Magnecraft & Struthers-Dunn

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DOCUMENT NUMBER OUTSIDE THE U.S. & CANADA: 352

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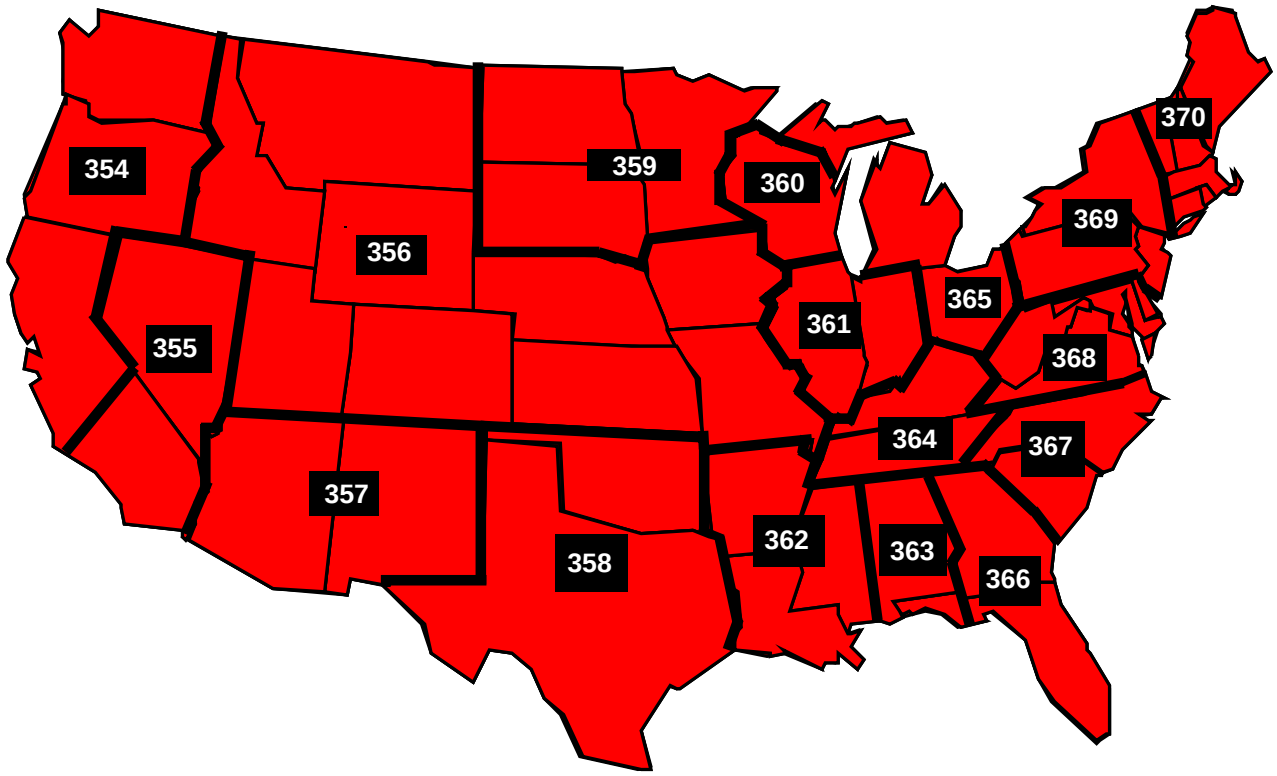


UNITED STATES DOCUMENT NUMBERS SHOWN INSIDE THE STATES.

SOCKET COMPATIBLE

AND

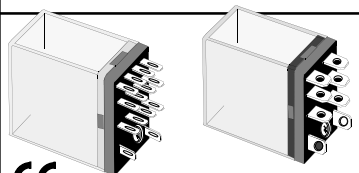
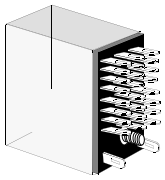
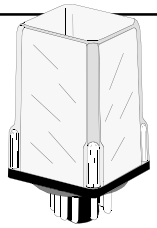
FLANGE MOUNTED

