

## Sensors and Protective Devices

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## E-328-2 Series AC Low Voltage Warning Relay, 10 Amps, 28 Vdc Contacts

### Product Facts

- DPDT
- Gasket sealed

### Performance Data

#### Electrical Characteristics

- Relay/Relay Driver**  
**Contact Arrangement** — DPDT  
**Rated Operating Voltage** — 28 Vdc  
**Resistive Rating** — 10 Amps  
**Inductive Rating** — 5 Amps  
**Lamp Rating** — 1.5 Amps

#### Coil Characteristics

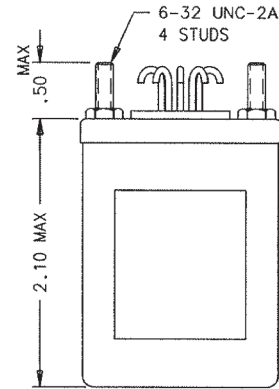
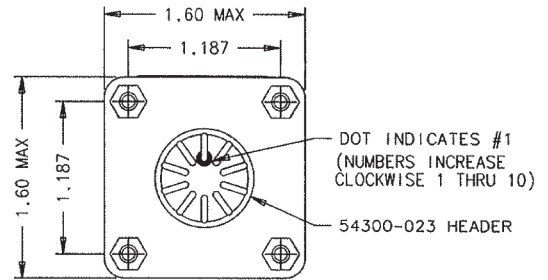
**Duty Cycle** — Continuous

#### Voltage Sensor

- Operating Voltage, Nom.** — 115 V, 380-420 Hz  
**Pickup Voltage** —  $107 \pm 3$  Vrms  
**Dropout Voltage** —  $100 \pm 2$  Vrms  
**Dropout Time, Min.** — 40 msec

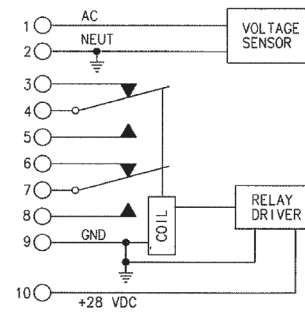
#### General Characteristics

- Temperature Range** —  $-55^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$   
**Operating Cycles (Life)**  
**Mechanical, Min.** — 100,000 cycles  
**Weight, Max.** — 6 oz.



Mounting Style A

**Circuit Configurations** (Consult factory for other available circuit configurations)



Circuit Configuration 1

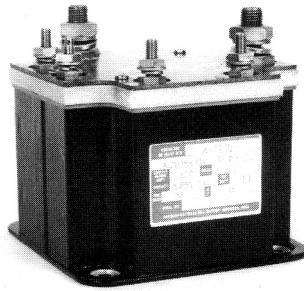
For factory-direct application assistance, phone 419-521-9500 or fax 419-526-2749.

HARTMAN Part Number	Construction Type	Mounting Style	Coil Type	Circuit Config.	TE Part Number
E-328-2	Gasket/Vented	A	Continuous	1	1-1616126-8

## A-772 Series Battery Contactor — Discharge Overload, Rated up to 200 Amps, 28 Vdc

### Product Facts

- SPST NO
- Gasket sealed
- Auxiliary contacts available
- Limits overload current duration



### Performance Data

#### Electrical Characteristics

- Main Contacts —**  
**Contact Arrangement —** SPST NO  
**Rated Operating Voltage —** 28 Vdc  
**Resistive Rating —** 200 Amps
- Auxiliary Contacts —**  
**Aux. Contact Arrangement —** SPST NC  
**Rated Operating Voltage —** 28 Vdc  
**Resistive Rating —** 5 Amps

#### General Characteristics

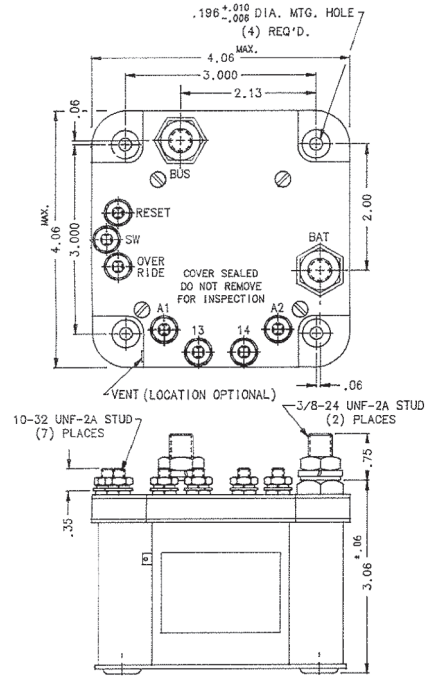
- Temperature Range —** -55°C to +71°C  
**Operating Cycles (Life) at Rated Resistive Load —** 50,000 cycles  
**Operating Cycles (Life) Mechanical —** 100,000 cycles  
**Electrical —** 50,000 min.  
**Weight, Max. —** 2 lbs. 13 oz.

#### Coil Characteristics

- Duty Cycle —** Continuous  
**Operating Voltage, Max. —** 30 V  
**Operating Voltage, Min. —** 24 V  
**Pickup Voltage @ 25°C, Max. —** 16 V  
**Dropout Voltage —** 1 to 7 V
- Overload Sensor**  
**Type —** Latching  
**Polarized —** Discharge  
**Trip —** 300 Amps ± 10%  
**Time Delay —** 900 to 1,100 msec

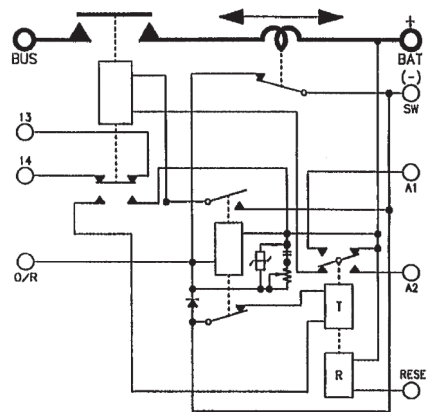
#### Sensor Contacts, Aux.

- Sensor Contact Arrangement —** SPST NO  
**Rated Operating Voltage —** 28 Vdc  
**Resistive Rating —** 3 Amps  
**Reset Rating, Max. —** 18 V



Mounting Style A

### Circuit Configurations (Consult factory for other available circuit configurations)



Circuit Configuration 1

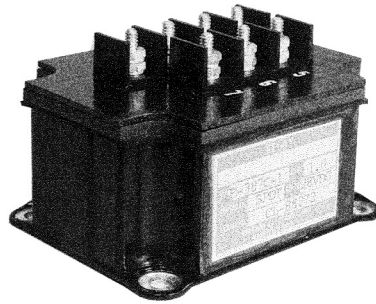
For factory-direct application assistance, phone 419-521-9500 or fax 419-526-2749.

HARTMAN Part Number	Construction Type	Mounting Style	Coil Type	Circuit Config.	TE Part Number
A-772XTB	Gasket/Vented	A	Continuous	1	1616545-1

## E-387 Series Current Sensor, Rated up to 25 Amps, 28 Vdc

### Product Facts

- SPDT
- Gasket sealed
- Meets many requirements of MIL-PRF-6106



### Performance Data

#### Electrical Characteristics

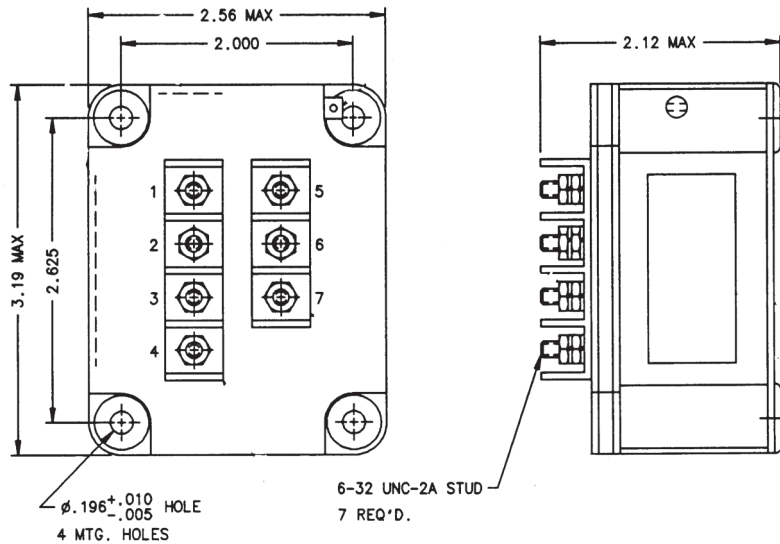
Indicator Contact Arrangement — SPDT  
 Rated Operating Voltage — 28 Vdc  
 Resistive Rating — 1 Amp

### General Characteristics

Dielectric Strength — 1,000 Vrms, 60 Hz  
 Insulation Resistance @ 500 Vdc & 20°C & 50% R.H. (Max.) — 1,000 megohm min.  
 Weight, Max. — 8 oz

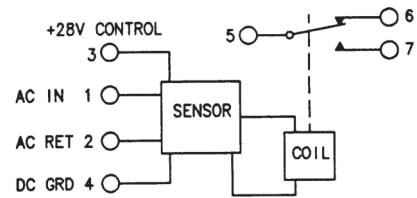
### Coil Characteristics

Duty Cycle — Continuous  
 Control Power — 28 Vdc  
 Sensor Input — 400 Hz ± 100 Hz  
 Pickup Current — 14 ± 2 Amps  
 Dropout Current — 7 ± 1 Amp  
 Continuous Sensor Current — 25 Amp, max.



Mounting Style A

**Circuit Configurations** (Consult factory for other available circuit configurations)



Circuit Configuration 1

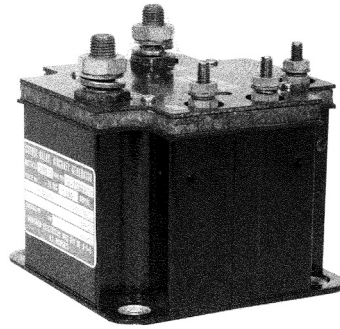
HARTMAN Part Number	Construction Type	Mounting Style	Coil Type	Circuit Config.	TE Part Number
E-387C-1	Gasket/Vented	A	Continuous	1	2-1616126-3

For factory-direct application assistance, phone 419-521-9500 or fax 419-526-2749.

## A-700 Series Cutout — Reverse Current, Rated up to 100 Amps, 28 Vdc

### Product Facts

- SPST NO
- Gasket sealed
- Auxiliary contacts available



### Performance Data

#### Electrical Characteristics

- Main Contacts** —
- Contact Arrangement** — SPST NO
- Rated Operating Voltage** — 28 Vdc
- Resistive Rating** — 100 Amps
- Resistive Rating at 1 min.** — 200 Amps
- Interrupting Capacity** — 4,500 Amps

**Reverse Current Setting\*** — 2 to 6 Amps

**Differential Voltage for Pickup** —  $.85 \pm .15$  V

**Auxiliary Contacts** —

**Aux. Contact Arrangement** — SPST NC, SPST NO

**Resistive Rating** — 5 Amps

**Inductive Rating** — 2 Amps

**Lamp Rating** — 1 Amps

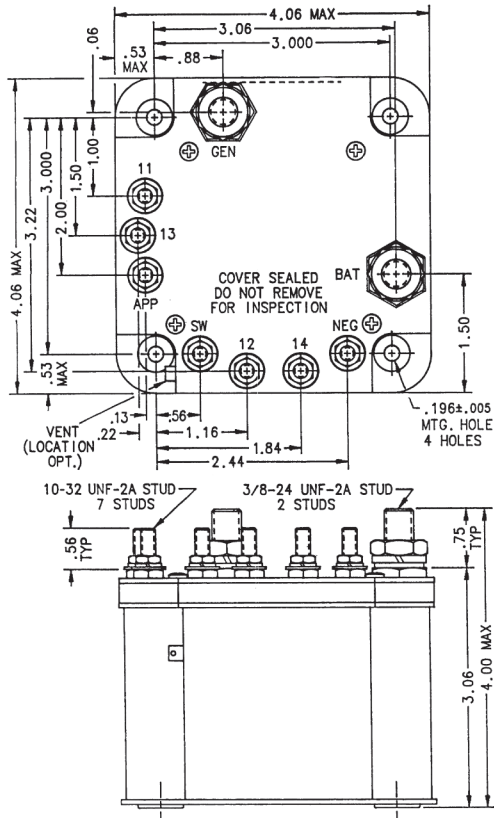
#### General Characteristics

**Weight, Max.** — 3 lbs 1 oz

#### Coil Characteristics

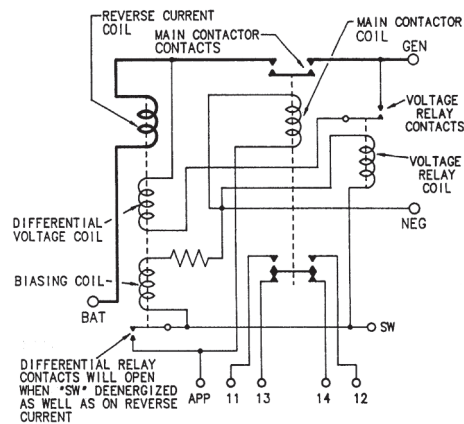
**Duty Cycle** — Continuous

\*Over a Voltage Range of  $27.5 \pm 2.5$  Vdc



Mounting Style A

### Circuit Configurations (Consult factory for other available circuit configurations)



Circuit Configuration 1

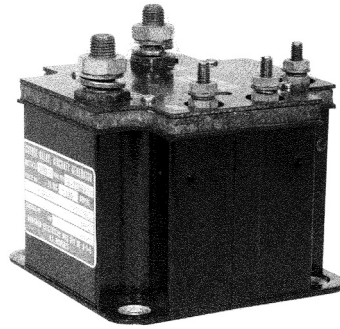
For factory-direct application assistance, phone 419-521-9500 or fax 419-526-2749.

