GENERAL INFORMATION

MDI Relays are all designed and built to meet the most exacting demands of the industry. They have won their high place in the electrical field by doing the tough and tricky jobs that ordinary equipment could at best do in an uncertain manner. They have proven their ability to stand up to the most adverse conditions of temperature, dust and moisture, in all types of applications. All the care required for the manufacture of high-grade instruments is used in the manufacture of the switches. All switch parts are specially cleaned, and contamination is avoided by use of tweezers, gloves, etc.; when making assemblies. Contacts are hermetically sealed with high quality glass to metal seals. The stainless steel tube is totally encapsulated in high grade epoxy to prevent moisture damage and voltage breakdown through the protective coating. The coils are wound on compact nylon bobbins and molded on to the metal tube to provide minimum power loss. This allows for low coil power required to activate the contactor. This also enables the units to handle high loads with minimum derating due to higher ambient temperatures. Internal gasses prevent excessive arcing between the mercury and the electrodes which enables the unit to function for millions of cycles with very low contact resistance, and minimum deterioration of the internal parts. Available in all standard coil voltages, in single, two, three and four pole arrangements. Other coil voltages available upon request. We can cross-reference any competitors products. Over 125 years experience in the relay business.

FEATURES

1) ADVANTAGE OVER ELECTROMECHANICAL AND SOLID STATE RELAYS

A) Superior Performance and Reliability
   (a) Long Life
   (b) Durable
B) Compact Size
C) Low, Predicatable Contact Resistance
D) Reduced RFI for Improved Interface Capability
E) Handles a Variety of Loads
F) Rapid On-Off Cycling Capability
   (a) Mercury quickly dissipates contact heat
G) Low Coil Power Requirements
H) Minimal Derating Due to Higher Ambient Temperatures
I) Quiet Action
2) DESIGN & CONSTRUCTION

A) Contacts are within a hermetically sealed steel body
B) Contacts are within a hermetically sealed steel body
C) Arcing is in a gaseous atmosphere

SELECTIVE FACTORS

In order to get the right relay for your job -- the relay that will give you the best performance -- it is essential that certain information, concerning the conditions under which the relay must perform, be carefully considered. We therefore recommend that answers to the following questions be forwarded to us with your inquiry or order.

1) APPLICATION
   a. What kind of job is relay to do?
   b. Is application special in any way?
   c. Will mounting be stationary?
2) TYPE OF LOAD
   a. What is the voltage in the load circuit?
   b. What is the amperage in the load circuit?
   c. Is it A.C. or D.C.?
   d. If A.C., what is the frequency?
3) CONTACTS
   a. Do you require a relay which has a normally open or normally closed contact?
4) DUTY
   a. How often is relay to be operated?
   b. How long is relay to be energized in each operation?
5) TIME DELAY CHARACTERISTICS
   a. What operating time do you want to achieve, maximum and minimum seconds?
   b. Is timing to be on closing or opening of the contacts?
6) COIL RATING
   a. What is your maximum and minimum coil operating voltage or current?
   b. Is coil to be operated from A.C. or D.C. circuit? If A.C., what frequency?
7) MOUNTING SPACE
   a. Are there any limitations on space for applying relay?

GLOSSARY OF TERMS & EXPRESSIONS

AMBIENT: The temperature of air or liquid surrounding any electrical part or device.
CONSTANT DUTY: If the contactor will remain "on" in normal use for indefinite periods of time, in excess of 100 hours.
CONTACTOR: 1) A device for the purpose of repeatedly establishing or interrupting an electric power circuit. 2) A heavy duty relay used to control electrical circuits. Relays rated at 15 to 30 AMPS and up are generally referred to as contactors.
CONTACTS: 1) One of the current-carrying parts of a relay, switch or connector that is engaged or disengaged to open or close the associated electrical circuits. 2) To join two conductors or conducting objects in order to provide a complete path for current flow. 3) A contact point to provide the complete path.
CONTACTS: Mercury to Metal: The contacts of a standard mercury displacement relay or contactor. The upper contact is fused and stationary. The lower contact is a post of mercury that gets displaced by the plunger assembly, thereby coming in contact with the metal electrode during operation. (See page 4.)
CURRENT: Mercury to Mercury: The contacts of a standard mercury timer relay. This contact arrangement utilizes a cup, which has the electrode in it, and is filled with mercury. When the mercury at the bottom of the cup is displaced, it floods over the sides of the cup, completing the circuit. This provides a clean make and break with no chatter and little erosion. (See page 11.)
CONTINUITY: A continuous path for the flow of current in an electric circuit.
DERATE: To reduce the voltage, current, or power rating of a device to improve its reliability or to permit operation at high ambient temperatures.
DELECTRIC: The insulating material between the metallic elements of an electronic component.
DROP-OFF: The current, voltage, or power value that will cause an energized relays contacts to return to their normal de-energized condition.
GAUSS: The centimeter-gram-second electromagnetic unit of magnetic induction. One gauss represents one maxwell per square centimeter.
HERTZ: Cycles per second.
INRUSH CURRENT: In an uncertain manner. The relay contacts within the armature or plunger, in its maximum open position.
LOAD, CONTACTS: The electrical power encountered by a contact set in any particular application.
MAXWELL: The cgs electromagnetic unit of magnetic flux, equal to one gauss per square centimeter, or one magnetic line of force.
OPERATE TIME: In a mercury displacement relay, the amount of time that passes when power is applied to the coil, to when the contacts close in a normally open set of contacts, or when the contacts open in a normally closed set of contacts. Quick Open is when the operate time is less than the stated release time. Slow open is when the operate time is no longer than the stated release time.
PLUNGER: A mercury displacement relay. The device used to displace mercury. The plunger is lighter than mercury so it floats on the mercury. The plunger also contains a magnetic shell or sleeve, so it can be pulled down into the mercury with a magnetic field. The plunger does the same job in a mercury displacement relay as an armature in a mechanical relay.
POLE: 1) Output terminals on a switch. 2) A single set of contacts; (i.e., three sets of contacts equal three poles)
POWER: 1) The rate of the actual power of an alternating or pulsating current to the apparent power.
POWER FACTOR: Ratio of the actual power of an alternating or pulsating current to the apparent power.
POWER REQUIREMENTS: The electrical power encountered by a contact set in any particular application.
RELAY: An electromechanical or electronic device in which continuity is established or interrupted in one circuit by a control circuit. Typically used to switch large currents by supplying relatively small currents to the control circuit. Also see Contactor.
RELEASE TIME: In a mercury displacement relay; The amount of time that passes when power is removed from the coil, until the contacts have returned to their normal de-energized condition. Usually the contacts of a normally open unit re-close. Quick Release is when the release time is less than the stated operate time. Slow release is when the release time is longer than the stated operate time.
STEADY-STATE: A condition in which circuit values remain essentially constant, occurring after all initial transients or fluctuating conditions have settled down.
TRANSIENT: A changing action occurring in a circuit during the interval between closing of a switch and settling to steady state conditions, or any other temporary actions occurring after some change in a circuit or if it's constants.
VOLT-AMPERE: A unit of apparent power in an AC circuit containing reactance. It is equal to the potential in volts multiplied by the current, in Amperes, without taking phase into consideration.
VOLTAGE SPIKES: An abrupt transient which comprises part of a pulse but exceeds it's average amplitude considerably.
WATT: A unit of electrical power. One Watt is expended when one Ampere of direct current flows through a resistance of one ohm. In an AC circuit, the true power in watts is effective Volt-Amperes multiplied by the circuit power factor. There are 746 watts in one horsepower.

ABBREVIATIONS

AC Alternating Current
DC Direct Current
MDR Mercury Displacement Relay
ATS Damper Arm Thyristor Switch
SPST Single Pole Single Throw
DSPT Double Pole Single Throw
TPST Triple Pole Single Throw
SSR Solid State Relay
Hg Mercury
Hz Hertz
NC Normally Closed
NO Normally Open
Q Quick
S Slow
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DESCRIPTION
MERCURY TO METAL CONTACTOR: The load terminals are isolated from each other by the glass in the hermetic seal. "The plunger assembly," which includes the ceramic insulator, the magnetic sleeve and related parts, floats on the mercury pool. When the coil is powered causing a magnetic field, the plunger assembly is pulled down into the mercury pool which is in turn displaced and moved up to make contact with the electrode, closing the circuit between the top and bottom load terminal which is connected to the stainless steel can.

TRAFFIC CONTROL (CONSTANT DUTY)
SP-1132- VOLTAGE- (A or D)
35 AMPS @ 600 VAC
SP-1130- VOLTAGE- (A or D)
60 AMPS @ 480 VAC
* A return spring replaces the buffer spring for this application

We can cross-reference any competitors products.
Over 125 years experience in the relay business.

EXAMPLE #1
NUMBER OF POLES: 2, 3, 4 or Blank if single pole (4 pole on 35 & 60-AMP only)
CONTACTS
NO - Normally Open
NC - Normally Closed
COIL VOLTAGE (Standard Voltages: 12, 24, 36, 48, 120, 220 (208-240), 277 & 480)
A - Alternating Current
D - Direct Current
SEE NOTE #1 (Below)
BRACKET See Page 12 for Optional Mounting Plates
A, B, N, NB, P or U on 35 & 60-AMP units
(Blank if Standard bracket is used)
H - Loads other then AC Resistive & Tungsten on Normally Open Units
(Blank if Normally Closed or AC Resistive & Tungsten loads)
T - Top Termination See Pages 8 for T-Top & Page 11 for Optional Terminations
TS - Top Screw Termination on 35-AMP Units
L-1 - Leaded Terminals on 35-AMP Normally Open Units
(Blank if Standard Termination)
A.C. RESISTIVE LOAD RATING: (30, 35, 60, or 100-AMP).

NOTE #1 Other designations are -1 thru -99. These are suffix numbers, and are reserved for units with dead special detail, construction and/or features. -11 MOV on coil (see page 29), -13 MOV & Metal Strap, -17 DIN Rail Mount, -20 DIN Rail & Metal Strap (see page 12), -18 Metal Strap (see page 7).

EXAMPLE #2
100NO-120AH-6A The -6A stands for HIGH VOLTAGE contactor.
Used in ultraviolet curing ovens and other high voltage applications.
See page 9 for ratings.
GENERAL INFORMATION

The 30-AMP model is designed to save space and simplify mounting methods. The standard mounting bracket on the three pole model allows the unit to be mounted in standard 3” snap track channel. If you do not use snap track mounting, the standard three pole bracket has key hole slots for easy mounting in any panel arrangement. The universal three pole mounting bracket has various mounting holes and key hole slots to meet a variety of mounting centers.

The 30-AMP series is a more compact line with a well proven switch which is the heart of mercury relays. It is the same switch design that is in our 35 and 60-AMP encapsulated MDR’s, which have withstood the test of time and millions of cycles in many different applications.

TYPICAL SPECIFICATIONS

- **ON NORMALLY OPEN UNITS:**
  - OPERATE TIME: 50 milliseconds
  - RELEASE TIME: 80 milliseconds
- **CONTACT RESISTANCE:**
  - 30-AMP: .003 ohm*
  - 230-AMP: .007 ohm*
- **DIELECTRIC WITHSTAND:**
  - 2500 VAC RMS
- **LONGEVITY:**
  - MILLIONS OF CYCLES
- **TEMPERATURE RANGE:**
  - -35°C TO 85°C
- **COIL TERMINALS:**
  - #6 BINDING HEAD SCREWS
- **LOAD TERMINALS:**
  - #8 BINDING HEAD SCREWS
- **UL LISTING:**
  - FILE #E62767
- **C.S.A.:**
  - FILE #LR41198
- **To Order See Page 4**

*AFTER CYCLING UNDER LOAD.

Made in the USA

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<th>Current</th>
<th>V.A.</th>
<th>Watts</th>
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<td>188 mA</td>
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<td>330NO-24D</td>
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<td>329 mA</td>
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<td>28 Ω</td>
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<tr>
<td>230NO-24A</td>
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<td>610 mA</td>
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<td>330NO-24A</td>
<td>7.6 Ω</td>
<td>815 mA</td>
<td>19.6</td>
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<td>30NO-120A</td>
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<td>65 mA</td>
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<td>317 Ω</td>
<td>118 mA</td>
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<td>163 mA</td>
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<td>30NO-220A</td>
<td>3,150 Ω</td>
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<td>230NO-220A</td>
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<td>728 Ω</td>
<td>86 mA</td>
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</table>
The “L” version of the 35 and 60-AMP normally open contactors are designed and manufactured to the same high quality specifications as the standard 35 and 60-AMP models. The contactor switch is the same well proven design that has been manufactured since 1975. The mounting centers and physical size are identical to the standard single and two pole 35 and 60-AMP molded versions.

The new design provides a cleaner appearance, and is a more economical design. It is available in the single and two pole models only, with top and bottom load terminals or with lead wires. Noted are the typical specifications and UL and CSA file numbers.

