STRUTHERS-DUNN

MILITARY/AEROSPACE RELAYS

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FAX ON DEMAND DOCUMENT NUMBER

FAX ON DEMAND 1-800-891-2957

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STRUTHERS-DUNN

MILITARY/AEROSPACE RELAYS

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FAX ON DEMAND 1-800-891-2957

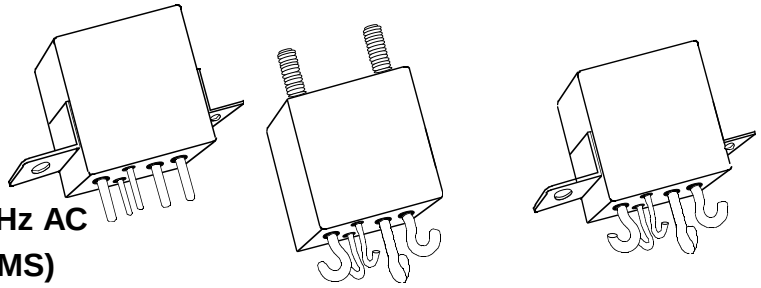
FCA SERIES

RELAYS

SERIES
FCA-125

STRUTHERS-DUNN
MILITARY/AEROSPACE RELAYS
25 AMPERES, SPDT

- **HERMETICALLY SEALED**
- **ALL WELDED CONSTRUCTION**
- **BALANCED FORCE**
- **PERMANENT MAGNET DRIVE**
- **CONTACTS: SILVER CADMIUM OXIDE WITH GOLD PLATING**
- **COILS FOR DC, 50 TO 400Hz AND 400Hz AC**
- **WEIGHT 1.6 OUNCES MAX. (45.4 GRAMS)**



The Series FCA-125 relay is a polarized single-side stable design, where the flux from a permanent magnet provides the armature holding force in the deactivated state, and its flux path is switched and combined with the coil flux in the operated state. This results in appreciably increased contact pressure in both states over that of a spring return nonpolar design. MSD also manufactures other versions of this relay:

FCAL-125: MAGNETIC LATCHING FORM OF THE FCA-125
FCA-325: 25 AMPERE 3PDT RELAY
FCAL-325: MAGNETIC LATCHING FORM OF THE FCA-325
FCAC-325: 25 AMPERE 3PST RELAY WITH 2 AMPERE SPDT AUXILIARY CONTACTS
FCACL-325: MAGNETIC LATCHING FORM OF THE FCAC-325

CONTACT RATING-AMPERES

Ratings Are Continuous Duty

TYPE OF LOAD	LIFE (MIN.) CYCLES X 10^3	28 VDC	115VAC 400HZ	115VAC 60HZ *
Resistive	50	25	25	10
Inductive	10	12	-	10
Inductive	20	-	15	-
Motor	50	10	10	8
Lamp	50	5	5	-
	* 60 Hz LOADS RATED FOR 25,000 OPERATIONS			

OVERLOAD CURRENT 50 AMPS DC, 80 AMPS 400Hz
RUPTURE CURRENT 60 AMPS DC, 100 AMPS 400Hz
CONTACT MAKE BOUNCE 1 MILLISECOND AT NOMINAL VOLTAGE
MAX. CONTACT DROP AT 25 AMPS: INITIAL 0.150 VOLTS.
END OF LIFE 0.175 VOLTS

STRUTHERS-DUNN

MILITARY/AEROSPACE RELAYS

25 AMPERES, SPDT

COIL DATA

COIL CODE	NOMINAL VOLTAGES	FREQ. HZ	DC RES. AC AMPS (B)	OVER TEMPERATURE RANGE		
				PICKUP OR BELOW VOLTS	DROPOUT OR ABOVE VOLTS	MUST HOLD VOLTAGE (C)
1	6	DC	20 Ω	4.5	0.3	2.5
2	12	DC	80 Ω	9.0	0.75	4.5
3	28	DC	320 Ω	18.0	1.5	7.0
4 (A)	28	DC	320 Ω	18.0	1.5	7.0
5	48	DC	920 Ω	32.0	2.5	14.0
6	28	400HZ	180 mA	22.0	1.25	10.0
7	28	50/400Hz	100 mA	22.0	1.25	10.0
8	115	400 Hz	40 mA	90.0	5.0	40.0
9	115	50/400Hz	30 mA	95.0	5.0	40.0

A. CODE 4 COILS HAVE BACK EMF SUPPRESSION TO 42 VOLTS MAX.
B. DC COIL RESISTANCE ± 10% AT 25˚C; AC COIL MAX. CURRENT AT NOMINAL VOLTAGE.
C. RELAY WILL STAY IN PICKED-UP STATE DOWN TO MUST HOLD VOLTAGES SHOWN.
D. MAX. OVERVOLTAGE: 6 & 12 VDC COILS 120% OF NOMINAL; ALL OTHERS 110% OF NOMINAL.
E. COILS AVAILABLE FOR OTHER VOLTAGES AND FOR AC 50/60HZ.

GENERAL SPECIFICATIONS

TEMPERATURE RATING:		-70˚C TO + 125˚C
ALTITUDE:		300,000 FEET
SHOCK:	Z, Y, & X ENCLOSURES	200 g FOR 6 mS
	W & M ENCLOSURES (STUD MTG.)	100 g FOR 6 mS
VIBRATION, SINUSOIDAL:*	Z, Y, & X ENCLOSURES	30 g 33-3000Hz
	W & M ENCLOSURES (STUD MTG.)	20 g 33-3000Hz
VIBRATION, RANDOM: *	Z, Y, & X ENCLOSURES	0.4 g^2/Hz 50-2000Hz
	W & M ENCLOSURES (STUD MTG.)	0.2 g^2/Hz 50-2000Hz
DIELECTRIC STRENGTH AT SEA LEVEL:	ALL CIRCUITS TO GROUND AND CIRCUIT TO CIRCUIT.	1250 V rms
	COIL TO GROUND	1000 V rms
DIELECTRIC STRENGTH AT 80,000 FEET:		350 V rms
INSULATION RESISTANCE:	INITIAL (500 VDC)	100 MΩ MINIMUM
	AFTER LIFE OR ENVIRONMENTAL TESTS	50 MΩ MINIMUM
OPERATE TIME AT NOMINAL VOLTAGE:	DC RELAYS	10 ms OR LESS
	AC RELAYS	15 ms OR LESS
RELEASE TIME AT NOMINAL VOLTAGE:	DC RELAYS	10 ms OR LESS
	AC RELAYS	50 ms OR LESS

* Max. Contact opening under vibration or shock 10 microseconds

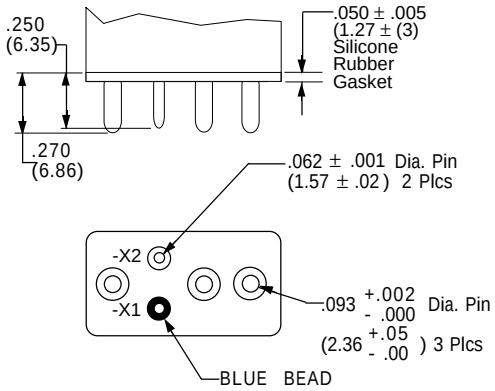
SERIES
FCA-125

STRUTHERS-DUNN
MILITARY/AEROSPACE RELAYS
25 AMPERES, SPDT

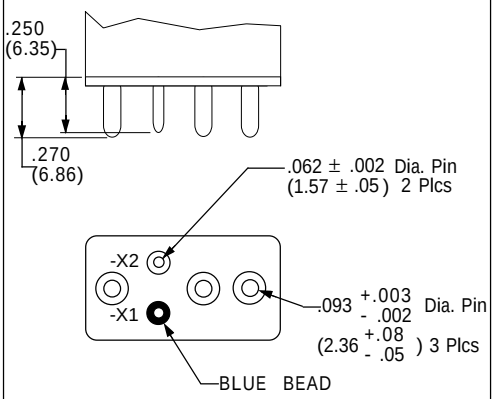
Below are shown the standard terminal types and the enclosures available. Specify the assembly as indicated under How To Order. Dimensions are shown in inches ± .010 and (Millimeters ± .25).

TERMINALS

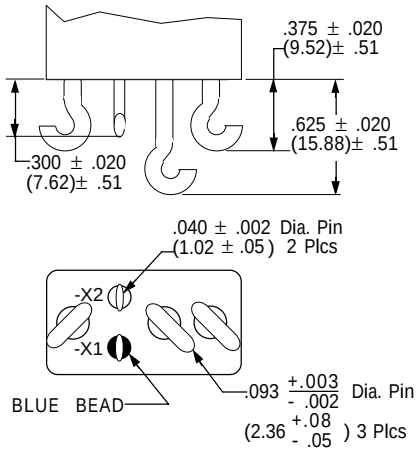
CODE "A"
Socket Pins - All DC Coils
PIN TERMINALS ARE GOLD PLATED



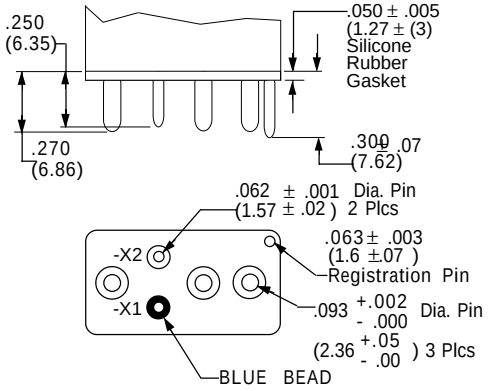
CODE "B"
Solder Pin Terminals
PIN TERMINALS TIN/LEAD PLATED



CODE "C"
Solder Hook Terminals
HOOK TERMINALS TIN/LEAD PLATED



CODE "D"
Socket Pins - All AC Coils
PIN TERMINALS ARE GOLD PLATED



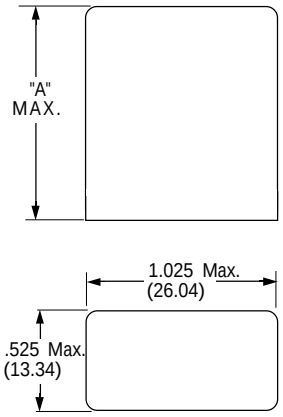
ENCLOSURES

All Enclosures have cupro-Nickel cans bright acid tin/lead plated after assembly to terminal headers.

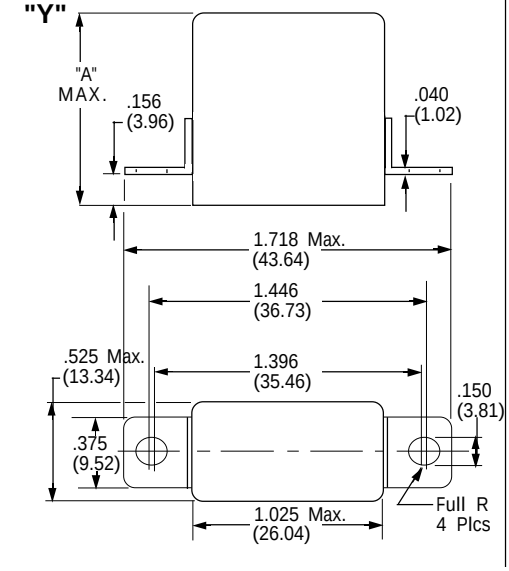
Dimensions: Inches ± .010 (mm ± .25)

"A" - AC Coils 1.125 in. (31.91) Max
DC Coils 1.010 in. (28.65) Max..

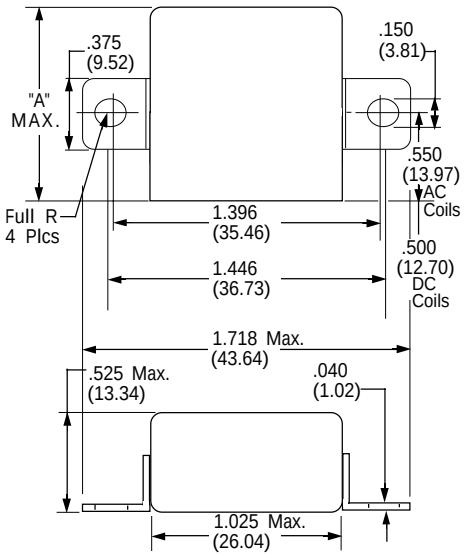
CODE "Z"



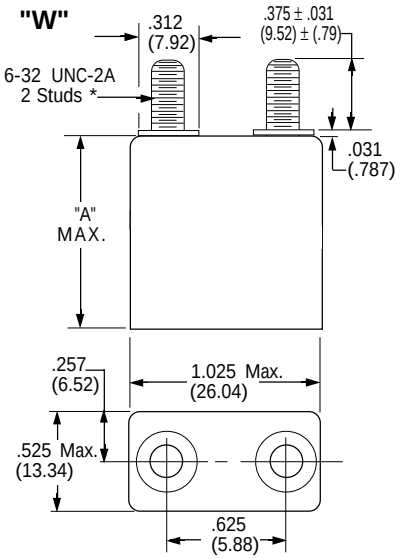
CODE "Y"



CODE "X"



CODE "W"



*Metric threads available.
To specify use Ⓜ in place of Ⓦ

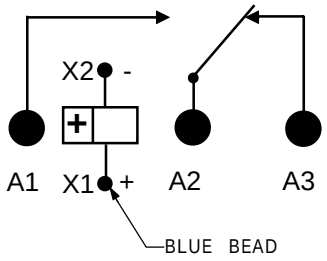
STRUTHERS-DUNN

MILITARY/AEROSPACE RELAYS

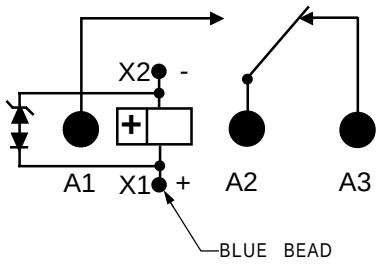
25 AMPERES, SPDT

TERMINAL WIRING

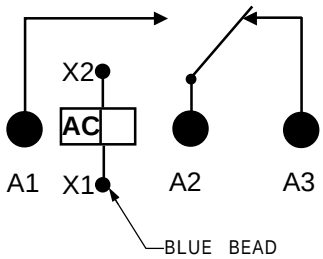
DC COILS



DC COILS WITH TRANSIENT SUPPRESSION



AC COILS

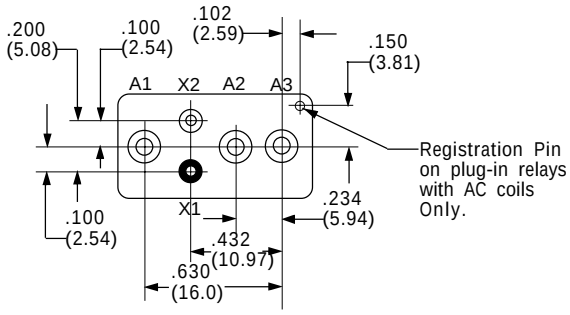


NOTE: Polarity must be observed with DC coil supply. Relay is polarized with a permanent magnet and will not operate or be damaged by reverse polarity.

Diodes used in transient suppression and in AC rectifier circuits have peak inverse voltage rating of 600 VDC minimum. Zener diodes have a minimum rating of 1 watt.

Terminal designations are for reference only and do not appear on the header.

TERMINAL LAYOUT



HOW TO ORDER

(EXAMPLE) — **FCA-125 - A Y 4**

RELAY TYPE

TERMINALS (Socket Pins, DC Coil)

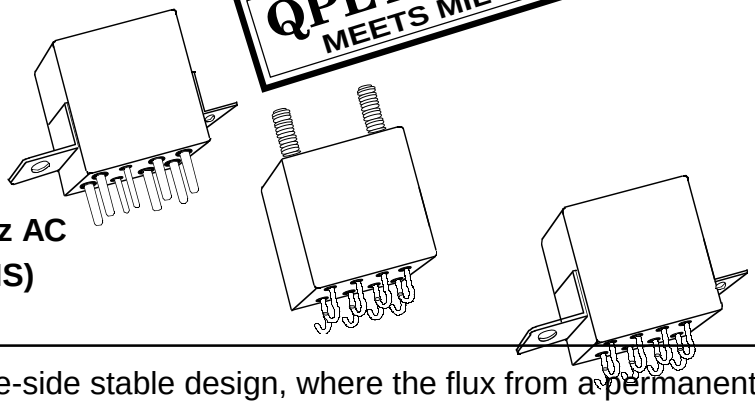
ENCLOSURE (With Flanges)

COIL (28 VDC With Transient Suppression).

SERIES
FCA-210

STRUTHERS-DUNN
MILITARY/AEROSPACE RELAYS
10 AMPERES, DPDT

QPL APPROVED
MEETS MIL-R-83536



- **HERMETICALLY SEALED**
- **ALL WELDED CONSTRUCTION**
- **BALANCED FORCE**
- **PERMANENT MAGNET DRIVE**
- **CONTACTS: SILVER CADMIUM OXIDE WITH GOLD PLATING**
- **COILS FOR DC, 50 TO 400Hz AND 400Hz AC**
- **WEIGHT 1.6 OUNCES MAX. (45.4 GRAMS)**

The Series FCA-210 relay is a polarized single-side stable design, where the flux from a permanent magnet provides the armature holding force in the deactivated state, and its flux path is switched and combined with the coil flux in the operated state. This results in appreciably increased contact pressure in both states over that of a spring return nonpolar design. MSD also manufactures other versions of this relay:

FCAL-210: MAGNETIC LATCHING FORM OF THE FCA-210
FCA-410: 10 AMPERE 4PDT RELAY
FCAL-410: MAGNETIC LATCHING FORM OF THE FCA-410
FCA-610: 10 AMPERE 6 PDT RELAY

AVAILABLE

FCA-215: 15 AMPERE DPDT RELAY, HAS THE SAME SPECIFICATIONS AS THE FCA-210 EXCEPT IS RATED AT 15 AMPS.

CONTACT RATING-AMPERES

Ratings Are Continuous Duty

TYPE OF LOAD	LIFE (MIN.) CYCLES X 10^3	28 VDC	115VAC 400Hz	115/200VAC 3ø	
				400 Hz	60Hz *
Resistive	100	10	10	10	2.5
Inductive	20	8	8	8	2.5
Motor	100	4	4	4	2.0
Lamp	100	2	2	2	1
	* 60 Hz LOADS RATED FOR 10,000 OPERATIONS				

OVERLOAD CURRENT 40 AMPS DC, 60AMPS 400Hz
RUPTURE CURRENT 50 AMPS DC, 80 AMPS 400Hz
CONTACT MAKE BOUNCE 1 MILLISECOND AT NOMINAL VOLTAGE
MAX. CONTACT DROP AT 10 AMPS: INITIAL 0.100 VOLTS.
END OF LIFE 0.125 VOLTS

STRUTHERS-DUNN

MILITARY/AEROSPACE RELAYS

10 AMPERES, DPDT

COIL DATA

COIL CODE	NOMINAL VOLTAGES	FREQ. Hz	DC RES. AC AMPS (B)	OVER TEMPERATURE RANGE		
				PICKUP OR BELOW VOLTS	DROPOUT OR ABOVE VOLTS	MUST HOLD VOLTAGE (C)
1	6	DC	20 Ω	4.5	0.3	2.5
2	12	DC	80 Ω	9.0	0.75	4.5
3	28	DC	320 Ω	18.0	1.5	7.0
4 (A)	28	DC	320 Ω	18.0	1.5	7.0
5	48	DC	920 Ω	32.0	2.5	14.0
6	28	400Hz	180 mA	22.0	1.25	10.0
7	28	50/400Hz	100 mA	22.0	1.25	10.0
8	115	400 Hz	40 mA	90.0	5.0	40.0
9	115	50/400Hz	30 mA	95.0	5.0	40.0

A. CODE 4 COILS HAVE BACK EMF SUPPRESSION TO 42 VOLTS MAX.
B. DC COIL RESISTANCE ± 10% AT 25˚C; AC COIL MAX. CURRENT AT NOMINAL VOLTAGE.
C. RELAY WILL STAY IN PICKED-UP STATE DOWN TO MUST HOLD VOLTAGES SHOWN.
D. MAX. OVERVOLTAGE: 6 & 12 VDC COILS 120% OF NOMINAL; ALL OTHERS 110% OF NOMINAL.
E. COILS AVAILABLE FOR OTHER VOLTAGES AND FOR AC 50/60HZ.

GENERAL SPECIFICATIONS

TEMPERATURE RATING:		-70˚C TO + 125˚C
ALTITUDE:		300,000 FEET
SHOCK:*	Z, Y, & X ENCLOSURES	200 g FOR 6 mS
	W & M ENCLOSURES (STUD MTG.)	100 g FOR 6 mS
VIBRATION, SINUSOIDAL:*	Z, Y, & X ENCLOSURES	30 g 33-3000Hz
	W & M ENCLOSURES (STUD MTG.)	20 g 33-3000Hz
VIBRATION, RANDOM: *	Z, Y, & X ENCLOSURES	0.4 g^2/Hz 50-2000Hz
	W & M ENCLOSURES (STUD MTG.)	0.2 g^2/Hz 50-2000Hz
DIELECTRIC STRENGTH AT SEA LEVEL:	ALL CIRCUITS TO GROUND AND CIRCUIT TO CIRCUIT.	1250 V rms
	COIL TO GROUND	1000 V rms
DIELECTRIC STRENGTH AT 80,000 FEET:		350 V rms
INSULATION RESISTANCE:	INITIAL (500 VDC)	100 MΩ MINIMUM
	AFTER LIFE OR ENVIRONMENTAL TESTS	50 MΩ MINIMUM
OPERATE TIME AT NOMINAL VOLTAGE:	DC RELAYS	10 ms OR LESS
	AC RELAYS	15 ms OR LESS
RELEASE TIME AT NOMINAL VOLTAGE:	DC RELAYS	10 ms OR LESS
	AC RELAYS	50 ms OR LESS

* Max. contact opening under vibration or shock 10 microseconds

SERIES
FCA-210

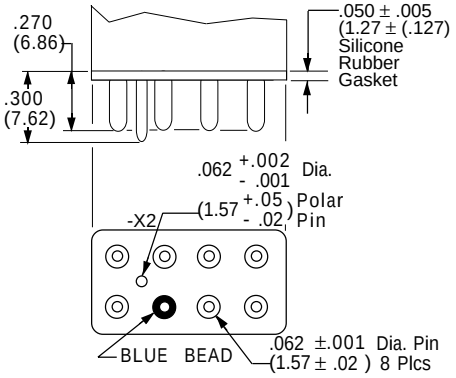
STRUTHERS-DUNN
MILITARY/AEROSPACE RELAYS
10 AMPERES, DPDT

Below are shown the standard terminal types and the enclosures available. Specify the assembly as indicated under How To Order. Dimensions are shown in inches ± .010 and (Millimeters ± .25).

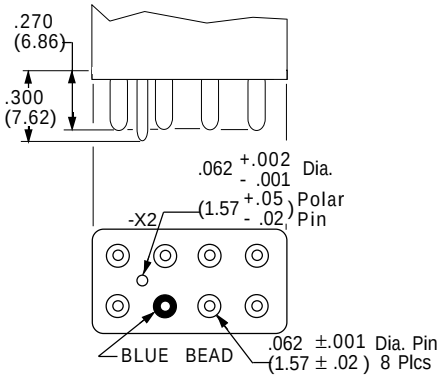
TERMINALS

SOCKET PINS ARE GOLD PLATED
POLARIZING PINS ARE TIN/LEAD PLATED
CIRCUIT BOARD PINS ARE TIN/LEAD PLATED
DIMENSIONS EXCEPT AS NOTED:
INCHES ± .010 (MILLIMETERS ± .25)

CODE "A" Socket Pins - All DC Coils

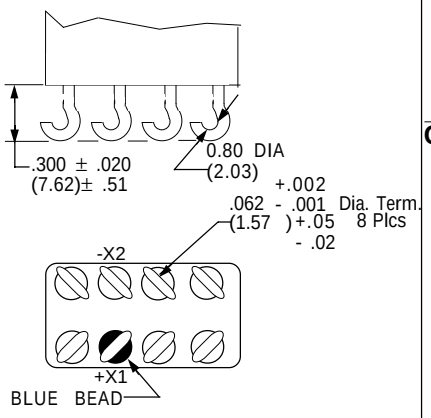


CODE "B" Circuit Board Pins - All DC Coils

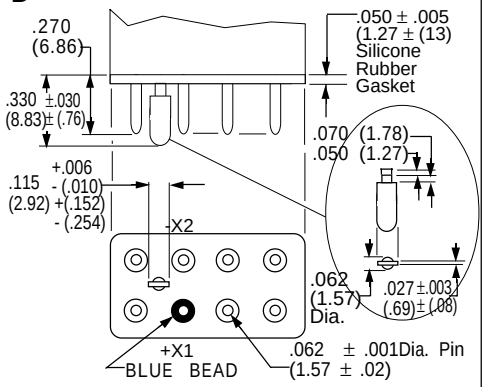


CODE "C" Solder Hook Terminals

HOOK TERMINALS TIN/LEAD PLATED

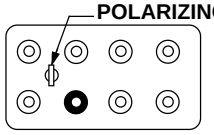


CODE "D" Socket Pins 115 VAC

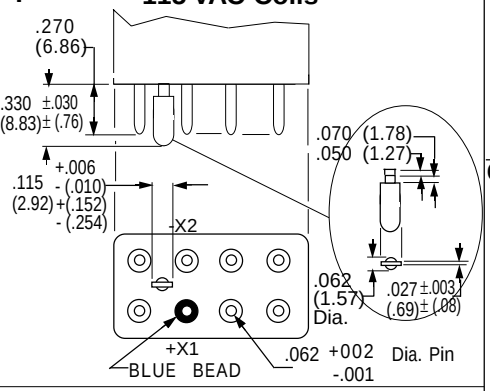


CODE "E" Socket Pins 28 VAC Coils

Same as Code "D" Except polarizing Pin turned 90˚ to this plane.

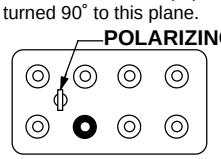


CODE "F" Circuit Board Pins 115 VAC Coils



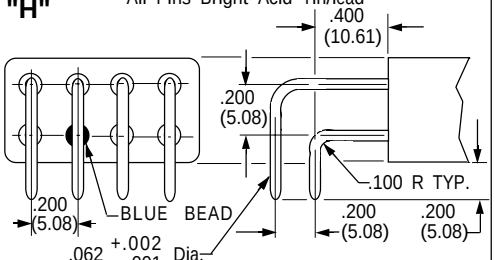
CODE "G" Circuit Board Pins 28 VAC Coils

Same as Code "F" Except polarizing Pin turned 90˚ to this plane.



CODE "H" 90˚ Solder Pins

All Pins Bright Acid Tin/lead



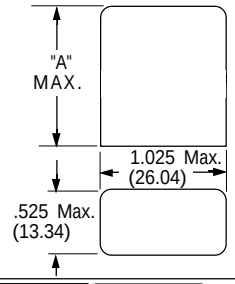
ENCLOSURES

All Enclosures have Cupro-Nickel Cans bright acid tin/lead plated after assembly to terminal headers.

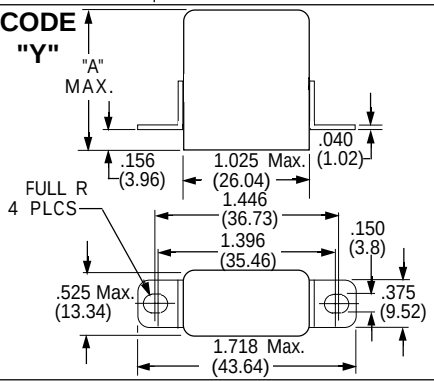
Dimensions: Inches ± .010 (mm ± .25)

"A" AC Coils 1.125 in. (28.57) Max.
DC Coils 1.010 in. (25.65) Max.

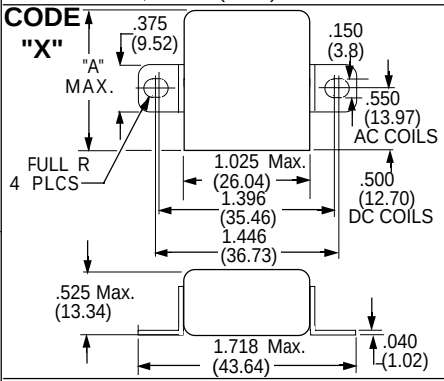
CODE "Z"



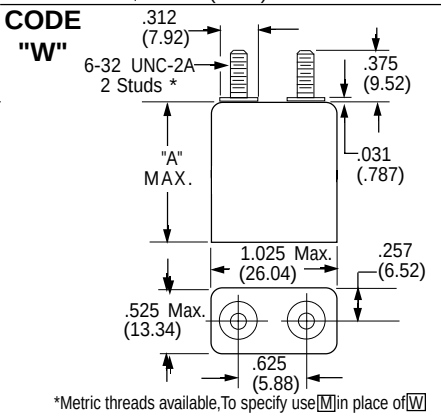
CODE "Y"



CODE "X"



CODE "W"



*Metric threads available,To specify use M in place of W

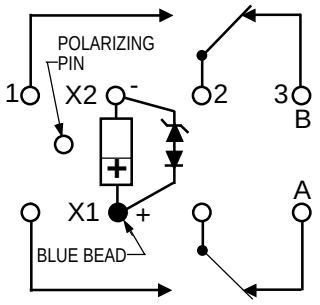
STRUTHERS-DUNN

MILITARY/AEROSPACE RELAYS

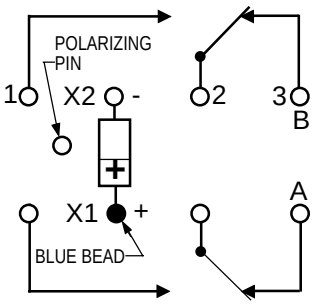
10 AMPERES, DPDT

TERMINAL WIRING

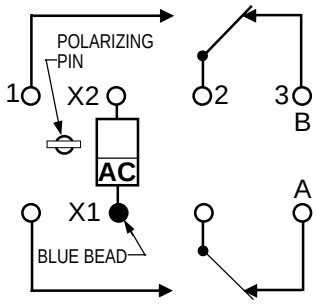
DC COILS WITH TRANSIENT SUPPRESSION



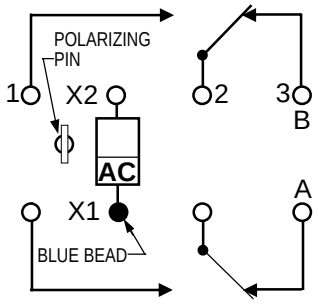
DC COILS



AC COILS 115 VAC



AC COILS 28 VAC

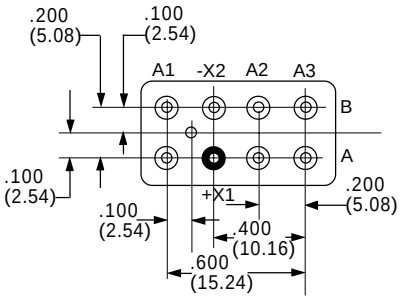


NOTE: Polarity must be observed with DC coil supply. Relay is polarized with a permanent magnet and will not operate or be damaged by reverse polarity.

Diodes used in transient suppression and in AC rectifier circuits have peak inverse voltage rating of 600 VDC minimum. Zener diodes have a minimum rating of 1 watt.

Terminal designations are for reference only and do not appear on the header.

TERMINAL LAYOUT



HOW TO ORDER

(EXAMPLE) — **FCA-215-**
FCA-210-A Y 4

RELAY TYPE

TERMINALS (Socket Pins, DC Coil)

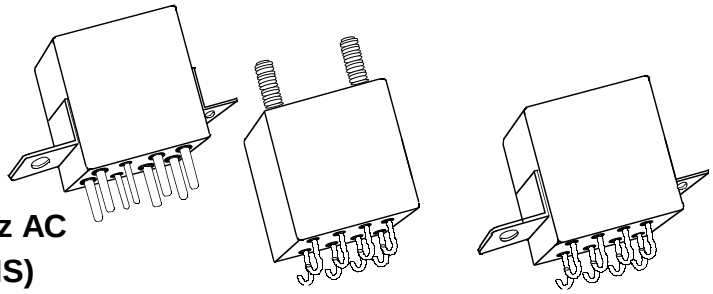
ENCLOSURE (With Flanges)

COIL (28 VDC With Transient Suppression).

SERIES
FCA-212

STRUTHERS-DUNN
MILITARY/AEROSPACE RELAYS
12 AMPERES, DPDT

- **HERMETICALLY SEALED**
- **ALL WELDED CONSTRUCTION**
- **BALANCED FORCE**
- **PERMANENT MAGNET DRIVE**
- **CONTACTS: SILVER CADMIUM OXIDE WITH GOLD PLATING**
- **COILS FOR DC, 50 TO 400Hz AND 400Hz AC**
- **WEIGHT 1.6 OUNCES MAX. (45.4 GRAMS)**



The Series FCA-212 relay is a polarized single-side stable design, where the flux from a permanent magnet provides the armature holding force in the deactivated state, and its flux path is switched and combined with the coil flux in the operated state. This results in appreciably increased contact pressure in both states over that of a spring return nonpolar design. MSD also manufactures other versions of this relay:

FCA-412: 12 AMP 4PDT RELAY

CONTACT RATING-AMPERES

Ratings Are Continuous Duty

TYPE OF LOAD	LIFE (MIN.) CYCLES X 10^3	28 VDC	115VAC 400Hz	115/200 VAC 3Ø	
				400Hz	60Hz *
Resistive	100	12	12	12	2.5
Inductive	20	8	8	8	2.5
Motor	100	4	4	4	2.0
Lamp	100	2	2	2	1
	* 60 Hz LOADS RATED FOR 10,000 OPERATIONS				

OVERLOAD CURRENT 40 AMPS DC, 60AMPS 400Hz
RUPTURE CURRENT 50 AMPS DC, 80 AMPS 400Hz
CONTACT MAKE BOUNCE 1 MILLISECOND AT NOMINAL VOLTAGE
MAX. CONTACT DROP AT 12 AMPS: INITIAL 0.150 VOLTS.
END OF LIFE 0.175 VOLTS

STRUTHERS-DUNN

MILITARY/AEROSPACE RELAYS

12 AMPERES, DPDT

COIL DATA

COIL CODE	NOMINAL VOLTAGES	FREQ. Hz	DC RES. AC AMPS (B)	OVER TEMPERATURE RANGE		
				PICKUP OR BELOW VOLTS	DROPOUT OR ABOVE VOLTS	MUST HOLD VOLTAGE (C)
1	6	DC	20 Ω	4.5	0.3	2.5
2	12	DC	80 Ω	9.0	0.75	4.5
3	28	DC	320 Ω	18.0	1.5	7.0
4 (A)	28	DC	320 Ω	18.0	1.5	7.0
5	48	DC	920 Ω	32.0	2.5	14.0
6	28	400Hz	180 mA	22.0	1.25	10.0
7	28	50/400Hz	100 mA	22.0	1.25	10.0
8	115	400 Hz	40 mA	90.0	5.0	40.0
9	115	50/400Hz	30 mA	95.0	5.0	40.0

A. CODE 4 COILS HAVE BACK EMF SUPPRESSION TO 42 VOLTS MAX.
B. DC COIL RESISTANCE ± 10% AT 25˚C; AC COIL MAX. CURRENT AT NOMINAL VOLTAGE.
C. RELAY WILL STAY IN PICKED-UP STATE DOWN TO MUST HOLD VOLTAGES SHOWN.
D. MAX. OVERVOLTAGE: 6 & 12 VDC COILS 120% OF NOMINAL; ALL OTHERS 110% OF NOMINAL.
E. COILS AVAILABLE FOR OTHER VOLTAGES AND FOR AC 50/60HZ.

GENERAL SPECIFICATIONS

TEMPERATURE RATING:		-70˚C TO + 125˚C
ALTITUDE:		300,000 FEET
SHOCK:*	Z, Y, & X ENCLOSURES	200 g FOR 6 mS
	W & M ENCLOSURES (STUD MTG.)	100 g FOR 6 mS
VIBRATION, SINUSOIDAL:*	Z, Y, & X ENCLOSURES	30 g 33-3000Hz
	W ENCLOSURE	20 g 33-3000Hz
VIBRATION, RANDOM: *	Z, Y, & X ENCLOSURES	0.4 g^2/Hz 50-2000Hz
	W & M ENCLOSURES (STUD MTG.)	0.2 g^2/Hz 50-2000Hz
DIELECTRIC STRENGTH AT SEA LEVEL:	ALL CIRCUITS TO GROUND AND CIRCUIT TO CIRCUIT.	1250 V rms
	COIL TO GROUND	1000 V rms
DIELECTRIC STRENGTH AT 80,000 FEET:		350 V rms
INSULATION RESISTANCE:	INITIAL (500 VDC)	100 MΩ MINIMUM
	AFTER LIFE OR ENVIRONMENTAL TESTS	50 MΩ MINIMUM
OPERATE TIME AT NOMINAL VOLTAGE:	DC RELAYS	10 ms OR LESS
	AC RELAYS	15 ms OR LESS
RELEASE TIME AT NOMINAL VOLTAGE:	DC RELAYS	10 ms OR LESS
	AC RELAYS	50 ms OR LESS

* Max. contact opening under vibration or shock 10 microseconds

STRUTHERS-DUNN

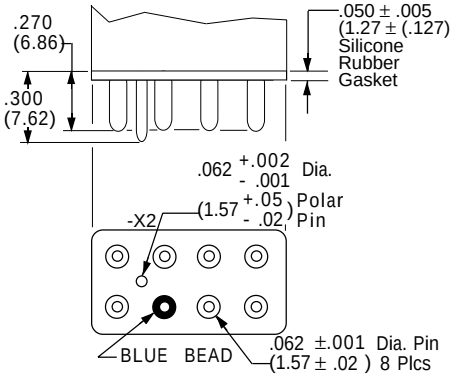
MILITARY/AEROSPACE RELAYS
12 AMPERES, DPDT

Below are shown the standard terminal types and the enclosures available. Specify the assembly as indicated under How To Order. Dimensions are shown in inches ± .010 and (Millimeters ± .25).

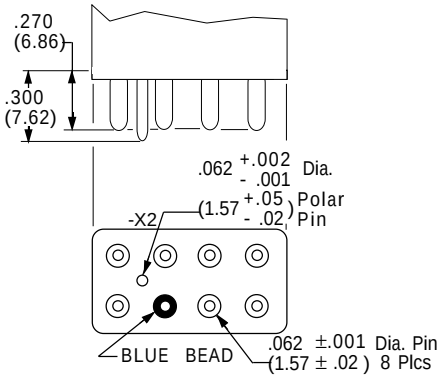
TERMINALS

SOCKET PINS ARE GOLD PLATED
POLARIZING PINS ARE TIN/LEAD PLATED.
CIRCUIT BOARD PINS ARE TIN/LEAD PLATED.
DIMENSIONS EXCEPT AS NOTED:
INCHES ± .010 (MILLIMETERS ± .25)

CODE "A" Socket Pins - All DC Coils

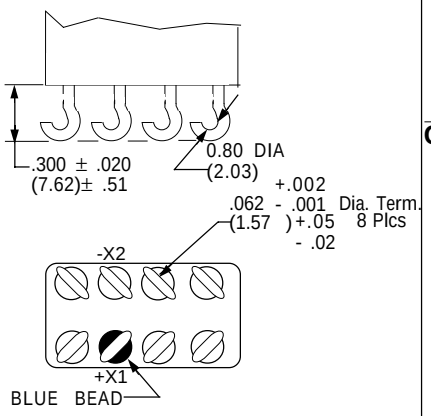


CODE "B" Circuit Board Pins - All DC Coils

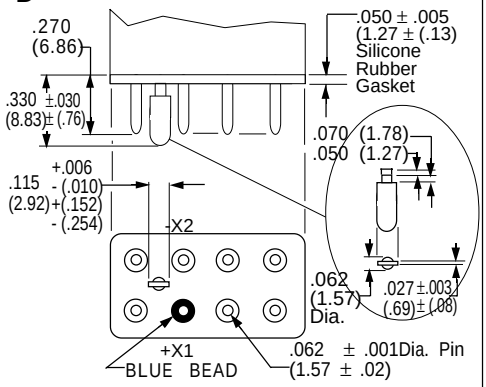


CODE "C" Solder Hook Terminals

HOOK TERMINALS TIN/lead PLATED

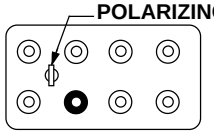


CODE "D" Socket Pins 115 VAC

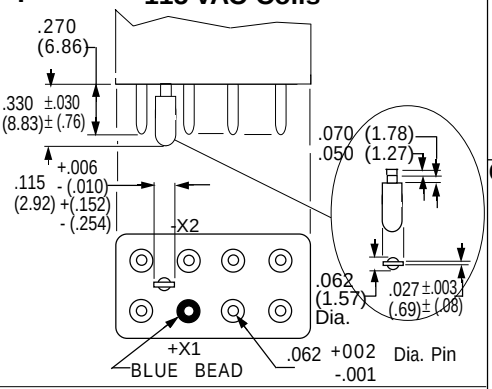


CODE "E" Socket Pins 28 VAC Coils

Same as Code "D" Except polarizing Pin turned 90˚ to this plane.

