MDI

MERCURY & SOLID STATE CONTACTORS RELAYS, TILT & TIP OVER SWITCHES

CATALOG Y

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.

Contactors 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 actuate 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, Predictable Contact Resistance
- D) Reduced RFI for Improved Interface Capability
- E) Handles a Variety of Loads
  - (a) Increases design flexibility
- 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
  - (a) Impervious to adverse condition
  - (b) No external arcing
- B) Arcing is in a gaseous atmosphere
  - (a) Quenches the arc
  - (b) Extends relay life
- C) Only one moving part (the plunger)
  - (a) No buttons to pit, weld or burn out
- D) One coil for each set of contacts
  - (a) Assures consistent switching
  - (b) Minimizes pull-in variation between contacts
- E) Epoxy encapsulated
  - (a) Moisture resistant
  - (b) High dielectric strength
  - (c) Permanently fixes contacts to coil; eliminating possible misalignment
  - (d) Helps dissipate heat and noise
  - (e) Rugged (impact resistant)

3) BENEFITS

- A) Reduction of Operational and Maintenance costs
- B) Increases Utilization and Productivity of equipment
  - (a) By reducing down-time
- C) Installation and service is a routine operation
  - (a) Simple to install
  - (b) No sophisticated equipment is required
  - (c) Easy to trouble-shoot

SELECTION 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.? If A.C., what is the frequency?
d. What is the nature of the load?
   Heater load?
   Lamp load?
   Motor load?
   Current inrush and running current?
   Other types of inductive load?

3) CONTACT ARRANGEMENT

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 and A.C. or a D.C. circuit? If A.C., what frequency?

7) MOUNTING SPACE

a. Are there any limitations on space for applying relay?

INDEX

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.

CONTACT: 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.) The juncture point to provide the complete path.

CONTACTS: Mercury to Metal: The contacts of a standard mercury displacement relay or contactor. The upper contact is metal and stationary. The lower contact is a pool of mercury that gets displaced by the plunger assembly, thereby coming in contact with the metal electrode during operation. (See page 4.)

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 unit 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 it's reliability or to permit operation at high ambient temperatures.

DIELECTRIC: The insulating material between the metallic elements of an electronic component.

DROP-OUT: 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.

HEAT RISE: In a mercury displacement relay; The heat developed from the coil and contacts as a unit.

HERMETIC SEAL: A mechanical or physical closure that is impervious to moisture or gas, including air.

HERTZ: Cycles per second.

INRUSH CURRENT: In a solenoid or coil, the steady-state current drawn from the line with the armature, or plunger, in its maximum open position.

LOAD, CONTACT: 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 Operate is when the operate time is less than the stated release time. Slow operate is when the operate time is no longer than the stated release time.

PLUNGER: In 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 FACTOR: Ratio of the actual power of an alternating or pulsating current to the apparent power.

PULL-IN: (Pick-up): The minimum current, voltage, power or other value which will trip a relay or cause it to operate.

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 of a normally open unit reopen, or when contacts of a normally closed unit recloses.

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 (Transient Phenomena): Rapidly 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 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.

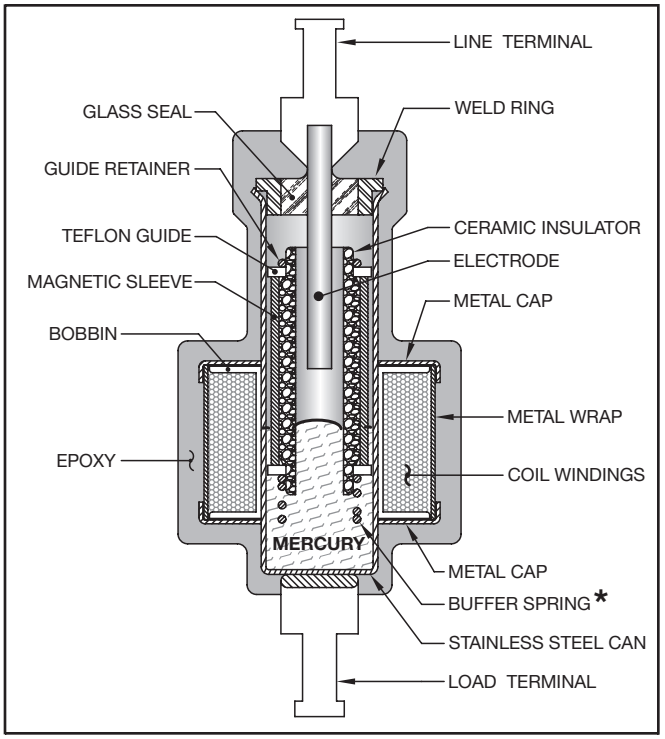
VOLTAGE SPIKES: An abrupt transient which comprises part of a pulse but exceeds it's average amplitude considerably.

VOLTAGE WITHSTAND: The amount of electromotive force (volts) that can be applied to two points before a current will flow (leakage or breakdown.)

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	Hg	Mercury
DC	Direct Current	Hz	Hertz
MDR	Mercury Displacement Relay	NC	Normally Closed
DPST	Double Pole Single Throw	NO	Normally Open
SPST	Single Pole Single Throw	Q	Quick
TPST	Triple Pole Single Throw	S	Slow
DATS	Damper Arm Tilt Switch		



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

HOW TO ORDER

SPECIFY AS SHOWN BELOW

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: Followed by **"A"** for Alternating Current or **"D"** for Direct Current

OPTIONS

SEE NOTE #1

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

335NO-120A THN-18

BRACKET, OTHER THEN STANDARD: **"A, B, N, P or U"** on 35 & 60-AMP units. (Blank if Standard bracket is used)
See Page 11 for Optional Terminations or Page 12 for Optional Mounting Plates

"H": Is for loads other then AC Resistive & Tungsten on Normally Open Units Only

"T": For Top Termination, **"TS"** For Top Screw Termination on 35-AMP Units. (Blank if Standard Termination).
See Pages 8 & 11

A.C. RESISTIVE LOAD RATING: (30, 35, 60, or 100-AMP).

NOTES: 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). (See example #2).

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.

30-AMP NORMALLY OPEN CONTACTORS

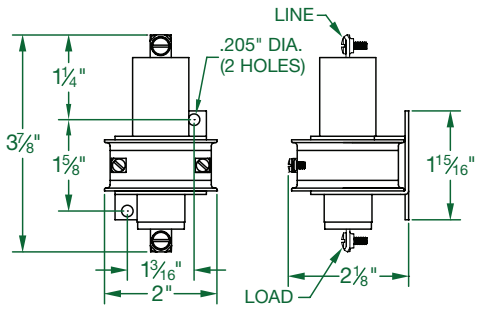
SINGLE POLE

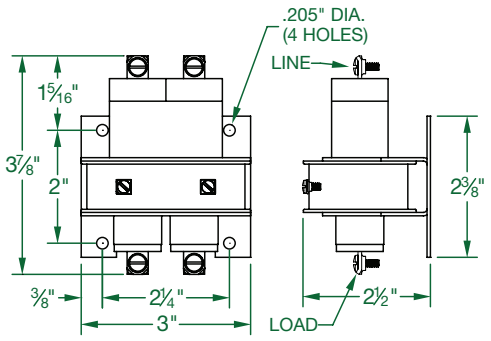
TWO POLE
STANDARD MOUNT

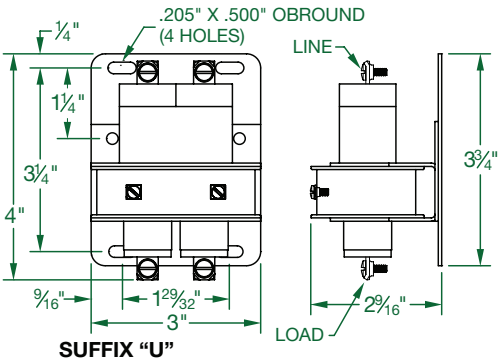
TWO POLE
UNIVERSAL MOUNT

THREE POLE
STANDARD MOUNT

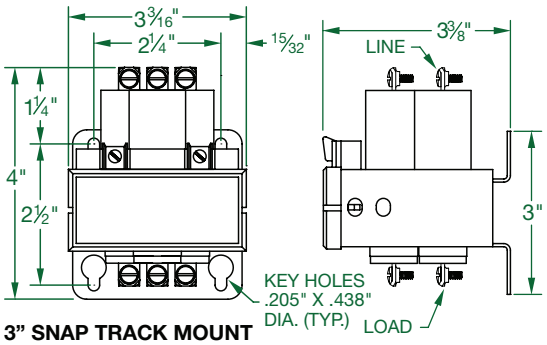
THREE POLE
UNIVERSAL MOUNT



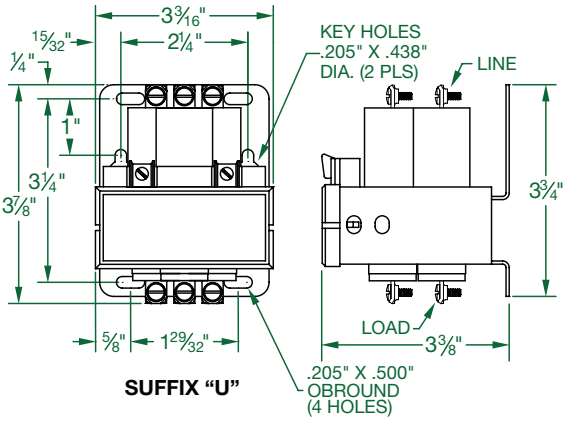




SUFFIX "U"



3" SNAP TRACK MOUNT



SUFFIX "U"

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***
- **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**

FILE #E-62767

FILE #LR 41198

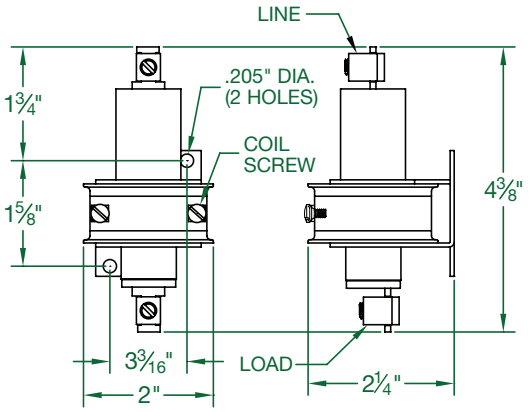
***AFTER CYCLING UNDER LOAD.**

Made in the USA

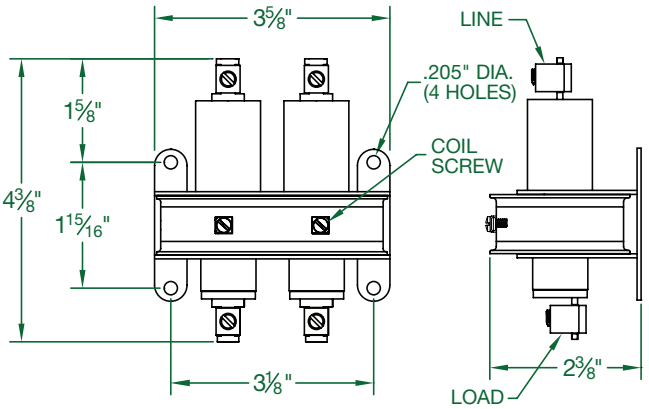
Catalog No.	Resistance	Current	V.A.	Watts
30NO-24D	180 Ω	133 mA	3.2	3.2
230NO-24D	131 Ω	188 mA	4.5	4.5
330NO-24D	73 Ω	329 mA	7.9	7.9
30NO-24A	28 Ω	316 mA	7.6	2.8
230NO-24A	12.5 Ω	610 mA	14.6	4.7
330NO-24A	7.6 Ω	815 mA	19.6	5.0
30NO-120A	725 Ω	65 mA	7.8	3.1
230NO-120A	317 Ω	118 mA	14.2	4.4
330NO-120A	210 Ω	163 mA	19.6	5.6
30NO-220A	3,150 Ω	27 mA	6.0	2.2
230NO-220A	1,300 Ω	56 mA	12.3	4.1
330NO-220A	728 Ω	86 mA	18.9	5.5

L35/L60-AMP NORMALLY OPEN CONTACTORS

SINGLE POLE
NORMALLY OPEN



TWO POLE
NORMALLY OPEN



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.

COIL DATA L35 AND L60 SERIES.

Catalog No.		Resistance	Current	V.A.	Watts
L35NO-24D	L60NO-24D	188 Ω	135 mA	3.3	3.3
L235NO-24D	L260NO-24D	92 Ω	260 mA	6.2	6.2
L35NO-24A	L60NO-24A	28 Ω	325 mA	7.8	3.0
L235NO-24A	L260NO-24A	10.3 Ω	660 mA	15.8	4.5
L35NO-120A	L60NO-120A	725 Ω	75 mA	9.0	4.0
L235NO-120A	L260NO-120A	350 Ω	115 mA	13.8	4.6
L35NO-220A	L60NO-220A	3,150 Ω	27 mA	5.9	2.2
L235NO-220A	L260NO-220A	1,000 Ω	69 mA	15.2	4.8

TYPICAL SPECIFICATIONS

Made in the USA

- **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 VAC 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

FILE #E-62767

FILE #LR 41198

*** AFTER CYCLING UNDER LOAD**

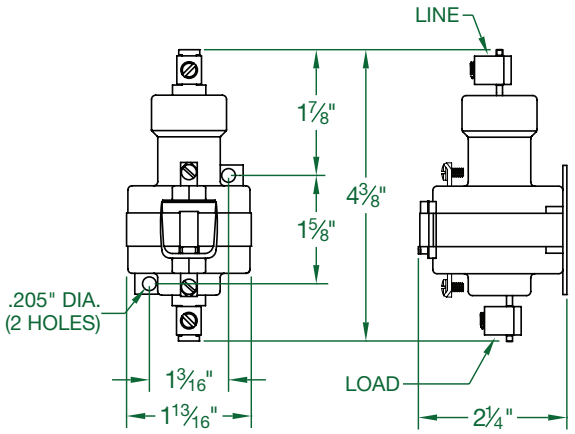
35/60-AMP NORMALLY OPEN CONTACTORS

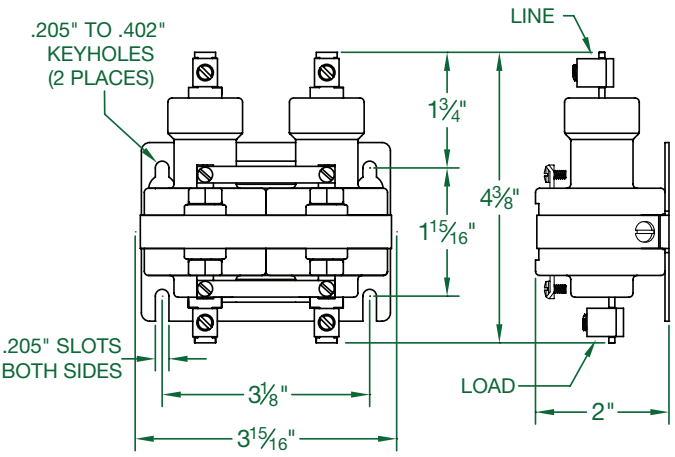
SINGLE POLE—NORMALLY OPEN

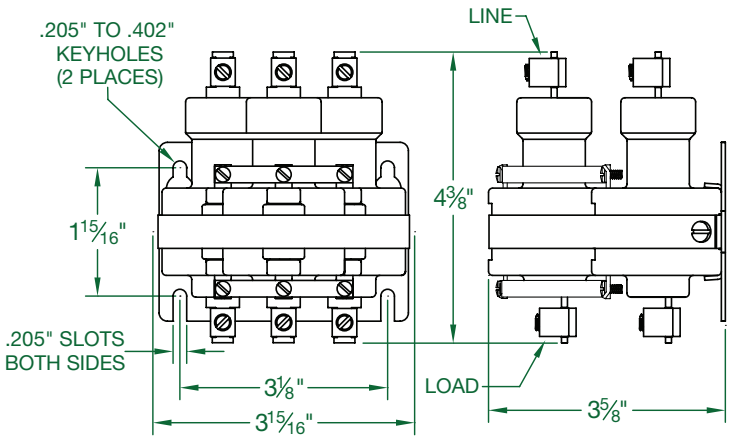
TWO POLE—NORMALLY OPEN

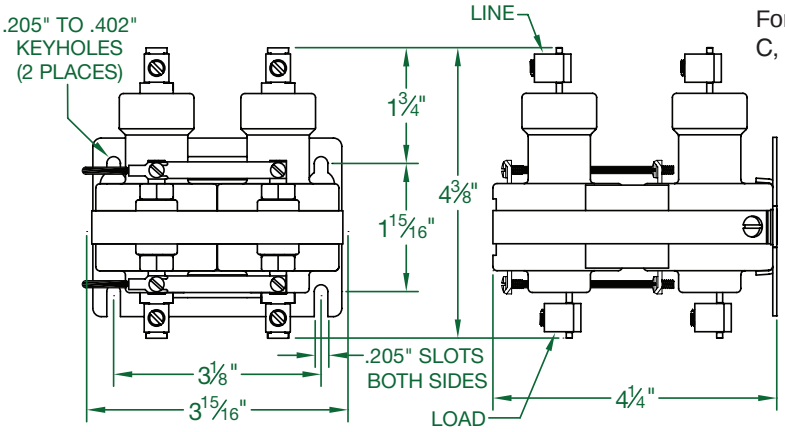
THREE POLE—NORMALLY OPEN

FOUR POLE—NORMALLY OPEN









FILE #E-62767 FILE #LR 41198

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**
- **C.S.A.: FILE # LR 41198 FOR**
- **TO ORDER SEE PAGE 4**