HARTMAN Part Number	Construction Type	Mounting Style	Coil Type	Circuit Config.	TE Part Number
A-700BU	Gasket/Vented	A	Continuous	1	1616109-6

## A-700 Series Cutout — Reverse Current, Rated up to 200 Amps, 28 Vdc

### Product Facts

- SPST NO
- Gasket sealed
- Meets many requirements of MIL-PRF-6106



### Performance Data

#### Electrical Characteristics

- Contact Arrangement** — SPST NO
- Rated Operating Voltage** — 28 Vdc
- Current Rating, Continuous** — 200 Amps
- Current Rating at 15 sec.** — 1,000 Amps
- Current Rating at 1 min.** — 500 Amps
- Current Rating at 5 min.** — 300 Amps
- Interrupting Capacity** — 4,500 Amps
- Reverse Current Setting\*** — 6 to 17 Amps
- Differential Voltage for Pickup** — .85 ± .15 V

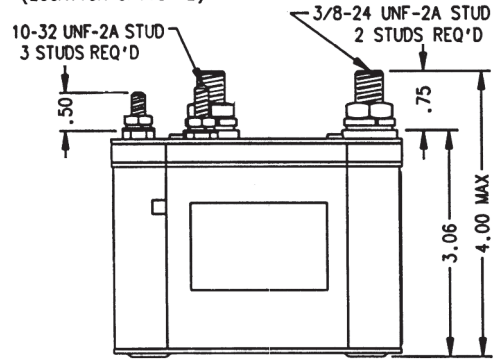
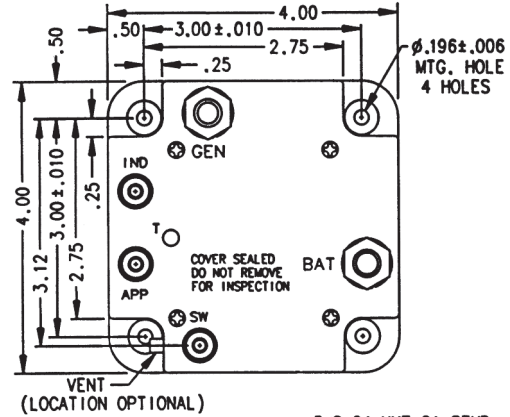
#### General Characteristics

- Temperature Range** — -55°C to +71°C
- Operating Cycles (Life) at Rated Resistive Load, Min.** — 50,000 cycles
- Operating Cycles (Life) Mechanical, Min.** — 100,000 cycles
- Electrical** — 50,000 min.
- Weight, Max.** — 2 lbs 15 oz

#### Coil Characteristics

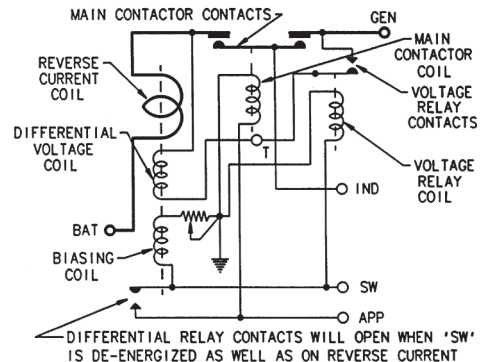
- Duty Cycle** — Continuous

\*Over a Voltage Range of 27.5 ± 2.5 Vdc and Calibrated at 12 ± 1 Amp RC at 28 Vdc & 25°C ± 5°C



Mounting Style A

### Circuit Configurations (Consult factory for other available circuit configurations)



Circuit Configuration 1

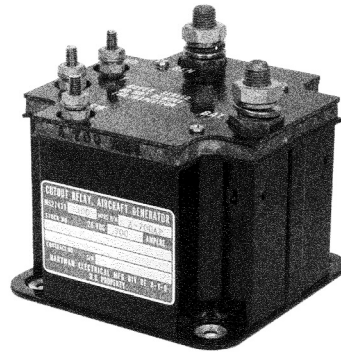
For factory-direct application assistance, phone 419-521-9500 or fax 419-526-2749.

HARTMAN Part Number	Construction Type	Mounting Style	Coil Type	Circuit Config.	TE Part Number
A-700AQ-4	Gasket/Vented	A	Continuous	1	1616109-4

## A-700 Series Cutout — Reverse Current, Rated up to 300 Amps, 28 Vdc

### Product Facts

- SPST NO, Double break
- Gasket sealed
- Meets many requirements of MIL-PRF-6106



### Performance Data

#### Electrical Characteristics

- Contact Arrangement** — SPST NO, Double Break
- Rated Operating Voltage** — 28 Vdc
- Resistive Rating** — 300 Amps
- Reverse Current Dropout** — 9 to 25 Amps
- Differential Pickup** —  $.5 \pm .15$

#### General Characteristics

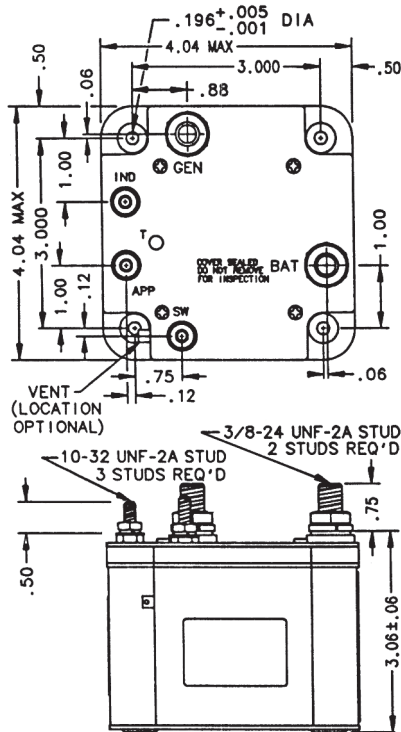
- Temperature Range** —  $-55^{\circ}\text{C}$  to  $+71^{\circ}\text{C}$
- Operating Cycles (Life) at Rated Resistive Load, Min.** — 50,000 cycles
- Operating Cycles (Life) Mechanical, Min.** — 100,000 cycles
- Electrical** — 50,000 min.
- Dielectric Strength** — All Circuits to Ground — 1,250 Vrms  
Circuit to Circuit — 1,250 Vrms  
Coil to Ground and Aux. Contacts — 500 Vrms

#### Weight, Max. —

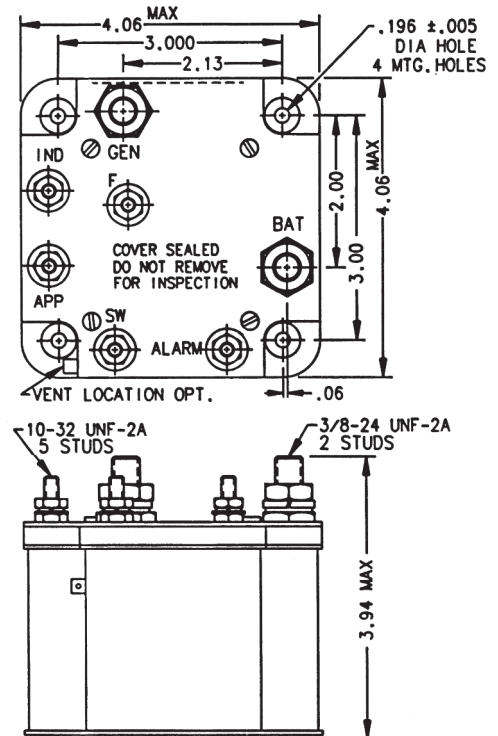
- A-700AAP — 2.9 lbs
- A-700ZC-7, A-700ZG — 2.5 lbs

#### Coil Characteristics

- Duty Cycle** — Continuous
- Duty Cycle when using "APP"** — Intermittent
- Nom. Coil Voltage** — 24 to 30 Vdc
- Pickup Voltage, Max.** — 18 Vdc
- Dropout Voltage** — 0.5 to 7.0 Vdc



Mounting Style A



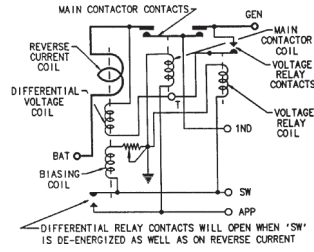
Mounting Style B

For factory-direct application assistance, phone 419-521-9500 or fax 419-526-2749.

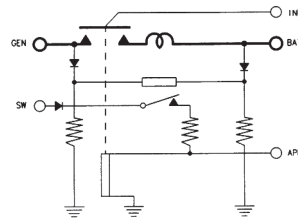


## A-700 Series Cutout — Reverse Current, Rated up to 300 Amps, 28 Vdc (Continued)

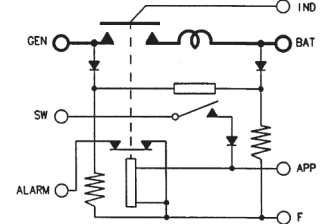
**Circuit Configurations** (Consult factory for other available circuit configurations)



**Circuit Configuration 1**



**Circuit Configuration 2**



**Circuit Configuration 3**

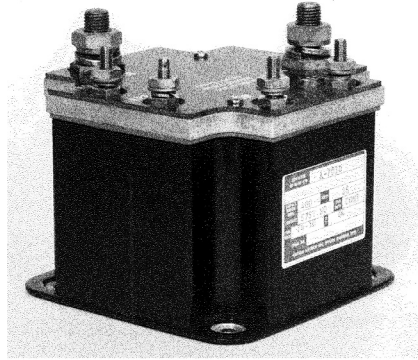
HARTMAN Part Number	Construction Type	Mounting Style	Coil Type	Circuit Config.	TE Part Number
A-700AAP	Gasket/Vented	A	Continuous	1	1616109-1
A-700ZC-7	Gasket/Vented	A	Continuous	2	1616109-7
A-700ZG	Gasket/Vented	B	Continuous	3	1616109-9

For factory-direct application assistance, phone 419-521-9500 or fax 419-526-2749.

## A-701 Series Cutout — Reverse Current, Rated up to 400 Amps, 28 Vdc

### Product Facts

- SPST NO, Double break
- Gasket sealed
- Meets many requirements of MIL-C-5026 and MIL-PRF-6106



### Performance Data

#### Electrical Characteristics

**Contact Arrangement** — SPST NO, Double Break  
**Rated Operating Voltage** — 28 Vdc  
**Resistive Rating** — 400 Amps  
**Resistive for 30 sec.** — 1,000 Amps  
**Inrush Rating** — 1,500 Amps  
**Reverse Current Dropout** —  
 A-701D — 25 to 50 Amps  
 A-701C — 18 to 35 Amps

#### General Characteristics

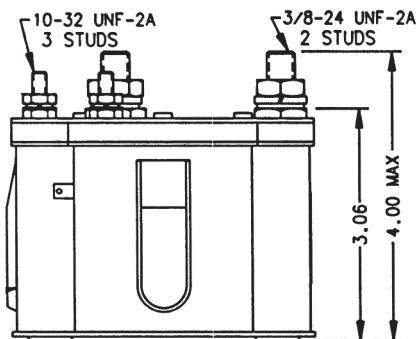
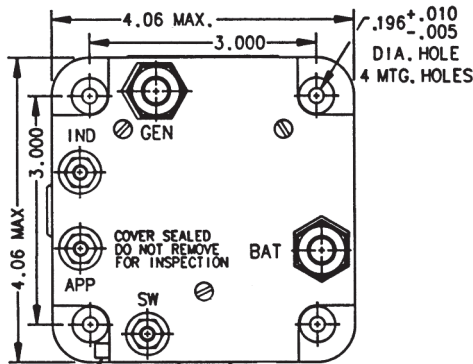
**Temperature Range** —  
 -55°C to +71°C  
**Operating Cycles (Life) at Rated Resistive Load, Min.** — 50,000 cycles  
**Operating Cycles (Life) Mechanical, Min.** — 100,000 cycles  
**Electrical** — 50,000 min.  
**Dielectric Strength** —  
 All Circuits to Ground — 1,250 Vrms  
 Circuit to Circuit — 1,250 Vrms  
 Coil to Ground and Aux. Contacts — 500 Vrms  
**Differential Pickup** —  $0.5 \pm .15$  Vdc

#### Weight, Max. —

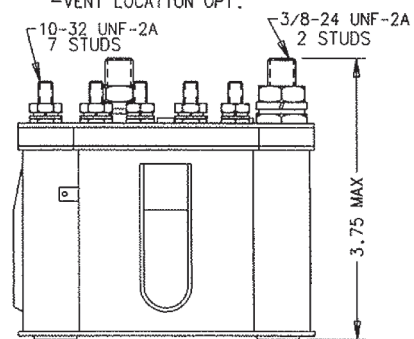
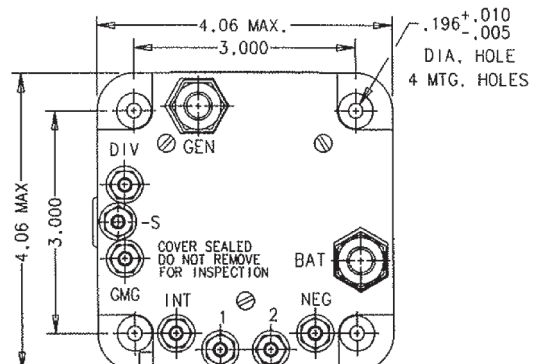
A-701D — 3 lbs 10 oz  
 A-701C — 4 lbs

#### Coil Characteristics

**Duty Cycle** — Continuous, economizing  
**Duty Cycle when using “APP” on A-701D or “GMG” on A-701C** — Intermittent  
**Nom. Coil Voltage** — 24 to 30 Vdc  
**Pickup Voltage, Max.** —  
 A-701D — 15 Vdc  
 A-701C — 12 Vdc  
**Dropout Voltage** — 0.5 to 7.0 Vdc



Mounting Style A

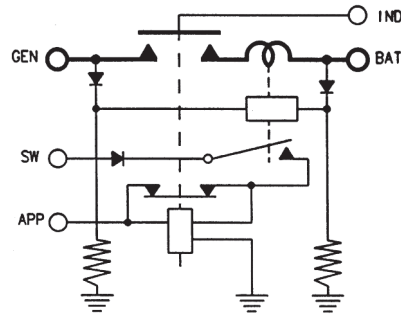


Mounting Style B

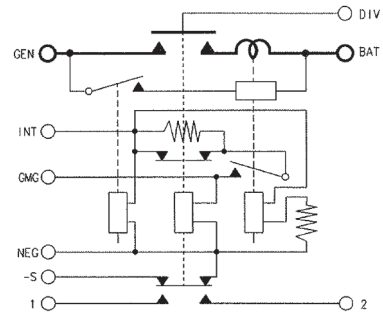
For factory-direct application assistance, phone 419-521-9500 or fax 419-526-2749.

## A-701 Series Cutout — Reverse Current, Rated up to 400 Amps, 28 Vdc (Continued)

**Circuit Configurations** (Consult factory for other available circuit configurations)



Circuit Configuration 1



Circuit Configuration 2

HARTMAN Part Number	Construction Type	Mounting Style	Coil Type	Circuit Config.	TE Part Number
A-701D	Gasket/Vented	A	Continuous, Economizing	1	1-1616109-1
A-701C	Gasket/Vented	B	Continuous, Economizing	2	1-1616109-0

For factory-direct application assistance, phone 419-521-9500 or fax 419-526-2749.