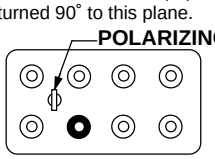


CODE "F" Circuit Board Pins 115 VAC Coils



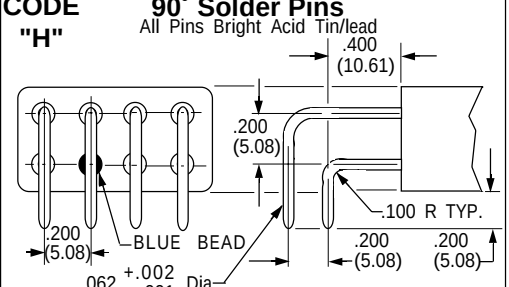
CODE "G" Circuit Board Pins 28 VAC Coils

Same as Code "F" Except polarizing Pin turned 90˚ to this plane.



CODE "H" 90˚ Solder Pins

All Pins Bright Acid Tin/lead



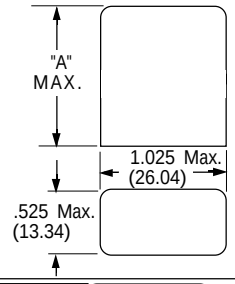
ENCLOSURES

All Enclosures have Cupro-Nickel Cans bright acid tin/lead plated after assembly to terminal headers.

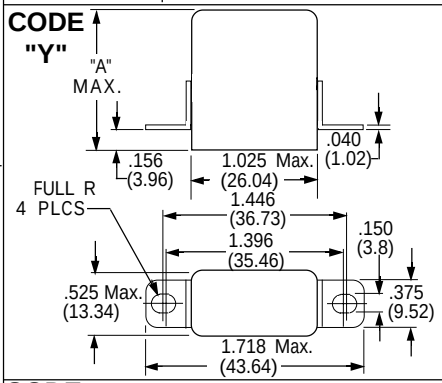
Dimensions: Inches ± .010 (mm ± .25)

"A" AC Coils 1.125 in. (28.57) Max.
DC Coils 1.010 in. (25.65) Max.

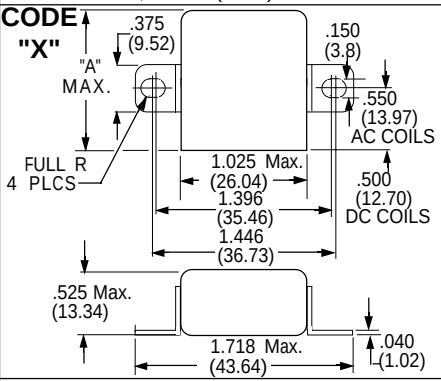
CODE "Z"



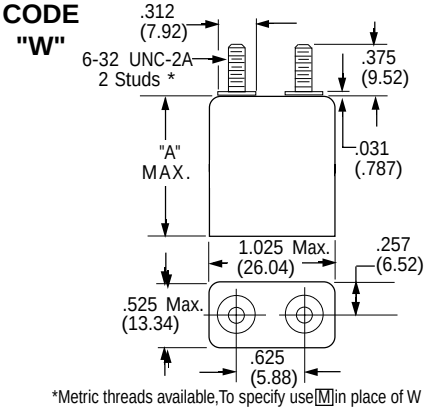
CODE "Y"



CODE "X"



CODE "W"



*Metric threads available,To specify use M in place of W

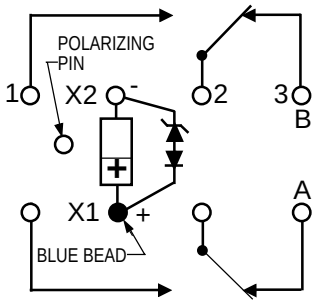
STRUTHERS-DUNN

MILITARY/AEROSPACE RELAYS

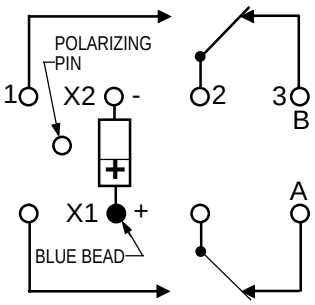
12 AMPERES, DPDT

TERMINAL WIRING

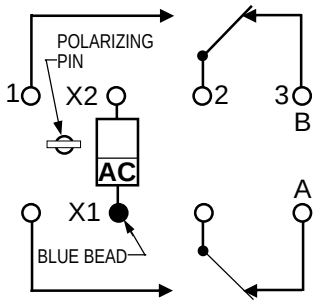
DC COILS WITH TRANSIENT SUPPRESSION



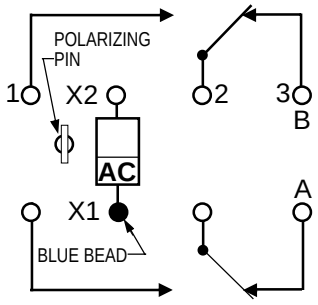
DC COILS



AC COILS 115 VAC



AC COILS 28 VAC

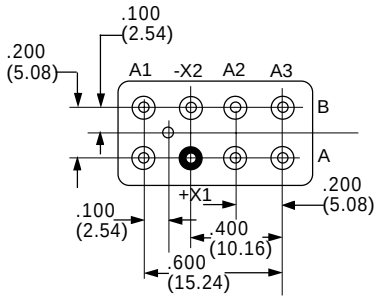


NOTE: Polarity must be observed with DC coil supply. Relay is polarized with a permanent magnet and will not operate or be damaged by reverse polarity.

Diodes used in transient suppression and in AC rectifier circuits have peak inverse voltage rating of 600 VDC minimum. Zener diodes have a minimum rating of 1 watt.

Terminal designations are for reference only and do not appear on the header.

TERMINAL LAYOUT



HOW TO ORDER

(EXAMPLE) — **FCA-212-A Y 4**

RELAY TYPE

TERMINALS (Socket Pins, DC Coil)

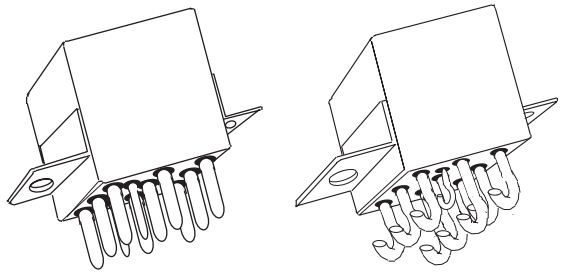
ENCLOSURE (With Flanges)

COIL (28 VDC With Transient Suppression).

SERIES
FCA-325

STRUTHERS-DUNN
MILITARY/AEROSPACE RELAYS
25 AMPERES, 3PDT

- **HERMETICALLY SEALED**
- **ALL WELDED CONSTRUCTION**
- **BALANCED FORCE**
- **PERMANENT MAGNET DRIVE**
- **CONTACTS: SILVER CADMIUM OXIDE WITH GOLD PLATING**
- **COILS FOR DC, 50 TO 400Hz AND 400Hz AC**
- **WEIGHT 2.89 OUNCES MAX. (82 GRAMS)**



The Series FCA-325 relay is a polarized single-side stable design, where the flux from a permanent magnet provides the armature holding force in the deactivated state, and its flux path is switched and combined with the coil flux in the operated state. This results in appreciably increased contact pressure in both states over that of a spring return nonpolar design. MSD also manufactures other versions of this relay:

FCA-125: 25 AMP SPDT RELAY
FCAL-125: MAGNETIC LATCHING FORM OF THE FCA-125
FCAL-325: MAGNETIC LATCHING FORM OF THE FCA-325
FCAC-325: 25 AMP 3PST RELAY WITH 2 AMP SPDT AUXILIARY CONTACTS
FCACL-325: MAGNETIC LATCHING FORM OF THE FCAC-325

CONTACT RATING-AMPERES

Ratings Are Continuous Duty

TYPE OF LOAD	LIFE (MIN.) CYCLES X 10^3	28 VDC	115VAC 400HZ	115/200VAC 400Hz-3Ø	115/200VAC 60Hz-3Ø *
Resistive	50	25	25	25	2.5
Inductive	10	12	-	-	2.5
Inductive	20	-	15	15	-
Motor	50	10	10	10	2.0
Lamp	50	5	5	5	1.0
	* 60 Hz LOADS RATED FOR 10,000 OPERATIONS				

OVERLOAD CURRENT 50 AMPS DC, 80 AMPS 400HZ
RUPTURE CURRENT 60 AMPS DC, 100 AMPS 400HZ
CONTACT MAKE BOUNCE 1 MILLISECOND AT NOMINAL VOLTAGE
MAX. CONTACT DROP AT 25 AMPS: INITIAL 0.150 VOLTS.
END OF LIFE 0.175 VOLTS

STRUTHERS-DUNN

MILITARY/AEROSPACE RELAYS

25 AMPERES, 3PDT

COIL DATA

COIL CODE	NOMINAL VOLTAGES	FREQ. HZ	DC RES. AC AMPS (B)	OVER TEMPERATURE RANGE		
				PICKUP OR BELOW VOLTS	DROPOUT OR ABOVE VOLTS	MUST HOLD VOLTAGE (C)
1	6	DC	18 Ω	4.5	0.3	2.5
2	12	DC	70 Ω	9.0	0.75	4.5
3	28	DC	290 Ω	18.0	1.5	7.0
4 (A)	28	DC	290 Ω	18.0	1.5	7.0
5	48	DC	865 Ω	32.0	2.5	14.0
6	28	400HZ	225 mA	22.0	1.25	10.0
7	28	50/400Hz	120 mA	22.0	1.25	10.0
8	115	400 Hz	40 mA	90.0	5.0	40.0
9	115	50/400Hz	30 mA	95.0	5.0	40.0

A. CODE 4 COILS HAVE BACK EMF SUPPRESSION TO 42 VOLTS MAX.
B. DC COIL RESISTANCE ± 10% AT 25˚C; AC COIL MAX. CURRENT AT NOMINAL VOLTAGE.
C. RELAY WILL STAY IN PICKED-UP STATE DOWN TO MUST HOLD VOLTAGES SHOWN.
D. MAX. OVER-VOLTAGE: 6 & 12 VDC COILS 120% OF NOMINAL; ALL OTHERS 110% OF NOMINAL.
E. COILS AVAILABLE FOR OTHER VOLTAGES AND FOR AC 50/60HZ.

GENERAL SPECIFICATIONS

TEMPERATURE RATING:		-70˚C TO + 125˚C
ALTITUDE:		300,000 FEET
SHOCK:*	Z, Y, & V ENCLOSURES	200 g FOR 6 mS
	W, X & M ENCLOSURES	100 g FOR 6 mS
VIBRATION, SINUSOIDAL:*	Z, Y, & V ENCLOSURES	30 g 33-3000Hz
	W, X & M ENCLOSURES	20 g 33-3000Hz
VIBRATION, RANDOM: *	Z, Y, & V ENCLOSURES	0.4 g^2/Hz 50-2000Hz
	W, X & M ENCLOSURES	0.2 g^2/Hz 50-2000Hz
DIELECTRIC STRENGTH AT SEA LEVEL:	ALL CIRCUITS TO GROUND AND CIRCUIT TO CIRCUIT.	1250 V rms
	COIL TO GROUND	1000 V rms
DIELECTRIC STRENGTH AT 80,000 FEET:		350 V rms
INSULATION RESISTANCE:	INITIAL (500 VDC)	100 MΩ MINIMUM
	AFTER LIFE OR ENVIRONMENTAL TESTS	50 MΩ MINIMUM
OPERATE TIME AT NOMINAL VOLTAGE:	DC RELAYS	15 ms OR LESS
	AC RELAYS	20 ms OR LESS
RELEASE TIME AT NOMINAL VOLTAGE:	DC RELAYS	15 ms OR LESS
	AC RELAYS	50 ms OR LESS

* Max. contact opening under vibration or shock 10 microseconds

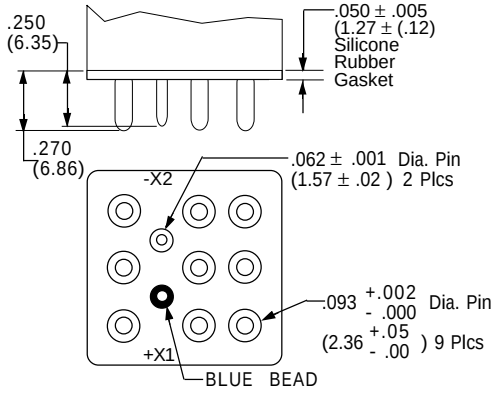
SERIES
FCA-325

STRUTHERS-DUNN
MILITARY/AEROSPACE RELAYS
25 AMPERES, 3PDT

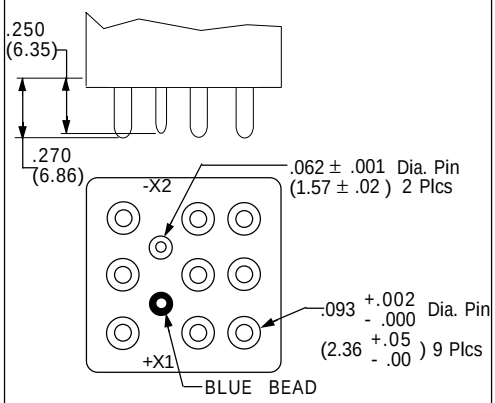
Below are shown the standard terminal types and the enclosures available. Specify the assembly as indicated under How To Order. Dimensions are shown in inches ± .010 and (Millimeters ± .25).

TERMINALS

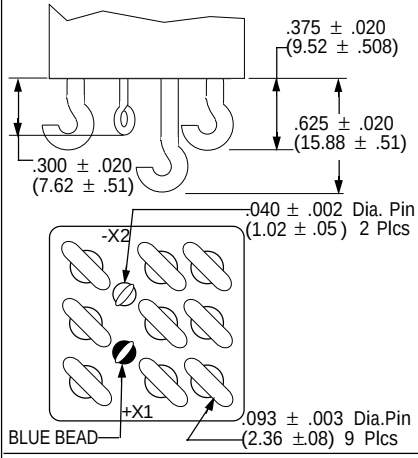
CODE "A"
Socket Pins - All DC Coils
PIN TERMINALS ARE GOLD PLATED



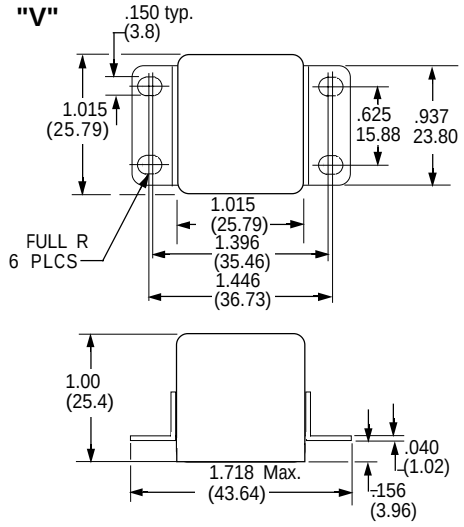
CODE "B"
Solder Pin Terminals
PIN TERMINALS TIN/LEAD PLATED



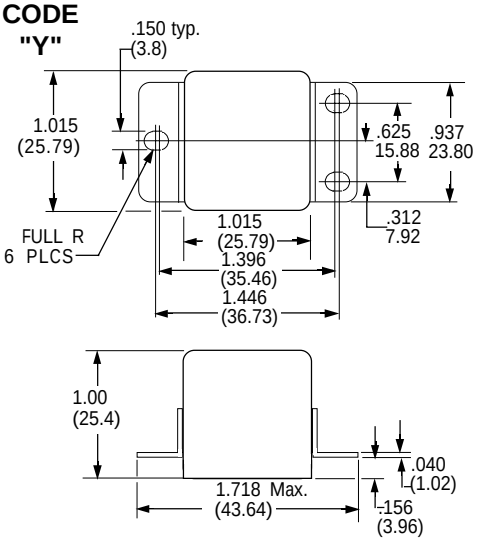
CODE "C"
Solder Hook Terminals
HOOK TERMINALS TIN/LEAD PLATED



CODE "V"



CODE "Y"



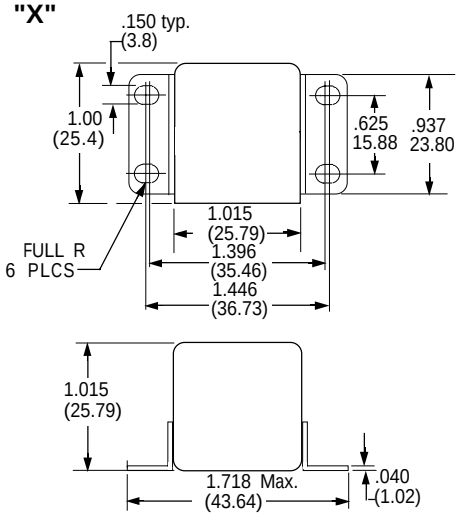
ENCLOSURES

All Enclosures have cupro-Nickel cans bright acid tin/lead plated after assembly to terminal headers.

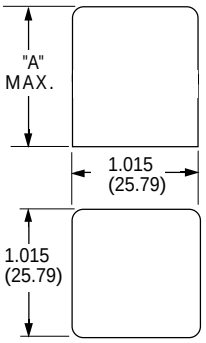
Dimensions: Inches ± .010 (mm ± .25)

For socket pin terminals: specify "Y" enclosures with DC coils and "V" enclosures with AC coils.

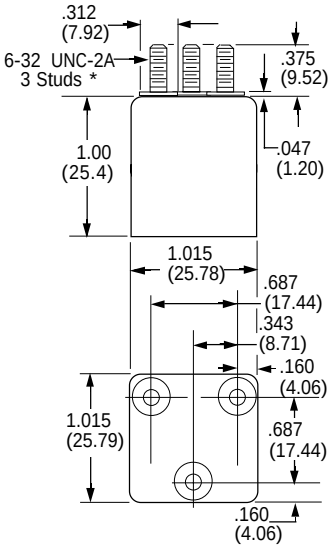
CODE "X"



CODE "Z"



CODE "W"



*Metric threads available,To specify use M in place of W

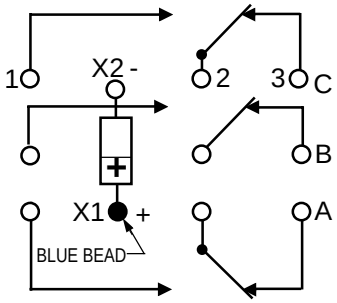
STRUTHERS-DUNN

MILITARY/AEROSPACE RELAYS

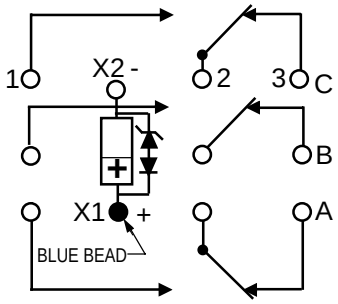
25 AMPERES, 3PDT

TERMINAL WIRING

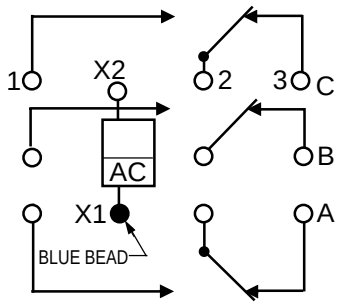
DC COILS



DC COILS WITH TRANSIENT SUPPRESSION



AC COILS

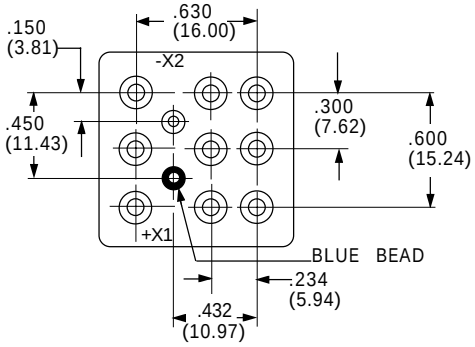


NOTE: Polarity must be observed with DC coil supply. Relay is polarized with a permanent magnet and will not operate or be damaged by reverse polarity.

Diodes used in transient suppression and in AC rectifier circuits have peak inverse voltage rating of 600 VDC minimum. Zener diodes have a minimum rating of 1 watt.

Terminal designations are for reference only and do not appear on the header.

TERMINAL LAYOUT



HOW TO ORDER

(EXAMPLE) — **FCA-325-A Y 4**

RELAY TYPE

TERMINALS (Socket Pins, DC Coil)

ENCLOSURE (With Flanges)

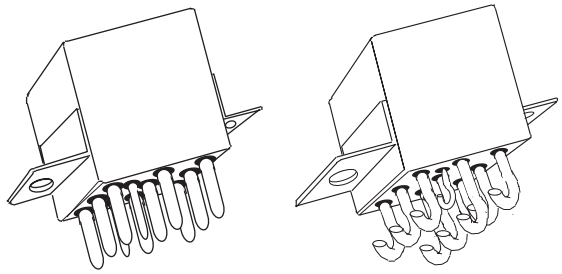
COIL (28 VDC With Transient Suppression).

SERIES
FCAC-325

STRUTHERS-DUNN
MILITARY/AEROSPACE RELAYS

25 AMPERES, 3PST-NO WITH 2 AMP SPDT AUXILIARY

- **HERMETICALLY SEALED**
- **ALL WELDED CONSTRUCTION**
- **BALANCED FORCE**
- **PERMANENT MAGNET DRIVE**
- **CONTACTS: SILVER CADMIUM OXIDE WITH GOLD PLATING**
- **COILS FOR DC, 50 TO 400Hz AND 400Hz AC**
- **WEIGHT 2.89 OUNCES MAX. (82 GRAMS)**



The Series FCAC-325 relay is a polarized single-side stable design, where the flux from a permanent magnet provides the armature holding force in the deactivated state, and its flux path is switched and combined with the coil flux in the operated state. This results in appreciably increased contact pressure in both states over that of a spring return nonpolar design. MSD also manufactures other versions of this relay:

FCA-125: 25 AMP SPDT RELAY
FCAL-125: MAGNETIC LATCHING FORM OF THE FCA-125
FCA-325: 25 AMP 3PDT RELAY
FCAL-325: MAGNETIC LATCHING FORM OF THE FCA-325
FCACL-325: MAGNETIC LATCHING FORM OF THE FCAC-325

CONTACT RATING-AMPERES

Ratings Are Continuous Duty

TYPE OF LOAD	LIFE (MIN.) CYCLES X 10^3	28 VDC		115VAC 400HZ		115/200VAC 400Hz-3Ø	115/200VAC 60Hz-3Ø *
		MAIN	AUX.	MAIN	AUX.		
Resistive	50	25	2	25	2	25	2.5
Inductive	10	12	1	-	-	-	2.5
Inductive	20	-	-	15	1	15	-
Motor	50	10	-	10	-	10	2.0
Lamp	50	5	.5	5	.5	5	1.0
	* 60 Hz LOADS RATED FOR 10,000 OPERATIONS						

MAIN CONTACTS OVERLOAD CURRENT 50 AMPS DC, 80 AMPS 400HZ
RUPTURE CURRENT 60 AMPS DC, 100 AMPS 400HZ
CONTACT MAKE BOUNCE 1 MILLISECOND AT NOMINALVOLTAGE
AUXILIARY CONTACT BOUNCE 4 MILLISECONDS MAX.
MAX. CONTACT DROP AT 25 AMPS: INITIAL 0.150 VOLTS.
END OF LIFE 0.175 VOLTS

STRUTHERS-DUNN

MILITARY/AEROSPACE RELAYS

25 AMPERES, 3PST-NO WITH 2 AMP SPDT AUXILIARY

COIL DATA

COIL CODE	NOMINAL VOLTAGES	FREQ. HZ	DC RES. AC AMPS (B)	OVER TEMPERATURE RANGE		
				PICKUP OR BELOW VOLTS	DROPOUT OR ABOVE VOLTS	MUST HOLD VOLTAGE (C)
1	6	DC	18 Ω	4.5	0.3	2.5
2	12	DC	70 Ω	9.0	0.75	4.5
3	28	DC	290 Ω	18.0	1.5	7.0
4 (A)	28	DC	290 Ω	18.0	1.5	7.0
5	48	DC	865 Ω	32.0	2.5	14.0
6	28	400HZ	225 mA	22.0	1.25	10.0
7	28	50/400Hz	120 mA	22.0	1.25	10.0
8	115	400 Hz	40 mA	90.0	5.0	40.0
9	115	50/400Hz	30 mA	95.0	5.0	40.0

A. CODE 4 COILS HAVE BACK EMF SUPPRESSION TO 42 VOLTS MAX.
B. DC COIL RESISTANCE ± 10% AT 25˚C; AC COIL MAX. CURRENT AT NOMINAL VOLTAGE.
C. RELAY WILL STAY IN PICKED-UP STATE DOWN TO MUST HOLD VOLTAGES SHOWN.
D. MAX. OVERVOLTAGE: 6 & 12 VDC COILS 120% OF NOMINAL; ALL OTHERS 110% OF NOMINAL.
E. COILS AVAILABLE FOR OTHER VOLTAGES AND FOR AC 50/60HZ.

GENERAL SPECIFICATIONS

TEMPERATURE RATING:		-70˚C TO + 125˚C
ALTITUDE:		300,000 FEET
SHOCK:*	Z, Y, & V ENCLOSURES	200 g FOR 6 mS
	W, X & M ENCLOSURES	100 g FOR 6 mS
VIBRATION, SINUSOIDAL:*	Z, Y, & V ENCLOSURES	30 g 33-3000Hz
	W, X & M ENCLOSURES	20 g 33-3000Hz
VIBRATION, RANDOM: *	Z, Y, & V ENCLOSURES	0.4 g^2/Hz 50-2000Hz
	W, X & M ENCLOSURES	0.2 g^2/Hz 50-2000Hz
DIELECTRIC STRENGTH AT SEA LEVEL:	ALL CIRCUITS TO GROUND AND CIRCUIT TO CIRCUIT.	1250 V rms
	COIL TO GROUND	1000 V rms
DIELECTRIC STRENGTH AT 80,000 FEET:		350 V rms
INSULATION RESISTANCE:	INITIAL (500 VDC)	100 MΩ MINIMUM
	AFTER LIFE OR ENVIRONMENTAL TESTS	50 MΩ MINIMUM
OPERATE TIME AT NOMINAL VOLTAGE:	DC RELAYS	15 ms OR LESS
	AC RELAYS	20 ms OR LESS
RELEASE TIME AT NOMINAL VOLTAGE:	DC RELAYS	15 ms OR LESS
	AC RELAYS	50 ms OR LESS

* Max. contact opening under vibration or shock 10 microseconds

SERIES

FCAC-325

STRUTHERS-DUNN

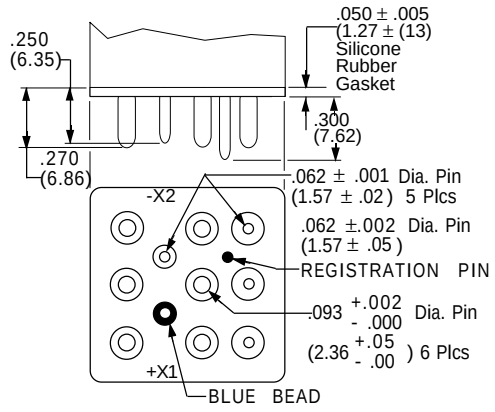
MILITARY/AEROSPACE RELAYS

25 AMPERES, 3PST-NO WITH 2 AMP SPDT AUXILIARY

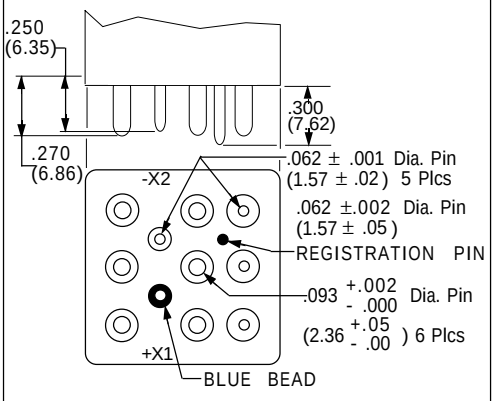
Below are shown the standard terminal types and the enclosures available. Specify the assembly as indicated under How To Order. Dimensions are shown in inches ± .010 and (Millimeters ± .25) except as noted.

TERMINALS

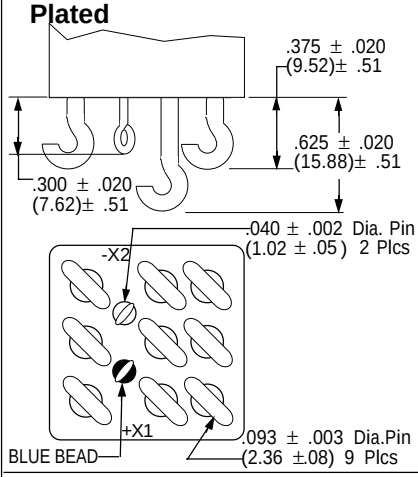
CODE "A"
Socket Pin Terminals
Pin Terminals are Gold Plated



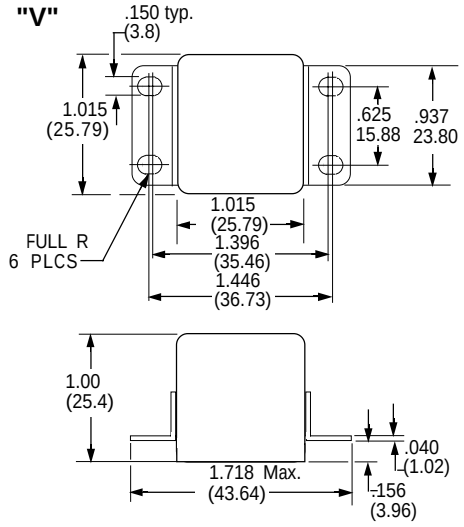
CODE "B"
Solder Pin Terminals
Pin Terminals are Tin/Lead Plated



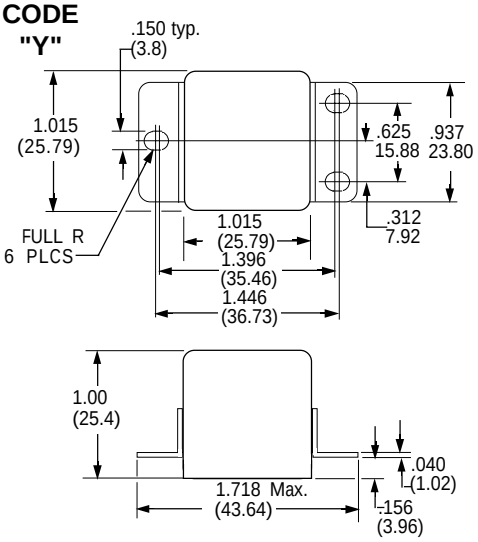
CODE "C"
Solder Hook Terminals
Hook Terminals are Tin/Lead Plated



CODE "V"



CODE "Y"



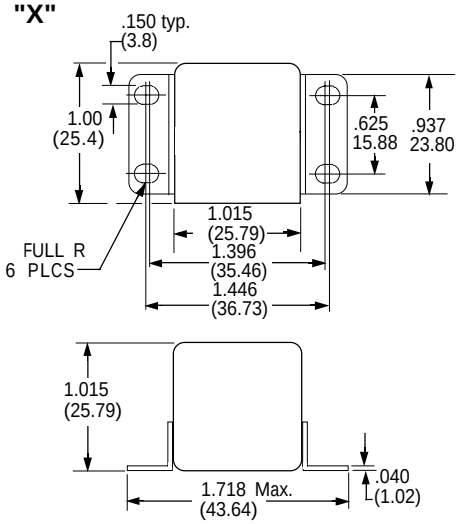
ENCLOSURES

All Enclosures have cupro-Nickel cans bright acid tin/lead plated after assembly to terminal headers.

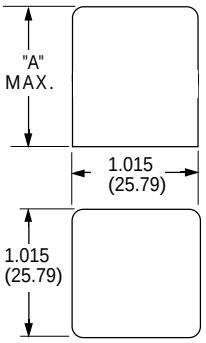
Dimensions: Inches ± .010 (mm ± .25)

For socket pin terminals: specify "Y" enclosures with DC coils and "V" enclosures with AC coils.

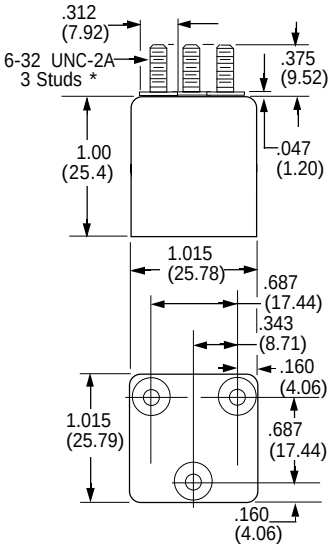
CODE "X"



CODE "Z"



CODE "W"



*Metric threads available, To specify use M in place of W

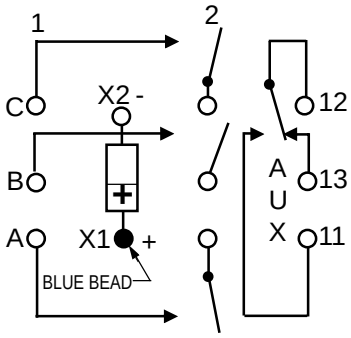
STRUTHERS-DUNN

MILITARY/AEROSPACE RELAYS

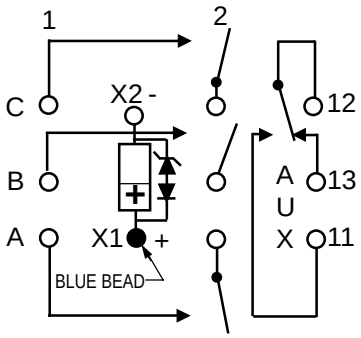
25 AMPERES, 3PST-NO WITH 2 AMP SPDT AUXILIARY

TERMINAL WIRING

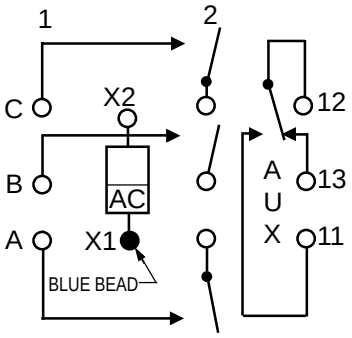
DC COILS



DC COILS WITH TRANSIENT SUPPRESSION



AC COILS

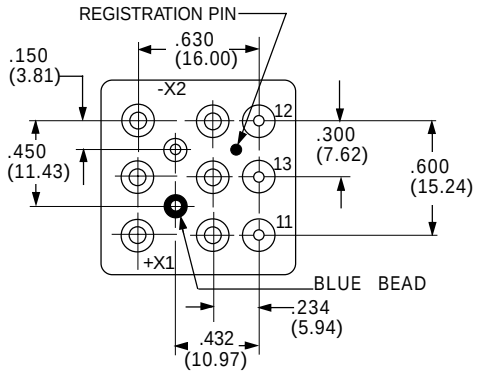


NOTE: Polarity must be observed with DC coil supply. Relay is polarized with a permanent magnet and will not operate or be damaged by reverse polarity.

Diodes used in transient suppression and in AC rectifier circuits have peak inverse voltage rating of 600 VDC minimum. Zener diodes have a minimum rating of 1 watt.

Terminal designations are for reference only and do not appear on the header.

TERMINAL LAYOUT



HOW TO ORDER

(EXAMPLE) — **FCAC-325-A Y 4**

RELAY TYPE

TERMINALS (Socket Pins, DC Coil)

ENCLOSURE (With Flangesand DC coil)

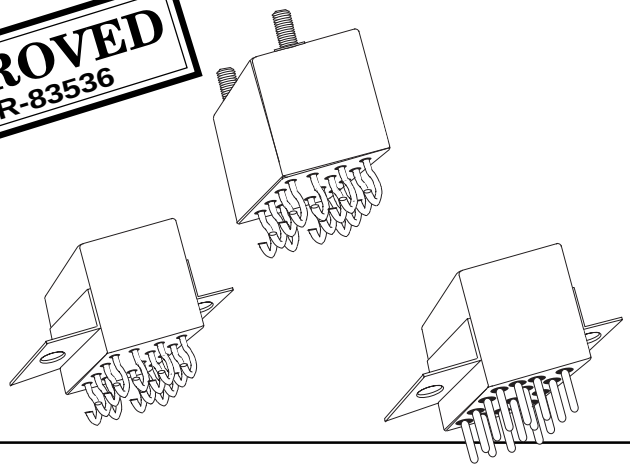
COIL (28 VDC With Transient Suppression).

SERIES
FCA-410

STRUTHERS-DUNN
QPL APPROVED MILITARY/AEROSPACE RELAYS
10 AMPERES, 4PDT

- **HERMETICALLY SEALED**
- **ALL WELDED CONSTRUCTION**
- **BALANCED FORCE**
- **PERMANENT MAGNET DRIVE**
- **4PDT SWITCHING IN ONE INCH CUBE**
- **CONTACTS: SILVER CADMIUM OXIDE WITH GOLD PLATING**
- **COILS FOR DC AND AC 50-400 Hz OR 400 Hz**
- **WEIGHT 2.72 OUNCES MAX. (77 GRAMS MAX.)**

QPL APPROVED
MEETS MIL-R-83536



The Series FCA-410 relay is a polarized single-side stable design, where the flux from a permanent magnet provides the armature holding force in the deactivated state, and its flux path is switched and combined with the coil flux in the operated state. This results in appreciably increased contact pressure in both states over that of a spring return nonpolar design.
MSD also manufactures 2-pole and 6-pole versions of this relay.

FCA-210: 10 AMP DPDT RELAY
FCA-610: 10 AMP 6PDT RELAY
FCAL-210: 10 AMP DPDT MAGNETIC LATCHING RELAY
FCAL-410: 10 AMP 4PDT MAGNETIC LATCHING RELAY

AVAILABLE
FCA-415: 15 AMPERE 4PDT, HAS THE SAME SPECIFICATIONS AS THE FCA-410 EXCEPT IS RATED AT 15 AMPS.