* AFTER CYCLING UNDER LOAD

Made in the USA

TRAFFIC CONTROL (CONSTANT DUTY)

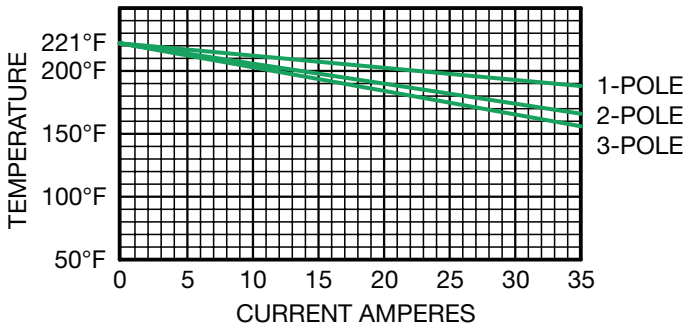
SP-1132- VOLTAGE- (A or D)
35 AMPS @ 600 VAC
SP-1130- VOLTAGE- (A or D)
60 AMPS @ 480 VAC
A return spring replaces the buffer spring for this application

HAZARDOUS LOCATIONS SUFFIX "X"

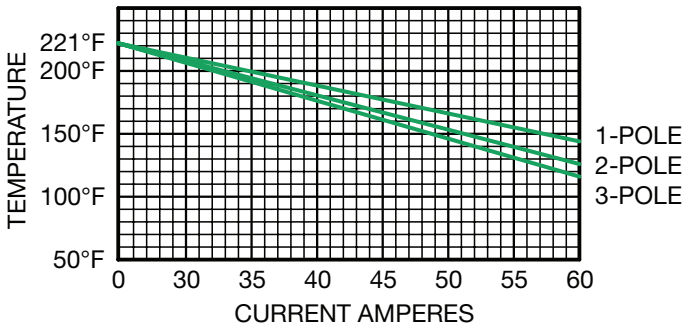
Available in 1, 2 & 3 Pole Units
Auxiliary devices for use in hazardous locations
For CLASS 1, GROUPS A, B, C, & D – Division 2 only.

DE-RATING CHARTS

35-AMP NORMALLY OPEN
LOAD DE-RATING DUE TO AMBIENT TEMPERATURE

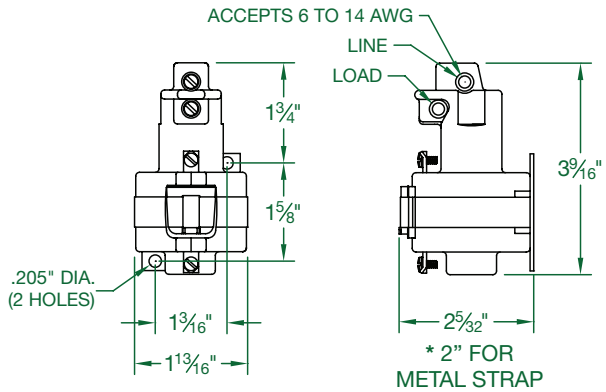


60-AMP NORMALLY OPEN
LOAD DE-RATING DUE TO AMBIENT TEMPERATURE



35-AMP T-TOP CONTACTORS

SINGLE POLE—NORMALLY OPEN

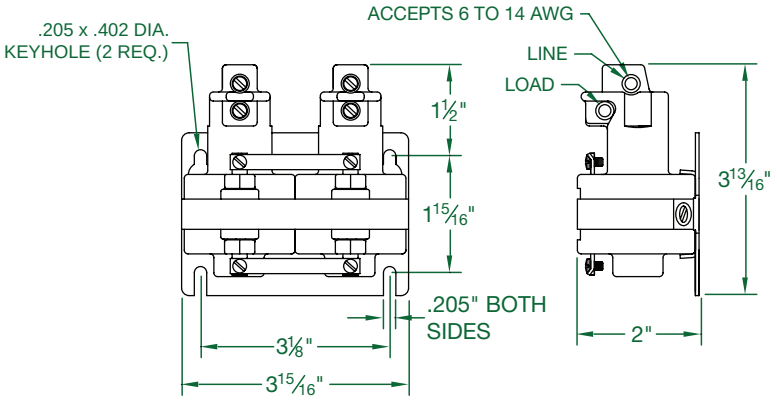


Made in the USA

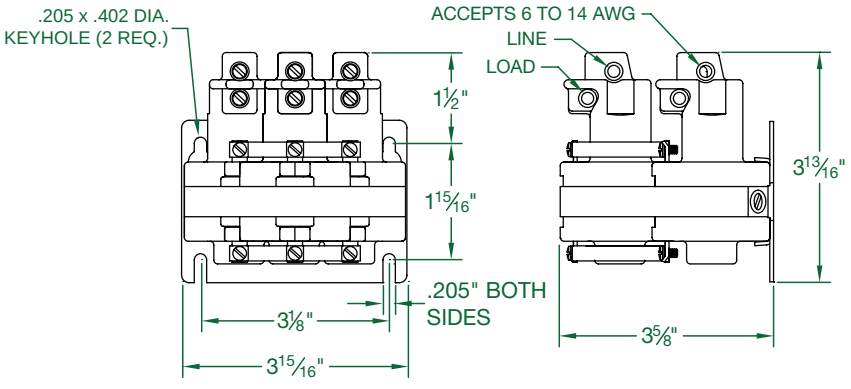
FILE #E-62767

FILE #LR 41198

TWO POLE—NORMALLY OPEN

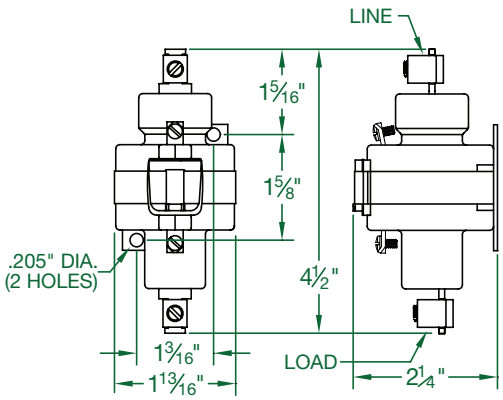


THREE POLE—NORMALLY OPEN

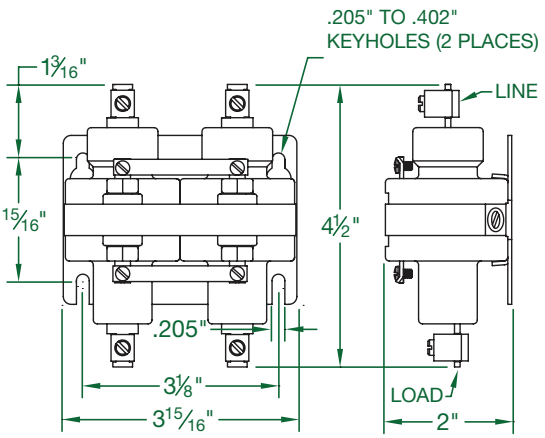


35/60-AMP NORMALLY CLOSED CONTACTORS

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



SINGLE POLE

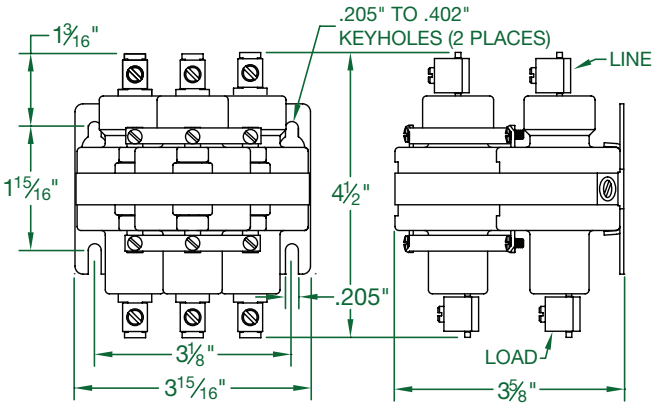


TWO POLE

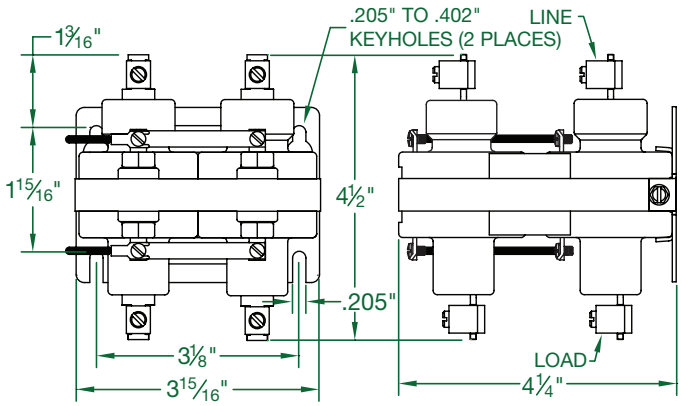
FILE #E-62767

FILE #LR 41198

Made in the USA

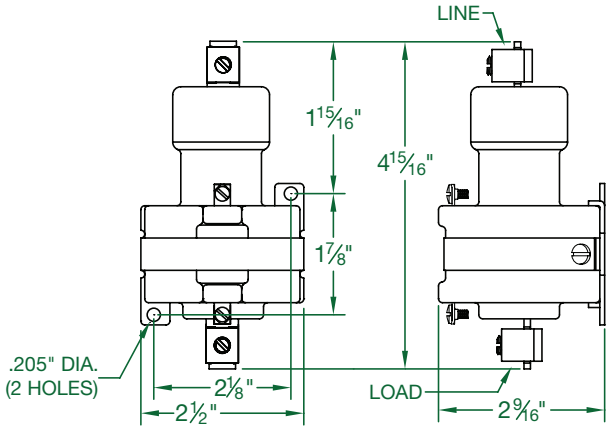


THREE POLE

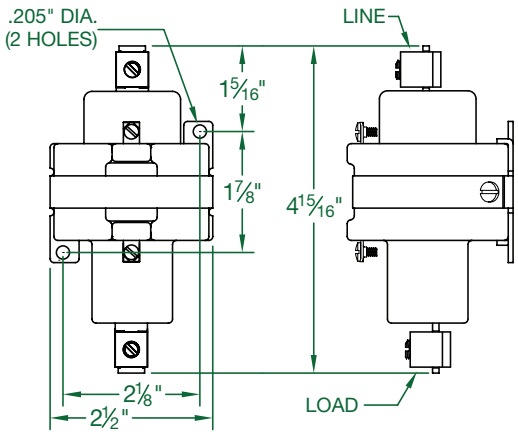


FOUR POLE

HIGH VOLTAGE CONTACTORS



NORMALLY OPEN



NORMALLY CLOSED

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 AW wire.

- **Also available in 2 & 3 pole**

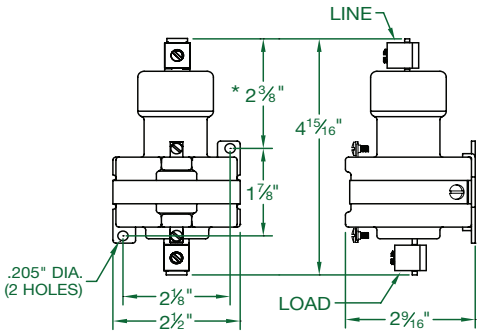
RATINGS: 10 AMPS @ 3500 VAC
15 AMPS @ 2500 VAC
AC INDUCTIVE Power Factor .7 or Greater.

COIL DATA

Catalog Number	Coil Voltage	Resistance	Current Draw	Wattage	V.A.
100NC-24D-6A	24 VDC	65 Ω	369 mA	8.9	8.9
100NC-120A-6A	120 VAC	380 Ω	125 mA	5.9	15.0
100NC-220A-6A	220 VAC	1,400 Ω	76 mA	8.1	16.7
100NO-12DH-6A	12 VDC	16 Ω	750 mA	9.0	9.0
100NO-24AH-6A	24 VAC	16 Ω	760 mA	9.2	18.2
100NO-24DH-6A	24 VDC	65 Ω	369 mA	8.9	8.9
100NO-120AH-6A	120 VAC	380 Ω	158 mA	9.5	19.0
100NO-220AH-6A	220 VAC	1,320 Ω	92 mA	11.2	20.2

NORMALLY OPEN UNIT

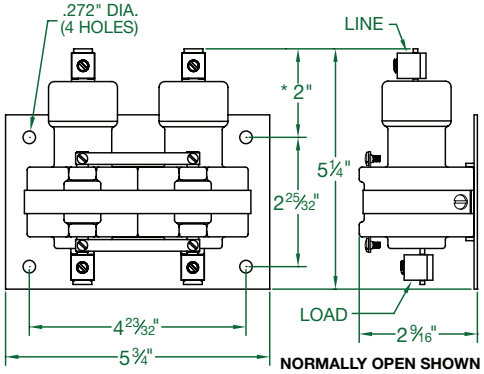
NORMALLY CLOSED UNIT



NORMALLY OPEN SHOWN

* THIS DIMENSION IS 1 ⅜" FOR NORMALLY CLOSED SINGLE POLE UNITS

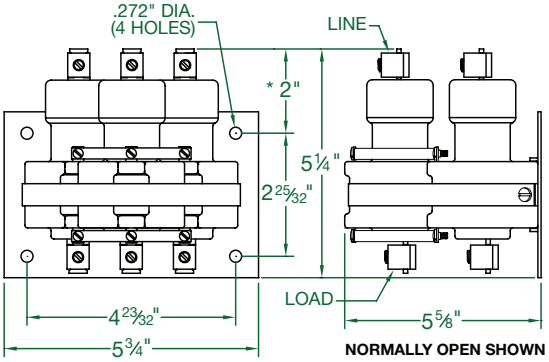
TWO POLE—NORMALLY OPEN



NORMALLY OPEN SHOWN

* THIS DIMENSION IS ¹⁵⁄₁₆" FOR NORMALLY CLOSED TWO POLE UNITS

THREE POLE—NORMALLY OPEN



NORMALLY OPEN SHOWN

* THIS DIMENSION IS ¹⁵⁄₁₆" FOR NORMALLY CLOSED TWO POLE UNITS

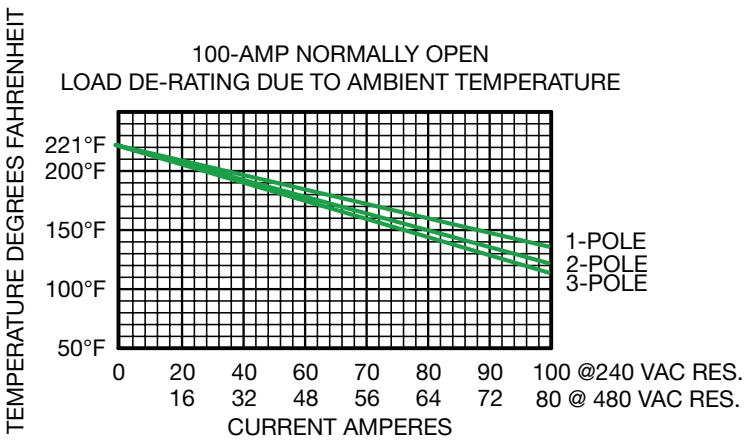
TYPICAL SPECIFICATIONS

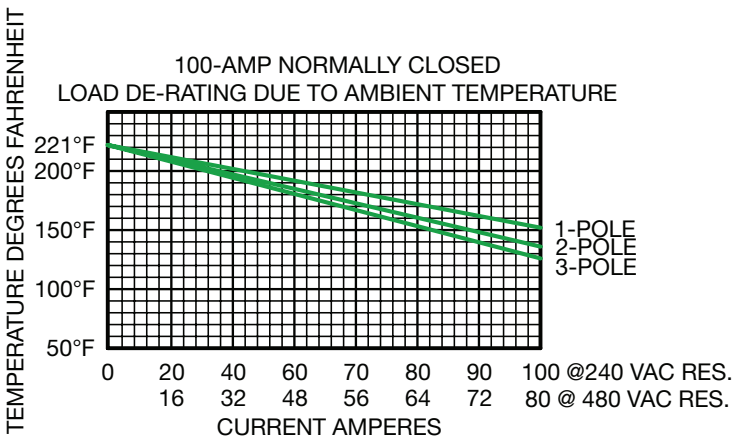
- ON NORMALLY OPEN UNITS:
  OPERATE TIME: 50 milliseconds
  RELEASE TIME: 80 milliseconds
- ON NORMALLY CLOSED UNITS:
  OPERATE TIME: 45 milliseconds
  RELEASE TIME: 60 milliseconds
- CONTACT RESISTANCE:
  .001 ohm*
- DIELECTRIC WITHSTAND:
  2500VAC RMS
- LONGEVITY:
  MILLIONS OF CYCLES
- TEMPERATURE 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 240VAC 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