### TYPICAL SPECIFICATIONS

- **ON NORMALLY OPEN UNITS:**
  - OPERATE TIME: 50 milliseconds
  - RELEASE TIME: 80 milliseconds
- **CONTACT RESISTANCE:**
  - 35-AMP = .003 ohm*
  - 60-AMP = .002 ohm*
- **DIELECTRIC WITHSTAND:**
  - 2500 V RMS
- **LONGEVITY:**
  - MILLIONS OF CYCLES
- **TEMPERATURE RANGE:**
  - -35°C TO 85°C
- **COIL TERMINALS:**
  - #6 BINDING HEAD SCREWS
- **LOAD TERMINALS:**
  - PRESSURE CONNECTORS FOR A.W.G. #4-#14 ON 35-AMP AND A.W.G. #2-#8 ON 60-AMP UNITS
- **UL LISTING:**
  - FILE #E62767 FOR L35 AND L60-AMP N.O. UNITS 1-2 POLES
- **C.S.A.:**
  - FILE #LR41198 FOR L35 AND L60-AMP N.O. UNITS 1-2 POLES

* AFTER CYCLING UNDER LOAD

### COIL DATA L35 AND L60 SERIES.

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<td>L35NO-24A</td>
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</table>
TYPICAL SPECIFICATIONS

- **NORMALLY OPEN UNITS:**
  - Operate Time: 50 milliseconds
  - Release Time: 80 milliseconds

- **NORMALLY CLOSED UNITS:**
  - Operate Time: 30 milliseconds
  - Release Time: 35 milliseconds

- **Contact Resistance:**
  - 35-AMP = .003 ohm*
  - 60-AMP = .002 ohm*

- **Temperature Range:**
  - -35°C to 85°C

- **Coil Terminals:**
  - #6 wire binding screws

- **Load Terminals:**
  - Pressure connectors
  - 4 to 14 AWG on 35-AMP
  - 2 to 8 AWG on 60-AMP

- **Ratings:**
  - See Page 13 for coil data
  - See Page 14 for ratings

- **UL Listing:**
  - File #E-62767 for
  - File #LR 41198 for

- **To Order See Page 4

* After cycling under load

Made in the USA

**Traffic Control (Constant Duty)**

SP-1132- VOLTAGE- (A or D)
- 35 AMPS @ 600 VAC

SP-1130- VOLTAGE- (A or D)
- 60 AMPS @ 480 VAC

A return spring replaces the buffer spring for this application

**Hazardous Locations**

Suffix “X”

Available in 1, 2 & 3 Pole Units

Auxiliary devices for use in hazardous locations

For CLASS 1, GROUPS A, B, C, & D – Division 2 only.
35-AMP T-TOP CONTACTORS

35-AMP NORMALLY OPEN

- SINGLE POLE—NORMALLY OPEN
- TWO POLE—NORMALLY OPEN
- THREE POLE—NORMALLY OPEN

60-AMP NORMALLY OPEN

- Made in the USA

DERATING CHARTS

35-AMP NORMALLY OPEN
LOAD DERATING DUE TO AMBIENT TEMPERATURE

60-AMP NORMALLY OPEN
LOAD DERATING DUE TO AMBIENT TEMPERATURE

- 1-POLE
- 2-POLE
- 3-POLE

CURRENT AMPERES

0 10 20 30 40
10 24 38 52 66 79 93 105°C

10 24 38 52 66 79 93 105°F

1.205" x .402" DIA.
FRAME KEYHOLE (2 REQ.)

2.205" BOTH SIDES

3.60-AMP NORMALLY OPEN
LOAD DERATING DUE TO AMBIENT TEMPERATURE

- ACCEPTS 6 TO 14 AWG
- LINE LOAD

4.35-AMP NORMALLY OPEN
LOAD DERATING DUE TO AMBIENT TEMPERATURE

- ACCEPTS 6 TO 14 AWG
- LINE LOAD

5.2-POLE

6.3-POLE

7.4-POLE
35/60-AMP NORMALLY CLOSED CONTACTORS

SIMILAR CONSTRUCTION AS THE NORMALLY OPEN UNITS BUT WITH THE COIL POSITIONED CLOSER TO THE TOP OF THE CONTACTOR.

Made in the USA

For UV Curing, and Various High Voltage applications. Available in Single Pole, Normally Open, and Normally Closed Units. The coils utilize 6-32 Wire Binding Screws, and the Contacts use Compression type terminals for #2 thru #8 A.W.G. wire.

* Also available in 2 & 3 pole

**RATINGS:** 10 AMPS @ 3500 VAC
15 AMPS @ 2500 VAC
AC INDUCTIVE Power Factor .7 or Greater

**Coil Data**

<table>
<thead>
<tr>
<th>Catalog Number</th>
<th>Coil Voltage</th>
<th>Resistance</th>
<th>Current Draw</th>
<th>Wattage</th>
<th>V.A.</th>
</tr>
</thead>
<tbody>
<tr>
<td>100NC-24D-6A</td>
<td>24 VDC</td>
<td>65 Ω</td>
<td>369 mA</td>
<td>8.9</td>
<td>8.9</td>
</tr>
<tr>
<td>100NC-120A-6A</td>
<td>120 VAC</td>
<td>380 Ω</td>
<td>125 mA</td>
<td>5.9</td>
<td>15.0</td>
</tr>
<tr>
<td>100NC-220A-6A</td>
<td>220 VAC</td>
<td>1,400 Ω</td>
<td>76 mA</td>
<td>8.1</td>
<td>16.7</td>
</tr>
<tr>
<td>100NO-12DH-6A</td>
<td>12 VDC</td>
<td>16 Ω</td>
<td>750 mA</td>
<td>9.0</td>
<td>9.0</td>
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<tr>
<td>100NO-24AH-6A</td>
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<td>16 Ω</td>
<td>760 mA</td>
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<td>18.2</td>
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<td>8.9</td>
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<tr>
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<td>120 VAC</td>
<td>380 Ω</td>
<td>158 mA</td>
<td>9.5</td>
<td>19.0</td>
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<tr>
<td>100NO-220AH-6A</td>
<td>220 VAC</td>
<td>1,320 Ω</td>
<td>92 mA</td>
<td>11.2</td>
<td>20.2</td>
</tr>
</tbody>
</table>
TYPICAL SPECIFICATIONS

- ON NORMALLY OPEN UNITS:
  OPERATE TIME: 50 milliseconds
  RELEASE TIME: 80 milliseconds

- ON NORMALLY CLOSED UNITS:
  OPERATE TIME: 45 milliseconds
  RELEASE TIME: 60 milliseconds

- CONTACT RESISTANCE: 
  .001 ohm*

- DIELECTRIC WITHSTAND:
  2500 V AC RMS

- LONGEVITY:
  MILLIONS OF CYCLES

- TEMPERATURE RANGE:
  -35°C TO 85°C

- COIL TERMINALS:
  #6 BINDING HEAD SCREWS

- LOAD TERMINALS:
  PRESSURE CONNECTORS,
  STANDARD ACCEPTS A.W.G.
  #2 to #8.
  FOR A.W.G. #1 to #8,
  ADD SUFFIX -5 TO CATALOG
  NUMBER (i.e. 100NO-120A-5)

- RATINGS:
  Derate over 240 VAC Res.
  See Page 13 for Coil Data.
  See Page 14 for Ratings.
  TO ORDER SEE PAGE 4.

S100NO - SERIES
AVAILABLE IN 1, 2 & 3 POLES
RATINGS: 100 AMPS @ 480 VAC
SEE PAGE 14 FOR RATINGS

Made in the USA
TIME DELAY RELAYS

MERCURY TO MERCURY CONTACTORS

HOW TO ORDER

A - Alternating Current
D - Direct Current

DOO - 120 A P - 5

TIME DELAY IN SECONDS

MOUNTING
A - “A” BRACKET
U - UNIVERSAL BRACKET
P - PANEL MOUNT
(Blank if Standard Bracket is used)

COIL VOLTAGE
(Standard Voltages: 12, 24, 36, 48,
120, 220, 240, 277 & 480)

CONTACT ACTION
DOO: Delay on Operate, Normally Open
DORO: Delay on Operate and Release, Normally Open
DRO: Delay on Release, Normally Open
DORC: Delay on Operate and Release, Normally Closed
DRC: Delay on Release, Normally Closed

TIME DELAY RELAYS Are available with delays of up to 15 seconds on normally open units, and 4 seconds on normally closed units. The timing limitation depends on the contact action required. A time delay function is accomplished in this unit by sizing a hole in the time disc that will control the rate of the mercury flow. This controls the time it will take from the instant the coil is powered until the mercury pools make contact with each other, closing the circuit between the load terminals. Typical contact ratings 10 AMP @ 120 VAC. Pilot duty rating 720 VA. Common coil voltages are available. Standard load terminals are compression type. Coil terminals use #6 binding head screws.

Made in the USA

OPTIONAL TERMINATIONS

L-1 (Leaded) Designated by the letters "L-1" in the catalog number suffix. For normally open 35-AMP units. Height 3-3/16" other dimensions same as standard (page 8).

TS (Top Screws) Designated by the letters “TS” in the catalog number suffix. For timers and 35-AMP units. (Dimensions same as T-Top see page 8).

Suffix “TN” Two or Three Pole 35-AMP Only. Load terminals on top for shorter overall height.
OPTIONAL MOUNTING

SP-1214-
2” wide, narrow mount two pole 30-AMP catalog number SP-1214 followed by the coil voltage, then “A” for AC & “D” for DC. Example: SP-1214-120A

“P” PANEL MOUNT
For 35, 60-AMP or standard timer; with standard mounting bracket. The standard mounting bracket attaches to the panel with two 6-32 screws. Material: 3/8” thick phenolic.

“U” UNIVERSAL BRACKET
For single pole, 35 and 60-AMP units, and for timers. This is the standard bracket for hybrid timers. Material: 16-ga. plated steel.

“B” BRACKET
For single pole 35 and 60-AMP units, and for timers. Mounts into standard 3” snap-track. Material is 16-ga. plated steel.

SUFFIX “N”
Narrow 2 or 3 pole 35 or 60-AMP units only

SUFFIX “NB”
Two pole 35 or 60-AMP narrow mounted, front facing, off set, for snap track mounted

SUFFIX “NB”
Two pole 35 or 60-AMP narrow mounted, front facing, off set, for snap track mounted

3” SNAP TRACK™ MOUNTING
Specify suffix “B” for SNAP TRACK mount on single, two and three pole 35 and 60-AMP series and single and two pole 30-AMP series. SNAP TRACK mount is standard on three pole 30-AMP without suffix.

SNAP TRACK Mounting Channel
Reed Devices Inc; a subsidiary of Augat, Inc.

SUFFIX “N”
Narrow 2 or 3 pole 35 or 60-AMP units only

SUFFIX -19
Two pole 35 or 60-AMP narrow mounted, front facing, off set, for panel mounting.

SUFFIX -17 & -20
Din rail mount 35 mm symmetrical for 35 and 60-AMP units.
## COIL DATA PER POLE RATINGS ON STANDARD COILS

