 | 1-1/2     |          | 120     | 8.33 | 20*       |
| 150      | 600     | 0.25 | 1/2       | 1500     | 600     | 2.50 | 5*        |
|          | 480     | 0.31 | 1/2       |          | 480     | 3.13 | 7*        |
|          | 240     | 0.63 | 1         |          | 240     | 6.25 | 10        |
|          | 208     | 0.72 | 1-1/2     |          | 208     | 7.21 | 20*       |
|          | 120     | 1.25 | 2-1/2     |          | 120     | 12.5 | 25*       |
| 200      | 600     | 0.33 | 1/2       | 2000     | 600     | 3.33 | 8*        |
|          | 480     | 0.42 | 6/10      |          | 480     | 4.17 | 10*       |
|          | 240     | 0.83 | 1-1/2     |          | 240     | 8.33 | 20+*      |
|          | 208     | 0.96 | 2         |          | 208     | 9.62 | 20+*      |
|          | 120     | 1.67 | 3         |          |         |      |           |
| 250      | 600     | 0.42 | 6/10      | 3000     | 600     | 5.00 | 12+*      |
|          | 480     | 0.52 | 1-1/8     |          | 480     | 6.25 | 15+*      |
|          | 240     | 1.04 | 2         |          | 240     | 12.5 | 30+*      |
|          | 208     | 1.2  | 3         | 5000     | 600     | 8.33 | 20+*      |
|          | 120     | 2.08 | 4*        |          | 480     | 10.4 | 25+*      |

## Dimensions



## Recommended Fuse Blocks for Class CC Fuses

| Number of Poles | ULTRASAFE™ Indicating Fuse Holder | Screw with Double Quick Connects | Pressure Plate with Double Quick Connects | Copper Box Connector |
|-----------------|-----------------------------------|----------------------------------|---|----------------------|
| <b>ADDER</b>    |                                   |                                  |   |                      |
| <b>1</b>        | USCC1I                            | 30310R<br>30311R                 | 30320R<br>30321R                          | 30350R<br>30351R     |
| <b>2</b>        | USCC2I                            | 30312R                           | 30322R                                    | 30352R               |
| <b>3</b>        | USCC3I                            | 30313R                           | 30323R                                    | 30353R               |

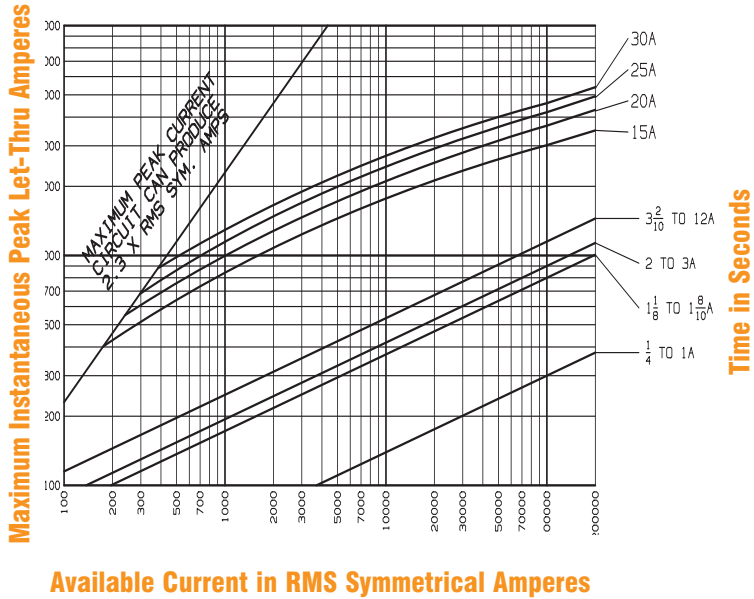
Primary fuses - If primary FLA is less than 2 amps, fuse may be 300% max. (500% for motor control). If primary FLA exceeds 2 amps but is less than 9 amps, fuse may not exceed 167% of primary FLA unless secondary protection is used, when it may be increased to 250%. Fuse sizes shown are based on approx. 40 x FLA for .01 sec.

- \* Secondary protection is required for these ratings.
- + Fuse will withstand 30 x FLA for .01 second
- ++ Fuse will withstand 25 x FLA for .01 second

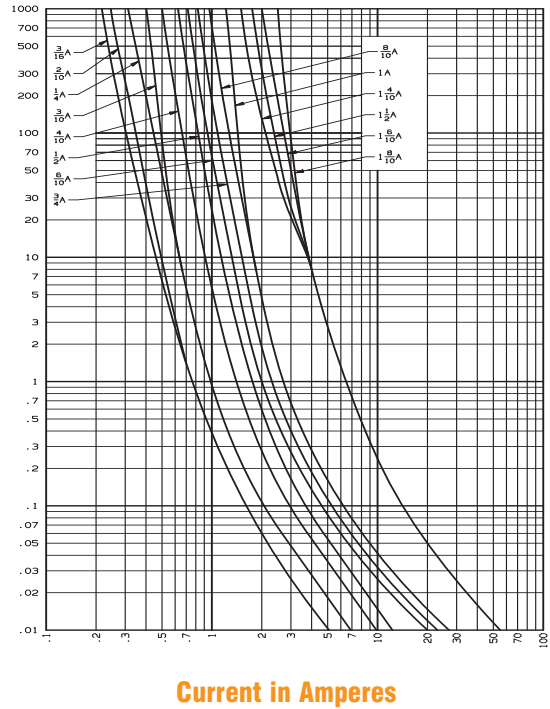
# TIME DELAY/CLASS CC FUSES

ATQR

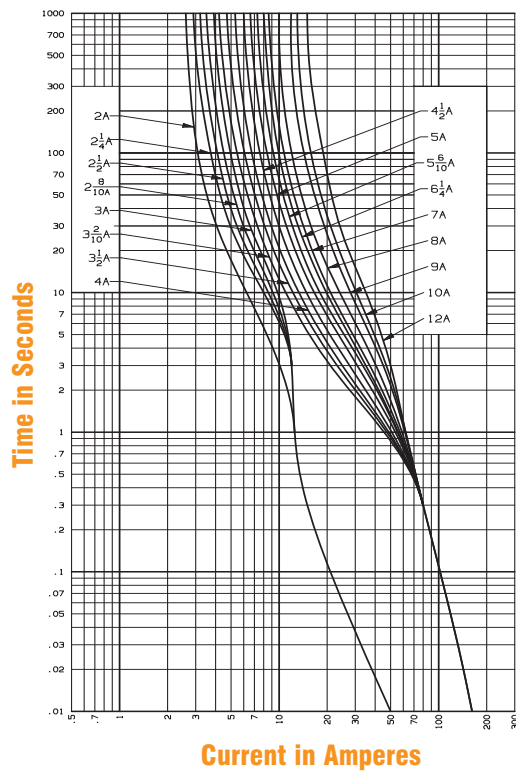
Peak Let-Thru Current Data-ATQR1/4 to 30, 600 Volts AC



Melting Time-Current Data ATQR 3/16 to 1-8/10, 600 Volts



Melting Time-Current Data ATQR 2 to 30, 600 Volts AC



# TRM

## 1-1/2" X 13/32" MIDGET FUSES



Tri-onic TRM time-delay midget fuses are rated 250 volts AC and are offered in ampere ratings from 1/10A to 30A. They have 12 seconds time delay at 200% rating to provide supplemental protection of small motors, small transformers and other high inrush loads, plus many other 250 volt applications. (Not for Branch Circuit Protection).

### Features/Benefits

- **Numerous ratings** for a wide variety of applications
- **250VAC rating** in all sizes up to 30A
- **Time delay** for circuits with high inrush current
- Can be used with **ULTRASAFE™** fuse holders



### HIGHLIGHTS:

- Time Delay
- 250 VAC Rated

### APPLICATIONS:

- Small Motors
- Small Transformers
- Lighting Circuits
- Control Circuits

### Ratings

- **AC:** 1/10 to 30A  
250VAC, 10kA I.R.

### Approvals

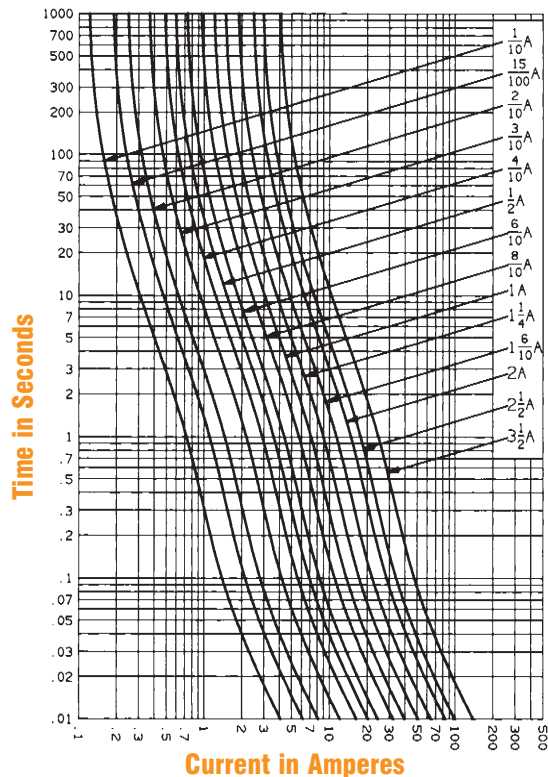
- UL Listed to Standard 248-14 File E33925
- CSA Certified to Standard C22.2 No. 248.14