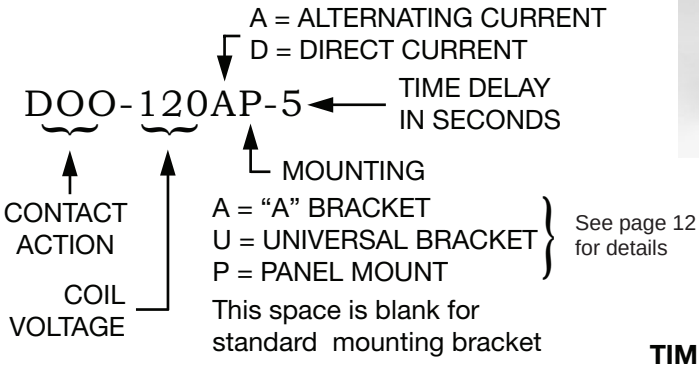


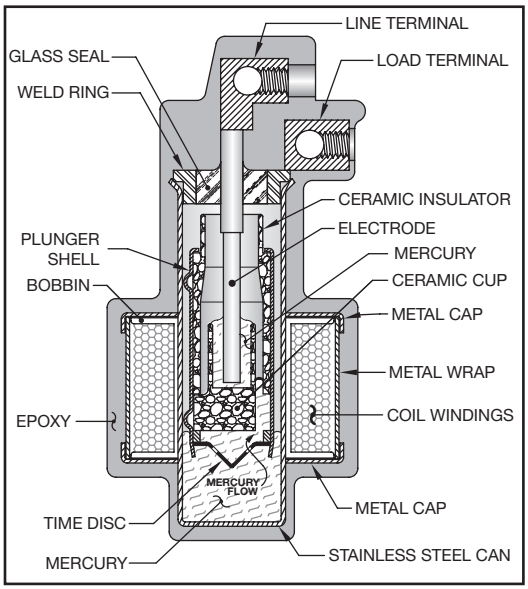


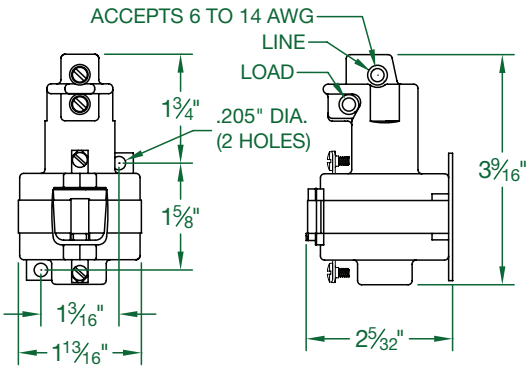
MDI's Time Delay CONTACT ACTION is designated as follows:

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

HOW TO ORDER Specify as shown below



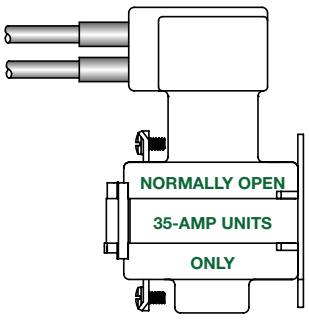




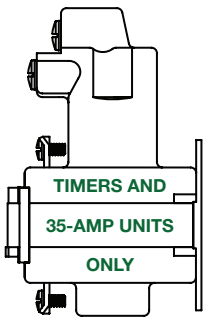
TIME DELAY RELAYS Are available with delays of up to 15 seconds on normally open units, and 4 seconds on normally closed units. The timing limitation depends on the contact action required. A time delay function is accomplished in this unit by sizing a hole in the time disc that will control the rate 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

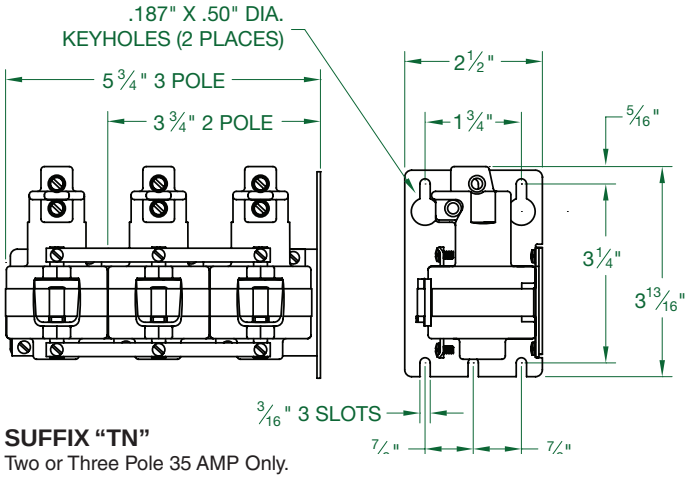
OPTIONAL TERMINATIONS



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).

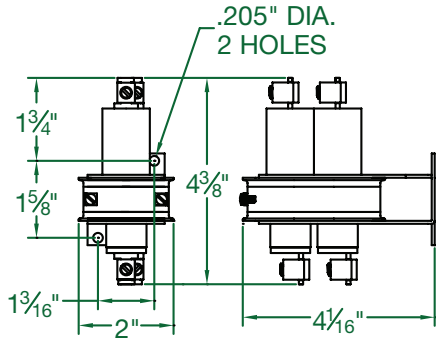


TS (Top Screws)
Designated by the letters "TS" in the catalog number suffix. For timers and 35-amp units. (Dimensions same as T-Top see page 8).

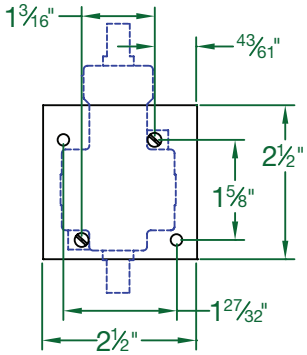


SUFFIX "TN"
Two or Three Pole 35 AMP Only.
Load terminals on top for shorter overall height.

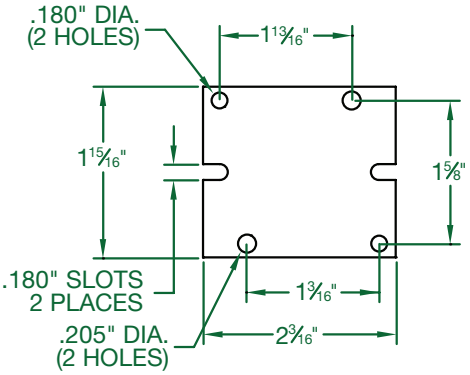
OPTIONAL MOUNTING PLATES



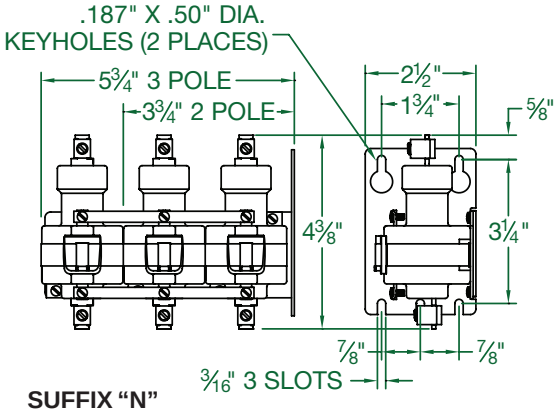
SP-1214-
2" wide, narrow mount two pole 30 amp. catalog number SP-1214 followed by the coil voltage, then "A" for AC & "D" for DC.
Example: SP-1214-120A



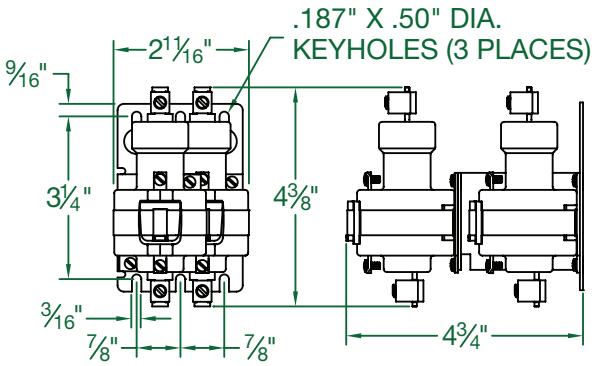
"P" PANEL MOUNT
For 35, 60-amp or standard timer; with standard mounting bracket. The standard mounting bracket attaches to the panel with two 6-32 screws.
Material: 3/8" thick phenolic.



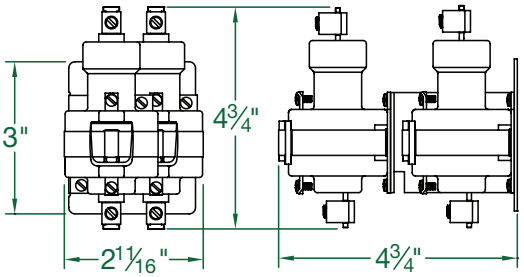
"U" UNIVERSAL BRACKET
For single pole, 35 and 60-amp units, and for timers. This is the standard bracket for hybrid timers.
Material: 16-ga. plated steel.



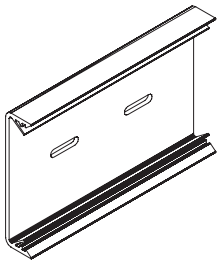
SUFFIX "N"
Narrow two or three pole 35 or 60 amp units only



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

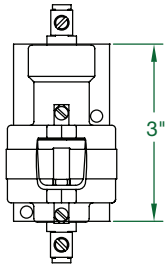


SUFFIX-"NB"
Two pole 35 or 60 amp narrow mounted, front facing, off set, for snap track mounted

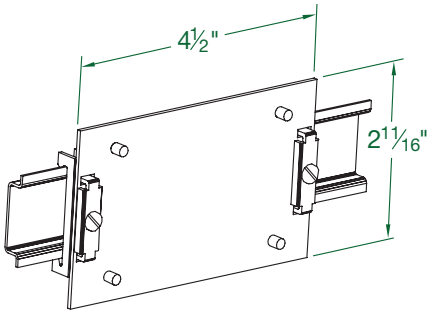


3" SNAP TRACK™ MOUNTING
Specify suffix "B" for SNAP TRACK mount on single, two and three pole 35 and 60 amp series and single and two pole 30 amp series. SNAP TRACK mount is standard on three pole 30 amp without suffix.

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



"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-17 & -20 Din rail mount 35mm symmetrical for 35 and 60 AMP units.

COIL DATA PER POLE RATINGS ON STANDARD COILS

CATALOG NUMBER	VOLTAGE	RESISTANCE (D.C. OHMS)	CURRENT (MILLIAMPERES)	VOLT AMPERES (VA)	POWER (WATTS)
30 AMP SERIES (SEE PAGE 5)	SEE PAGE 5	SEE PAGE 5	SEE PAGE 5	SEE PAGE 5	SEE PAGE 5
35NO-24A	24 VAC	50 Ω	242 mA	5.8 VA	2.9 W
35NO-120A	120 VAC	1,250 Ω	53 mA	6.4 VA	3.5 W
35NO-208A	208 VAC	3,400 Ω	30 mA	6.2 VA	3.1 W
35NO-220A	220 VAC	4,800 Ω	28 mA	6.2 VA	3.8 W
35NO-277A	277 VAC	7,900 Ω	20 mA	5.5 VA	3.2 W
35NO-480A	480 VAC	20,000 Ω	12 mA	5.9 VA	3.0 W
35NO-6D	6 VDC	13 Ω	462 mA	2.8 VA	2.8 W
35NO-12D	12 VDC	36 Ω	333 mA	4.0 VA	4.0 W
35NO-24D	24 VDC	176 Ω	136 mA	3.3 VA	3.3 W
35NO-48D	48 VDC	636 Ω	75 mA	3.6 VA	3.6 W
35NO-125D	125 VDC	3,400 Ω	37 mA	4.6 VA	4.6 W
35NO-250D	250 VDC	14,800 Ω	17 mA	4.2 VA	4.2 W
35NC-24A	24 VAC	36 Ω	310 mA	7.4 VA	3.5 W
35NC-120A	120 VAC	960 Ω	65 mA	7.8 VA	3.6 W
35NC-220A	220 VAC	3,400 Ω	31 mA	6.8 VA	3.3 W
35NC-12D	12 VDC	36 Ω	333 mA	4.0 VA	4.0 W
35NC-24D	24 VDC	176 Ω	136 mA	3.3 VA	3.3 W
35NC-48D	48 VDC	560 Ω	86 mA	4.1 VA	4.1 W
35NC-125D	125 VDC	3,400 Ω	37 mA	4.6 VA	4.6 W
60NO-24A	24 VAC	50 Ω	259 mA	6.2 VA	3.4 W
60NO-120A	120 VAC	1,250 Ω	48 mA	5.8 VA	2.9 W
60NO-208A	208 VAC	3,400 Ω	30 mA	6.2 VA	3.1 W
60NO-220A	220 VAC	4,800 Ω	27 mA	5.9 VA	3.5 W
60NO-277A	277 VAC	7,900 Ω	19 mA	5.3 VA	2.9 W
60NO-480A	480 VAC	20,000 Ω	12 mA	5.8 VA	2.9 W
60NO-12D	12 VDC	36 Ω	333 mA	4.0 VA	4.0 W
60NO-24D	24 VDC	140 Ω	171 mA	4.1 VA	4.1 W
60NO-48D	48 VDC	636 Ω	75 mA	3.6 VA	3.6 W
60NO-125D	125 VDC	3,400 Ω	37 mA	4.6 VA	4.6 W
60NO-250D	250 VDC	14,800 Ω	17 mA	4.3 VA	4.3 W
60NC-24A	24 VAC	36 Ω	325 mA	7.8 VA	5.3 W
60NC-120A	120 VAC	960 Ω	69 mA	8.3 VA	4.1 W
60NC-220A	220 VAC	3,400 Ω	34 mA	7.5 VA	3.9 W
60NC-277A	277 VAC	7,900 Ω	26 mA	7.3 VA	5.5 W
60NC-12D	12 VDC	36 Ω	333 mA	4.0 VA	4.0 W
60NC-24D	24 VDC	140 Ω	171 mA	4.1 VA	4.1 W
60NC-48D	48 VDC	560 Ω	86 mA	4.1 VA	4.1 W
60NC-125D	125 VDC	3,400 Ω	37 mA	4.6 VA	4.6 W
100NO-24A	24 VAC	16 Ω	646 mA	15.5 VA	6.7 W
100NO-120A	120 VAC	380 Ω	137 mA	16.4 VA	7.1 W
100NO-220A	220 VAC	1,400 Ω	73 mA	16.1 VA	7.5 W
100NO-277A	277 VAC	2,400 Ω	55 mA	15.2 VA	7.3 W
100NO-480A	480 VAC	6,300 Ω	35 mA	16.8 VA	7.7 W
100NO-24D	24 VDC	65 Ω	369 mA	8.9 VA	8.9 W
100NO-48D	48 VDC	325 Ω	148 mA	7.1 VA	7.1 W
100NO-125D	125 VDC	2,400 Ω	52 mA	6.5 VA	6.5 W
100NC-24A	24 VAC	16 Ω	515 mA	12.4 VA	4.2 W
100NC-120A	120 VAC	380 Ω	110 mA	13.2 VA	4.6 W
100NC-208A	220 VAC	1,400 Ω	55 mA	11.4 VA	4.2 W
100NC-240A	240 VAC	1,685 Ω	49 mA	11.8 VA	4.0 W
100NC-480A	480 VAC	6,300 Ω	27 mA	13.0 VA	4.6 W
100NC-12D	12 VDC	28 Ω	433 mA	5.2 VA	5.2 W
100NC-24D	24 VDC	108 Ω	222 mA	5.3 VA	5.3 W
100NC-48D	48 VDC	380 Ω	126 mA	6.1 VA	6.1 W
100NC-125D	125 VDC	2,400 Ω	52 mA	6.5 VA	6.5 W

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

RATINGS ARE IN AMPS UNLESS OTHERWISE SPECIFIED

		30 NO	35 NO	35 NO (H)	35 NC	60 NO	60 NO (H)	60 NC	100 NO	S100 NO	100 NO (H)	100 NC	S100 NO (H)
A.C. RESISTIVE	240 V	30	35	35	35	60	60	60	100	100	100	100	100
	480 V	30	35	35	35	60	60	60	80	100	80		100
	600 V	30	35	–	–	48	–	–	70	80	70		80
A.C. INDUCTIVE P.F. .4 OR GREATER	120 V	–	–	25	25	–	30	30	–		100		
	240 V	–	–	15	15	–	20	20	–		100		
GENERAL PURPOSE P.F. .7 OR GREATER	240 V	–	–	35	35	–	60	60	–		100	80	100
	480 V										80		100
D.C. RESISTIVE HEATING	48 V	–	–	35	35	–	60	60	–		100		
	125 V	–	–	16	16	–	40	40	–		50		
	250 V	–	–	12	12	–	20	20	–		30		
TUNGSTEN LAMP	120 V	30	35	35		60	60		100		100		
MOTOR LOADS SINGLE PHASE	120 V	–	1 H.P.	2 H.P.		–	3 H.P.		–		7.5 H.P.		
	240 V	–	1 H.P.	3 H.P.		–	5 H.P.		–		10 H.P.		
MOTOR LOADS THREE PHASE	240 V	–	–	5 H.P.		–	7.5 H.P.		–		15 H.P.		
	480 V	–	–	7.5 H.P.		–	10 H.P.		–		20 H.P.		