<table>
<thead>
<tr>
<th>CATALOG NUMBER</th>
<th>VOLTAGE</th>
<th>RESISTANCE (D.C. OHMS)</th>
<th>CURRENT (MILLIAMPERES)</th>
<th>VOLT AMPERES (VA)</th>
<th>POWER (WATTS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>35NO-24A</td>
<td>24 VAC</td>
<td>50 Ω</td>
<td>242 mA</td>
<td>5.8 VA</td>
<td>2.9 W</td>
</tr>
<tr>
<td>35NO-120A</td>
<td>120 VAC</td>
<td>1,250 Ω</td>
<td>53 mA</td>
<td>6.4 VA</td>
<td>3.5 W</td>
</tr>
<tr>
<td>35NO-208A</td>
<td>208 VAC</td>
<td>3,400 Ω</td>
<td>30 mA</td>
<td>6.2 VA</td>
<td>3.1 W</td>
</tr>
<tr>
<td>35NO-220A</td>
<td>220 VAC</td>
<td>4,800 Ω</td>
<td>28 mA</td>
<td>6.2 VA</td>
<td>3.8 W</td>
</tr>
<tr>
<td>35NO-277A</td>
<td>277 VAC</td>
<td>7,900 Ω</td>
<td>20 mA</td>
<td>5.5 VA</td>
<td>3.2 W</td>
</tr>
<tr>
<td>35NO-480A</td>
<td>480 VAC</td>
<td>20,000 Ω</td>
<td>12 mA</td>
<td>5.9 VA</td>
<td>3.0 W</td>
</tr>
<tr>
<td>35NO-6D</td>
<td>6 VDC</td>
<td>13 Ω</td>
<td>462 mA</td>
<td>2.8 VA</td>
<td>2.8 W</td>
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<tr>
<td>35NO-12D</td>
<td>12 VDC</td>
<td>36 Ω</td>
<td>333 mA</td>
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<td>4.0 W</td>
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<td>35NO-24D</td>
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<td>176 Ω</td>
<td>136 mA</td>
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<td>3.3 W</td>
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<tr>
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<td>48 VDC</td>
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<td>75 mA</td>
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<tr>
<td>35NO-125D</td>
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<td>960 Ω</td>
<td>65 mA</td>
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<td>3.6 W</td>
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<tr>
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<td>31 mA</td>
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<td>3.3 W</td>
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<tr>
<td>35NC-12D</td>
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<td>36 Ω</td>
<td>333 mA</td>
<td>4.0 VA</td>
<td>4.0 W</td>
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<tr>
<td>35NC-24D</td>
<td>24 VDC</td>
<td>176 Ω</td>
<td>136 mA</td>
<td>3.3 VA</td>
<td>3.3 W</td>
</tr>
<tr>
<td>35NC-48D</td>
<td>48 VDC</td>
<td>560 Ω</td>
<td>86 mA</td>
<td>4.1 VA</td>
<td>4.1 W</td>
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<tr>
<td>35NC-125D</td>
<td>125 VDC</td>
<td>3,400 Ω</td>
<td>37 mA</td>
<td>4.6 VA</td>
<td>4.6 W</td>
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<td>1,250 Ω</td>
<td>48 mA</td>
<td>5.8 VA</td>
<td>2.9 W</td>
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<tr>
<td>60NO-208A</td>
<td>208 VAC</td>
<td>3,400 Ω</td>
<td>30 mA</td>
<td>6.2 VA</td>
<td>3.1 W</td>
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<tr>
<td>60NO-220A</td>
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<td>4,800 Ω</td>
<td>27 mA</td>
<td>5.9 VA</td>
<td>3.5 W</td>
</tr>
<tr>
<td>60NO-277A</td>
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<td>7,900 Ω</td>
<td>19 mA</td>
<td>5.3 VA</td>
<td>2.9 W</td>
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<tr>
<td>60NO-480A</td>
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<td>2.9 W</td>
</tr>
<tr>
<td>60NO-12D</td>
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<td>333 mA</td>
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<td>4.0 W</td>
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<td>4.1 W</td>
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<tr>
<td>60NO-48D</td>
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<td>636 Ω</td>
<td>75 mA</td>
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<td>3.6 W</td>
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<tr>
<td>60NO-125D</td>
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<td>4.6 W</td>
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<td>5.3 W</td>
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<td>69 mA</td>
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<td>34 mA</td>
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<td>4.1 W</td>
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<td>4.1 W</td>
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<td>3,400 Ω</td>
<td>37 mA</td>
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<td>4.6 W</td>
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<td>55 mA</td>
<td>15.2 VA</td>
<td>7.3 W</td>
</tr>
<tr>
<td>100NO-480A</td>
<td>480 VAC</td>
<td>6,300 Ω</td>
<td>35 mA</td>
<td>16.8 VA</td>
<td>7.7 W</td>
</tr>
<tr>
<td>100NO-24D</td>
<td>24 VDC</td>
<td>65 Ω</td>
<td>369 mA</td>
<td>8.9 VA</td>
<td>8.9 W</td>
</tr>
<tr>
<td>100NO-48D</td>
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<td>325 Ω</td>
<td>148 mA</td>
<td>7.1 VA</td>
<td>7.1 W</td>
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<td>2,400 Ω</td>
<td>52 mA</td>
<td>6.5 VA</td>
<td>6.5 W</td>
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<td>515 mA</td>
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<td>110 mA</td>
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<td>100NC-208A</td>
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<td>55 mA</td>
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<td>4.2 W</td>
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<td>27 mA</td>
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<td>6.1 W</td>
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<td>52 mA</td>
<td>6.5 VA</td>
<td>6.5 W</td>
</tr>
</tbody>
</table>

**NOTES:**
1. Inrush current = 1.5 times the steady state current. (No inrush on DC coils).
2. Minimum operation voltage is 90% of nominal voltage.
3. All AC voltages are 50/60 Hz.
4. For other coils voltages contact the factory.
5. Ratings shown are per pole. (Coils are in parallel).
### MERCURY CONTACTORS RATINGS

<table>
<thead>
<tr>
<th>A.C.</th>
<th>Resistive</th>
<th>A.C.</th>
<th>Inductive</th>
<th>P.F. .4 OR GREATER</th>
<th>General Purpose</th>
<th>P.F. .7 OR GREATER</th>
<th>D.C.</th>
<th>Resistive</th>
<th>Heating</th>
<th>Tungsten Lamp</th>
<th>Single Phase</th>
<th>Three Phase</th>
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</thead>
<tbody>
<tr>
<td>240 V</td>
<td>30 NO</td>
<td>35 NO</td>
<td>35 NO (H)</td>
<td>35 NO (H)</td>
<td>35 NO (H)</td>
<td>60 NO (H)</td>
<td>60 NO</td>
<td>60 NO (H)</td>
<td>100 NO</td>
<td>100 NO (H)</td>
<td>100 NO (H)</td>
<td>100 NO (H)</td>
</tr>
<tr>
<td>480 V</td>
<td>30 NO</td>
<td>35 NO</td>
<td>35 NO (H)</td>
<td>35 NO (H)</td>
<td>35 NO (H)</td>
<td>60 NO (H)</td>
<td>60 NO</td>
<td>60 NO (H)</td>
<td>100 NO</td>
<td>100 NO (H)</td>
<td>100 NO (H)</td>
<td>100 NO (H)</td>
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<td>600 V</td>
<td>30 NO</td>
<td>35 NO</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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**RATINGS ARE IN AMPS UNLESS OTHERWISE SPECIFIED**

**See Page 15 for 3PSS60A75**

### SOLID STATE RELAY RATINGS

#### See Page 16 for HPR Series

<table>
<thead>
<tr>
<th>HPR48A25</th>
<th>HPR48A50</th>
<th>HPR48A75</th>
<th>HPR48A100</th>
<th>3PSS60A75</th>
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<td>HPR48D75</td>
<td>HPR48D100</td>
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</table>

#### Rated operational current

- **AC51 @ Ta=25°C**
  - 25 AMPS rms
  - 50 AMPS rms
  - 75 AMPS rms
  - 100 AMPS rms
  - 75 AMPS rms

- **AC53a @ Ta=25°C**
  - 5 AMPS rms
  - 15 AMPS rms
  - 20 AMPS rms
  - 30 AMPS rms
  - 20 AMPS rms

#### Minimum operational current

- 150 mA rms
- 250 mA rms
- 400 mA rms
- 500 mA rms
- 400 mA rms

#### Rep. overload current t=1 s

- < 55 A rms
- < 125 A rms
- < 150 A rms
- < 200 A rms
- < 150 A rms

#### I2t (10ms) Minimum

- 75 AMPS rms
- 20 AMPS rms
- 400 mA rms
- < 150 A rms
- 6600 A2s

#### See Page 18 for SSR Series

<table>
<thead>
<tr>
<th>SS20AE-1</th>
<th>SS30AE-1</th>
<th>SS40AE-1</th>
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<tr>
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<td>SS40DU-1</td>
<td>SS60DU-1</td>
<td>SS90DU-1</td>
</tr>
</tbody>
</table>

#### Rated operational current

- **AC51 @ Ta=25°C**
  - 20 AAC
  - 30 AAC
  - 47.4 AAC
  - 70.4 AAC
  - 85 AAC

- **AC51 @ Ta=40°C**
  - 20 AAC
  - 30 AAC
  - 40 AAC
  - 60 AAC
  - 85 AAC

- **AC53a @ Ta=25°C**
  - 5 AAC
  - 8 AAC
  - 13 AAC
  - 14.8 AAC
  - 18 AAC

#### Minimum operational current

- 150 mAAC
- 250 mAAC
- 400 mAAC
- 400 mAAC
- 400 mAAC

#### Rep. overload current

- 60 AAC
- 84 AAC
- 126 AAC
- 144 AAC
- 168 AAC

#### I2t (10ms) Minimum

- 525 A2s
- 1800 A2s
- 6600 A2s
- 6600 A2s
- 6600 A2s

#### See Page 25 for 2 & 3 Pole

<table>
<thead>
<tr>
<th>2PSS60A25</th>
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<th>2PSS60A75-24DF</th>
<th>2PSS60A75-120F</th>
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<td>3PSS60D65-24DF</td>
<td>3PSS60D65-120F</td>
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</tbody>
</table>

#### Rated operational current

- **AC51 @ Ta=25°C**
  - 32 AAC
  - 50 AAC
  - 85 AAC
  - 25 AAC
  - 32 AAC
  - 37 AAC
  - 42 AAC
  - 71 AAC

- **AC51 @ Ta=40°C**
  - 27 AAC
  - 40 AAC
  - 75 AAC
  - 20 AAC
  - 28 AAC
  - 30 AAC
  - 42 AAC
  - 66 AAC

- **AC53a @ Ta=25°C**
  - 11.5 AAC
  - 16.5 AAC
  - 28 AAC
  - 10 AAC
  - 11 AAC
  - 14 AAC
  - 17 AAC
  - 25 AAC

#### Minimum operational current

- 250 mAAC
- 400 mAAC
- 500 mAAC
- 250 mAAC
- 250 mAAC
- 400 mAAC
- 400 mAAC
- 500 mAAC

#### Rep. overload current

- 61 AAC
- 107 AAC
- 154 AAC
- 61 AAC
- 84 AAC
- 107 AAC
- 107 AAC
- 154 AAC

#### I2t (10ms) Minimum

- 1800 A2s
- 6600 A2s
- 15000 A2s
- 1800 A2s
- 1800 A2s
- 6600 A2s
- 6600 A2s
- 15000 A2s

**KEY:** SHADED AREA FOR UL LISTING AND/OR COMPONENT RECOGNITION.
- NOT RECOMMENDED FOR THIS TYPE OF LOAD.
SOLID STATE RELAYS

3PSS Series with Suffix S (Standard Din-rail) or R (Retro Fit)

General Specifications

- Operational voltage range: 42-660 VAC, 45 to 65 Hz
- Blocking voltage: 1600 Vp
- Over voltage category: III
- Pollution degree: 3
- Operating temperature: -30° to 80°C (-22° to 158°F)
- Storage temperature: -40° to 100°C (-40° to 212°F)
- Input to output isolation voltage: ≥ 4000 VAC rms
- Output to case isolation voltage: ≥ 4000 VAC rms
- Heat Sink Fan requires: 70 mA @ 24 VDC (Included), 55 mA @ 120 VAC (Optional)

Tested and Approved

- 3 Pole 50 AMPS @ 480 VAC @ -30°C to 50°C 3-Phase
- 2 Pole 75 AMPS @ 480 VAC @ -30°C to 50°C 3-Phase *
- 51°C to 80°C derates @ 10 AMPS per decade
- *For 2 Pole usage, use L1 & L3

Product Description

A Solid State Relay family designed to switch various loads such as heating elements, motors and transformers. The relay is capable of switching voltages up to 600 VAC rms. The built-in varistor is for heavy industrial applications. For higher reliability and load cycle capability three semiconductor power units are bonded directly to the substrate.

Input Specifications

- Control voltage range: 3PSS60A75 24-275 VAC/24-50 VDC, 3PSS60D75 4-32 VDC
- Pick-up voltage: 18 VAC/20 VDC, 3.8 VDC
- Drop-out voltage: 9 VAC/DC, 1.2 VDC
- Input current: ≤ 15 mA, ≤ 23 mA
- Response time pick-up (Power output = 50 Hz): 20 ms, 10 ms
- Response time drop-out (Power output = 50 Hz): 30 ms, 10 ms

Suffix S

Includes Retro Fit Back Plate For direct replacement with standard 2 & 3 pole Mercury Relays. Using the same mounting holes.

Suffix R

Includes Retro Fit Back Plate For direct replacement with standard 2 & 3 pole Mercury Relays. Using the same mounting holes.
SOLID STATE RELAYS (Continued)

HPR Series (Hockey Puck Relay)

Product Description
The industrial, 1-phase relay with anti parallel thyristor output is the most widely used industrial SSR due to its multiple application possibilities. The relay can be used for resistive, inductive and capacitive loads. The zero switching relay switches ON when the sinusoidal curve crosses zero and switches OFF when the current crosses zero.

The instant-on relay with DC control input can be used for phase control. The built in varistor secures transient protection for the heavy industrial applications, and the LED indicates the status of the control input. The clip on cover is securing touch protection to IP20. Protected output terminals can handle cables up to 16mm² (6 AWG).