GENERAL PURPOSE RELAYS

2 TO 30 AMPERES

Magnecraft & Struthers-Dunn

SOCKET COMPATIBLE

RELAY SERIES	78	67	A314/250
SEE SECTION 10 FOR MATING SOCKETS	 QUALIFIED ISO 9002 QS 9000		 ISO 9002 QS 9000
FEATURES	POLYCARBONATE DUST COVER SOLDER/PLUG-IN OR PC BOARD MOUNTING. INDUSTRY STANDARD FOOTPRINTS. UP TO 4 POLES WITH STANDARD OR BIFURCATED CONTACTS, INDICATOR LAMP AND PUSH BUTTON, TOP FLANGE COVER , PANEL/DIN, CHASSIS OR P.C STYLE SOCKETS AVAILABLE.	POLYCARBONATE DUST COVER. SOLDER/PLUG-IN OR PC BOARD MOUNTING INDUSTRY STANDARD FOOT-PRINTS. UP TO 8 POLES WITH STANDARD OR BIFURCATED CONTACTS. CHASSIS OR PC STYLE SOCKETS AVAILABLE.	POLYCARBONATE DUST COVER 8 OR 11 PIN OCTAL PLUG-IN INDUSTRY STANDARD FOOT-PRINTS INDICATOR LAMP AND PUSH BUTTON AVAILABLE. PANEL/DIN STYLE SOCKETS AVAILABLE.
CONTACT DATA CONTACT CONFIGURATION:	SPDT, DPDT / 4PDT	SPDT TO 8PDT	SPDT / DPDT / 3PDT
MAXIMUM ALLOWABLE CONTACT LOAD:	15 &10 AMPS AT 120/240 VAC / 1, 3 & 5 AMPS AT 120/240 VAC	STANDARD CONTACTS 5 AMP BIFURCATED CONTACTS 3 AMP AT 120VAC/32VDC	12 AMPS AT 120 VAC / 12 AMPS AT 120 VAC / 10 AMPS AT 240 VAC
CONTACT MATERIAL: CONTACT RESISTANCE:	SILVER, GOLD PLATED - 1A SILVER, GOLD FLASHED - 3A SILVER CADMIUM OXIDE - 5, 10 & 15A 50 & 100 MILLIOHMS MAX	SILVER, GOLD OVERLAY 50 MILLIOHMS (INITIAL)	SILVER CADMIUM OXIDE, (GOLD FLASHED) 50 MILLIOHMS (INITIAL)
INSULATION CHARACTERISTICS DIELECTRIC STRENGTH	1500 V rms	1500 V rms	1500 V rms
COIL DATA AC - VOLTAGE: DC - VOLTAGE: POWER: VA,: (VAC) WATTS,: (VDC)	6, 12, 24,120 & 240 VAC 6, 12, 24, 48 & 110 VDC 1.2 VA 0.9 WATTS	120 VAC 5, 12, 24, 48 &115 VDC 2.5 VA 2 WATTS	24, 120 & 240 VAC 12, & 24 VDC 2.75 VA 1.2 WATTS
GENERAL DATA AMBIENT TEMPERATURE OPERATIONAL: STORAGE: TIMING VALUES MAX. OPERATE: MAX. RELEASE: LIFE MECHANICAL: ELECTRICAL:	- 40˚ C to + 70˚ C 25 MILLISECONDS 25 MILLISECONDS AC- 50M, - DC-100M OPER'S. 200,000 OPERATIONS .	- 55˚ C to + 70˚ C - 55˚C to + 105˚C 18 MILLISECONDS 8 MILLISECONDS 10 MILLION OPERATIONS 100,000 OPERATIONS	- 10˚ C to + 50˚ C (AC) - 10˚ C to + 60˚ C (DC) - 30˚ C to + 105˚ C 25 MILLISECONDS 20 MILLISECONDS 10 MILLION OPERATIONS 100,000 OPERATIONS
DIMENSIONS	H W L .858 X 1.10 X 1.40	H W L 1.20 X .735 X -	H W L 1.37 X 1.37 X 2.25
APPROVALS	c UL us, CSA, CE	UL, CSA	c UL us
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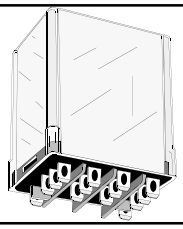
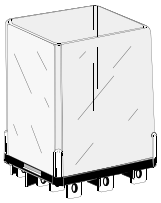
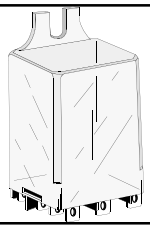
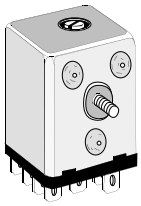
SOCKET COMPATIBLE & FLANGE MOUNT