KEY: SHADED AREA FOR UL LISTING AND/OR COMPONENT RECOGNITION.
– NOT RECOMMENDED FOR THIS TYPE OF LOAD.

SOLID STATE RELAY RATINGS

See Page 16 for HPR Series
See Page 15 for 3PSS60A75

CATALOG NUMBER	HPR48A25 HPR48D25	HPR48A50 HPR48D50	HPR48A75 HPR48D75	HPR48A100 HPR48D100	3PSS60A75
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
I^2t (10ms) Minimum	525 A2s	1800 A2s	6600 A2s	18000 A2s	6600 A2s

See Page 18 for SSR Series

CATALOG NUMBER	SS20AE-1 SS20AU-1 SS20DE-1 SS20DU-1	SS30AE-1 SS30AU-1 SS30DE-1 SS30DU-1	SS40AE-1 SS40AU-1 SS40DE-1 SS40DU-1	SS60AE-1 SS60AU-1 SS60DE-1 SS60DU-1	SS90AE-1 SS90AU-1 SS90DE-1 SS90DU-1
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
I^2t (10ms) Minimum	525 A^2S	1800 A^2S	3200 A^2S	3200 A^2S	6600 A^2S

See Page 25 for 2 & 3 Pole

CATALOG NUMBER	2SS60A25 2SS60D25	2SS60A40 2SS60D40	2SS60A75-24DF 2SS60A75-120F 2SS60D75-24DF 2SS60D75-120F	3SS60A20 3SS60D20	3SS60A25 3SS60D25	3SS60A30 3SS60D30	3SS60A40 3SS60D40	3SS60A65-24DF 3SS60A65-120F 3SS60A65-24DF 3SS60A65-120F
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
I^2t (10ms) Minimum	1800 A^2S	6600 A^2S	15000 A^2S	1800 A^2S	1800 A^2S	6600 A^2S	6600 A^2S	15000 A^2S

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

Industrial, 3-Phase SS

- 3-phase Solid State Relay
- Zero switching
- Rated operational current: 3 x 75 AMPS
- Rated operational voltage: 600 VAC
- Control voltage 3PSS60A75 24-50 VDC/24-275 VAC
  3PSS60D75 3-32 VDC
- Integral snubber network
- Built-in varistor
- IP10 back-of-hand protection
- LED indication of control input
- Heat Sink and 24 VDC Fan Included
  120 VAC Fan Optional

CE

c UL us
E 354129

3PSS60A75 S
3PSS60D75 S — **Standard Din-Rail**

3PSS60A75 R
3PSS60D75 R — **Retro Fit**

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.

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

General Specifications

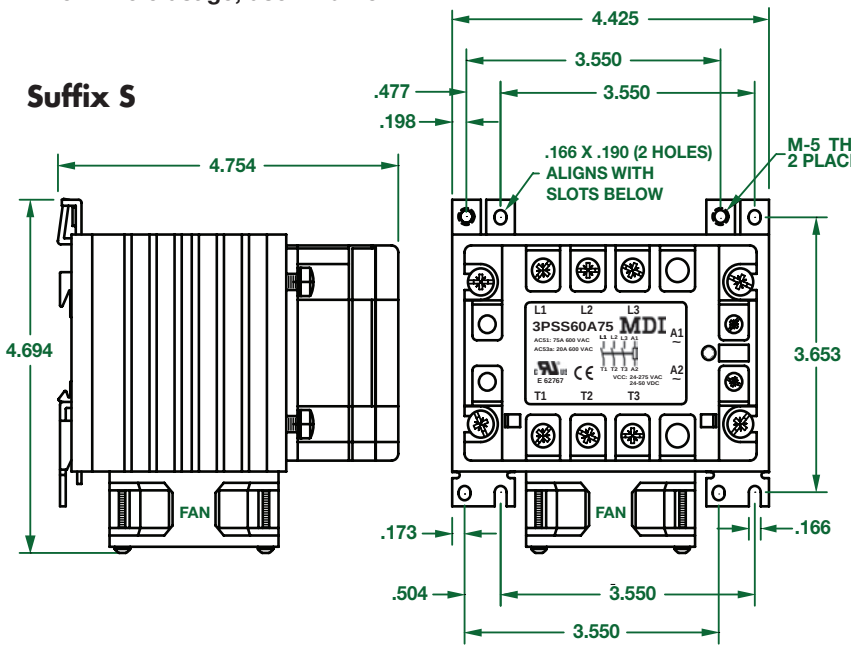
Operational voltage range	42-660 VAC 45 to 65 Hz
Blocking voltage	1600_p V
Over voltage category III	Pollution degree 3
Operating temperature	-30° to 80°C (-22° to 158°F)
Storage temperature	-40° to 100°C (-40° to 212°F)
Input to output isolation voltage	≥ 4000 VAC rms
Output to case isolation voltage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

Input Specifications

	3PSS60A75	3PSS60D75
Control voltage range	24-275 VAC/24-50 VDC	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

All data specified at Ta=25°C

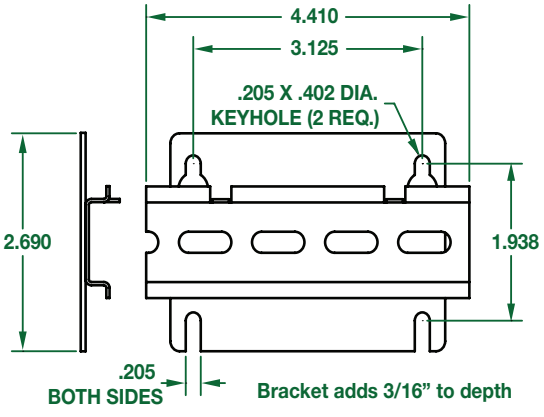
Suffix S



Suffix R

Includes Retro Fit Back Plate

For direct replacement with standard 2 & 3 pole Mercury Relays. Using the same mounting holes.



HPR Series (Hockey Puck Relay)

Industrial, 1-Phase ZS (IO) w. LED and Built-in Varistor

- Zero switching
- Direct copper bonding (DCB) technology
- LED indication
- Built-in varistor 480 V
- Clip-on IP20 protection cover
- Self-lifting terminals
- Housing free of moulding mass
- Blocking voltage: 1200V_p
- Opto-isolation: > 4000 VAC rms
- 2 input ranges: 4-32 VDC and 20-280 VAC/22-48 VDC
- Operational ratings: Up to 75 AMPS rms
- Rated voltage: 480 VAC rms

CE

c UL us
E 354129

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).

Ordering Key

HPR48 A 25

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

Type Selection

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

General Specifications

	HPR48...
Operational voltage range	42 to 530 VAC rms
Blocking voltage	≥ 1200 V_p
Zero voltage turn-on	≤ 10V
Operational frequency range	45 to 65Hz
Power factor	> 0.5 @ 480 VAC rms
Markings	c UL us CE

Input Specifications

	HPR..D..	HPR..A..
Control voltage range	4 - 32 VDC	20 - 280 VAC
Pick-up voltage @ Ta = 25°C	3.5 VDC	18 VAC/DC
Reverse voltage	32 VDC	-
Drop out voltage	1.2 VDC	6 VAC/DC
Input current @ max voltage	≤ 12 mA	≤ 20 mA
Response time pick-up	≤ 1/2 cycle	≤ 12 ms
Response time drop-out	≤ 1/2 cycle	≤ 40 ms

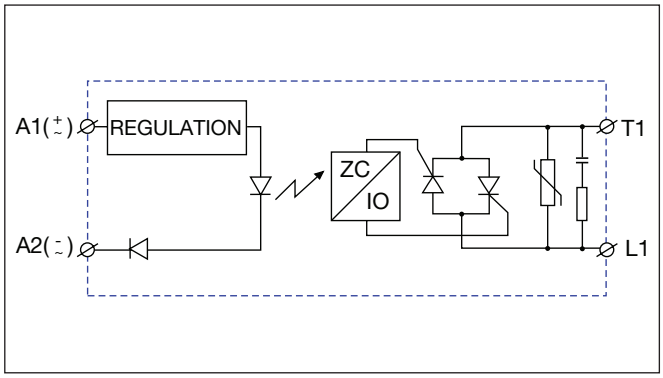
Output Specifications

See page 14

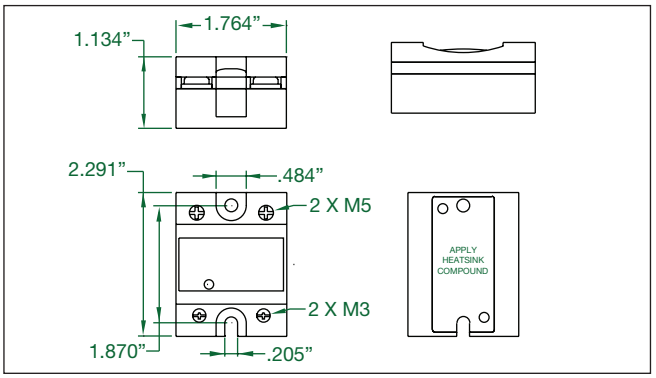
Thermal Specifications

	HPR...25	HPR...50	HPR...75	HPR...100
Operating temperature range		-20° to 70°C (36° to 126°F)		
Storage temperature range		-40° to 100°C (72° to 180°F)		
Junction temperature		≤ 125°C (225°F)		
R_{th} junction to case	≤ 0.80K/W	≤ 0.50K/W	≤ 0.35K/W	≤ 0.30K/W
R_{th} junction to ambient		≤ 20.0K/W		

Functional Diagram



Dimensions



Heatsink Data
(load current versus ambient temperature)

HPR...25

Load current [A]	Thermal resistance [K/W]						Power dissipation [W]
25.0	2.70	2.34	1.98	1.61	1.25	0.89	28
22.5	3.10	2.69	2.28	1.86	1.45	1.04	24
20.0	3.61	3.13	2.65	2.18	1.70	1.23	21
17.5	4.26	3.70	3.14	2.59	2.03	1.47	18
15.0	5.14	4.47	3.80	3.14	2.47	1.80	15
12.5	6.38	5.56	4.73	3.91	3.09	2.27	12
10.0	8.25	7.19	6.14	5.08	4.02	2.97	9
7.5	11.4	9.94	8.49	7.04	5.59	4.14	7
5.0	17.7	15.4	13.2	11.0	8.74	6.51	4
2.5	-	-	-	-	18.2	13.6	2
20 / 68	30 / 86	40 / 104	50 / 122	60 / 140	70°C / 158°F	T_A	

Ambient temp.

HPR...50

Load current [A]	Thermal resistance [K/W]						Power dissipation [W]
50.0	1.03	0.86	0.70	0.53	0.37	0.20	61
45.0	1.27	1.09	0.90	0.71	0.52	0.33	53
40.0	1.54	1.32	1.10	0.89	0.67	0.45	46
35.0	1.85	1.59	1.34	1.08	0.82	0.57	39
30.0	2.26	1.95	1.65	1.34	1.03	0.72	33
25.0	2.85	2.47	2.08	1.70	1.32	0.94	26
20.0	3.73	3.24	2.75	2.26	1.77	1.27	20
15.0	5.22	4.54	3.86	3.19	2.51	1.83	15
10.0	8.21	7.16	6.11	5.05	4.00	2.95	10
5.0	17.2	15.0	12.9	10.7	8.51	6.33	5
20 / 68	30 / 86	40 / 104	50 / 122	60 / 140	70°C / 158°F	T_A	

Ambient temp.

HPR...75

Load current [A]	Thermal resistance [K/W]						Power dissipation [W]
75.0	0.91	0.78	0.65	0.52	0.39	0.26	77
67.5	1.10	0.96	0.81	0.66	0.51	0.36	68
60.0	1.34	1.17	1.00	0.83	0.66	0.49	59
52.5	1.60	1.40	1.20	1.00	0.80	0.60	50
45.0	1.93	1.68	1.44	1.20	0.96	0.72	42
37.5	2.38	2.08	1.78	1.49	1.19	0.89	34
30.0	3.06	2.68	2.30	1.91	1.53	1.15	26
22.5	4.21	3.68	3.16	2.63	2.10	1.58	19
15.0	6.51	5.70	4.88	4.07	3.26	2.44	12
7.5	13.5	11.77	10.09	8.41	6.73	5.04	6
20 / 68	30 / 86	40 / 104	50 / 122	60 / 140	70°C / 158°F	T_A	

Ambient temp.

HPR...100

Load current [A]	Thermal resistance [K/W]						Power dissipation [W]
100.0	0.54	0.45	0.36	0.27	0.18	0.09	111
90.0	0.68	0.58	0.47	0.37	0.27	0.17	97
80.0	0.86	0.74	0.62	0.50	0.38	0.26	84
70.0	1.08	0.94	0.80	0.66	0.52	0.38	71
60.0	1.37	1.20	1.03	0.85	0.68	0.51	59
50.0	1.70	1.49	1.28	1.06	0.85	0.64	47
40.0	2.21	1.93	1.66	1.38	1.10	0.83	36
30.0	3.06	2.68	2.30	1.91	1.53	1.15	26
20.0	4.78	4.18	3.59	2.99	2.39	1.79	17
10.0	9.98	8.73	7.49	6.24	4.99	3.74	8
20 / 68	30 / 86	40 / 104	50 / 122	60 / 140	70°C / 158°F	T_A	

Ambient temp.

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

Isolation

Rated isolation voltage Input to output	≥ 4000 VAC rms
Rated isolation voltage Output to case	≥ 4000 VAC rms

Heatsink Selection

Heatsink	Thermal resistance	for power dissipation
HS 45CD	2.70K/W	> 60W
HS 45BD	2.00K/W	> 60W
Consult MDI	> 0.25K/W	N/A

SSR-1 Series

20, 30, 40, 60 & 85 AMP RELAYS WITH INTEGRATED HEATSINKS

- Product Width ranging from 17.5mm up to 70mm
- Rated Operational voltage: 42 - 600 VAC
- Rated Operational current: Up to 85AAC @ 40°C
- Up to 6600A²s for I²t
- Control voltages: 4-32 VDC (5-32 VDC on SS90D.-1), 20-275 VAC (24-190 VDC)
- Short circuit current rating: 100kA
- Latching Voltage ≤20V
- Operational Frequency range 45-65 Hz
- Power Factor > 0.5 @ Vrated
- Blocking Voltage 1200Vp
- Internal Varistor 625V
- UL508 & cUL Listed (E 354129)
- IP20 protection
- Design according to EN/IE60947-4-2, EN/IEC60947-4-3, EN/IEC62314, UL508, CSA 22-2 No. 14-10
- Integrated voltage transient protection with varistor
- Continuously ON Green LED when control input is applied
- RoHS compliant
- VDE approval
- U: SSR Style
- E: Contactor
- Germanischer Lloyd approval[1]

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.