General Specifications
- Operational voltage range: 42 to 530 VAC rms
- Blocking voltage: ≥ 1200 Vp
- Zero voltage turn-on: ≤ 10V
- Operational frequency range: 45 to 65Hz
- Power factor: > 0.5 @ 480 VAC rms
- Markings: cULus

Fusing
See Web: https://www.mdius.com/solid-state/hpr/
Call: (269) 663-8574 or (800) 634-4077

Input Specifications
- Control voltage range: 4 - 32 VDC
- Pick-up voltage @ Ta = 25°C: 3.5 VDC
- Reverse voltage: 32 VDC
- Drop out voltage: 1.2 VDC
- Input current @ max voltage: ≤ 12 mA
- Response time pick-up: ≤ 1/2 cycle
- Response time drop-out: ≤ 1/2 cycle

Thermal Specifications
- Operating temperature range: -20° to 70°C (-36° to 126°F)
- Storage temperature range: -40° to 100°C (-40° to 180°F)
- Junction temperature: ≤ 125°C (225°F)
- Rth, junction to case: ≤ 0.80K/W
- Rth, junction to ambient: ≤ 20.0K/W

Functional Diagram

Ordering Key
- HPR48 A 25
  - Solid State Relay
  - Control voltage
  - Rated operational current

Type Selection
- Control voltage
  - A: 20-280 VAC/22-48 VDC
  - D: 4-32 VDC
- Rated operational current
  - 25: 25 AACrms
  - 50: 50 AACrms
  - 75: 75 AACrms
  - 100: 100 AACrms

Dimensions

See Web: https://www.mdius.com/solid-state/hpr/
Call: (269) 663-8574 or (800) 634-4077
### Heatsink Data

(Heat current versus ambient temperature)

<table>
<thead>
<tr>
<th></th>
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### Isolation

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<tr>
<td><strong>Rated isolation voltage</strong></td>
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<tr>
<td>Input to output</td>
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<tr>
<td>Output to case</td>
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### Heatsink Selection

<table>
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<tr>
<th>Heatsink</th>
<th>Thermal Resistance [°C/W]</th>
<th>Power Dissipation</th>
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<td>HS 45CD</td>
<td>2.70</td>
<td>&gt; 60W</td>
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<tr>
<td>HS 45BD</td>
<td>2.00</td>
<td>&gt; 60W</td>
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<tr>
<td>Consult MDI</td>
<td>&gt;0.25</td>
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</table>

Junction to ambient thermal resistance, $R_{th,j-a}$ < 20.0 °C/W
Junction to case thermal resistance, $R_{th,j-c}$ < 0.35 °C/W
Case to heatsink thermal resistance, $R_{th,c-s}$ < 0.10 °C/W
Maximum allowable case temperature 100 (212) °C (°F)
Maximum allowable junction temperature 125 (257) °C (°F)
Product Description

This new range of solid state contactors presents an unique opportunity to maximize efficiency in panel space and is an evolution of solid state switches. The nominal current ratings are at 40°C. The smallest width is 17.5mm and is rated at 20 AAC. Power and control terminals allow for safe looping of cables. Voltage transient protection is standard across the output with a varistor.

Ordering Key

<table>
<thead>
<tr>
<th>Rated operational current</th>
<th>Control voltage</th>
<th>Connection Configuration</th>
<th>Current Version</th>
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</thead>
<tbody>
<tr>
<td>SS 40 D U - 1</td>
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</table>

Output Specifications

See Page 14

See Web: https://www.mdius.com/solid-state/ssr-series/
E-mail: rbrewers@mdius.com or Call: (269) 663-8574 or (800) 634-4077

Current Derating (UL508)

SS......-1P models max. operating temperature is + 70°C (158°F)
Terminal Layout and Dimensions “U” Connection

SS.20.U-1

SS.30.U-1

SS.40.U-1

1/L1: Supply connection
2/T1: Load connection
A1 (+): Positive control signal
A2 (-): Control ground

* Housing width tolerance +0.02” (0.5 mm) -0 as per DIN43880
Terminal Layout and Dimensions “U” Connection

SS.60.U-1

SS.90.U-1P

1/L1: Supply connection
2/T1: Load connection
A1 (+): Positive control signal
(Positive supply in case of SS.90DU-1P)
A2 (-): Control ground
IN1: Control signal (only for SS.90DU-1P)
IN2: Fan + supply (only for SS.90AU-1P)
IN3: Fan - supply (only for SS.90AU-1P)
11 + : Alarm output (+)
OUT, 12 - : Alarm output (-)

* Housing width tolerance +0.02" (0.5 mm), -0 as per DIN43880
Terminal Layout and Dimensions “E” Connection

SS.20.E-1

1/L1: Supply connection
2/T1: Load connection
A1 (+): Positive control signal
A2 (-): Control ground

* Housing width tolerance +0.02” (0.5 mm), -0 as per DIN43880

SS.30.E-1

1/L1: Supply connection
2/T1: Load connection
A1 (+): Positive control signal
A2 (-): Control ground

SS.40.E-1

1/L1: Supply connection
2/T1: Load connection
A1 (+): Positive control signal
A2 (-): Control ground

* Housing width tolerance +0.02” (0.5 mm), -0 as per DIN43880
Terminal Layout and Dimensions “E” Connection

1/L1: Supply connection
2/T1: Load connection
A1 (+): Positive control signal (Positive supply in case of SS.90DE-1P)
A2 (-): Control ground
IN1: Control signal (only for SS.90DE-1P)
IN2: Fan + supply (only for SS.90AE-1P)
IN3: Fan - supply (only for SS.90AE-1P)
11 + : Alarm output (+)
OUT, 12 - : Alarm output (-)

* Housing width tolerance +0.02" (0.5 mm), -0 as per DIN43880
Derating vs. Spacing Curves

### SSR-1 Series (Continued)

#### SS.20..1

![Graph showing derating vs. spacing curves for SS.20..1 series.](image)

#### SS.30..1

![Graph showing derating vs. spacing curves for SS.30..1 series.](image)

#### SS.40..1

![Graph showing derating vs. spacing curves for SS.40..1 series.](image)
Derating vs. Spacing Curves (cont.)

SS.60..1

SS.90...1P

Installation Instructions

X = Refer to Derating vs. Spacing Curves

Y1 = 5mm

Y2 = 100mm
SSR with Integrated Heatsink

- 2-Pole & 3-Pole AC switching solid state contactors
- Product width from 2.13” (54 mm) to 2.84” (72 mm)
- Rated operational voltage: 42 to 600 VAC
- Rated operational current: up to 75 AAC
- Control voltages: 5-32 VDC or 20-275 VAC (24-190 VDC)
- **Line & Load accepts:** 10-14 AWG (20 & 25 units)
- 3-14 AWG (30, 40, 65 & 75 units)
- Up to 15,000 A2s for I2t
- Latching Voltage ≤20 V
- Operational Frequency range 45-65 Hz
- Power Factor >0.5 @ rated voltage
- Blocking Voltage 1200 Vp
- Internal Varistor 625 V
- UL Listed, UL508, & cUL Listed (E 354129)
- Motor ratings up to 11 kW @ 400 VAC, 25 HP @ 600 VAC
- Controlled fan operation for versions with integrated fan
- 100 kA Short Circuit Current Rating according to UL 508
- DIN or panel mount
- RoHS compliant

### Ordering Key

<table>
<thead>
<tr>
<th>Number of poles</th>
<th>Solid state relay</th>
<th>Rated operational voltage</th>
<th>Control voltage</th>
<th>Rated operational current</th>
<th>Fan voltage (24D or 120A)</th>
<th>Integrated fan</th>
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</thead>
<tbody>
<tr>
<td>3P SS 40 - 120A</td>
<td>3-Pole switching, ZC</td>
<td>60: 42-660 VAC, 1200 Vp</td>
<td>A: 20-275 VAC, 24-190 VDC</td>
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<td></td>
</tr>
</tbody>
</table>

### Product Description

This product is intended to replace mechanical contactors especially when switching is frequent. The smallest product width in the 2 & 3 Pole range is 2.13” (54 mm) (3xDIN) and goes up to 2.84” (72 mm).

Switch ON occurs at the voltage zero cross and switch OFF occurs at the current zero cross. Apart from resistive and slightly inductive loads, the relays are certified for motor switching with associated motor ratings. Varistors are integrated for output overvoltage protection. A green LED gives indication of control voltage presence. Fan operation is controlled for the versions which have an integrated fan.

### Output Specifications

**Motor Ratings:** HP (UL508)

<table>
<thead>
<tr>
<th>Terminals</th>
<th>Line connections</th>
<th>Load connections</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/L1, 2/L2, 3/L3</td>
<td>A1(+)</td>
<td>A2(-)</td>
</tr>
<tr>
<td>2/T1, 4/T2, 6/T3</td>
<td>1: A1+</td>
<td>2: A2-</td>
</tr>
</tbody>
</table>

Connections to Uf+, Uf- are provided readily terminated by manufacturer. However, in case of needed user intervention on terminals Uf+, Uf- for the .PSS..-..M models, the mains supply has to be turned off first to avoid risk of electrical shock.

### Terminal Layout

1. Refer to Current Derating curves
2. ZC= Zero Cross Switching
3. AC control range for .PSS..-..M starts from 90 VAC
4. Operating voltage for .PSS..-..M is limited to 20-275 VAC only

---

Connections to Uf+, Uf- are provided readily terminated by manufacturer. However, in case of needed user intervention on terminals Uf+, Uf- for the .PSS..-..M models, the mains supply has to be turned off first to avoid risk of electrical shock.

---

**Features**

- **F:** Integrated fan with over temperature protection (OTP) & EMR alarm output
- **M:** Monitoring for Mains loss, Load loss, SSR short circuit, open circuit and over temperature with EMR alarm output and auxiliary output’ (suitable only for resistive loads)
Derating vs. Spacing Curves

### 2PSS

![2PSS Derating vs. Spacing Curve](image)

- **2PSS..D75-24DF**
- **2PSS...75-120F**
- **2PSS..D40-24D**
- **2PSS..D25-24D**

### 3PSS

![3PSS Derating vs. Spacing Curve](image)

- **3PSS..D65-24DF**
- **3PSS...65-120F**
- **3PSS..D40-24D**
- **3PSS..D25-24D**
- **3PSS..D20-24D**

### Installation Instructions

1. **Mounting on DIN rail**
2. **Dismounting from DIN rail**

![Installation Instructions Diagram](image)
Dimensions

2PSS...25
3PSS...20

Dimensions in mm. Housing width tolerance +.02" (0.5 mm), -0 as per DIN43880.
All other tolerances ±.02" (0.5 mm)
Dimensions

2PSS...40
3PSS...30

Dimensions in mm. Housing width tolerance ±.02” (0.5 mm), -0 as per DIN43880.
All other tolerances ±.02” (0.5 mm)
Proper Fusing is Required

1. While MDI Mercury contactors handle high inrush, such as lamps, mercury contactors are susceptible to damage by short circuit currents, and should be fused to minimize short circuit fault currents. UL class RK-1 and class J fuses and semiconductor I²t fuses more effectively protect relays. These are low current-peak fuses designed to limit short circuit currents. Regardless, when there is a short circuit, relay operations should be closely monitored afterward because of the possibility of concealed damage that could cause the relays to behave inconsistently.

2. For sizing of relay see below

3. For data on standard coils see pages 5, 6, 11, & 13.

4. MDI RELAYS must mount vertically, ±10°.

5. Control line can be protected with metal oxide varistors (MOV). Use suffix –11.

6. Disconnect power before installing or servicing. Observe all electrical and safety codes and ordinances such as national electric code (NEC) and the occupational safety and health act (OSHA).

-RECOMMENDED-

Solid State Relays

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Siemens</th>
<th>Harris</th>
<th>C.K.E.</th>
<th>MDI</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 V</td>
<td>S14K30</td>
<td>V47ZA7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>120 V</td>
<td>S20K130</td>
<td>V150LA20B</td>
<td>Z150LA20B</td>
<td>PM-567-1</td>
</tr>
<tr>
<td>220 V</td>
<td>S20K275</td>
<td>V275LA40B</td>
<td>Z275LA40B</td>
<td>PM-567-2</td>
</tr>
<tr>
<td>277 V</td>
<td>S20K385</td>
<td>V320LA20B</td>
<td>Z320LA20B</td>
<td>PM-567-3</td>
</tr>
</tbody>
</table>

Mercury Relays

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Siemens</th>
<th>Harris</th>
<th>C.K.E.</th>
<th>MDI</th>
</tr>
</thead>
<tbody>
<tr>
<td>250 V</td>
<td>KTN-R</td>
<td>JJN/A3T</td>
<td>JJS</td>
<td>KTS-R</td>
</tr>
<tr>
<td>600 V</td>
<td>PM-567-5</td>
<td>PM-567-1</td>
<td>PM-567-2</td>
<td></td>
</tr>
</tbody>
</table>

SIZING RELAY

To find AMPS per pole

3 Ø Balanced Heater loads

AMPS per pole = \( \frac{KW \times 1,000}{VOLTS \times 1.732} \)

Or multiply the kilowatts times the appropriate factor

<table>
<thead>
<tr>
<th>Voltage</th>
<th>FACTORS</th>
</tr>
</thead>
<tbody>
<tr>
<td>208 V</td>
<td>2.776</td>
</tr>
<tr>
<td>220 V</td>
<td>2.624</td>
</tr>
<tr>
<td>240 V</td>
<td>2.406</td>
</tr>
<tr>
<td>277 V</td>
<td>2.084</td>
</tr>
<tr>
<td>480 V</td>
<td>1.203</td>
</tr>
<tr>
<td>600 V</td>
<td>0.962</td>
</tr>
</tbody>
</table>

TORQUE SPECIFICATIONS

- For coils 8 in. Lb. max.
- For line and load terminals see ratings labels.