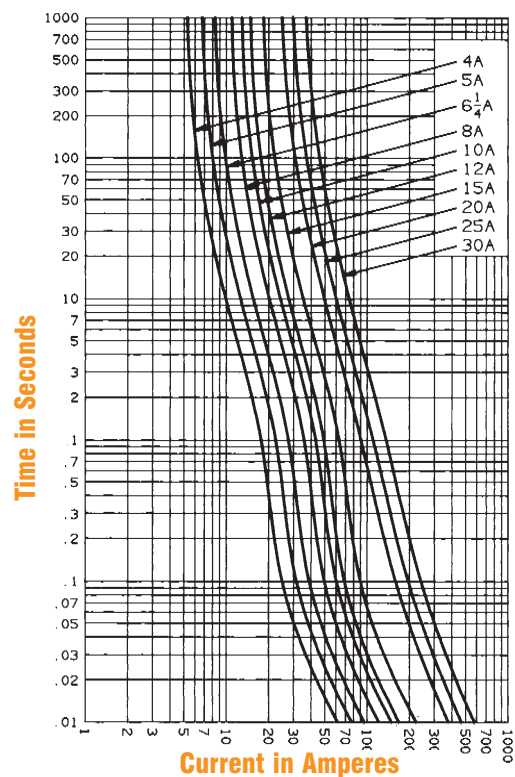
### Standard Fuse Ampere Ratings, Catalog Numbers

| AMPERE RATING | CATALOG NUMBER | AMPERE RATING | CATALOG NUMBER | AMPERE RATING | CATALOG NUMBER | AMPERE RATING | CATALOG NUMBER | AMPERE RATING | CATALOG NUMBER | AMPERE RATING | CATALOG NUMBER |
|---------------|----------------|---------------|----------------|---------------|----------------|---------------|----------------|---------------|----------------|---------------|----------------|
| 1/10          | TRM1/10        | 6/10          | TRM6/10        | 1-6/10        | TRM1-6/10      | 3             | TRM3           | 5-6/10        | TRM5-6/10      | 10            | TRM10          |
| 15/100        | TRM15/100      | 8/10          | TRM8/10        | 1-8/10        | TRM1-8/10      | 3-2/10        | TRM3-2/10      | 6             | TRM6           | 12            | TRM12          |
| 2/10          | TRM2/10        | 1             | TRM1           | 2             | TRM2           | 3-1/2         | TRM3-1/2       | 6-1/4         | TRM6-1/4       | 15            | TRM15          |
| 1/4           | TRM1/4         | 1-1/8         | TRM1-1/8       | 2-1/4         | TRM2-1/4       | 4             | TRM4           | 7             | TRM7           | 20            | TRM20          |
| 3/10          | TRM3/10        | 1-1/4         | TRM1-1/4       | 2-1/2         | TRM2-1/2       | 4-1/2         | TRM4-1/2       | 8             | TRM8           | 25            | TRM25          |
| 4/10          | TRM4/10        | 1-4/10        | TRM1-4/10      | 2-8/10        | TRM2-8/10      | 5             | TRM5           | 9             | TRM9           | 30            | TRM30          |
| 1/2           | TRM1/2         |               |                |               |                |               |                |               |                |               |                |

Melting Time – Current Data 1/10 - 3-1/2 Amperes, 250 Volts AC



Melting Time – Current Data 4 - 30 Amperes, 250 Volts AC



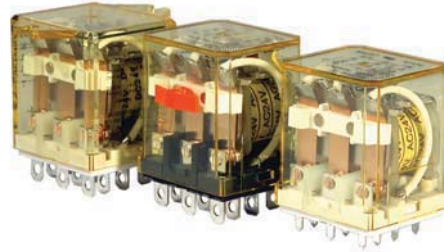
**SECTION 6**  
**CONTROL RELAYS**



### RH Series Compact Power Relays

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

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



#### Part Number Selection

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

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

#### Ordering Information

When ordering, specify the Part No. and coil voltage code:

(example) **RH3B-U**    **AC120V**  
 Part No.                      Coil Voltage Code

Switches & Pilot Lights

Display Lights

Relays & Sockets





Timers

Terminal Blocks

Circuit Breakers



Sockets (for Blade Terminal Models)


| Relays | Standard DIN Rail Mount <sup>1</sup> | Finger-safe DIN Rail Mount <sup>1</sup> | Through Panel Mount | PCB Mount |
|--------|--------------------------------------|---|---------------------|-----------|
| RH1B   | SH1B-05                              | SH1B-05C                                | SH1B-51             | SH1B-62   |
| RH2B   | SH2B-05                              | SH2B-05C                                | SH2B-51             | SH2B-62   |
| RH3B   | SH3B-05                              | SH3B-05C                                | SH3B-51             | SH3B-62   |
| RH4B   | SH4B-05                              | SH4B-05C                                | SH4B-51             | SH4B-62   |

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

Hold Down Springs & Clips

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

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

AC Coil Ratings

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

DC Coil Ratings

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

-  Standard coil voltages are in **BOLD**.

# RZ7-FE Electronic Timing Relays

Control &  
Timing Relays

RZ7-FE

The economical choice  
for most industrial  
timing applications



Sprecher + Schuh's RZ7-FE electronic timing relays offer seven popular output functions in an economical package. This series is especially designed for applications where a high quality, yet basic timing relay is required. Timing formats include ON-delay, OFF-delay, Wye-Delta and four other choices. All models are multi-time relays, meaning that various time ranges (from 0.05 seconds to 10 hours) can be selected from the face of the relay.

## Solid state accuracy and reliability

Except for their hard silver contacts, all RZ7-FE timing relays are built with solid state surface mounted electronics and are accurate to within one percent. Their ruggedness and accuracy is due to the thorough testing of function, timing characteristics and surge voltage strength performed on *each device* prior to shipment.

In addition, RZ7-FE relays function reliably from 15% under rated operating voltage to 10% over rated operating voltage (AC). Voltage tolerance is even greater in DC applications.

## Universal voltage capability

All RZ7-FE timing relays operate with multiple supply voltages ranging from 24VAC or DC to 240VAC. Universal voltage capability means smaller inventories and more flexibility.

## Choose from two different output contacts

New to the RZ7-FE series is the choice between one normally open (NO) contact or one single pole double throw (SPDT) contact. The new SPDT version can be used either normally open or normally closed. This version has several technical advantages such as shorter impulse duration requirements and a faster recovery time.



## Multiple functions in one relay

The RZ7-FEM relay combines four of the most popular timing functions into one device. Six timing ranges are included that are individually selectable from 0.05 seconds to 10 hours. This multifunction relay reduces inventories and is ideal for maintaining remote installations where stocking several different timing relays would not be practical.

## Many safety and convenience features

- Each relay is equipped with an LED that indicates output status conditions.
- Finger and back of hand protection to IP40.
- Terminals are captive and supplied in the open position.
- All RZ7's can be surface mounted, rail mounted, or mounted directly on our family of CA7/CS7 devices.
- RZ7 relays can be mounted in any plane.
- Terminals, setting knob and LED's are all accessible from the front of the unit.
- RZ7-FE Timing Relays are very compact, measuring approximately 1" x 3" x 3".



The RZ7-FEM multifunction timing relay combines all functions in one device.

**Quick Selection Guide**

| Single Function Timing Relays |  |  |                             |   |
|-------------------------------|--|--|-----------------------------|---|
| RZ7-FE                        | A  | 1  | T                           | U22   |
| Type                          | Function   | Contacts   | Time Ranges                 | Supply Voltages                                       |
|                               | <b>A</b> On-Delay<br><b>B</b> Off-Delay<br><b>D</b> One Shot / Watchdog<br><b>E</b> Fleeting Off-Delay ❷<br><b>F</b> Symmetric flasher starting with a pulse<br><b>L</b> Impulse Converter ❷ | <i>Functions A, B, D &amp; F</i><br><b>1</b> One normally open contact | <b>T</b> 0.05s...10 hours ❶ | <b>U22</b> 24VAC or DC<br>110...240V 50/60Hz<br>A1/A2 |
|                               |  | <i>All Functions:</i><br><b>3</b> One single pole double contact       | <b>T</b> 0.05s...10 hours ❶ | <b>U23</b> 24...48VDC<br>24...240V 50/60Hz<br>A1/A2   |

| Multi-Function Timing Relays |   |   |                             |   |
|------------------------------|---|---|-----------------------------|---|
| RZ7-FE                       | M   | 1                                       | T                           | U22   |
| Type                         | Function  | Contacts                                | Time Ranges                 | Supply Voltages                                       |
|                              | <b>M</b> Multi-function<br><i>Four single functions</i><br>- On-delay<br>- Off-delay<br>- One shot<br>- Symmetric flasher starting with a pulse | <b>1</b> One normally open contact      | <b>T</b> 0.05s...10 hours ❶ | <b>U22</b> 24VAC or DC<br>110...240V 50/60Hz<br>A1/A2 |
|                              |   | <b>3</b> One single pole double contact | <b>T</b> 0.05s...10 hours ❶ | <b>U23</b> 24...48VDC<br>24...240V 50/60Hz<br>A1/A2   |

| Special Function Timing Relays |                                 |   |                               |  |
|--------------------------------|---------------------------------|---|-------------------------------|--|
| RZ7-FE                         | Y                               | 2   | Q                             | U23  |
| Type                           | Function                        | Contacts  | Time Ranges                   | Supply Voltages  |
|                                | <b>Y</b> Wye-Delta Timing Relay | <b>2</b> Two normally open contacts (one side common) | <b>Q</b> 0.15s...10 minutes ❶ | <b>U23</b> 24...48VDC<br>24...240V 50/60Hz<br>A1/A2<br>A1/A2 |



Control & Timing Relays

RZ7-FE

❶ Multi-time setting range. See appropriate catalog page for specific time settings.  
 ❷ Not available in RZ7-FEx1 model.