## A-702 Series Cutout — Reverse Current, Rated up to 600 Amps, 28 Vdc

### Product Facts

- SPST NO
- Gasket sealed

### Performance Data

#### Electrical Characteristics

- Contact Arrangement** — SPST NO, Double Break
- Rated Operating Voltage** — 28 Vdc
- Resistive Rating** — 600 Amps
- Reverse Current Dropout** — 18 to 35 Amps
- Differential Pickup** —  $.5 \pm .15$

#### General Characteristics

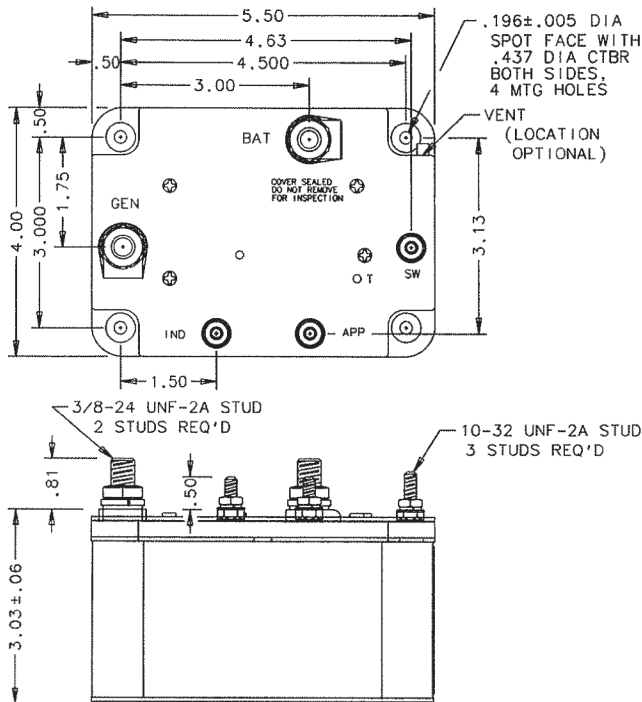
- Temperature Range** —  $-55^{\circ}\text{C}$  to  $+71^{\circ}\text{C}$
- Operating Cycles (Life) at Rated Resistive Load, Min.** — 50,000 cycles
- Operating Cycles (Life) Mechanical, Min.** — 100,000 cycles
- Electrical** — 50,000 min.
- Dielectric Strength** — All Circuits to Ground — 1,250 Vrms  
Circuit to Circuit — 1,250 Vrms

Coil to Ground and Aux. Contacts — 500 Vrms

**Weight, Max.** — 3.9 lbs.

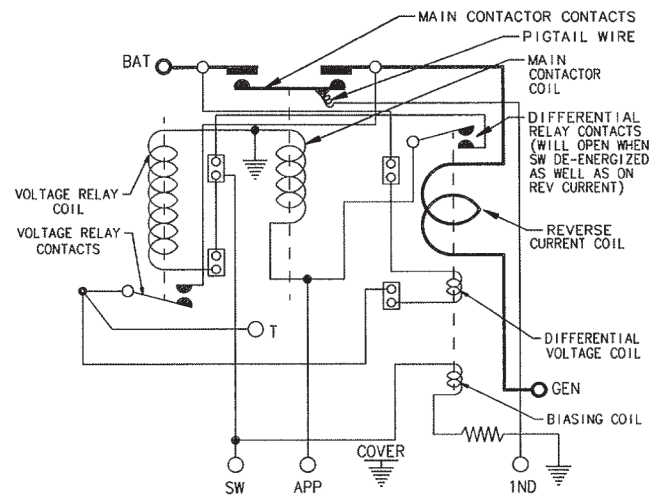
#### Coil Characteristics

- Duty Cycle** — Continuous
- Duty Cycle when using "APP"** — Continuous
- Nom. Coil Voltage** — 24 to 30 Vdc
- Pickup Voltage, Max.** — 18 Vdc
- Dropout Voltage** — 0.5 to 7.0 Vdc



Mounting Style A

### Circuit Configurations (Consult factory for other available circuit configurations)



Circuit Configuration 1

For factory-direct application assistance, phone 419-521-9500 or fax 419-526-2749.

HARTMAN Part Number	Construction Type	Mounting Style	Coil Type	Circuit Config.	TE Part Number
A-702AAP	Gasket/Vented	A	Continuous	1	1-1616109-3

## B-188 Series External Power Monitor, 115 VAC, 400 Hz

### Product Facts

- SPST
- Gasket Sealed
- Over/under frequency protection
- Over/under voltage protection
- Dust tight



### Performance Data

#### Electrical Characteristics

**Contact Arrangement** — SPST

**Rated Operating Voltage** — 115 VAC/28 Vdc, 3 phase, 400 Hz

**Resistive Rating** — 3 Amps

#### General Characteristics

**Operating Temperature Range** — -54°C to +71°C

**Dielectric Strength** — Leakage current will not exceed .001 Amps when unit is subjected to test of Para. 4.6.2 of MIL-E-24021A

**Altitude** — 0-40,000 ft

**Weight, Max.** — .75 lb

**Sinusoidal Vibration** —

5-15.5 CPS  $\pm 0.13$  G,  
15.5-54 CPS 0.01 inch DA,  
54-500 CPS  $\pm 1.5$  G

**Shock, Max.** — 10 G 30  $\pm 1$  ms

**Operation** — Contacts will remain as shown (off condition) until input power is anywhere within the “on” zone. Contacts will revert to off condition whenever input voltage and/or frequency is above the high side or below the low side “off”. Limits for time intervals exceeding the transient period.

#### Limits

“On” zone —

“On” zone voltage limits 100 to 120 volts rms all phases

“On” zone frequency limits 380 to 420 CPS

“Off” limits —

High side voltage “off” limits — 131  $\pm 5$  volts 3  $\emptyset$  (highest of 3 $\emptyset$ )

High side frequency “off” limits — 425  $\pm 5$  CPS

Low side frequency “off” limits — 375  $\pm 5$  CPS

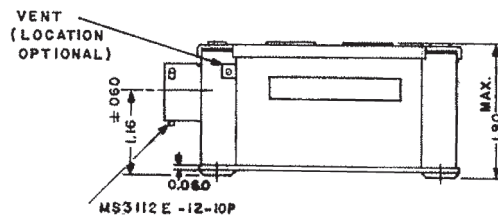
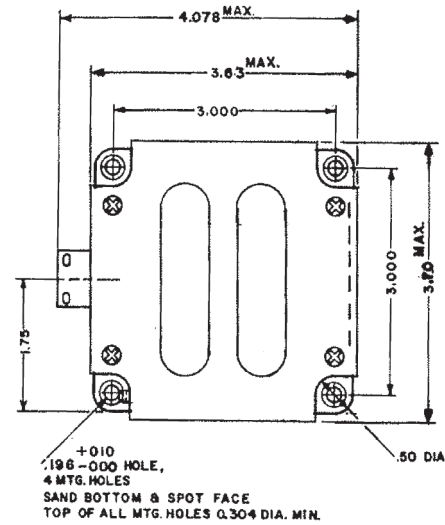
Voltage Transient Limits —

High Side — above limit 2 but below limit 1 of Fig. 2 MIL-STD-704, 3 $\emptyset$  (highest of 3 $\emptyset$ )

Low Side — below limit 3 Fig. 2 MIL-STD-704

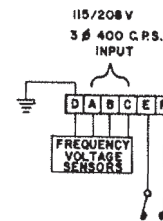
Over and Under frequency time delay 3  $\pm 1$  sec.

Output rating SPST 3 AMP Ind. 28 V DC/115 V 400 CPS



Mounting Style A

**Circuit Configurations** (Consult factory for other available circuit configurations)



Circuit Configuration 1

For factory-direct application assistance, phone 419-521-9500 or fax 419-526-2749.

HARTMAN Part Number	Construction Type	Mounting Style	Coil Type	Circuit Config.	TE Part Number
B-188MA-1	Gasket/Vented	A	N/A	1	1616114-7

## A-711 Series Relay, Automatic Dropout, Rated up to 600 Amps, 29 Vdc

### Product Facts

- SPST NO, Double break
- Gasket sealed
- Auxiliary contacts available
- Meets many requirements of MIL-PRF-6106



### Performance Data

#### Electrical Characteristics

**Contact Arrangement** — SPST NO, Double Break  
**Operating Voltage, Max.** — 29 Vdc  
**Resistive Rating** — 600 Amps  
**Pickup Voltage, Max.** — 17 Vdc  
**Dropout Voltage, Max.** — 14 Vdc, except for A-711 which is 1 to 5 Vdc  
**Pickup Current, Max.** — 490 Amps  
**Dropout Current at any Contactor Voltage** — 150 ± 15 Amps, except for A-711R which is S1 — 135 ± 15 Amps and S2 — 235 ± 20 Amps

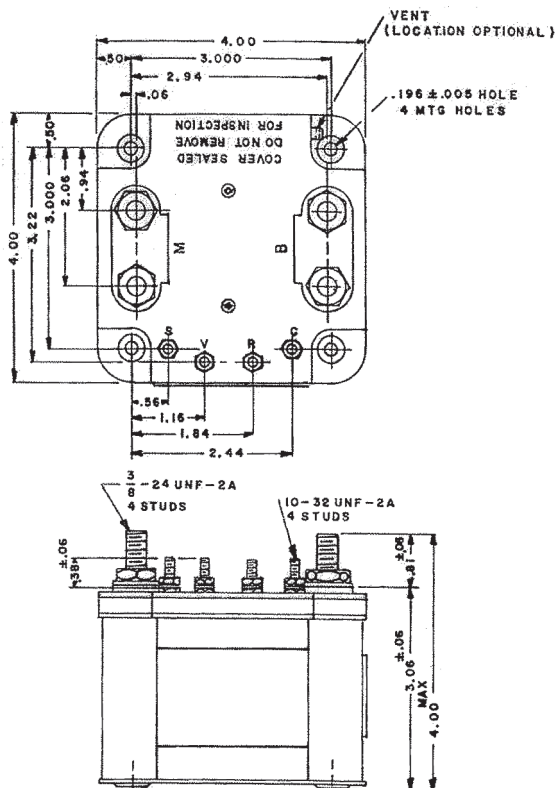
### General Characteristics

**Temperature Range** — -55°C to +71°C  
**Operating Cycles (Life) at Rated Resistive Load, Min.** — 25,000 cycles  
**Operating Period, Max.** — 3 min.  
**Weight, Max.** —  
 A-711JF, A-711JF — 3 lbs 13 oz  
 A-711Z — 3 lbs 6 oz  
 A-711R — 3 lbs 5 oz

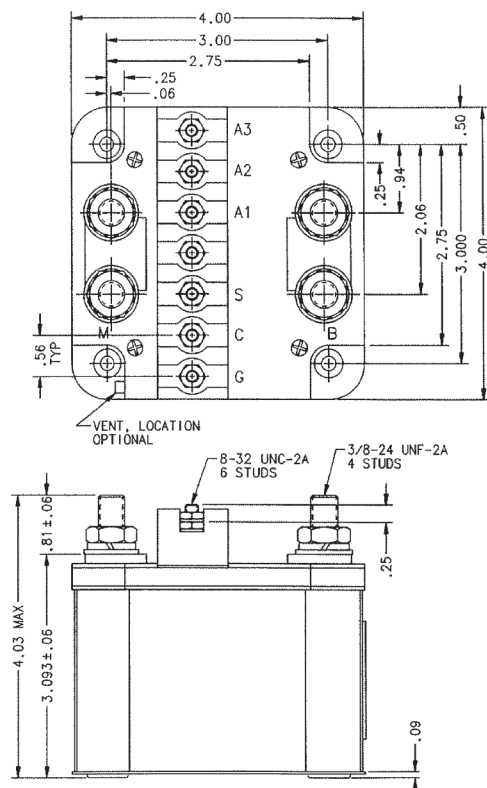
### Coil Characteristics

**Duty Cycle** — Intermittent  
**Coil Current, Max.** —  
 A-711AJ, A-711JM — 2 Amps  
 A-711Z — 0.6 Amp  
 A-711R — 1.0 Amp  
**Coil Voltage, Nom.** — 28 Vdc  
**Signal Resistor** — 20 Ohm ± 10%, 20 W  
**Coil Res., "C" Term. to "GND"** — 36 Ohm ± 10%

For factory-direct application assistance, phone 419-521-9500 or fax 419-526-2749.



Mounting Style A

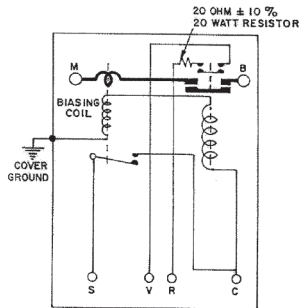


Mounting Style B

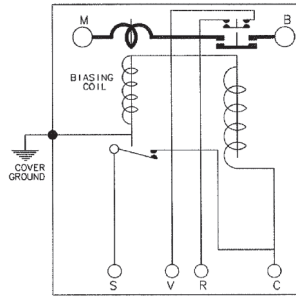
For factory-direct application assistance, phone 419-521-9500 or fax 419-526-2749.

## A-711 Series Relay, Automatic Dropout, Rated up to 600 Amps, 29 Vdc (Continued)

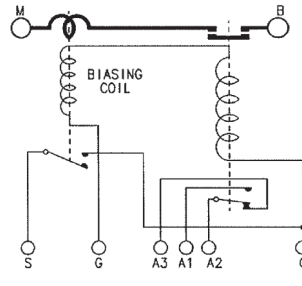
**Circuit Configurations** (Consult factory for other available circuit configurations)



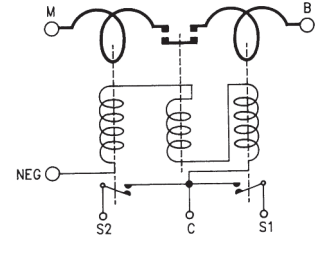
Circuit Configuration 1



Circuit Configuration 2



Circuit Configuration 3



Circuit Configuration 4

HARTMAN Part Number	Construction Type	Mounting Style	Coil Type	Circuit Config.	TE Part Number
A-711JF	Gasket/Vented	A	Intermittent	1	1-1616109-6
A-711JM	Gasket/Vented	A	Intermittent	2	1-1616109-7
A-711Z	Gasket/Vented	B	Intermittent	3	6-1616071-3
A-711R	Gasket/Vented	A	Intermittent	4	1-1616109-8

For factory-direct application assistance, phone 419-521-9500 or fax 419-526-2749.