MOV CHART

<table>
<thead>
<tr>
<th>FOR</th>
<th>SIEMENS</th>
<th>HARRIS</th>
<th>C.K.E.</th>
<th>MDI</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 V</td>
<td>S14K30</td>
<td>V47ZA7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>120 V</td>
<td>S20K130</td>
<td>V150LA20B</td>
<td>Z150LA20B</td>
<td>PM-567-1</td>
</tr>
<tr>
<td>220 V</td>
<td>S20K275</td>
<td>V275LA40B</td>
<td>Z275LA40B</td>
<td>PM-567-2</td>
</tr>
<tr>
<td>277 V</td>
<td>S20K385</td>
<td>V320LA20B</td>
<td>Z320LA20B</td>
<td>PM-567-3</td>
</tr>
</tbody>
</table>
**How To Order**

**SWITCH TYPE**
- TOS - Tip-Over Switch
- TS - Tilt Switch
- WATS - Wide Angle Tilt Switch

**AMP RATING**
- 12 - 12 AMPS (TOS ONLY)
- 1 - 1 AMP
- 10 - 10 AMPS (TS ONLY)
- 20 - 20 AMPS

**MOUNTING CLIPS**

<table>
<thead>
<tr>
<th>PART NO.</th>
<th>FOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM-348-36</td>
<td>TS-1, TS-1-L1</td>
</tr>
<tr>
<td>PM-348-44</td>
<td>TS-10, TS-10-L1</td>
</tr>
<tr>
<td>PM-348-50</td>
<td>TS-1C-L1</td>
</tr>
<tr>
<td>PM-348-62</td>
<td>TS-10C-L1, TS-20C-L1</td>
</tr>
</tbody>
</table>

**RATINGS:**

**TS-1 & WATS-1**
- Tilt Switch 10°
  - 1 AMP @ 120 VAC / 1 AMP @ 28 VDC
  - SP-1357 & SP-1358-L*
    - 1 AMP @ 6-24 VDC

**TS-10**
- 10 AMP @ 120 VAC

**TS-20**
- 20 AMP @ 120 VAC

**NATS-20 & WATS-20**
- 13 AMP @ 120 VAC
- 6 AMP @ 240 VAC

**SP-1357**
- (Mechanical NON-Mercury)
- With ¼” Quick Connects

**TS-10 & TS-20**
- Tilt Switch 10°
  - 1.812” DIA.
  - .60” DIA.
  - .125” DIA.

**TS-1C-L* (Mercury)**

**WATS-1C-L* (Mercury)**

**SP-1358-L* (Mechanical NON-Mercury)**

**NATS-20**
- Narrow Angle Tilt Switch 30°

**WATS-20**
- Wide Angle Tilt Switch 90°

**TERMINATION**
- 2 - 1/4” Quick Connects (TOS Non-Cased Only)
- 3 - Printed Circuit Mountable (TS-1 & WATS-1 Non-Cased Only)
- 6 - Standard Mounts (TS-1 & WATS-1 Non-Cased Only)
- 8 - 1/4” Quick Connects (TOS Cased Only)

L1 - 6” Leads
L2 - 12” Leads
L3 - 18” Leads
L4 - 24” Leads

* For lead wire or lengths other than the above contact the factory

All leaded and cased tilt switches come with silicone rubber mercury switch lead wire, except TOS-12

---

**Tilt Switches Mercury & Mechanical (Non-Mercury)**

**RATINGS:**

**TS-1 & WATS-1**
- 1 AMP @ 120 VAC / 1 AMP @ 28 VDC

**SP-1357 & SP-1358-L***
- 1 AMP @ 6-24 VDC

**TS-10**
- 10 AMP @ 120 VAC

**TS-20**
- 20 AMP @ 120 VAC

**NATS-20 & WATS-20**
- 13 AMP @ 120 VAC
- 6 AMP @ 240 VAC

**TS-1-6 & WATS-1-6**
- Standard

**SP-1357**
- (Mechanical NON-Mercury)
- With ¼” Quick Connects

**TS-10C-L* & WATS-10C-L***
- Tilt Switch 10°
  - 2.31” DIA.

**TS-1C-L* (Mercury)**

**WATS-1C-L* (Mercury)**

**SP-1358-L* (Mechanical NON-Mercury)**

**NATS-20**
- Narrow Angle Tilt Switch 30°

**WATS-20**
- Wide Angle Tilt Switch 90°

---

**UNINSULATION**
- C - Case Unit
- (blank) - Uninsulated Unit
Tip-Over Switches  Mercury & Mechanical (Non-Mercury)

TOS-12
12 AMPS @ 120 VAC
25° Tip Over Angle

SP-1353
0.25 AMP @ 60 V
3 VA Max 10 Omhs Max
45° ±10° Tip Over Angle

TOS-12-2

SP-1353-L* Mechanical
TOS-12C-L*

SP-1431
(Mechanical Non-Mercury)
Ratings:
0.25 AMPS @ 60 V
3 VA Max.
40° Tip Over Angle
30-50° Tip Over Angle

Switches  Operating Angles

TS-1, TS-10, TS-20
Operating Angle
Recommended operating angle for good
switch open and closure conditions.

SP-1357 & SP-1358
Operating Angle

Damper Arm Tilt Switch

SP-1162-L*
SPDT - .50" SHAFT - 18 AWG Plenum wire

SP-1442-L*
SPDT - 1.00" SHAFT - 18 AWG Plenum wire

SP-1335-L*
SPDT - .50" SHAFT - 18 AWG SJOW Cord

Ratings
1 AMPS @ 120 VAC / 1 AMP @ 24 VDC

Mechanical DATS (Non-Mercury)

SP-1347-L*
SPDT - .50" SHAFT - 18 AWG Plenum wire

SP-1450-L*
SPDT - 1.00" SHAFT - 18 AWG Plenum wire

Ratings
5 AMPS @ 120 VAC / 5 AMP @ 30 VDC

US Patent 7,473,858

Contact the Factory 1-800-634-4077 or www.mdius.com

Tip-Over Switches  Mercury & Mechanical (Non-Mercury)
HOW TO ORDER

BASIC SWITCH SERIES

MERCUARRY
A - TS-1
1 AMP @ 120 VAC Pilot Duty 10°
B - WATS-1
1 AMP @ 120 VAC Pilot Duty 90°
C - TS-10
13 AMPS @ 120 VAC / 6 AMPS @ 240 VAC 30°
D - NATS-20
13 AMPS @ 120 VAC / 5 AMPS @ 240 VAC 30°
E - WATS-20
13 AMPS @ 120 VAC / 6 AMPS @ 240 VAC 90°

MECHANICAL
G - ½ H.P. 13/15 AMPS 90°
H - 1 and 2 H.P. 15 AMPS 90°
K - 10 AMPS Pilot Duty Narrow Angle Tetherless
L - 1 & 2 H.P. 25 AMPS 90°
N - 10 AMPS Pilot Duty Narrow Angle 35°
P - ½ H.P. Narrow Angle 25°
R - ½ H.P. Narrow Angle Tetherless
S - Small 5 AMPS 120/250 VAC Narrow Angle 15°

FLOAT MATERIAL
1 - High Impact Polystyrene (HIPS) for 60°C/140°F
2 - Acrylonitrile Butadiene Styrene (ABS) for 82°C/180°F
3 - ABS/PolyCarbonate (PC/ABS)

TERMINATION AND LABEL DESIGNATION

00 - Standard skive (See Fig 4)
Recognized: No Label
C1 - 120 VAC Series plug (See Fig 1)
Listed: Label on 6’ min. cord
F1 - 120 VAC Series plug (See Fig 1)
Listed: Label on Float - 6’ min. cord
R1 - 120 VAC Series plug (See Fig 1)
Recognized: No Label - 6’ min. cord
C2 - 240 VAC Series plug (See Fig 2)
Listed: Label on 6’ min. cord
F2 - 240 VAC Series plug (See Fig 2)
Listed: Label on Float - 6’ min. cord
R2 - 240 VAC Series plug (See Fig 2)
Recognized: No Label - 6’ min. cord
R3 - 3 Pin barrel plug (See Fig 3)
Recognized: No Label
C0 - 120 VAC Series plug (See Fig 1)
Recognized: No Label - 6’ min. cord

OPTIONAL PEAR FLOAT

Same MDI switch, larger pear shaped float
This option only comes in ABS plastic

GOLD CONTACTS MECHANICAL FLOAT SWITCHES
INTRINSICALLY SAFE RATINGS: 160 μA TO 100 mA

CONTACTS

0 - Normally Open
C - Normally Closed
D - Double Throw

OPTIONAL

B - Individually boxed
C - External weighted
T - Cable Tie Tether
TC - Tether Clamp
G - Gold Contacts

CORD TYPE AND MATERIAL

A - 12 Gauge - Chlorinated Polyethylene CPE Jacketed (SJOW)
B - 14 Gauge - Chlorinated Polyethylene CPE Jacketed (SJOW)
C - 16 Gauge - Polyvinyl Chloride PVC Jacketed (SJOW)
L - 16 Gauge - Chlorinated Polyethylene Yellow CPE Jacketed (SJOW)
X - 16 Gauge - Polyvinyl Chloride PVC Jacketed (SJOW)
T - 16 Gauge - Teflon TFE Jacketed (Not UL or CSA approved)
U - 14 Gauge - Chlorinated Polyethylene CPE Jacketed (SJOW)
P - 12 Gauge - Chlorinated Polyethylene CPE Jacketed (SJOW)

BLACK - COMMON
RED - N.O.
WHITE - N.C.
Gold Series Switch

Available in: “G, N, & K” Series
Add the suffix “G” for Gold Plated Contacts.

Example: GF2OW1000 G
Good for 160 µA to 100 mA
Same standard angles.
Commonly used in intrinsically safe equipment.

SKF Series

This includes our standard K Series float switch (internally weighted), with a longer 3” ROJ and 1/2” skive.

Features:
SKF-5032-10 (10’ Normally Open)
SKF-5033-10 (10’ Normally Closed)
SKF-5034-10 (10’ Double Throw)

Installation Instructions

1. Attach cord, using a cable tie (tether clamp), to any convenient rigid surface as illustrated. This is known as the tether point. Do not tighten until both turn-on and turn-off levels are established.
2. To adjust greater distance between turn-on and turn-off, increase cord length between tether point or tether clamp and float. For less distance between turn-on and turn-off decrease cord.
3. Make sure the float is at least 2 inches above pump base, in the turn-off position, before tightening cable tie or tether clamp at the tether point.
4. Plug piggy-back switch cord (Series Plug) into GFCI outlet, then plug into piggy-back switch cord, and check for proper operation.

MDI Tether Clamp
This is a nice and simple way to mount your float switch to a pipe, either with a cable tie or pipe clamp. It can be used on 18-2 to 12-2 (18-3 to 14-3) cords.

TC (Includes the clamp, bolt and nut)
TC-1 (Includes the TC and 2½” pipe clamp)
TC-2 (Includes the TC and 3½” pipe clamp)
TC-10 (Includes the TC and 14” cable tie)

Tether Data
For CPE 16-2 SJOW jacketed cord

<table>
<thead>
<tr>
<th>WIRE GAUGE</th>
<th>LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>12-2</td>
<td>7 ½ INCHES</td>
</tr>
<tr>
<td>14-3</td>
<td>5 INCHES</td>
</tr>
<tr>
<td>14-2, 16-3</td>
<td>4 INCHES</td>
</tr>
<tr>
<td>18-2, 18-3, 16-2</td>
<td>3 ½ INCHES</td>
</tr>
</tbody>
</table>

Based on SJOW cord @ 65° F. Flexibility of wire varies, test in actual application to verify.

Typical Normally Open (Pump Down) Application

Tetherless Internally Weighted
Narrow Angle Float (Normally Open Shown)

External Weight

P - Series

PUMPING RANGE
CLOSE
PM-590

N - Series

TETHER POINT
TETHER LENGTH
NARROW ANGLE FLOAT
(NORMALLY OPEN SHOWN)

K - SERIES = 9.5"
R - SERIES = 10"
FROM INITIAL CONTACT TO TURN ON

HORIZONATAL
Vertical Liquid Level Control Switch

RATINGS
(Standard Switch)
13 AMPS / 1/2 HP @ 120/240 V 50/60 Hz

(Optional Relay)
15 AMPS @ 120/240 VAC 50/60 Hz.
1 HP @ 120 VAC or 2 HP @ 240 VAC

PUMPING RANGE
Adjustable up to 6 inches (with standard 9” rod length)

MATERIALS
Enclosure and Guide are ABS Plastic
Float is black Polypropylene

MOUNTING
Standard mounting holes for #8 screws on 2.06 inch centers are located under housing.

OPTIONAL PIPE MOUNT
This bracket allows for mounting to standard size sump discharge piping. Comes is Stainless Steel or PVC Plastic.

HOW TO ORDER

VS 01 - 012 03 R9 L - 01
A B C D E F

(Optional)
A - Contacts and Current
Blank - Standard switch
(This is CSA approved option)
O - Normally Open
C - Normally Closed
D - Double Throw
O1 - Normally Open 1 HP @ 120 VAC Relay
C1 - Normally Closed 1 HP @ 120 VAC Relay
O2 - Normally Open 2 HP @ 240 VAC Relay
C2 - Normally Closed 2 HP @ 240 VAC Relay

B - Length of cord in inches (012 - 720)

C - Termination
00 - 1 3/4” ROJ & 3/4” Strip or Skive (Standard)
R1 - Piggyback 120 VAC Component Recognized
C1 - Piggyback 120 VAC W/ Listed Cord Label
R2 - Piggyback 240 VAC Component Recognized
C2 - Piggyback 240 VAC W/ Listed Cord Label
R3 - 3-Pin Barrel Plug Component Recognized
C3 - 3-Pin Barrel Plug W/ Listed Cord Label

D - Rod Length
Rod length in inches (9” is standard)
Rods available up to 24”

E - Rod Guide
L - Lower rod guide
U - Upper rod guide

(Optional)
F - With or Without Bracket
01 - Pipe Clamp & Stainless Steel Bracket
02 - Pipe Clamp & Plastic Bracket
**PRODUCT DESCRIPTION**

The Twin Float pump switch consists of two floats, each float contains our standard “JH” series switch. The boot contains a heavy-duty latching relay, which enables the floats to function together. The relay eliminates pump chatter in turbulent conditions.