### RZ7-FE Timing Relays – Single Function, One Pole

| Functional Description  | Functional Diagram  | Terminal Arrangement | Type  | Catalog Number  | Price        |
|---|---|----------------------|---|---|--------------|
| <b>ON-Delay Timing Relay (A)</b><br>When supply voltage is applied, output contact(s) change state after time delay $t$ .   |   |                      | <ul style="list-style-type: none"> <li>One NO contact</li> <li>Multi-timing range (from 0.05s to 10h) Ⓣ</li> <li>Supply voltage selected via wiring terminals A1, A2</li> <li>LED indicator</li> </ul>                      | RZ7-FEA1TU22  | 84           |
|   |   |                      | <ul style="list-style-type: none"> <li>One SPDT contact</li> <li>Multi-timing range (from 0.05s to 10h) Ⓣ</li> <li>"Universal" terminals accept all appropriate supply voltages</li> <li>Bicolored LED indicator</li> </ul> | RZ7-FEA3TU23  | 90           |
| <b>OFF-Delay Timing Relay (B)</b><br>When control contact B1 closes, the output contact changes state immediately. When control contact B1 opens, the output contact changes state after time delay $t$ . Constant supply voltage required on terminals A1/A2 or A3/A2. |   |                      | <ul style="list-style-type: none"> <li>One NO contact</li> <li>Multi-timing range (from 0.05s to 10h) Ⓣ</li> <li>Supply voltage selected via wiring terminals A1, A2</li> <li>LED indicator</li> </ul>                      | RZ7-FEB1TU22  | 90           |
|   | <b>Note:</b> Control pulse duration minimum 250ms for RZ7-FEB1SU22; 50ms (AC) and 30ms (DC) for RZ7-FEB3TU23. |                      |   | <ul style="list-style-type: none"> <li>One SPDT contact</li> <li>Multi-timing range (from 0.05s to 10h) Ⓣ</li> <li>"Universal" terminals accept all appropriate supply voltages</li> <li>Bicolored LED indicator</li> </ul> | RZ7-FEB3TU23 |
| <b>One Shot Relay / Watchdog (D)</b><br>When supply voltage is applied, the output contact changes state for time period $t$ .  |   |                      | <ul style="list-style-type: none"> <li>One NO contact</li> <li>Multi-timing range (from 0.05s to 10h) Ⓣ</li> <li>Supply voltage selected via wiring terminals A1, A2</li> <li>LED indicator</li> </ul>                      | RZ7-FED1TU22  | 84           |
|   |   |                      | <ul style="list-style-type: none"> <li>One SPDT contact</li> <li>Multi-timing range (from 0.05s to 10h) Ⓣ</li> <li>"Universal" terminals accept all appropriate supply voltages</li> <li>Bicolored LED indicator</li> </ul> | RZ7-FED3TU23  | 90           |

### Supply Voltage

The last three digits in the catalog number represent the supply voltage range the relay will accept:

|            |                                  |         |
|------------|----------------------------------|---------|
| <b>U22</b> | 24V AC or DC                     | (A1/A2) |
|            | 110...240V 50/60Hz               | (A1/A2) |
| <b>U23</b> | 24...48VDC and 24...240V 50/60Hz | (A1/A2) |

### Timing Range Codes

| RZ7-FE        |
|---------------|
| 0.05...1 sec  |
| 0.5...10 sec  |
| 0.05...1 min  |
| 0.5...10 min  |
| 0.05...1 hour |
| 0.5...10 hour |

### Bicolored LED

Relays with SPDT contacts have bicolored LEDs to indicate function:

|  |             |                          |
|--|-------------|--------------------------|
|  | LED = green | Supply voltage available |
|  | LED = red   | Output is energized      |



RZ7-FE timing relay

Ⓣ For timing control, a voltage other than the supply voltage can also be used.  
 Ⓣ Timing range is screwdriver selectable from the faceplate.

**SECTION 7**





**PILOT DEVICES**

# Push Buttons and Operator Interface - Type K and SK, 30 mm Corrosion Resistant Operators - Type SK

## Non-Illuminated Momentary Push Button Operators – UL Types 4, 4X, 13/NEMA Types 4, 4X, 13

For use in hazardous locations – See page 150.

Contact Blocks And Legend Plate Not Included Unless Otherwise Noted

| Description  | Color  | Operator With 1 N.O. and 1 N.C. Contact (KA1) | Operator With (KA2) | Operator With 1 N.C. Contact (KA3) | Operator Only With No Contacts ⑤ |         |
|--|--|---|---------------------|------------------------------------|----------------------------------|---------|
| <br>Full Guard            | Black  | SKR1BH13                                      | SKR1BH5             | SKR1BH6                            | SKR1B                            |         |
|  | Red  | SKR1RH13                                      | SKR1RH5             | SKR1RH6                            | SKR1R                            |         |
|  | Green  | SKR1GH13                                      | SKR1GH5             | SKR1GH6                            | SKR1G                            |         |
|  | Universal ①  | SKR1UH13                                      | SKR1UH5             | SKR1UH6                            | SKR1U                            |         |
|  | Other ②  | SKR1②H13                                      | SKR1②H5             | SKR1②H6                            | SKR1②                            |         |
| <br>No Guard              | Black  | SKR3BH13                                      | SKR3BH5             | SKR3BH6                            | SKR3B                            |         |
|  | Red  | SKR3RH13                                      | SKR3RH5             | SKR3RH6                            | SKR3R                            |         |
|  | Green  | SKR3GH13                                      | SKR3GH5             | SKR3GH6                            | SKR3G                            |         |
|  | Universal ①  | SKR3UH13                                      | SKR3UH5             | SKR3UH6                            | SKR3U                            |         |
|  | Other ②  | SKR3②H13                                      | SKR3②H5             | SKR3②H6                            | SKR3②                            |         |
| <br>Extended Guard        | Black  | SKR2BH13                                      | SKR2BH5             | SKR2BH6                            | SKR2B                            |         |
|  | Red  | SKR2RH13                                      | SKR2RH5             | SKR2RH6                            | SKR2R                            |         |
|  | Green  | SKR2GH13                                      | SKR2GH5             | SKR2GH6                            | SKR2G                            |         |
|  | Universal ①  | SKR2UH13                                      | SKR2UH5             | SKR2UH6                            | SKR2U                            |         |
|  | Other ②  | SKR2②   | SKR2②H5             | SKR2②H6                            | SKR2②                            |         |
| <br>1 5/8 Mushroom Button | <b>Snap In Mushroom Button</b>   |   |                     |                                    |                                  |         |
|  | Black  | SKR4BH13                                      | SKR4BH5             | SKR4BH6                            | SKR4B                            |         |
|  | Red  | SKR4RH13                                      | SKR4RH5             | SKR4RH6                            | SKR4R                            |         |
|  | Red ③  | SKR4R05H13                                    | SKR4R05H5           | SKR4R05H6                          | SKR4R05                          |         |
|  | Green  | SKR4GH13                                      | SKR4GH5             | SKR4GH6                            | SKR4G                            |         |
|  | Other ④  | SKR4④H13                                      | SKR4④H5             | SKR4④H6                            | SKR4④                            |         |
|  | <b>Screw-On Mushroom Button With Set Screw Security</b>  |   |                     |                                    |                                  |         |
|  | Black  | SKR24BH13                                     | SKR24BH5            | SKR24BH6                           | SKR24B                           |         |
|  | Red  | SKR24RH13                                     | SKR24RH5            | SKR24RH6                           | SKR24R                           |         |
|  | Green  | SKR24GH13                                     | SKR24GH5            | SKR24GH6                           | SKR24G                           |         |
|  | Other ④  | SKR24④H13                                     | SKR24④H5            | SKR24④H6                           | SKR24④                           |         |
|  | <br>2 1/4 Mushroom Button | <b>Snap-In Mushroom Button</b>                |                     |                                    |                                  |         |
|  |  | Black   | SKR5BH13            | SKR5BH5                            | SKR5BH6                          | SKR5B   |
|  |  | Red   | SKR5RH13            | SKR5RH5                            | SKR5RH6                          | SKR5R   |
|  |  | Red ③   | SKR5R05H13          | SKR5R05H5                          | SKR5R05H6                        | SKR5R05 |
| Green  |  | SKR5GH13                                      | SKR5GH5             | SKR5GH6                            | SKR5G                            |         |
| Other ④  |  | SKR5④H13                                      | SKR5④H5             | SKR5④H6                            | SKR5④                            |         |
| <b>Screw-On Mushroom Button With Set Screw Security</b>  |  |   |                     |                                    |                                  |         |
| Black  |  | SKR25BH13                                     | SKR25BH5            | SKR25BH6                           | SKR25B                           |         |
| Red  |  | SKR25RH13                                     | SKR25RH5            | SKR25RH6                           | SKR25R                           |         |
| Green  |  | SKR25GH13                                     | SKR25GH5            | SKR25GH6                           | SKR25G                           |         |
| Other ④  |  | SKR25④H13                                     | SKR25④H5            | SKR25④H6                           | SKR25④                           |         |

① The universal push button operators include one each of the following color inserts: black, red, green, yellow, orange, blue and white.