284	388 & 283	389	97
	 CE QUALIFIED ISO 9002 QS 9000	 CE QUALIFIED ISO 9002 QS 9000	
POLYCARBONATE DUST COVER. 3/16" SOLDER/PLUG-IN, OR PC BOARD MOUNTING INDUSTRY STANDARD FOOTPRINT. CAPABLE OF SWITCHING UP TO 30 AMPS. WIDE CHOICE OF OPTIONS.	POLYCARBONATE DUST COVER. 3/16" SOLDER/PLUG-IN, FLANGE OR PC BOARD MOUNTING INDUSTRY STANDARD FOOTPRINTS. WIDE SELECTION OFPANEL/DIN, CHASSIS & P.C. STYLE SOCKETS 15 AMP VERSIONS & TOP FLANGE COVERS AVAILABLE.	POLYCARBONATE FLANGED DUST COVER. 1/4" Q.C./SOLDER LUG TERMINALS FOR QUICK CONNECT. INDUSTRY STANDARD FOOTPRINTS TOP FLANGE COVER AVAILABLE.	METAL DUST COVER 1/4" BRASS CONTACT TERMINALS DPDT-NO-NC (DM-DB) CONTACTS CHOICE OF MOUNTING MATING SOCKETS
4PDT	SPDT / DPDT / 3PDT	SPDT, DPDT / SPDT-NO-NC (DM-DB)	DPDT NO-NC (DM-DB)
MAX TOTAL LOAD 30 AMPS @ 120 VAC, 20 AMPS @ 240 VAC 10 AMPS PER POLE NOT TO EXCEED 30 AMPS	13 AMPS AT 240 VAC / 12 AMPS AT 240 VAC / 11 AMPS AT 240 VAC 388B STYLES RATED UP TO 10 AMPS AT 150 VDC.	25 AMPS @ 300 VAC / 30 AMPS @ 300 VAC 3PDT 20 AMPS @ 150 VAC	25 AMPS @ 120 VAC/28VDC TUNG. LAMP 25A, 120VAC
SILVER CADMIUM OXIDE, SILVER OR GOLD DIFFUSED 50 MILLIOHMS (INITIAL)	SILVER CADMIUM OXIDE, (GOLD FLASHED) 50 MILLIOHMS (INITIAL)	SILVER CADMIUM OXIDE 50 MILLIOHMS (INITIAL)	SILVER ALLOY 50 MILLIOHMS, (INITIAL)
1500 V rms	2000 V rms	2200 V rms	2000 V rms
6, 12, 24, 48, 120 & 240 VAC 6, 12, 24, 48, 115-125 VDC 3.4 VA 1.9 WATTS	24, 120 & 240 VAC 12, 24 & 120 VDC 2.75 VA 1.2 WATTS	24, 120 & 240 VAC 12, & 24 VDC 3.5 VA 1.44 WATTS	24, 120 & 240 VAC 12, 24 & 120 VDC 8 VA 3 WATTS
- 45˚ C to + 45˚ C (AC, COVR..) - 45˚ C to + 70˚ C (DC, COVR) - 45˚ C to + 85˚ C (DC, OPEN) 15 MILLISECONDS 10 MILLISECONDS 10 MILLION OPERATIONS 100,000 OPERATIONS	- 30˚ C to + 50˚ C (AC) - 30˚ C to + 65˚ C (DC) - 30˚ C to + 100˚ C 24 MILLISECONDS 30 MILLISECONDS 5 MILLION OPERATIONS 100,000 OPERATIONS	- 30˚ C to + 50˚ C (AC) - 30˚ C to + 65˚ C (DC) - 30˚ C to + 100˚ C 20 MILLISECONDS 20 MILLISECONDS 5 MILLION OPERATIONS 100,000 OPERATIONS	- 20˚ C to + 50˚ C 35 MILLISECONDS 35 MILLISECONDS 5 MILLION OPERATIONS 100,000 OPERATIONS
H W L	H W L	H W L	H W L
1.50 X 1.93 X 1.87	1.40 X 1.53 X 1.90	1.40 X 1.53 X 1.90	1.56 X 1.56 X 2.06
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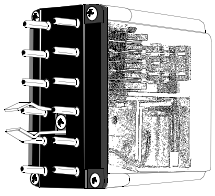
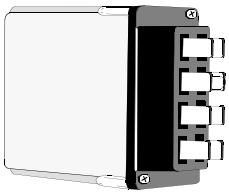
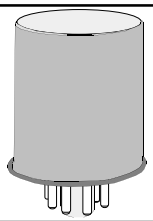
SOCKET COMPATIBLE