The unit is well suited for narrow and deep sump pump pits. On the N.O. (pump down) model, the pump is turned on when activated by the top float switch. The pump stays on until the bottom float switch turns it off, this allows a pumping range of about 12 - 60” with the standard 060 (60” cord length on the bottom float). This can be extended almost indefinitely with longer cords.

**Ratings**

- 15 AMPS @ 120 VAC
- 1 HP @ 120 VAC
- 15 @ 240 VAC
- 2 HP @ 240 VAC

**Standard colors**

- Top float color indicates voltage
  - Blue Float - 120 VAC
  - Red Float - 240 VAC

- Bottom float color indicates action
  - Graphite - Pump Down (Normally Open)
  - Yellow - Pump Up (Normally Closed)

**HOW TO ORDER**

```
JTF D - 060 - U 15 R1
A B C D E
```

- **A** - Switch Action
  - D - Pump Down (Normally Open)
  - U - Pump Up (Normally Closed)

- **B** - Bottom Float Cord Length
  - 12” Increments (Min. length 12”)
  - 060 is our standard 60” length

- **C** - Cord Types (Currently 14 AWG only)
  - U - 14 AWG CPE jacketed SJOW cord

- **D** - Power Cord Length in Feet
  - 00 - Standard Skive
  - R1 - 120 VAC (15 AMP piggyback)
  - R2 - 240 VAC (15 AMP piggyback)
Pressure Transducers

Perfect for Sewage, Sludge and Slurries

Features / Benefits
- Durable cage design with large diameter 316 SS diaphragm seal that is non-clogging and damage resistant to floating solids
- Incorporates lightning and surge protection utilizing dual arrestor technology, grounded to case, eliminating both power supply surges and lightning ground strike transients (surge protection is not guaranteed and is not covered by warranty) on PBLT2 models
- Maintenance free filter eliminates particulate or water droplets from entering and damaging the transducer
- UL approved intrinsically safe on PBLTX models for use in hazardous locations when used with proper barrier
- Excellent chemical compatibility for wide application use
- NPT connection allows the unit to be rigidly installed in a pipe/conduit, or the addition of a A-625 hanging loop for attaching a chain for pulling out of the installation

Applications
- Wastewater
- Sludge pits, clarifiers, digesters
- Alum tanks
- Chemical storage tanks
- Oil tanks
- Lime slurry
- Sumps
- Reservoirs

Description
The SERIES PBLT2 & PBLTX Submersible Level Transmitters are manufactured for years of trouble free service in the harshest applications. This Series measures the height of liquid above the position in the tank referenced to atmospheric pressure. The transmitter consists of a piezo-resistive sensing element, encased in a 316 SS housing with cage and large diameter 316 SS diaphragm seal.

Specifications

<table>
<thead>
<tr>
<th>Service</th>
<th>Compatible liquids.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wetted Materials</td>
<td>316 SS, 316L SS, epoxy, cable: ETFE or polyurethane.</td>
</tr>
<tr>
<td>Accuracy</td>
<td>±0.25% FS (includes linearity, hysteresis, and repeatability)*.</td>
</tr>
<tr>
<td>Temperature Limit</td>
<td>PBLT2: 0 to 200°F (-18 to 93°C); PBLTX: 0 to 176°F (18 to 80°C).</td>
</tr>
<tr>
<td>Compensated Temperature Range</td>
<td>PBLT2: 0 to 180°F (-18 to 82°C); PBLTX: 0 to 176°F (18 to 80°C).</td>
</tr>
<tr>
<td>Thermal Effect</td>
<td>±0.02% FS°F.</td>
</tr>
<tr>
<td>Pressure Limit</td>
<td>2X FS.</td>
</tr>
<tr>
<td>Power Requirement</td>
<td>PBLT2: 13 to 30 VDC, PBLTX: 10 to 28 VDC.</td>
</tr>
<tr>
<td>Output Signal</td>
<td>4 to 20 mA DC, two wire.</td>
</tr>
<tr>
<td>Response Time</td>
<td>50 ms.</td>
</tr>
<tr>
<td>Loop Resistance</td>
<td>900 Ω.</td>
</tr>
<tr>
<td>Electrical Connection</td>
<td>Wire pigtail.</td>
</tr>
<tr>
<td>Mounting Orientation</td>
<td>Suspended in tank below level being measured.</td>
</tr>
<tr>
<td>Electrical Protection</td>
<td>PBLT2: Lightning and surge protection, PBLTX: none.</td>
</tr>
<tr>
<td>Weight</td>
<td>4.3 lb (2.0 kg).</td>
</tr>
<tr>
<td>Agency Approvals</td>
<td>PBLT2: CE, PBLTX: CE, cULus intrinsically safe for Class I, Div. 1, Groups A, B, C, &amp; D; Class II, Div. 1, Groups E, F, &amp; G; Class III, Div. 1. **</td>
</tr>
</tbody>
</table>

*Configured ranges below 5 psi (11.54 ft w.c.) (3.52 m w.c.) ±1% FS accuracy
**Up to 196 ft (59.5 m) for ETFE cable; Up to 333 ft (101.5 m) for polyurethane cable

How to Order
Use the bold characters from the chart below to construct a product code.

**SERIES**
2 - Submersible level transmitter
X - Submersible level transmitter (intrinsically safe)

**RANGE psi (ft w.c.) [m w.c.]**
5 - 5 (11.54) [3.52]
10 - 10 (23.09) [7.04]
15 - 15 (34.63) [10.56]
20 - 20 (46.18) [14.08]
3.5M - 4.87 (11.48) [3.5]
5M - 7.11 (16.40) [5]
10M - 14.21 (34.63) [10]

**CABLE TYPE**
(blank) - ETFE
PU - Polyurethane

**CABLE TYPE**
40 - 40 (12.2)
60 - 60 (18.3)
5M - 16.40 (5)
10M - 32.81 (10)
18M - 59.06 (18)

**Configure cable lengths available from 10 to 2000 ft (3 to 610 m)**

*Additional pressure ranges available (Consult Factory)*
Description
The SBLT2 Submersible Level Transducer is manufactured for years of trouble free service. The transmitter consists of a piezo-resistive sensing element, encased in a 316 SS housing. Superior lightning and surge protection utilizing dual arrestor technology, grounded to case, eliminating both power supply surges and lightning ground strike transients (surge protection is not guaranteed and is not covered by warranty). Bullet nose design protects diaphragm from damage. Comes equipped with a 270-pound tensile strength, shielded, vented cable. Ventilation tube in the cable automatically compensates for changes in atmospheric pressure above the tank.

Applications
Well monitoring; Ground water monitoring; Environmental re-mediation; Surface water monitoring; Down hole; Water Tanks.

Electrical Installation
An external power supply delivering 13-30 VDC with minimum current capability of 40 mA DC (per transmitter) is required to power the control loop. See figure below for connection of the power supply, transmitter and receiver.

Specifications
Service: Compatible liquids
Wetted Materials: 316 SS, 316L SS, epoxy adhesive
Cable: Polyether Polyurethane or ETFE
Bullet Nose: PVC
Accuracy: ±0.25% of full scale
Temperature Limit: 0 to 150°F (-18 to 66°C)
Compensated Temperature Range: 0 to 140°F (-18 to 60°C)
Thermal Effect: Less than ±0.02%/°F
Pressure Requirement: 13 to 30 VDC
Output Signal: 4 to 20 mA DC, 2-wire
Response Time: 50 ms
Max. Loop Resistance: 850 ohms at 30 VDC
Electrical Connections: Wire pigtail
Mounting Orientation: Suspended in tank below level being measured
Weight: 2.2 lb. (1.0 kg)
Electrical Protection: Lightning and surge protection

WARNING:
A voltage potential between the ground wire of the unit and the ground of other equipment can lead to electrolytic corrosion. Always ensure the grounding system provides an equipotential between the transmitter and the earthing ground connection. Avoid using the power system protective ground since this will often have a significant potential difference to the transmitter ground. Also note that dissimilar metals in the ground system may cause electrolysis corrosion of the transmitter or other components in the ground system.

During installation, connect a voltmeter or ammeter between the shield ground wire and the grounding connection. If there is a measurable voltage or current electrolytic corrosion may be a serious possibility. If there is a potential difference then some isolation system will be required. Improper grounding may lead to damage or poor signal integrity.

The maximum receiver load resistance (RLmax) for the DC power supply voltage (Vsup) is expressed by the formula:

\[ RL_{\text{max}} = \frac{V_{\text{sup}} - 13V}{0.02A} \]

Shielded cable is recommended for control loop wiring.

Intrinsically Safe Approval:
Change model number from SBLT2 to SBLTX

Custom ranges or Cable Lengths - Contact MDI
The BBLA alarm system is designed to monitor liquid levels in sump basins, holding tanks, lift stations tanks and many other non-potable water and wastewater applications. Comes individually boxed with Cable tie and Instruction sheet.

Auxiliary contacts with common, normally open and normally closed terminals are available behind a panel, on the lower right side, held in place by two #1 Phillips head screws. The barrier terminal screws are Phillips/Standard slot combo head type.

The BBLA is designed to sound a piezo horn and illuminate a red light to notify of an alarm situation. There is a green line voltage power indicator light to show that the unit is functioning, as well as a silence switch to turn horn off while fixing the alarm (the red alarm light will remain on until the alarm conditions are remedied).

**SPECIFICATIONS**

- **Dimensions**: 7" X 4" X 2 1/2"
- **Enclosure**: NEMA 1 thermoplastic (external mounting feet)
- **Horn**: 85 dB
- **Weight**: 1 1/3 pounds
- **Voltage**: Primary: 120 VAC, Secondary 12 VAC, 60 Hz (Alarm condition 2.5 Watts max)
- **Power cord**: 6 feet 120 VAC (NEMA 5-15P)
- **External block connection**: Float connection. DO NOT APPLY POWER! Class Two Output, 12 VAC
- **Auxiliary contacts**: 120 VAC, 5 AMPS max 60 Hz
- **Battery Back Up**: 9 Volt

**XF2OY1500**

- **OPERATING ANGLE 15°**: CONTACTS CLOSE @ 10° ABOVE HORIZONTAL
- **CONTACTS OPEN @ 5° BELOW HORIZONTAL**

**ELECTRICAL RATINGS:**
- 5 AMP @ 120/240 VAC.
- 5 AMP @ 30 V.D.C.

**FLOAT MATERIAL:** A.B.S.

**AS2OY1500**

- **OPERATING ANGLE 10°**: CONTACTS CLOSE @ 5° ABOVE HORIZONTAL
- **CONTACTS OPEN @ 5° BELOW HORIZONTAL**

**ELECTRICAL RATINGS:**
- 1 AMP @ 120 VAC.

**FLOAT MATERIAL:** A.B.S.
**SP-4000 ALARM** - OTA OUTDOOR ALARM WITH **NF2OW1500** MECHANICAL FLOAT

**SP-4100 ALARM** - OTA OUTDOOR ALARM WITH **CG2OY1500** MERCURY FLOAT

The OTA alarm system is designed to monitor liquid levels in sump basins, holding tanks, lift stations tanks and many other non-potable water and wastewater applications. Comes individually boxed with Cable tie and Instruction sheet.

This alarm comes in a Type 4X nonmetallic enclosure with external mounting feet and a gasketed door for outdoor use. It has a large red illuminating beacon, front cover mounted piezo, with Test and Silence push button switches.

The OTA is designed to sound an audible piezo horn and illuminate the red beacon light to notify of an alarm situation. There is a silence switch to turn the piezo horn off while fixing the alarm (the red alarm light will remain on until the alarm conditions are remedied).

### SPECIFICATIONS

- **Dimensions**: 8” X 4 1/2” X 4 1/4”
- **Enclosure**: Type 4X nonmetallic enclosure rated for indoor or outdoor use
- **Piezo Horn**: 85 dB
- **Weight**: 2 pounds
- **Voltage**: Primary and Secondary: 120 VAC, 60 Hz
- **Power cord**: 6 feet 120 VAC (NEMA 5-15P)
- **Float connection**: External block connection

### NF2OW1500

- **Operating Angle 15°**: Contacts close @ 25° above horizontal, Contacts open @ 10° below horizontal
- **Electrical Ratings**: 1/4 H.P. 10 Amps @ 120/240 VAC, 34.8 LRA
- **Float Material**: A.B.S.