② See table below.

③ Knob has the words "Emergency Stop" in raised letters highlighted in white for readability. Available in red snap-in mushroom buttons only.

④ See table below.

⑤ These operators can be ordered complete with contact blocks, for maximum block usage – see page 155. Add the "H" number chosen from page 151 to the end of the operator type number. **EXAMPLE: SKR24B + H2(2-KA1) = SKR24BH2**

| Color  | ② For SKR1,2,3<br>Choose Color and Place<br>Color Code in Type Number | ④ For SKR4,5,24,25<br>Choose Color and Place<br>Color Code in Type Number |
|--------|---|---|
| Blue   | L   | L   |
| Yellow | Y   | Y   |
| White  | W   | –   |
| Orange | S   | S   |
| Gray   | E   | –   |

|  |               |
|--|---------------|
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# Push Buttons and Operator Interface - Type K and SK, 30 mm


## Corrosion Resistant Operators - Type SK

### Multifunction Operators – UL Types 4, 4X, 13/NEMA Types 4, 4X, 13

For use in hazardous locations – See page 150. Legend Plate And Contact Blocks Not Included Unless Otherwise Noted

|  | Description                                  | Color                    | Contacts ⑥           | Without Contacts ⑦ |
|---|--|--------------------------|----------------------|--------------------|
|   | Both Buttons Maintained Interlocked Assembly | Universal ①<br>Other ②   | SKR11UH1<br>SKR11②H1 | SKR11U<br>SKR11②   |
| One Button Momentary One Button Maintained Interlocked Assembly                   | Universal ①<br>Other ②                       | SKR12UH1H1<br>SKR12②H1H1 | SKR12U<br>SKR12②     |                    |

|  | Description   | Color                     | With 2 N.C. Contacts (1 KA3, 1 KA5) | With 1 N.O. 1 N.C. Contact (1 KA1) | Without Contacts ⑦      |
|---|---|---------------------------|-------------------------------------|------------------------------------|-------------------------|
|   | 3 POSITION Momentary Pull-Maintained Neutral-Momentary Push | Red ⑨<br>Green<br>Other ③ | SKR8RH25<br>SKR8GH25<br>SKR8③H25    | –<br>–<br>–                        | SKR8R<br>SKR8G<br>SKR8③ |
| 2 POSITION Maintained Pull-Maintained Push  | Red ⑨<br>Green<br>Other ③                                   | –<br>–<br>–               | SKR9RH13<br>SKR9GH13<br>SKR9③H13    | SKR9R<br>SKR9G<br>SKR9③            |                         |

|  | Description  | Voltage   | With Red Knob ⑩<br>With 2 N.C. Contacts (1 KA3, 1 KA5)   | With Other Color Knob<br>With 2 N.C. Contacts (1 KA3, 1 KA5) | With Other Color Knob<br>Without Contacts ⑦ |
|--|--|---|--|--|---|
|  | 3 POSITION Momentary Pull-Maintained Neutral-Momentary Push  | 110-120 V, 50-60 Hz<br>Other – Transformer, LED, Flashing ⑤<br>Other – Full Voltage, Resistor, Neon ⑥ | SKR8P1RH25<br>SKR8P④RH25<br>SKR8P④RH25                   | SKR8P1③H25<br>SKR8P④③H25                                     | SKR8P1③<br>SKR8P④③                          |
| Description  | Voltage  | With Red ⑩ Knob With 1 N.O. & 1 N.C. Contact (KA1)  | With Other Color Knob With 1 N.O. & 1 N.C. Contact (KA1) | With Other Color Knob<br>Without Contacts                    |   |
| 2 POSITION Maintained Pull-Maintained Push Illuminated                             | 110-120 V, 50-60 Hz<br>Other – Transformer, L.E.D., Flashing ⑤<br>Other – Full Voltage, Resistor, Neon ⑥ | SKR9P1RH13<br>SKR9P④RH13<br>SKR9P④RH13  | SKR9P1③H13<br>SKR9P④③H13                                 | SKR9P1③<br>SKR9P④③   |   |

- ① Universal for SKR11,12 includes 2 each of black, red, green, yellow, orange, blue, white.
- ② Choose one color for each button from table and insert color code in type number.  
**EXAMPLE: An SKR11 with top button gray and bottom button orange = SKR11ES**
- ③ Choose one color from table and insert color code in type number.  
**EXAMPLE: SKR9 with a yellow knob=SKR9Y**
- ④ Add the voltage assembly code as chosen from voltage assembly code table on page 141.  
**EXAMPLE: SKR8P④ with a 277 V 50-60 Hz voltage=SKR8P8**
- ⑤ The color of the knob must be the same color as the LED voltage chosen (i.e., green LED uses green knob) or use a clear knob.
- ⑥ On neon voltages use clear knobs only.
- ⑦ These operators can be ordered complete with contact blocks, for maximum block usage – see page 155. Add the "H" number chosen from page 151 to the end of the operator type number.
- ⑧ SKR11UH1 has 1 KA1(1N.O., 1N.C.) and SKR12UH1H1 has 2 KA1 (2N.O., 2N.C.).
- ⑨ To obtain a red knob with "Push Emergency Stop" printed on the red knob – substitute "R05" in place of "R". Not available in 1 3/8" or 2 1/4".

| Color  | SKR11, SKR12② | SKR8, SKR9 ③ |
|--------|---------------|--------------|
| Black  | B             | B *          |
| Red    | R             | R            |
| Green  | G             | G            |
| Blue   | L             | L            |
| Yellow | Y             | Y            |
| White  | W             | W            |
| Orange | S             | S *          |
| Clear  | –             | C            |
| Amber  | –             | A            |
| Gray   | E             | –            |

\* These colors are not available on illuminated push-pull operators.

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# Push Buttons and Operator Interface - Type K and SK, 30 mm

## Corrosion Resistant Selector Switches - Type SK

**Non-Illuminated 3 Position Selector Switch Operators – UL Types 4, 4X, 13/NEMA Types 4, 4X, 13**  
 For use in hazardous locations – See page 150. Legend Plate and Contact Block Not Included Unless Noted