CONTACT RATING-AMPERES

Ratings Are Continuous Duty

TYPE OF LOAD	LIFE (MIN.) CYCLES X 10^3	28 VDC	120VAC 400HZ	120/200VAC 400Hz-3Ø	120/200VAC 60Hz-3Ø *
Resistive	100	10	10	10	2.5
Inductive	20	8	8	8	2.5
Motor	100	4	4	4	2.0
Lamp	100	2	2	2	1.0
	* 60 Hz LOADS RATED FOR 10,000 OPERATIONS				

OVERLOAD CURRENT 40 AMPS DC, 60 AMPS 400HZ
RUPTURE CURRENT 50 AMPS DC, 80 AMPS 400HZ
CONTACT MAKE BOUNCE 1 MILLISECOND AT NOMINAL VOLTAGE
MAX. CONTACT DROP AT 10 AMPS: INITIAL 0.100 VOLTS.
END OF LIFE 0.125 VOLTS

STRUTHERS-DUNN

MILITARY/AEROSPACE RELAYS

10 AMPERES, 4PDT

COIL DATA

COIL CODE	NOMINAL VOLTAGES	FREQ. HZ	DC RES. AC AMPS (B)	OVER TEMPERATURE RANGE		
				PICKUP OR BELOW VOLTS	DROPOUT OR ABOVE VOLTS	MUST HOLD VOLTAGE (C)
1	6	DC	18 Ω	4.5	0.3	2.5
2	12	DC	70 Ω	9.0	0.75	4.5
3	28	DC	290 Ω	18.0	1.5	7.0
4 (A)	28	DC	290 Ω	18.0	1.5	7.0
5	48	DC	865 Ω	32.0	2.5	14.0
6	28	400HZ	225 mA	22.0	1.25	10.0
7	28	50/400Hz	120 mA	22.0	1.25	10.0
8	115	400 Hz	40 mA	90.0	5.0	40.0
9	115	50/400Hz	40 mA	95.0	5.0	40.0

A. CODE 4 COILS HAVE BACK EMF SUPPRESSION TO 42 VOLTS MAX.
B. DC COIL RESISTANCE ± 10% AT 25˚C; AC COIL MAX. CURRENT AT NOMINAL VOLTAGE.
C. RELAY WILL STAY IN PICKED-UP STATE DOWN TO MUST HOLD VOLTAGES SHOWN.
D. MAX. OVERVOLTAGE: 6 & 12 VDC COILS 120% OF NOMINAL; ALL OTHERS 110% OF NOMINAL.
E. COILS AVAILABLE FOR OTHER VOLTAGES AND FOR AC 50/60HZ.

GENERAL SPECIFICATIONS

TEMPERATURE RATING:		-70˚C TO + 125˚C
ALTITUDE:		300,000 FEET
SHOCK:*	Z,& Y ENCLOSURES	200 g FOR 6 mS
	W, X & M ENCLOSURES	100 g FOR 6 mS
VIBRATION, SINUSOIDAL:*	Z & Y ENCLOSURES	0.12 DA 10 TO 70Hz
		30 g 70 TO 3000 Hz
	W, X & M ENCLOSURES	0.12 DA 10 TO 57 Hz
		20 g 57 TO 3000 Hz
VIBRATION, RANDOM: *	Z, & Y ENCLOSURES	0.4 g^2/Hz 50-2000Hz
	W, X & M ENCLOSURES	0.2 g^2/Hz 50-2000Hz
DIELECTRIC STRENGTH AT SEA LEVEL:	ALL CIRCUITS TO GROUND AND CIRCUIT TO CIRCUIT.	1250 V rms
	COIL TO GROUND	1000 V rms
DIELECTRIC STRENGTH AT 80,000 FEET:		350 V rms
INSULATION RESISTANCE:	INITIAL (500 VDC)	100 MΩ MINIMUM
	AFTER LIFE OR ENVIRONMENTAL TESTS	50 MΩ MINIMUM
OPERATE TIME AT NOMINAL VOLTAGE:	DC RELAYS	15 ms OR LESS
	AC RELAYS	20 ms OR LESS
RELEASE TIME AT NOMINAL VOLTAGE:	DC RELAYS	15 ms OR LESS
	AC RELAYS	50 ms OR LESS

* Max. contact opening under vibration or shock 10 microseconds

SERIES

FCA-410

STRUTHERS-DUNN

MILITARY/AEROSPACE RELAYS

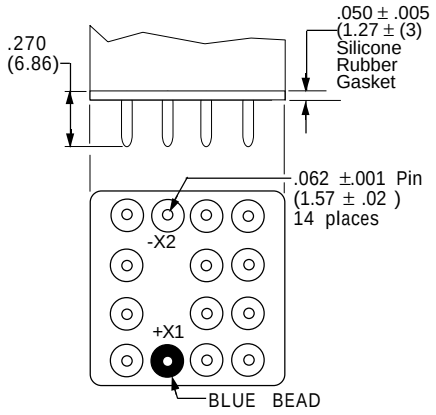
10 AMPERES, 4PDT

Below are shown the standard terminal types and the enclosures available. Note that the pin configuration for coil connections is determined by the coil supply voltage. Specify the assembly as indicated under How To Order. Dimensions are shown in inches ± .010 and (Millimeters ± .25) except as noted.

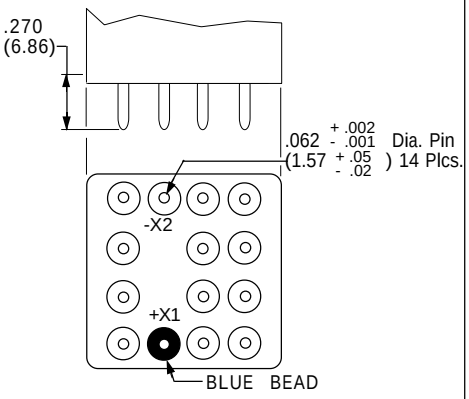
TERMINALS

Trminals on 0.200 centers.
Coil terminals: X1-X2; See Page 26.
Socket Pins are Gold Plated.
Circuit Board Pins are Tin/Lead Plated.

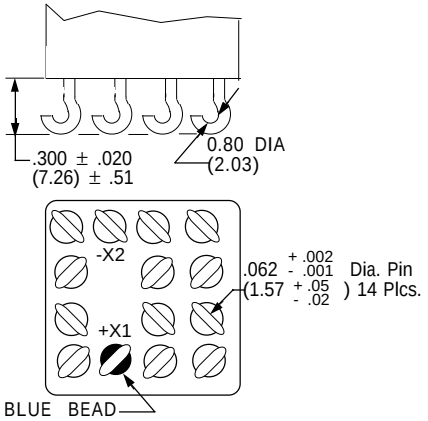
CODE "A"
Socket Pins-All DC Coils



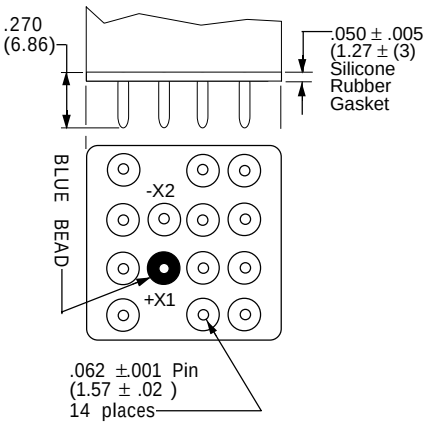
CODE "B"
Circuit Board Pins-All DC Coils



CODE "C"
Solder Hooks-AC or DC Coils



CODE "D"
Socket Pins-115 VAC Coils

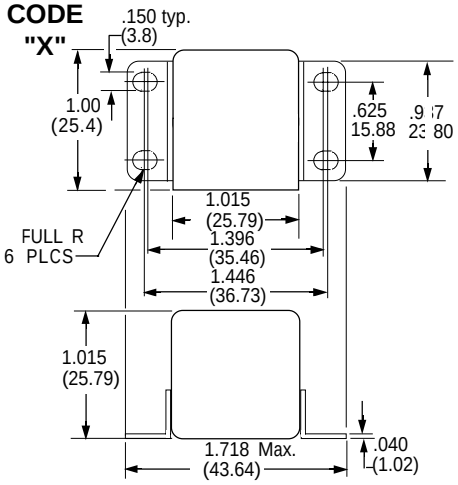


SEE NEXT PAGE

FOR MORE COIL

TERMINAL OPTIONS

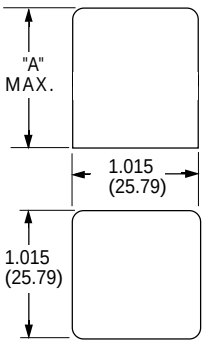
CODE "X"



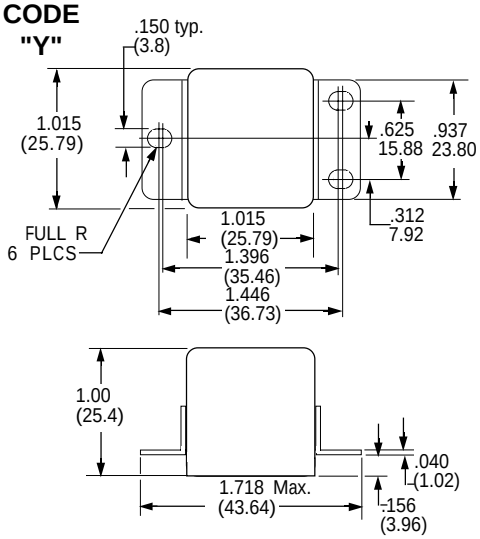
ENCLOSURES

All Enclosures have cupro-Nickel cans bright acid tin/lead plated after assembly to terminal headers.

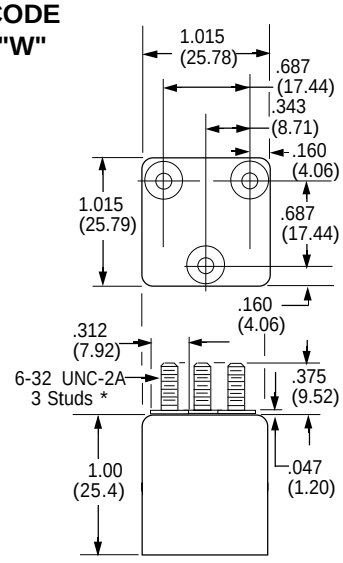
CODE "Z"



CODE "Y"



CODE "W"



*Metric threads available, To specify use M in place of W

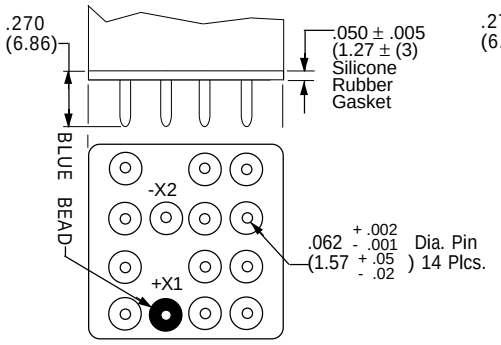
STRUTHERS-DUNN

MILITARY/AEROSPACE RELAYS

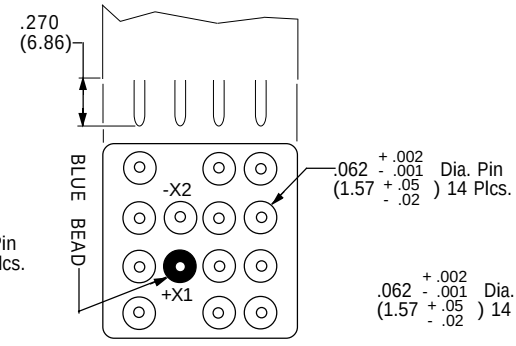
10 AMPERE 4PDT

TERMINALS CONTINUED

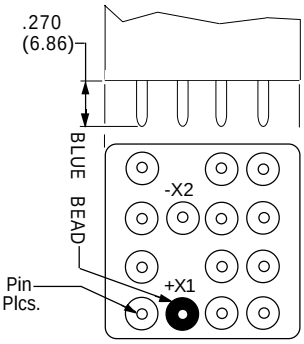
CODE "E"
Socket Pins- 28 VAC Coils



CODE "F"
Circuit Board Pins-115 VAC Coils

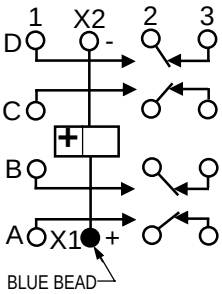


CODE "G"
Circuit Board Pins- 28 VAC Coils

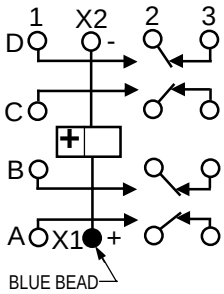


TERMINAL WIRING

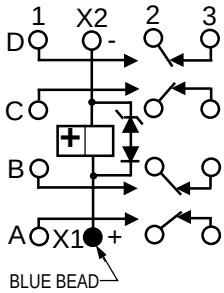
A & B PIN TERMINAL
ALL DC COILS



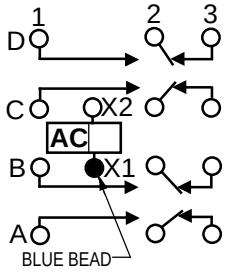
C HOOK TERMINAL
ALL AC & DC COILS



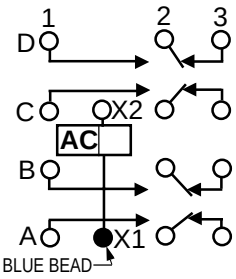
TRANSIENT
SUPPRESSION CIR.



D & F PIN TERMINAL
115 VAC COILS



E & G PIN TERMINAL
28 VAC COILS

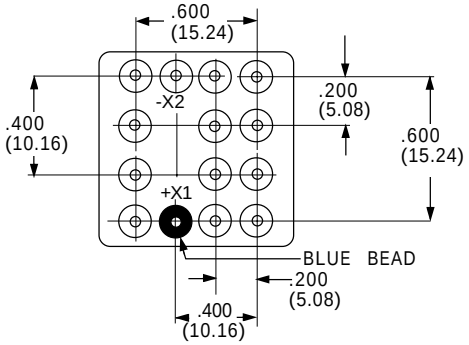


NOTE: Polarity must be observed with DC coil supply. Relay is polarized with a permanent magnet and will not operate or be damaged by reverse polarity.

Diodes used in transient suppression and in AC rectifier circuits have peak inverse voltage rating of 600 VDC minimum. Zener diodes have a minimum rating of 1 watt.

Terminal designations are for reference only and do not appear on the header.

TERMINAL LAYOUT



HOW TO ORDER

(EXAMPLE) — **FCA-415-**
FCA-410- A Y 4

RELAY TYPE

TERMINALS (Socket Pins)

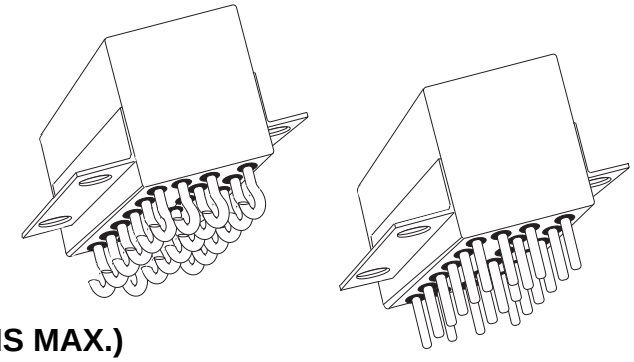
ENCLOSURE (With Flanges)

COIL (28 VDC With Transient Suppression).

SERIES
FCA-610

STRUTHERS-DUNN
MILITARY/AEROSPACE RELAYS
10 AMPERES, 6PDT

- **HERMETICALLY SEALED**
- **ALL WELDED CONSTRUCTION**
- **BALANCED FORCE**
- **PERMANENT MAGNET DRIVE**
- **6PDT SWITCHING IN 1.4 CU INCH**
- **CONTACTS: SILVER CADMIUM OXIDE WITH GOLD PLATING**
- **COILS FOR DC AND 400 Hz**
- **WEIGHT 4.16 OUNCES MAX. (117.94 GRAMS MAX.)**



The Series FCA-610 relay is a polarized single-side stable design, where the flux from a permanent magnet provides the armature holding force in the deactivated state, and its flux path is switched and combined with the coil flux in the operated state. This results in appreciably increased contact pressure in both states over that of a spring return nonpolar design.
MSD also manufactures 2-pole and 4-pole versions of this relay.

FCA-210: 10 AMP DPDT RELAY
FCA-410: 10 AMP 4PDT RELAY
FCAL-210: 10 AMP DPDT MAGNETIC LATCHING RELAY
FCAL-410: 10 AMP 4PDT MAGNETIC LATCHING RELAY

CONTACT RATING-AMPERES

Ratings Are Continuous Duty

TYPE OF LOAD	LIFE (MIN.) CYCLES X 10^3	28 VDC	115VAC 400HZ	115/200VAC 400Hz-3Ø
Resistive	100	10	10	10
Inductive	20	8	8	8
Motor	100	4	4	4
Lamp	100	2	2	2
	* 60 Hz LOADS RATED FOR 10,000 OPERATIONS			

OVERLOAD CURRENT 40 AMPS DC, 60 AMPS 400HZ
RUPTURE CURRENT 50 AMPS DC, 80 AMPS 400HZ
CONTACT MAKE BOUNCE 1 MILLISECOND AT NOMINAL VOLTAGE
MAX. CONTACT DROP AT 10 AMPS: INITIAL 0.100 VOLTS.
END OF LIFE 0.125 VOLTS

STRUTHERS-DUNN

MILITARY/AEROSPACE RELAYS

10 AMPERES, 6PDT

COIL DATA

COIL CODE	NOMINAL VOLTAGES	FREQ. Hz	DC RES. AC AMPS (B)	OVER TEMPERATURE RANGE		
				PICKUP OR BELOW VOLTS	DROPOUT OR ABOVE VOLTS	MUST HOLD VOLTAGE (C)
1	6	DC	8.5 Ω	4.5	0.3	2.5
2	12	DC	33 Ω	9.0	0.75	4.5
3	28	DC	180 Ω	18.0	1.5	7.0
4 (A)	28	DC	180 Ω	18.0	1.5	7.0
5	48	DC	530 Ω	32.0	2.5	14.0
8	115	400H z	60 mA	90.0	5.0	40.0

A. CODE 4 COILS HAVE BACK EMF SUPPRESSION TO 42 VOLTS MAX.
B. DC COIL RESISTANCE ± 10% AT 25˚C; AC COIL MAX. CURRENT AT NOMINAL VOLTAGE.
C. RELAY WILL STAY IN PICKED-UP STATE DOWN TO MUST HOLD VOLTAGES SHOWN.
D. MAX. OVERVOLTAGE: 6 & 12 VDC COILS 120% OF NOMINAL; ALL OTHERS 110% OF NOMINAL.
E. COILS AVAILABLE FOR OTHER VOLTAGES AND FOR AC 50/60HZ.

GENERAL SPECIFICATIONS

TEMPERATURE RATING:		-70˚C TO + 125˚C
ALTITUDE:		300,000 FEET
SHOCK:*	Z, Y & X ENCLOSURES	50 g FOR 6 TO 9 mS
VIBRATION, SINUSOIDAL:*	Z, Y & X ENCLOSURES	20 g TO 2000Hz
VIBRATION, RANDOM: *	Z, Y & X ENCLOSURES	0.3 g^2/Hz 50-2000Hz
DIELECTRIC STRENGTH AT SEA LEVEL:	ALL CIRCUITS TO GROUND AND CIRCUIT TO CIRCUIT.	1250 V rms
	COIL TO GROUND	1000 V rms
DIELECTRIC STRENGTH AT 80,000 FEET:		350 V rms
INSULATION RESISTANCE:	INITIAL (500 VDC)	100 MΩ MINIMUM
	AFTER LIFE OR ENVIRONMENTAL TESTS	50 MΩ MINIMUM
OPERATE TIME AT NOMINAL VOLTAGE:	DC RELAYS	15 ms OR LESS
	AC RELAYS	20 ms OR LESS
RELEASE TIME AT NOMINAL VOLTAGE:	DC RELAYS	15 ms OR LESS
	AC RELAYS	50 ms OR LESS

* Max. contact opening under vibration or shock 10 microseconds

SERIES

FCA-610

STRUTHERS-DUNN

MILITARY/AEROSPACE RELAYS

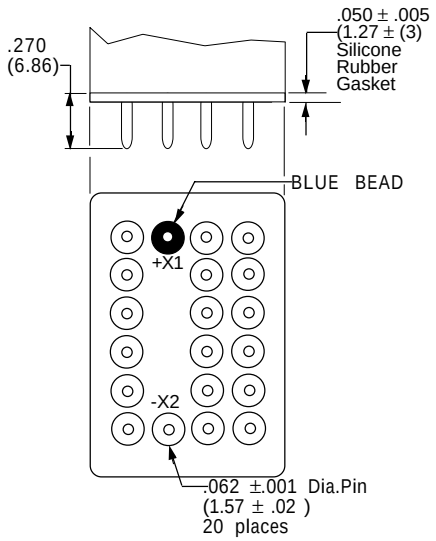
10 AMPERES, 6PDT

Below are shown the standard terminal types and the enclosures available. Note that the pin configuration for coil connections is determined by the coil supply voltage. Specify the assembly as indicated under How To Order. Dimensions are shown in inches ± .010 and (Millimeters ± .25) except as noted.

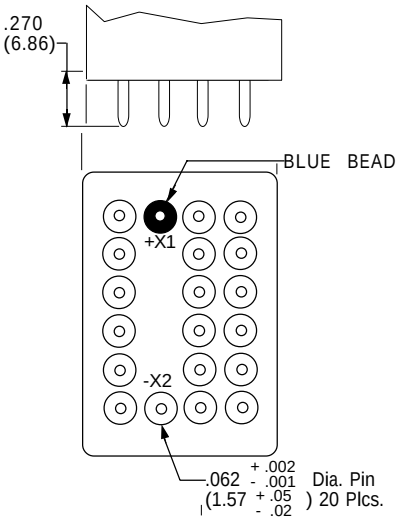
TERMINALS

Terminals on 0.200 centers.
Coil terminals: X1-X2; See Page 30.
Socket Pins are Gold Plated.
Circuit Board Pins are Tin/Lead Plated.

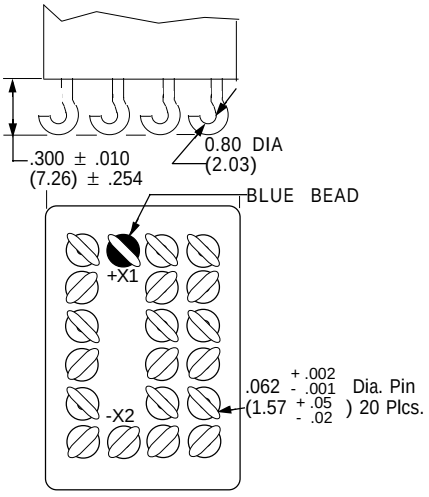
CODE "A"
Socket Pins-All DC Coils



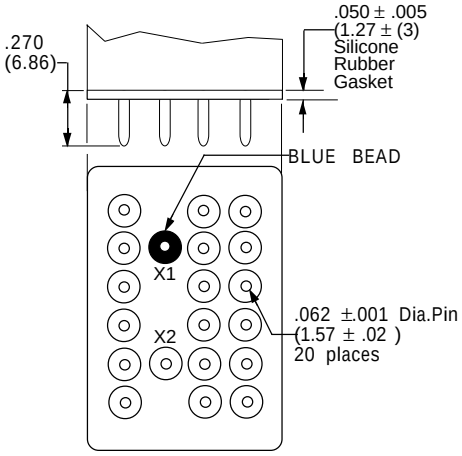
CODE "B"
Circuit Board Pins-All DC Coils



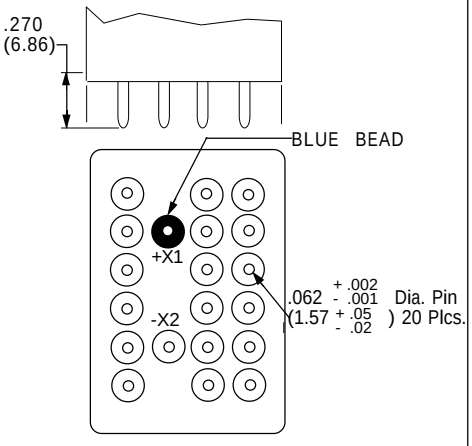
CODE "C"
Solder Hooks-AC or DC Coils



CODE "D"
Socket Pins-All AC Coils



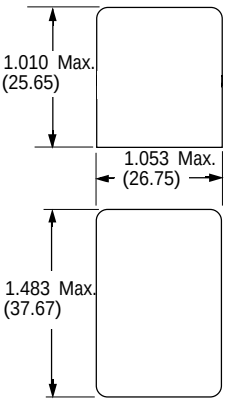
CODE "F"
Circuit Board Pins-All AC Coils



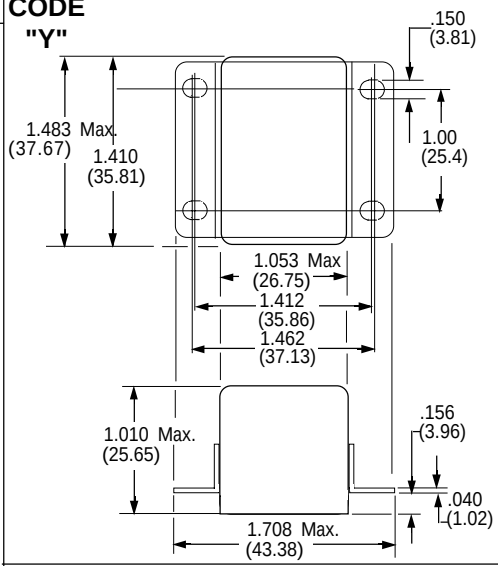
ENCLOSURES

All Enclosures have cupro-Nickel cans bright acid tin/lead plated after assembly to terminal headers.

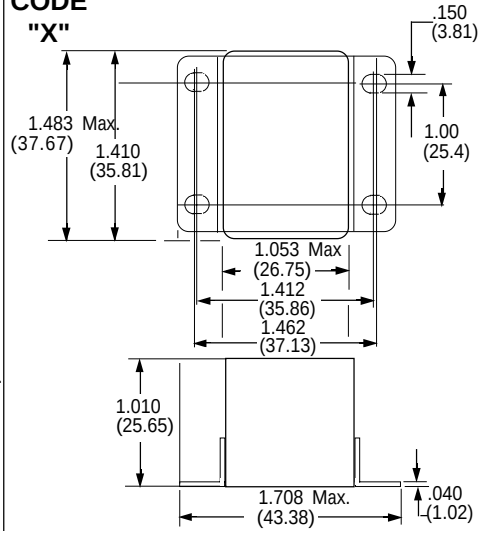
CODE "Z"



CODE "Y"



CODE "X"



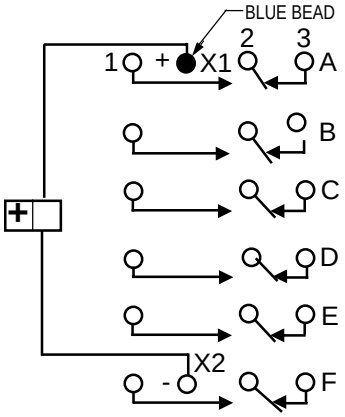
STRUTHERS-DUNN

MILITARY/AEROSPACE RELAYS

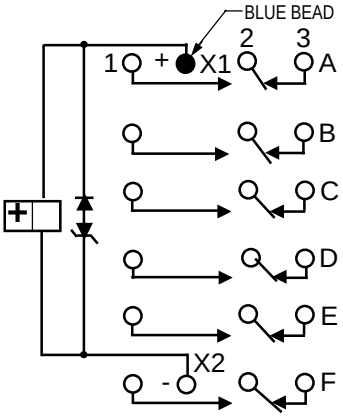
10 AMPERE 6PDT

TERMINAL WIRING

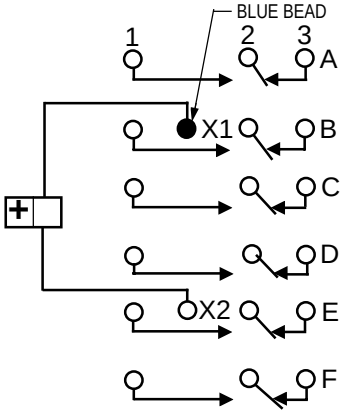
ALL DC COILS & AC SOLDER HOOKS



DC COILS WITH TRANSIENT SUPPRESSION



AC COILS (SOCKET PINS)

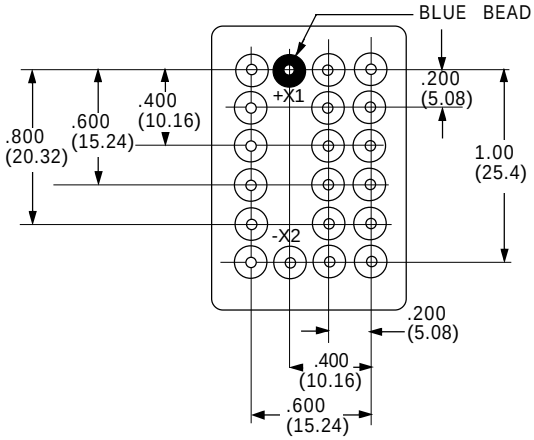


NOTE: Polarity must be observed with DC coil supply. Relay is polarized with a permanent magnet and will not operate or be damaged by reverse polarity.

Diodes used in transient suppression and in AC rectifier circuits have peak inverse voltage rating of 600 VDC minimum. Zener diodes have a minimum rating of 1 watt.

Terminal designations are for reference only and do not appear on the header.

TERMINAL LAYOUT



HOW TO ORDER

(EXAMPLE) — **FCA-610- A Y 4**

RELAY TYPE

TERMINALS (Socket Pins DC Coils)

ENCLOSURE (With Flanges)

COIL (28 VDC With Transient Suppression).

NOTES

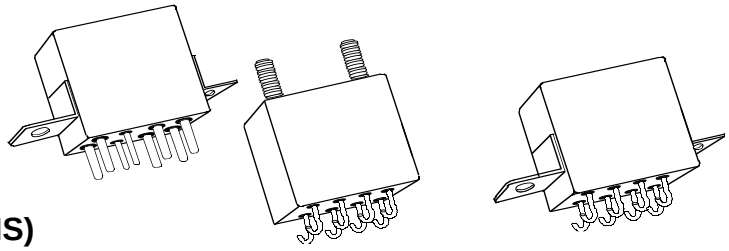
FCB SERIES

RELAYS

SERIES
FCB-205

STRUTHERS-DUNN
MILITARY/AEROSPACE RELAYS
5 AMPERES, DPDT

- **HERMETICALLY SEALED**
- **ALL WELDED CONSTRUCTION**
- **BALANCED FORCE**
- **PERMANENT MAGNET DRIVE**
- **CONTACTS RATED LOW LEVEL TO 5 AMPS 28 VDC AND 115/200 VAC 400 Hz , 3 PHASE.**
- **WEIGHT .54 OUNCES MAX. (15.4 GRAMS)**



The Series FCB-205 relay is a polarized single-side stable design, where the flux from a permanent magnet provides the armature holding force in the deactivated state, and its flux path is switched and combined with the coil flux in the operated state. This results in appreciably increased contact pressure in both states over that of a spring return nonpolar design. MSD also manufactures other forms of the FCB relay:

FCB-405: 5 AMP 4PDT RELAY
FCB-310: 10 AMP 3PDT RELAY

CONTACT RATING-AMPERES

Ratings Are Continuous Duty

TYPE OF LOAD	LIFE (MIN.) CYCLES X 10^3	28 VDC	115VAC 400Hz	115/200VAC 400 Hz, 3Ø
Resistive	100	5	5	5
Inductive	20	3	5	5
Motor	100	2	3	3
Lamp	100	1	1	1
	* 60 Hz LOADS RATED FOR 10,000 OPERATIONS			

Low Level Switching Capability: With contacts operating a load of 10 to 50 microamperes at 10 to 50 millivolts, the contact resistance miss detection level shall be 100 ohms max. Cycling rate is 1 to 12 per second, for 100,000 operations.

OVERLOAD CURRENT 20 AMPS DC, 30AMPS 400Hz
RUPTURE CURRENT 25 AMPS DC, 40 AMPS 400Hz
CONTACT MAKE BOUNCE 1.0 MILLISECOND MAX. AT NOMINAL VOLTAGE
MAX. CONTACT DROP AT 5 AMPS: INITIAL 0.100 VOLTS.
END OF LIFE 0.125 VOLTS

STRUTHERS-DUNN

MILITARY/AEROSPACE RELAYS

5 AMPERES, DPDT

MSD, INC PAGE 35

COIL DATA

COIL CODE	NOMINAL VOLTAGES	FREQ. Hz	DC RES. (B)	OVER TEMPERATURE RANGE		
				PICKUP OR BELOW VOLTS	DROPOUT OR ABOVE VOLTS	MUST HOLD VOLTAGE (C)
1	6	DC	20 Ω	4.5	0.3	2.5
2	12	DC	95 Ω	9.0	0.75	4.5
3	28	DC	500 Ω	18.0	1.5	7.0
4 (A)	28	DC	500 Ω	18.0	1.5	7.0
5	48	DC	1600 Ω	36.0	2.5	14.0

A. CODE 4 COILS HAVE BACK EMF SUPPRESSION TO 42 VOLTS MAX.
B. DC COIL RESISTANCE ± 10% AT 25˚C;
C. RELAY WILL STAY IN PICKUP STATE DOWN TO MUST HOLD VOLTAGES SHOWN.
D. MAX. OVERVOLTAGE: 6 & 12 VDC COILS 120% OF NOMINAL; ALL OTHERS 110% OF NOMINAL.

GENERAL SPECIFICATIONS

TEMPERATURE RATING:		-70˚C TO + 125˚C
ALTITUDE:		300,000 FEET
SHOCK:*	Z, Y, & X ENCLOSURES	200 g FOR 6 mS
	W & M ENCLOSURES (STUD MTG.)	100 g FOR 6 mS
	T ENCLOSURE (SOCKET MOUNTED IN TRACK)	50 g FOR 11 mS
VIBRATION, SINUSOIDAL:*	Z, Y, & X ENCLOSURES	0.12 DA 10 TO 70 Hz
		30 g 70-3000Hz
	W & M ENCLOSURES	0.12 DA 10 TO 57 Hz
		20 g 57-3000Hz
	T ENCLOSURE IN TRACK	0.06DA 10 TO 57 Hz
		10 g 57 TO 500 Hz
		20 g 500 TO 3000 Hz
VIBRATION, RANDOM: *	Z, Y & X ENCLOSURES	0.4 g^2/Hz 50-2000Hz
	T, W & M ENCLOSURES	0.2 g^2/Hz 50-2000Hz
DIELECTRIC STRENGTH AT SEA LEVEL:	ALL CIRCUITS TO GROUND AND CIRCUIT TO CIRCUIT.	1000 V rms
	COIL TO GROUND	1000 V rms
DIELECTRIC STRENGTH AT 80,000 FEET:		250 V rms
INSULATION RESISTANCE:	INITIAL (500 VDC)	100 MΩ MINIMUM
	AFTER LIFE OR ENVIRONMENTAL TESTS	50 MΩ MINIMUM
OPERATE TIME AT NOMINAL VOLTAGE:		4 ms OR LESS
RELEASE TIME AT NOMINAL VOLTAGE:		4 ms OR LESS

* Max. contact opening under vibration or shock 10 microseconds

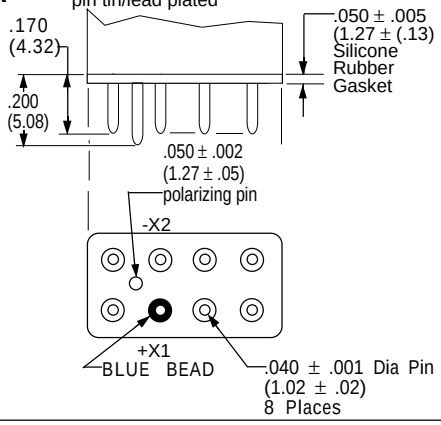
SERIES
FCB-205

STRUTHERS-DUNN
MILITARY/AEROSPACE RELAYS
5 AMPERES, DPDT

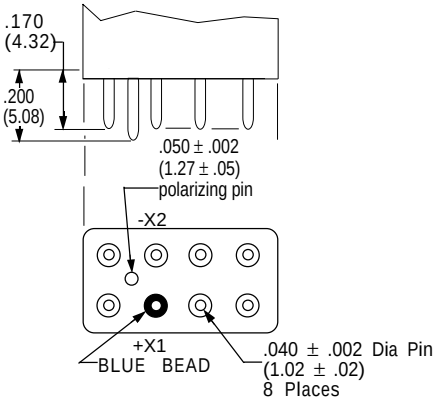
Below are shown the standard terminal types and the enclosures available. Specify the assembly as indicated under How To Order. Dimensions are shown in inches ± .010 and (Millimeters ± .25).

TERMINALS

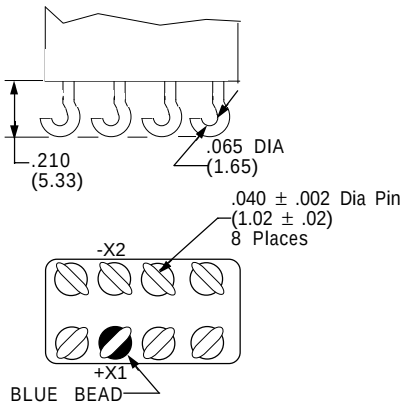
CODE "A" Socket Pin Terminals
Socket Pins Gold Plated. Polarizing pin tin/lead plated



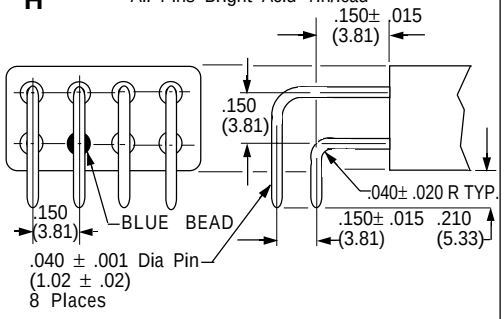
CODE "B" Solder Pin Terminals
All Terminals Tin/Lead Plated



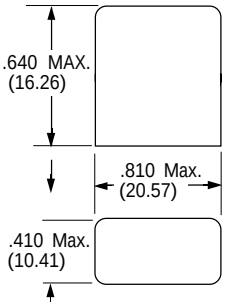
CODE "C" Solder Hook Terminals
Hook Terminals Tin/Lead Plated



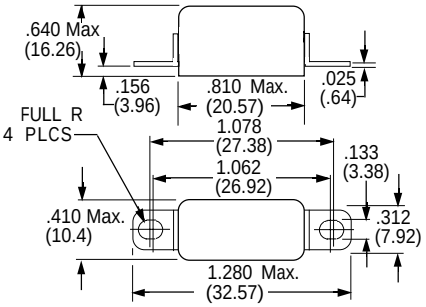
CODE "H" 90° Solder Pins
All Pins Bright Acid Tin/lead



CODE "Z"



CODE "Y"



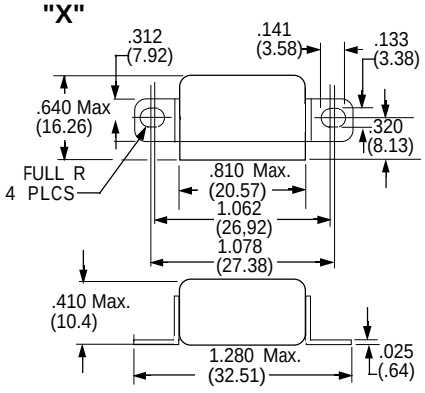
ENCLOSURES

All Enclosures have Cupro-Nickel Cans bright acid tin/lead plated after assembly to terminal headers.

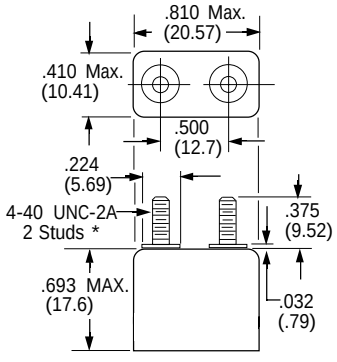
Dimensions: Inches ± .010 (mm ± .25)

Enclosure "T" is for use with track mounted sockets and requires socket pin terminals, but no gasket. The gasket is included in the socket assembly.