1. Germanischer Lloyd approval applicable only to models SS20A.-1, SS20D.-1, SS30A.-1 and SS30D.-1.

Output Specifications

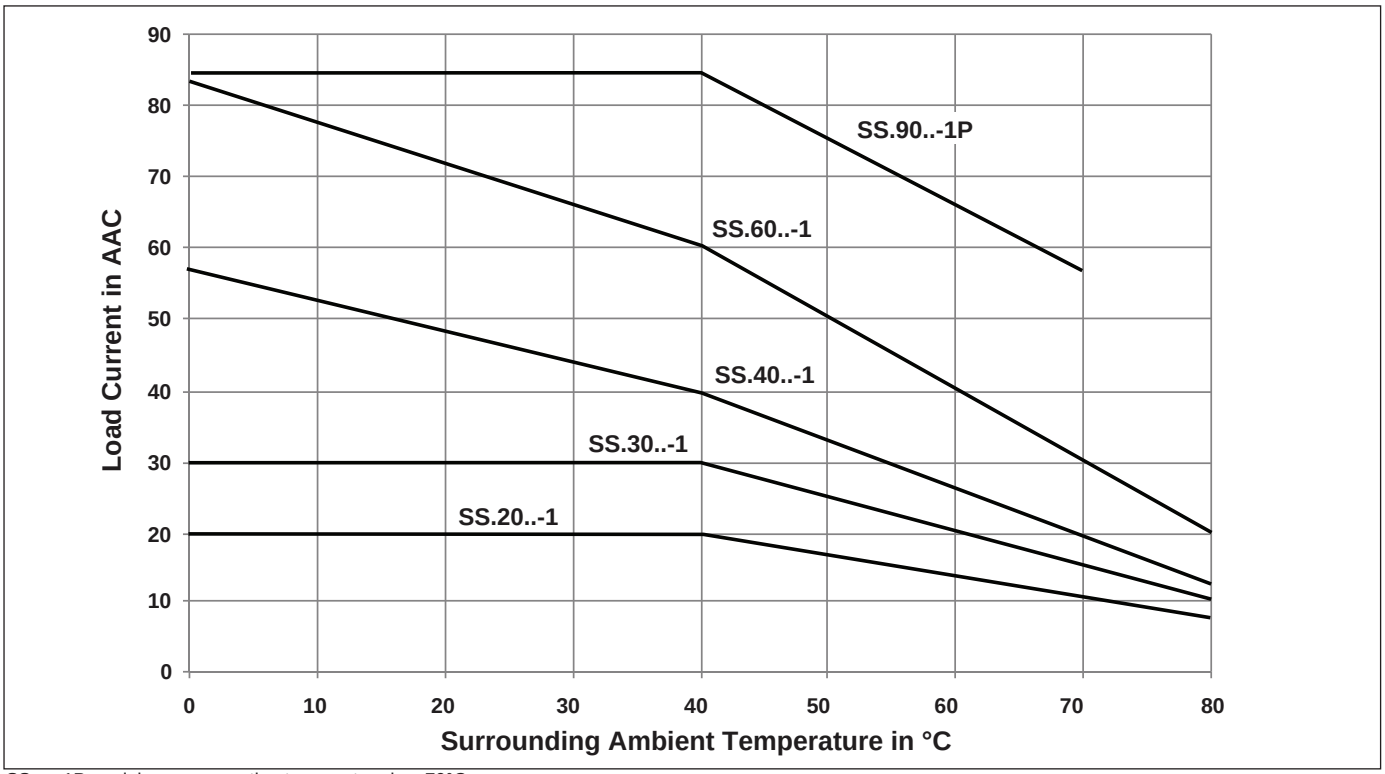
See Page 14

Motor Ratings: HP (UL508)

See Web: http://www.mdius.com/ssr-1php
E-mail: rbrewers@mdius.com or Call: (269) 663-8574 or (800) 634-4077

Filtering

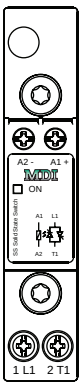
Current Derating (UL508)

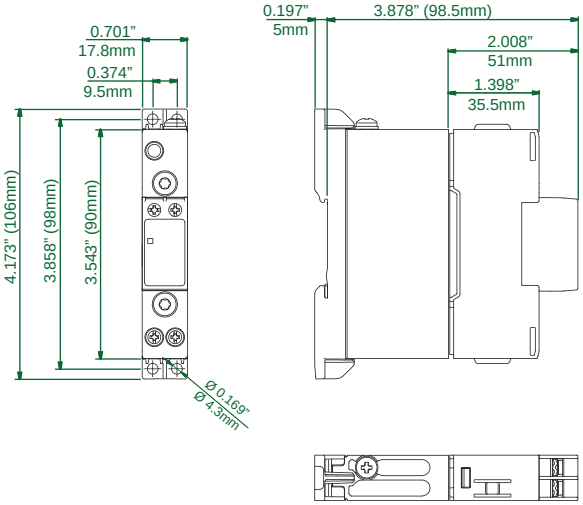


SS.....-1P models max. operating temperature is + 70°C

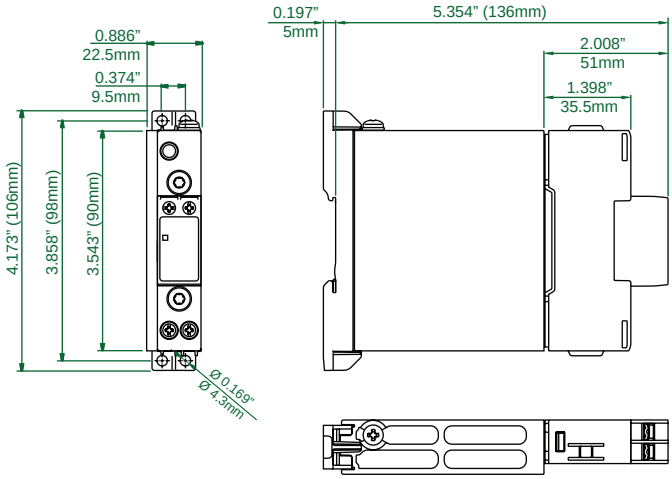
Terminal Layout and Dimensions "U" Connection

SS.20.U-1

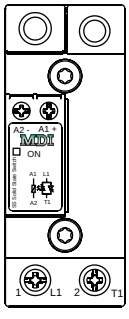


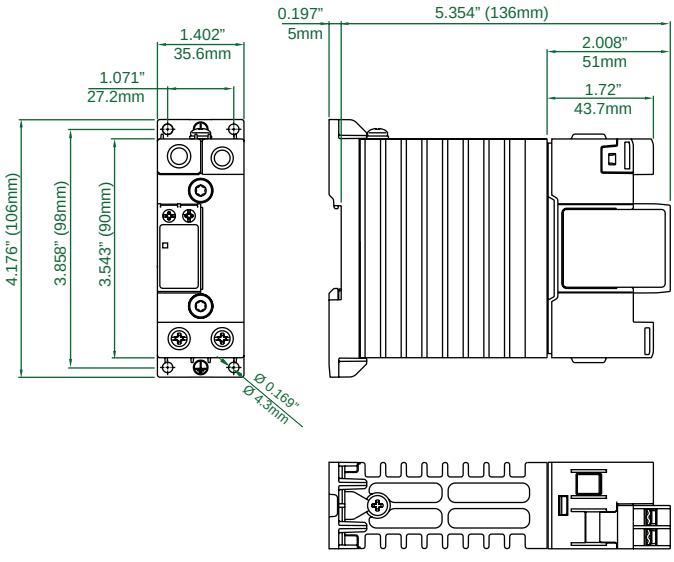


SS.30.U-1



SS.40.U-1





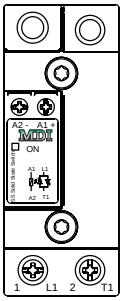
1/L1: Supply connection
2/T1: Load connection
A1 (+): Positive control signal
A2 (-): Control ground

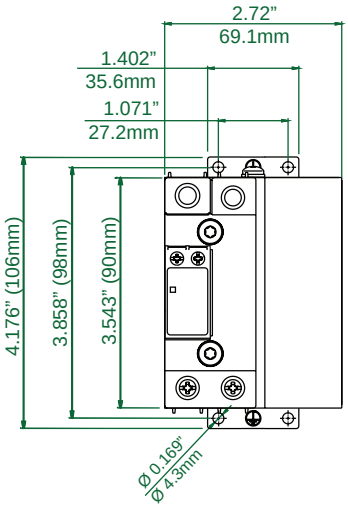
* Housing width tolerance +0.02" (0.5mm), -0 as per DIN43880

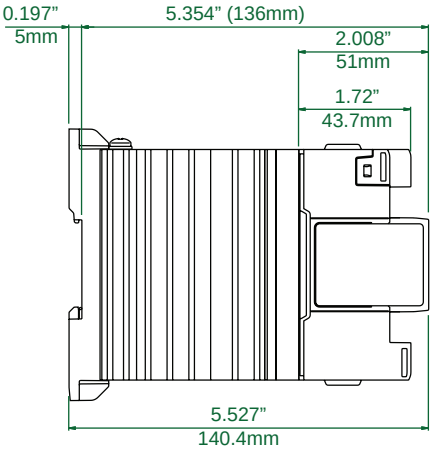
SSR-1 Series *(Continued)*

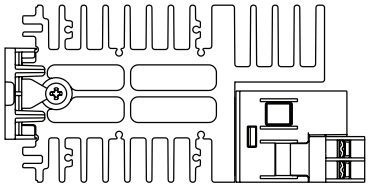
Terminal Layout and Dimensions "U" Connection (cont.)

SS.60.U-1

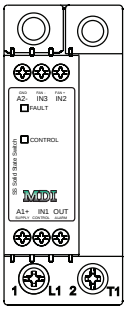




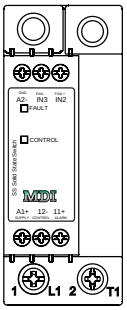




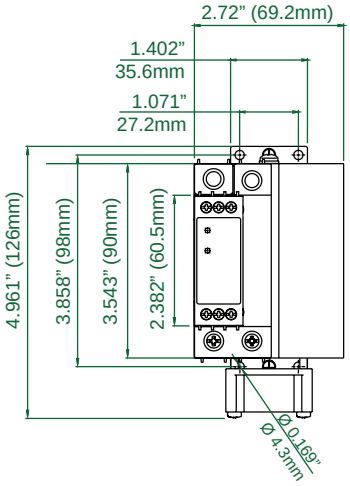
SS.90.U-1P

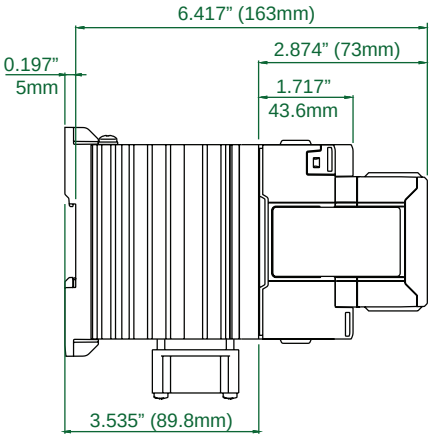


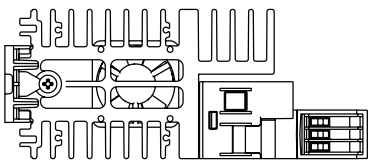
SS.90DU-1



SS.90AU-1





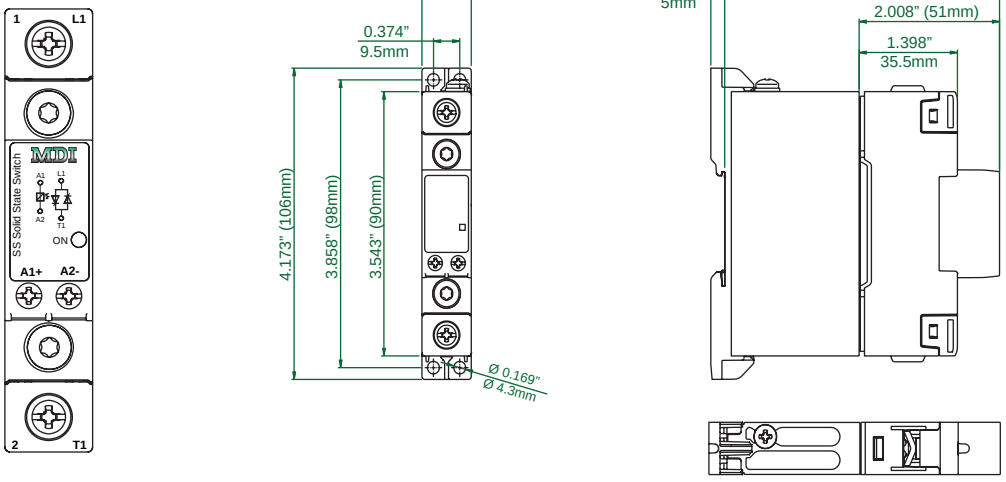


1/L1: Supply connection
2/T1: Load connection
A1 (+): Positive control signal
(Positive supply in case of SS.90DU-1P)
A2 (-): Control ground
IN1: Control signal (only for SS.90DU-1P)
IN2: Fan + supply (only for SS.90AU-1P)
IN3: Fan - supply (only for SS.90AU-1P)
11 + : Alarm output (+)
OUT, 12 - : Alarm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

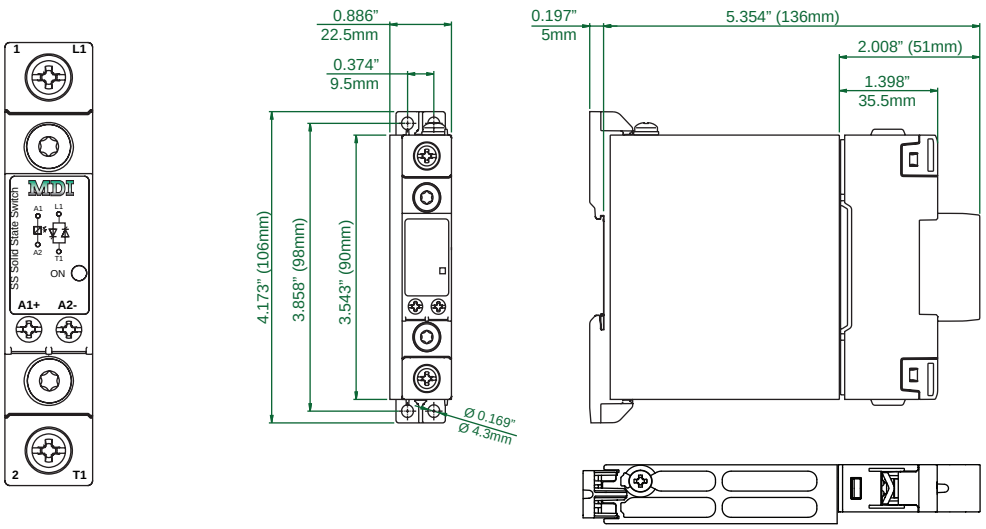
* Housing width tolerance +0.02" (0.5mm), -0 as per DIN43880

Terminal Layout and Dimensions "E" Connection

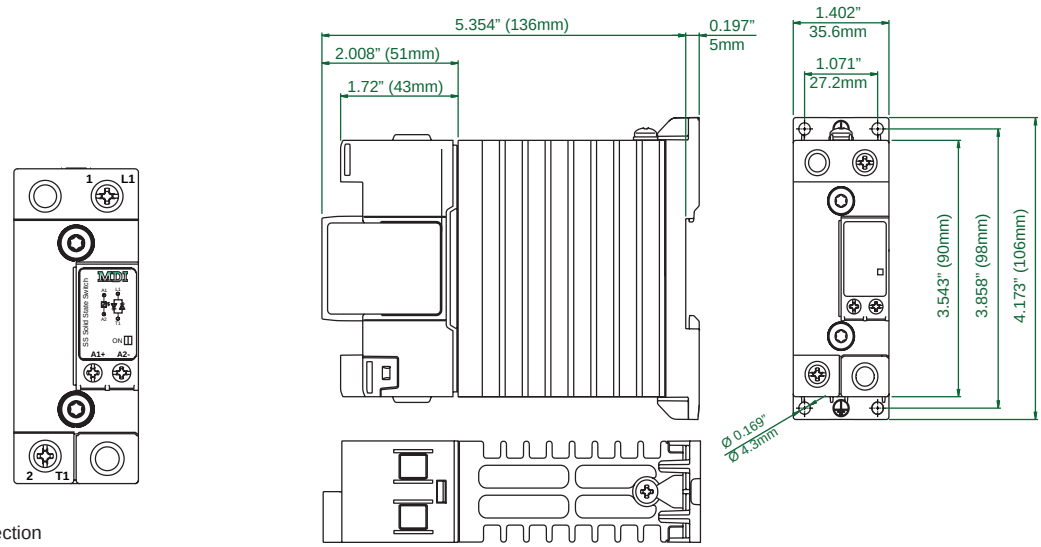
SS.20.E-1



SS.30.E-1



SS.40.E-1



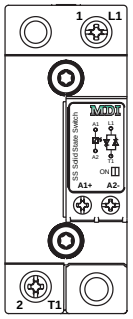
1/L1: Supply connection
2/T1: Load connection
A1 (+): Positive control signal
A2 (-): Control ground

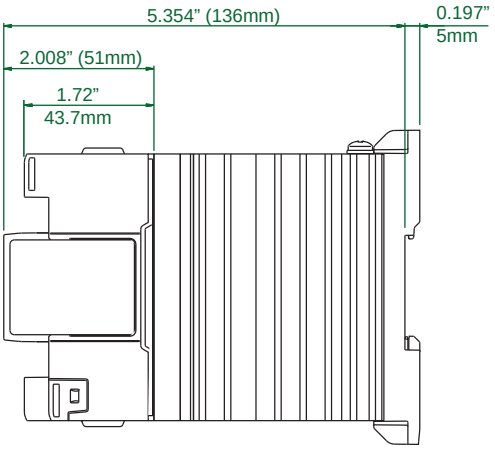
* Housing width tolerance +0.02" (0.5mm), -0 as per DIN43880

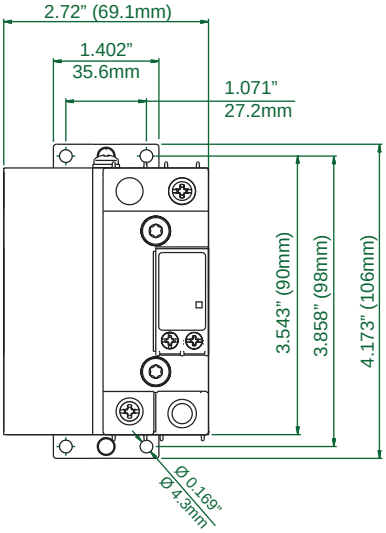
SSR-1 Series *(Continued)*

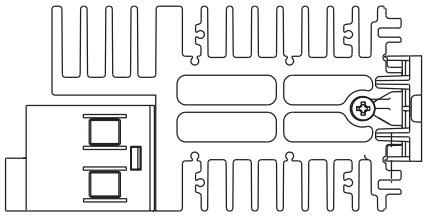
Terminal Layout and Dimensions "E" Connection (cont.)