| CONTACT BLOCK REQUIRED             |                            |  | 1 — Contact Closed    0 — Contact Open |                                       |                                       |                                       |                                       |                                       |                                       |  |  |                                   |                                   |                                   |                                   |                                   |                                   |                                   |                                      |                                      |      |      |      |      |      |   |
|------------------------------------|----------------------------|--|--|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|--|--|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|--------------------------------------|--------------------------------------|------|------|------|------|------|---|
| Contact Block Position             | Quantity and Type          | Mount on Side  | Center                                 |                                       | Center                                |                                       | Center                                |                                       | Center                                |  | Center                                   |                                   | Center                            |                                   | Center                            |                                   |                                   |                                   |                                      |                                      |      |      |      |      |      |   |
|                                    |                            |  | Left                                   | Right                                 | Left                                  | Right                                 | Left                                  | Right                                 | Left                                  | Right                                    | Left                                     | Right                             | Left                              | Right                             | Left                              | Right                             |                                   |                                   |                                      |                                      |      |      |      |      |      |   |
| <p>Top View</p>                    | KA1 OR KA3                 | KA1 #2 OR KA3 #2   | 1                                      | 0                                     | 0                                     | 1                                     | 0                                     | 0                                     | 0                                     | 0  | 1  | 1                                 | 0                                 | 0                                 | 1                                 | 0                                 | 0                                 | 1                                 | 0                                    | 0                                    | 0    | 1    | 0    | 1    | 1    | 0 |
|                                    | KA2                        |  | 0                                      | 1                                     | 1                                     | 0                                     | 0                                     | 1                                     | 0                                     | 1  | 0  | 0                                 | 1                                 | 0                                 | 0                                 | 0                                 | 1                                 | 0                                 | 1                                    | 1                                    | 1    | 0    | 0    | 0    | 0    | 1 |
|                                    | KA1 OR KA3                 | KA1 #1 OR KA3 #1   | 0                                      | 0                                     | 1                                     | 1                                     | 0                                     | 0                                     | 0                                     | 0  | 1  | 1                                 | 0                                 | 0                                 | 0                                 | 1                                 | 0                                 | 0                                 | 0                                    | 1                                    | 1    | 0    | 1    | 0    | 0    | 1 |
|                                    | KA2                        |  | 1                                      | 1                                     | 0                                     | 0                                     | 0                                     | 1                                     | 0                                     | 1  | 0  | 0                                 | 1                                 | 0                                 | 0                                 | 0                                 | 1                                 | 1                                 | 0                                    | 0                                    | 0    | 1    | 0    | 1    | 0    | 0 |
| CAM                                |                            |  | B                                      | C                                     | D                                     | E                                     | F                                     | G                                     | J                                     | L  | M  |                                   |                                   |                                   |                                   |                                   |                                   |                                   |                                      |                                      |      |      |      |      |      |   |
| Non-Illuminated Operators          |                            |  | Type                                   | Type                                  | Type                                  | Type                                  | Type                                  | Type                                  | Type                                  | Type                                     | Type                                     | Type                              | Type                              | Type                              | Type                              | Type                              | Type                              | Type                              | Type                                 | Type                                 | Type | Type | Type | Type | Type |   |
| Manual Return                      | Operator Only <sup>①</sup> | Without Knob<br>With Standard Black Knob<br>With Other Color Knob (See Table) <sup>②</sup>   | SKS42<br>SKS42B<br>SKS42 <sup>②</sup>  | SKS43<br>SKS43B<br>SKS43 <sup>②</sup> | SKS44<br>SKS44B<br>SKS44 <sup>②</sup> | SKS45<br>SKS45B<br>SKS45 <sup>②</sup> | SKS46<br>SKS46B<br>SKS46 <sup>②</sup> | SKS47<br>SKS47B<br>SKS47 <sup>②</sup> | SKS49<br>SKS49B<br>SKS49 <sup>②</sup> | SKS401<br>SKS401B<br>SKS401 <sup>②</sup> | SKS402<br>SKS402B<br>SKS402 <sup>②</sup> | SKS42BH13<br>SKS42BH1<br>SKS42BH2 | SKS43BH13<br>SKS43BH1<br>SKS43BH2 | SKS44BH13<br>SKS44BH1<br>SKS44BH2 | SKS45BH13<br>SKS45BH1<br>SKS45BH2 | SKS46BH13<br>SKS46BH1<br>SKS46BH2 | SKS47BH13<br>SKS47BH1<br>SKS47BH2 | SKS49BH13<br>SKS49BH1<br>SKS49BH2 | SKS401BH13<br>SKS401BH1<br>SKS401BH2 | SKS402BH13<br>SKS402BH1<br>SKS402BH2 |      |      |      |      |      |   |
|                                    | With Contact Block(s)      | With Standard Black Knob (See Table for Other Colors, Replace B in Type No. with Color Code)<br>With 1 KA1 on side #2 (H13)<br>With 1 KA1 on side #1 (H1)<br>With 1 KA1 on side #1 and 1 KA1 on side #2 (H2) |  |                                       |                                       |                                       |                                       |                                       |                                       |  |  |                                   |                                   |                                   |                                   |                                   |                                   |                                   |                                      |                                      |      |      |      |      |      |   |
| Spring Return from Left to Center  | Operator Only <sup>①</sup> | Without Knob<br>With Standard Black Knob<br>With Other Color Knob (See Table) <sup>②</sup>   | SKS62<br>SKS62B<br>SKS62 <sup>②</sup>  | SKS63<br>SKS63B<br>SKS63 <sup>②</sup> | SKS64<br>SKS64B<br>SKS64 <sup>②</sup> | SKS65<br>SKS65B<br>SKS65 <sup>②</sup> | SKS66<br>SKS66B<br>SKS66 <sup>②</sup> | SKS67<br>SKS67B<br>SKS67 <sup>②</sup> | SKS69<br>SKS69B<br>SKS69 <sup>②</sup> | SKS601<br>SKS601B<br>SKS601 <sup>②</sup> | SKS602<br>SKS602B<br>SKS602 <sup>②</sup> |                                   |                                   |                                   |                                   |                                   |                                   |                                   |                                      |                                      |      |      |      |      |      |   |
| Spring Return From Right to Center | Operator Only <sup>①</sup> | Without Knob<br>With Standard Black Knob<br>With Other Color Knob (See Table) <sup>②</sup>   | SKS72<br>SKS72B<br>SKS72 <sup>②</sup>  | SKS73<br>SKS73B<br>SKS73 <sup>②</sup> | SKS74<br>SKS74B<br>SKS74 <sup>②</sup> | SKS75<br>SKS75B<br>SKS75 <sup>②</sup> | SKS76<br>SKS76B<br>SKS76 <sup>②</sup> | SKS77<br>SKS77B<br>SKS77 <sup>②</sup> | SKS79<br>SKS79B<br>SKS79 <sup>②</sup> | SKS701<br>SKS701B<br>SKS701 <sup>②</sup> | SKS702<br>SKS702B<br>SKS702 <sup>②</sup> |                                   |                                   |                                   |                                   |                                   |                                   |                                   |                                      |                                      |      |      |      |      |      |   |
| Spring Return Both Sides to Center | Operator Only <sup>①</sup> | Without Knob<br>With Standard Black Knob<br>With Other Color Knob (See Table) <sup>②</sup>   | SKS52<br>SKS52B<br>SKS52 <sup>②</sup>  | SKS53<br>SKS53B<br>SKS53 <sup>②</sup> | SKS54<br>SKS54B<br>SKS54 <sup>②</sup> | SKS55<br>SKS55B<br>SKS55 <sup>②</sup> | SKS56<br>SKS56B<br>SKS56 <sup>②</sup> | SKS57<br>SKS57B<br>SKS57 <sup>②</sup> | SKS59<br>SKS59B<br>SKS59 <sup>②</sup> | SKS501<br>SKS501B<br>SKS501 <sup>②</sup> | SKS502<br>SKS502B<br>SKS502 <sup>②</sup> |                                   |                                   |                                   |                                   |                                   |                                   |                                   |                                      |                                      |      |      |      |      |      |   |

<sup>①</sup> These operators can be ordered complete with contact blocks, for maximum block usage – see page 155. Add the "H" number chosen from page 151 to the end of the operator type number.  
**EXAMPLE: SKS43FB+H13(KA1-POS 2) = SKS43FBH13.**  
<sup>②</sup> Add the color code as chosen from knob color table below.  
**EXAMPLE: SKS43<sup>②</sup> with a green gloved hand knob = SKS43FG.**





### Selector Switch Knobs

| Color  | Standard Knob |      | Gloved Hand Knob |      | Coin Operated |      |
|--------|---------------|------|------------------|------|---------------|------|
|        | ② Knob Code   | Type | ② Knob Code      | Type | ② Knob Code   | Type |
| Black  | B             | B11  | FB               | B25  | TB            | B18  |
| Red    | R             | R8   | FR               | R24  | TR            | R16  |
| Green  | G             | G8   | FG               | G24  | TG            | G16  |
| Yellow | Y             | Y8   | FY               | Y24  | TY            | Y16  |
| Orange | S             | S11  | FS               | S25  | —             | —    |
| Blue   | L             | L8   | FL               | L24  | TL            | L16  |
| White  | W             | W8   | FW               | W24  | —             | —    |
| Amber  | A             | A8   | FA               | A24  | —             | —    |
| Clear  | C             | C8   | FC               | C24  | TC            | C16  |

|                    |               |
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# Push Buttons and Operator Interface - Type K and SK, 30 mm Corrosion Resistant Pilot Lights - Type SK

**Pilot Lights – UL Types 4, 4X, 13/NEMA Types 4, 4X, 13**  
For use in hazardous locations – See page 150. Legend Plate Not Included.

| Description   | Voltage  | Style                          | With Red Fresnel Color Cap     | With Green Fresnel Color Cap | With Other Color Cap        | Without Color Cap |
|---|--|--------------------------------|--------------------------------|------------------------------|-----------------------------|-------------------|
|  <p>Standard Pilot Light<br/>(Plastic fresnel color cap shown)</p>     | 110-120 V, 50-60 Hz  | Transformer                    | SKP1R31                        | SKP1G31                      | SKP1②                       | SKP1              |
|   | 220-240 V, 50-60 Hz  | Transformer                    | SKP7R31                        | SKP7G31                      | SKP7②                       | SKP7              |
|   | 24-28 Vac-dc   | Full Voltage                   | SKP35R31                       | SKP35G31                     | SKP35②                      | SKP35             |
|   | For other voltages see Table ①   | Transformer, Flashing or LED ③ | SKP①R31                        | SKP①G31                      | SKP①②                       | SKP①              |
| Full Voltage, Neon or Resistor ④  |  | SKP①R31                        | SKP①G31                        | SKP①②                        | SKP①                        |                   |
|  <p>Push-To-Test Pilot Light<br/>(Plastic fresnel color cap shown)</p> | 110-120 V, 50-60 Hz  | Transformer                    | SKT1R31                        | SKT1G31                      | SKT1②                       | SKT1              |
|   | 220-240 V, 50-60 Hz  | Transformer                    | SKT7R31                        | SKT7G31                      | SKT7②                       | SKT7              |
|   | 24-28 Vac-dc   | Full Voltage                   | SKT35R31                       | SKT35G31                     | SKT35②                      | SKT35             |
|   | For other voltages see Table ①   | Transformer, Flashing or LED ③ | SKT①R31                        | SKT①G31                      | SKT①②                       | SKT①              |
| Full Voltage, Neon or Resistor ④  |  | SKT①R31                        | SKT①G31                        | SKT①②                        | SKT①                        |                   |
|  <p>Remote Test Pilot Light<br/>(Plastic fresnel color cap shown)</p>  | 120 Vac Only   | Resistor ⑤                     | SKTR38R31                      | SKTR38G31                    | SKTR38②                     | SKTR38            |
|   | 24-28 Vac Only   | Full Voltage ⑤                 | SKTR35R31                      | SKTR35G31                    | SKTR35②                     | SKTR35            |
|   | For other voltages see Tables ①②⑤  | Full Voltage or Resistor⑤      | SKTR①R31                       | SKTR①⑤G31                    | SKTR①②⑤                     | SKTR①             |
|  <p>Pilot Light For Intrinsically Safe Circuits<br/>(NEMA 4X)</p>     | Intrinsically safe equipment must not release electrical or thermal energy capable of igniting certain explosive or combustible hazardous atmosphere, for which the equipment has been tested. These pilot lights are intrinsically safe when used with a suitable approved barrier or barrier relay (Class 8501 Type TO or NY2). These pilot lights are Factory Mutual (FM approved). Consult your local Square D Sales Office for further details. These pilot lights are fully encapsulated — there are no replaceable parts — except for the SK40 ring nut. Use KN100 series plastic legend plates as shown on pages 152 and 153 |                                | KP44R                          | KP44G                        | KP44Y<br>(Yellow Color Cap) | -                 |
|   | Operating Voltage Range  | Nominal Current                | V max = 32 V<br>I max = 165 mA |                              |                             |                   |
|   | 20-30 Vac/dc   | 25 mA                          |                                |                              |                             |                   |