CODE "X"

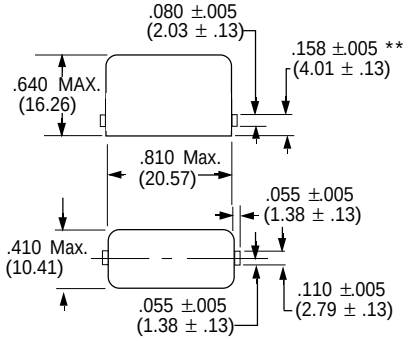


CODE "W"



*Metric threads available,To specify use M in place of W

CODE "T"
M83536/2-028
(REFERENCE ONLY)



NOTE: FOR USE WITH TRACK MOUNT PER MIL-R-6106/23
** MEASURED FROM SURFACE OF HEADER

STRUTHERS-DUNN

MILITARY/AEROSPACE RELAYS

5 AMPERES, DPDT

MSD, INC
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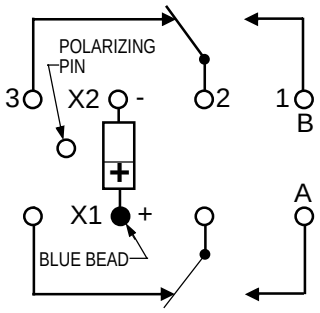
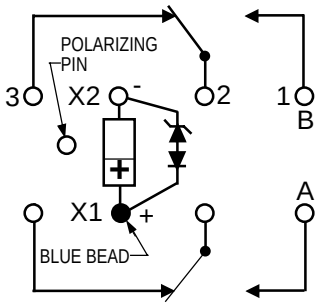
TERMINAL WIRING

DC COILS



TRANSIENT SUPPRESSION

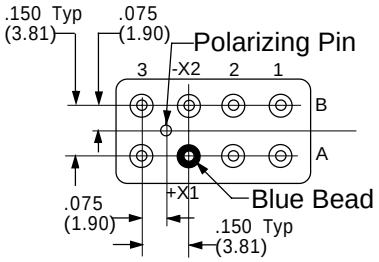


NOTE: Polarity must be observed with DC coil supply. Relay is polarized with a permanent magnet and will not operate or be damaged by reverse polarity.

Diodes used in transient suppression and in AC rectifier circuits have peak inverse voltage rating of 600 VDC minimum. Zener diodes have a minimum rating of 1 watt.

Terminal designations are for reference only and do not appear on the header.

TERMINAL LAYOUT



HOW TO ORDER

(EXAMPLE) — **FCB-205- A Y 4**

RELAY TYPE

TERMINALS (Socket Pins)

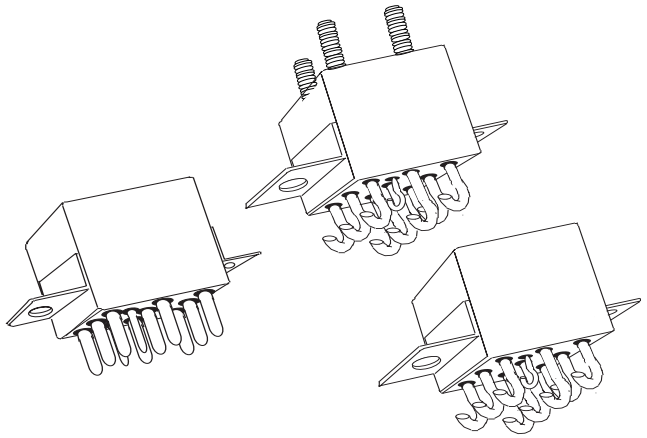
ENCLOSURE (With Flanges)

COIL (28 VDC With Transient Suppression).

SERIES
FCB-310

STRUTHERS-DUNN
MILITARY/AEROSPACE RELAYS
10 AMPERES, 3PDT

- **HERMETICALLY SEALED**
- **ALL WELDED CONSTRUCTION**
- **BALANCED FORCE**
- **PERMANENT MAGNET DRIVE**
- **CONTACTS RATED LOW LEVEL TO 10 AMPS**
  28 VDC AND 115/200 VAC 400 Hz 3 PHASE
- **WEIGHT .99 OUNCES MAX. (28.15 GRAMS)**



The Series FCB-310 relay is a polarized single-side stable design, where the flux from a permanent magnet provides the armature holding force in the deactivated state, and its flux path is switched and combined with the coil flux in the operated state. This results in appreciably increased contact pressure in both states over that of a spring return nonpolar design. MSD also manufactures other versions of this relay:

FCB-205: 5 AMP DPDT RELAY
FCB-405: 5 AMP 4PDT RELAY

CONTACT RATING-AMPERES

Ratings Are Continuous Duty

TYPE OF LOAD	LIFE (MIN.) CYCLES X 10^3	28 VDC	115VAC 400HZ	115AC 400Hz-	115/200VAC 400Hz-3Ø
Resistive	50	10	10	10	10
Inductive	10	6	-	-	-
Inductive	20	-	8	8	8
Motor	50	4	4	4	4
Lamp	50	2	2	2	2

Low Level Switching Capability: With contacts operating a load of 10 to 50 microamperes at 10 to 50 millivolts, the contact resistance miss detection level shall be 100 ohms max. Cycling rate is 1 to 12 per second, for 100,000 operations.

OVERLOAD CURRENT 30 AMPS DC, 60 AMPS 400HZ
RUPTURE CURRENT 40AMPS DC, 80 AMPS 400HZ
CONTACT MAKE BOUNCE 1 MILLISECOND AT NOMINAL VOLTAGE
MAX. CONTACT DROP AT 10 AMPS: INITIAL 0.100 VOLTS.
END OF LIFE 0.125 VOLTS

STRUTHERS-DUNN

MILITARY/AEROSPACE RELAYS

10 AMPERES, 3PDT

COIL DATA

COIL CODE	NOMINAL VOLTAGES	FREQ. HZ	DC RES (B).	OVER TEMPERATURE RANGE		
				PICKUP OR BELOW VOLTS	DROPOUT OR ABOVE VOLTS	MUST HOLD VOLTAGE (C)
1	6	DC	18 Ω	4.5	0.3	2.5
2	12	DC	78 Ω	9.0	0.75	4.5
3	28	DC	400 Ω	18.0	1.5	7.0
4 (A)	28	DC	400 Ω	18.0	1.5	7.0
5	48	DC	1275 Ω	36.0	2.5	14.0

A. CODE 4 COILS HAVE BACK EMF SUPPRESSION TO 42 VOLTS MAX.
B. DC COIL RESISTANCE ± 10% AT 25˚C;
C. RELAY WILL STAY IN PICKED-UP STATE DOWN TO MUST HOLD VOLTAGES SHOWN.
D. MAX. OVER-VOLTAGE: 6 & 12 VDC COILS 120% OF NOMINAL; ALL OTHERS 110% OF NOMINAL.

GENERAL SPECIFICATIONS

TEMPERATURE RATING:		-70˚C TO + 125˚C
ALTITUDE:		300,000 FEET
SHOCK:*	Z, & Y ENCLOSURES	200 g FOR 6 mS
	W, X & M ENCLOSURES	100 g FOR 6 mS
	T ENCLOSURE (IN TRACK)	50 g FOR 11 mS
VIBRATION, SINUSOIDAL:*	Z, & Y ENCLOSURES	30 g 70-3000Hz
	W, X & M ENCLOSURES	20 g 70-3000Hz
	T ENCLOSURE (IN TRACK)	10 g 57-500 Hz
		20 g 500-3000 Hz
VIBRATION, RANDOM: *	Z, & Y ENCLOSURES	0.4 g^2/Hz 50-2000Hz
	T, W & M ENCLOSURES	0.2 g^2/Hz 50-2000Hz
DIELECTRIC STRENGTH AT SEA LEVEL:	ALL CIRCUITS TO GROUND AND CIRCUIT TO CIRCUIT.	1000 V rms
	COIL TO GROUND	1000 V rms
DIELECTRIC STRENGTH AT 80,000 FEET:		250 V rms
INSULATION RESISTANCE:	INITIAL (500 VDC)	100 MΩ MINIMUM
	AFTER LIFE OR ENVIRONMENTAL TESTS	50 MΩ MINIMUM
OPERATE TIME AT NOMINAL VOLTAGE:		6 ms OR LESS
RELEASE TIME AT NOMINAL VOLTAGE:		6 ms OR LESS

* Max. contact opening under vibration or shock 10 microseconds

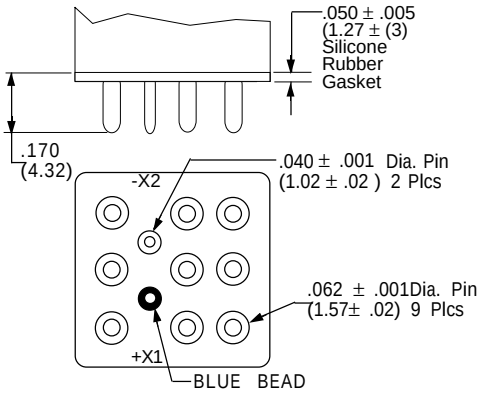
SERIES
FCB-310

STRUTHERS-DUNN
MILITARY/AEROSPACE RELAYS
10 AMPERES, 3PDT

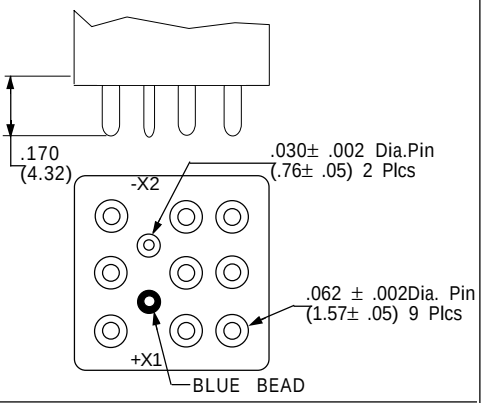
Below are shown the standard terminal types and the enclosures available. Specify the assembly as indicated under How To Order. Dimensions are shown in inches ± .010 and (Millimeters ± .25).

TERMINALS

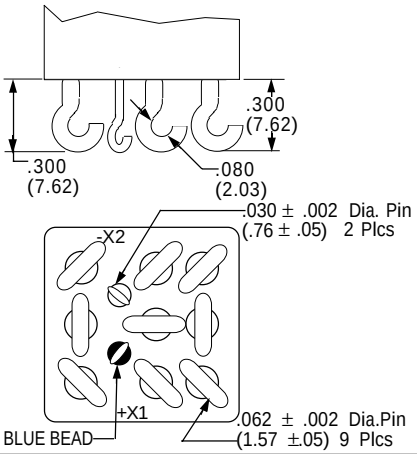
CODE "A"
Socket Pins - All DC Coils
PIN TERMINALS ARE GOLD PLATED



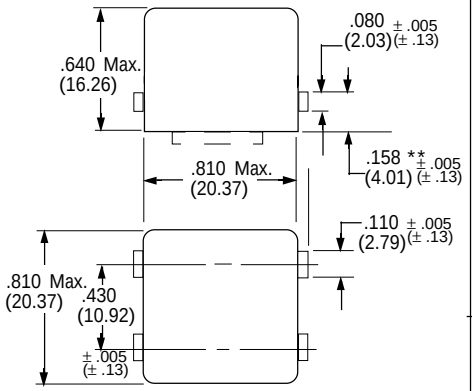
CODE "B"
Solder Pin Terminals
PIN TERMINALS TIN/LEAD PLATED



CODE "C"
Solder Hook Terminals
HOOK TERMINALS TIN/LEAD PLATED



CODE "T"
M83536/22-025
(REFERENCE ONLY)



** Measured from surface of header

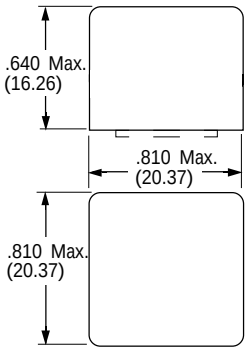
ENCLOSURES

All Enclosures have cupro-Nickel cans bright acid tin/lead plated after assembly to terminal headers.

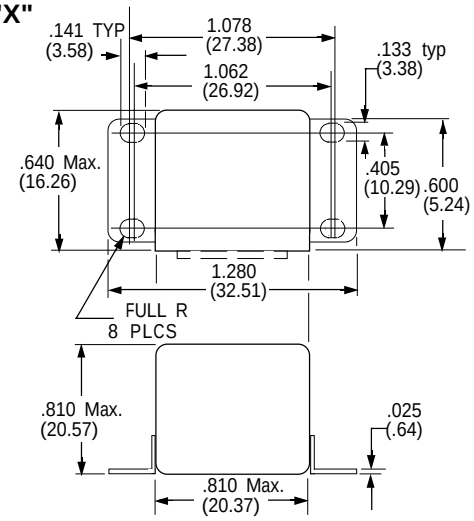
Dimensions: Inches ± .010 (mm ± .25)

Enclosure "T" is for use with track mounted sockets and requires socket pin terminals, but no gasket. The gasket is included in the socket assembly.

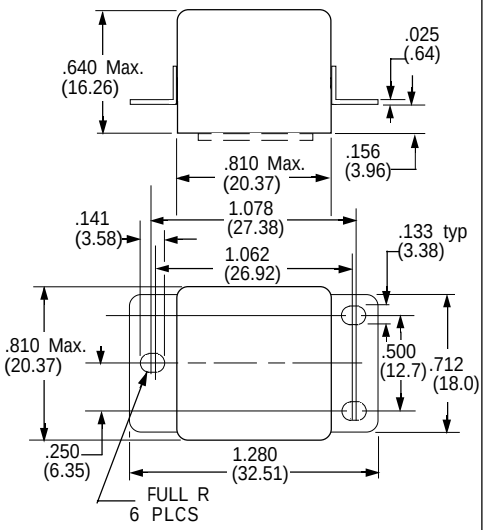
CODE "Z"



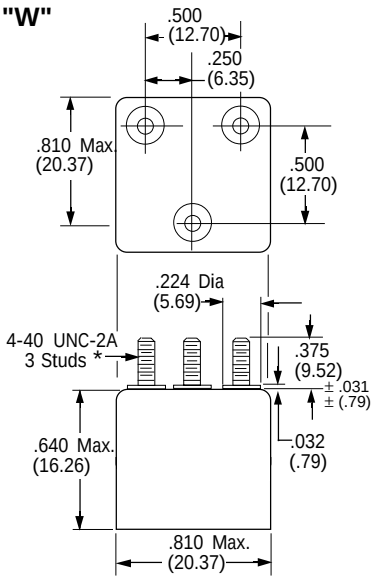
CODE "X"



CODE "Y"



CODE "W"



*Metric threads available,To specify use M in place of W

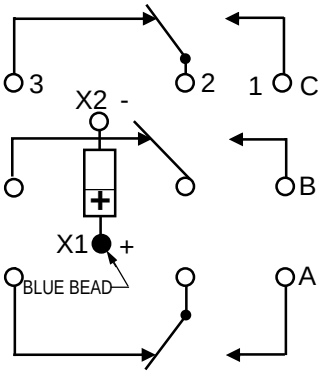
STRUTHERS-DUNN

MILITARY/AEROSPACE RELAYS

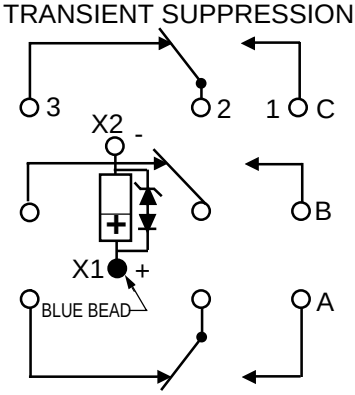
10 AMPERES, 3PDT

TERMINAL WIRING

DC COILS



DC COILS WITH
TRANSIENT SUPPRESSION

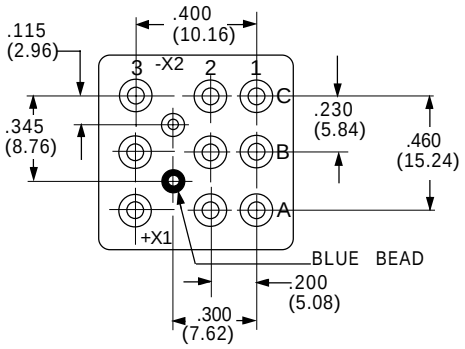


NOTE: Polarity must be observed with DC coil supply. Relay is polarized with a permanent magnet and will not operate or be damaged by reverse polarity.

Diodes used in transient suppression and in AC rectifier circuits have peak inverse voltage rating of 600 VDC minimum. Zener diodes have a minimum rating of 1 watt.

Terminal designations are for reference only and do not appear on the header.

TERMINAL LAYOUT



HOW TO ORDER

(EXAMPLE) — **FCB-310-A Y 4**

RELAY TYPE

TERMINALS (Socket Pins)

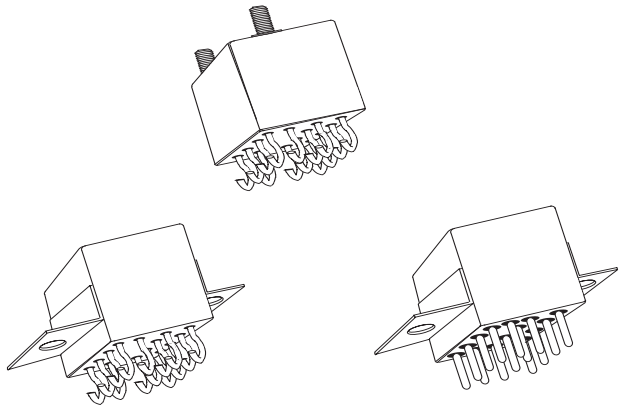
ENCLOSURE (With Flanges)

COIL (28 VDC With Transient Suppression).

SERIES
FCB-405

STRUTHERS-DUNN
MILITARY/AEROSPACE RELAYS
5 AMPERES, 4PDT

- **HERMETICALLY SEALED**
- **ALL WELDED CONSTRUCTION**
- **BALANCED FORCE**
- **PERMANENT MAGNET DRIVE**
- **CONTACTS RATED LOW LEVEL TO 5 AMPS 28 VDC AND 115/200 VAC 400 Hz 3 PHASE**
- **WEIGHT .93 OUNCES MAX. (26.4 GRAMS)**



The Series FCB-405 relay is a polarized single-side stable design, where the flux from a permanent magnet provides the armature holding force in the deactivated state, and its flux path is switched and combined with the coil flux in the operated state. This results in appreciably increased contact pressure in both states over that of a spring return nonpolar design. MSD also manufactures other versions of this relay:

FCB-205: 5 AMP DPDT RELAY
FCB-310: 10 AMP 3PDT RELAY

CONTACT RATING-AMPERES

Ratings Are Continuous Duty

TYPE OF LOAD	LIFE (MIN.) CYCLES X 10^3	28 VDC	115VAC 400HZ	115/200VAC 400Hz-3Ø
Resistive	100	5	5	5
Inductive	20	3	5	5
Motor	100	2	3	3
Lamp	100	1	1	1

Low Level Switching Capability: With contacts operating a load of 10 to 50 microamperes at 10 to 50 millivolts, the contact resistance miss detection level shall be 100 ohms max. Cycling rate is 1 to 12 per second, for 100,000 operations.

OVERLOAD CURRENT 20 AMPS DC, 30 AMPS 400HZ
RUPTURE CURRENT 25 AMPS DC, 40 AMPS 400HZ
CONTACT MAKE BOUNCE 1.0 MILLISECOND AT NOMINAL VOLTAGE
MAX. CONTACT DROP AT 5 AMPS: INITIAL 0.100 VOLTS.
END OF LIFE 0.125 VOLTS

STRUTHERS-DUNN

MILITARY/AEROSPACE RELAYS

5 AMPERES, 4PDT

COIL DATA

COIL CODE	NOMINAL VOLTAGES	FREQ. HZ	DC RES. (B)	OVER TEMPERATURE RANGE		
				PICKUP OR BELOW VOLTS	DROPOUT OR ABOVE VOLTS	MUST HOLD VOLTAGE (C)
1	6	DC	18 Ω	4.5	0.3	2.5
2	12	DC	78 Ω	9.0	0.75	4.5
3	28	DC	400 Ω	18.0	1.5	7.0
4 (A)	28	DC	400 Ω	18.0	1.5	7.0
5	48	DC	1275 Ω	36.0	2.5	14.0

A. CODE 4 COILS HAVE BACK EMF SUPPRESSION TO 42 VOLTS MAX.
B. DC COIL RESISTANCE ± 10% AT 25˚C;
C. RELAY WILL STAY IN PICKED-UP STATE DOWN TO MUST HOLD VOLTAGES SHOWN.
D. MAX. OVER-VOLTAGE: 6 & 12 VDC COILS 120% OF NOMINAL; ALL OTHERS 110% OF NOMINAL.

GENERAL SPECIFICATIONS

TEMPERATURE RATING:		-70˚C TO + 125˚C
ALTITUDE:		300,000 FEET
SHOCK:*	Z, & Y ENCLOSURES	200 g FOR 6 mS
	W, X & M ENCLOSURES	100 g FOR 6 mS
	T ENCLOSURE (IN TRACK)	50 g FOR 11 mS
VIBRATION, SINUSOIDAL:*	Z, & Y ENCLOSURES	30 g 70-3000Hz
	W, X & M ENCLOSURES	20 g 70-3000Hz
	T ENCLOSURE (IN TRACK)	20 g500-3000 Hz
VIBRATION, RANDOM: *	Z, & Y ENCLOSURES	0.4 g^2/Hz 50-2000Hz
	T, W, X & M ENCLOSURES	0.2 g^2/Hz 50-2000Hz
DIELECTRIC STRENGTH AT SEA LEVEL:	ALL CIRCUITS TO GROUND AND CIRCUIT TO CIRCUIT.	1000 V rms
	COIL TO GROUND	1000 V rms
DIELECTRIC STRENGTH AT 80,000 FEET:		250 V rms
INSULATION RESISTANCE:	INITIAL (500 VDC)	100 MΩ MINIMUM
	AFTER LIFE OR ENVIRONMENTAL TESTS	50 MΩ MINIMUM
OPERATE TIME AT NOMINAL VOLTAGE:		6 ms OR LESS
RELEASE TIME AT NOMINAL VOLTAGE:		6 ms OR LESS

* Max. contact opening under vibration or shock 10 microseconds

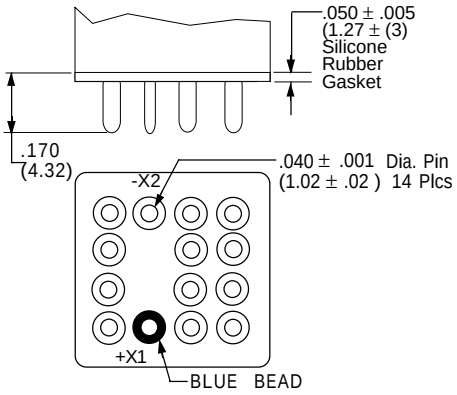
SERIES
FCB-405

STRUTHERS-DUNN
MILITARY/AEROSPACE RELAYS
5 AMPERES, 4PDT

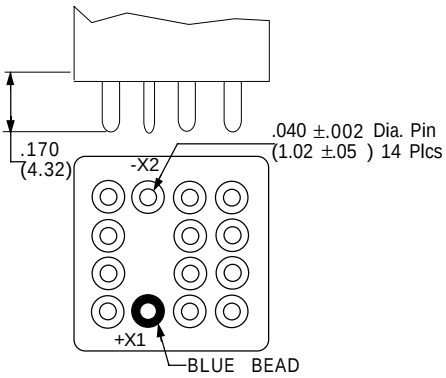
Below are shown the standard terminal types and the enclosures available. Specify the assembly as indicated under How To Order. Dimensions are shown in inches ± .010 and (Millimeters ± .25).

TERMINALS

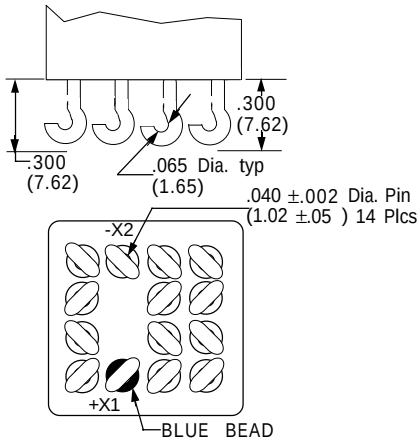
CODE "A"
Socket Pins - All DC Coils
PIN TERMINALS ARE GOLD PLATED



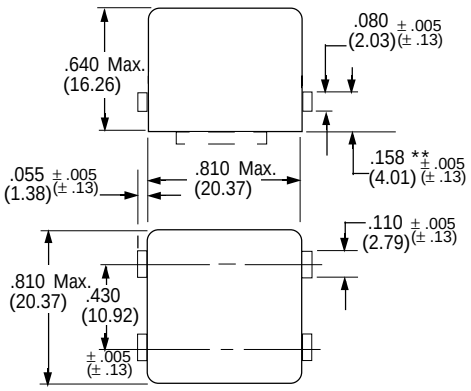
CODE "B"
Solder Pin Terminals
PIN TERMINALS TIN/LEAD PLATED



CODE "C"
Solder Hook Terminals
HOOK TERMINALS TIN/LEAD PLATED

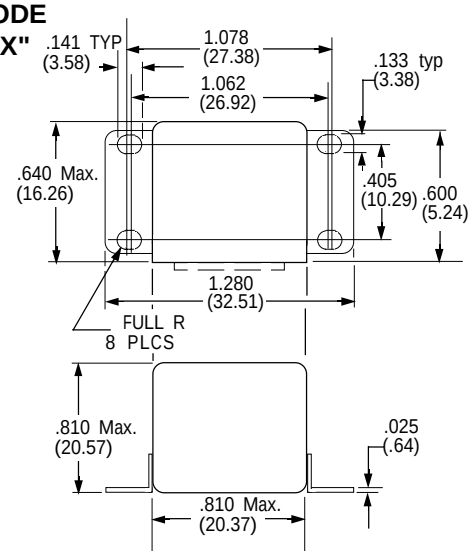


CODE "T"
M83536/6-025
(REFERENCE ONLY)



** Measured from surface of header

CODE "X"



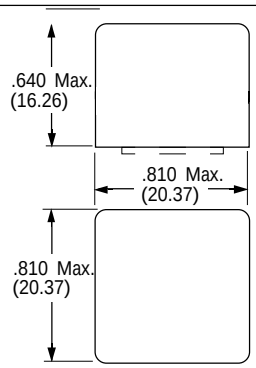
ENCLOSURES

All Enclosures have cupro-Nickel cans bright acid tin/lead plated after assembly to terminal headers.

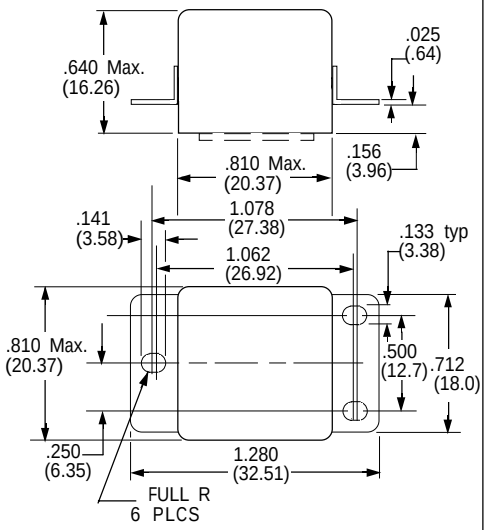
Dimensions: Inches ± .010 (mm ± .25)

Code "T" used only with track-mounted Sockets. Requires code "A" pin terminals. Gasket is included in the socket assembly.

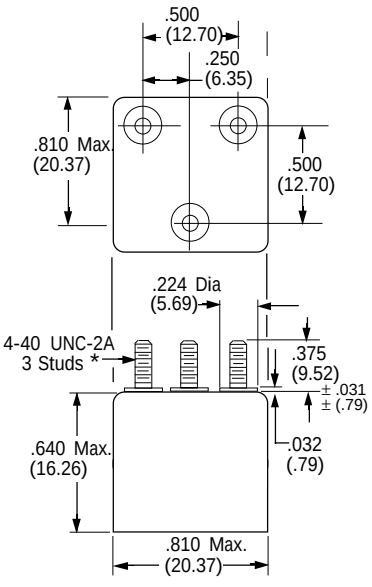
CODE "Z"



CODE "Y"



CODE "W"



*Metric threads available,To specify use M in place of W

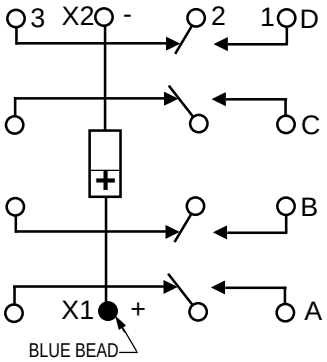
STRUTHERS-DUNN

MILITARY/AEROSPACE RELAYS

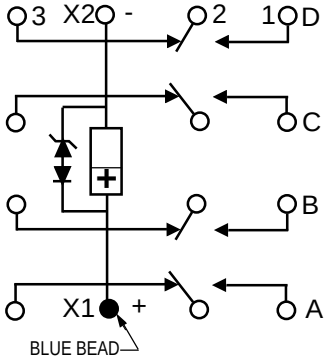
5 AMPERES, 4PDT

TERMINAL WIRING

DC COILS



DC COILS WITH
TRANSIENT SUPPRESSION

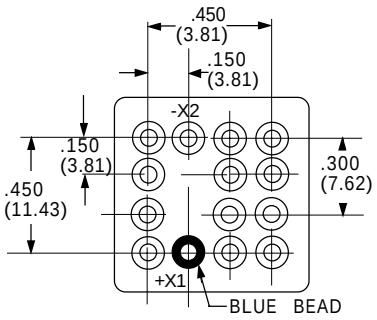


NOTE: Polarity must be observed with DC coil supply. Relay is polarized with a permanent magnet and will not operate or be damaged by reverse polarity.

Diodes used in transient suppression and in AC rectifier circuits have peak inverse voltage rating of 600 VDC minimum. Zener diodes have a minimum rating of 1 watt.

Terminal designations are for reference only and do not appear on the header.

TERMINAL LAYOUT



HOW TO ORDER

(EXAMPLE) — **FCB-405-A Y 4**

RELAY TYPE

TERMINALS (Socket Pins)

ENCLOSURE (With Flanges)

COIL (28 VDC With Transient Suppression).

STRUTHERS-DUNN

MILITARY/AEROSPACE RELAYS

NOTES

FCAL LATCH

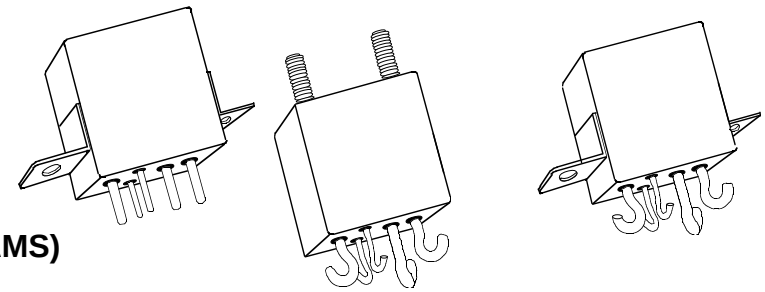
SERIES

RELAYS

SERIES
FCAL-125

STRUTHERS-DUNN
MILITARY/AEROSPACE RELAYS
MAGNETIC LATCHING RELAY
25 AMPERES, SPDT

- **HERMETICALLY SEALED**
- **ALL WELDED CONSTRUCTION**
- **BALANCED FORCE**
- **PERMANENT MAGNET LATCHING**
- **CONTACTS: SILVER CADMIUM OXIDE WITH GOLD PLATING**
- **COILS FOR DC, AND 400Hz**
- **WEIGHT 1.6 OUNCES MAX. (45.4 GRAMS)**



The Series FCAL-125 relay is a magnetically polarized bi-stable design, where the flux from a permanent magnet provides the armature holding force to maintain the relay contacts in the last position without continued application of power. This design provides a appreciably increased contact pressure in both states over that of a spring return mechanically latched nonpolar design. Dual coils are provided, one for latching and the second for reset. MSD also manufactures other versions of this relay:

FCAL-210: 10 AMPERE DPDT MAGNETIC LATCHING RELAY
FCAL-410: 10 AMPERE 4PDT MAGNETIC LATCHING RELAY
FCAL-325: 25 AMPERE 3PDT MAGNETIC LATCHING RELAY
FCACL-325: 25 AMPERE 3PST-NO & 2 AMPERE SPDT MAGNETIC LATCHING RELAY

CONTACT RATING-AMPERES

Ratings Are Continuous Duty

TYPE OF LOAD	LIFE (MIN.) CYCLES X 10^3	28 VDC	120VAC 400HZ	120VAC 60HZ *
Resistive	50	25	25	10
Inductive	10	12	-	10
Inductive	20	-	15	-
Motor	50	10	10	8
Lamp	50	5	5	-
	* 60 Hz LOADS RATED FOR 25,000 OPERATIONS			

OVERLOAD CURRENT 50 AMPS DC, 80 AMPS 400Hz
RUPTURE CURRENT 60 AMPS DC, 100 AMPS 400Hz
CONTACT MAKE BOUNCE 1 MILLISECOND AT NOMINAL VOLTAGE
MAX. CONTACT DROP AT 25 AMPS: INITIAL 0.150 VOLTS.
END OF LIFE 0.175 VOLTS

STRUTHERS-DUNN

MILITARY/AEROSPACE RELAYS

MAGNETIC LATCHING RELAY
25 AMPERES, SPDT

COIL DATA

COIL CODE	NOMINAL VOLTAGES	FREQ. HZ	DC RES. AC AMPS (B)	OVER TEMPERATURE RANGE OPERATE & RESET VOLTAGE, OR LESS
1	6	DC	38/38 Ω	4.5 DC
2	12	DC	150/150 Ω	9.0 DC
3	28	DC	627/627 Ω	18.0 DC
4 (A)	28	DC	627/627 Ω	18.0 DC
8	115	400	40/40 mA	32.0 AC

A. CODE 4 COILS HAVE BACK EMF TRANSIENT PROTECTION TO UNDER 5 VOLTS. THIS FEATURE ALSO MAKES THE COILS IMMUNE TO INCOMING TRANSIENTS THAT MIGHT CAUSE UNINTENDED CONTACT TRANSFER.

B. DC COIL RESISTANCE ± 10% AT 25˚C;
AC COIL MAX. CURRENT AT NOMINAL VOLTAGE.

C. MAX. OVERVOLTAGE: 6 & 12 VDC COILS 120% OF NOMINAL; ALL OTHERS 110% OF NOMINAL.

D. COILS AVAILABLE FOR OTHER VOLTAGES .

GENERAL SPECIFICATIONS

TEMPERATURE RATING:		-70˚C TO + 125˚C
ALTITUDE:		300,000 FEET
SHOCK:*	Z, Y, & X ENCLOSURES	200 g FOR 6 mS
	W & M ENCLOSURES	100 g FOR 6 mS
VIBRATION, SINUSOIDAL:*	Z, Y, & X ENCLOSURES	30 g 33-3000Hz
	W & M ENCLOSURES (STUD MTG.)	20 g 33-3000Hz
VIBRATION, RANDOM :*	Z, Y, & X ENCLOSURES	0.4 g^2/Hz 50-2000Hz
	W & M ENCLOSURES (STUD MTG.)	0.2 g^2/Hz 50-2000Hz
DIELECTRIC STRENGTH AT SEA LEVEL:	ALL CIRCUITS TO GROUND AND CIRCUIT TO CIRCUIT.	1250 V rms
	COIL TO GROUND	1000 V rms
DIELECTRIC STRENGTH AT 80,000 FEET:		350 V rms
INSULATION RESISTANCE:	INITIAL (500 VDC)	100 MΩ MINIMUM
	AFTER LIFE OR ENVIRONMENTAL TESTS	50 MΩ MINIMUM
OPERATE/RESET TIME AT NOMINAL COIL VOLTAGE:	DC RELAYS	15 ms OR LESS
	AC RELAYS	20 ms OR LESS

* Max. contact opening under vibration or shock 10 microseconds

SERIES
FCAL-125

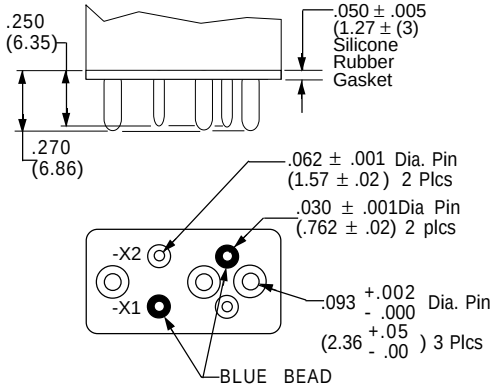
STRUTHERS-DUNN

MILITARY/AEROSPACE RELAYS
MAGNETIC LATCHING RELAY
25 AMPERES, SPDT

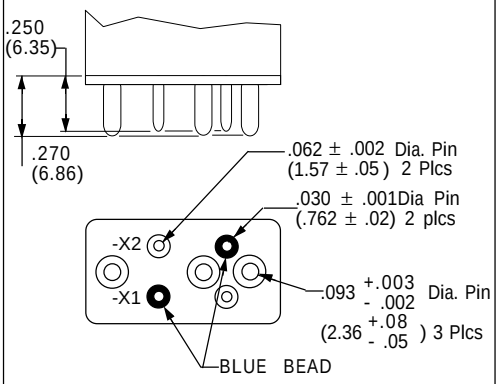
Below are shown the standard terminal types and the enclosures available. Specify the assembly as indicated under How To Order. Dimensions are shown in inches ± .010 and (Millimeters ± .25).

TERMINALS

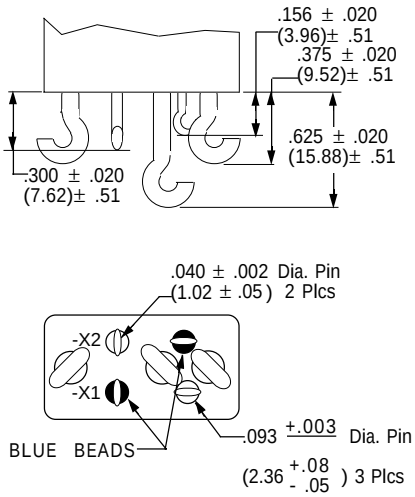
CODE "A"
Socket Pins - All DC Coils
PIN TERMINALS ARE GOLD PLATED



CODE "B"
Solder Pin Terminals
PIN TERMINALS TIN/LEAD PLATED



CODE "C"
Solder Hook Terminals
HOOK TERMINALS TIN/LEAD PLATED



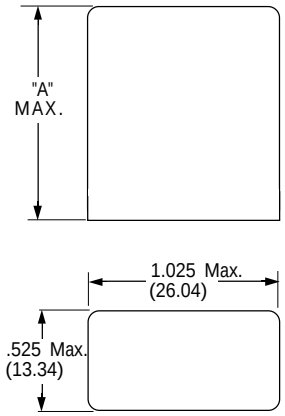
ENCLOSURES

All Enclosures have cupro-Nickel cans bright acid tin/lead plated after assembly to terminal headers.

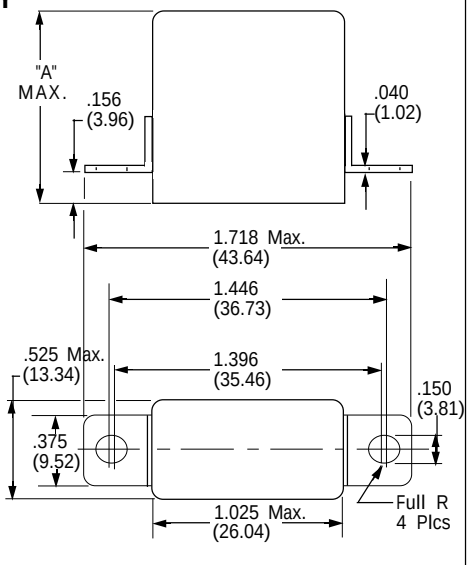
Dimensions: Inches ± .010 (mm ± .25)

"A" - AC & DC Suppressed Coils 1.125 in. (28.58) Max
DC Coils 1.010 in. (25.65) Max..