### CG2OY1500

- **Operating Angle 10°**: Contacts close @ 5° above horizontal, Contacts open @ 5° below horizontal
- **Electrical Ratings**: 10 Amp @ 120 VAC, 5 Amp @ 240 VAC
- **Float Material**: A.B.S.
Pump Control Panels

Features

- Flashing Red Alarm Light
- Amber Run Lights
- High Decibel Audible Alarm
- NEMA 4X Fiberglass Enclosure
- Stainless Piano Hinged Door
- Stainless Door Latches w/Padlock Hasp
- External Mounting Feet
- Alternating Relay/Override Circuit
- Non-Reversing Contactors
- “Hand/Off/Auto” Heavy Duty Toggles
- Alarm “On/Off/Test” Heavy Duty Toggle
- Field Wiring Terminal Strips
- Motor Circuit Breakers
- Control Circuit Breaker
- Individual 3 AMP Control/Alarm Circuit Fuses
- UL 508A Listing
- One Year Limited Warranty
- Custom Options Available

Applications Include

- Starting & Stopping Pump for:
  - Sump & Sewage Basins
  - Septic Tanks & Aeration Systems
  - Cisterns & Atmospheric Storage Tanks
  - Chemical Solution Tanks
Sump, Effluent & Sewage Pumps

Sump Pump: CPS3-12

Basements, Dewatering, Septic Systems, Decorative Ponds

- 1/3 HP @ 115 VAC 60 Hz
- Single Phase @ 4.0 AMPS
- 1750 RPM, 60 Hz NEMA L Includes Overload Protection
- 16 AWG 20 Foot (UL/cUL) Cord
- Discharge 1 1/2” NPT, Vertical
- Liquid Temperature 140 Degrees F. (Intermittent)
- Hardware 300 Series Stainless Steel
- Cast Iron Motor Housing
- Shaft Nickel Plated
- Bearing (Upper & Lower) Single Row, Ball, Oil Lubricated
- Cast Iron Volute
- Seal Plate Cast Iron
- Impeller Nylon + 30% Fiberglass
- Square Rings Buna-N
- Oil Filled, Class B
- Permanent Split Capacitor

Effluent Pump: CPE5-12

Dewatering, Elevator Pits, Septic Systems, Residential & Commercial Developments, STEP Systems

- 1/2 HP @ 115 VAC 60 Hz
- Single Phase @ 8.5 AMPS
- 3450 RPM, 60 Hz NEMA L Includes Overload Protection
- 16 AWG 20 Foot (UL/cUL) Cord
- Discharge 2” NPT, Vertical
- Solids Handling 3/4”
- Liquid Temperature 140 Degrees F. (Intermittent)
- Hardware 300 Series Stainless Steel
- Cast Iron Motor Housing
- Shaft Stainless Steel
- Bearing (Upper & Lower) Single Row, Ball, Oil Lubricated
- Cast Iron Volute
- Seal Plate Cast Iron
- Impeller Cast Iron/Vortex
- Square Rings Buna-N
- Oil Filled, Class B
- Permanent Split Capacitor

Sewage Pumps

Submersible Non-Clog Sewage Pumps Are Designed for Typical Raw Sewage Application.

CPW5-12

- 1/2 HP @ 115 VAC 60 Hz
- Single Phase @ 11.5 AMPS
- 25’ Head & 109 GPM
- 3450 RPM, 60 Hz NEMA L Includes Overload Protection
- 16 AWG 20 Foot (UL/cUL) Cord
- Discharge 1 1/2” NPT, Vertical
- Liquid Temperature 140°F (60°C) Intermittent
- Hardware 300 Series Stainless Steel
- Cast Iron Motor Housing
- Bearing (Upper & Lower) Single Row, Ball, Oil Lubricated
- Cast Iron Volute
- Cast Iron Impeller/Vortex
- Shaft Stainless Steel

MD500T

- 1/2 HP @ 115 VAC 60 Hz
- Single Phase @ 7.4 AMPS
- 18’ Head & 108 GPM
- Automatic Reset Thermal Overload Protection
- 18 AWG 10 Foot Cord
- Discharge 2” NPT, Vertical
- Solids Handling 2”
- Liquid Temperature 190°F (88°C) Intermittent
- Hardware 300 Series Stainless Steel
- Cast Iron Motor Housing
- Bearing (Upper & Lower) Single Row, Ball, Oil Lubricated
- Cast Iron Volute
- Thermoplastic Impeller/Vortex
The vortex impeller design of the grinder pump provides non-overloading performance and prevents clogging. The CPG20... pump produces capacities up to 44 gpm with heads up to 103 feet. The CPGF20... pump produces capacities up to 42 gpm with heads up to 133 feet.

The pump can easily handle waste from:
- Residential/Commercial Developments
- Wastewater Transfer
- Hospitals, Motels, Apartments
- Schools, Universities
- Churches
- Campgrounds
- Office Complexes

Some of the other pump features:
- Single or 3 Phase
  - 2 HP @ 208/230 V 1-Phase @ 15 AMPS
  - 2 HP @ 230 V 3-Phase @ 9 AMPS
  - 2 HP @ 460 V 3-Phase @ 4.5 AMPS
- 150 Degrees F. (Intermittent)
- 30’ Cord
- Start component
  - Internal (no control panel required)
  - External (must use start kit or components in control panel)

How to Order

CPG  H  20  2  3  DSL

HEAD
S - Standard Head
H - High Head

HORSE POWER
20 - 2 H.P.

VOLTS
2 - 208/230 VAC
3 - 230 VAC
4 - 460 VAC
9 - 208 VAC

CORD LENGTH
2 - 20 FEET
3 - 30 FEET

START COMPONENTS
DS - Internal Start Components
DSL - External Start Components
Sealed Entrance-Replaceable Power Cord
Easy to replace, prevents water from entering the motor housing through a cut power cord. Warranty is not voided if plug is cut off.

Internal or External Start Kit
Internal Start / Run capacitor in the motor. External Start / Run capacitor design for capacitors in the control panel.

Pump Design
The centrifugal submersible grinder pump is capable of reducing all material found in normal residential and light industrial sewage containing small quantities of plastic, disposable diapers, sanitary napkins, rubber, food particles and other non-abrasive solids into a finely ground slurry. Heavy duty ASTMA48, Class 30 cast iron components.

Strong Motor
Non-overloading high torque for powerful and reliable pump operation. The rotor and stator assembly is of the standard frame design. The motor windings shall be of Class B insulation and operate in a sealed environment containing clean dielectric oil, making it capable of operating in a totally, partially or non-submerged condition for extended periods of time without damage due to the heat being generated.

2-Bearing Support
Pump shall utilize a 2-Bearing design operating in an oil bath atmosphere, consisting of an upper single row, an intermediate single row, ball bearing for thrust loads and a lower bronze sleeve bearing for radial loads to prevent shaft deflection. Long 50,000-hour B-10 bearing life.

Tandem Double Mechanical Seal Protection
Each shaft seal prevents leakage between the pump and motor. The upper seal is constructed of a carbon rotating face and ceramic stationary face, 300 series stainless steel hardware, and all elastomer parts to be Buna-N. The lower seal is silicon carbide rotating face and stationary face, 300 series stainless steel hardware, and all elastomer parts to be Viton.

Non-Overloading Hydraulic Design
The recessed centrifugal impeller allows 100% performance curve operation from shut-off to maximum flow without damage to the pump or system. The recessed vortex impeller is out of the passageway of fluid flow, eliminating concerns of blockage or wear. The impeller shall be capable of being trimmed to meet specific performance characteristics.

Proven Grinder Assembly
The shredding ring and radial cutter shall be constructed of 440C stainless steel hardened to a minimum Rockwell C55 and shall be finish for a fine cutting edge. The grinding mechanism shall be constructed to eliminate clogging and jamming under starting and all normal conditions and capable of passing stringy type solids through the pump without roping or winding the material.

Accessories Included
Stainless steel lifting handle and anti-vibration rubber mounting feet are included with the pump.
The MDI grinder pumps easily handle residential, light commercial or industrial sanitary waste, reducing it to fine slurry. The **G2-11SI Series** pump is designed for use in pressure sewer applications or any piping network.

The recessed vortex impeller design of the **G2-11SI Series** grinder pump provides trouble free, non-overloading operation over the entire performance curve. The **G2-11SI Series** pump produces capacities up to 43 gpm with heads up to 130 feet.

The modular design provides quick access to the internal start capacitor kit. Hardened stainless steel grinder assembly and many quality features.

Some of the other **G2-11SI Series** pump features:
- Strong, 2 HP, 115 V motor @ 16.9 AMPS
- Internal start component (no control box required)
- Potted cord cap assembly
- Dual silicon carbide shaft seals
- 3 Bearings
- Pressed in motor
- 27.5 x 8.25 x 10.75 with 1.25" NPT Removable Discharge Flange
1. **Triple Sealed Cable Entrance**  
Stainless steel strain relief cord grip with compression grommet protects outer cord jacket. Epoxy filled inner cord cap with individually soldered wires provide anti-wicking moisture protection to the motor even if power cable is cut or damaged.

2. **Internal Start Kit**  
Start / Run capacitor with relay securely positioned in dry compartment. Rubber compression grommet for wire leads to motor prevents oil from entering chamber. 4 bolts quickly removes cord cap for easy servicing.

3. **Modular Pump Design**  
Commonality of parts across the pump product line minimizes the amount of parts required for servicing. Heavy duty ASTM A48, Class 30 cast iron components.

4. **Strong Motor**  
High torque for powerful and reliable pump operation. Pressed stator securely holds motor and efficiently transfers heat. Class F insulation with overload protection in oil filled chamber for cool operation and long motor life.

5. **3-Bearing Support**  
Motor / Pump shaft securely held with upper and lower ball bearing plus addition sleeve bearing in lower seal chamber. Long 50,000 hour B-10 bearing life.

6. **Double Mechanical Seal Protection**  
Dual silicon carbide mechanical shaft seals provide twice the moisture protection for the motor. Dual seals are housed in a secondary oil filled seal chamber. Tougher silicon carbide seals better handles sand, grit and abrasive materials.

7. **Non-Overloading Hydraulic Design**  
The recessed centrifugal impeller allows 100% performance curve operation from shut-off to maximum flow without damage to the pump or system. The recessed vortex impeller is out of the passageway of fluid flow, eliminating concerns of blockage or wear.

8. **Proven Grinder Assembly**  
Hardened (Rockwell 56-60) stainless steel grinder assembly has 30+ years proven field experience. The reversible grinder ring and grinder impeller effectively reduces solids into a fine slurry, easily passable in a piping system without concerns of clogging. Highly efficient G2-11SI 7,400 cuts per second.

9. **Easy Piping Connection**  
Removable 1-1/4” NPT connection flange for simple and easy connection to discharge piping.

10. **Accessories Included**  
Stainless steel lifting handle and anti-vibration rubber mounting feet are included with the pump.
External Start Components

The MDI grinder pumps easily handle residential, light commercial or industrial sanitary waste, reducing it to fine slurry. The G2-21 pump is designed for use in pressure sewer applications or any piping network.

The recessed vortex impeller design of this grinder pump provides trouble free, non-overloading operation over the entire performance curve. The G2-21 grinder pump retrofits into many existing competitor pump installations. The G2-21 pump operates with the same control panel and installation piping / rail system.

Some of the other G2-21 series pump features:
- Interchangeable into competitor installations
- Dual mechanical seals (silicon carbide)
- Class H motor, internal overload protection
- 3 Bearing shaft support
- Internal moisture detection
- Strong, 2 HP motor 208 V @ 14 AMPS / 230 V @ 12.8 AMPS
1. **Triple Sealed Cable Entrance**  
Stainless steel strain relief cord grip with compression grommet protects outer cord jacket. Epoxy filled inner cord cap with individually soldered wires provide anti-wicking moisture protection to the motor even if power cable is cut or damaged.

2. **Modular Pump Design**  
Commonality of parts across the pump product line minimizes the amount of parts required for servicing. Heavy duty ASTM A48, Class 30 cast iron components.

3. **Strong Motor**  
High torque for powerful (208/230 V) and reliable pump operation. Pressed stator securely holds motor and efficiently transfers heat. Class F insulation with overload protection in oil filled chamber for cool operation and long motor life.

4. **3-Bearing Support**  
Motor / Pump shaft securely held with upper and lower ball bearing plus addition sleeve bearing in lower seal chamber. Long 50,000 hour B-10 bearing life.

5. **Double Mechanical Seal Protection**  
Dual silicon carbide mechanical shaft seals provide twice the moisture protection for the motor. Dual seals are housed in a secondary oil filled seal chamber. Tougher silicon carbide seals better handles sand, grit and abrasive materials.

6. **Moisture Detection**  
Seal leak probe signals alarm in control panel for scheduled maintenance.

7. **Non-Overloading Hydraulic Design**  
The recessed centrifugal impeller allows 100% performance curve operation from shut-off to maximum flow without damage to the pump or system. The recessed vortex impeller is out of the passageway of fluid flow, eliminating concerns of blockage or wear.

8. **Proven Grinder Assembly**  
Hardened (Rockwell 56-60) stainless steel grinder assembly has 30+ years proven field experience. The reversible grinder ring and grinder impeller effectively reduces solids into a fine slurry, easily passable in a piping system without concerns of clogging. Highly efficient 16,600 (G2-21HE 7,400) cuts per second.

9. **Easy Piping Connection**  
Removable 1-1/4" NPT connection flange for simple and easy connection to discharge piping.