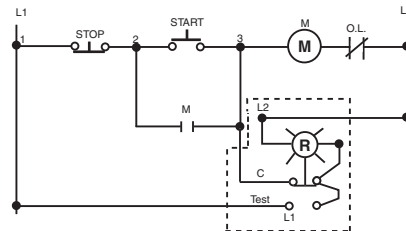
- ① Add the voltage assembly code as chosen from voltage assembly code table, page 145.  
**EXAMPLE: SKT①R31 with a 60Vac red LED voltage = SKT37LRR31.**
- ② Add the color code as chosen from the color cap table below.  
**EXAMPLE: SKP1② with a blue fresnel cap = SKP1L31.**
- ③ The color cap must be the same color as the LED voltage chosen (i.e., green LED use a green color cap) or use a clear cap.
- ④ On neon voltages use clear color caps only.
- ⑤ Use only full voltage or resistor voltage assembly codes on remote test pilot lights. Do not choose LED, or neon transformer codes. For AC use only.

**Voltage Assembly Codes**  
See Page 145

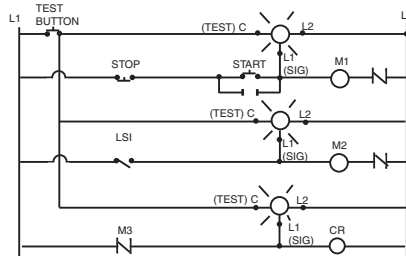
### Color Caps

| Color  | ② Plastic Fresnel | ② Plastic Domed |
|--------|-------------------|-----------------|
| Amber  | A31               | A9              |
| Blue   | L31               | L9              |
| Clear  | C31               | C9              |
| Green  | G31               | G9              |
| Red    | R31               | R9              |
| White  | W31               | W9              |
| Yellow | Y31               | Y9              |

### Typical Push-To-Test Wiring Diagram



### Typical Remote Test Pilot Light Wiring Diagram



|                       |               |
|-----------------------|---------------|
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| Lamps .....           | Page 148      |
| Legend Plates .....   | Pages 152-153 |
| Light Modules .....   | Page 148      |

|                          |               |
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# Push Buttons and Operator Interface - Type K and SK, 30 mm Contact Blocks - Type K, SK, KX, and T

The Class 9001 Type KA contact blocks have been improved. The most noticeable change is that the terminals are Fingersafe® contact blocks (meeting VDE 0106 Part 100). They also have one screw mounting and captive backed out plus/minus terminal screws. These contact blocks still use the same reliable double break direct acting contacts used since 1965. Because of the wiping action of these contacts, they are suitable for use with programmable controllers. All contact blocks listed below will accept up to 2 #12-#24 solid or stranded wires. Types KA1, KA3, KA31, and KA33 NC contacts are direct opening. →

### Standard Contact Blocks

| Description       | Symbol                            | Type |
|-------------------|-----------------------------------|------|
| <br>(Clear Cover) |                                   | KA1  |
| <br>(Green Cover) |                                   | KA2  |
| <br>(Red Cover)   |                                   | KA3  |
| <br>(Clear Cover) | <br>N.O. Contact<br>Early Closing | KA4  |
| <br>(Red Cover)   | <br>N.C. Contact<br>Late Opening  | KA5  |
| <br>(Green Cover) | <br>N.O. Contact<br>Early Closing | KA6  |

### Additional Circuit Arrangements Available

|  |  |   |
|--|--|---|
| Sequencing ※<br>N.O. Contact of<br>KA4 closes before<br>N.O. Contact on<br>KA1           |  | Order One<br>Type KA4 and<br>One Type KA1 |
| Overlapping ※<br>N.O. Contact of<br>KA4 closes<br>before N.C.<br>Contact of KA5<br>Opens |  | Order One<br>Type KA4 and<br>One Type KA5 |

※ For push buttons or two position selector switches (Types K or SKS11, K or SKS12, K or SKS25, K or SKS34, K or SK11J, K or SK12J, K or SK25J and K or SK34J) only. For sequencing or overlapping contacts on other operators — consult local Square D Sales Office.

| Symbol                        | Contact Blocks With Binder Head Screws (not Fingersafe) |          | Gold Flashed Contacts With Standard Pressure Wire Terminals |
|-------------------------------|---|----------|---|
|                               | Type  | Quantity | Type  |
|                               | KA21  | 25-Up ▲  | KA31 →  |
|                               | KA22  | 25-Up ▲  | KA32  |
|                               | KA23  | 25-Up ▲  | KA33 →  |
| <br>N.O. Early Closing        | KA24  | 25-Up ▲  | KA34  |
| <br>N.C. Contact Late Opening | KA25  | 25-Up ▲  | KA35  |

▲ Minimum order quantity is 25.

### Contact Blocks Listed Below Are Not FINGERSAFE® Contact Blocks, But Provide:

- Terminals that accept ring tongue/fork tongue connectors
- Short single circuit contact blocks (0.75" deep vs. 0.97" deep on the FINGERSAFE® Contact Blocks)
- Same as old style Series G product available prior to 3/89.
- Use form Y238 (add to catalog # as suffix)



| Symbol | Type | Symbol                         | Type |
|--------|------|--------------------------------|------|
|        | KA1G | <br>N.O. Contact Early Closing | KA4G |
|        | KA2G | <br>N.C. Contact Late Opening  | KA5G |
|        | KA3G | <br>N.O. Contact Early Closing | KA6G |

### Contact Blocks Listed Below Are Not FINGERSAFE® Contact Blocks, But Have "Quick Connect" Terminals.

| Symbol | Type |
|--------|------|
|        | KA12 |
|        | KA13 |

Dimensions . . . . . Page 159  
Maximum Block Usage . . . . . Page 155

### Maximum Current Ratings For Control Circuit Contacts – Types KA1-KA6, KA21-25, KA31-35, KA1G-KA6G

| Volts | AC  |      |         |     |                                   |   | Volts | DC  |            |     |            |                                   |
|-------|---|------|---------|-----|-----------------------------------|---|-------|---|------------|-----|------------|-----------------------------------|
|       | Inductive (NEMA / UL Type A600)<br>35% Power Factor |      |         |     |                                   | Resistive 75%<br>Power Factor<br>Make, Break<br>and Continuous<br>Amperes |       | Inductive and Resistive (NEMA / UL Type P600) |            |     |            |                                   |
|       | Make  |      | Break   |     | Continuous<br>Carrying<br>Amperes |   |       | Make and Break                                |            |     |            | Continuous<br>Carrying<br>Amperes |
|       | Amperes   | VA   | Amperes | VA  |                                   |   |       | KA1   | KA2<br>KA3 | KA4 | KA5<br>KA6 |                                   |
| 120   | 60  | 7200 | 6.0     | 720 | 10                                | 10  | 125   | 1.1   | 1.1        | 1.1 | 1.1        | 10                                |
| 240   | 30  | 7200 | 3.0     | 720 | 10                                | 10  | 250   | 0.55  | 0.55       | —   | 0.55       | 10                                |
| 480   | 15  | 7200 | 1.5     | 720 | 10                                | 10  | 600   | 0.2   | 0.2        | —   | 0.2        | 10                                |
| 600   | 12  | 7200 | 1.2     | 720 | 10                                | 10  |       |   |            |     |            |                                   |

## **SECTION 8**

# **TERMINAL BLOCKS / ACCESSORIES**

## Feed-through terminal block - UT 4 - 3044102

Please be informed that the data shown in this PDF Document is generated from our Online Catalog. Please find the complete data in the user's documentation. Our General Terms of Use for Downloads are valid (<http://download.phoenixcontact.com>)



Feed-through terminal block, Connection method: Screw connection, Cross section: 0.14 mm<sup>2</sup> - 6 mm<sup>2</sup>, AWG 26 - 10, Width: 6.2 mm, Color: gray, Mounting type: NS 35/7.5, NS 35/15

### Why buy this product

- The large wiring space enables the connection of solid and stranded conductors without ferrules, even above the nominal cross section
- As well as saving space, the compact design enables user-friendly wiring in a small amount of space
- The multi-conductor connection offers maximum flexibility and wiring density
- Optimum screwdriver guidance through closed screw shafts
- The cable entry funnel enables the use of conductors with ferrules and plastic collars within the nominal cross section



### Key commercial data

|                        |   |
|------------------------|---|
| Packing unit           | 1   |
| Minimum order quantity | 50  |
| Catalog page           | Page 27 (CL1-2011)  |
| GTIN                   | <br>4 017918 960391 |
| Custom tariff number   | 85369010  |
| Country of origin      | GERMANY   |

### Technical data

#### General

|   |      |
|---|------|
| Number of levels                        | 1    |
| Number of connections                   | 2    |
| Color                                   | gray |
| Insulating material                     | PA   |
| Inflammability class according to UL 94 | V0   |