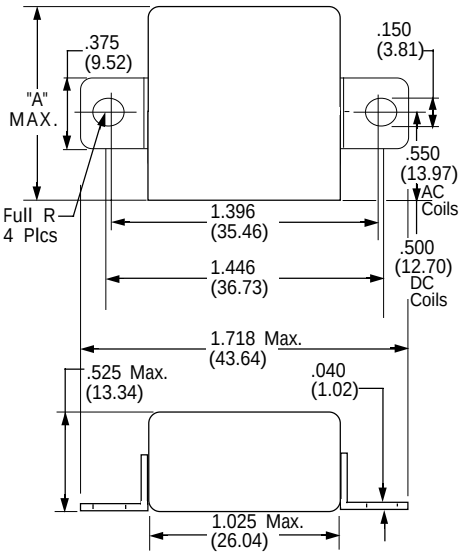
CODE "Z"



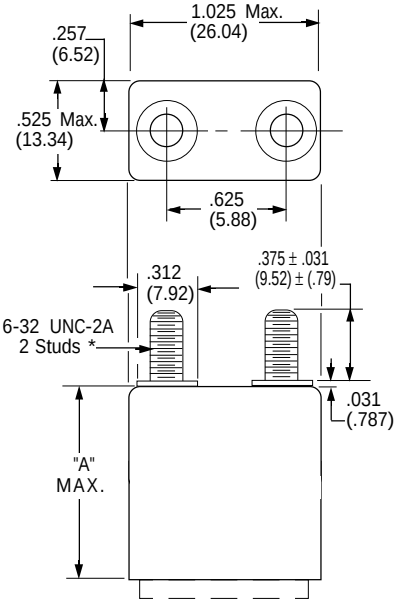
CODE "Y"



CODE "X"



CODE "W"



*Metric threads available.
To specify use M in place of W

STRUTHERS-DUNN

MILITARY/AEROSPACE RELAYS

MAGNETIC LATCH RELAY
25 AMPERES, SPDT

MSD, INC
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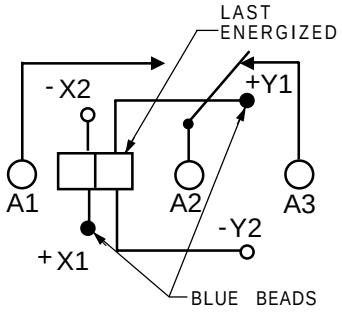
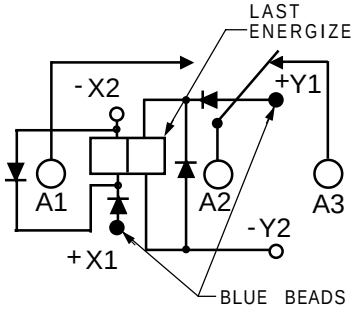
TERMINAL WIRING

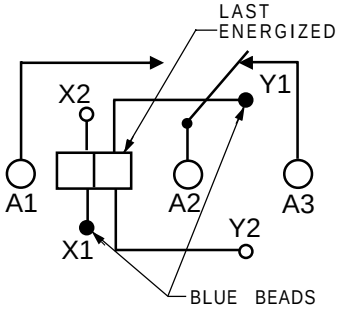
DC COILS



DC COILS WITH TRANSIENT SUPPRESSION



AC COILS

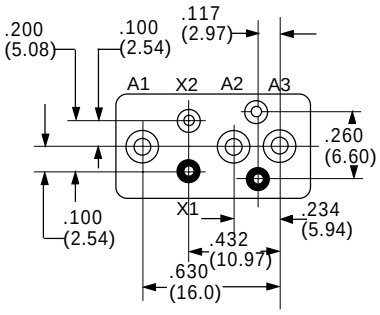


NOTE: Polarity must be observed with DC coil supply. Relay is polarized with a permanent magnet and will not operate or be damaged by reverse polarity.

Diodes used in transient suppression and in AC rectifier circuits have peak inverse voltage rating of 600 VDC minimum. Zener diodes have a minimum rating of 1 watt.

Terminal designations are for reference only and do not appear on the header.

TERMINAL LAYOUT



HOW TO ORDER

(EXAMPLE) — **FCAL-125-A Y 3**

RELAY TYPE

TERMINALS (Socket Pins)

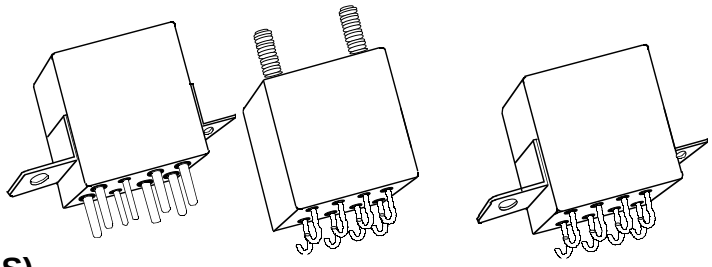
ENCLOSURE (With Flanges)

COIL (28 VDC).

SERIES
FCAL-210

STRUTHERS-DUNN
MILITARY/AEROSPACE RELAYS
MAGNETIC LATCHING RELAY
10 AMPERES, DPDT

- **HERMETICALLY SEALED**
- **ALL WELDED CONSTRUCTION**
- **BALANCED FORCE**
- **PERMANENT MAGNET LATCHING**
- **CONTACTS: SILVER CADMIUM OXIDE WITH GOLD PLATING**
- **COILS FOR DC AND 400Hz**
- **WEIGHT 1.6 OUNCES MAX. (45.4 GRAMS)**



The Series FCAL-210 relay is a magnetically polarized bi-stable design, where the flux from a permanent magnet provides the armature holding force to maintain the relay contacts in the last position without continued application of power. This design provides a appreciably increased contact pressure in both states over that of a spring return mechanically latched nonpolar design. Dual coils are provided, one for latching and the second for reset. MSD also manufactures other versions of this relay:

FCAL-125: 10 AMPERE SPDT MAGNETIC LATCHING RELAY
FCAL-410: 10 AMPERE 4PDT MAGNETIC LATCHING RELAY
FCAL-325: 25 AMPERE 3PDT MAGNETIC LATCHING RELAY
FCACL-325: 25 AMPERE 3PST-NO & AUX. 2 AMPERE SPDT MAGNETIC LATCHING RELAY

CONTACT RATING-AMPERES

Ratings Are Continuous Duty

TYPE OF LOAD	LIFE (MIN.) CYCLES X 10^3	28 VDC	115/200 VAC-3Ø	
			115 VAC 400HZ	115 VAC 60 HZ *
Resistive	100	10	10	10
Inductive	20	8	8	8
Motor	100	4	4	4
Lamp	100	2	2	2
	* 60 Hz LOADS RATED FOR 10,000 OPERATIONS			

OVERLOAD CURRENT 40 AMPS DC, 60 AMPS 400Hz
RUPTURE CURRENT 50 AMPS DC, 80 AMPS 400Hz
CONTACT MAKE BOUNCE 1 MILLISECOND AT NOMINAL VOLTAGE
MAX. CONTACT DROP AT 10 AMPS: INITIAL 0.150 VOLTS.
END OF LIFE 0.175 VOLTS

STRUTHERS-DUNN

MILITARY/AEROSPACE RELAYS
MAGNETIC LATCHING RELAY
10 AMPERES, DPDT

COIL DATA

COIL CODE	NOMINAL VOLTAGES	FREQ. HZ	DC RES. AC AMPS (B)	OVER TEMPERATURE RANGE OPERATE & RESET VOLTAGE, OR LESS
1	6	DC	38/38 Ω	4.5 DC
2	12	DC	150/150 Ω	9.0 DC
3	28	DC	627/627 Ω	18.0 DC
4	28 (B)	DC	627/627 Ω	18.0 DC
8	115	400	40/40 mA	90.0 AC

A. CODE 4 COILS HAVE BACK EMF TRANSIENT PROTECTION TO UNDER 5 VOLTS. THIS FEATURE ALSO MAKES THE COILS IMMUNE TO INCOMING TRANSIENTS THAT MIGHT CAUSE UNINTENDED CONTACT TRANSFER.

B. DC COIL RESISTANCE ± 10% AT 25˚C;
AC COIL MAX. CURRENT AT NOMINAL VOLTAGE.

C. MAX. OVERVOLTAGE: 6 & 12 VDC COILS 120% OF NOMINAL; ALL OTHERS 110% OF NOMINAL.

D. COILS AVAILABLE FOR OTHER VOLTAGES .

GENERAL SPECIFICATIONS

TEMPERATURE RATING:		-70˚C TO + 125˚C
ALTITUDE:		300,000 FEET
SHOCK:*	Z, Y, & X ENCLOSURES	200 g FOR 6 mS
	W & M ENCLOSURES (STUD MTG.)	100 g FOR 6 mS
VIBRATION, SINUSOIDAL:*	Z, Y, & X ENCLOSURES	30 g 33-3000Hz
	W & M ENCLOSURES	20 g 33-3000Hz
VIBRATION, RANDOM: *	Z, Y, & X ENCLOSURES	$0.4g^2$/Hz 50-2000Hz
	W & M ENCLOSURES	$0.2g^2$/Hz 50-2000Hz
DIELECTRIC STRENGTH AT SEA LEVEL:	ALL CIRCUITS TO GROUND AND CIRCUIT TO CIRCUIT.	1250 V rms
	COIL TO GROUND	1000 V rms
DIELECTRIC STRENGTH AT 80,000 FEET:		350 V rms
INSULATION RESISTANCE:	INITIAL (500 VDC)	100 MΩ MINIMUM
	AFTER LIFE OR ENVIRONMENTAL TESTS	50 MΩ MINIMUM
OPERATE/RESET TIME AT NOMINAL COIL VOLTAGE:	DC RELAYS	10 ms OR LESS
	AC RELAYS	20 ms OR LESS

*** Max. contact opening under vibration or shock 10 microseconds**

STRUTHERS-DUNN

MILITARY/AEROSPACE RELAYS

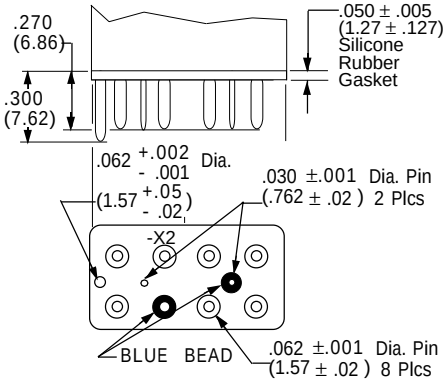
MAGNETIC LATCHING RELAY

10 AMPERES, DPDT

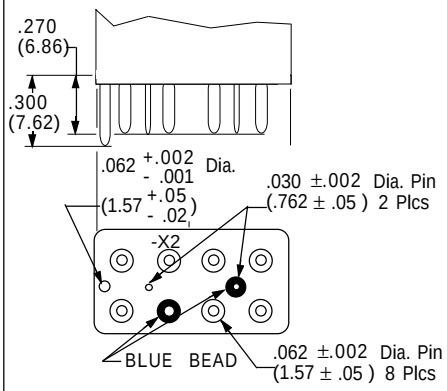
Below are shown the standard terminal types and the enclosures available. Specify the assembly as indicated under How To Order. Dimensions are shown in inches ± .010 and (Millimeters ± .25)except as noted.

TERMINALS

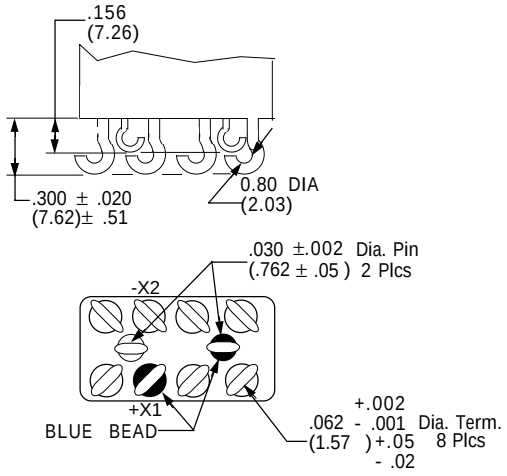
CODE "A"
Socket Pin Terminals
Terminals Gold plated



CODE "B"
Solder Pin Terminals
Terminals Tin/Lead plated



CODE "C"
Solder Hook Terminals
HOOK TERMINALS TIN/LEAD PLATED

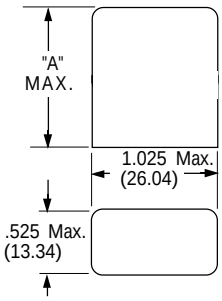


ENCLOSURES

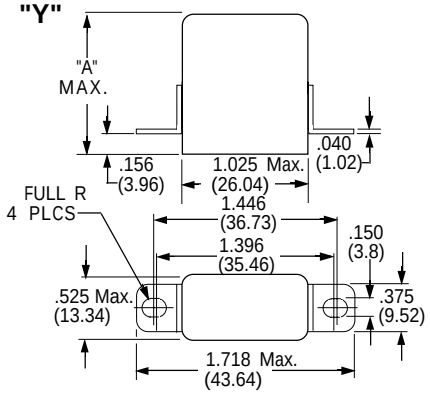
All enclosures have cupro-nickel cans bright acid tin/lead plated after assembly to terminal headers.

"A": for AC coils and DC coils with transient suppression diodes
(1.125 in. Max. (28.58 mm Max.)
For DC coils: (1.010 in. max. (25.65 mm Max.)

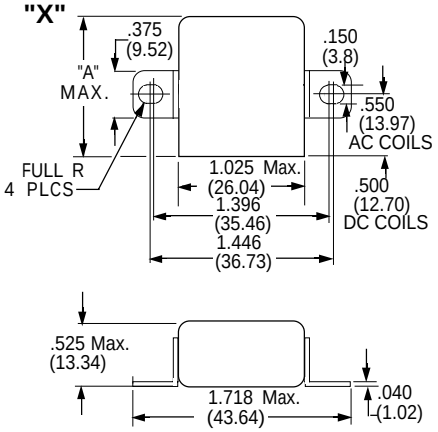
CODE "Z"



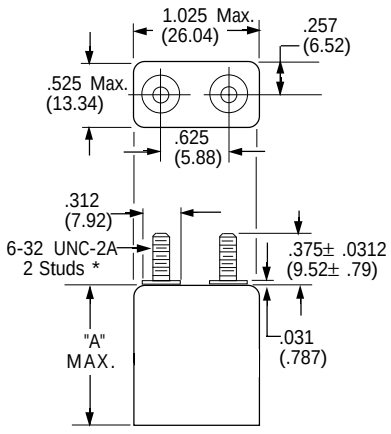
CODE "Y"



CODE "X"



CODE "W"



*Metric threads available,To specify use M in place of W

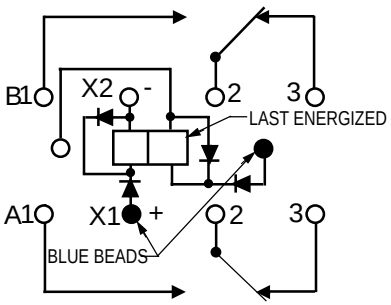
STRUTHERS-DUNN

MILITARY/AEROSPACE RELAYS

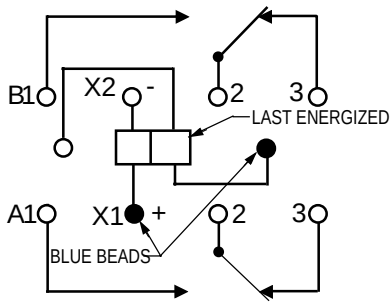
MAGNETIC LATCHING RELAY
10 AMPERES, DPDT

TERMINAL WIRING

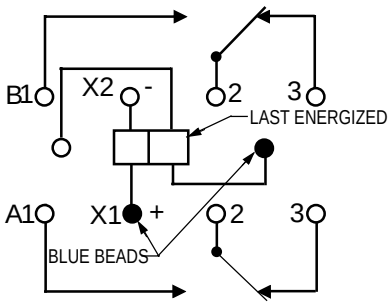
DC COILS WITH TRANSIENT SUPPRESSION



DC COILS



AC COILS

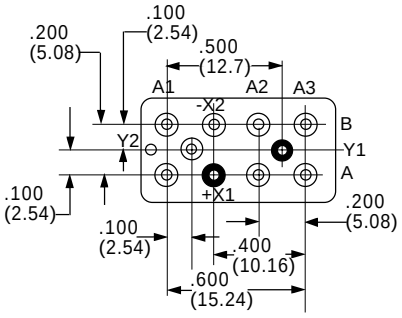


NOTE: With DC coil supply, polarity must be observed to obtain operation to the intended contact position. Reverse polarity will not damage coils but may result in contact transfer.

Diodes used in transient protection and in AC rectifier circuits have peak inverse voltage rating of 600 VDC minimum.

Terminal designations are for reference only and do not appear on the header.

TERMINAL LAYOUT



HOW TO ORDER

(EXAMPLE) — **FCAL-210-A Y 4**

RELAY TYPE

TERMINALS (Socket Pins)

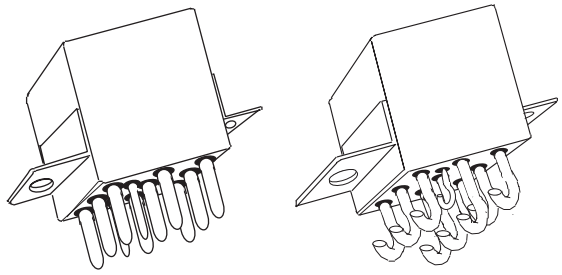
ENCLOSURE (With Flanges)

COIL (28 VDC)

SERIES
FCAL-325

STRUTHERS-DUNN
MILITARY/AEROSPACE RELAYS
MAGNETIC LATCHING RELAY
25 AMPERES, 3PDT

- **HERMETICALLY SEALED**
- **ALL WELDED CONSTRUCTION**
- **BALANCED FORCE**
- **PERMANENT MAGNET LATCHING**
- **CONTACTS: SILVER CADMIUM OXIDE WITH GOLD PLATING**
- **COILS FOR DC AND 400Hz**
- **WEIGHT 2.8 OUNCES MAX. (82 GRAMS)**



The Series FCAL-325 relay is a magnetically polarized bi- stable design,where the flux from permanent magnets provides the armature holding force to maintain the relay contacts in the last position without continued application of coil power. This design results in appreciably increased contact pressure in both states over that of a spring return nonpolar design Dual coils are provided, one for latching and the second for reset. MSD also manufactures other versions of this relay:

FCAL-125: 10 AMP, SPDT MAGNETIC LATCHING
FCAL-210: 10 AMP, DPDT MAGNETIC LATCHING
FCAL-410: 10 AMP 4PDT MAGNETIC LATCHING
FCACL-325: 25 AMP 3PST-NO WITH 2 AMP SPDT AUXILIARY CONTACTS

CONTACT RATING-AMPERES

Ratings Are Continuous Duty

TYPE OF LOAD	LIFE (MIN.) CYCLES X 10^3	28 VDC	115VAC 400HZ	115/200VAC 400Hz-3Ø	115/200VAC 60Hz-3Ø *
Resistive	50	25	25	25	2.5
Inductive	10	12	-	-	2.5
Inductive	20	-	15	15	-
Motor	50	10	10	10	2.0
Lamp	50	5	5	5	1.0
	* 60 Hz LOADS RATED FOR 10,000 OPERATIONS				

OVERLOAD CURRENT 50 AMPS DC, 80 AMPS 400HZ
RUPTURE CURRENT 60 AMPS DC, 100 AMPS 400HZ
CONTACT MAKE BOUNCE 1 MILLISECOND MAX. AT NOMINAL VOLTAGE
MAX. CONTACT DROP AT 25 AMPS: INITIAL 0.150 VOLTS.
END OF LIFE 0.175 VOLTS

STRUTHERS-DUNN

MILITARY/AEROSPACE RELAYS
MAGNETIC LATCHING RELAY
25 AMPERES, 3PDT

COIL DATA

COIL CODE	NOMINAL VOLTAGES	FREQ. HZ	DC RES. AC AMPS (B)	OVER TEMPERATURE RANGE OPERATE & RESET VOLTS, OR BELOW
1	6	DC	28/28 Ω	4.5 DC
2	12	DC	112/112 Ω	9.0 DC
3	28	DC	450/450 Ω	18.0 DC
4 (A)	28	DC	450/450 Ω	18.0 DC
8	115	400	40/40 mA	90.0 AC

A. CODE 4 COILS HAVE BACK EMF TRANSIENT SUPPRESSION TO UNDER 5 VOLTS. THIS FEATURE ALSO MAKES THE COILS IMMUNE TO INCOMING TRANSIENTS THAT MAY CAUSE UNINTENDED CONTACT TRANSFER.

B. DC COIL RESISTANCE ± 10% AT 25˚C; AC COIL MAX. CURRENT AT NOMINAL VOLTAGE.

C. MAX. OVER-VOLTAGE: 6 & 12 VDC COILS 120% OF NOMINAL; ALL OTHERS 110% OF NOMINAL.

D. COILS AVAILABLE FOR OTHER VOLTAGES .

GENERAL SPECIFICATIONS

TEMPERATURE RATING:		-70˚C TO + 125˚C
ALTITUDE:		300,000 FEET
SHOCK:*	Z, Y, & V ENCLOSURES	200 g FOR 6 mS
	W, X & M ENCLOSURES	100 g FOR 6 mS
VIBRATION, SINUSOIDAL:*	Z, Y, & V ENCLOSURES	30 g 33-3000Hz
	W, X & M ENCLOSURES	20 g 33-3000Hz
VIBRATION, RANDOM: *	Z, Y, & V ENCLOSURES	0.4 g^2/Hz 50-2000Hz
	W, X & M ENCLOSURES	0.2 g^2/Hz 50-2000Hz
DIELECTRIC STRENGTH AT SEA LEVEL:	ALL CIRCUITS TO GROUND AND CIRCUIT TO CIRCUIT.	1250 V rms
	COIL TO GROUND	1000 V rms
DIELECTRIC STRENGTH AT 80,000 FEET:		350 V rms
INSULATION RESISTANCE:	INITIAL (500 VDC)	100 MΩ MINIMUM
	AFTER LIFE OR ENVIRONMENTAL TESTS	50 MΩ MINIMUM
OPERATE TIME AT NOMINAL VOLTAGE:	DC RELAYS	15 ms OR LESS
	AC RELAYS	20 ms OR LESS

*** Max. contact opening under vibration or shock 10 microseconds**

SERIES
FCAL-325

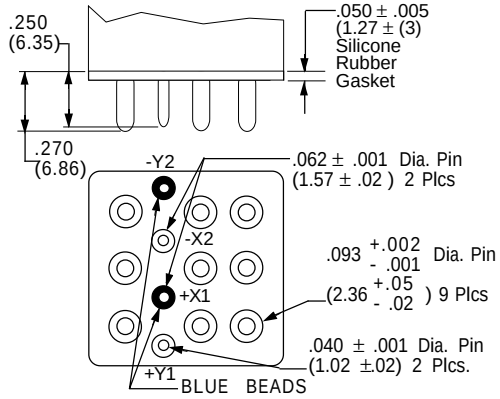
STRUTHERS-DUNN

MILITARY/AEROSPACE RELAYS
MAGNETIC LATCHING RELAY
25 AMPERES, 3PDT

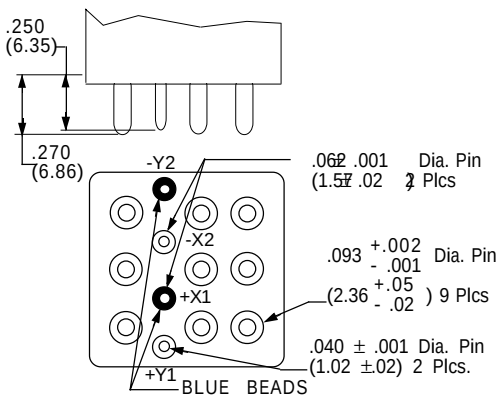
Below are shown the standard terminal types and the enclosures available. Specify the assembly as indicated under How To Order. Dimensions are shown in inches ± .010 and (Millimeters ± .25).

TERMINALS

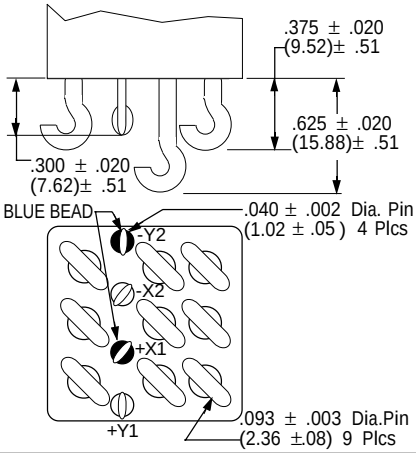
CODE "A"
Socket Pins Terminals
PIN TERMINALS ARE GOLD PLATED



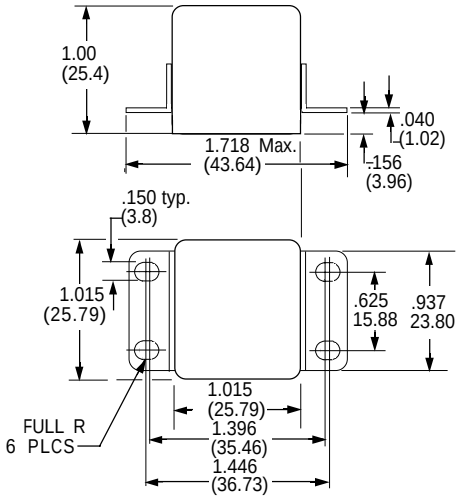
CODE "B"
Solder Pin Terminals
PIN TERMINALS TIN/LEAD PLATED



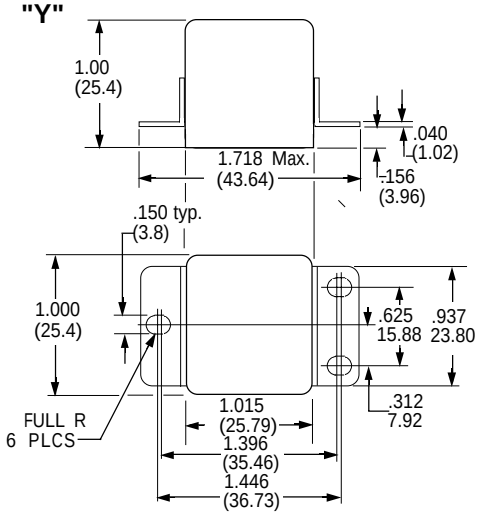
CODE "C"
Solder Hook Terminals
HOOK TERMINALS TIN/LEAD PLATED



CODE "V"



CODE "Y"



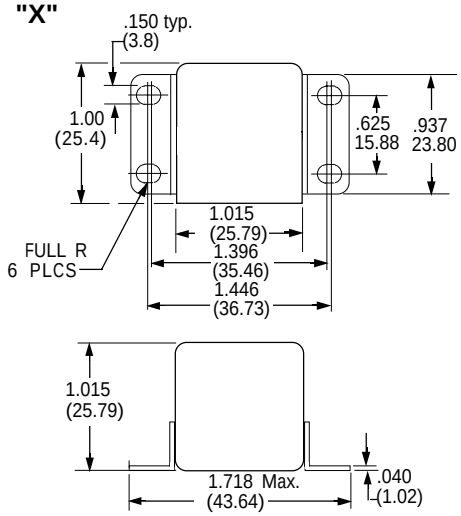
ENCLOSURES

All Enclosures have cupro-Nickel cans bright acid tin/lead plated after assembly to terminal headers.

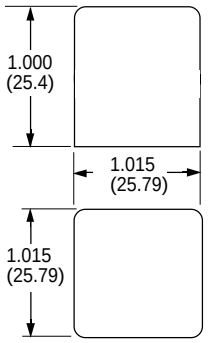
Dimensions: Inches ± .010 (mm ± .25)

For socket pin terminals: specify "Y" enclosures with DC coils and "V" enclosures with AC coils.

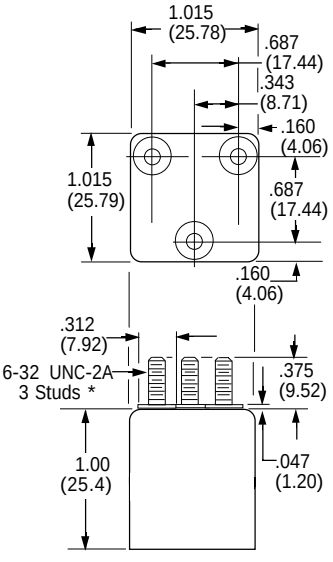
CODE "X"



CODE "Z"



CODE "W"



*Metric threads available,To specify use M in place of W

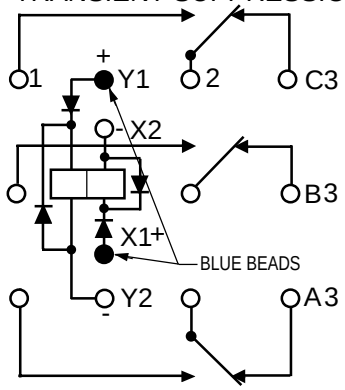
STRUTHERS-DUNN

MILITARY/AEROSPACE RELAYS

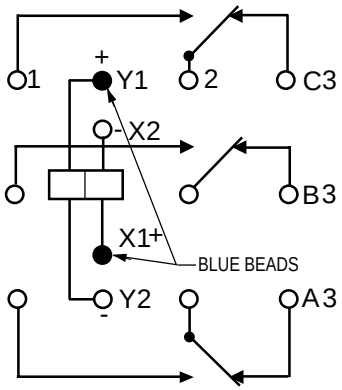
MAGNETIC LATCHING RELAY
25 AMPERES, 3PDT

TERMINAL WIRING

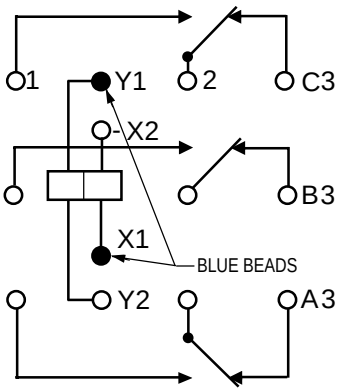
DC COILS WITH TRANSIENT SUPPRESSION



DC COILS



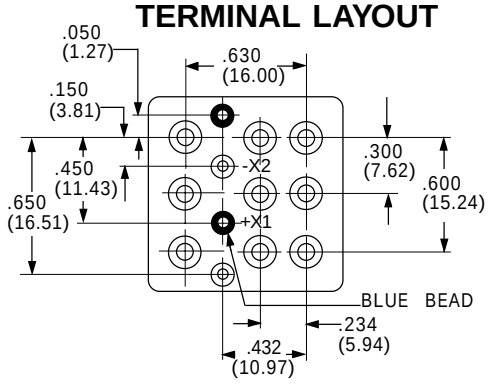
AC COILS



NOTE: Polarity must be observed to obtain operation to the intended contact position. Reverse polarity will not damage coils but may result in contact transfer. Diodes used in transient suppression and in AC rectifier circuits have peak inverse voltage rating of 600 VDC minimum.

Terminal designations are for reference only and do not appear on the header.

TERMINAL LAYOUT



HOW TO ORDER

(EXAMPLE) — **FCAL-325-A Y 4**

RELAY TYPE

TERMINALS (Socket Pins)

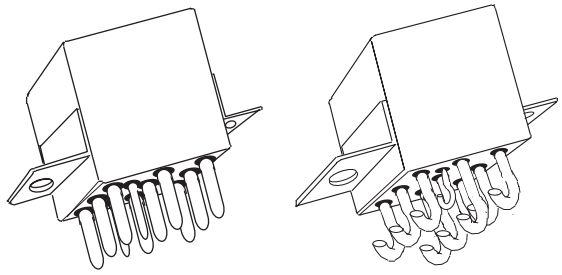
ENCLOSURE (With Flanges and DC Coils)

COIL (28 VDC)

SERIES
FCACL-325

STRUTHERS-DUNN
MILITARY/AEROSPACE RELAYS
MAGNETIC LATCHING RELAY
25 AMPERES, 3PST-NO & 2 AMP SPDT AUX.

- **HERMETICALLY SEALED**
- **ALL WELDED CONSTRUCTION**
- **BALANCED FORCE**
- **PERMANENT MAGNET LATCHING**
- **CONTACTS: SILVER CADMIUM OXIDE WITH GOLD PLATING**
- **COILS FOR DC AND 400Hz**
- **WEIGHT 2.8 OUNCES MAX. (82 GRAMS)**



The Series FCACL-325 relay is a magnetically polarized bi- stable design,where the flux from permanent magnets provides the armature holding force to maintain the relay contacts in the last position without continued application of coil power. This design results in appreciably increased contact pressure in both states over that of a spring return nonpolar design Dual coils are provided, one for latching and the second for reset. MSD also manufactures other versions of this relay:

FCAL-125: 25 AMP, SPDT MAGNETIC LATCHING
FCAL-210: 10 AMP, DPDT MAGNETIC LATCHING
FCAL-325: 25 AMP 3PDT MAGNETIC LATCHING
FCACL-410: 10 AMP 4PDT MAGNETIC LATCHING

CONTACT RATING-AMPERES

Ratings Are Continuous Duty

TYPE OF LOAD	LIFE (MIN.) CYCLES X 10^3	28 VDC		115VAC 400HZ		115/200VAC 400Hz-3Ø	115/200VAC 60Hz-3Ø *
		MAIN	AUX.	MAIN	AUX.		
Resistive	50	25	2	25	2	25	2.5
Inductive	10	12	1	-	-	-	2.5
Inductive	20	-	-	15	1	15	-
Motor	50	10	-	10	-	10	2.0
Lamp	50	5	.5	5	.5	5	1.0
	* 60 Hz LOADS RATED FOR 10,000 OPERATIONS						

OVERLOAD CURRENT 50 AMPS DC, 80 AMPS 400HZ
RUPTURE CURRENT 60 AMPS DC, 100 AMPS 400HZ
CONTACT MAKE BOUNCE 1 MILLISECOND MAX. AT NOMINAL VOLTAGE
MAX. CONTACT DROP AT 25 AMPS: INITIAL 0.150 VOLTS.
END OF LIFE 0.175 VOLTS
CONTACT MAKE BOUNCE 1 mS MAX. AT NOMINAL VOLTAGE
(AUX. CONTACT BOUNCE 4 mS MAX.).

STRUTHERS-DUNN

MILITARY/AEROSPACE RELAYS
MAGNETIC LATCHING RELAY
25 AMPERES, 3PST-NO & 2 AMP SPDT AUX.

COIL DATA

COIL CODE	NOMINAL VOLTAGES	FREQ. HZ	DC RES. AC AMPS (B)	OVER TEMPERATURE RANGE OPERATE & RESET VOLTS, OR BELOW
1	6	DC	28/28 Ω	4.5 DC
2	12	DC	112/112 Ω	9.0 DC
3	28	DC	450/450 Ω	18.0 DC
4 (A)	28	DC	450/450 Ω	18.0 DC
8	115	400	40/40 mA	90.0 AC

A. CODE 4 COILS HAVE BACK EMF TRANSIENT SUPPRESSION TO UNDER 5 VOLTS. THIS FEATURE ALSO MAKES THE COILS IMMUNE TO INCOMING TRANSIENTS THAT MAY CAUSE UNINTENDED CONTACT TRANSFER.

B. DC COIL RESISTANCE ± 10% AT 25˚C; AC COIL MAX. CURRENT AT NOMINAL VOLTAGE.

C. MAX. OVER-VOLTAGE: 6 & 12 VDC COILS 120% OF NOMINAL; ALL OTHERS 110% OF NOMINAL.

D. COILS AVAILABLE FOR OTHER VOLTAGES .

GENERAL SPECIFICATIONS

TEMPERATURE RATING:		-70˚C TO + 125˚C
ALTITUDE:		300,000 FEET
SHOCK:*	Z, Y, & V ENCLOSURES	200 g FOR 6 mS
	W, X & M ENCLOSURES	100 g FOR 6 mS
VIBRATION, SINUSOIDAL:*	Z, Y, & V ENCLOSURES	30 g 33-3000Hz
	W, X & M ENCLOSURES	20 g 33-3000Hz
VIBRATION, RANDOM: *	Z, Y, & V ENCLOSURES	0.4 g^2/Hz 50-2000Hz
	W, X & M ENCLOSURES	0.2 g^2/Hz 50-2000Hz
DIELECTRIC STRENGTH AT SEA LEVEL:	ALL CIRCUITS TO GROUND AND CIRCUIT TO CIRCUIT.	1250 V rms
	COIL TO GROUND	1000 V rms
DIELECTRIC STRENGTH AT 80,000 FEET:		350 V rms
INSULATION RESISTANCE:	INITIAL (500 VDC)	100 MΩ MINIMUM
	AFTER LIFE OR ENVIRONMENTAL TESTS	50 MΩ MINIMUM
OPERATE TIME AT NOMINAL VOLTAGE:	DC RELAYS	15 ms OR LESS
	AC RELAYS	20 ms OR LESS

*** Max. contact opening under vibration or shock 10 microseconds**

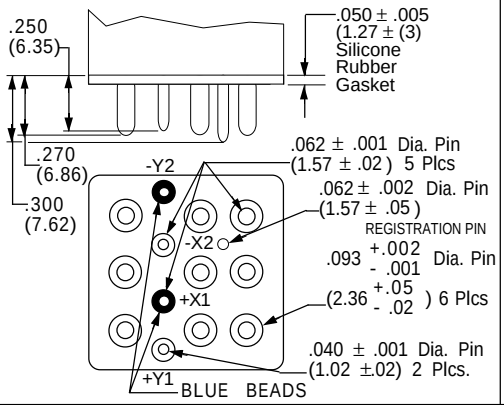
SERIES
FCACL-325
STRUTHERS-DUNN

MILITARY/AEROSPACE RELAYS
MAGNETIC LATCHING RELAY
25 AMPERES, 3PST-NO & 2 AMP SPDT AUX.

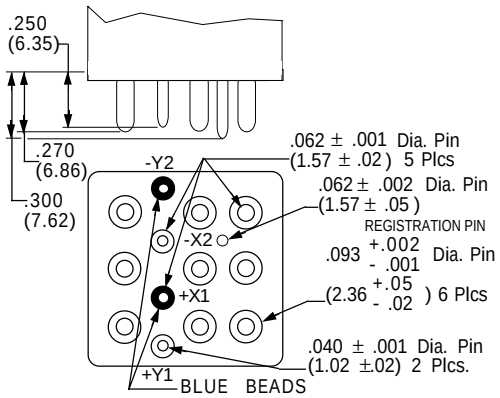
Below are shown the standard terminal types and the enclosures available. Specify the assembly as indicated under How To Order. Dimensions are shown in inches ± .010 and (Millimeters ± .25).