SS.60.E-1

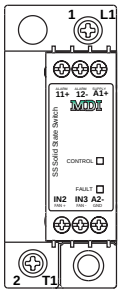




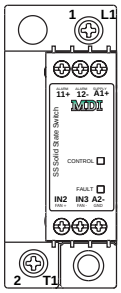




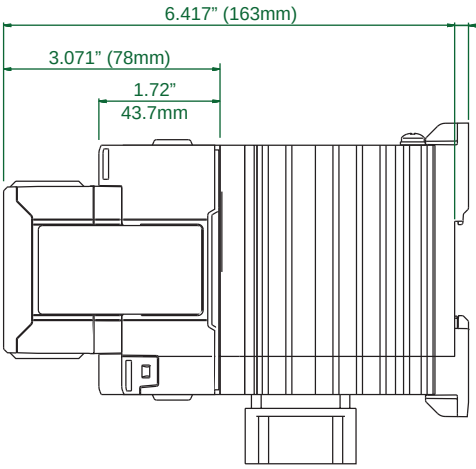
SS.90.E-1P

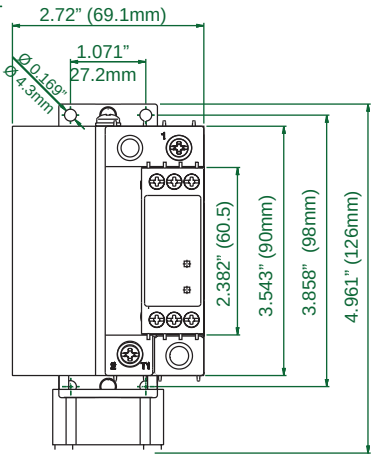


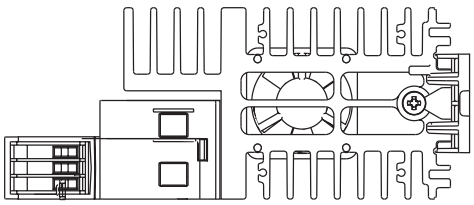
SS.90DE-1P



SS.90AE-1P





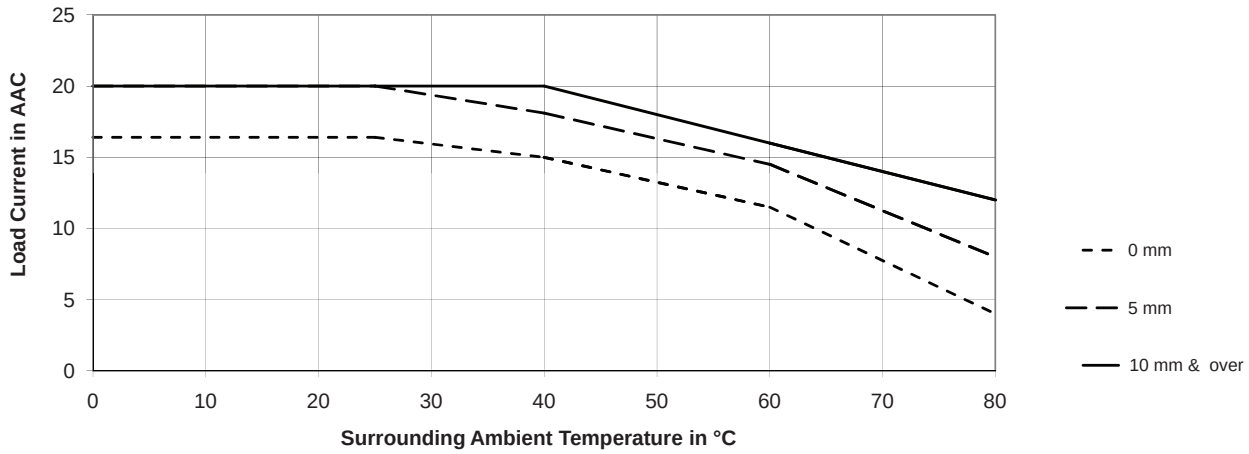


1/L1: Supply connection
2/T1: Load connection
A1 (+): Positive control signal
(Positive supply in case of SS.90DE-1P)
A2 (-): Control ground
IN1: Control signal (only for SS.90DE-1P)
IN2: Fan + supply (only for SS90AE-1P)
IN3: Fan - supply (only for SS90AE-1P)
11 + : Alarm output (+)
OUT, 12 - : Alarm output (-)

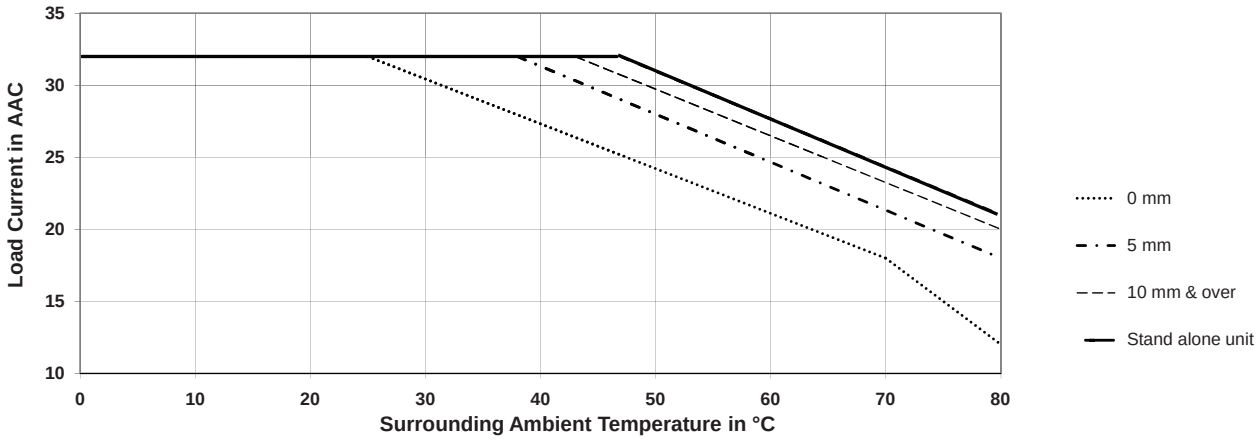
* Housing width tolerance +0.02" (0.5mm), -0 as per DIN43880

Derating vs. Spacing Curves

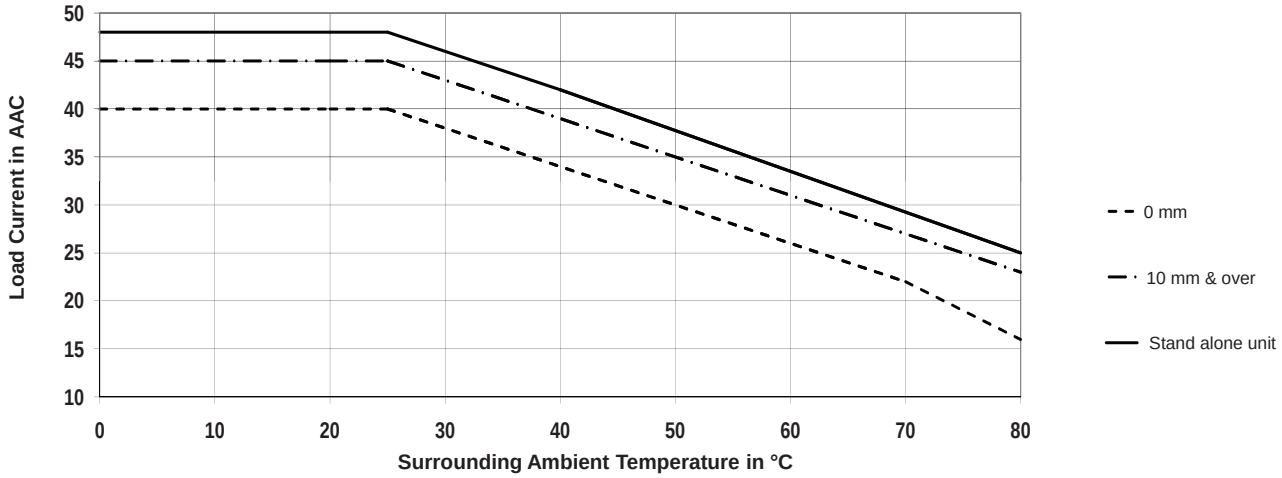
SS.20..-1



SS.30.-1



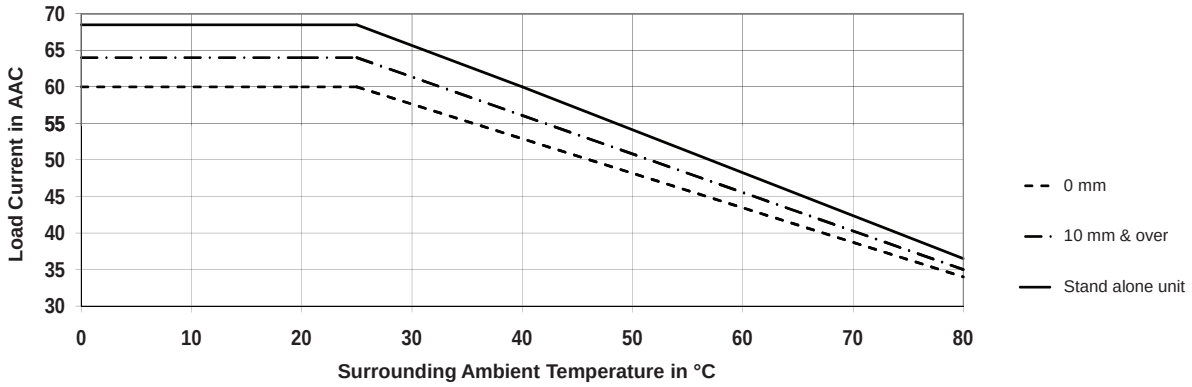
SS.40.-1



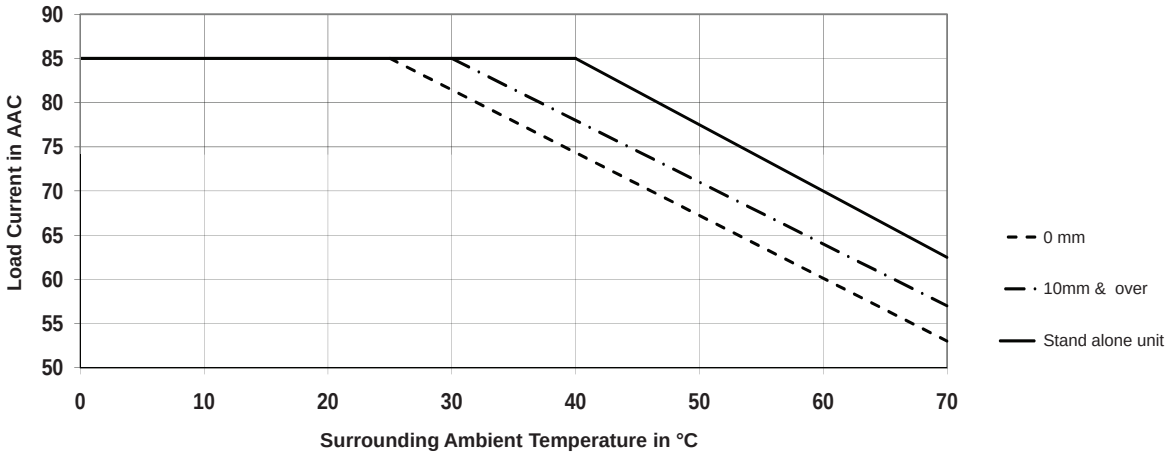
SSR-1 Series *(Continued)*

Derating vs. Spacing Curves (cont.)

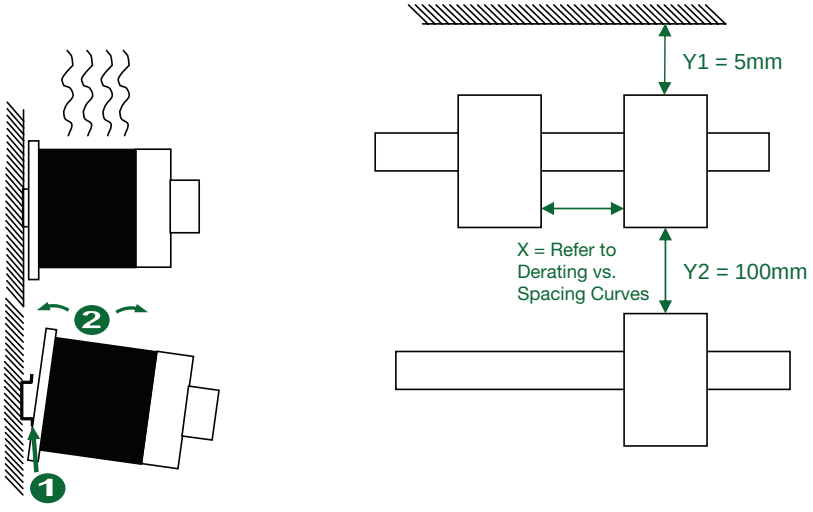
SS.60..-1



SS.90..-1P



Installation Instructions



with Integrated Heatsink

- 2-pole & 3-pole AC switching solid state contactors
- Product width from 2.13" (54mm) 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)
- Up to 15,000A²s for I²t
- Latching Voltage ≤20V
- Operational Frequency range 45-65 Hz
- Power Factor >0.5 @ rated voltage
- Blocking Voltage 1200Vp
- Internal Varistor 625V
- 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

c UL US LISTED

CE

Ordering Key

2P SS 60 A 65 - 24D F

- **Number of poles**
- **Solid state relay**
- **Rated operational voltage**
- **Control voltage**
- **Rated operational current**
- **Fan voltage (24D or 120A)**
- **Integrated fan**

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" (54mm) (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.

SSR with heatsink	Rated voltage (Ue)[4], Blocking voltage	Control voltage[5] (Uc)	Rated current / pole @ 40°C[2]	Fan Voltage	External supply (Us)	Features
2PSS: 2-pole switching + 1-pole direct, ZC[3] **3PSS:** 3-pole switching, ZC	**22:** 42-242 VAC, 800Vp **60:** 42-660 VAC, 1200 Vp	**D:** 5-32 VDC **A:** 20-275 VAC, 24-190 VDC	**2PSS** **25:** 25 AAC **40:** 40 AAC **75:** 75 AAC **3PSS** **20:** 20 AAC **25:** 25 AAC **30:** 30 AAC **40:** 40 AAC **65:** 65 AAC	**24:** 24 VDC **120:** 120 VAC	**D:** 24 VDC **(blank):** 90-250 VAC	**F:** Integrated fan with over temperature protection (OTP) & EMR alarm output **M:** Monitoring for Mains loss, Load loss, SSR short circuit, open circuit and overtemperature with EMR alarm output and auxiliary output[1] (suitable only for resistive loads)

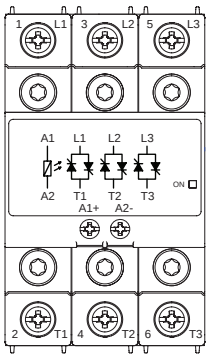
2. Refer to Current Derating curves
3. ZC= Zero Cross Switching
4. Operating voltage for .PSS...-...M starts from 90 VAC
5. AC control range for .PSS..A..-120. is limited to 20-275 VAC only

Output Specifications **Motor Ratings: HP (UL508)** **Filtering**

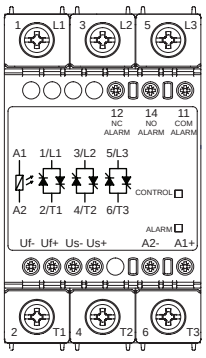
See page 14

See Web: http://www.mdius.com/3-phase.php
E-mail: rbrewers@mdius.com or Call: (269) 663-8574 or (800) 634-4077