#### Dimensions

|                  |         |
|------------------|---------|
| Width            | 6.2 mm  |
| Length           | 47.7 mm |
| Height NS 35/7.5 | 47.5 mm |
| Height NS 35/15  | 55 mm   |

# Feed-through terminal block - UT 4 - 3044102

## Technical data

### Technical data

|   |   |
|---|---|
| Maximum load current  | 41 A (with 6 mm <sup>2</sup> conductor cross section) |
| Rated surge voltage   | 8 kV  |
| Pollution degree  | 3   |
| Surge voltage category  | III   |
| Insulating material group   | I   |
| Connection in acc. with standard  | IEC 60947-7-1   |
| Nominal current I <sub>N</sub>  | 32 A (with 4 mm <sup>2</sup> conductor cross section) |
| Nominal voltage U <sub>N</sub>  | 1000 V  |
| Open side panel   | ja  |
| Shock protection test specification   | DIN EN 50274 (VDE 0660-514):2002-11                   |
| Back of the hand protection   | guaranteed  |
| Finger protection   | guaranteed  |
| Surge voltage test setpoint   | 9.8 kV  |
| Result of surge voltage test  | Test passed   |
| Power frequency withstand voltage setpoint                                      | 2.2 kV  |
| Result of power-frequency withstand voltage test                                | Test passed   |
| Checking the mechanical stability of terminal points (5 x conductor connection) | Test passed   |
| Bending test rotation speed   | 10 rpm  |
| Bending test turns  | 135   |
| Bending test conductor cross section/weight                                     | 0.14 mm <sup>2</sup> / 0.2 kg                         |
| Bending test conductor cross section/weight                                     | 4 mm <sup>2</sup> / 0.9 kg                            |
| Bending test conductor cross section/weight                                     | 6 mm <sup>2</sup> / 1.4 kg                            |
| Result of bending test  | Test passed   |
| Conductor cross section tensile test  | 0.14 mm <sup>2</sup>                                  |
| Tractive force setpoint   | 10 N  |
| Conductor cross section tensile test  | 4 mm <sup>2</sup>                                     |
| Tractive force setpoint   | 60 N  |
| Conductor cross section tensile test  | 6 mm <sup>2</sup>                                     |
| Tractive force setpoint   | 80 N  |
| Tensile test result   | Test passed   |
| Tight fit on carrier  | NS 35   |
| Setpoint  | 1 N   |
| Result of tight fit test  | Test passed   |
| Requirements, voltage drop  | ≤ 3.2 mV  |
| Result of voltage drop test   | Test passed   |
| Temperature-rise test   | Test passed   |
| Conductor cross section short circuit testing                                   | 4 mm <sup>2</sup>                                     |
| Short-time current  | 0.48 kA   |
| Conductor cross section short circuit testing                                   | 6 mm <sup>2</sup>                                     |
| Short-time current  | 0.72 kA   |
| Short circuit stability result  | Test passed   |
| Proof of thermal characteristics (needle flame) effective duration              | 30 s  |



# Feed-through terminal block - UT 4 - 3044102

## Technical data

### Technical data

|   |  |
|---|--|
| Result of thermal test  | Test passed  |
| Test specification, oscillation, broadband noise                      | DIN EN 50155 (VDE 0115-200):2008-03                    |
| Test spectrum   | Service life test category 1, class B, on vehicle body |
| Test frequency  | f1 = 5 Hz to f2 = 150 Hz                               |
| ASD level   | 0.02 g <sup>2</sup> /Hz                                |
| Acceleration  | 0.8 g  |
| Test duration per axis  | 5 h  |
| Test directions   | X-, Y- and Z-axis                                      |
| Oscillation, broadband noise test result                              | Test passed  |
| Test specification, shock test  | DIN EN 50155 (VDE 0115-200):2008-03                    |
| Shock form  | Half-sine  |
| Acceleration  | 5 g  |
| Shock duration  | 30 ms  |
| Number of shocks per direction  | 3  |
| Test directions   | X-, Y- and Z-axis (pos. and neg.)                      |
| Shock test result   | Test passed  |
| Temperature index, insulating material (DIN EN 60216-1 (VDE 0304-21)) | 120 °C   |

### Connection data

|   |  |
|---|--|
| Note  | Note: Product releases, connection cross sections and notes on connecting aluminum cables can be found in the download area. |
| Conductor cross section solid min.  | 0.14 mm <sup>2</sup>   |
| Conductor cross section solid max.  | 6 mm <sup>2</sup>  |
| Conductor cross section stranded min.   | 0.14 mm <sup>2</sup>   |
| Conductor cross section stranded max.   | 6 mm <sup>2</sup>  |
| Conductor cross section AWG/kcmil min.  | 26   |
| Conductor cross section AWG/kcmil max   | 10   |
| Conductor cross section stranded, with ferrule without plastic sleeve min.              | 0.14 mm <sup>2</sup>   |
| Conductor cross section stranded, with ferrule without plastic sleeve max.              | 4 mm <sup>2</sup>  |
| Conductor cross section stranded, with ferrule with plastic sleeve min.                 | 0.14 mm <sup>2</sup>   |
| Conductor cross section stranded, with ferrule with plastic sleeve max.                 | 4 mm <sup>2</sup>  |
| 2 conductors with same cross section, solid min.  | 0.14 mm <sup>2</sup>   |
| 2 conductors with same cross section, solid max.  | 1.5 mm <sup>2</sup>  |
| 2 conductors with same cross section, stranded min.                                     | 0.14 mm <sup>2</sup>   |
| 2 conductors with same cross section, stranded max.                                     | 1.5 mm <sup>2</sup>  |
| 2 conductors with same cross section, stranded, TWIN ferrules with plastic sleeve, min. | 0.5 mm <sup>2</sup>  |
| 2 conductors with same cross section, stranded, TWIN ferrules with plastic sleeve, max. | 2.5 mm <sup>2</sup>  |
| 2 conductors with same cross section, stranded, ferrules without plastic sleeve, min.   | 0.14 mm <sup>2</sup>   |

# Feed-through terminal block - UT 4 - 3044102

## Technical data

### Connection data

|   |                     |
|---|---------------------|
| 2 conductors with same cross section, stranded, ferrules without plastic sleeve, max. | 1.5 mm <sup>2</sup> |
| Connection method   | Screw connection    |
| Stripping length  | 9 mm                |
| Internal cylindrical gage   | A4                  |
| Screw thread  | M3                  |
| Tightening torque, min  | 0.6 Nm              |
| Tightening torque max   | 0.8 Nm              |

## Classifications

### eclass

|            |          |
|------------|----------|
| eCl@ss 4.0 | 27141120 |
| eCl@ss 4.1 | 27141120 |
| eCl@ss 5.0 | 27141120 |
| eCl@ss 5.1 | 27141120 |
| eCl@ss 6.0 | 27141120 |
| eCl@ss 7.0 | 27141120 |

### etim

|          |          |
|----------|----------|
| ETIM 2.0 | EC000897 |
| ETIM 3.0 | EC000897 |
| ETIM 4.0 | EC000897 |
| ETIM 5.0 | EC000897 |

### unspsc

|               |          |
|---------------|----------|
| UNSPSC 6.01   | 30211811 |
| UNSPSC 7.0901 | 39121410 |
| UNSPSC 11     | 39121410 |
| UNSPSC 12.01  | 39121410 |
| UNSPSC 13.2   | 39121410 |

## Approvals

### Approvals

---

#### Approvals

CSA / UL Recognized / VDE report with production monitoring / cUL Recognized / LR / GL / DNV / RS / IECB Scheme / GOST / cULus Recognized

---

#### Ex Approvals

IECEX / ATEX


---

# Feed-through terminal block - UT 4 - 3044102


## Approvals

Approvals submitted


### Approval details

CSA 


|                                | B     | C     |
|--------------------------------|-------|-------|
| mm <sup>2</sup> /AWG/kcmil     | 26-10 | 26-10 |
| Nominal current I <sub>N</sub> | 30 A  | 30 A  |
| Nominal voltage U <sub>N</sub> | 600 V | 600 V |

UL Recognized 

|                                |       | B     | C |
|--------------------------------|-------|-------|---|
| mm <sup>2</sup> /AWG/kcmil     | 26-14 | 26-14 |   |
| Nominal current I <sub>N</sub> | 30 A  | 30 A  |   |
| Nominal voltage U <sub>N</sub> | 600 V | 600 V |   |

VDE report with production monitoring 

| mm <sup>2</sup> /AWG/kcmil     | 0.2-4 |
|--------------------------------|-------|
| Nominal voltage U <sub>N</sub> | 800 V |

cUL Recognized 

|                                |       | B     | C |
|--------------------------------|-------|-------|---|
| mm <sup>2</sup> /AWG/kcmil     | 26-14 | 26-14 |   |
| Nominal current I <sub>N</sub> | 30 A  | 30 A  |   |
| Nominal voltage U <sub>N</sub> | 600 V | 600 V |   |

LR

GL

DNV

RS

# Feed-through terminal block - UT 4 - 3044102

## Approvals

|                            |       |
|----------------------------|-------|
| IECEE CB Scheme            |       |
|                            |       |
| mm <sup>2</sup> /AWG/kcmil | 0.2-4 |
| Nominal voltage UN         | 800 V |