10. **Accessories Included**  
Stainless steel lifting handle and anti-vibration rubber mounting feet are included with the pump.
Non-Clog Pumps

M4VN - 4” Discharge

2-Vane Enclosed Impeller
- Efficient Operation, Non-clogging
- Pump-Out Vanes Prevent Material Build-up
- Pressure Balance on Shaft Seal for Long Life
- Positive Pumping Action through Impeller

Strong Performance
- Ideal for Higher Flows, Lower Heads
- Operate to Shut-off Head without Damage
- Non-Overloading Performance Curve
- 3-Bearing Shaft Support

Long Service Life
- Dual Silicon Carbide Shaft Seals
- Low Motor Operation Temperatures
- Continuously Lubricated Ball Bearings

Low Maintenance
- Easily Replaceable Impeller Wear Ring
  Restores Original Pump Performance
- Unobstructed Impeller Passageway
- Grit-Resistant Silicon Carbide Shaft Seals
- Large, 3” diameter Solids-Handling
- High Service Factor Motor Handles Tough Electrical Operating Conditions

Capabilities
- Flows to 700 GPM
- Heads to 67 Feet
- 3 - 10 HP Range
- Voltage / Phase Options
  - 208 / 230 Volt 1-Phase
  - 208 / 230 / 460 Volt, 3-Phase
- ANSI Class 125 Horizontal Flange Discharge Connection
- Motor Speeds 1150 / 1750 RPM
- Solids-Handling 3”
- Recessed, Vortex Impeller
- Motor Service Factor 1.20

Features and Benefits
- Watertight Cable Entrance
- Strong Motor (U.S. Motor Manufacturer)
- Solid 3-Bearing Support Rated for 100,000 hour B-10 life.
- Severe Duty Dual Mechanical Seals
- Moisture Detection
- High Efficiency Hydraulic Design
- 4” Horizontal Standard Flange Connection
- High Performance Wear Ring
- Available in dry pit configuration

Graph showing capacity vs. total head for different horsepower options.
### Long Service Life
- Easily Replaceable Impeller Wear Ring Restores Original Pump Performance
- Unobstructed Impeller Passageway
- Grit-Resistant Silicon Carbide Shaft Seals
- Large, 3” diameter Solids-Handling
- High Service Factor Motor Handles Tough Electrical Operating Conditions

### Low Maintenance
- Easily replaceable impeller wear ring restores original pump performance
- Unobstructed impeller passageway
- Grit-resistant silicon carbide shaft seals
- Large, 3” diameter solids handling
- High service factor motor handles tough electrical operating conditions

### Heavy Duty Pump Series
- Handles aggressive pumping applications
- Strong pumping capacities
- Centerline volute discharge
- Smooth, quiet operation

### Strong Performance
- Ideal for higher flows
- Positive pumping action through impeller
- Pump-out vanes, prevent material build-up Non-overloading performance curve

### Options Available
- Flows to 20,000 GPM
- Up to 350 HP
- Discharge to 24”
- Available in dry pit configuration

### Features and Benefits
- Watertight Cable Entrance
- Strong Motor (U.S. Motor Manufacturer)
- Solid 2-Bearing Support Rated for 100,000 hour B-10 life.
- Severe Duty Dual Mechanical Seals
- Moisture Detection
- High Efficiency Hydraulic Design
- 4” Horizontal Standard Flange Connection
- High Performance Wear Ring

### Capabilities:
- Flows to 1850 GPM
- Heads to 165 Feet
- 3 - 60 HP Range
- Voltage Options
  - 208 / 230 / 460 / 575 Volt, 3-Phase
  - 4” ANSI Class 125 Horizontal Flange
  - Motor Speed 870 / 1150 / 1750 rpm
  - Solids Handling 3 3/16”
  - Balanced, Enclosed, 2-Vane Impeller
  - Motor Service Factor 1.20

#### M4V Series

**M4VP - 4” Discharge**

**Features and Benefits**
- Watertight Cable Entrance
- Strong Motor (U.S. Motor Manufacturer)
- Solid 2-Bearing Support Rated for 100,000 hour B-10 life.
- Severe Duty Dual Mechanical Seals
- Moisture Detection
- High Efficiency Hydraulic Design
- 4” Horizontal Standard Flange Connection
- High Performance Wear Ring

**Capabilities:**
- Flows to 1150 GPM
- Heads to 110 Feet
- 3 - 20 HP Range
- Voltage Options
  - 208 / 230 Volt, 1-Phase
  - 208 / 230 / 460 / 575 Volt, 3-Phase
  - 4” ANSI Class 125 Horizontal Flange
  - Motor Speed 1150 / 1750 rpm
  - Solids Handling 3”
  - Balanced, Enclosed, 2-Vane Impeller
  - Motor Service Factor 1.20

**M4VB - 4” Discharge**

**Features and Benefits**
- Watertight Cable Entrance
- Strong Motor (U.S. Motor Manufacturer)
- Solid 2-Bearing Support Rated for 100,000 hour B-10 life.
- Severe Duty Dual Mechanical Seals
- Moisture Detection
- High Efficiency Hydraulic Design
- 4” Horizontal Standard Flange Connection
- High Performance Wear Ring

**Capabilities:**
- Flows to 1850 GPM
- Heads to 165 Feet
- 3 - 60 HP Range
- Voltage Options
  - 208 / 230 / 460 / 575 Volt, 3-Phase
  - 4” ANSI Class 125 Horizontal Flange
  - Motor Speed 870 / 1150 / 1750 rpm
  - Solids Handling 3 3/16”
  - Balanced, Enclosed, 2-Vane Impeller
  - Motor Service Factor 1.20
Non-Clogs (Continued)

### Recessed Impeller
- Handles Stringy and Fibrous Materials
- Passes Large Solids
- Pumps Heavier Solids Concentrations
- Ideal for Grit and Abrasive Solids
- Pumping via Vortex Action
- Solids Do Not Pass through Impeller
- Virtually Impossible to Clog

### Strong Performance
- Ideal for Higher heads, Lower flows
- Operate to Shut-off Head without Damage
- Non-overloading Performance Curve

### Long Service Life
- Dual Silicon Carbide Shaft Seals
- Low Motor Operation Temperatures
- Continuously Lubricated Bearings
- Premium 3-Bearing Construction
- Epoxy Potted Cord Entry

### Low Maintenance
- No Wear Components
- Recessed Impeller out of Passageway
- Grit-Resistant Silicon Carbide Shaft Seals

### Capabilities
- Flows to 650 GPM
- Heads to 57 Feet
- 3 - 10 HP Range
- Voltage / Phase Options
  - 208 / 230 Volt 1-Phase
  - 208 / 230 / 460 Volt, 3-Phase
- ANSI Class 125 Horizontal Flange Discharge Connection
- Motor Speeds 1150 / 1750 RPM
- Solids-Handling 3"
- Balanced, Enclosed, 2-Vane Impeller
- Motor Service Factor 1.20

### Features and Benefits
- Watertight Cable Entrance
- Strong Motor (U.S. Motor Manufacturer)
- Solid 3-Bearing Support Rated for 100,000 hour B-10 life.
- Severe Duty Dual Mechanical Seals
- Moisture Detection
- High Efficiency Hydraulic Design
- 3” Solids Handling
- Standard Flange Connection
- Available in dry pit configuration
Recessed Impeller
- Handles Stringy and Fibrous Materials
- Passes Large Solids
- Pumps Heavier Solids Concentrations
- Ideal for Grit and Abrasive Solids
- Pumping via Vortex Action
- Solids Do Not Pass through Impeller
- Virtually Impossible to Clog

Long Service Life
- Dual Silicon Carbide Shaft Seals
- Low Motor Operation Temperatures
- Continuously Lubricated Bearings
- Premium 3-Bearing Construction
- Epoxy Potted Cord Entry

Low Maintenance
- No Wear Components
- Recessed Impeller out of Passageway
- Grit-Resistant Silicon Carbide Shaft Seals

Strong Performance
- Ideal for Higher heads, Lower flows
- Operate to Shut-off Head without Damage
- Non-overloading Performance Curve

Options Available
- Flows to 1,400 GPM
- Up to 60 HP
- Available in dry pit configuration

M4R Series

M4RH - 4” Discharge
Features and Benefits
- Watertight Cable Entrance
- Strong Motor
- 3-Bearing Support Rated for 100,000 hour B-10 life.
- Severe Duty Dual Mechanical Seals
- Moisture Detection
- Non-Overloading Hydraulic Design
- 3” Solids Handling
- Standard Flange Connection

Capabilities:
- Flows to 510 GPM
- Heads to 93 Feet
- 7.5 - 15 HP Range
- Voltage Options
  - 208 / 230 Volt, 1-Phase
  - 208 / 230 / 460 Volt, 3-Phase
- 4” ANSI Class 125 Horizontal Flange
- Motor Speed 3450 rpm
- Solids Handling 3”
- Recessed, Vortex Impeller
- Motor Service Factor 1.20

M4RP - 4” Discharge
Features and Benefits
- Watertight Cable Entrance
- Strong Motor (U.S. Motor Manufacturer)
- Solid Bearing Support Rated for 100,000 hour B-10 life.
- Severe Duty Dual Mechanical Seals
- Moisture Detection
- Non-Overloading Hydraulic Design
- 3” Solids Handling
- Standard Flange Connection

Capabilities:
- Flows to 800 GPM
- Heads to 125 Feet
- 3 - 20 HP Range
- Voltage Options
  - 208 / 230 Volt, 1-Phase
  - 208 / 230 / 460 / 575 Volt, 3-Phase
- 4” ANSI Class 125 Horizontal Flange
- Motor Speed 1150 / 1750 / 3450 rpm
- Solids Handling 3”
- Recessed, Vortex Impeller
- Motor Service Factor 1.20
COMPLETE Turnkey Packages

- AK Industries Fiberglass Basin
- Completely Assembled
- Quick & Simple Field Installation
- Saves Time & Money
- Fast Shipping Time
- Custom Built to Your Requirements

Standard Basins
- Diameters to 96”
- Lengths to 240”
- Custom Sizes Available

Systems
- Fiberglass Basins
- Complete Simplex
- Complete Duplex
- Custom Basins

Packages
- Pumps
- Controls
- Junction Box
- Floats
- Rail System
- Piping
**EOR-WTB-F (High Flow)**

**CPG2023DS 2 HP Dual Seal Grinder Pump**

The vortex impeller design of the CPG2023DS pump provides non-overloading performance and prevents clogging over the entire performance curve. The CPG2023DS pump produces capacities to 42 gpm with heads to 133 feet.

**For more detail see page 42**

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Barnes Retrofits

Turnkey Replacement Package
Fully Assembled

The MDI advantages:
- Fits into Existing System - No Modifications
- Simple and Fast Installation - Just Lower Into Place
- Operates with same Control Panel
- Eliminates Existing Problems
- Superior Pump Performance - More Flow
- Reduces Service/Maintenance Issues
- Reliable Operation
- Saves up to 20% on energy costs

The Barnes Retrofit works with any of our 2 HP grinder pumps. Just add BR to the beginning of the part number:
(Ex. BRG2-21SI)

For detailed specs please refer to any of the following:

115 Volt 2 HP Standard Head Internal Start G2-11SI (See Page 44)

208/230 Volt 2 HP Standard Head Internal Start G2-21SI (See Page 44)

208/230 Volt 2 HP Standard Head External Start G2-21SE (See Page 46)
Turnkey Replacement Package
Fully Assembled
Simple Fast Installation
Just lower into place!

The MDI advantages:
• No Modifications - Fits into Existing System
• Eliminates Existing Problems
• Superior Pump Performance - More Flow
• Reduces Service/Maintenance Issues
• Saves Money!
• Operates with same Control Panel
• Reliable Operation

The MDI BRG5-21HE series centrifugal grinder pumps easily handle residential, light commercial or industrial sanitary waste, reducing it to fine slurry. The BRG5-21HE pump is designed for use in pressure sewer applications or any piping network.

The recessed vortex impeller design of the BRG5-21HE grinder pump provides trouble free, non-overloading operation over the entire performance curve.

The modular design provides quick and easy serviceability. The hardened stainless steel grinder assembly provides many years of dependable operation.

Pump Specifications: BRG5-21HE
5 HP Dual Seal Grinder High Flow Pump
External Start Components - High Flow

The G5-21HE series pump features:
Strong Class F 5 HP motor, 208 / 230 Volt, 1-phase
3 support bearings (upper / lower ball, sleeve)
Dual mechanical seals (silicon carbide)
Internal moisture protection

The MDI BRG5-21HE series centrifugal grinder pumps easily handle residential, light commercial or industrial sanitary waste, reducing it to fine slurry. The BRG5-21HE pump is designed for use in pressure sewer applications or any piping network.
WARRANTY
MDI Inc; warrants its products to be free from defects in material or workmanship (length varies depending on product), and will replace any units with such defects. Warranty is void if units are improperly applied. All repairs are to be done by MDI in their facility. The purchaser is responsible for pump removal and re-installation. MDI Inc. shall not be liable for any consequential, incidental, or contingent damages whatsoever. The forgoing Warranty is exclusive to MDI products and in lieu of all other express or implied Warranties, including but not limited to the implied Warranties of merchantability and fitness for a particular purpose.

To recycle used Mercury floats, contactors, & switches
Return to or Contact MDI Inc.
1-800-634-4077 or www.mdius.com

Post Office Box 710 - U.S. 12 East - Edwardsburg, Michigan 49112-0710
PHONE (269) 663-8574 - FAX (269) 663-2924
1-800-MDI-4077 - 1-800-634-4077
www.mdius.com