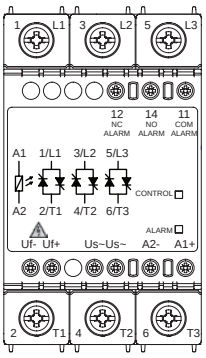
Terminal Layout



2PSS..25, 2PSS..40
3PSS..20-.., 3PSS..40, 3PSS..30



2PSS..75-24DF
3PSS..40-24DF, 3PSS..65-24DF



2PSS..75-120F
3PSS..40-120F, 3PSS..65-120F

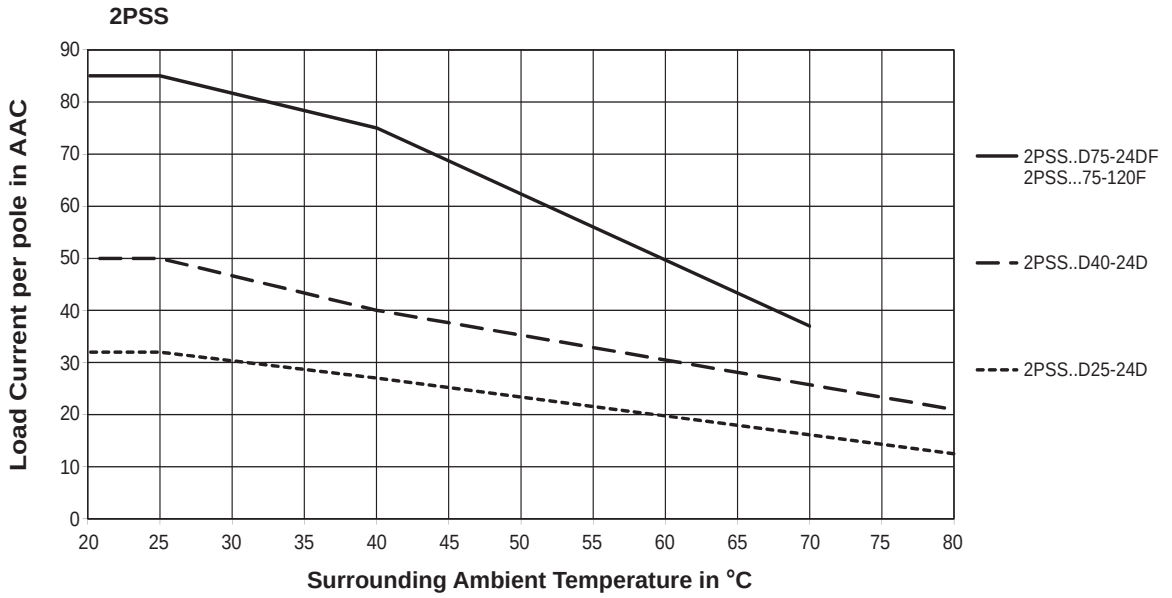
Terminals labelling:

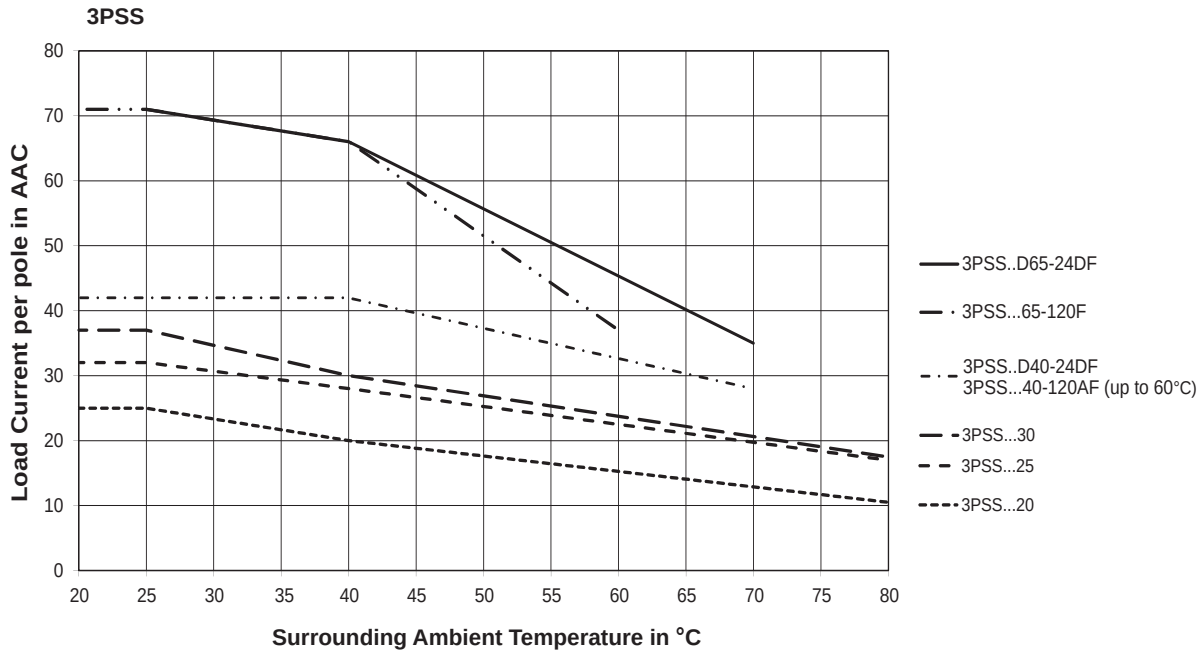
1/L1, 2/L2, 3/L3:	Line connections
2/T1, 4/T2, 6/T3:	Load connections
A1(+):	Positive control
A2(-):	Control ground
Us(+):	External supply positive
Us(-):	External supply ground
Us(~):	AC external supply
Uf(+):	Fan supply positive (Pre-Connected)
Uf(-):	Fan supply ground (Pre-Connected)

Connections to Uf+, Uf- are provided readily terminated by manufacturer. However, in case of needed user intervention on terminals Uf+, Uf- for the .PSS..A..-120AF models, the mains supply has to be turned off first to avoid risk of electrical shock.

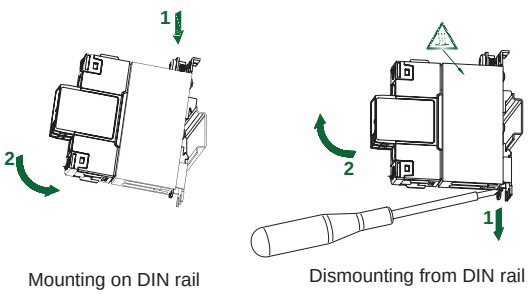
2 & 3 Pole 3-Phase *(Continued)*

Current Derating



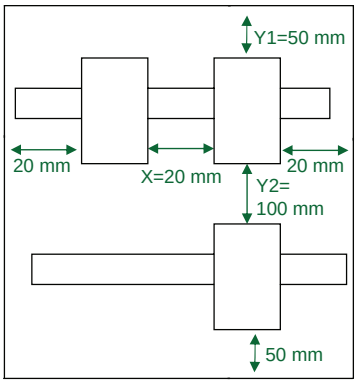


Installation Instructions



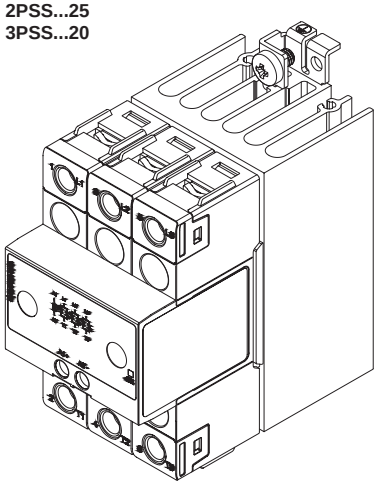
Mounting on DIN rail

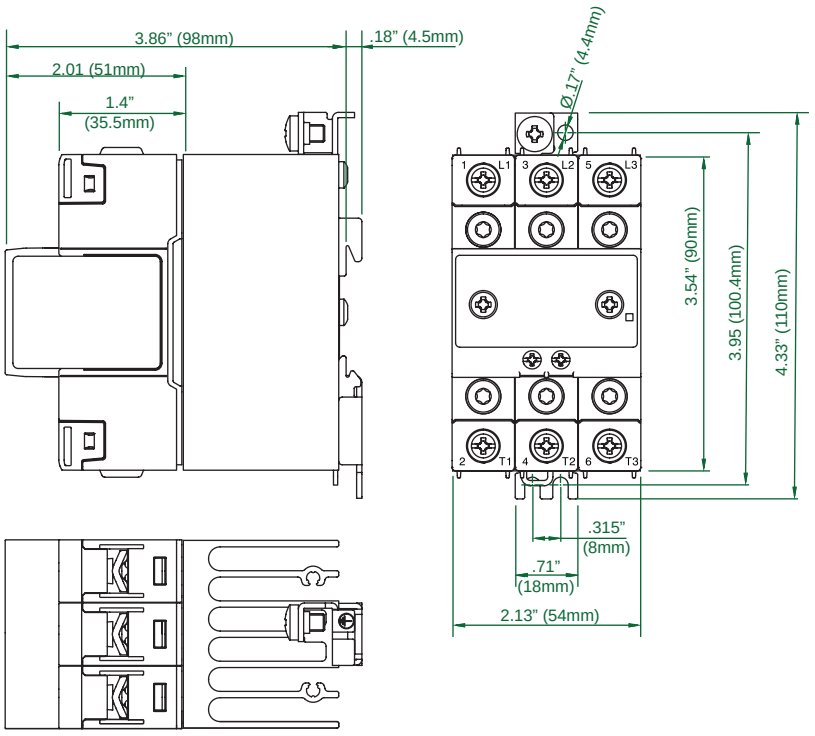
Dismounting from DIN rail



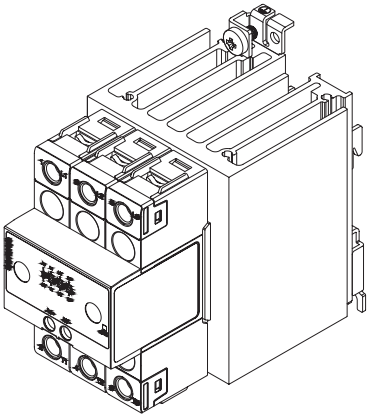
Dimensions

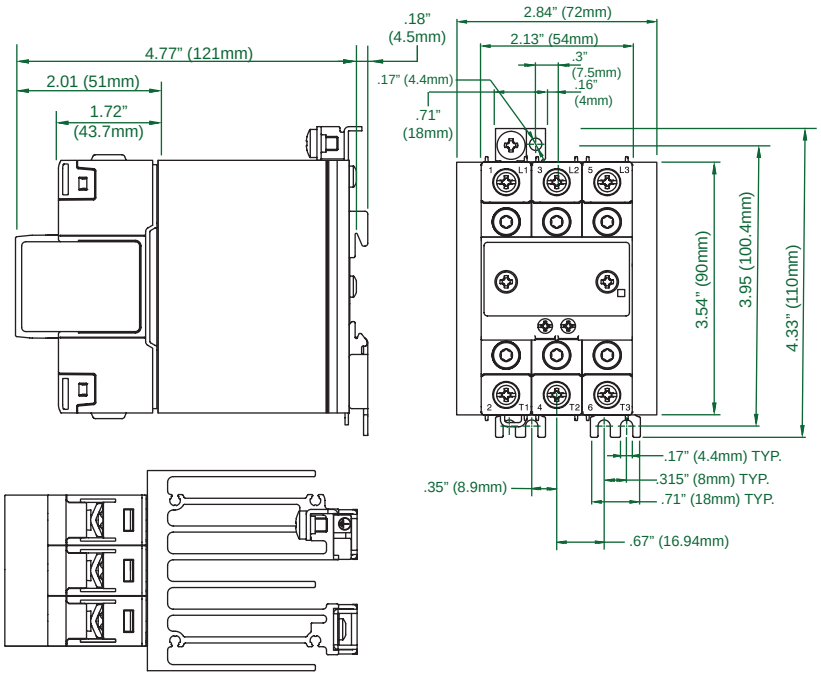
2PSS...25
3PSS...20





3PSS...25



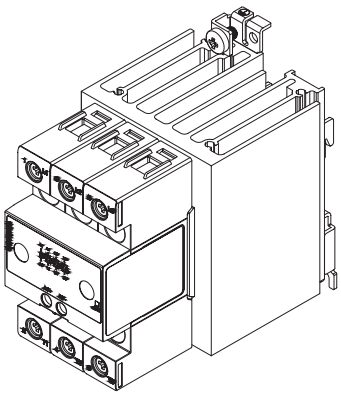


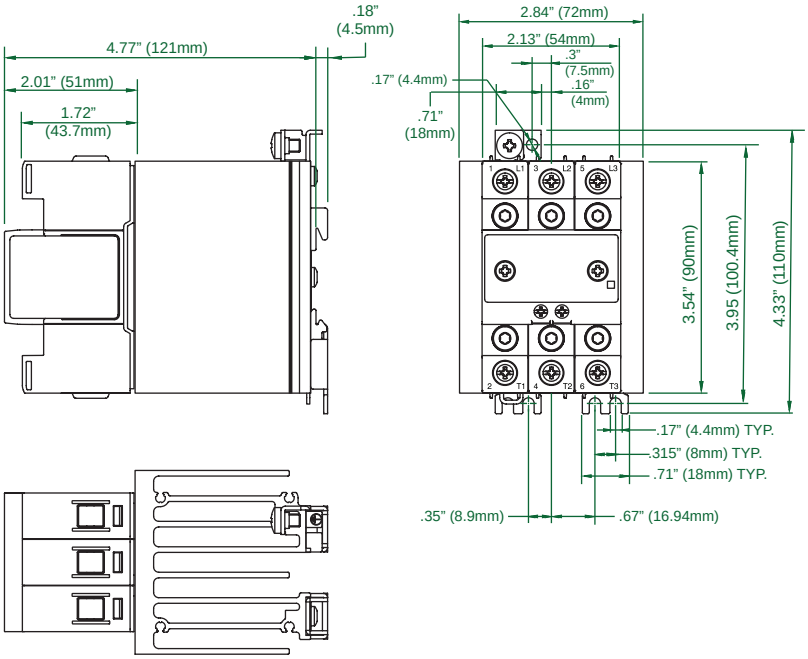
Dimensions in mm. Housing width tolerance +.02" (0.5mm), -0 as per DIN43880.
All other tolerances ±.02" (0.5mm)

2 & 3 Pole 3-Phase *(Continued)*

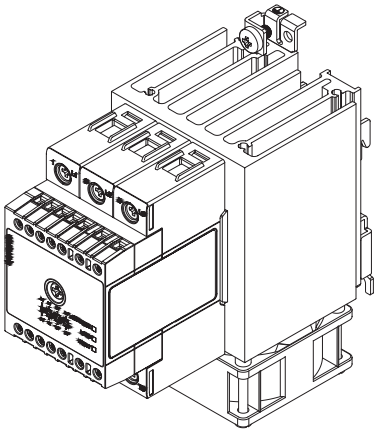
Dimensions

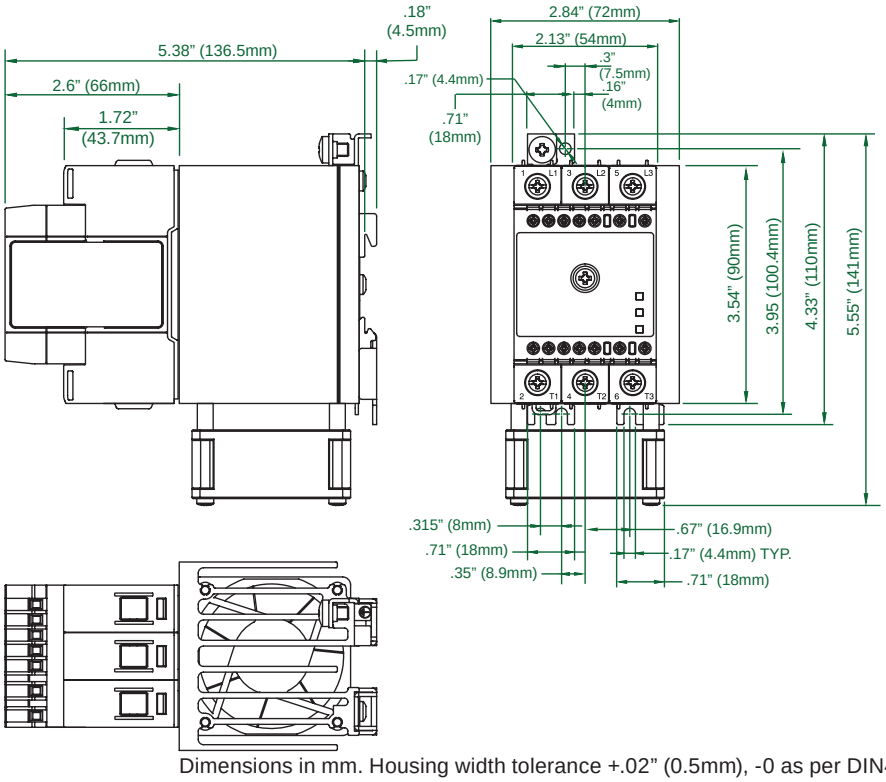
2PSS...40
3PSS...30





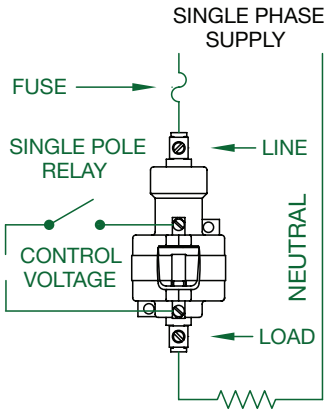
2PSS...75-...
3PSS...65-...