## Accessories

### Accessories

### Assembly

End cover - D-UT 2,5/10 - 3047028



End cover, Length: 47.7 mm, Width: 2.2 mm, Height: 48.4 mm, Color: gray

Partition plate - ATP-UT - 3047167



Partition plate, Length: 50 mm, Width: 2.2 mm, Height: 48 mm, Color: gray

End clamp - CLIPFIX 35-5 - 3022276



Quick mounting end clamp for NS 35/7,5 DIN rail or NS 35/15 DIN rail, can be fitted with ZB 5 and ZBF 5 zack marker strip, KLM 2, KLM3, and KML3L terminal strip marker, parking option for FBS...5, FBS...6, KSS 5, KSS 6, width: 5.15 mm, color: gray

## Feed-through terminal block - UT 4 - 3044102

### Accessories

DIN rail perforated - NS 35/ 7,5 PERF 2000MM - 0801733



DIN rail, material: steel galvanized and passivated with a thick layer, perforated, height 7.5 mm, width 35 mm, length: 2000 mm

DIN rail - NS 35/ 7,5 UNPERF 2000MM - 0801681



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

DIN rail - NS 35/ 7,5 WH PERF 2000MM - 1204119



DIN rail 35 mm (NS 35)

DIN rail - NS 35/ 7,5 WH UNPERF 2000MM - 1204122



DIN rail 35 mm (NS 35)

DIN rail - NS 35/ 7,5 AL UNPERF 2000MM - 0801704



DIN rail, material: Aluminum, unperforated, height 7.5 mm, width 35 mm, length: 2 m

DIN rail - NS 35/ 7,5 ZN PERF 2000MM - 1206421



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

## Feed-through terminal block - UT 4 - 3044102

### Accessories

---

DIN rail - NS 35/ 7,5 ZN UNPERF 2000MM - 1206434



DIN rail, material: Galvanized, unperforated, height 7.5 mm, width 35 mm, length: 2 m

---

DIN rail - NS 35/ 7,5 CU UNPERF 2000MM - 0801762



DIN rail, material: Copper, unperforated, height 7.5 mm, width 35 mm, length: 2 m

---

End cap - NS 35/ 7,5 CAP - 1206560



DIN rail end piece, for DIN rail NS 35/7.5

---

DIN rail perforated - NS 35/15 PERF 2000MM - 1201730



DIN rail, material: steel galvanized and passivated with a thick layer, perforated, height 15 mm, width 35 mm, length: 2000 mm

---

DIN rail - NS 35/15 UNPERF 2000MM - 1201714



DIN rail, material: Steel, unperforated, height 15 mm, width 35 mm, length: 2 m

---

## Feed-through terminal block - UT 4 - 3044102

### Accessories

DIN rail - NS 35/15 WH PERF 2000MM - 0806602



DIN rail 35 mm (NS 35)

---

DIN rail - NS 35/15 WH UNPERF 2000MM - 1204135



DIN rail 35 mm (NS 35)

---

DIN rail, unperforated - NS 35/15 AL UNPERF 2000MM - 1201756



DIN rail, deep drawn, high profile, unperforated, 1.5 mm thick, material: aluminum, height 15 mm, width 35 mm, length 2000 mm

---

DIN rail - NS 35/15 ZN PERF 2000MM - 1206599



DIN rail, material: Galvanized, perforated, height 15 mm, width 35 mm, length: 2 m

---

DIN rail - NS 35/15 ZN UNPERF 2000MM - 1206586



DIN rail, material: Galvanized, unperforated, height 15 mm, width 35 mm, length: 2 m

---

DIN rail - NS 35/15 CU UNPERF 2000MM - 1201895



DIN rail, material: Copper, unperforated, 1.5 mm thick, height 15 mm, width 35 mm, length: 2 m



## Feed-through terminal block - UT 4 - 3044102

### Accessories

---

End cap - NS 35/15 CAP - 1206573



DIN rail end piece, for DIN rail NS 35/15

---

DIN rail - NS 35/15-2,3 UNPERF 2000MM - 1201798



DIN rail, material: Steel, unperforated, 2.3 mm thick, height 15 mm, width 35 mm, length: 2 m

---

Spacer plate - DP PS-6 - 3036738



Spacer plate, Color: red

---

### Bridges

Plug-in bridge - FBS 2-6 - 3030336



Plug-in bridge, Number of positions: 2, Color: red

---

Plug-in bridge - FBS 3-6 - 3030242



Plug-in bridge, Number of positions: 3, Color: red

---

## Feed-through terminal block - UT 4 - 3044102

### Accessories

Plug-in bridge - FBS 4-6 - 3030255



Plug-in bridge, Number of positions: 4, Color: red

---

Plug-in bridge - FBS 5-6 - 3030349



Plug-in bridge, Number of positions: 5, Color: red

---

Plug-in bridge - FBS 10-6 - 3030271



Plug-in bridge, Number of positions: 10, Color: red

---

Plug-in bridge - FBS 20-6 - 3030365



Plug-in bridge, Number of positions: 20, Color: red

---

Plug-in bridge - FBS 50-6 - 3032224



Plug-in bridge, Number of positions: 50, Color: red

---

### Marking

## Feed-through terminal block - UT 4 - 3044102

### Accessories

Marker pen - X-PEN 0,35 - 0811228



Marker pen without ink cartridge, for manual labeling of markers, labeling extremely wipe-proof, line thickness 0.35 mm

---

Warning label - WS UT 4 - 3047332



Warning sign for UT terminal blocks

---

Zack marker strip - ZB 6:UNBEDRUCKT - 1051003



Zack marker strip, Strip, white, Unlabeled, Can be labeled with: Plotter, Mounting type: Snap into tall marker groove, For terminal block width: 6.2 mm, Lettering field: 6.15 x 10.5 mm

---

Zack marker strip - ZB 6 CUS - 0824992



Zack marker strip, Can be ordered: Strip, white, Labeled according to customer specifications, Mounting type: Snap into tall marker groove, For terminal block width: 6.2 mm, Lettering field: 6.15 x 10.5 mm

---

Marker for terminal blocks - UC-TM 6 - 0818085



Marker for terminal blocks, Sheet, white, Unlabeled, Can be labeled with: Bluemark, Plotter, Mounting type: Snap into tall marker groove, For terminal block width: 6.2 mm, Lettering field: 5.6 x 10.5 mm

---

Marker for terminal blocks - UC-TM 6 CUS - 0824589



Marker for terminal blocks, Can be ordered: By sheet, white, Labeled according to customer specifications, Mounting type: Snap into tall marker groove, For terminal block width: 6.2 mm, Lettering field: 5.6 x 10.5 mm

## Feed-through terminal block - UT 4 - 3044102

### Accessories

---

#### Marker for terminal blocks - UCT-TM 6 - 0828736



Marker for terminal blocks, Sheet, white, Unlabeled, Can be labeled with: Thermomark C, Bluemark, Mounting type: Snap into tall marker groove, For terminal block width: 6.2 mm, Lettering field: 5.6 x 10.5 mm

---

#### Marker for terminal blocks - UCT-TM 6 CUS - 0829602



Marker for terminal blocks, Can be ordered: By sheet, white, Labeled according to customer specifications, Mounting type: Snap into tall marker groove, For terminal block width: 6.2 mm, Lettering field: 5.6 x 10.5 mm

---

### Plug/Adapter

#### Test plugs - MPS-MT - 0201744



Test plugs

---

#### Insulating sleeve - MPS-IH WH - 0201663



Insulating sleeve, Color: white

---

#### Insulating sleeve - MPS-IH RD - 0201676



Insulating sleeve, Color: red

---

## Feed-through terminal block - UT 4 - 3044102

### Accessories

Insulating sleeve - MPS-IH BU - 0201689



Insulating sleeve, Color: blue

---

Insulating sleeve - MPS-IH YE - 0201692



Insulating sleeve, Color: yellow

---

Insulating sleeve - MPS-IH GN - 0201702



Insulating sleeve, Color: green

---

Insulating sleeve - MPS-IH GY - 0201728



Insulating sleeve, Color: gray

---

Insulating sleeve - MPS-IH BK - 0201731



Insulating sleeve, Color: black

---

Test adapter - PAI-4-N GY - 3032871



Test adapter, Color: gray

# Feed-through terminal block - UT 4 - 3044102

## Accessories

---

Test adapter - PS-6 - 3030996



Test adapter, Color: red

## Software

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Software - CLIP-PROJECT ADVANCED - 5146040



Multilingual software for easy planning of Phoenix Contact on DIN rails together with the integrated TRABTECH-select software module for planning comprehensive surge protection concepts.

Software - CLIP-PROJECT PROFESSIONAL - 5146053



Multi-lingual software for terminal strip project planning. A marking module allows professional labeling of markers and labels for marking terminal blocks, conductors, cables and devices. The additionally integrated software module TRABTECH-select for planning comprehensive surge protection concepts.

## Tools

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Screwdriver - SZS 0,6X3,5 - 1205053



Actuation tool, for ST terminal blocks, insulated, also suitable for use as a bladed screwdriver, size: 0.6 x 3.5 x 100 mm, 2-component grip, with non-slip grip

Screwdriver - SF-SL 0,6X3,5-100 S-VDE - 1212587



Actuation tool, for ST terminal blocks, VDE insulated, with slimmer insulation integrated in the blade, also suitable for use as a bladed screwdriver, size: 0.6 x 3.5 x 100 mm, 2-component grip, with non-slip grip

## Drawings

## Feed-through terminal block - UT 4 - 3044102

Circuit diagram



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