## A-957 Series Relay, Automatic Cutout, Rated up to 200 Amps, 28 Vdc

### Product Facts

- SPST NO, Double break
- Gasket sealed
- Auxiliary contacts available
- Meets many requirements of MIL-PRF-6106

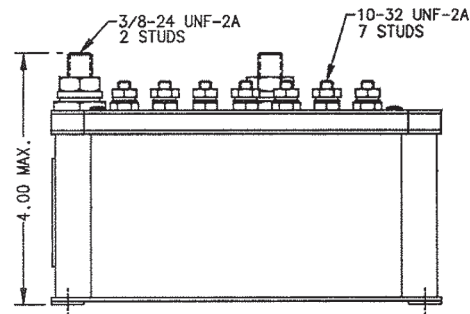
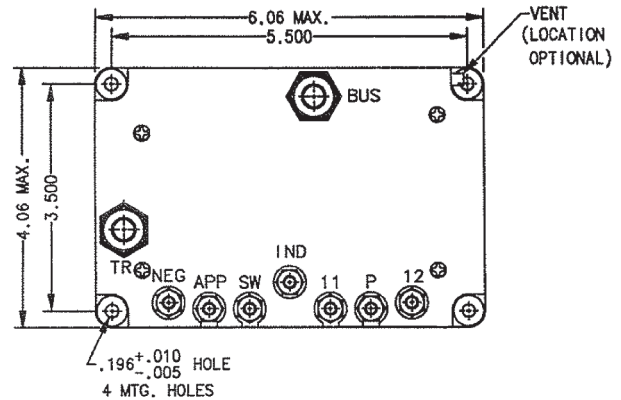
### Performance Data

#### Electrical Characteristics

- Main Contacts —**  
**Contact Arrangement —** SPST NO, Double Break  
**Operating Voltage, Nom. —** 28 Vdc  
**Resistive Rating —** 200 Amps  
**Inrush Rating —** 300 Amps  
**Pickup Current —**  
 VR — 21-24 V  
 I — 25 Amp Max.  
 SR — 18 V Max.  
 MC — 18 V Max.
- Dropout Current —**  
 I — 5 Amp Min.  
 SR — 18 ± 3 V  
 MC — 1 to 7 V
- Auxiliary Contacts —**  
**Aux. Contact Arrangement —** SPST NO, SPST NC  
**Rated Operating Voltage —** 28 Vdc  
**Resistive Rating —** 5 Amps

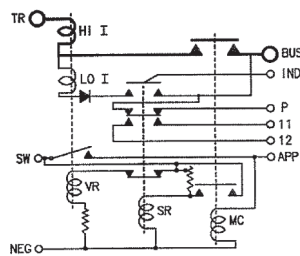
#### General Characteristics

- Temperature Range —** -55°C to +71°C  
**Operating Cycles (Life) at Rated Resistive Load, Min. —** 50,000 cycles  
**Operating Cycles (Life) Mechanical —** 100,000 cycles  
**Altitude, Max. —** 50,000 ft  
**Weight, Max. —** 4 lbs 8 oz
- Coil Characteristics**  
**Duty Cycle —** Continuous  
**Coil Voltage, Nom. —** 24 to 30 Vdc

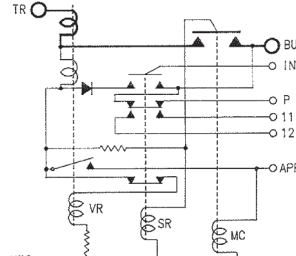


Mounting Style A

### Circuit Configurations (Consult factory for other available circuit configurations)



Circuit Configuration 1



Circuit Configuration 2

HARTMAN Part Number	Construction Type	Mounting Style	Coil Type	Circuit Config.	TE Part Number
A-957CSD	Gasket/Vented	A	Continuous	1	1616110-6
A-957G	Gasket/Vented	A	Continuous	2	1616110-8

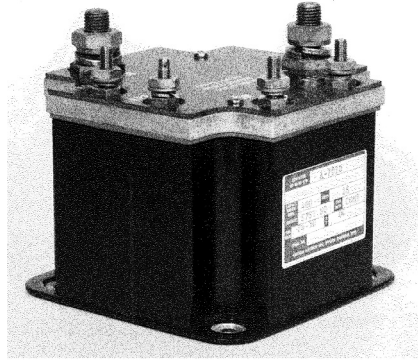
For factory-direct application assistance, phone 419-521-9500 or fax 419-526-2749.



## A-957 Series Relay, Automatic Cutout, Rated up to 300 Amps, 24/30 Vdc

### Product Facts

- SPST NO, Double break
- Gasket sealed
- Meets many requirements of MIL-PRF-6106



### Performance Data

#### Electrical Characteristics

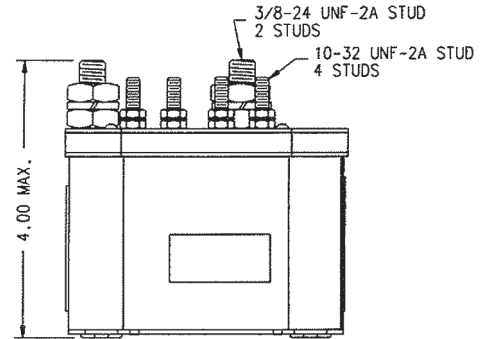
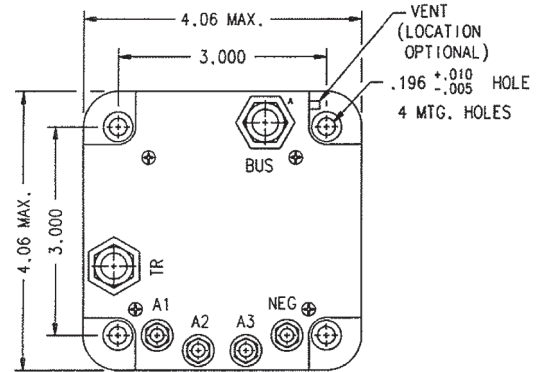
- Contact Arrangement** — SPST NO, Double Break
- Operating Voltage, Nom.** — 24/30 Vdc
- Resistive Rating** — 300 Amps
- Inrush Rating** — 800 Amps
- Pickup Current** —  
 VR — 21-24 Vdc  
 Current — 25 Amp Max.  
 SR — 18 V Max.  
 Main Contactor — 18 V Max.
- Dropout Current** —  
 Current — 5 Amp Min.  
 SR — 18 ± 3 V  
 Main Contactor — 12 V Max.

#### General Characteristics

- Temperature Range** — -55°C to +71°C
- Operating Cycles (Life) at Rated Resistive Load, Min.** — 50,000 cycles
- Operating Cycles (Life) Mechanical** — 100,000 cycles
- Weight, Max.** — 3.5 lbs

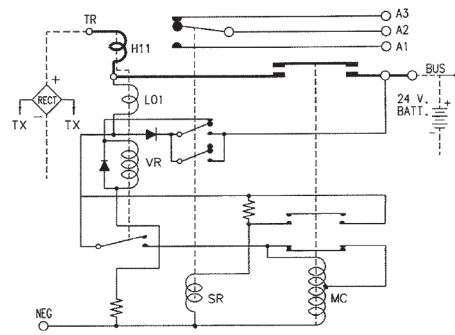
#### Coil Characteristics

- Duty Cycle** — Continuous
- Coil Voltage, Nom.** — 24 to 30 Vdc



Mounting Style A

### Circuit Configurations (Consult factory for other available circuit configurations)



Circuit Configuration 1

For factory-direct application assistance, phone 419-521-9500 or fax 419-526-2749.

HARTMAN Part Number	Construction Type	Mounting Style	Coil Type	Circuit Config.	TE Part Number
A-957E	Gasket/Vented	A	Continuous	1	1616110-7

## A-957 Series Relay, Automatic Cutout, Rated up to 350 Amps, 28 Vdc

### Product Facts

- SPST NO, Double break
- Gasket sealed
- Auxiliary contacts available
- Meets many requirements of MIL-PRF-6106

### Performance Data

#### Electrical Characteristics

**Main Contacts —**  
**Contact Arrangement —** SPST NO, Double Break  
**Operating Voltage, Nom. —** 28 Vdc  
**Resistive Rating —** 350 Amps  
**Pickup Current —**  
 VR — 21-24 V  
 I — 25 Amp Max.  
 SR — 18 V Max.  
 MC — 18 V Max.

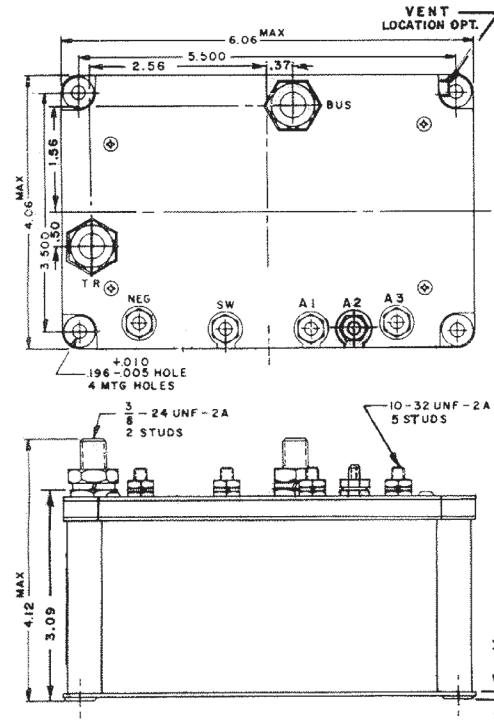
**Dropout Current —**  
 I — 5 Amp Min.  
 SR — 18 ± 3 V  
 MC — 1 to 7 V

**Auxiliary Contacts —**  
**Aux. Contact Arrangement —** SPDT  
**Rated Operating Voltage —** 28 Vdc  
**Resistive Rating —** 5 Amps

**General Characteristics**  
**Ambient Temperature Range —** -30°F to +220°F

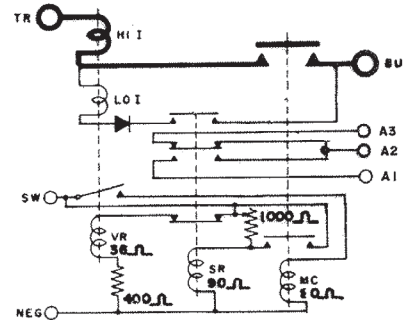
**Altitude, Max. —** 50,000 ft  
**Weight, Max. —** 4 lbs 8 oz

**Coil Characteristics**  
**Duty Cycle —** Continuous  
**Coil Voltage, Nom. —** 24 to 30 Vdc



Mounting Style A

### Circuit Configurations (Consult factory for other available circuit configurations)



Circuit Configuration 1

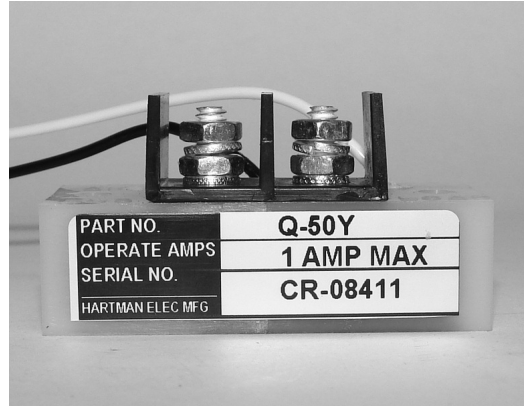
For factory-direct application assistance, phone 419-521-9500 or fax 419-526-2749.

HARTMAN Part Number	Construction Type	Mounting Style	Coil Type	Circuit Config.	TE Part Number
A-957CA	Gasket/Vented	A	Continuous	1	1616110-5

## Q-50 Series Relay, Current Indicator, Rated up to 2 Amps, 28 Vdc

### Product Facts

- SPST NC
- Environmentally sealed
- Meets many requirements of MIL-PRF-6106



### Performance Data

#### Electrical Characteristics

Contact Arrangement — SPST NC

Contact Rating @ 120 Vdc —  
0.1 Amp

Rated Operating Voltage — 28 Vdc

Sensing Current Rating — 2 Amps,  
continuous

Pickup Max. — 1 Amp DC

Dropout Min. — 0.4 Amp

Operating Voltage, Nom. —  
28 Vdc

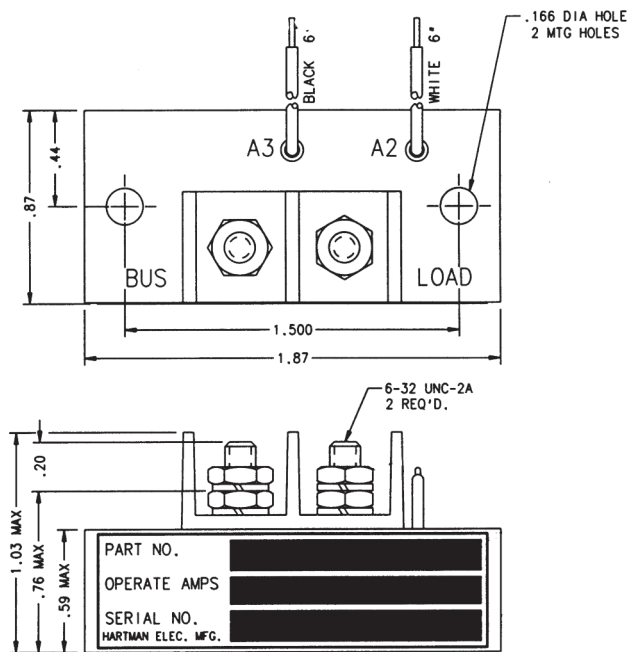
#### General Characteristics

Temperature Range —

-55°C to +71°C

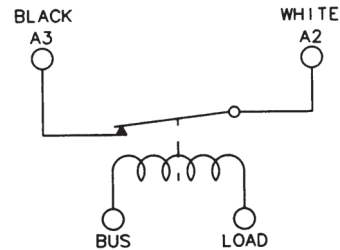
Altitude, Max. — 50,000 ft

Weight, Max. — 1.25 oz



Mounting Style A

### Circuit Configurations (Consult factory for other available circuit configurations)



Circuit Configuration 1

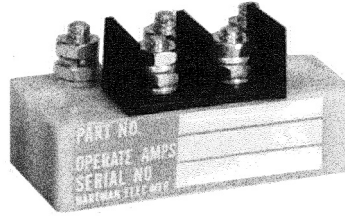
For factory-direct application assistance, phone 419-521-9500 or fax 419-526-2749.

HARTMAN Part Number	Construction Type	Mounting Style	Duty Cycle	Circuit Config.	TE Part Number
Q-50Y	Environmentally Sealed	A	Continuous	1	1-1616131-2

## Q-50 Series Relay, Current Indicator, Rated up to 3.5 Amps, 28 Vdc

### Product Facts

- SPDT
- Environmentally sealed
- Meets many requirements of MIL-PRF-6106



### Performance Data

#### Electrical Characteristics

**Contact Arrangement** — SPDT

**Contact Rating @ 28 Vdc** — 0.25 Amp

**Lamp Load @ 28 Vdc** — 0.080 Amp

**Rated Operating Voltage** — 28 Vdc

**Sensing Current Rating** — 3.5 Amps, continuous

**Pickup Max.** — 2 Amp DC

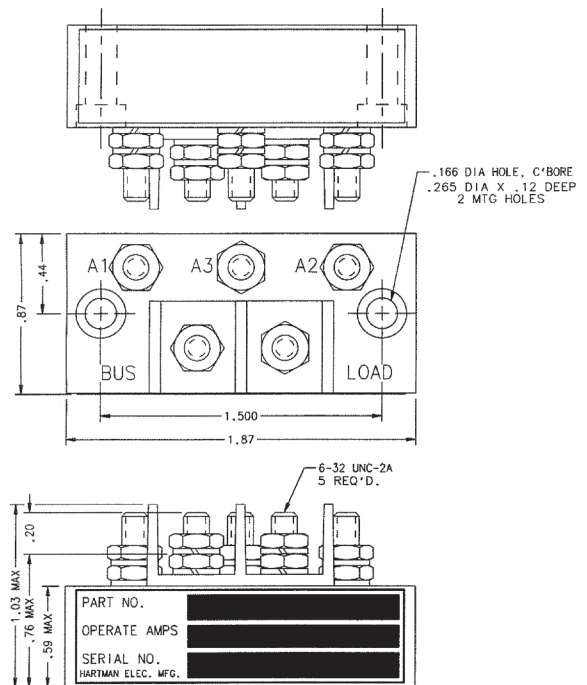
**Dropout Min.** — 0.8 Amp

#### General Characteristics

**Temperature Range** — -55°C to +71°C

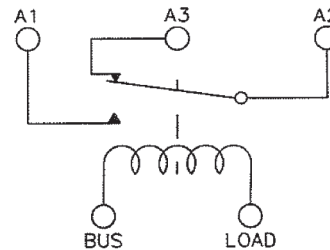
**Altitude, Max.** — 50,000 ft

**Weight, Max.** — 1.25 oz



Mounting Style A

### Circuit Configurations (Consult factory for other available circuit configurations)



Circuit Configuration 1

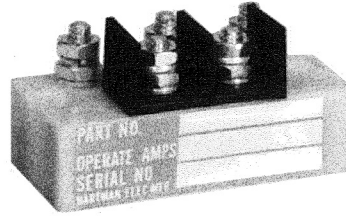
For factory-direct application assistance, phone 419-521-9500 or fax 419-526-2749.