TERMINALS

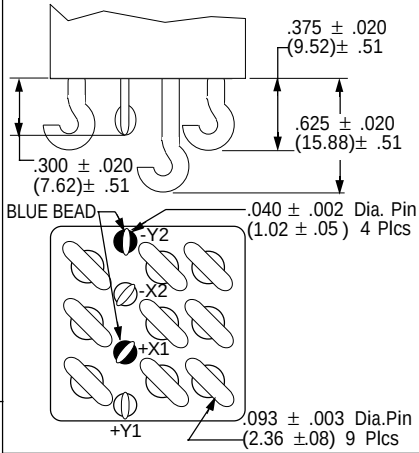
CODE "A" Socket Pins Terminals
PIN TERMINALS ARE GOLD PLATED



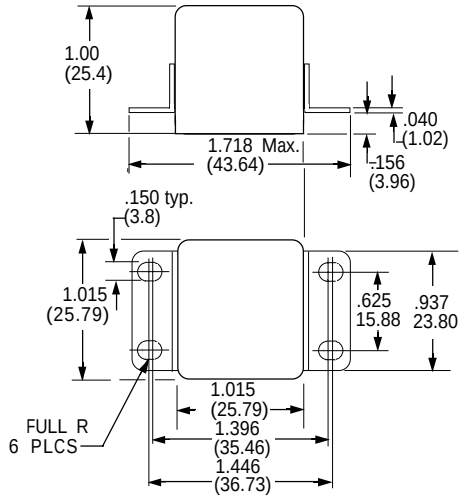
CODE "B" Solder Pin Terminals
PIN TERMINALS TIN/LEAD PLATED



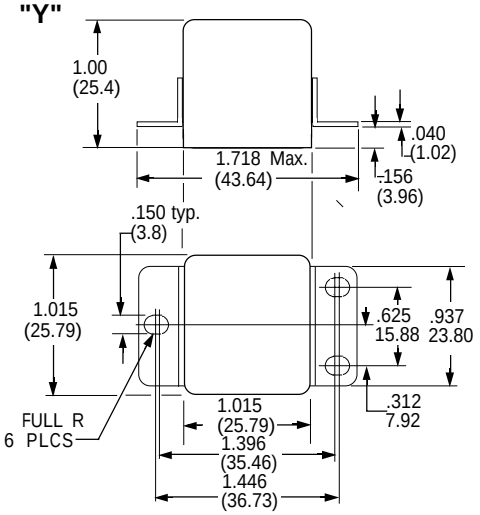
CODE "C" Solder Hook Terminals
HOOK TERMINALS TIN/LEAD PLATED



CODE "V"



CODE "Y"



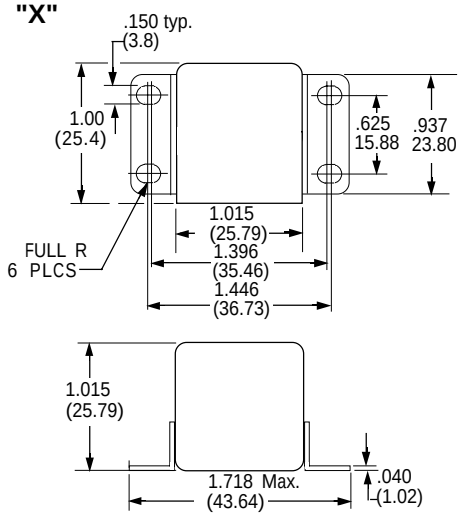
ENCLOSURES

All Enclosures have cupro-Nickel cans bright acid tin/lead plated after assembly to terminal headers.

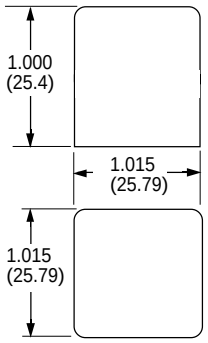
Dimensions: Inches ± .010 (mm ± .25)

For socket pin terminals: specify "Y" enclosures with DC coils and "V" enclosures with AC coils.

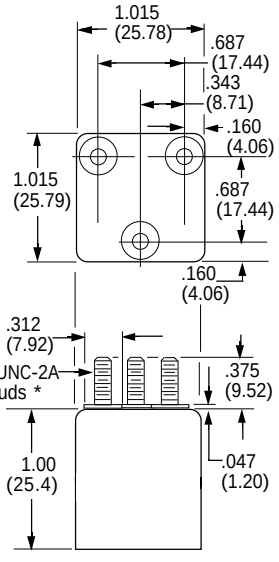
CODE "X"



CODE "Z"



CODE "W"



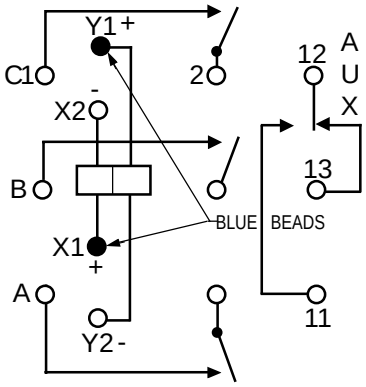
*Metric threads available,To specify use M in place of W

STRUTHERS-DUNN

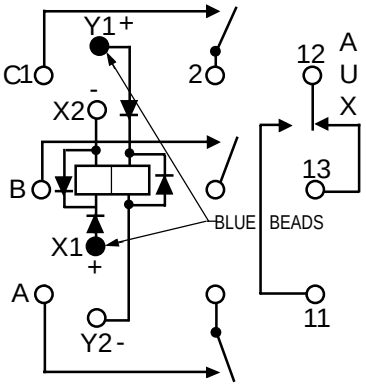
MILITARY/AEROSPACE RELAYS
MAGNETIC LATCHING RELAY
25 AMPERES, 3PST-NO & 2 AMP SPDT AUX.

TERMINAL WIRING

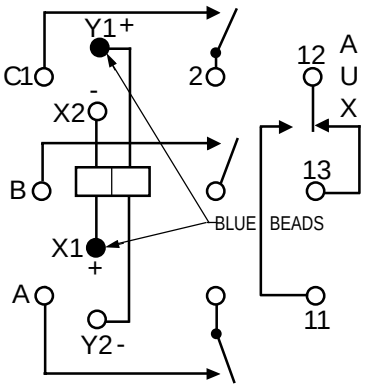
DC COILS



DC COILS WITH TRANSIENT SUPPRESSION



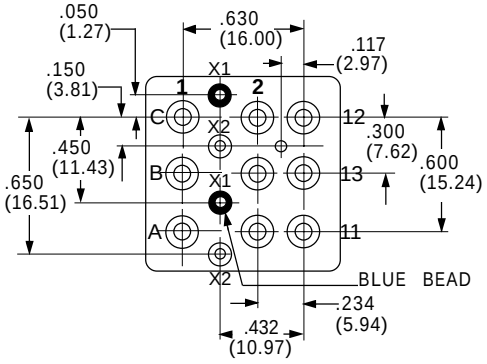
AC COILS



NOTE: Polarity must be observed to obtain operation to the intended contact position. Reverse polarity will not damage coils but may result in contact transfer. Diodes used in transient suppression and in AC rectifier circuits have peak inverse voltage rating of 600 VDC minimum.

Terminal designations are for reference only and do not appear on the header.

TERMINAL LAYOUT



HOW TO ORDER

(EXAMPLE) — **FCACL-325-A Y 4**

RELAY TYPE

TERMINALS (Socket Pins)

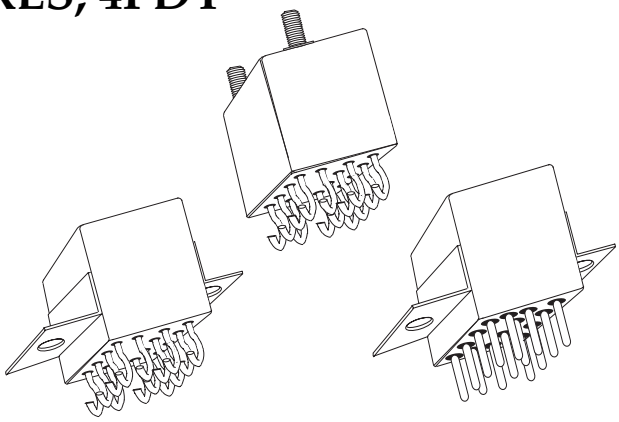
ENCLOSURE (With Flanges and DC Coils)

COIL (28 VDC with transient Suppression)

SERIES
FCAL-410

STRUTHERS-DUNN
MILITARY/AEROSPACE RELAYS
MAGNETIC LATCHING RELAY
10 AMPERES, 4PDT

- **HERMETICALLY SEALED.**
- **ALL WELDED CONSTRUCTION.**
- **BALANCED FORCE.**
- **PERMANENT MAGNET LATCHING.**
- **4PDT SWITCHING IN ONE INCH CUBE.**
- **CONTACTS: SILVER CADMIUM. OXIDE WITH GOLD PLATING.**
- **COILS FOR DC AND 400Hz.**
- **WEIGHT 2.72 OUNCES MAX. (77 GRAMS)**



The Series FCAL-410 relay is a magnetically polarized bi-stable design,where the flux from permanent magnets provides the armature holding force to maintain the relay contacts in the last position without continued application of coil power. This design results in appreciably increased contact pressure in both states over that of a spring return nonpolar design Dual coils are provided, one for latching and the second for reset. MSD also manufactures other versions of this relay:

FCAL-125: 25 AMP, SPDT MAGNETIC LATCHING
FCAL-210: 10 AMP, DPDT MAGNETIC LATCHING
FCAL-325: 25 AMP 3PDT MAGNETIC LATCHING
FCACL-325: 25 AMP 3PST-NO & 2 AMP SPDT AUX. MAGNETIC LATCHING

CONTACT RATING-AMPERES

Ratings Are Continuous Duty

TYPE OF LOAD	LIFE (MIN.) CYCLES X 10^3	28 VDC	115VAC 400HZ	115/200VAC 400Hz-3Ø	115/200VAC 60Hz-3Ø *
Resistive	100	10	10	10	2.5
Inductive	20	8	8	8	2.5
Motor	100	4	4	4	2.0
Lamp	100	2	2	2	1
	* 60 Hz LOADS RATED FOR 10,000 OPERATIONS				

OVERLOAD CURRENT 40 AMPS DC, 60 AMPS 400HZ
RUPTURE CURRENT 50 AMPS DC, 80 AMPS 400HZ
CONTACT MAKE BOUNCE 1 MILLISECOND MAX. AT NOMINAL VOLTAGE
MAX. CONTACT DROP AT 10 AMPS: INITIAL 0.150 VOLTS.
END OF LIFE 0.175 VOLTS

STRUTHERS-DUNN

MILITARY/AEROSPACE RELAYS
MAGNETIC LATCHING RELAY
10 AMPERES, 4PDT

COIL DATA

COIL CODE	NOMINAL VOLTAGES	FREQ. HZ	DC RES. (B) AC AMPS	OVER TEMPERATURE RANGE OPERATE & RESET VOLTS, OR BELOW
1	6	DC	28/28 Ω	4.5 DC
2	12	DC	112/112 Ω	9.0 DC
3	28	DC	450/450 Ω	18.0 DC
4	28 (A)	DC	450/450 Ω	18.0 DC
8	115	400	40/40 mA	90.0 AC

A. CODE 4 COILS HAVE BACK EMF TRANSIENT SUPPRESSION TO UNDER 5 VOLTS. THIS FEATURE ALSO MAKES THE COILS IMMUNE TO INCOMING TRANSIENTS THAT MAY CAUSE UNINTENDED CONTACT TRANSFER.

B. DC COIL RESISTANCE ± 10% AT 25˚C; AC COIL MAX. CURRENT AT NOMINAL VOLTAGE.

C. MAX. OVER-VOLTAGE: 6 & 12 VDC COILS 120% OF NOMINAL; ALL OTHERS 110% OF NOMINAL.

D. COILS AVAILABLE FOR OTHER VOLTAGES .

GENERAL SPECIFICATIONS

TEMPERATURE RATING:		-70˚C TO + 125˚C
ALTITUDE:		300,000 FEET
SHOCK:*	Z, & Y ENCLOSURES	200 g FOR 6 mS
	W, X & M ENCLOSURES	100 g FOR 6 mS
VIBRATION, SINUSOIDAL:*	Z, & Y ENCLOSURES	30 g 33-3000Hz
	W, X & M ENCLOSURES	20 g 33-3000Hz
VIBRATION, RANDOM :*	Z, & Y ENCLOSURES	0.4 g^2/Hz 50-2000Hz
	W, X & M ENCLOSURES	0.2 g^2/Hz 50-2000Hz
DIELECTRIC STRENGTH AT SEA LEVEL:	ALL CIRCUITS TO GROUND AND CIRCUIT TO CIRCUIT.	1250 V rms
	COIL TO GROUND	1000 V rms
DIELECTRIC STRENGTH AT 80,000 FEET:		350 V rms
INSULATION RESISTANCE:	INITIAL (500 VDC)	100 MΩ MINIMUM
	AFTER LIFE OR ENVIRONMENTAL TESTS	50 MΩ MINIMUM
OPERATE TIME AT NOMINAL VOLTAGE:	DC RELAYS	15 ms OR LESS
	AC RELAYS	20 ms OR LESS

*** Max. contact opening under vibration or shock 10 microseconds**

SERIES

FCAL-410

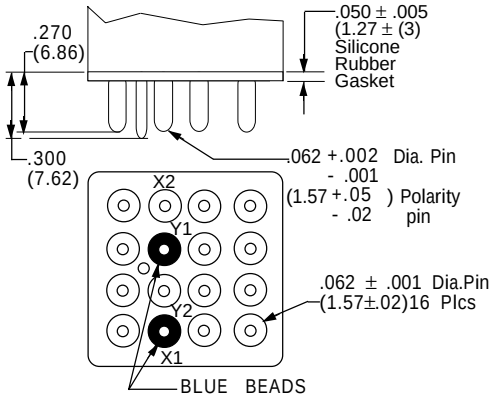
STRUTHERS-DUNN

MILITARY/AEROSPACE RELAYS
MAGNETIC LATCHING RELAY
10 AMPERES, 4PDT

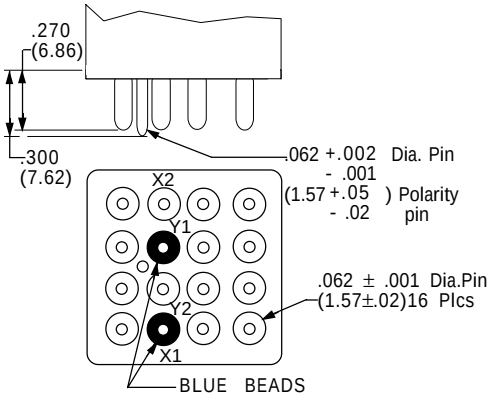
Below are shown the standard terminal types and the enclosures available. Specify the assembly as indicated under How To Order. Dimensions are shown in inches ± .010 and (Millimeters ± .25).

TERMINALS

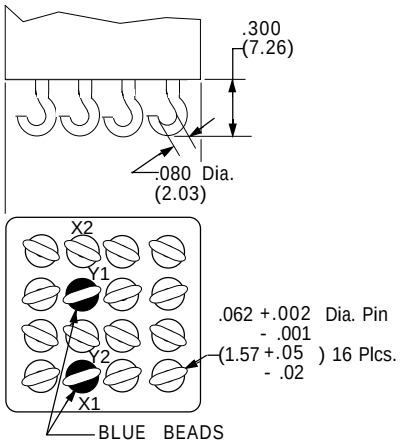
CODE "A" **Socket Pins Terminals**
PIN TERMINALS ARE GOLD PLATED



CODE "B" **Solder Pin Terminals**
PIN TERMINALS TIN/LEAD PLATED



CODE "C" **Solder Hook Terminals**
HOOK TERMINALS TIN/LEAD PLATED

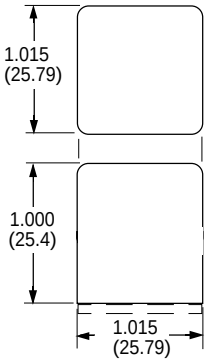


ENCLOSURES

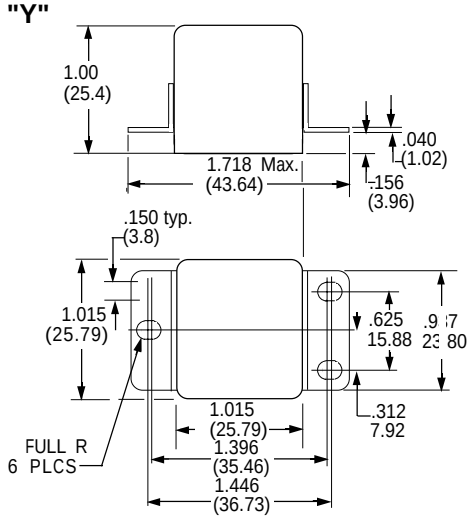
All Enclosures have cupro-Nickel cans bright acid tin/lead plated after assembly to terminal headers.

Dimensions: Inches ± .010 (mm ± .25)

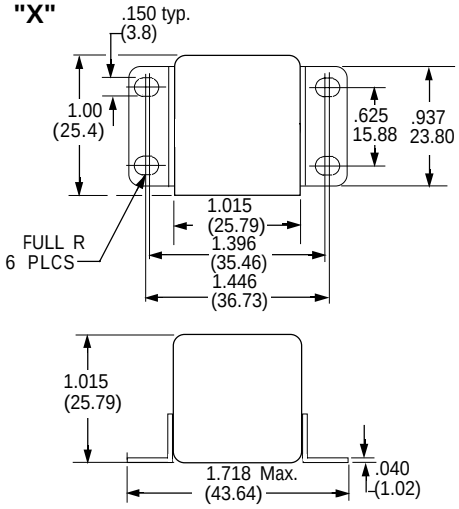
CODE "Z"



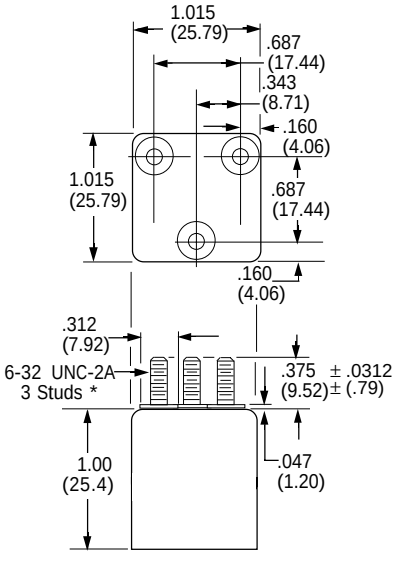
CODE "Y"



CODE "X"



CODE "W"



*Metric threads available,To specify use M in place of W

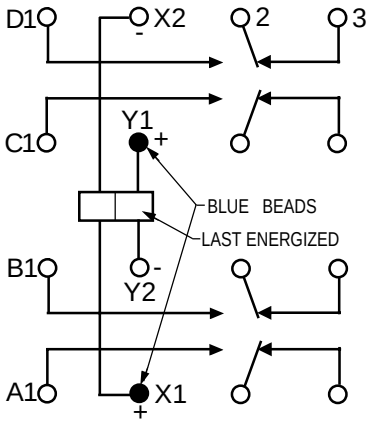
STRUTHERS-DUNN

MILITARY/AEROSPACE RELAYS
MAGNETIC LATCHING RELAY
10 AMPERES, 4PDT

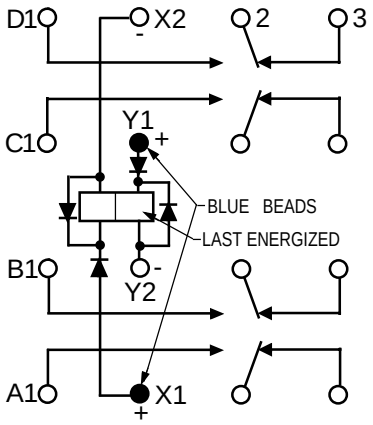
MSD, INC
PAGE 67

TERMINAL WIRING

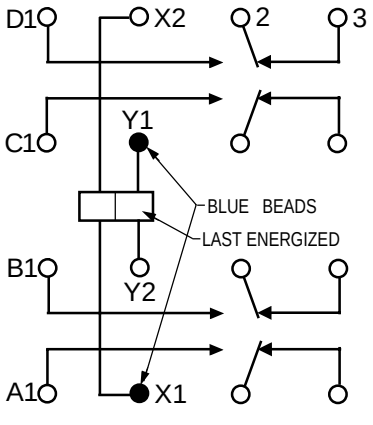
DC COILS



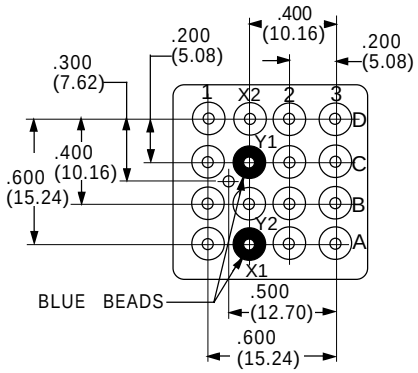
DC COILS WITH
TRANSIENT SUPPRESSION



AC COILS



TERMINAL LAYOUT



NOTE: Polarity must be observed to obtain operation to the intended contact position. Reverse polarity will not damage coils but may result in contact transfer. Diodes used in transient suppression and in AC rectifier circuits have peak inverse voltage rating of 600 VDC minimum.

Terminal designations are for reference only and do not appear on the header.

HOW TO ORDER

(EXAMPLE) — **FCAL-410-A Y 3**

RELAY TYPE

TERMINALS (Socket Pins)

ENCLOSURE (With Flanges)

COIL (28 VDC)

STRUTHERS-DUNN

MILITARY/AEROSPACE RELAYS

NOTES

HERMETICALLY SEALED

4 POLE, 7.5 AMP

AND

CHASSIS SOCKET

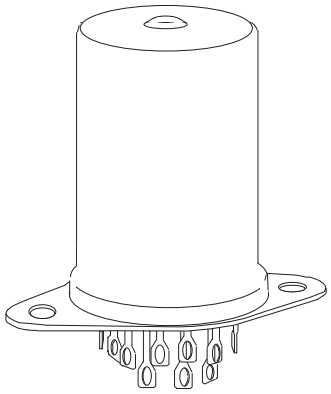
SERIES
46H

STRUTHERS-DUNN

MILITARY/AEROSPACE RELAYS

7.5 AMP, HERMETICALLY SEALED
CONTACT ARRANGEMENTS: 4PDT

- **MANUFACTURED WITH REFERENCE TO MIL-R-5757**
- **HERMETICALLY SEALED IN STEEL ENCLOSURE.**
- **SILVER ALLOY CONTACTS**
- **SOCKET AVAILABLE**



CLASS 46H

4PDT HERMETICALLY SEALED, MINIATURE RELAY IS RATED FOR 7.5 AMPS RESISTIVE, AND 5 AMPS INDUCTIVELOADS. THE CONTACT MATERIAL USED IS SILVER ALLOY CONTACTS. Enclosure is filled with dry nitrogen, soldered shut and then electronically leak checked to prevent contamination of Internal parts. The case is painted gray to protect against the elements.

SPECIFICATIONS CLASS 46H RELAY

COIL

Pull-in voltage:	75% of nominal voltage or less.
Dropout:	10% of nominal voltage or more.
Sensitivity:	4.7 watts @ nominal coil voltage.
Coil resistance	± 10 % measured @ 25 ˚C
Duty:	Continuous

CONTACTS

Contact material:	Silver Alloy, gold flashed
Contact Configuration:	4PDT (4 Form C).
Contact resistance:	50 Milliohms maximum initial, at rated current
Contact Rating:	7.5 Amps Resistive, and 5 Amps inductive @ 120 VAC/30 VDC

TIMING

Operate time:	15 mS or less at nominal voltage.
Release time:	5 mS or less at nominal Voltage.

DIELECTRIC STRENGTH

Contacts to Case:	1000 V rms
Across open contacts:	500 V rms
Coil to Case	500 V rms
Insulation resistance:	1000 megohms min. @ 500 VDC

VIBRATION

Operating:	Meets Specification MIL-R-5757 (Table II) max. Contact opening or closing: 10 uS : @ 10G/10-55Hz @ 10 G/10-500Hz @ 15 G/10-200Hz

SHOCK

Operating:	Meets Specification MIL-R-5757 (Table IV) max. Contact opening or closing: 10 uS with no damage: @ 50 G/11 mS/1/2 sine wave @ 75 G/6 mS/1/2 sine wave @ 100 G/6 mS/1/2 sine wave

TEMPERATURE

Operating:	-65˚C to +125˚C

MISCELLANEOUS

Enclosure:	Steel can Hermetically sealed per MIL-specification.
Mounting:	Chassis saddle mount for both solder terminal and plug-in versions is standard. Socket for plug-in versionis available with mounting hardware.
Terminals	Plug-in or pierced solder lug
Weight:.	4 oz. 113.4 grams, approximately

Magnecraft

PART NUMBERS	STYLE	FIGURE	COIL Measured @ 25˚C		
			NOMINAL INPUT VOLTAGE	MUST OPERATE VOLTAGE	NOMINAL RESISTANCE (OHMS)
DC OPERATED					
W46HSX-10	SOLDER	"A"	26.5 VDC	10 VDC	150
W46HSX-18	PLUG-IN	"B"	26.5VDC	13.5 VDC	150

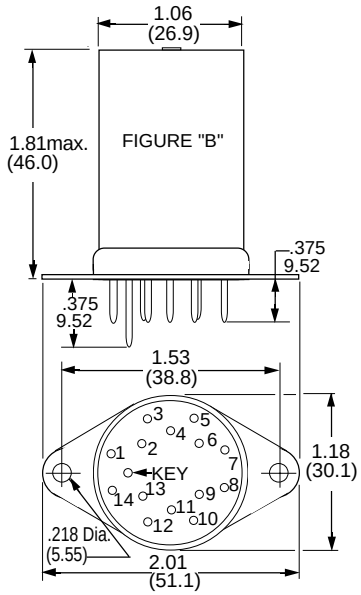
NOTE: Other Voltages available on special order. Consult Factory

STRUTHERS-DUNN

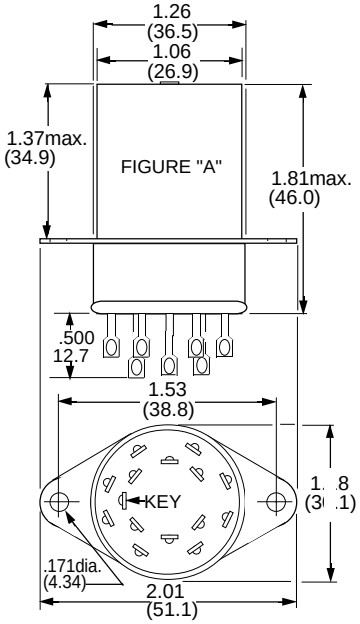
MILITARY/AEROSPACE RELAYS
7.5 AMP, HERMETICALLY SEALED
CONTACT ARRANGEMENTS: 4PDT

OUTLINE DIMENSIONS

Dimensions are shown in Inches and (Millimeters)



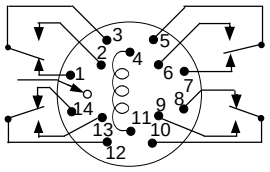
Terminal numbers for reference only.



WIRING DIAGRAM

VIEWED FROM PIN END

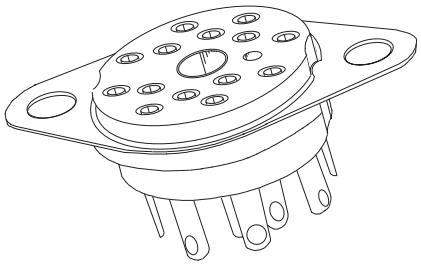
KEY



4PDT

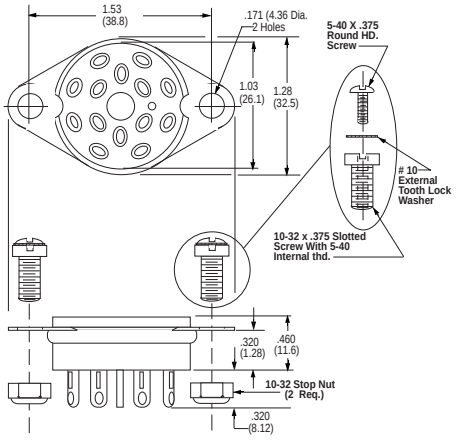
46H MATING SOCKET

- CHASSIS MOUNTED SOCKET
- FLANGE MOUNT WITH MOUNTING HARDWARE.
- SOCKET BODY, CERAMIC
- RATED 10AMPS
- ACCEPTS 46HPX STYLE RELAY

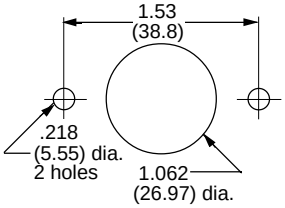


OUTLINE DIMENSIONS

Dimensions are shown in Inches and (Millimeters)



RECOMMENDED CHASSIS LAYOUT



Magnecraft

Part Number	STYLE	WEIGHT (GRAMS)
70-320	14 Pin socket, Chassis Mounted Ceramic, Solder Terminal with Hardware	25 With Hardware

Notes: No relay hold down spring required
Mounting hardware is Included.

STRUTHERS-DUNN

MILITARY/AEROSPACE RELAYS

NOTES

DRY REED

DIP & SIP

RELAYS

STRUTHERS-DUNN

QPL APPROVED MILITARY/AEROSPACE RELAYS

DRY REED DUAL IN-LINE PACKAGE

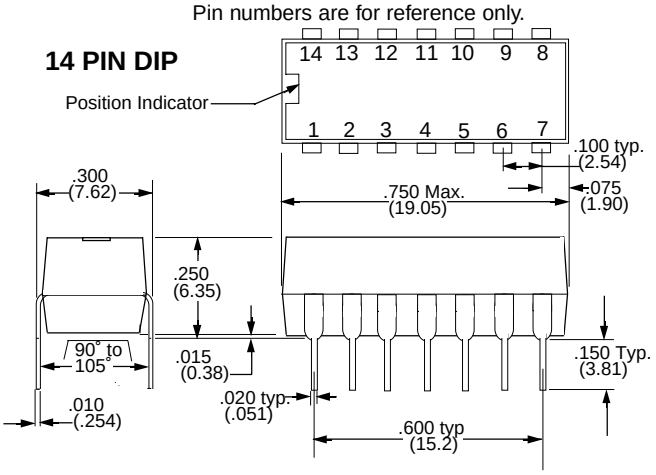
CONTACT ARRANGEMENTS : 1A, 2A, 3B, 1C

- **QUALIFIED TO MIL-R-83516/1/4**
  /1 GENERAL PURPOSE
  /4 LOW POWER COILS
- **DUAL IN-LINE PACKAGE (DIP)**
- **8 OR 14 PIN CONFIGURATION**
- **CONTACT RATING 10 VA FOR 1A, 2A, OR 1B; RATED 3 VA FOR 1C**
- **DIODE COIL TRANSIENT SUPPRESSION AND CONTACT ELECTRO STATIC SHIELDING OPTIONS AVAILABLE**

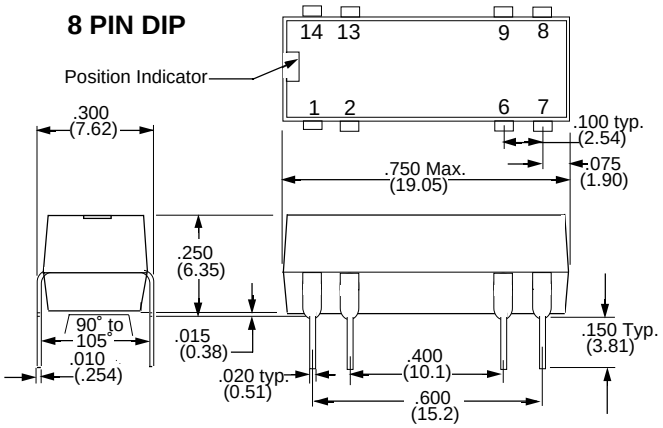
QPL APPROVED

Pin numbers are for reference only.

14 PIN DIP



8 PIN DIP



Reed Contacts are rated in **Volt-Amperes (VA)**, the product of the voltage and current of the contact load, with upper limits on both parameters as tabulated in the table below.

CONTACT RATING-VA

Ratings Are Continuous Duty, for resistive loads.

CONTACT FORM	VOLT-AMPERES	MAX. VOLTAGE	MAX. CURRENT
1A	10	100	.500
2A	10	100	.500
1B	10	100	.500
1C	3	28	.250

CONTACT RESISTANCE:
INITIAL 0.200 OHMS MAX.
DURING AND AFTER LIFE 1.0 OHM MAX.

LIFE:
LOW LEVEL-50 MILLION AT 5 VDC AND 10 MILLIAMPS AT RATED VA-5 MILLION.

CONTACT DEFINITIONS:
FORM A-SPST, N.O. (Single Pole Single Throw, Normally Open)
FORM B-SPST, N.C. (Single Pole Single Throw, Normally Closed)
FORM C-SPDT, (Single Pole Double Throw)

OPERATE AND RELEASE TIME

Includes Bounce

CONTACT FORM	OPERATE TIME @ NOMINAL		RELEASE TIME @ NOMINAL	
	MILLISECONDS		MILLISECONDS	
	NO DIODE	WITH DIODE	NO DIODE	WITH DIODE
FORM A	1.0	1.0	0.5	1.0
FORM B	0.5	0.5	0.5	0.5
FORM C	2.0	2.0	2.5	2.5

STRUTHERS-DUNN

MILITARY/AEROSPACE RELAYS
DRY REED DUAL IN-LINE PACKAGE
CONTACT ARRANGEMENTS : 1A, 2A, 3B, 1C

COIL DATA

MIL TYPE MIL-R-	D.C. VOLTS AT 25˚C			COIL RESISTANCE OHMS AT 25˚C BY CONTACT FORM							
	NOMINAL VOLTAGES	PICK-UP OR BELOW VOLTS	DROP-OUT OR ABOVE VOLTS	1A MIN.	1A NOM.	2A MIN.	2A NOM.	1B MIN.	1B NOM.	1C MIN.	1C NOM.
GENERAL PURPOSE 83510/1	5/6	3.5	1.0	324	360	112	125	112	125	90	100
	12	8.25	2.4	1296	1440	450	500	450	500	450	500
	24	16.5	4.8	5185	5760	1800	2000	1800	2000	1800	2000
LOW POWER 83516/4	5/6	4.0	1.0	450	500	CONSULT		FACTORY		324	360
LATCHING 83516/2		LATCH	RESET								
	5/6	3.4	3.4	675	675	750	750	The Latching relay is			
	12	7.5	7.5	900	900	1000	1000	available only with			
	24	15.0	15.0	4140	4140	4600	4600	Form 1A contacts			

COIL DIODES

Coil EMF transient suppression to 1.0 volt max. can be provided, with an internal diode connected across the coil. **COIL POLARITY MUST BE OBSERVED OR THE DIODE WILL BE DESTROYED**. Diodes have peak inverse voltage ratings of 75 VDC min.

GENERAL SPECIFICATIONS

TEMPERATURE RATINGS:	**MIL-R SPEC**	
MILD GENERAL PURPOSE	**83516/1**	**-40˚C to +105˚C**
MILDL LATCHING	**-**	**-40˚C to +105˚C**
MILD LOW POWER COILS	**83516/4**	**-40˚C to +85˚C**
SHOCK		**11 mS, 1/2 SINE**
VIBRATION, SINUSOIDAL:		**20 G, 10-2000 Hz**
DIELECTRIC STRENGTH, SEA LEVEL		
BETWEEN MUTUALLY INSULATED COMPONENTS:*		**500 VDC**
ACROSS OPEN CONTACTS:		**250 VDC**
INSULATION RESISTANCE		
BETWEEN CONTACTS:		**10KMΩ @ 100 VDC ±10%**

CAPACITANCE: pF MAXIMUM	**1A**	**2A**	**1B**	**1C**
ACROSS OPEN CONTACTS, NO SHIELD:	**1.25**	**1.25**	**1.25**	**2.0**
ACROSS OPEN CONTACTS, SHIELD GUARDED:	**0.25**	**0.25**	**0.25**	**1.2**
BETWEEN CINTACT AND COIL, NO SHIELD:	**3.0**	**3.0**	**3.0**	**3.5**
BETWEEN CONTACT AND COIL, SHIELD GUARDED:	**2.0**	**2.0**	**2.0**	**2.0**

MAGNETIC INTERFERENCE: Relays are subject to interaction with stray magnetic fields. To keep within operating parameters, relays should be mounted no closer than .500 inch (12.7 mm) to each other.

* For relays with an internal coil diode, the coil leads must be connected together to avoid damage to the diode.

SERIES
MILD
STRUTHERS-DUNN

MILITARY/AEROSPACE RELAYS
DRY REED DUAL IN-LINE PACKAGE
CONTACT ARRANGEMENTS : 1A, 2A, 3B, 1C

HOW TO ORDER

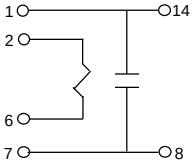
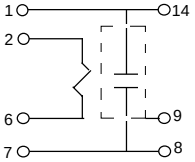
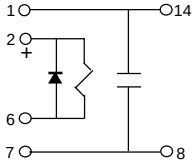
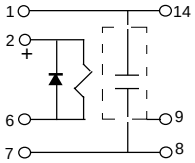
There is a Struthers-Dunn part number listed for each of the standard combinations of options available with each contact form. These are tabulated in the following 7 tables.

Select the appropriate chart by referring to the COIL DATA on page 63 which details the class of use for each contact form.

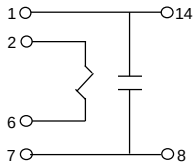
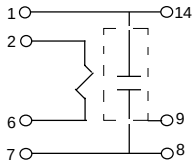
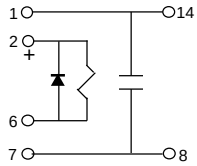
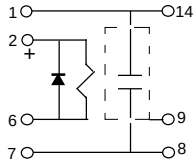
The contact shielding and the coil diode transient suppression options are shown in the wiring diagrams in each of the tables.

NOTE: Rectangle with dashed lines represents a electrostatic shield.

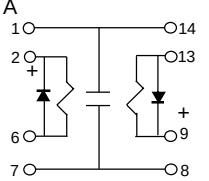
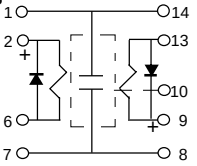
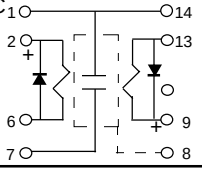
FORM 1A CONTACTS, 50 mW LOW POWER

WIRING DIAGRAM	NO. OF PINS	NOM. COIL VOLTS	STRUTHERS-DUNN PART NUMBER	MIL-R 83516/4 DASH NOS.
	14	5/6	MILD1A125	-001
	8	5/6	MILD1A125	-005
	14	5/6	MILD1A125	-002
	8	5/6	MILD1A125	-006
	14	5/6	MILD1A125	-003
	8	5/6	MILD1A125	-007
	14	5/6	MILD1A125	-004
	8	5/6	MILD1A125	-008

FORM 1A CONTACTS, GENERAL PURPOSE

WIRING DIAGRAM	NO. OF PINS	NOM. COIL VOLTS	STRUTHERS-DUNN PART NUMBER	MIL-R 83516/1 DASH NOS.
	14	5/6	MILD1A101	-001
	14	12	MILD1A102	-002
	14	24	MILD1A103	-003
	8	5/6	MILD1A113	-013
	8	12	MILD1A114	-014
	8	24	MILD1A115	-015
	14	5/6	MILD1A104	-004
	14	12	MILD1A105	-005
	14	24	MILD1A106	-006
	8	5/6	MILD1A116	-016
	8	12	MILD1A117	-017
	8	24	MILD1A118	-018
	14	]5/6	MILD1A107	-007
	14	12	MILD1A108	-008
	14	24	MILD1A109	-009
	8	5/6	MILD1A119	-019
	8	12	MILD1A120	-020
	8	24	MILD1A121	-021
	14	5/6	MILD1A110	-010
	14	12	MILD1A111	-011
	14	24	MILD1A112	-012
	8	5/6	MILD1A122	-022
	8	12	MILD1A123	-023
	8	24	MILD1A124	-024

FORM 1A CONTACTS, MAGNETIC LATCHING

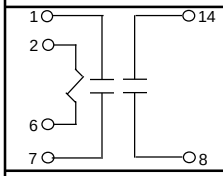
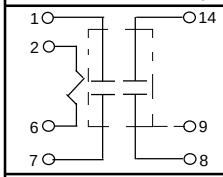
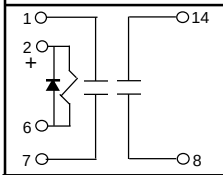
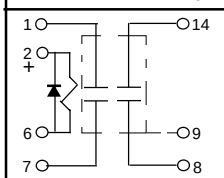
WIRING DIAGRAM	NO. OF PINS	NOM. COIL VOLTS	STRUTHERS-DUNN PART NUMBER	MIL-R 83516/2 DASH NOS.
A 	14	5/6	MILDL1A101	-001
	14	12	MILDL1A102	-002
	14	24	MILDL1A103	-003
	8	5/6	MILDL1A107	-007
	8	12	MILDL1A108	-008
	8	24	MILDL1A109	-009
B 	14	5/6	MILDL1A104	-004
	14	12	MILDL1A105	-005
	14	24	MILDL1A106	-006
CIRCUIT C FOR 8 PIN TYPES				
C 	8	5/6	MILDL1A110	-010
	8	12	MILDL1A111	-011
	8	24	MILDL1A112	-012
CIRCUIT B FOR 14 PIN TYPES				

COIL PINS +2 & -6 CLOSE CONTACT(S) ON LATCH STYLE RELAYS; COIL PINS +9 & -13 OPEN CONTACT(S) (RESET) INTERNAL COIL DIODES ARE PROVIDED IN ALL LATCHING RELAYS.