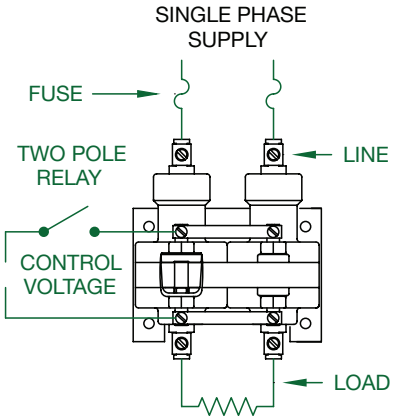


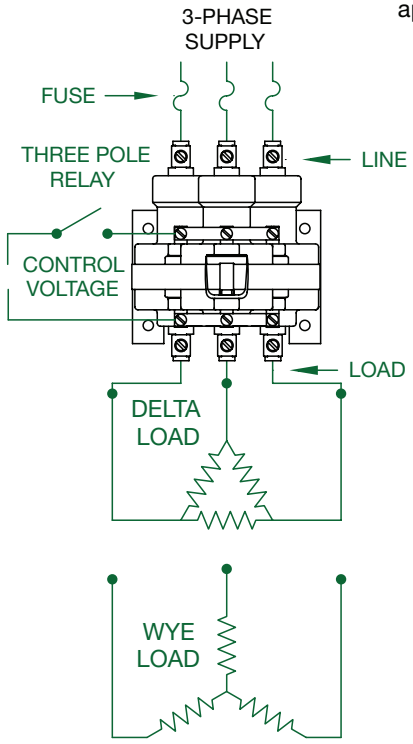


Dimensions in mm. Housing width tolerance +.02" (0.5mm), -0 as per DIN43880.
All other tolerances ±.02" (0.5mm)

MERCURY CONTACTORS

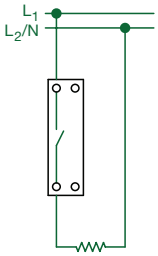




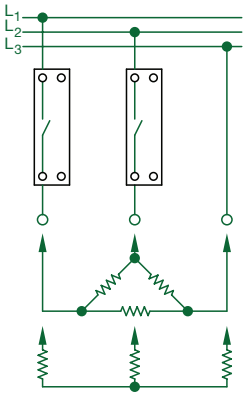


SOLID STATE

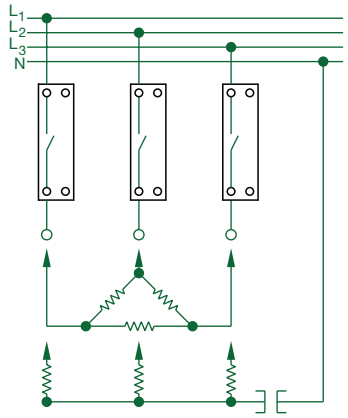
Single pole relay application
Line-Neutral, Line-Line

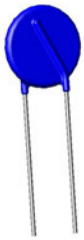


2 single pole relays in 3-phase application
Delta and star connection (economy switch)



3 single pole relays in 3-phase application Delta, Star, Star with neutral





M.O.V.

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 I^2t 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.

-RECOMMENDED-

250 VOLT	600 VOLT
KTN-R	KTS-R
JJN/A3T	JJS
	JKS/A4J
	KTK-R

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).

TORQUE SPECIFICATIONS

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

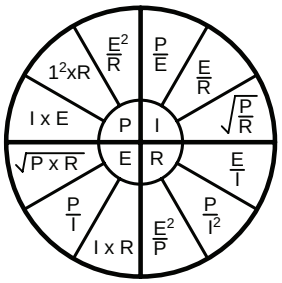
SIZING RELAY

To find AMPS per pole
3 Ø Balanced Heater loads

$$\text{AMPS per pole} = \frac{\text{KW X 1,000}}{\text{VOLTS X 1.732}}$$

Or multiply the kilowatts times the appropriate factor

3 Ø AC	FACTORS
208 V	2.776
220 V	2.624
240 V	2.406
277 V	2.084
480 V	1.203
600 V	0.962



MOV CHART

FOR	SIEMENS	HARRIS	C.K.E.	M.D.I.
24 VOLTS	S14K30	V47ZA7	-	PM-567-5
120 VOLTS	S20K130	V150LA20B	Z150LA20B	PM-567-1
220 VOLTS	S20K275	V275LA40B	Z275LA40B	PM-567-2
277 VOLTS	S20K385	V320LA20B	Z320LA20B	PM-567-3

How To Order

TIP-OVER SWITCH
TILT SWITCH

TOS-12-2
TS-10-3

TERMINATION

AMP RATING

TOS-12C-L1
TS-10C-L1

TERMINATION

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

*** TERMINATION WIRE LENGTHS**
-L1 = 6" Leads
-L2 = 12" Leads
-L3 = 18" Leads
-L4 = 24" Leads
(CONTINUES IN 6" INCREMENTS)

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

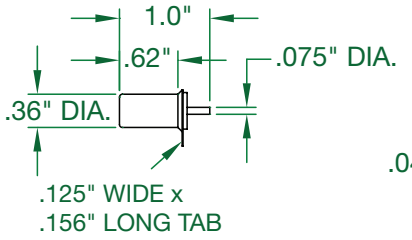
MOUNTING CLIPS

PART NO.	FOR
PM-348-36	TS-1, TS-1-L1
PM-348-44	TS-10, TS-10-L1
PM-348-50	TS-1C-L1
PM-348-62	TS-10C-L1, TS-20C-L1

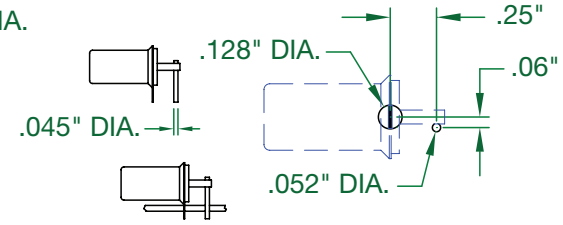
CASED UNIT
"C" for cased unit this space is blank for uninsulated units

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

TS-1 & WATS-1
Tilt Switch 10°

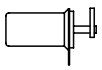


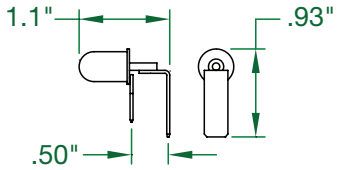
TS-1-3
WATS-1-3
Printed circuit mountable Tilt Switch



Hole pattern side opposite component

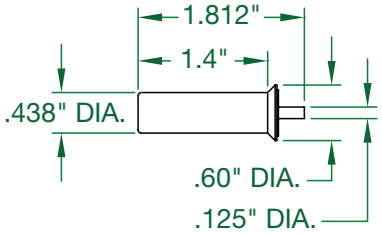
TS-1-6
WATS-1-6
Standard



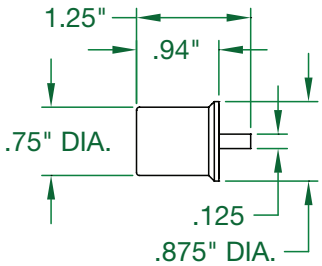


SP-1357
(Mechanical NON-Mercury)
With ¼" Quick Connects

TS-10 & TS-20
Tilt Switch 10°

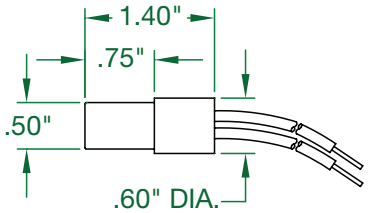


NATS-20
Narrow Angle Tilt Switch 30°
WATS-20
Wide Angle Tilt Switch 90°



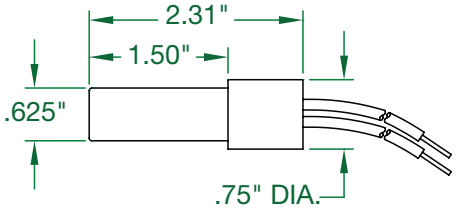
RATINGS:

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



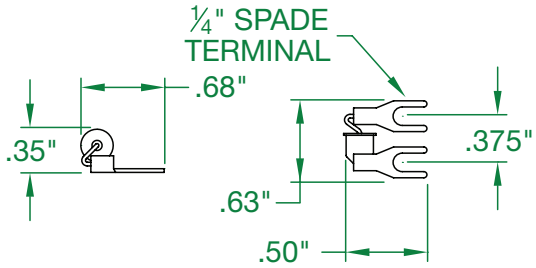
TS-1C-L* (Mercury)
WATS-1C-L* (Mercury)
SP-1358-L* (Mechanical NON-Mercury)

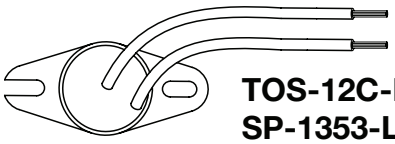
TS-10C-L*
TS-20C-L*



Tip-Over Switches *Mercury & Mechanical (Non-Mercury)*

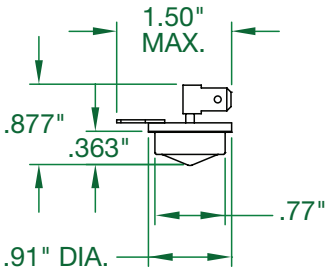
SP-1431
(Mechanical Non-Mercury)
Tip-Over 30-50°



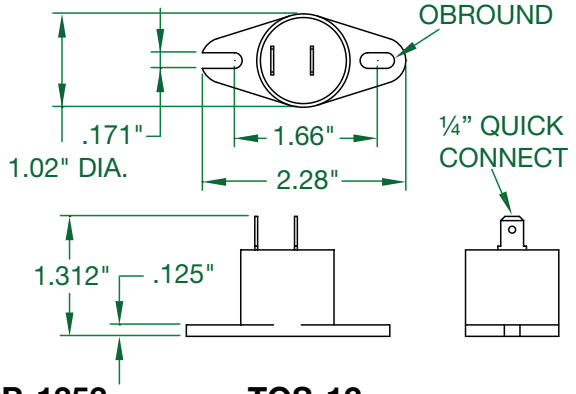


TOS-12C-L*
SP-1353-L* Mechanical

TOS-12-2
Tip Over Switch 25°



TOS-12C-8



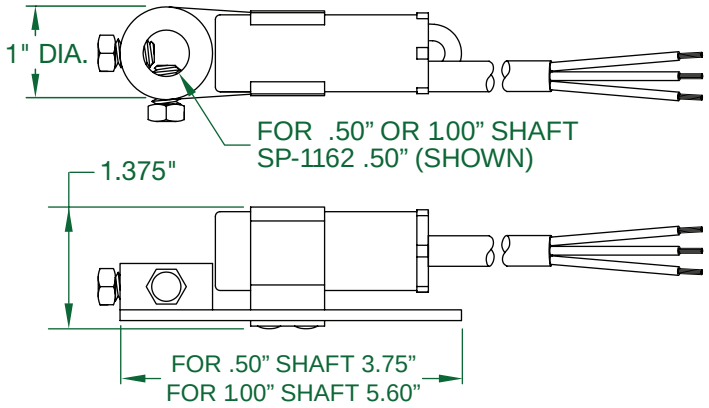
RATINGS:

SP-1431
0.25 AMPS @ 60 V
3 VA Max.
40° Tip Over Angle

SP-1353
1 AMP @ 120 VAC
0.4 AMP @ 240 VAC
25° Tip Over Angle

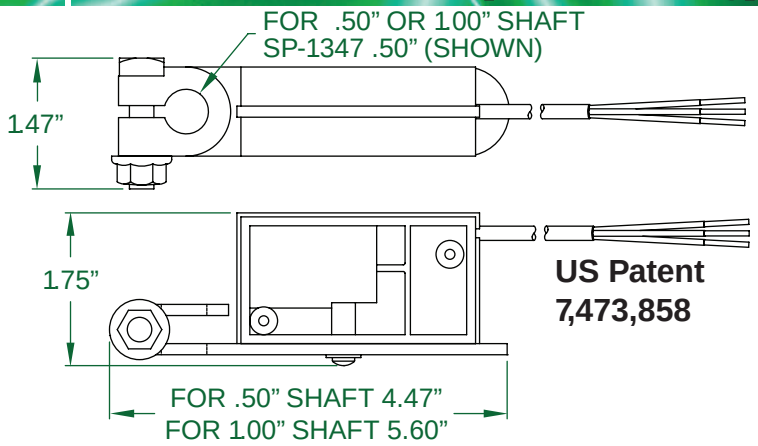
TOS-12
12 AMPS @ 120 VAC
25° Tip Over Angle

Damper Arm Tilt Switch

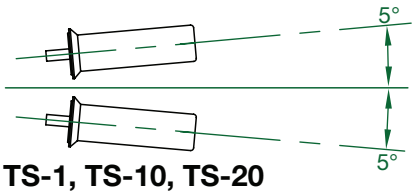


SP-1162-L_
SPDT - .50" SHAFT - 18 AWG Plenum wire
SP-1442-L_
SPDT - 1.00" SHAFT - 18 AWG Plenum wire
SP-1335-L_
SPDT - .50" SHAFT - 18 AWG SJOW Cord
RATINGS
1 AMPS @ 120 VAC / 1 AMP @ 28 VDC

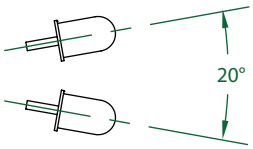
Mechanical DATS (Non-Mercury)



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

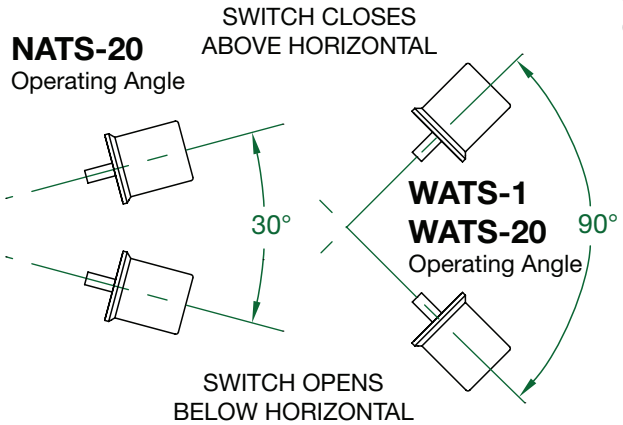


TS-1, TS-10, TS-20
Operating Angle
Recommended operating angle for good switch open and closure conditions.

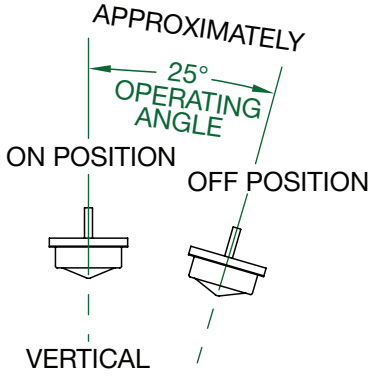


SP-1357 & SP-1358
Operating Angle

NATS-20
Operating Angle



TOS-12, SP-1353 &
SP-1431 (Operating Angle is 40°)
Omni Directional Operating Angle



15° & 45° Operating Angle Available
Contact the Factory

TYPICAL APPLICATIONS

FOR MDI'S MERCURY DISPLACEMENT CONTACTORS

LIGHTING
Auditorium Lighting
Beacons and Search Lights
Copy Equipment
Dimmer Controls
Display Signs
Emergency Lighting
Flood Lights
High Intensity Lamps
Hospital Lighting
Lighting Test Panels
Mercury Vapor Lamps
Parking Lots
Photography Lighting
Scoreboards
Sodium Vapor Lamps
Stage Lighting
Street Lighting
Surgical Lighting Control
Tower Lights
Traffic Signal
Tungsten Lamps

GENERAL APPLICATIONS
Air Conditioning
Alarm Systems
Automatic Door Closers
Battery Chargers
Blue Print Machines
Copiers
Computer Power Supplies
Corrosive Locations
Dusty, Oil Locations
Dry Cleaning Equipment
Energy Management Systems
Farm Incubators and Brooders
Low Voltage Switching
Marking and Engraving Equipment
Motor Starting
Soldering Systems
Surgical Equipment
Telephone Switching
Test Panels
Vapor De-greasers
X-Ray Machine Controls

ELECTRIC HEATERS
Baseboard Heaters
Blow Molding
Cabinet Heaters
Chemical Tank Heaters
Curing Furnaces
Drying Ovens
Duct Heaters
Film Packaging
Glass Furnaces
Heat Lamps
Heat Sealing Machines
Induction Heater
Industrial Ovens
Infrared Heaters
Ink Drying
Ink Heating
Injection Molding Machines
Kilns
Lab Ovens
Packaging Equipment
Plastic Extruders
Pool Heaters
Quartz Heaters
Radiant Heaters
Roof Top Heating
Shrink Tunnels
Unit Heaters
Vacuum Forming

FOOD INDUSTRY EQUIPMENT
(Heaters)
Baking Ovens
Coffee Urns
Deep Fryers
Dishwashers
Electric Grills
Electric Ranges
Pizza Ovens
Steam Generators

SPECIALTY APPLICATIONS
Capacitor Discharge Systems
Hazardous Locations
Mining Equipment
Phase Converters
Tower Control

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

WARRANTY

MDI Inc., warrants it's products to be free from defects in material or workmanship for one year, and will replace any units with such defects. Warranty is void if units are improperly applied. MDI Inc. shall not be liable for special or consequential damages.

For Mercury Free Switches
Contact MDI Inc.
1-800-634-4077 or www.mdius.com

TO RECYCLE USED CONTACTORS, TILT SWITCHES & MERCURY FLOATS, RETURN TO MDI

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

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