HARTMAN Part Number	Construction Type	Mounting Style	Duty Cycle	Circuit Config.	TE Part Number
Q-50F	Environmentally Sealed	A	Continuous	1	1616131-9

## Q-50 Series Relay, Current Indicator, Rated up to 6.25 Amps, 28 Vdc

### Product Facts

- SPDT
- Environmentally sealed
- Meets many requirements of MIL-PRF-6106



### Performance Data

#### Electrical Characteristics

**Contact Arrangement** — SPST NC

**Contact Rating @ 28 Vdc** — 0.25 Amp

**Rated Operating Voltage** — 28 Vdc

**Sensing Current Rating** — 6.25 Amps, continuous

**Lamp Load** — 0.080 Amp

**Pickup Max.** —

Q50BB - 2.5 Amps DC

Q50BD - 2.0 Amps DC

Q50E - 3.5 Amps DC

**Dropout Min.** —

Q50BD - 0.8 Amps DC

Q50BB - 1.0 Amps DC

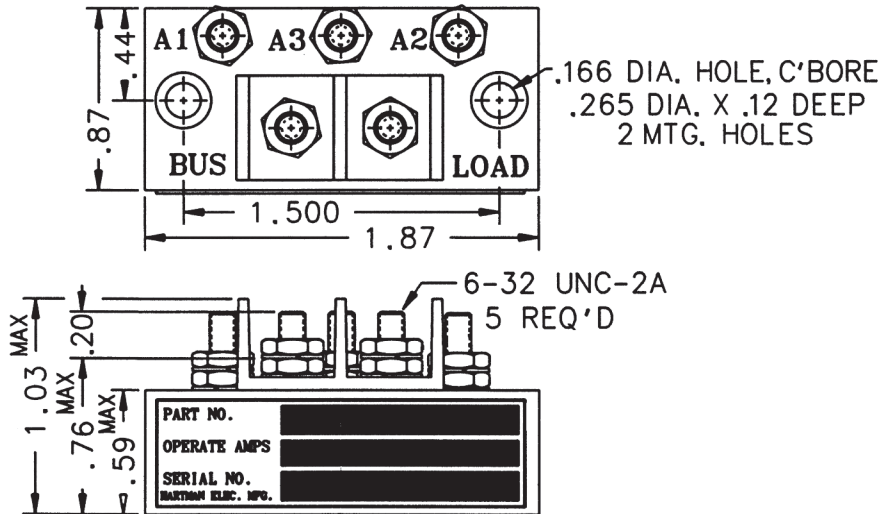
Q50E - 1.4 Amps DC

### General Characteristics

**Temperature Range** — -55°C to +71°C

**Altitude, Max.** — 50,000 ft

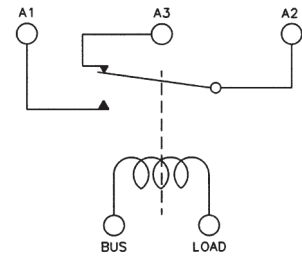
**Weight, Max.** — 1.25 oz



Mounting Style A

### Circuit Configurations

(Consult factory for other available circuit configurations)



Circuit Configuration 1

6

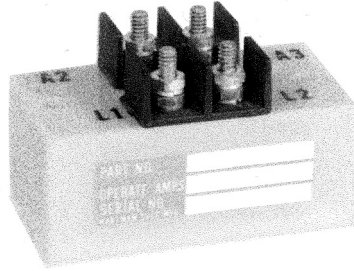
HARTMAN Part Number	Construction Type	Mounting Style	Coil Type	Circuit Config.	TE Part Number
Q-50BB	Environmentally Sealed	A	Continuous	1	1616131-5
Q-50E	Environmentally Sealed	A	Continuous	1	1616131-8
Q-50BD	Environmentally Sealed	A	Continuous	1	1616131-6

For factory-direct application assistance, phone 419-521-9500 or fax 419-526-2749.

**Q-50 Series Relay, Current Indicator, Rated up to 10 Amps, 28 Vdc**

**Product Facts**

- SPST NO
- Environmentally sealed
- Meets many requirements of MIL-PRF-6106



**Performance Data**

**Electrical Characteristics**

**Contact Arrangement** — SPST NO

**Contact Rating @ 28 Vdc** — 0.25 Amp

**Lamp Load @ 28 Vdc** — 0.08 Amp

**Rated Operating Voltage** — 28 Vdc

**Sensing Current Rating** — 20 Amps, continuous, max.

**Pickup Max.** — 3.5 Amps DC

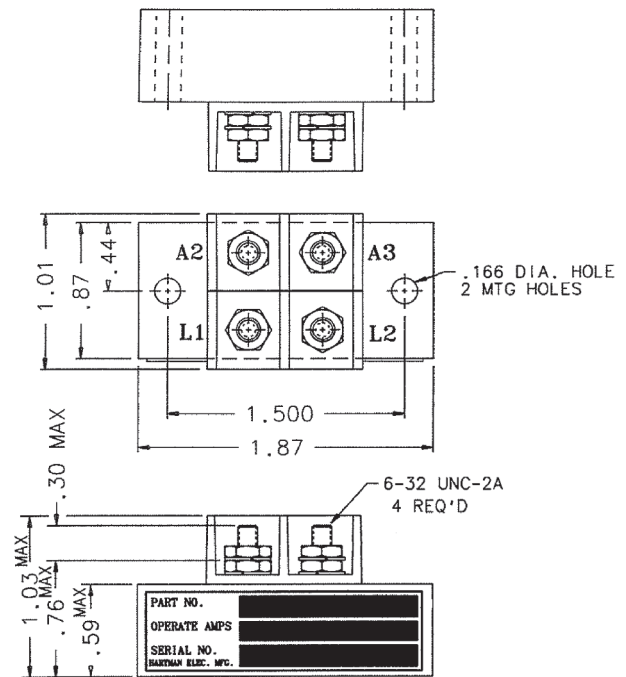
**Dropout Min.** — 0.5 Amp

**General Characteristics**

**Temperature Range** — -55°C to +71°C

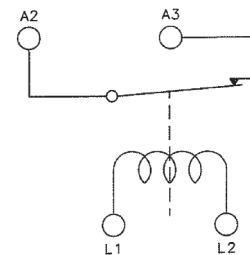
**Altitude, Max.** — 50,000 ft

**Weight, Max.** — 1.25 oz



**Mounting Style A**

**Circuit Configurations** (Consult factory for other available circuit configurations)



**Circuit Configuration 1**

For factory-direct application assistance, phone 419-521-9500 or fax 419-526-2749.

HARTMAN Part Number	Construction Type	Mounting Style	Duty Cycle	Circuit Config.	TE Part Number
Q-50A	Environmentally Sealed	A	Continuous	1	1616131-1

## Q-50 Series Relay, Current Indicator, Rated up to 15 Amps, 28 Vdc

### Product Facts

- SPDT
- Environmentally sealed
- Meets many requirements of MIL-PRF-6106



### Performance Data

#### Electrical Characteristics

**Contact Arrangement** — SPDT

**Contact Rating @ 28 Vdc** —  
0.25 Amp

**Lamp Load @ 28 Vdc** —  
0.10 Amp

**Rated Operating Voltage** — 28 Vdc

**Sensing Current Rating** — 15 Amps  
DC, continuous, max.

**Pickup Max.** —  
3.2 Amps DC

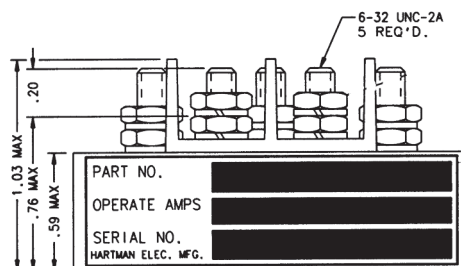
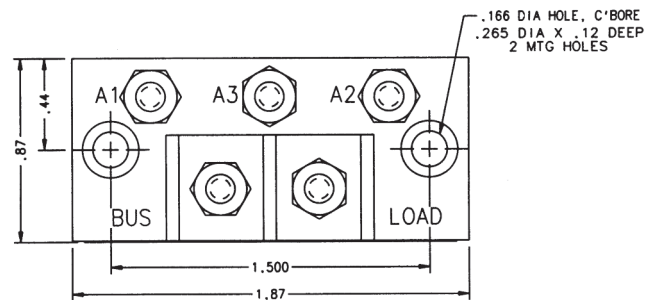
**Dropout Min.** — 1.2 Amps

#### General Characteristics

**Temperature Range** —  
-55°C to +85°C

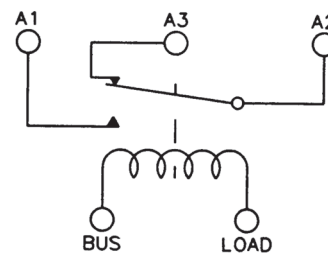
**Altitude, Max.** — 50,000 ft

**Weight, Max.** — 1.25 oz



Mounting Style A

**Circuit Configurations** (Consult factory for other available circuit configurations)



Circuit Configuration 1

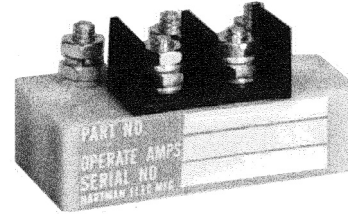
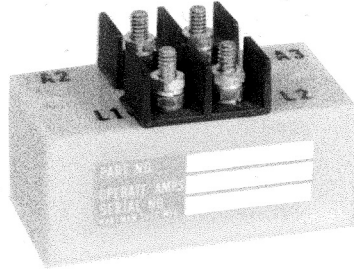
For factory-direct application assistance, phone 419-521-9500 or fax 419-526-2749.

HARTMAN Part Number	Construction Type	Mounting Style	Duty Cycle	Circuit Config.	TE Part Number
Q-50CC	Environmentally Sealed	A	Continuous	1	1616131-7

## Q-50 Series Relay, Current Indicator, Rated up to 16 Amps, 28 Vdc

### Product Facts

- SPST NC
- Environmentally sealed
- Meets many requirements of MIL-PRF-6106



### Performance Data

#### Electrical Characteristics

##### Contact Arrangement —

Q50S - SPST NC  
Q50Z - SPDT

**Contact Rating @ 28 Vdc** —  
0.25 Amp

**Lamp Load @ 28 Vdc** —  
0.10 Amp

**Rated Operating Voltage** — 28 Vdc

**Sensing Current Rating** — 16 Amps  
DC, continuous, max.

**Pickup Max.** — 3 Amps DC

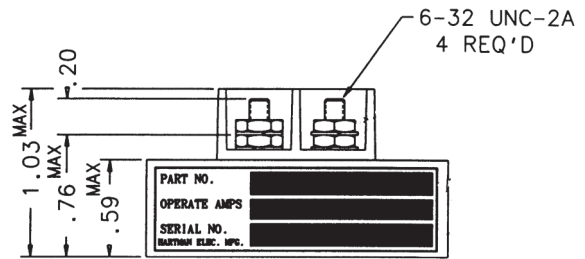
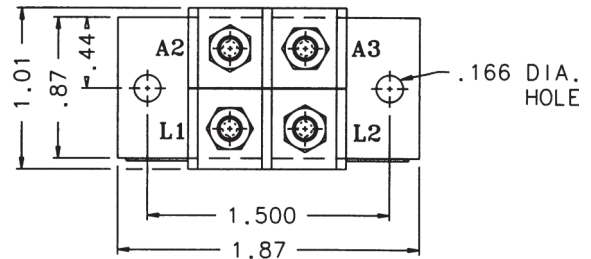
**Dropout Min.** — 1.2 Amps

#### General Characteristics

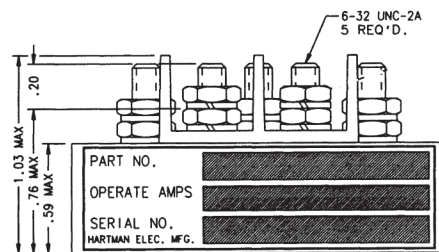
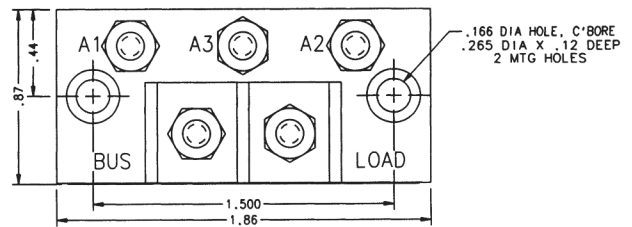
**Temperature Range** —  
-55°C to +71°C

**Altitude, Max.** — 50,000 ft

**Weight, Max.** — 1.25 oz

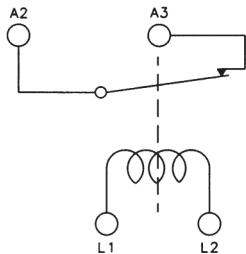


Mounting Style A

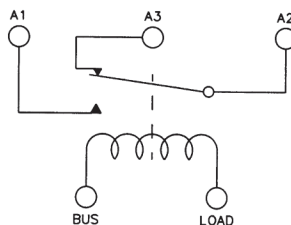


Mounting Style B

### Circuit Configurations (Consult factory for other available circuit configurations)



Circuit Configuration 1



Circuit Configuration 1

For factory-direct application assistance, phone 419-521-9500 or fax 419-526-2749.