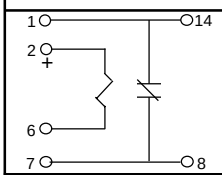
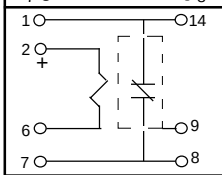
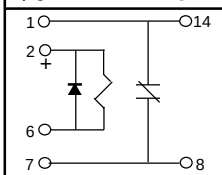
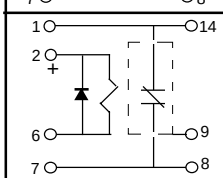
STRUTHERS-DUNN

MILITARY/AEROSPACE RELAYS
DRY REED DUAL IN-LINE PACKAGE
CONTACT ARRANGEMENTS : 1A, 2A, 3B, 1C

FORM 2A CONTACTS, GENERAL PURPOSE

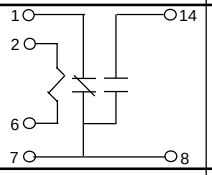
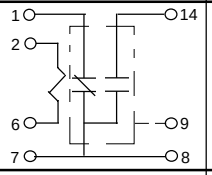
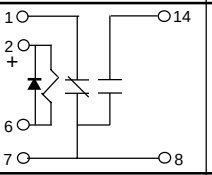
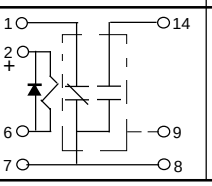
WIRING DIAGRAM	NO. OF PINS	NOM. COIL VOLTS	STRUTHERS-DUNN PART NUMBER	MIL-R 83516/1 DASH NOS.
	14	5/6	MILD2A101	-073
	14	12	MILD2A102	-074
	14	24	MILD2A103	-075
	8	5/6	MILD2A113	-085
	8	12	MILD2A114	-086
	8	24	MILD2A115	-087
	14	5/6	MILD2A104	-076
	14	12	MILD2A105	-077
	14	24	MILD2A106	-078
	8	5/6	MILD2A116	-088
	8	12	MILD2A117	-089
	8	24	MILD2A118	-090
	14	5/6	MILD2A107	-079
	14	12	MILD2A108	-080
	14	24	MILD2A109	-081
	8	5/6	MILD2A119	-091
	8	12	MILD2A120	-092
	8	24	MILD2A121	-093
	14	5/6	MILD2A110	-082
	14	12	MILD2A111	-083
	14	24	MILD2A112	-084
	8	5/6	MILD2A122	-094
	8	12	MILD2A123	-095
	8	24	MILD2A124	-096

FORM 1B CONTACTS, GENERAL PURPOSE

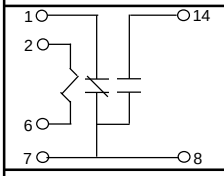
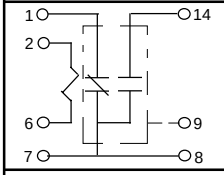
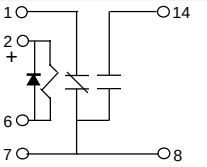
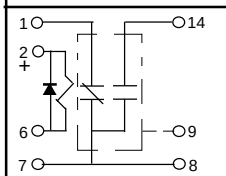
WIRING DIAGRAM	NO. OF PINS	NOM. COIL VOLTS	STRUTHERS-DUNN PART NUMBER	MIL-R 83516/1 DASH NOS.
	14	5/6	MILD1B101	-049
	14	12	MILD1B102	-050
	14	24	MILD1B103	-051
	8	5/6	MILD1B113	-061
	8	12	MILD1B114	-062
	8	24	MILD1B115	-063
	14	5/6	MILD1B104	-052
	14	12	MILD1B105	-053
	14	24	MILD1B106	-054
	8	5/6	MILD1B116	-064
	8	12	MILD1B117	-065
	8	24	MILD1B118	-066
	14	5/6	MILD1B107	-055
	14	12	MILD1B108	-056
	14	24	MILD1B109	-057
	8	5/6	MILD1B119	-067
	8	12	MILD1B120	-068
	8	24	MILD1B121	-069
	14	5/6	MILD1B110	-058
	14	12	MILD1B111	-059
	14	24	MILD1B112	-060
	8	5/6	MILD1B122	-070
	8	12	MILD1B123	-071
	8	24	MILD1B124	-072

NOTE: RETANGLE WITH DASHED LINES REPRESENTS ELECTROSTATIC SHIELD.

FORM 1C CONTACTS, GENERAL PURPOSE

WIRING DIAGRAM	NO. OF PINS	NOM. COIL VOLTS	STRUTHERS-DUNN PART NUMBER	MIL-R 83516/1 DASH NOS.
	14	5/6	MILD1C101	-025
	14	12	MILD1C102	-026
	14	24	MILD1C103	-027
	8	5/6	MILD1C113	-037
	8	12	MILD1C114	-038
	8	24	MILD1C115	-039
	14	5/6	MILD1C104	-028
	14	12	MILD1C105	-029
	14	24	MILD1C106	-030
	8	5/6	MILD1C116	-040
	8	12	MILD1C117	-041
	8	24	MILD1C118	-042
	14	5/6	MILD1CA107	-031
	14	12	MILD1C108	-032
	14	24	MILD1C109	-033
	8	5/6	MILD1C119	-043
	8	12	MILD1C120	-044
	8	24	MILD1C121	-045
	14	5/6	MILD1C110	-034
	14	12	MILD1C111	-035
	14	24	MILD1C112	-036
	8	5/6	MILD1C122	-046
	8	12	MILD1C123	-047
	8	24	MILD1C124	-048

FORM 1C CONTACTS, 170mW LOW POWER

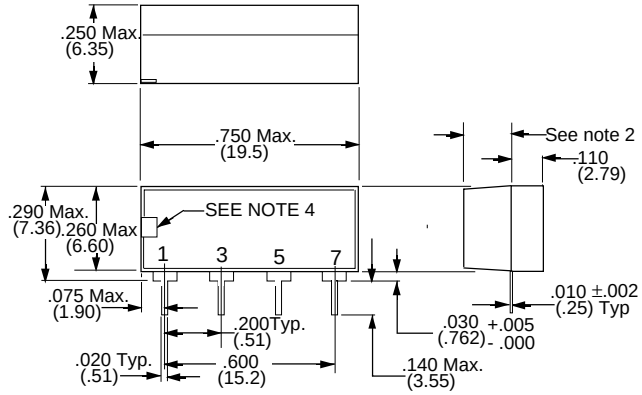
WIRING DIAGRAM	NO. OF PINS	NOM. COIL VOLTS	STRUTHERS-DUNN PART NUMBER	MIL-R 83516/4 DASH NOS.
	14	5/6	MILD1C125	-009
	8	5/6	MILD1C129	-013
	14	5/6	MILD1C126	-010
	8	5/6	MILD1C130	-014
	14	5/6	MILD1C127	-011
	8	5/6	MILD1C131	-015
	14	5/6	MILD1C128	-012
	8	5/6	MILD1C132	-016

SERIES
MILQ

STRUTHERS-DUNN

MILITARY/AEROSPACE RELAYS
DRY REED SINGLE IN-LINE PACKAGE
CONTACT ARRANGEMENTS : 1A OR 1B, 10VA

- **MANUFACTURED WITH REFERENCE TO MIL-R-83516/3/5**
  /3 GENERAL PURPOSE
  /5 LOW POWER COILS
- **SINGLE IN-LINE PACKAGE (SIP)**
- **4 PIN CONFIGURATION**
- **CONTACTS: 1 FORM A OR 1FORM B RATED 10 VA**
- **DIODE COIL TRANSIENT SUPPRESSION OPTIONAL**



NOTES:
1. DIMENSIONS SHOWN ARE IN INCH AND (MILLIMETERS)
2. WIDTH DIMENSION (MAX.):
   GENERAL PURPOSE FORM A .250
   GENERAL PURPOSE FORM B .250
   LOW POWER COILS FORM A .290
   LOW POWER COILS FORM B .350
3. PIN NUMBERS ARE FOR REFERENCE ONLY AND DO NOT APPEAR ON RELAY.
4. A POSITION INDICATOR IS AT THE NO. 1 PIN POSITION AS SHOWN.

Reed Contacts are rated in **Volt-Amperes (VA)**, the product of the voltage and current of the contact load, with upper limits on both parameters as tabulated in the table below.

CONTACT RATING-VA

Ratings Are Continuous Duty, for resistive loads.

CONTACT FORM	VOLT-AMPERES	MAX. VOLTAGE	MAX. CURRENT
1A	10	100	.500
1B	10	100	.500

CONTACT RESISTANCE:
INITIAL 0.130 OHMS MAX.
DURING AND AFTER LIFE 1.0 OHM MAX.

LIFE:
LOW LEVEL-50 MILLION AT 5 VDC AND 10 MILLIAMPS AT RATED VA-5 MILLION.

CONTACT DEFINITIONS:
FORM A-SPST, N.O. (Single Pole Single Throw, Normally Open)
FORM B-SPST, N.C. (Single Pole Single Throw, Normally Closed)

OPERATE AND RELEASE TIME

Includes Bounce

CONTACT FORM	OPERATE TIME @ NOMINAL		RELEASE TIME @ NOMINAL	
	MILLISECONDS		MILLISECONDS	
	NO DIODE	WITH DIODE	NO DIODE	WITH DIODE
FORM A	1.0	1.0	0.5	1.0
FORM B	0.5	0.5	0.5	0.5

STRUTHERS-DUNN

MILITARY/AEROSPACE RELAYS
DRY REED SINGLE IN-LINE PACKAGE
CONTACT ARRANGEMENTS : 1A OR 1B, 10VA

COIL DATA

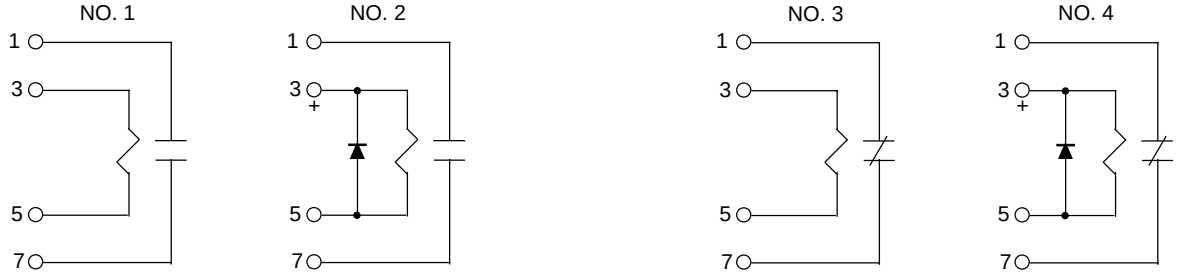
MIL TYPE MIL-R-	NOMINAL VOLTAGES	PICK-UP OR BELOW VOLTS	DROP-OUT OR ABOVE VOLTS	MINIMUM OHMS	NOMINAL OHMS	COIL POWER IN MILLIWATTS
GENERAL	5/6	3.7	0.5	180 Ω	200Ω	125
PURPOSE	12	8.00	1.0	450 Ω	500 Ω	288
83510/3	24	18.0	2.0	1835 Ω	2150 Ω	270
LOW POWER	5/6	4.0	1.0	450 Ω	500 Ω	50
83516/5	12	9.6	2.0	900Ω	1000 Ω	145

GENERAL SPECIFICATIONS

TEMPERATURE RATING	
GENERAL PURPOSE:	-40˚C to +105˚C
LOW POWER COILS	-40˚C to +85˚C
DIELECTRIC WITHSTANDING VOLTAGE	
BETWEEN MUTUALLY INSULATED COMPONENTS:	500 VDC
ACROSS OPEN CONTACTS:	250 VDC
INSULATION RESISTANCE	
BETWEEN CONTACTS:	100 VDC
SHOCK:	50 G'S. 11 mS. 1/2 SINE
VIBRATION SINUSOIDAL:	20 G'S, TO 2000 Hz
CAPACITANCE	
ACROSS OPEN CONTACTS:	1.25 pF MAX.
BETWEEN CONTACTS AND COIL:	3.0 pF MAX.
COIL TRANSIENT SUPPRESSION	
WITH INTERNAL DIODES:	1.0 VOLT NEGATIVE TRANSIENT.

Magnetic Interference: Single in-Line pqckages can be mounted side-by-side in one DIP socket. This mounting will cause their Magnetic Field to interact with each other, affecting pickup and dropout voltages by as much as 15 percent of the original parameters. Relays are also subject to interaction with stray magnetic fields. To keep within operating parameters, relays should be mounted no closer than .500 inch (12.7 mm) to each other.

HOW TO ORDER: Part numbers for every combination of options ane tabulated below.



GENERAL PURPOSE SIP MIL-R-83516/3

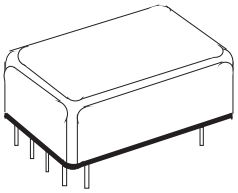
NOMINAL COIL VOLTAGES	CIRCUIT 1 PART NUMBER	MIL DASH NUMBER	CIRCUIT 2 PART NUMBER	MIL DASH NUMBER	CIRCUIT 3 PART NUMBER	MIL DASH NUMBER	CIRCUIT 4 PART NUMBER	MIL DASH NUMBER
5/6	MILQ1A 101	-001	MILQ1A 104	-004	MILQ1B 101	-007	MILQ1B 104	-010
12	MILQ1A 102	-002	MILQ1A 105	-005	MILQ1B 102	-008	MILQ1B 105	-011
24	MILQ1A 103	-003	MILQ1A 106	-006	MILQ1B 103	-009	MILQ1B 106	-012
		LOW POWER COILS SIP, MIL-R-83516/5---						
5/6	MILQ1A 107	-001	MILQ1A 109	-003	MILQ1B 107	-005	MILQ1B 109	-007
12	MILQ1A 108	-002	MILQ1A 110	-004	MILQ1B 108	-006	MILQ1B 110	-008

STRUTHERS-DUNN

MILITARY/AEROSPACE RELAYS

MINIATURE REED, METAL CASE

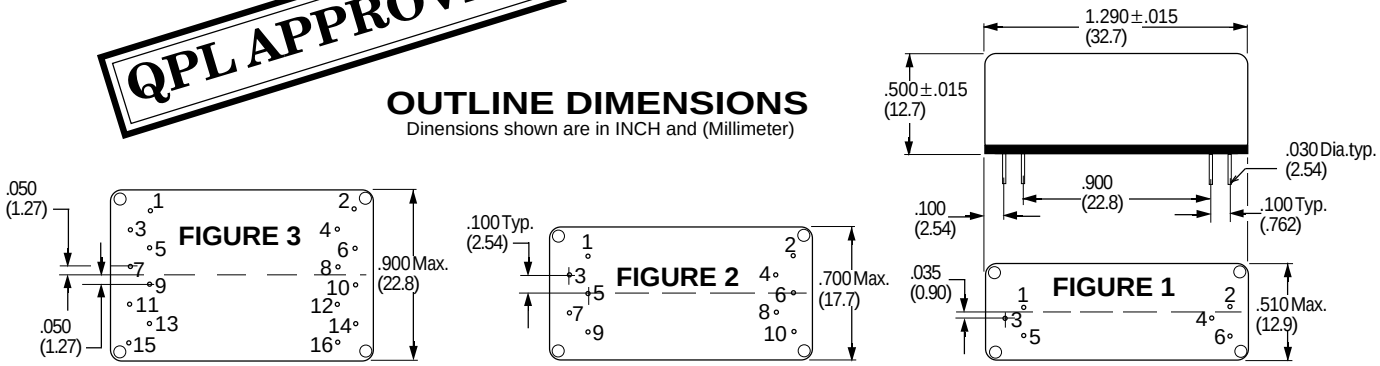
- **STAGGERED PIN DESIGN**
- **LOW LEVEL TO 0.5 AMP SWITCHING**
- **ELECTROSTATICALLY & MAGNETICALLY SHIELDED**
- **MIL-SPEC 5757/29 -001 THRU -042 QPL LISTED.**



QPL APPROVED

OUTLINE DIMENSIONS

Dinensions shown are in INCH and (Millimeter)



WIRING DIAGRAMS

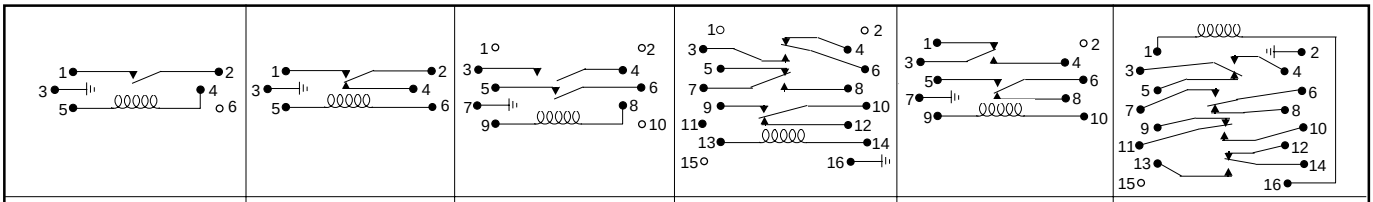


FIGURE "A"	FIGURE "B"	FIGURE "C"	FIGURE "D"	FIGURE "E"	FIGURE "F"

ALL WIRING DIAGRAMS ARE BOTTOM VIEW

SPECIFICATIONS

OPERATIONAL CHARACTERISTICS
- Timing Values
  - Operate Time: 2.0 mS Max. @ Nominal Voltage.
  - Release Time: 2.0 mS Max. @ Nominal Voltage.
  - Contact bounce: 2.0 mS Max.

INSULATION CHARACTERISTICS
- Dielectric Withstanding Voltage
  - All Mutually Insulated Points: 500 V rms Contacts to Case
  - Insulation Resistance: 1000 MΩ Exceeds 500 VDC

ENVIROMENTAL CAPABILITIES
- Operating: **Meets Qualifications under MIL5757/29**

COIL
- Pull-in Voltage: 80% of Nominal Voltage or less
- Drop-out Voltage: 10% of nominal voltage or more.
- Coil Resistance Nominal Resistance Range: ±10% Measured @ 25˚C

CONTACTS
- Contact Rating: 100 VDC, 0.5 AMP, 10VA
- Contact Material: Rhodium
- Contact Resistance: 200 Milliohms max

MISCELLANEOUS
- Terminals: Pin type, 0.100" grid spacing for printed circuit boards.
- Enclosure: Tin Dipped Steel
- Operating Position: Any
- Weight: 1 pole - 12 Grams; 2 pole - 18 Grams; 3 pole - 22 Grams; 4 pole - 24 Grams

Part Numbers	MIL-SPEC Part Numbers	Coil Measured @ 25 ˚C: Nominal Voltage (VDC)	Coil Measured @ 25 ˚C: Max. Pull-in Voltage	Coil Measured @ 25 ˚C: Max. Dropout Voltage	Number of Poles (Capsules)	Number of Switch Capsules: Form "A"	Number of Switch Capsules: Form "C"	Wiring Diagram	Case Size and Pin-Configuration	Coil Resistance (Ohms)
W194HE1A-22001	M5757/29-001	24	17	2.5	1	1	0	FIG."A"	Figure 1	2350
W194HE1C-22002	M5757/29-002	24	15.6	2.5		0	1	FIG. "B"		1450
W194HE2A-22003	M5757/29-003	24	17	2.5	2	2	0	FIG."C"	Figure 2	925
W194HE2C-22005	M5757/29-005	24	14.6	2.5		0	2	FIG. "E"		925
W194HE3C-22009	M5757/29-009	24	15.5	2.5	3	0	3	FIG."D"	Figure 3	650
W194HE4C-22014	M5757/29-014	24	14.5	2.5	4	0	4	FIG. "F"		460

COMMERCIAL RELAYS AVAILABLE WITH HIGHER COIL RESISTANCE AND CONTACT CONFIGURATIONS . CONSULT FACTORY

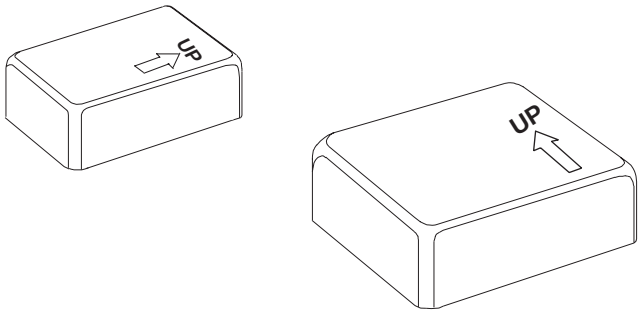
MERCURY WETTED REED RELAYS

SERIES
MRRW

STRUTHERS-DUNN

MILITARY/AEROSPACE RELAYS
MERCURY WETTED REED RELAYS

- **MERCURY WETTED CONTACTS 1, 2 OR 3 POLE-N.O. AND SPDT OR DPDT**
- **QUALIFIED TO MIL-R-83407/3**
- **HERMETICALLY SEALED**
- **WELDED CONSTRUCTION**
- **COILS FOR 4,5 AND 12 VDC**
- **WEIGHT: SINGLE POLE 12 GRAMS 2 AND 3 POLE 20 GRAMS**



The **Series MRRW** relays are made up of one or more sealed mercury-wetted contact switch capsules, mounted in a hermetically-sealed metal can, with tinned solder pins for circuit board mounting. All models have electrostatic shields. All coils have back EMF suppression.

CONTACT RATINGS

CARRY CURRENT:
FORM A (SPDT) TO 2 AMPERES
FORM C (SPDT) TO 1 AMPERE

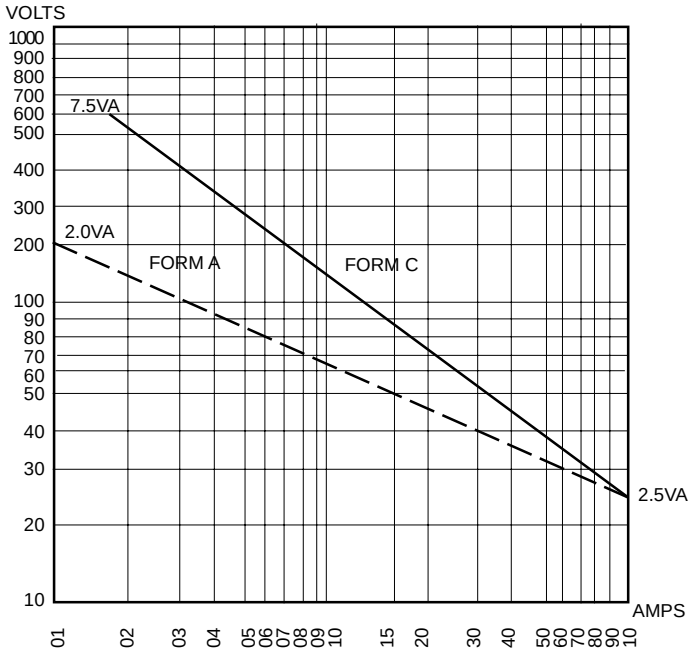
SWITCHING:
WHEN OPERATED WITHIN THE VOLTAGE AND CURRENT LIMITS (DC OR PEAK AC) SHOWN IN THE CHART BELOW, LIFE WILL BE 50 X 10^6 OPERATIONS.

CONTACT RESISTANCE:
INITIAL AND AFTER LIFE IS 60 MILLIOHMS MAX.

DIELECTRIC WITHSTANDING VOLTAGE:
1000 VDC MIN.

CONTACT RATING CURVES:

SWITCHED VOLTAGE & CURRENT COMBINATION



GENERAL SPECIFICATIONS

POSITION:	MUST BE MOUNTED IN THE VERTICAL POSITION BUT MAY DEVIATE 30˚ FROM VERTICAL
TEMPERATURE RATING:	-38˚C to +105˚C
ALTITUDE:	40,000 FEET
SHOCK, NON-OPERATING:	20G, 11 mS. 1/2 SINE
VIBRATION, SINUSOIDAL	
OPERATING:	4G, 10-500 Hz
NON-OPERATING:	.06 DA 10-55Hz, AND 20G 55-2000Hz
DIELECTRIC STRENGTH AT SEA LEVEL:	500 V rms, 60Hz., 1 mA MAX. LEAKAGE BETWEEN CASE AND CONTACTS, ALL CONTACTS , COIL AND ELECTROSTATIC SHIELD AND OTHER COMPONENTS. *
INSULATION RESISTANCE:	10,000 MEGOHMS MIN. TESTED AT 90 VDC WITH N.O. CONTACTS OPEN.
CAPACITANCE:	CONTACTS AND COIL 2 pF MAX.- BETWEEN N.O. CONTACTS. 1pF MAX.- AT 100K Hz.
OPERATE AND RELEASE TIME AT NOMINAL VOLTAGE:	3 MILLISECONDS MAX.

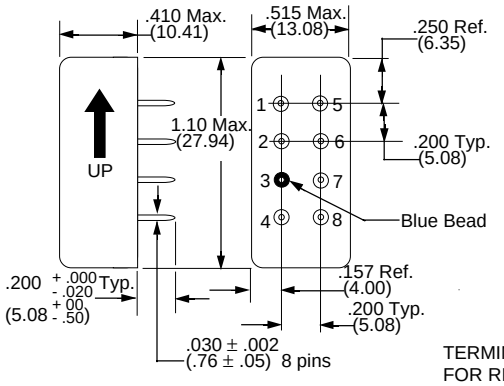
* FOR RELAYS WITH AN INTERNAL COIL DIODE, THE COIL LEADS MUST BE CONNECTED TOGEATHER TO AVOID DAMAGE TO THE DIODE.

STRUTHERS-DUNN

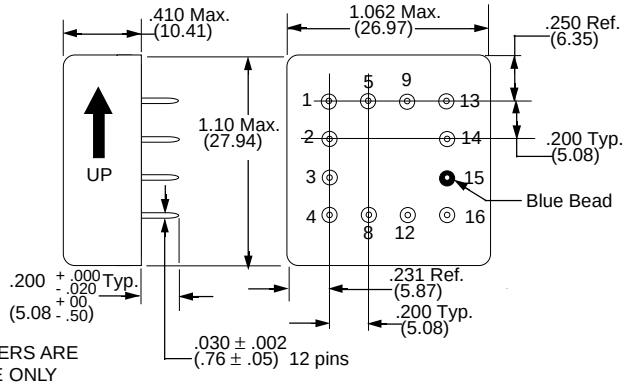
MILITARY/AEROSPACE RELAYS
MERCURY WETTED REED RELAYS

MOUNTINGS AND TERMINAL WIRING

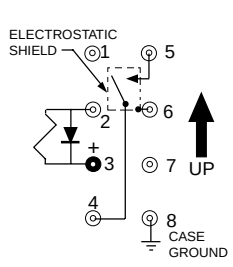
MRRW1A, 1C



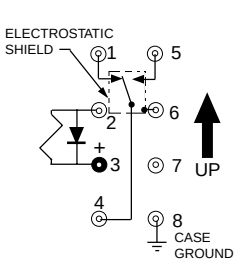
MRRW2A, 3A, 2C



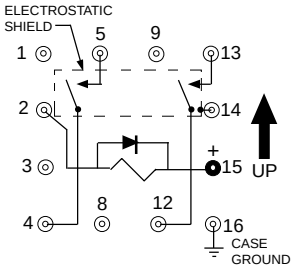
TERMINAL NUMBERS ARE
FOR REFERENCE ONLY



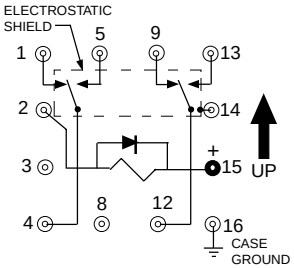
TERMINAL VIEW MRRW1A



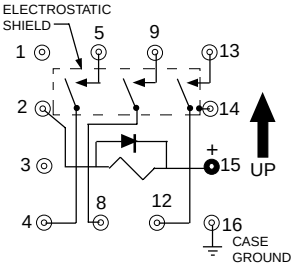
TERMINAL VIEW MRRW1C



TERMINAL VIEW MRRW2A



TERMINAL VIEW MRRW2C



TERMINAL VIEW MRRW3A

COIL AND OPERATING DATA

PART NUMBER (A)	MIL-R-83407/3 DASH NO.	RATED COIL VOLTAGE (B)	DC COIL RESISTANCE ±10% @ 25°C	OVER TEMPERATURE RANGE		CONTACT ARRANGEMENT
				PICK-UP OR BELOW VOLTS	DROP-OUT OR ABOVE VOLTS	
MRRW1A148	-011	4.5	100	4.0	0.4	1A (SPST-NO)
MRRW1A149	-012	12	500	9.6	0.9	1A (SPST-NO)
MRRW1C109	-013	12	500	9.6	0.9	1C (SPDT)
MRRW1C110	-014	4.5	87	4.0	0.4	1C (SPDT)
MRRW2A108	-015	4.5	50	4.0	0.4	2A (DPST-NO
MRRW2A109	-016	12	300	9.6	0.9	2A (DPST-NO)
MRRW2C106	-017	4.5	44	4.0	0.4	2C (DPDT)
MRRW2C107	-018	12	250	9.6	0.9	2C (DPDT)
MRRW3A108	-019	4.5	44	4.0	0.4	3A (3PST-NO)
MRRW3A109	-020	12	250	9.6	.09	3A (3PST-NO)

A. All models have gross leak and fine leak tests performed on the switch capsules, per MIL-R-83407/3.

B. CAUTION: The use of any voltage less than rated coil voltage will compromise the operation of the relay.

C. Coils are available for 6 VDC and 28 VDC.

NOTES

CROSS REFFERENCE GUIDE

SERIES
FCA

STRUTHERS-DUNN
MILITARY/AEROSPACE RELAYS
CROSS REFERENCE GUIDE

PREVIOUS MIL-SPEC P/N	CURRENT MIL-SPEC P/N	NEW MSD P/N	CATALOG EQUIVALENT P/N	PREVIOUS S-D P/N
M6106/1 - 001	**M83536/10** - 028	**FCA-210-1028**	NONE	FCA-210-31
M6106/1 - 002	**M83536/11** - 012	**FCA-210-1112**	NONE	FCA-210-33
M6106/1 - 003	**M83536/10** - 028	**FCA-210-1028**	NONE	FCA-210-32
M6106/2 - 001	**M83536/16** - 025	**FCA-410-1625**	NONE	FCA-410-31
M6106/2 - 002	**M83536/17** - 010	**FCA-410-1710**	NONE	FCA-410-33
M6106/2 - 003	**M83536/16** - 025	**FCA-410-1625**	NONE	FCA-410-34
M6106/8 - 001	**M83536/25** - 001	**FCA-610-2501**	**FCA-610-CY3**	FCA-610-1
M6106/8 - 002	**M83536/25** - 002	**FCA-610-2502**	**FCA-610-AY3**	FCA-610-2
M6106/8 - 003	**M83536/27** - 001	**FCA-610-2701**	**FCA-610-CY8**	FCA-610-3
M6106/8 - 004	**M83536/27** - 002	**FCA-610-2702**	**FCA-610-DY8**	FCA-610-4
M6106/8 - 005	**M83536/25** - 001	**FCA-610-2501**	**FCA-610-CY3**	FCA-610-5
M6106/8 - 006	**M83536/25** - 002	**FCA-610-2502**	**FCA-610-AY3**	FCA-610-6
M6106/8 - 007	**M83536/27** - 001	**FCA-610-2701**	**FCA-610-CY8**	FCA-610-7
M6106/8 - 008	**M83536/27** - 002	**FCA-610-2702**	**FCA-610-DY8**	FCA-610-8
M6106/8 - 009	**M83536/26** - 001	**FCA-610-2601**	**FCA-610-CY4**	FCA-610-9
M6106/8 - 010	**M83536/26** - 002	**FCA-610-2602**	**FCA-610-AY4**	FCA-610-10
M6106/8 - 011	**M83536/26** - 001	**FCA-610-2601**	**FCA-610-CY4**	FCA-610-11
M6106/8 - 012	**M83536/26** - 002	**FCA-610-2602**	**FCA-610-AY4**	FCA-610-12
M6106/8 - 013	**M83536/25** - 001	**FCA-610-2501**	**FCA-610-CY3**	FCA-610-13
M6106/8 - 014	**M83536/25** - 002	**FCA-610-2501**	**FCA-610-AY3**	FCA-610-14
M6106/19 - 003	**M6106/19** - 003	**FCA-125-3**	**FCA-125-CY3**	FCA-125-3
M6106/19 - 004	**M6106/19** - 004	**FCA-125-4**	**FCA-125-AY3**	FCA-125-4
M6106/19 - 005	**M6106/19** - 005	**FCA-125-5**	**FCA-125-BY3**	FCA-125-5
M6106/19 - 006	**M6106/19** - 006	**FCA-125-6**	**FCA-125-CY3**	FCA-125-6
M6106/19 - 007	**M6106/19** - 007	**FCA-125-7**	**FCA-125-AY3**	FCA-125-7
M6106/19 - 008	**M6106/19** - 008	**FCA-125-8**	**FCA-125-BX3**	FCA-125-8
M6106/19 - 009	**M6106/19** - 009	**FCA-125-9**	**FCA-125-CX3**	FCA-125-9
M6106/19 - 010	**M6106/19** - 010	**FCA-125-10**	**FCA-125-BY3**	FCA-125-10
M6106/19 - 011	**M6106/19** - 011	**FCA-125-11**	**FCA-125-CY3**	FCA-125-11
M6106/19 - 012	**M6106/19** - 012	**FCA-125-12**	**FCA-125-AY3**	FCA-125-12
M6106/19 - 013	**M6106/19** - 013	**FCA-125-13**	**FCA-125-BX3**	FCA-125-13
M6106/19 - 014	**M6106/19** - 014	**FCA-125-14**	**FCA-125-CX3**	FCA-125-14
M6106/19 - 015	**M6106/19** - 015	**FCA-125-15**	**FCA-125-BY4**	FCA-125-15
M6106/19 - 016	**M6106/19** - 016	**FCA-125-16**	**FCA-125-CY4**	FCA-125-16
M6106/19 - 017	**M6106/19** - 017	**FCA-125-17**	**FCA-125-AY4**	FCA-125-17
M6106/19 - 018	**M6106/19** - 018	**FCA-125-18**	**FCA-125-BX4**	FCA-125-18
M6106/19 - 019	**M6106/19** - 019	**FCA-125-19**	**FCA-125-CX4**	FCA-125-19
M6106/19 - 020	**M6106/19** - 020	**FCA-125-20**	**FCA-125-BY4**	FCA-125-20
M6106/19 - 021	**M6106/19** - 021	**FCA-125-21**	**FCA-125-CY4**	FCA-125-21
M6106/19 - 022	**M6106/19** - 022	**FCA-125-22**	**FCA-125-AY4**	FCA-125-22
M6106/19 - 023	**M6106/19** - 023	**FCA-125-23**	**FCA-125-BX4**	FCA-125-23
M6106/19 - 024	**M6106/19** - 024	**FCA-125-24**	**FCA-125-CX4**	FCA-125-24
M6106/19 - 025	**M6106/19** - 025	**FCA-125-25**	**FCA-125-CX3**	FCA-125-25

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MILITARY/AEROSPACE RELAYS
CROSS REFERENCE GUIDE

PREVIOUS MIL-SPEC P/N	CURRENT MIL-SPEC P/N	NEW MSD P/N	CATALOG EQUIVALENT P/N	PREVIOUS S-D P/N
M6106/21 - 003	**M83536/2** - 028	**FCB-205-0228**	**FCB-205-AT4**	FCB-210-23X
M6106/22 - 003	**M83536/6** - 025	**FCB-405-0625**	**FCB-405-AT4**	FCB-410-24X
M6106/24 - 003	**M83536/22** - 025	**FCB-310-2225**	**FCB-310-AT4**	FCB-310-26U
M6106/27 - 001	**M83536/1** - 019	**FCB-205-0119**	**FCB-205-BZ3**	FCB-210-1
M6106/27 - 002	**M83536/1** - 019	**FCB-205-0119**	**FCB-205-BZ3**	FCB-210-2X
M6106/27 - 003	**M83536/2** - 019	**FCB-205-0219**	**FCB-205-BZ4**	FCB-210-3
M6106/27 - 004	**M83536/2** - 019	**FCB-205-0219**	**FCB-205-BZ4**	FCB-210-4X
M6106/27 - 005	**M83536/1** - 020	**FCB-205-0120**	**FCB-205-CZ3**	FCB-210-5
M6106/27 - 006	**M83536/1** - 020	**FCB-205-0120**	**FCB-205-CZ3**	FCB-210-6X
M6106/27 - 007	**M83536/2** - 020	**FCB-205-0220**	**FCB-205-CZ4**	FCB-210-7
M6106/27 - 008	**M83536/2** - 020	**FCB-205-0220**	**FCB-205-CZ4**	FCB-210-8X
M6106/27 - 009	**M83536/1** - 021	**FCB-205-0121**	**FCB-205-AZ3**	FCB-210-9
M6106/27 - 010	**M83536/1**- 021	**FCB-205-0121**	**FCB-205-AZ3**	FCB-210-10X
M6106/27 - 011	**M83536/2** - 021	**FCB-205-0221**	**FCB-205-AZ4**	FCB-210-11
M6106/27 - 012	**M83536/2** - 021	**FCB-205-0221**	**FCB-205-AZ4**	FCB-210-12X
M6106/27 - 013	**M83536/1** - 022	**FCB-205-0122**	**FCB-205-BY3**	FCB-210-13
M6106/27 - 014	**M83536/1** - 022	**FCB-205-0122**	**FCB-205-BY3**	FCB-210-14X
M6106/27 - 015	**M83536/2** - 022	**FCB-205-0222**	**FCB-205-BY4**	FCB-210-15
M6106/27 - 016	**M83536/2** - 022	**FCB-205-0222**	**FCB-205-BY4**	FCB-210-16X
M6106/27 - 017	**M83536/1** - 023	**FCB-205-0123**	**FCB-205-CY3**	FCB-210-17
M6106/27 - 018	**M83536/1** - 023	**FCB-205-0123**	**FCB-205-CY3**	FCB-210-18X
M6106/27 - 019	**M83536/2** - 023	**FCB-205-0223**	**FCB-205-CY4**	FCB-210-19
M6106/27 - 020	**M83536/2** - 023	**FCB-205-0223**	**FCB-205-CY4**	FCB-210-20X
M6106/27 - 021	**M83536/1** - 024	**FCB-205-0124**	**FCB-205-AY3**	FCB-210-42
M6106/27 - 022	**M83536/1** - 024	**FCB-205-0124**	**FCB-205-AY3**	FCB-210-43X
M6106/27 - 023	**M83536/2** - 024	**FCB-205-0224**	**FCB-205-AY4**	FCB-210-44
M6106/27 - 024	**M83536/2** - 024	**FCB-205-0224**	**FCB-205-AY4**	FCB-210-45X
M6106/27 - 025	**M83536/1** - 025	**FCB-205-0125**	**FCB-205-BX3**	FCB-210-46
M6106/27 - 026	**M83536/1** - 025	**FCB-205-0125**	**FCB-205-BX3**	FCB-210-47X
M6106/27 - 027	**M83536/2** - 025	**FCB-205-0225**	**FCB-205-BX4**	FCB-210-48
M6106/27 - 028	**M83536/2** - 025	**FCB-205-0225**	**FCB-205-BX4**	FCB-210-49X
M6106/27 - 029	**M83536/1** - 026	**FCB-205-0126**	**FCB-205-CX3**	FCB-210-50
M6106/27 - 030	**M83536/1** - 026	**FCB-205-0126**	**FCB-205-CX3**	FCB-210-51X
M6106/27 - 031	**M83536/2** - 026	**FCB-205-0226**	**FCB-205-CX4**	FCB-210-52
M6106/27 - 032	**M83536/2** - 026	**FCB-205-0226**	**FCB-205-CX4**	FCB-210-53X
M6106/27 - 037	**M83536/1** - 027	**FCB-205-0127**	**FCB-205-HX3**	FCB-210-90
M6106/27 - 038	**M83536/1** - 027	**FCB-205-0127**	**FCB-205-HX3**	FCB-210-91X
M6106/27 - 039	**M83536/2** - 027	**FCB-205-0227**	**FCB-205-HX4**	FCB-210-92
M6106/27 - 040	**M83536/2**- 027	**FCB-205-0227**	**FCB-205-HX4**	FCB-210-93X