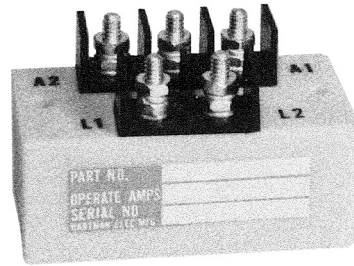
HARTMAN Part Number	Construction Type	Mounting Style	Duty Cycle	Circuit Config.	TE Part Number
Q-50S	Environmentally Sealed	A	Continuous	1	1-1616131-1
Q-50Z	Environmentally Sealed	A	Continuous	2	1-1616131-3



## Q-50 Series Relay, Current Indicator, Rated up to 20 Amps, 28 Vdc

### Product Facts

- SPST NC or SPST NO
- Environmentally sealed
- Meets many requirements of MIL-PRF-6106



### Performance Data

#### Electrical Characteristics

**Contact Arrangement** —  
SPST NC, SPST NO or SPDT

**Contact Rating @ 28 Vdc** —

- Q-50AB-2 — 0.2 Amp
- Q-50J, — 0.25 Amp
- Q-50AG — 1.0 Amp
- Q-50AB-1 — 1 Amp switching, and 2 Amps carry
- Q50AC — 2 Amp

**Lamp Load @ 28 Vdc** —

- Q-50AC, Q-50AB-2 — 0.08 Amp
- Q-50J, Q-50AG — 0.20 Amp

**Operating Voltage, Nom.** — 28 Vdc

**Sensing Current Rating** —

- 20 Amps continuous, max. except for Q-50AB-1 and Q-50AB-2 which are 10

Amps max. and 15 Amps max. for 3 sec. Q50AC 2 Amps continuous 10 Amps max. for 5 seconds

**Pickup Max.** —

- Q-50AC — 0.3 Amp
- Q-50AB-1, Q-50AB-2 — 1.5 Amp
- Q-50J — 3.5 Amps DC
- Q-50AG — 6 Amps DC ± 20%

**Dropout Min.** —

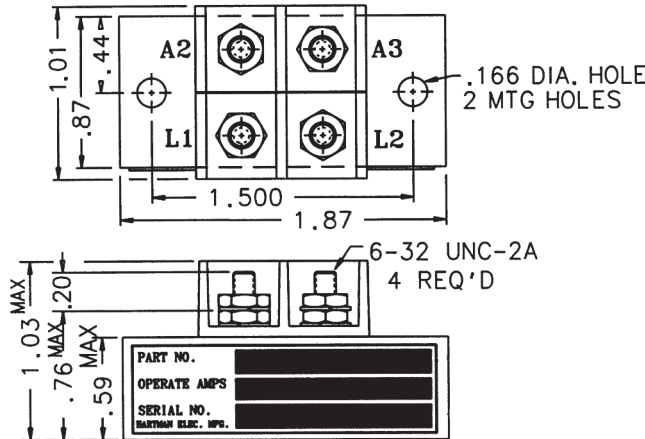
- Q-50AC — 0.1 Amp
- Q-50J — 0.5 Amp
- Q-50AB-1, Q-50AB-2 — less than 1 Amp
- Q-50AG — 2.4 Amp

### General Characteristics

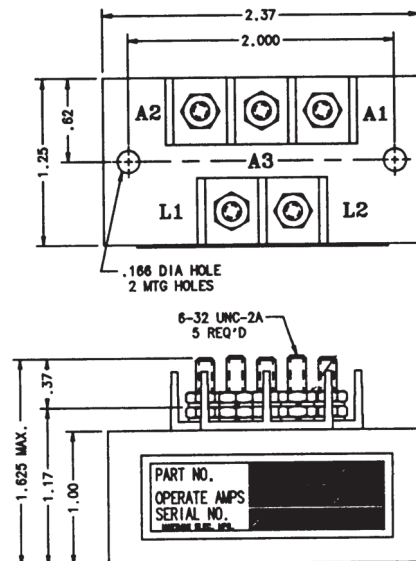
**Temperature Range** —  
-55°C to +71°C

**Altitude, Max.** —  
Q-50J, Q-50AB-1 — 50,000 ft  
Q-50AC, Q-50AG, Q-50AB-2 — 60,000 ft

**Weight, Max.** — 1.25 oz



Mounting Style A

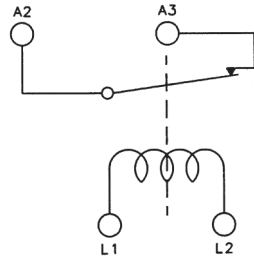


Mounting Style B

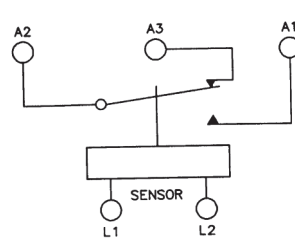
For factory-direct application assistance, phone 419-521-9500 or fax 419-526-2749.

**Q-50 Series Relay, Current Indicator, Rated up to 20 Amps, 28 Vdc** (Continued)

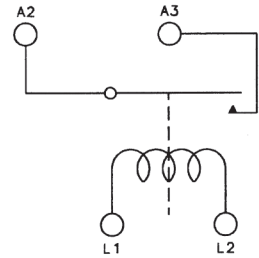
**Circuit Configurations** (Consult factory for other available circuit configurations)



Circuit Configuration 1



Circuit Configuration 2



Circuit Configuration 3

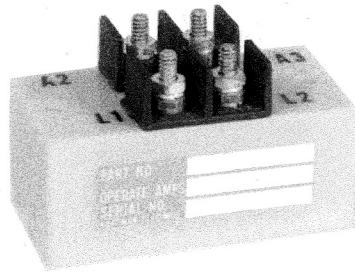
HARTMAN Part Number	Construction Type	Mounting Style	Duty Cycle	Circuit Config.	TE Part Number
Q-50J	Environmentally Sealed	A	Continuous	1	1-1616131-0
Q-50AC	Environmentally Sealed	B	Continuous	2	1616131-4
Q-50AG	Environmentally Sealed	A	Continuous	1	1616540-7
Q-50AB-1	Environmentally Sealed	A	Continuous	1	1616131-2
Q-50AB-2	Environmentally Sealed	A	Continuous	3	1616131-3

For factory-direct application assistance, phone 419-521-9500 or fax 419-526-2749.

**QR-50 Series Relay, AC Current Indicator, Rated up to 5 Amps, 115 VAC**

**Product Facts**

- SPST NC
- Environmentally sealed
- Meets many requirements of MIL-PRF-6106



**Performance Data**

**Electrical Characteristics**

Contact Arrangement — SPST NC

Resistive Rating @ 28 Vdc — .25 Amp

Lamp Load @ 28 Vdc — .10 Amp

Sensing Current Rating — 5 Amp, AC continuous

**General Characteristics**

Temperature Range — -55°C to +85°C

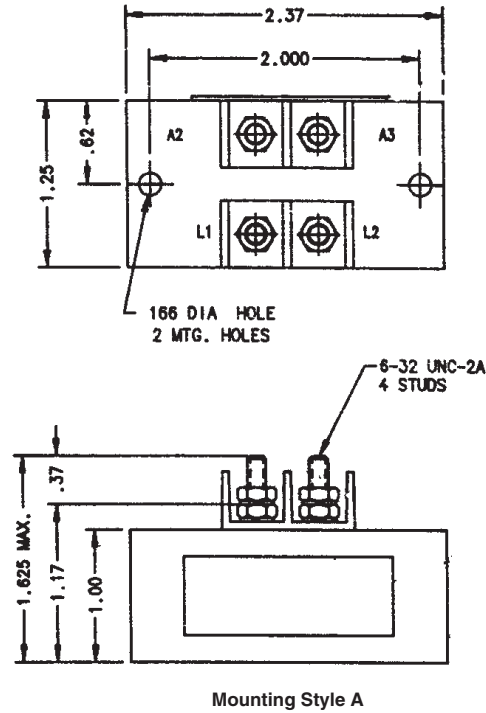
Altitude — 50,000 ft

Weight, Max. — .25 lbs

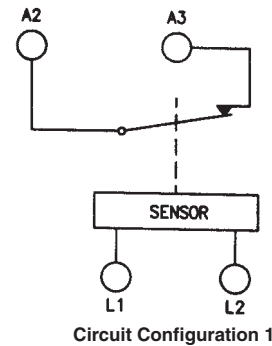
Operating Voltage, Nom. — 115 Vrms, 325-600 Hz

Pickup Max. — 95 MA, AC

Dropout Min. — 47 MA AC



**Circuit Configurations** (Consult factory for other available circuit configurations)



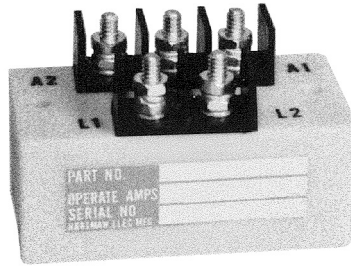
For factory-direct application assistance, phone 419-521-9500 or fax 419-526-2749.

HARTMAN Part Number	Construction Type	Mounting Style	Duty Cycle	Circuit Config.	TE Part Number
QR-50V	Environmentally Sealed	A	Continuous	1	1616132-3

**QR-50 Series Relay, AC Current Indicator, Rated up to 15 Amps, 115 VAC**

**Product Facts**

- SPDT
- Environmentally sealed
- Meets many requirements of MIL-PRF-6106



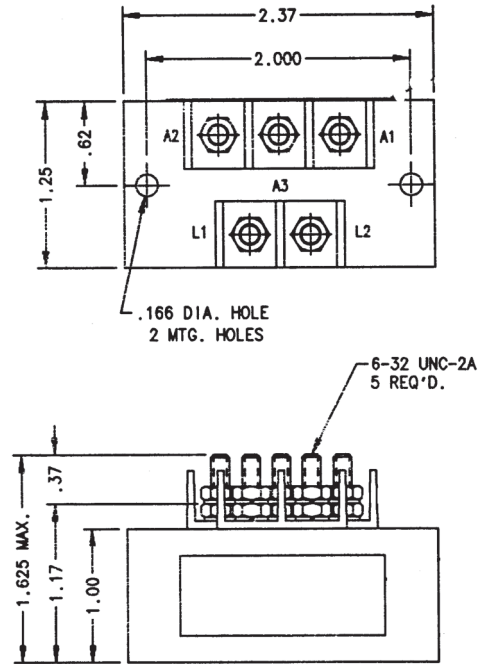
**Performance Data**

**Electrical Characteristics**

- Contact Arrangement** — SPDT
- Resistive Rating @ 28 Vdc** — .25 Amp
- Lamp Load @ 28 Vdc** — .08 Amp
- Operating Voltage, Nom.** — 115 VAC, 1 Phase, 400 Hz
- Pickup Max.** — 6 Amp, AC
- Dropout Min.** — 2.4 Amp, AC
- Sensing Current Rating** — 15 Amp, AC Continuous

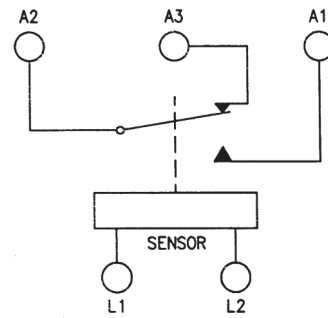
**General Characteristics**

- Temperature Range** — -55°C to +71°C
- Altitude** — 50,000 ft
- Weight, Max.** — .19 lbs
- Sinusoidal Vibration** — 10 G to 500 Hz



Mounting Style A

**Circuit Configurations** (Consult factory for other available circuit configurations)



Circuit Configuration 1

For factory-direct application assistance, phone 419-521-9500 or fax 419-526-2749.

HARTMAN Part Number	Construction Type	Mounting Style	Duty Cycle	Circuit Config.	TE Part Number
QR-50H	Environmentally Sealed	A	Continuous	1	1616132-1

## E-316C Series Relay, Undervoltage AC 3 Phase, Lowest of 3

### Product Facts

- DPDT
- Gasket sealed
- Meets many requirements of MIL-PRF-6106

### Performance Data

#### Electrical Characteristics

**Contact Arrangement** — DPDT

**Resistive Rating @ 28 Vdc** — 10 Amps

**Inductive Rating** — 5 Amps

**Lamp Load** — 1.5 Amps

**Rated Operating Voltage, Nom.** — 115 V, 400 Hz

**Pickup Voltage (All 3 Phases Up)** — 85-90 Volts

**Dropout Voltage (3 Phase Lowest of 3)** — 75-80 Volts

### General Characteristics

**Temperature Range** — -55°C to +71°C

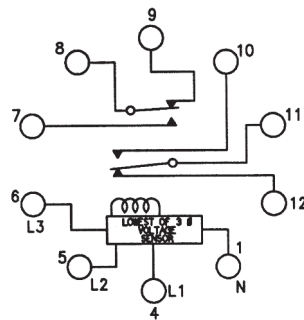
**Operating Cycles (Life) at Rated Resistive Load, Min.** — 10,000 cycles

**Weight, Max.** — 10 oz.

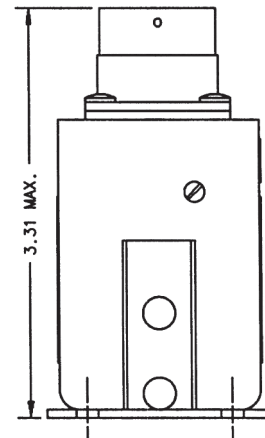
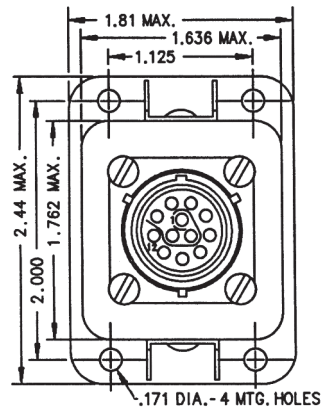
**Operating Voltage, Max.** — 124 VAC

### Circuit Configurations

(Consult factory for other available circuit configurations)



Circuit Configuration 1



Mounting Style A

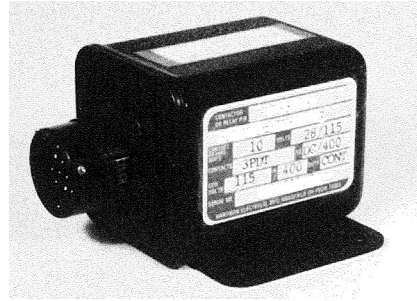
For factory-direct application assistance, phone 419-521-9500 or fax 419-526-2749.

HARTMAN Part Number	Construction Type	Mounting Style	Duty Cycle	Circuit Config.	TE Part Number
E-316C	Gasket/Vented	A	Continuous	1	1-1616126-4

## E-311PB Series Relay, Undervoltage with Time Delay

### Product Facts

- 2PDT
- Solder sealed, hermetically sealed
- Meets many requirements of MIL-PRF-6106



### Performance Data

#### Electrical Characteristics

Main Contacts —

Contact Arrangement — 2PDT

Operating Voltage, Nom. — 28 Vdc

Resistive Rating — 10 Amps

Inductive Rating — 6 Amps

Motor Rating — 3 Amps

Lamp Rating — 1 Amps

Pickup Time, Max. — 125 msec

Contact Bounce, Max. — 3 msec

Operating Voltage, Max. — 36 Vdc

Operating Voltage, Nom. — 28 Vdc

Pickup Voltage —  $24.5 \pm 0.5$  Vdc

Dropout Voltage —  $21.5 \pm 0.5$  Vdc

Dropout Time Delay — 200-400 milliseconds when the relay is in the energized position and the voltage drops below  $21.5 \pm 0.5$  Vdc and above 15 Vdc. The relay will remain energized for 200 to 400 milliseconds before de-energizing when the voltage drops below 15 Vdc. Time delay is 30 Ms max.

Operating Current, Max.

@ 25°C — 150 milliamp

#### General Characteristics

Ambient Temperature Range —  
-55°C to +85°C

Operating Cycles (Life) at Rated Resistive Load, Min. —  
100,000 cycles

Dielectric Withstanding Voltage —  
1,000 Vrms, 60 Hz, 1 mil/Amp max. leakage

Insulation Resistance @ 500 Vdc — 100 megohm min.

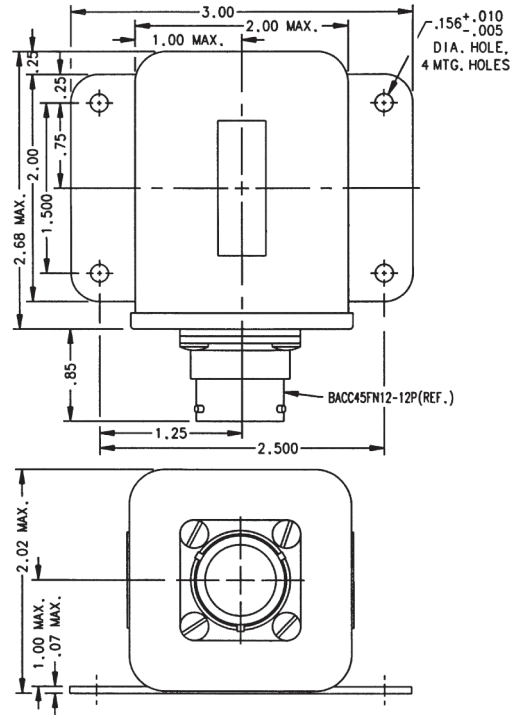
Altitude — 80,000 ft

Weight, Max. — .25 lbs

Sinusoidal Vibration —  
.060 DA @ 5 to 80 Hz  
20 G<sup>TM</sup> 80 to 2000 Hz

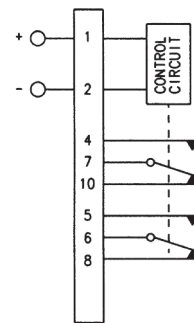
Shock for 11 msec, 1/2 Sine, 3

Axes — 30 G



Mounting Style A

Circuit Configurations (Consult factory for other available circuit configurations)



Circuit Configuration 1

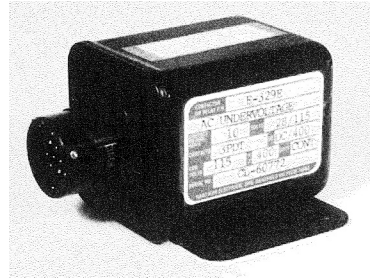
For factory-direct application assistance, phone 419-521-9500 or fax 419-526-2749.

HARTMAN Part Number	Construction Type	Mounting Style	Duty Cycle	Circuit Config.	TE Part Number
E-311PB	Hermetically Sealed	A	Continuous	1	1-1616126-1

## E-329 Series Relay, Voltage Sensing

### Product Facts

- 3PDT
- Solder sealed cover, hermetically sealed contacts
- Meets many requirements of MIL-PRF-6106



### Performance Data

#### Electrical Characteristics

**Contact Arrangement** — 3PDT

**Rated Operating Voltage** — 28 Vdc, and 155 Vac 400 Hz

**Resistive Rating** — 10 Amps

**Inductive Rating** — 8 Amps

**Motor Rating** — 4 Amps

**Lamp Rating** — 2 Amps

**Pickup Time, Max.** — 70 msec

**Contact Bounce, Max.** — 3 msec

**Dropout Time Delay** —

200-400 msec when the relay is in the energized position and the voltage drops below  $104 \pm 2$  Vrms and above  $88 \pm 4$  Vrms. The relay will remain energized for 200-400 msec before deenergizing. When the voltage drops below  $88 \pm 4$  Vrms no time delay is required. When the voltage drops to 30 volts or less the relay will de-energize 50 msec max.

**Operating Voltage, Nom.** — 115 VAC, RMS L-N

**Operating Voltage, Max.** — 122 VAC, RMS L-N

**Operating Frequency** —  $400 \pm 20$  Hz

**Pickup Voltage** —  $109 \pm 2$  Vrms

**Dropout Voltage** —  $104 \pm 2$  Vrms

**Operating Current, Max. @ 25°C** — 100 milliamp

#### General Characteristics

**Temperature Range** —  $-55^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$

**Operating Cycles (Life) at Rated Resistive Load, Min.** — 100,000 cycles

**Operating Cycles (Life) Mechanical, Min.** — 100,000 cycles

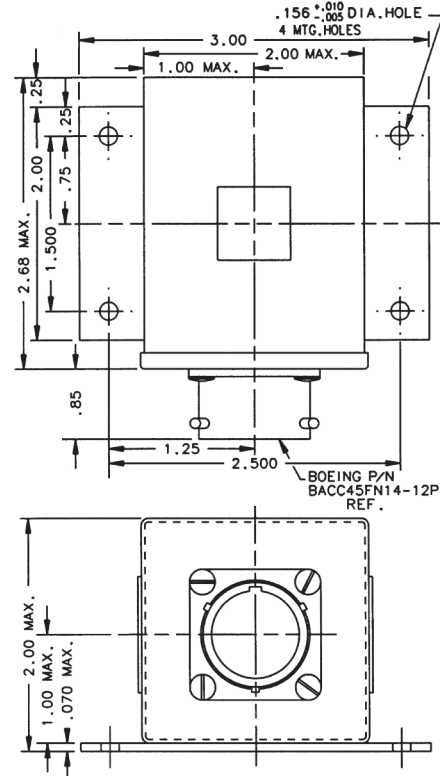
**Dielectric Withstanding Voltage** — 1,000 Vrms, 60 Hz

**Insulation Resistance @ 500 Vdc** — 1,000 megohm min.

**Altitude** — 0-80,000 ft

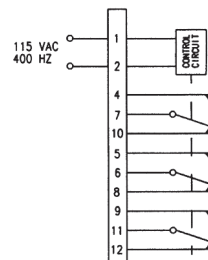
**Weight, Max.** — 10 oz

**Shock for 11 msec, 1/2 Sine, 3 Axis** — 30 G



Mounting Style A

### Circuit Configurations (Consult factory for other available circuit configurations)



Circuit Configuration 1

For factory-direct application assistance, phone 419-521-9500 or fax 419-526-2749.

HARTMAN Part Number	Construction Type	Mounting Style	Duty Cycle	Circuit Config.	TE Part Number
E-329E	Hermetically Sealed	A	Continuous	1	1-1616126-9

## RA-3100 Series Remote Power Controller, Rated up to 60 Amps, 115/208 VAC

### Product Facts

- 3PST NO
- Gasket sealed



### Performance Data

#### Electrical Characteristics

**Contact Arrangement** — 3PST NO

**Rated Operating Voltage** — 115/208 VAC, 400-610 Hz, 3 phase

**Resistive Rating** — 50 Amp

**Motor Rating** — 30 Amp

**Rupture Rating** — 1000 Amp

**Closing Time, Max., Override at 28 Vdc** — 35 msec

**Opening Time, Max., Override at 28 Vdc** — 25 msec

**Contact Bounce, Max.** — 3 msec

#### Coil Characteristics

**Duty Cycle** — Continuous, economizing

**Operating Voltage, Max.** — 32 Vdc  
**Operating Voltage @ 85°C, Min.** — 18 Vdc

**Trip Time @ 60 Amp Current +10%** — 2.0 to 3.0 sec

**Trip Time @ 75 Amp Current +10%** — 1.0 to 1.9 sec

**Trip Time @ 95 Amp Current +10%** — .2 to .9 sec

**Trip Time @ 200+ Amp Current +10%** — 0.01 to 0.1 sec

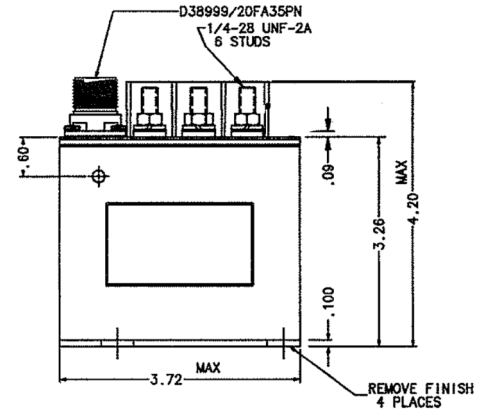
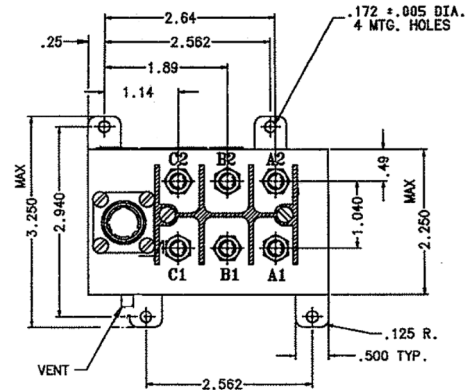
#### General Characteristics

**Temperature Range** — -55°C to +85°C

**Operating Cycles (Life) Mechanical, Min.** — 100,000 cycles

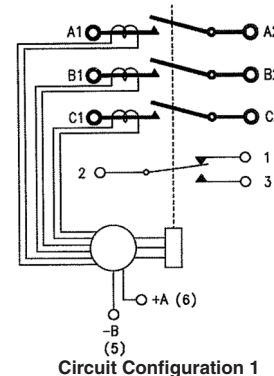
**Altitude** — 50,000 ft

**Weight, Max.** — 1.55 lbs



Mounting Style A

**Circuit Configurations** (Consult factory for other available circuit configurations)



Circuit Configuration 1

For factory-direct application assistance, phone 419-521-9500 or fax 419-526-2749.

HARTMAN Part Number	Construction Type	Mounting Style	Coil Type	Circuit Config.	TE Part Number
RA-3100H	Gasket/Vented	A	Continuous, Economizing	1	1616539-3



## RA-3100 Series Remote Power Controller, Rated up to 70 Amps, 115/208 VAC

### Product Facts

- 3PST NO
- Gasket sealed



### Performance Data

#### Electrical Characteristics

**Contact Arrangement** — 3PST NO

**Rated Operating Voltage** — 115/208 VAC, 400-610 Hz, 3 phase

**Resistive Rating** — 70 Amp

**Motor Rating** — 70 Amp

**Rupture Rating** — 1,000 Amp

#### Coil Characteristics

**Duty Cycle** — Continuous, economizing

**Operating Voltage, Max.** — 32 Vdc

**Operating Voltage @ 85°C, Min.** — 18 Vdc

**Trip Time @ 70 Amp Current**

+10% — 3.0 to 5.0 sec

**Trip Time @ 87 Amp Current +10%**

— 2.0 to 2.9sec

**Trip Time @ 111 Amp Current**

+10% — 1.0 to 1.8 sec

**Trip Time @ 200 Amp Current**

+10% — 0.25 to 0.5 sec

#### General Characteristics

**Operating Temperature Range** — -55°C to +85°C

**Altitude** — 50,000 ft max.

**Weight, Max.** — 1.55 lb

**Sinusoidal Vibration** —

.038 DA from 10 to 50 Hz

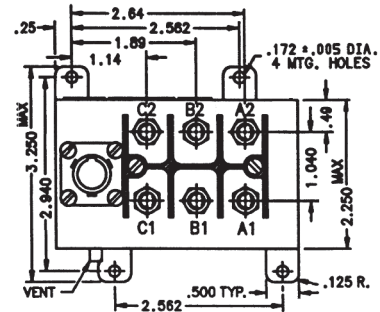
10g from 55 to 2000 Hz

**Shock, Max.** — 9 G max for 10-12 ms

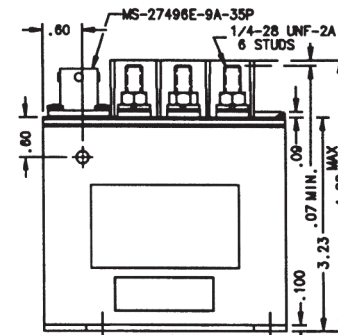
**Load, Min.** — 50,000 cycles

**Operating Cycles (Life)**

**Mechanical, Min.** — 100,000 cycles

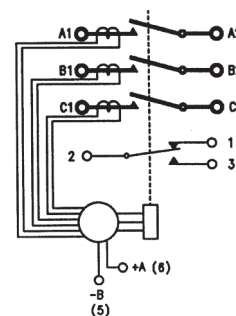


NOTE: FOR PROPER OPERATION, PIN A REQUIRES 18 TO 28 VDC



Mounting Style A

**Circuit Configurations** (Consult factory for other available circuit configurations)



Circuit Configuration 1

For factory-direct application assistance, phone 419-521-9500 or fax 419-526-2749.

HARTMAN Part Number	Construction Type	Mounting Style	Coil Type	Circuit Config.	TE Part Number
RA-3100F	Gasket/Vented	A	Continuous, Economizing	1	1616133-2

## RA-3100 Series Remote Power Controller, Rated up to 100 Amps, 115/208 VAC

### Product Facts

- 3PST NO
- Gasket sealed
- Auxiliary contacts available
- Meets many requirements of MIL-PRF-6106



### Performance Data

#### Electrical Characteristics

**Contact Arrangement** — 3PST NO

**Rated Operating Voltage** — 115/208 VAC, 400-610 Hz, 3 phase

**Resistive Rating** — 100 Amp

**Motor Rating** — 100 Amp

**Rupture Rating** — 1,000 Amp

**Closing Time, Max., at 28 Vdc** — 35 msec

**Opening Time, Max., at 28 Vdc** — 25 msec

**Contact Bounce, Max.** — 3 msec

#### Coil Characteristics

**Duty Cycle** — Continuous, economizing

**Operating Voltage, Max.** — 32 Vdc

**Operating Voltage @ 85°C, Min.** — 18 Vdc

**Coil Current, Inrush Max. @ 25°C** — 6.0 Amps

**Coil Current, Hold Max. @ 25°C** — 0.5 Amps

**Trip Time @ 28 Amp Current**

**+10%** —

RA-3100M - 1.0 to 1.50 sec

**Trip Time @ 151 Amp Current**

**+10%** — RA-3100D - 3.0 to 5.0 Sec.

**Trip Time @ 185 Amp Current**

**+10%** — RA-3100D - 2 to 2.9 Sec.

**Trip Time @ 237 Amp Current**

**+10%** — RA-3100D - 1 to 2.5 Sec.

#### General Characteristics

**Temperature Range** —

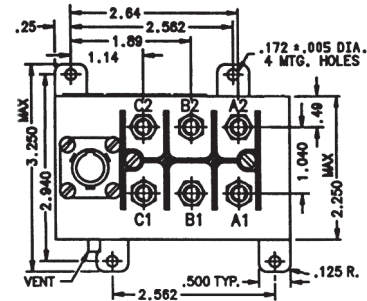
-55°C to +85°C

**Operating Cycles (Life) at Rated Load, Min.** — 50,000 cycles

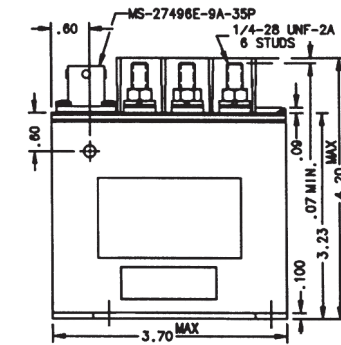
**Operating Cycles (Life) Mechanical, Min.** — 100,000 cycles

**Altitude** — 50,000 ft

**Weight, Max.** — 1.55 lbs

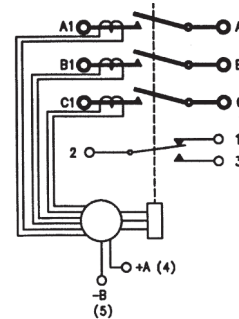


NOTE: FOR PROPER OPERATION, PIN A REQUIRES 18 TO 28 VDC



Mounting Style A

**Circuit Configurations** (Consult factory for other available circuit configurations)



Circuit Configuration 1

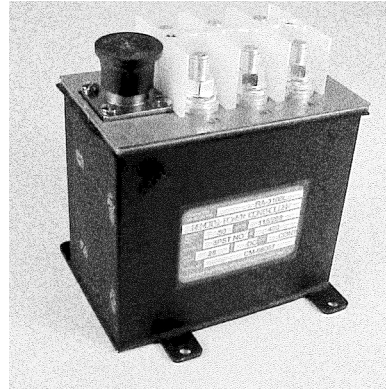
HARTMAN Part Number	Construction Type	Mounting Style	Coil Type	Circuit Config.	TE Part Number
RA-3100D	Gasket/Vented	A	Continuous, Economizing	1	1616133-1
RA-3100M	Gasket/Vented	A	Continuous, Economizing	1	1616133-5

For factory-direct application assistance, phone 419-521-9500 or fax 419-526-2749.