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MILITARY/AEROSPACE RELAYS
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M6106/28 - 001	**M83536/5** - 017	**FCB-405-0517**	**FCB-405-BZ3**	FCB-410-1
M6106/28 - 002	**M83536/5** - 017	**FCB-405-0517**	**FCB-405-BZ3**	FCB-410-2X
M6106/28 - 003	**M83536/6** - 017	**FCB-405-0617**	**FCB-405-BZ4**	FCB-410-3
M6106/28 - 004	**M83536/6** - 017	**FCB-405-0617**	**FCB-405-BZ4**	FCB-410-4X
M6106/28 - 005	**M83536/5** - 018	**FCB-405-0518**	**FCB-405-CZ3**	FCB-410-5
M6106/28 - 006	**M83536/5** - 018	**FCB-405-0518**	**FCB-405-CZ3**	FCB-410-6X
M6106/28 - 007	**M83536/6**- 018	**FCB-405-0618**	**FCB-405-CZ4**	FCB-410-7
M6106/28 - 008	**M83536/6** - 018	**FCB-405-0618**	**FCB-405-CZ4**	FCB-410-8X
M6106/28 - 009	**M83536/5** - 019	**FCB-405-0519**	**FCB-405-AZ3**	FCB-410-9
M6106/28 - 010	**M83536/5** - 019	**FCB-405-0519**	**FCB-405-AZ3**	FCB-410-10X
M6106/28 - 011	**M83536/6** - 019	**FCB-405-0619**	**FCB-405-AZ4**	FCB-410-11
M6106/28 - 012	**M83536/6** - 019	**FCB-405-0619**	**FCB-405-AZ4**	FCB-410-12X
M6106/28 - 013	**M83536/5** - 020	**FCB-405-0520**	**FCB-405-BY3**	FCB-410-13
M6106/28 - 014	**M83536/5** - 020	**FCB-405-0520**	**FCB-405-BY3**	FCB-410-14X
M6106/28 - 015	**M83536/6** - 020	**FCB-405-0620**	**FCB-405-BY4**	FCB-410-15
M6106/28 - 016	**M83536/6** - 020	**FCB-405-0620**	**FCB-405-BY4**	FCB-410-16X
M6106/28 - 017	**M83536/5** - 021	**FCB-405-0521**	**FCB-405-CY3**	FCB-410-17
M6106/28 - 018	**M83536/5** - 021	**FCB-405-0521**	**FCB-405-CY3**	FCB-410-18X
M6106/28 - 019	**M83536/6** - 021	**FCB-405-0621**	**FCB-405-CY4**	FCB-410-19
M6106/28 - 020	**M83536/6** - 021	**FCB-405-0621**	**FCB-405-CY4**	FCB-410-20X
M6106/28 - 021	**M83536/5** - 022	**FCB-405-0522**	**FCB-405-AY3**	FCB-410-21
M6106/28 - 022	**M83536/5** - 022	**FCB-405-0522**	**FCB-405-AY3**	FCB-410-38X
M6106/28 - 023	**M83536/6** - 022	**FCB-405-0622**	**FCB-405-AY4**	FCB-410-39
M6106/28 - 024	**M83536/6** - 022	**FCB-405-0622**	**FCB-405-AY4**	FCB-410-40X
M6106/28 - 025	**M83536/5** - 023	**FCB-405-0523**	**FCB-405-BX3**	FCB-410-41
M6106/28 - 026	**M83536/5** - 023	**FCB-405-0523**	**FCB-405-BX3**	FCB-410-42X
M6106/28 - 027	**M83536/6** - 023	**FCB-405-0623**	**FCB-405-BX4**	FCB-410-43
M6106/28 - 028	**M83536/6** - 023	**FCB-405-0623**	**FCB-405-BX4**	FCB-410-44X
M6106/28 - 029	**M83536/5** - 024	**FCB-405-0524**	**FCB-405-CX3**	FCB-410-45
M6106/28 - 030	**M83536/5** - 024	**FCB-405-0524**	**FCB-405-CX3**	FCB-410-46X
M6106/28 - 031	**M83536/6** - 024	**FCB-405-0624**	**FCB-405-CX4**	FCB-410-47
M6106/28 - 032	**M83536/6** - 024	**FCB-405-0624**	**FCB-405-CX4**	FCB-410-48X
M6106/28 - 037	**M83536/5** - 012	**FCB-405-0512**	**FCB-405-BY2**	FCB-410-53
M6106/28 - 038	**M83536/6** - 012	**FCB-405-0612**	**-**	FCB-410-54
M6106/28 - 039	**M83536/5** - 013	**FCB-405-0513**	**FCB-405-CY2**	FCB-410-55
M6106/28 - 040	**M83536/6** - 013	**FCB-405-0613**	**-**	FCB-410-56
M6106/28 - 041	**M83536/5** - 014	**FCB-405-0514**	**FCB-405-AY2**	FCB-410-57
M6106/28 - 042	**M83536/6** - 014	**FCB-405-0614**	**-**	FCB-410-58
M6106/28 - 043	**M83536/5** - 015	**FCB-405-0515**	**FCB-405-BX2**	FCB-410-76
M6106/28 - 044	**M83536/6** - 015	**FCB-405-0615**	**-**	FCB-410-77
M6106/28 - 045	**M83536/5** - 016	**FCB-405-0516**	**FCB-405-CX2**	FCB-410-78
M6106/28 - 046	**M83536/6** - 016	**FCB-405-0616**	**-**	FCB-410-79

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PREVIOUS MIL-SPEC P/N	CURRENT MIL-SPEC P/N	NEW MSD P/N	CATALOG EQUIVALENT P/N	PREVIOUS S-D P/N
M6106/29 - 001	**M83536/21** - 017	**FCB-310-2117**	**FCB-310-BZ3**	FCB-310-1
M6106/29 - 002	**M83536/21** - 017	**FCB-310-2117**	**FCB-310-BZ3**	FCB-310-2U
M6106/29 - 003	**M83536/22** - 017	**FCB-310-2217**	**FCB-310-BZ4**	FCB-310-3
M6106/29 - 004	**M83536/22** - 017	**FCB-310-2217**	**FCB-310-BZ4**	FCB-310-4U
M6106/29 - 005	**M83536/21** - 018	**FCB-310-2118**	**FCB-310-CZ3**	FCB-310-5
M6106/29 - 006	**M83536/21** - 018	**FCB-310-2118**	**FCB-310-CZ3**	FCB-310-6U
M6106/29 - 007	**M83536/22** - 018	**FCB-310-2218**	**FCB-310-CZ4**	FCB-310-7
M6106/29 - 008	**M83536/22** - 018	**FCB-310-2218**	**FCB-310-CZ4**	FCB-310-8U
M6106/29 - 009	**M83536/21** - 019	**FCB-310-2119**	**FCB-310-AZ3**	FCB-310-9
M6106/29 - 010	**M83536/21** - 019	**FCB-310-2119**	**FCB-310-AZ3**	FCB-310-10U
M6106/29 - 011	**M83536/22** - 019	**FCB-310-2219**	**FCB-310-AZ4**	FCB-310-11
M6106/29 - 012	**M83536/22** - 019	**FCB-310-2219**	**FCB-310-AZ4**	FCB-310-12U
M6106/29 - 013	**M83536/21** - 020	**FCB-310-2120**	**FCB-310-BY3**	FCB-310-13
M6106/29 - 014	**M83536/21** - 020	**FCB-310-2120**	**FCB-310-BY3**	FCB-310-14U
M6106/29 - 015	**M83536/22** - 020	**FCB-310-2220**	**FCB-310-BY4**	FCB-310-15
M6106/29 - 016	**M83536/22** - 020	**FCB-310-2220**	**FCB-310-BY4**	FCB-310-16U
M6106/29 - 017	**M83536/21** - 021	**FCB-310-2121**	**FCB-310-CY3**	FCB-310-17
M6106/29 - 018	**M83536/21** - 021	**FCB-310-2121**	**FCB-310-CY3**	FCB-310-18U
M6106/29 - 019	**M83536/22** - 021	**FCB-310-2221**	**FCB-310-CY4**	FCB-310-19
M6106/29 - 020	**M83536/22** - 021	**FCB-310-2221**	**FCB-310-CY4**	FCB-310-20U
M6106/29 - 021	**M83536/21** - 022	**FCB-310-2122**	**FCB-310-AY3**	FCB-310-21
M6106/29 - 022	**M83536/21** - 022	**FCB-310-2122**	**FCB-310-AY3**	FCB-310-22U
M6106/29 - 023	**M83536/22** - 022	**FCB-310-2222**	**FCB-310-AY4**	FCB-310-23
M6106/29 - 024	**M83536/22** - 022	**FCB-310-2222**	**FCB-310-AY4**	FCB-310-29U
M6106/29 - 025	**M83536/21** - 023	**FCB-310-2123**	**FCB-310-BX3**	FCB-310-30
M6106/29 - 026	**M83536/21** - 023	**FCB-310-2123**	**FCB-310-BX3**	FCB-310-31U
M6106/29 - 027	**M83536/22** - 023	**FCB-310-2223**	**FCB-310-BX4**	FCB-310-32
M6106/29 - 028	**M83536/22** - 023	**FCB-310-2223**	**FCB-310-BX4**	FCB-310-33U
M6106/29 - 029	**M83536/21** - 024	**FCB-310-2124**	**FCB-310-CX3**	FCB-310-34
M6106/29 - 030	**M83536/21** - 024	**FCB-310-2124**	**FCB-310-CX3**	FCB-310-35U
M6106/29 - 031	**M83536/22** - 024	**FCB-310-2224**	**FCB-310-CX4**	FCB-310-36
M6106/29 - 032	**M83536/22** - 024	**FCB-310-2224**	**FCB-310-CX4**	FCB-310-37U

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CROSS REFERENCE GUIDE

PREVIOUS MIL-SPEC P/N	CURRENT MIL-SPEC P/N	NEW MSD P/N	CATALOG EQUIVALENT P/N	PREVIOUS S-D P/N
M6101/50 - 001	**M83536/12** - 007	**FCAL-210-1207**	**FCAL-210-CY3**	FCAL-210-230
M6101/50 - 002	**M83536/12** - 008	**FCAL-210-1208**	**FCAL-210-AY3**	FCAL-210-231
M6101/50 - 003	**M83536/12** - 009	**FCAL-210-1209**	**FCAL-210-CX3**	FCAL-210-232
M6101/50 - 004	**M83536/13** - 007	**FCAL-210-1307**	**FCAL-210-CY4**	FCAL-210-233
M6101/50 - 005	**M83536/13** - 008	**FCAL-210-1308**	**FCAL-210-AY4**	FCAL-210-234
M6101/50 - 006	**M83536/13** - 009	**FCAL-210-1309**	**FCAL-210-CX4**	FCAL-210-235
M6101/50 - 007	**M83536/14** - 001	**FCAL-210-1401**	**FCAL-210-CY8**	FCAL-210-236
M6101/50 - 008	**M83536/14** - 002	**FCAL-210-1402**	**FCAL-210-AY8**	FCAL-210-237
M6101/50 - 009	**M83536/14** - 003	**FCAL-210-1403**	**FCAL-210-CX8**	FCAL-210-238
M6106/51 - 001	**M83536/18** - 007	**FCAL-410-1807**	**FCAL-410-CY3**	FCAL-410-190
M6106/51 - 002	**M83536/18** - 008	**FCAL-410-1808**	**FCAL-410-AY3**	FCAL-410-191
M6106/51 - 003	**M83536/18** - 009	**FCAL-410-1809**	**FCAL-410-CX3**	FCAL-410-192
M6106/51 - 004	**M83536/19** - 007	**FCAL-410-1907**	**FCAL-410-CY4**	FCAL-410-193
M6106/51 - 005	**M83536/19** - 008	**FCAL-410-1908**	**FCAL-410-AY4**	FCAL-410-194
M6106/51 - 006	**M83536/19** - 009	**FCAL-410-1909**	**FCAL-410-CX4**	FCAL-410-195
M6106/51 - 007	**M83536/20** - 001	**FCAL-410-2001**	**FCAL-410-CY8**	FCAL-410-196
M6106/51 - 008	**M83536/20** - 002	**FCAL-410-2002**	**FCAL-410-AY8**	FCAL-410-197
M6106/51 - 009	**M83536/20** - 003	**FCAL-410-2003**	**FCAL-410-CX8**	FCAL-410-198
MS27400- 1			**FCA-410-CY3**	FCA-410-1
MS27400- 2			**FCA-410-AY3**	FCA-410-2
MS27400- 3			**FCA-410-CY8**	FCA-410-3
MS27400- 4			**FCA-410-CY8**	FCA-410-4
MS27400- 5	**M83536/15** - 021	**FCA-410-1521**	**FCA-410-CY3**	FCA-410-5X
MS27400- 6	**M83536/15** - 022	**FCA-410-1522**	**FCA-410-AY3**	FCA-410-6X
MS27400- 7	**M83536/17** - 001	**FCA-410-1701**	**FCA-410-CY8**	FCA-410-7X
MS27400- 8	**M83536/17** - 002	**FCA-410-1702**	**FCA-410-DY8**	FCA-410-8X
MS27400- 9	**M83536/15** - 021	**FCA-410-1521**	**FCA-410-CY3**	FCA-410-9
MS27400- 10	**M83536/15** - 022	**FCA-410-1522**	**FCA-410-AY3**	FCA-410-10
MS27400- 11	**M83536/17** - 001	**FCA-410-1701**	**FCA-410-CY8**	FCA-410-11
MS27400- 12	**M83536/17** - 002	**FCA-410-1702**	**FCA-410-DY8**	FCA-410-12
MS27400- 17	**M83536/16** - 022	**FCA-410-1622**	**FCA-410-AY4**	FCA-410-17
MS27400- 18	**M83536/16** - 031	**FCA-410-1631**		FCA-410-18
MS27400- 19	**M83536/15** - 024	**FCA-410-1524**	**FCA-410-CX3**	FCA-410-19X
MS27400- 20	**M83536/17** - 006	**FCA-410-1706**	**FCA-410-CX8**	FCA-410-CX8
MS27400- 21	**M83536/15** - 024	**FCA-410-1524**	**FCA-410-CX3**	FCA-410- 41
MS27400- 22	**M83536/17** - 006	**FCA-410-1706**	**FCA-410-CX8**	FCA-410- 42
MS27400- 23	**M83536/16** - 021	**FCA-410-1621**	**FCA-410-CY4**	FCA-410- 43
MS27400- 24	**M83536/16** - 024	**FCA-410-1624**	**FCA-410-CX4**	FCA-410- 44
MS27400- 26	**M83536/17** - 004	**FCA-410-1704**	**FCA-410-CY9**	FCA-410- 46
MS27400- 27	**M83536/17** - 007	**FCA-410-1707**	**FCA-410-CX9**	FCA-410- 47
MS27400- 28	**M83536/17** - 005	**FCA-410-1705**	**FCA-410-DY9**	FCA-410- 48
MS27400- 29	**M83536/16** - 021	**FCA-410-1621**	**FCA-410-CY4**	FCA-410- 49X
MS27400- 30	**M83536/16** - 024	**FCA-410-1624**	**FCA-410-CX4**	FCA-410- 50X
MS27400- 31	**M83536/16** - 022	**FCA-410-1622**	**FCA-410-AY4**	FCA-410- 51X
MS27400- 32	**M83536/17** - 004	**FCA-410-1704**	**FCA-410-CY9**	FCA-410- CY9
MS27400- 33	**M83536/17** - 007	**FCA-410-1707**	**FCA-410-CX9**	FCA-410-CX9
MS27400- 34	**M83536/17** - 005	**FCA-410-1705**	**FCA-410-DY9**	FCA-410-DY9
MS27400- 35	**M83536/15** - 020	**FCA-410-1520**	**FCA-410-BY3**	FCA-410 -124
MS27400- 36	**M83536/15** - 020	**FCA-410-1520**	**FCA-410-BY3**	FCA-410 -125X
MS27400- 37	**M83536/16** - 020	**FCA-410-1620**	**FCA-410-BY4**	FCA-410 -126
MS27400- 38	**M83536/16** - 020	**FCA-410-1620**	**FCA-410-BY4**	FCA-410 -127X
MS27400- 39	**M83536/17** - 003	**FCA-410-1703**	**FCA-410-FY9**	FCA-410 -114
MS27400- 40	**M83536/15** - 018	**FCA-410-1518**	**FCA-410-CZ3**	FCA-410 -220
MS27400- 41	**M83536/15** - 017	**FCA-410-1517**	**FCA-410-BZ3**	FCA-410 -221
MS27400- 42	**M83536/16** - 018	**FCA-410-1618**	**FCA-410-CZ4**	FCA-410 -222
MS27400- 43	**M83536/16** - 017	**FCA-410-1617**	**FCA-410-BZ4**	FCA-410 -223
MS27400- 44	**M83536/15** - 018	**FCA-410-1518**	**FCA-410-CZ3**	FCA-410 -224X
MS27400- 45	**M83536/15** - 017	**FCA-410-1517**	**FCA-410-BZ3**	FCA-410 -225X
MS27400- 46	**M83536/16** - 018	**FCA-410-1618**	**FCA-410-CZ4**	FCA-410 -226X
MS27400- 47	**M83536/16** - 017	**FCA-410-1617**	**FCA-410-BZ4**	FCA-410 -227X
MS27400- 48	**M83536/17** - 009	**FCA-410-1709**	**FCA-410-CZ9**	FCA-410 -228
MS27400- 49	**M83536/17** - 008	**FCA-410-1708**	**FCA-410-FZ9**	FCA-410 -229
MS27400- 50	**M83536/17** - 009	**FCA-410-1709**	**FCA-410-CZ9**	FCA-410 -CZ9
MS27400- 51	**M83536/17** - 008	**FCA-410-1708**	**FCA-410-FZ9**	FCA-410 -FZ9

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MS27401 -5	**M83536/9** - 023	**FCA-210-0923**	**FCA-210-CY3**	FCA-210-5X
MS27401 -6	**M83536/9** - 024	**FCA-210-0924**	**FCA-210-AY3**	FCA-210-6X
MS27401 -7	**M83536/11** - 001	**FCA-210-1101**	**FCA-210-CY8**	FCA-210-7X
MS27401 -8	**M83536/11** - 002	**FCA-210-1102**	**FCA-210-DY8**	FCA-210-8X
MS27401 -9	**M83536/9** - 008	**FCA-210-0928**		FCA-210-9
MS27401 -10	**M83536/9** - 009	**FCA-210-0929**		FCA-210-10
MS27401 -11	**M83536/11**- 003	**FCA-210-1103**		FCA-210-11
MS27401 -12	**M83536/11**-004	**FCA-210-1104**		FCA-210-12
MS27401 -13	**M83536/9** - 023	**FCA-210-0923**	**FCA-210-CY3**	FCA-210-13
MS27401 -14	**M83536/9** - 024	**FCA-210-0924**	**FCA-210-AV3**	FCA-210-14
MS27401 -15	**M83536/11** - 001	**FCA-210-1101**	**FCA-210-CY8**	FCA-210-15
MS27401 -16	**M83536/11** - 002	**FCA-210-1102**	**FCA-210-DY8**	FCA-210-16
MS27401 -21	**M83536/9** - 026	**FCA-210-0926**	**FCA-210-CX3**	FCA-210-41X
MS27401 -22	**M83536/11** - 008	**FCA-210-1108**	**FCA-210-CX8**	FCA-210-42X
MS27401 -23	**M83536/9** - 026	**FCA-210-0926**	**FCA-210-CX3**	FCA-210-43
MS27401 -24	**M83536/11** -008	**FCA-210-1108**	**FCA-210-CX8**	FCA-210-44
MS27401 -25	**M83536/10** - 023	**FCA-210-1023**	**FCA-210-CY4**	FCA-210-45
MS27401 -26	**M83536/10** - 026	**FCA-210-1026**	**FCA-210-CX4**	FCA-210-46
MS27401 -27	**M83536/10** - 024	**FCA-210-1024**	**FCA-210-AY4**	FCA-210-47
MS27401 -28	**M83536/11** - 006	**FCA-210-1106**	**FCA-210-CY9**	FCA-210-48
MS27401 -29	**M83536/11** - 009	**FCA-210-1109**	**FCA-210-CX9**	FCA-210-49
MS27401 -30	**M83536/10** - 007	**FCA-210-1107**	**FCA-210-DY9**	FCA-210-50
MS27401 -31	**M83536/10** - 023	**FCA-210-1023**	**FCA-210-CY4**	FCA-210-51X
MS27401 -32	**M83536/10** - 026	**FCA-210-1026**	**FCA-210-CX4**	FCA-210-52X
MS27401 -33	**M83536/10** - 024	**FCA-210-1024**	**FCA-210-AY4**	FCA-210-53X
MS27401 -34	**M83536/11** -007	**FCA-210-1107**	**FCA-210-CY9**	FCA-210-54X
MS27401 -35	**M83536/11**- 009	**FCA-210-1109**	**FCA-210-CX9**	FCA-210-55X
MS27401 -36	**M83536/11**- 007	**FCA-210-1107**	**FCA-210-DY9**	FCA-210-56X
MS27401 -37	**M83536/9** - 025	**FCA-210-0925**	**FCA-210-BX3**	FCA-210-57
MS27401 -38	**M83536/9** - 025	**FCA-210-0925**	**FCA-210-BX3**	FCA-210-58X
MS27401 -39	**M83536/10** - 025	**FCA-210-1025**	**FCA-210-BX4**	FCA-210-59
MS27401 -40	**M83536/10** - 025	**FCA-210-1025**	**FCA-210-BX4**	FCA-210-60X
MS27401 -41	**M83536/9** - 022	**FCA-210-0922**	**FCA-210-BY3**	FCA-210-119
MS27401 -42	**M83536/9** -022	**FCA-210-0922**	**FCA-210-BY3**	FCA-210-120X
MS27401 -43	**M83536/10** - 022	**FCA-210-1022**	**FCA-210-BY4**	FCA-210-121
MS27401 -44	**M83536/10** - 022	**FCA-210-1022**	**FCA-210-BY4**	FCA-210-122X
MS27401 -45	**M83536/11** - 005	**FCA-210-1105**	**FCA-210-FY9**	FCA-210-123
MS27401 -46	**M83536/9** - 020	**FCA-210-0920**	**FCA-210-CZ3**	FCA-210-220
MS27401 -47	**M83536/9** - 019	**FCA-210-0919**	**FCA-210-BZ3**	FCA-210-221
MS27401 -48	**M83536/10** -020	**FCA-210-1020**	**FCA-210-CZ4**	FCA-210-222
MS27401 -49	**M83536/10** - 019	**FCA-210-1019**	**FCA-210-BZ4**	FCA-210-223
MS27401 -50	**M83536/9** - 020	**FCA-210-0920**	**FCA-210-CZ3**	FCA-210-224X
MS27401 -51	**M83536/9** - 019	**FCA-210-0919**	**FCA-210-BZ3**	FCA-210-225X
MS27401 -52	**M83536/10** - 020	**FCA-210-1020**	**FCA-210-CZ4**	FCA-210-226X
MS27401 -53	**M83536/10** - 019	**FCA-210-1019**	**FCA-210-BZ4**	FCA-210-227X
MS27401 -54	**M83536/11** - 011	**FCA-210-1111**	**FCA-210-CZ9**	FCA-210-228
MS27401 -55	**M83536/11** - 010	**FCA-210-1110**	**FCA-210-ZZ9**	FCA-210-229
MS27401 -56	**M83536/11** -011	**FCA-210-1111**	**FCA-210-CZ9**	FCA-210-230
MS27401 -57	**M83536/11** - 010	**FCA-210-1110**	**FCA-210-FZ9**	FCA-210-231X
MS27401 -58	**M83536/9** - 027	**FCA-210-0927**	**FCA-210-HX3**	FCA-210-321X
MS27401 -59	**M83536/10** - 027	**FCA-210-1027**	**FCA-210-HX4**	FCA-210-332X

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MS27418 - 1A	**MS27418**	**FC-325-1**		
MS27418 - 1B		**FC-325-2**		
MS27418 - 1C		**FC-325-3**		
MS27418 - 2A		**FC-325-4**		
MS27418 - 2B		**FC-325-5**		
MS27418 - 2C		**FC-325-6**		
MS27418 - 1D		**FC-325-7**		
MS27418 - 2D		**FC-325-8**		
MS27743- 1	**MS27743-**	**FCA-325-1**	**FCA-325-CY3**	
MS27743- 2		**FCA-325-2**	**FCA-325-AY3**	
MS27743- 3		**FCA-325-3**	**FCA-325-CX3**	
MS27743- 4		**FCA-325-4**	**FCA-325-CY3**	
MS27743- 5		**FCA-325-5**	**FCA-325-CX3**	
MS27743- 6		**FCA-325-6**	**FCA-325-AY3**	
MS27743- 7		**FCA-325-7**	**FCA-325-CY8**	
MS27743- 8		**FCA-325-8**	**FCA-325-CX8**	
MS27743- 9		**FCA-325-9**	**FCA-325-AV8**	
MS27743- 10		**FCA-325-10**	**FCA-325-CY3**	
MS27743- 11		**FCA-325-11**	**FCA-325-CX3**	
MS27743- 12		**FCA-325-12**	**FCA-325-AY3**	
MS27743- 13		**FCA-325-13**	**FCA-325-CY8**	
MS27743- 14		**FCA-325-14**	**FCA-325-CX8**	
MS27743- 15		**FCA-325-15**	**FCA-325-AV8**	
MS27743- 16		**FCA-325-16**	**FCA-325-CY4**	
MS27743- 17		**FCA-325-17**	**FCA-325-CX4**	
MS27743- 18		**FCA-325-18**	**FCA-325-AY4**	
MS27743- 19		**FCA-325-19**	**FCA-325-CY9**	
MS27743- 20		**FCA-325-20**	**FCA-325-CX9**	
MS27743- 21		**FCA-325-21**	**FCA-325-AV9**	
MS27743- 22		**FCA-325-22**	**FCA-325-CY4**	
MS27743- 23		**FCA-325-23**	**FCA-325-CX4**	
MS27743- 24		**FCA-325-24**	**FCA-325-AY4**	
MS27743- 25		**FCA-325-25**	**FCA-325-CY9**	
MS27743- 26		**FCA-325-26**	**FCA-325-CX9**	
MS27743- 27		**FCA-325-27**	**FCA-325-AV9**	
MS27743- 28		**FCA-325-28**	**FCA-325-BY3**	
MS27743- 29		**FCA-325-29**	**FCA-325-BX3**	
MS27743- 30		**FCA-325-30**	**FCA-325-BY3**	
MS27743- 31		**FCA-325-31**	**FCA-325-BX3**	
MS27743- 32		**FCA-325-32**	**FCA-325-BY4**	
MS27743- 33		**FCA-325-33**	**FCA-325-BX4**	
MS27743- 34		**FCA-325-34**	**FCA-325-BY4**	
MS27743- 35		**FCA-325-35**	**FCA-325-BX4**	

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M83407/3 -	**M83407/3** -001	**MRRW1A140**		
	M83407/3 -002	**MRRW1A141**		
	M83407/3 -003	**MRRW1C106**		
	M83407/3 -004	**MRRW1C107**		
	M83407/3 -005	**MRRW2A104**		
	M83407/3 -006	**MRRW2A105**		
	M83407/3 -007	**MRRW2C102**		
	M83407/3 -008	**MRRW2C103**		
	M83407/3 -009	**MRRW3A105**		
	M83407/3 -010	**MRRW3A106**		
	M83407/3 -011	**MRRW1A148**		
	M83407/3 -012	**MRRW1A149**		
	M83407/3 -013	**MRRW1C109**		
	M83407/3 -014	**MRRW1C110**		
	M83407/3 -015	**MRRW2A108**		
	M83407/3 -016	**MRRW2A109**		
	M83407/3 -017	**MRRW2C106**		
	M83407/3 -018	**MRRW2C107**		
	M83407/3 -019	**MRRW3A108**		
	M83407/3 -020	**MRRW3A109**		
M83516/1-	**M83516/1** -001	**MILD1A101**		
	M83516/1 -002	**MILD1A102**		
	M83516/1 -003	**MILD1A103**		
	M83516/1 -004	**MILD1A104**		
	M83516/1 -005	**MILD1A105**		
	M83516/1 -006	**MILD1A106**		
	M83516/1 -007	**MILD1A107**		
	M83516/1 -008	**MILD1A108**		
	M83516/1 -009	**MILD1A109**		
	M83516/1 -010	**MILD1A110**		
	M83516/1 -011	**MILD1A111**		
	M83516/1 -012	**MILD1A112**		
	M83516/1 -013	**MILD1A113**		
	M83516/1 -014	**MILD1A114**		
	M83516/1 -015	**MILD1A115**		
	M83516/1 -016	**MILD1A116**		
	M83516/1 -017	**MILD1A117**		
	M83516/1 -018	**MILD1A118**		
	M83516/1 -019	**MILD1A119**		
	M83516/1 -020	**MILD1A120**		
	M83516/1 -021	**MILD1A121**		
	M83516/1 -022	**MILD1A122**		
	M83516/1 -023	**MILD1A123**		
	M83516/1 -024	**MILD1A124**		
	M83516/1 -025	**MILD1C101**		
	M83516/1 -026	**MILD1C102**		
	M83516/1 -027	**MILD1C103**		
	M83516/1 -028	**MILD1C104**		
	M83516/1 -029	**MILD1C105**		
	M83516/1 -030	**MILD1C106**		

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M83516/1-	**M83516/1**- 031	**MILD1C107**		
	M83516/1- 032	**MILD1C108**		
	M83516/1- 033	**MILD1C109**		
	M83516/1- 034	**MILD1C110**		
	M83516/1- 035	**MILD1C111**		
	M83516/1- 036	**MILD1C112**		
	M83516/1- 037	**MILD1C113**		
	M83516/1- 038	**MILD1C114**		
	M83516/1- 039	**MILD1C115**		
	M83516/1- 040	**MILD1C116**		
	M83516/1- 041	**MILD1C117**		
	M83516/1- 042	**MILD1C118**		
	M83516/1- 043	**MILD1C119**		
	M83516/1- 044	**MILD1C120**		
	M83516/1- 045	**MILD1C121**		
	M83516/1- 046	**MILD1C122**		
	M83516/1- 047	**MILD1C123**		
	M83516/1- 048	**MILD1C124**		
	M83516/1- 049	**MILD1B101**		
	M83516/1- 050	**MILD1B102**		
	M83516/1- 051	**MILD1B103**		
	M83516/1- 052	**MILD1B104**		
	M83516/1- 053	**MILD1B105**		
	M83516/1- 054	**MILD1B106**		
	M83516/1- 055	**MILD1B107**		
	M83516/1- 056	**MILD1B108**		
	M83516/1- 057	**MILD1B109**		
	M83516/1- 058	**MILD1B110**		
	M83516/1- 059	**MILD1B111**		
	M83516/1- 060	**MILD1B112**		
	M83516/1- 061	**MILD1B113**		
	M83516/1- 062	**MILD1B114**		
	M83516/1- 063	**MILD1B115**		
	M83516/1- 064	**MILD1B116**		
	M83516/1- 065	**MILD1B117**		
	M83516/1- 066	**MILD1B118**		
	M83516/1- 067	**MILD1B119**		
	M83516/1- 068	**MILD1B120**		
	M83516/1- 069	**MILD1B121**		
	M83516/1- 070	**MILD1B122**		

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M83516/1-	M83516/1- 071	MILD1B123		
	M83516/1- 072	MILD1B124		
	M83516/1- 073	MILD2A101		
	M83516/1- 074	MILD2A102		
	M83516/1- 075	MILD2A103		
	M83516/1- 076	MILD2A104		
	M83516/1- 077	MILD2A105		
	M83516/1- 078	MILD2A106		
	M83516/1- 079	MILD2A107		
	M83516/1- 080	MILD2A108		
	M83516/1- 081	MILD2A109		
	M83516/1- 082	MILD2A110		
	M83516/1- 083	MILD2A111		
	M83516/1- 084	MILD2A112		
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	M83516/1- 095	MILD2A123		
	M83516/1- 096	MILD2A124		
	M83516/4- 001	MILD1A125		
	M83516/4- 002	MILD1A126		
	M83516/4- 003	MILD1A127		
	M83516/4- 004	MILD1A128		
	M83516/4- 005	MILD1A129		
	M83516/4- 006	MILD1A130		
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	M83516/4- 008	MILD1A132		
	M83516/4- 009	MILD1C125		
	M83516/4- 010	MILD1C126		
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	M83516/4- 012	MILD1C128		
	M83516/4- 013	MILD1C129		
	M83516/4- 014	MILD1C130		
	M83516/4- 015	MILD1C131		
	M83516/4- 016	MILD1C132		
	M83516/3- 001	MILQ1A101		
	M83516/3- 002	MILQ1A102		
	M83516/3- 003	MILQ1A103		
	M83516/3- 004	MILQ1A104		
	M83516/3- 005	MILQ1A105		
	M83516/3- 006	MILQ1A106		
	M83516/3- 007	MILQ1B101		
	M83516/3- 008	MILQ1B102		
	M83516/3- 009	MILQ1B103		
	M83516/3- 010	MILQ1B104		
	M83516/3- 011	MILQ1B105		
	M83516/3- 012	MILQ1B106		

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SELECTION AND APPLICATION

MIL-SPEC

APPLICATION

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MILITARY/AEROSPACE RELAYS SELECTION AND APPLICATION

This selection and application guide is suggested practices from ARP (Aerospace Recommended Practice) 4005 Concerning proper performance of relays

***CAUTION*;** The use of any coil voltage less than the rated coil voltage may compromise the operation of the relay. Choosing the proper relay depends primarily on matching the relay to the load, power supply, and environment. Selection should be limited to items that meet the following requirements:

A. Contacts must be rated for the load. Current rating, type of load (resistive, lamp, motor, inductive, and so forth), impedance range, voltage rating, DC or AC, frequency, single phase or polyphase, polyphase load balance, and type of switching or transfer should all be considered. Each of the following switching and transfer functions places a different requirement on each of the relay contacts and must be considered when selecting a relay with the proper contact rating: **(1)** On-off switching - DC, single phase or polyphase. **(2)** motor reversing (AC or DC). **(3)** transferring load between phases of same source. **(4)** Transferring load between unsynchronized AC sources.

B. Power supply characteristics must be taken into account. Voltage regulation, variations in frequency, ripples and spikes, as well as steady state conditions, should be included. If more that one power supply is involved, not only must each be suitable but interaction between them also should be investigated.

C. Coil (or coils) should be rated to insure proper operation under all anticipated conditions.

D. Consideration of environmental conditions anticipated throughout the service of life, as well as those expected during storage and transportation before installing the relays in equipment, is mandatory. Electrical parameters, environmental factors, mechanical stresses, and compatibility are among the categories for which the relay must be investigated.

E. The circuit in which the relay is used, the interlocking feature employed, the wiring harness, and the associated components should all be investigated for assuring mutual suitability.

F. Relays should be hard wired whenever possible, to avoid the need for additional contact points associated with the relay plug-in socket arrangement. (Plug-in types should be considered for quick turnaround times)

G. To permit "safe" isolation of relay circuit in the OFF condition, and eliminate an electrical shock hazard, an electromechanical switching device should be placed between the positive terminal of the power source and the relay coil.

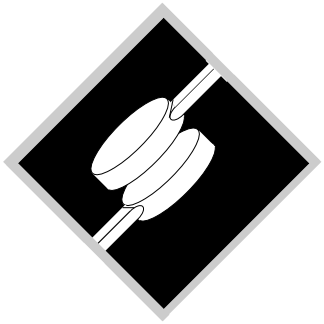
H. Proper Transistor control of the relay coil requires a stable reference voltage. This can be done by connecting the plus side of the coil to the positive side of the power source, the minus side of the relay coil to the collector of an NPN transistor, the emitter of the transistor to the grounded side of the power source, and the transistor base to the control voltage. For example, see MIL-R-28776/1.

I. Any switching device controlling the relay coil circuit must be capable of withstanding, without damage, the sum of the maximum coil circuit voltage and the peak value of transient voltage that results when the coil circuit is opened; for example, a switch controlling a relay coil that is supplied with a 28 V DC line and subjected to a transient voltage suppressed to 42 V must be capable of withstanding 28 V + 42 V or a 70 V surge without damage.

J. In selecting solid state electronic switching devices to control relay coil circuits, care must be used in selecting a solid state device with a leakage current (in the "off state") that is sufficiently low to permit the relay to drop out.

K. Control of the relay coil circuit by other than step-function switching may invalidate published relay performance properties such as pickup and dropout voltages, pickup, dropout, and bounce times.

Magnecraft & Struthers-Dunn



Dear Reader:

Magnecraft/Struthers-Dunn makes relays. But **what we catalog and sell are solutions.** Whatever your application, whatever your switching problem - - - chances are excellent that the solution can be found on the following pages.

Despite the breadth of our line, we recognize that in order to truly provide solutions, many of your needs may require assistance when choosing the proper relay for your application. For courteous and experienced assistance with unique applications, **please call (803) 393-5778** and ask to be connected with one of our application engineers.

Equally important is the recognition by all of us, that the satisfaction we derive from our work, as well as our growth, is dependent upon our ability to meet your needs. Accordingly, you will find at Magnecraft/Struthers-Dunn a willingness to go the distance. You will find this is true in all departments at all levels. Our commitment to all our constituents is this:

MISSION STATEMENT

Magnecraft/Struthers-Dunn is an innovator and provider of quality relay products, with a hands on commitment to staying close to customers worldwide.

Our goal is to deliver defect-free products on time, all the time.

We pledge ourselves to achieve these goals in a manner which assures profitability and the resources to support growth.

We encourage an atmosphere where diligence and hard work can exist in harmony with warmth, laughter, continuing education, and personal development. **We will** conduct business in a way that encourages integrity in every employee, supplier and customer relationship.

Thank You

James A. Steinback

James A. Steinback
President

Magnecraft & Struthers-Dunn

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MAGNECRAFT ELECTRIC COMPANY/ MSD, Inc. warrants its product to be free of defects in workmanship and materials for a period of one year from date of delivery to the purchaser buying direct from **MAGNECRAFT ELECTRIC COMPANY/ MSD, Inc.** or authorized Distributor.

This warranty includes, but is not limited to those products manufactured to specifications supplied to us by the purchaser. Any defects appearing more than one year from the date of delivery to the purchaser, shall be deemed to be due to ordinary wear and tear.

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