## RA-3100 Series Remote Power Controller, Rated up to 110 Amps, 115/208 VAC

### Product Facts

- 3PST NO
- Gasket sealed
- Auxiliary contacts available
- Meets many requirements of MIL-PRF-6106



### Performance Data

#### Electrical Characteristics

**Contact Arrangement** — 3PST NO

**Rated Operating Voltage** — 115/208 VAC, 400-610 Hz, 3 phase

**Resistive Rating** —

RA-3100J-1 - 110 Amp

RA-3100L - 50 Amp

**Motor Rating** —

RA-3100J01 - 110 Amp

RA-3100L - 50 Amp

**Rupture Rating** —

RA-3100J-1 - 1,100 Amp

RA-3100L - 500 Amp

**Shock for 10-12 msec** — 50 G

**Closing Time, Max., Override at 28 Vdc** — 35 msec

**Opening Time, Max., Override at 28 Vdc** — 25 msec

**Contact Bounce, Max.** — 3 msec

#### Coil Characteristics

**Duty Cycle** — Continuous, economizing

**Operating Voltage, Max.** — 32 Vdc

**Operating Voltage @ 85°C, Min.** — 18 Vdc

**Coil Current, Inrush Max. @ 25°C** — 6.0 Amps

**Coil Current, Hold Max. @ 25°C** — 0.5 Amps

**Trip Time @ 165 Amp Current +10%** — 8.0 to 10.0 sec

**Trip Time @ 330 Amp Current +10%** —

RA-3100J-1 - 1.2 to 2.0 sec

**Trip Time @ 550 Amp Current +10%** —

RA-3100J-1 - 0.34 to 0.65 sec

**Trip Time @ 1100 Amp Current +10%** —

RA-3100J-1 - 0.07 to 0.20 sec

For factory-direct application assistance, phone 419-521-9500 or fax 419-526-2749.

**Trip Time @ 60 Amp Current +10%** —

RA-3100L - 8.0 to 10.0 sec

**Trip Time @ 150 Amp Current +10%** —

RA-3100L - 4.0 to 6.0 sec

**Trip Time @ 300 Amp Current +10%** —

RA-3100L - 2.0 to 3.0 sec

**Trip Time @ 500 Amp Current +10%** —

RA-3100L - 0.07 to 0.20 sec

#### General Characteristics

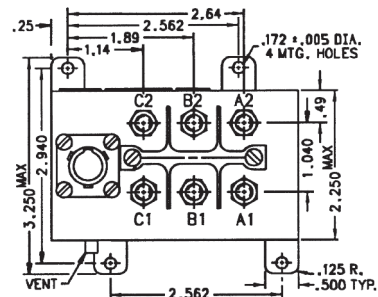
**Temperature Range** — -55°C to +85°C

**Operating Cycles (Life) at Rated Load, Min.** — 50,000 cycles

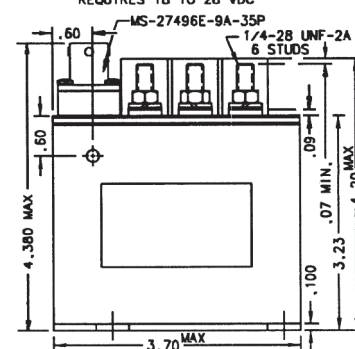
**Operating Cycles (Life) Mechanical, Min.** — 100,000 cycles

**Altitude** — 60,000 ft

**Weight, Max.** — 1.55 lbs

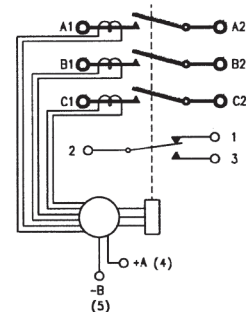


NOTE: FOR PROPER OPERATION, PIN A REQUIRES 18 TO 28 VDC



Mounting Style A

**Circuit Configurations** (Consult factory for other available circuit configurations)



Circuit Configuration 1

HARTMAN Part Number	Construction Type	Mounting Style	Coil Type	Circuit Config.	TE Part Number
RA-3100J-1	Gasket/Vented	A	Continuous, Economizing	1	1616133-3
RA-3100L	Gasket/Vented	A	Continuous, Economizing	1	1616133-4

## E-308TA Series, Undervoltage Sensor, Rated up to 10 Amps, 28 Vdc

### Product Facts

- DPDT
- Gasket sealed
- Meets many requirements of MIL-PRF-6106

### Performance Data

#### Electrical Characteristics

**Contact Arrangement** — DPDT  
**Operating Voltage, Nom.** — 28 Vdc  
**Resistive Rating** — 10 Amps  
**Inductive Rating** — 2 Amps

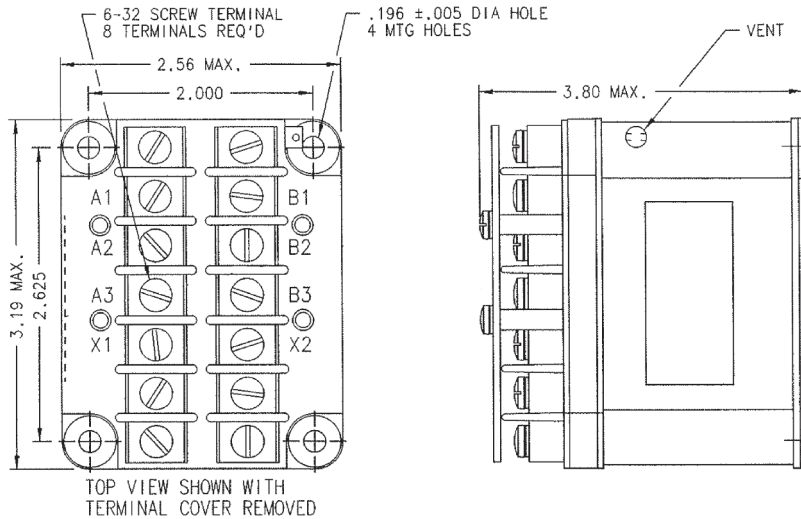
### General Characteristics

**Operating Ambient Temperature Range** — -55°F to +165°F  
**Altitude** — 50,000 ft  
**Weight, Max.** — 15.5 oz

### Coil Characteristics

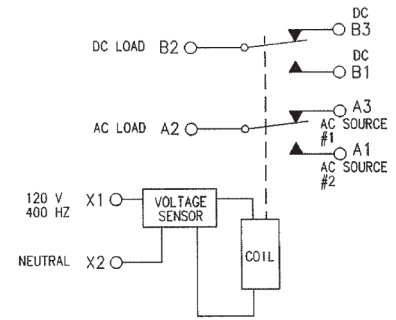
**Duty Cycle** — Continuous  
**Input to Sensor, Nom.** — 120 V, 400 Hz

**Operating Characteristic** —  
 Contacts A1-A2, B1-B2 will close if the AC input voltage is above  $106 \pm 2$  VAC  
 Contacts A1-A2, B1-B2 will open if the AC input voltage falls below  $106 \pm 2$  VAC.



Mounting Style A

### Circuit Configurations (Consult factory for other available circuit configurations)



Circuit Configuration 1

HARTMAN Part Number	Construction Type	Mounting Style	Coil Type	Circuit Config.	TE Part Number
E-308TA	Gasket/Vented	A	Continuous	1	1616126-6

For factory-direct application assistance, phone 419-521-9500 or fax 419-526-2749.

### Cross Reference

Main Current Rating	AC/DC	Rating	Main Contact Config.	Operating Mode	Aux. Contact Config.	Coil Voltage (VDC)	Seal Type	Duty Cycle	Coil Trans. Voltage	Hartman Part No.	TE Part No.
10	DC	28	DPDT	Side Stable	—	115V	Gasket/Vented		Cont.	E-328-2	1-1616126-8
200	DC	28	SPST NO	Side Stable	SPST NC	24-30	Gasket/Vented		Cont.	A772XTB	1616545-1
25	AC	—	—	Side Stable	SPDT	28	Gasket/Vented		Cont.	E-387C-1	2-1616126-3
100	DC	28	SPST NO	Side Stable	SPST NC SPST NO.	28	Gasket/Vented		Cont.	A-700BU	1616109-6
200	DC	28	SPST NO	Side Stable	N/A	28	Gasket/Vented		Cont.	A-700AQ-4	1616109-4
		28	SPST NO	Side Stable	N/A	28	Gasket/Vented		Cont.	A-700AAP	1616109-1
300	DC	28	SPST NO	Side Stable	—	24-30	Gasket/Vented		Cont.	A-700ZC-7	1616109-7
		28	SPST NO	Side Stable	SPST NC	24-30	Gasket/Vented		Cont.	A-700ZG	1616109-9
400	DC	28	SPST NO	Side Stable	—	24-30	Gasket/Vented	Cont. Econ.		A-701D	1-1616109-1
		28	SPST NO	Side Stable	SPDT	24-30	Gasket/Vented	Cont. Econ.		A-701C	1-1616109-0
600	DC	28	SPST NO	Side Stable	—	28	Gasket/Vented		Cont.	A-702AAP	1-1616109-3
3	AC/DC	28/115	SPST NO	Side Stable	—	—	Gasket/Vented		—	B-188MA-1	1616114-7
		29	SPST NO	Side Stable	SPST NO	28	Gasket/Vented		Int.	A-711JF	1-1616109-6
600	DC	29	SPST NO	Side Stable	SPST NO	28	Gasket/Vented		Int.	A-711JM	1-1616109-7
		29	SPST NO	Side Stable	SPDT	28	Gasket/Vented		Int.	A-711Z	6-1616071-3
		29	SPST NO	Side Stable	—	28	Gasket/Vented		Int.	A-711R	1-1616109-8
		28	SPST NO	Side Stable	SPST NO SPST NC	24-30	Gasket/Vented		Cont.	A-957CSD	1616110-6
200	DC	28	SPST NO	Side Stable	SPST NO SPST NC	24-30	Gasket/Vented		Cont.	A-957G	1616110-8
300	DC	24/30	SPST NO	Side Stable	—	24-30	Gasket/Vented		Cont.	A-957E	1616110-7
350	DC	28	SPST NO	Side Stable	SPDT	24-30	Gasket/Vented		Cont.	A-957CA	1616110-5
2	DC	28	SPST NC	Side Stable	—	120	Environ		Cont.	Q-50Y	1-1616131-2
3.5	DC	28	SPDT	Side Stable	—	29	Environ		Cont.	Q-50F	1616131-9
		28	SPDT	Side Stable	—	28	Environ		Cont.	Q-50BB	1616131-5
6.25	DC	28	SPDT	Side Stable	—	28	Environ		Cont.	Q-50E	1616131-8
		28	SPDT	Side Stable	—	28	Environ		Cont.	Q-50BD	1616131-6
10	DC	28	SPST NO	Side Stable	—	28	Environ		Cont.	Q-50A	1616131-1
15	DC	28	SPDT	Side Stable	—	28	Environ		Cont.	Q-50CC	1616131-7
16	DC	28	SPDT	Side Stable	—	28	Environ		Cont.	Q-50S	1-1616131-1
	DC	28	SPDT	Side Stable	—	28	Environ		Cont.	Q-50Z	1-1616131-3
		28	SPST NC	Side Stable	—	28	Environ		Cont.	Q-50J	1-1616131-0
		28	SPST NO	Side Stable	—	28	Environ		Cont.	Q-50AC	1616131-4
20	DC	28	SPST NO	Side Stable	—	28	Environ		Cont.	Q-50AG	1616540-7
		28	SPST NC	Side Stable	—	28	Environ		Cont.	Q-50AB-1	1616131-2
		28	SPST NC	Side Stable	—	28	Environ		Cont.	Q-50AB-2	1616131-3
5	AC	115	SPST NC	Side Stable	—	115	Environ		Cont.	Q-50V	1616132-3
15	AC	115	SPDT	Side Stable	—	115	Environ		Cont.	QR-50H	1616132-1
		28	DPDT	Side Stable	—	—	Gasket/Vented		Cont.	E-316C	1-1616126-4
10	DC	28	3PDT	Side Stable	—	28	Hermetic		Cont.	E-311PB	1-1616126-1
		28	3PDT	Side Stable	—	115	Hermetic		Cont.	E-329E	1-1616126-9

For factory-direct application assistance, phone 419-521-9500 or fax 419-526-2749.

**Cross Reference** (Continued)

Main Current Rating	AC/DC	Rating	Main Contact Config.	Operating Mode	Aux. Contact Config.	Coil Voltage (VDC)	Seal Type	Duty Cycle	Coil Trans. Voltage	Hartman Part No.	TE Part No.
100	AC	115/208	3PST NO	Side Stable	SPDT	18-32	Gasket/Vented	Cont. Econ.		RA-3100M	1616133-5
		115/208	3PST NO	Side Stable	SPDT	18-32	Gasket/Vented	Cont. Econ.		RA-3100D	1616133-1
110	AC	115/208	3PST NO	Side Stable	SPDT	18-32	Gasket/Vented	Cont. Econ.		RA-3100J-1	1616133-3
50	AC	115/208	3PST NO	Side Stable	SPDT	18-32	Gasket/Vented	Cont. Econ.		RA-3100L	1616133-4
60	AC	115/208	3PST NO	Side Stable	SPDT	18-32	Gasket/Vented	Cont. Econ.		RA-3100H	1616539-3
70	AC	115/208	3PST NO	Side Stable	SPDT	18-32	Gasket/Vented	Cont. Econ.		RA-3100F	1616133-2
10	DC	28	DPDT	Side Stable	–	120V	Gasket/Vented	Cont.		E-308TA	1616126-6

For factory-direct application assistance, phone 419-521-9500 or fax 419-526-2749.