RELAY SERIES	219	RSX-1800	21	88HP
SEE SECTION 10 FOR MATING SOCKETS				
FEATURES	POLYCARBONATE DUST COVER 12 OR 14 PIN STYLES ENCAPSULATED COIL WIDE CHOICE OF CONTACT COMBINATIONS. LARGE CHOICE OF OPTIONS MATING SOCKETS AVAILABLE	POLYCARBONATE DUST COVER 12 PIN STYLES PERFORMS BASIC FUNCTIONS OF AN ALARM POINT OPERATES FROM AN N.O. OR N.C. TROUBLE CONTACT MATING SOCKETS AVAILABLE	POLYCARBONATE DUST COVER MEETS NEMA STD. TS 2-1992 APPROVED BY D.O.T INDUSTRY STANDARD FOOTPRINT	HERMETICALLY SEALED STEEL ENCLOSURE 10 AMP AND 12 AMP CONTACTS 8 OR 11 PIN OCTAL BASE.
CONTACT DATA CONTACT CONFIGURATION:	VARIOUS COMBINATIONS	2 PAIR of DPDT or 3PDT	DPDT	DPDT, 3PDT
MAXIMUM ALLOWABLE CONTACT LOAD:	10 AMPS @ 240 VAC/28 VDC Available with Make Before Break contacts	10 AMPS @ 120VAC, 28 VDC	20 AMPS @ 120/240 VAC, 28 VDC 20 AMPS, 120VAC TUNGSTEN	**(2 POLE)** 12 AMPS @ 120VAC 8 AMPS @ 240 VAC **(3 POLE)** 10 AMPS @ 120VAC 6 AMPS @ 240 VAC
CONTACT MATERIAL:	SILVER CADMIUM OXIDE, GOLD DIFFUSED	SILVER CADMIUM OXIDE	SILVER ALLOY	SILVER CADMIUM OXIDE
CONTACT RESISTANCE:	50 MILLIOHMS (INITIAL)	50 MILLIOHMS (INITIAL)	100 MILLIOHMS (INITIAL)	50 MILLIOHMS (INITIAL)
INSULATION CHARACTERISTICS DIELECTRIC STRENGTH	1500 V rms	1500 V rms	1500 V rms	1500 V rms
COIL DATA AC - VOLTAGE: DC - VOLTAGE: POWER: VA,: (VAC) WATTS,: (VDC)	6, 12, 24, 120 & 240 AC 6,12, 24(28),32,115(125)DC 5 VA 1.8 WATTS	6, 12, 24 & 120 VAC 6, 12, 24 & 110-125 VDC 5 VA 1.8 WATTS	120 VAC OPTIONAL VDC 4 & 8 VA -	120 VAC 12, 24 VDC 3.0 VA 1.5 WATTS
GENERAL DATA AMBIENT TEMPERATURE OPERATIONAL: STORAGE: TIMING VALUES MAX. OPERATE: MAX. RELEASE: LIFE MECHANICAL: ELECTRICAL:	- 10˚ C to + 60˚ C 25 MILLISECONDS 20 MILLISECONDS 20 MILLION OPERATIONS 100,000 OPERATIONS	- 10˚ C to + 70˚ C 25 MILLISECONDS 20 MILLISECONDS 20 MILLION OPERATIONS 500,000 OPERATIONS	- 40˚ C to + 84˚ C 25 MILLISECONDS 25 MILLISECONDS 5 MILLION OPERATIONS 250,000 OPERATIONS	- 10˚C to + 50˚C (AC), - 10˚C to + 60˚C (DC), -30˚C to + 105˚C 25 MILLISECONDS 20 MILLISECONDS 5 MILLION OPERATIONS 100,000 OPERATIONS
DIMENSIONS	H W L .2.62 X 1.468 X .2.593	H W L .2.62 X 1.468 X 2.593	H W L .2.47 X 1.85 X 2.84	H W L 1.53 X 1.53X 2.03
APPROVALS				
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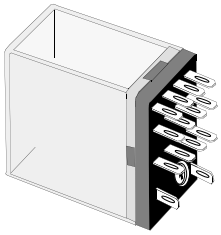
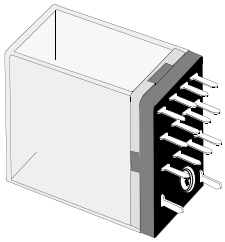
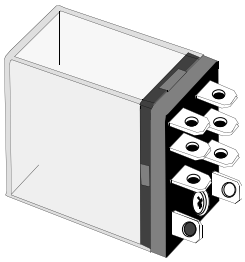
ICE CUBE STYLE SOLDER/PLUG-IN OR PC BOARD RELAY



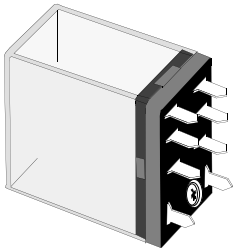
W78ACSX & CSX
4PDT, SOLDER/PLUG-IN
1, 3 OR 5 AMP



W78APCX & PCX
4PDT, PRINTED CIRCUIT
1, 3 OR 5 AMP



W78ARCSX & RCSX
SPDT, DPDT, SOLDER/PLUG-IN
10 OR 15 AMP



W78ARPCX & RPCX
SPDT, DPDT, SOLDER/PLUG-IN
10 OR 15 AMP

MANUFACTURED UNDER QUALITY SYSTEM
ISO 9002 & QS 9000

Recognized Component mark for Canada and the United States.
UL Recognized
File No. E52197

COMPLIES WITH REQUIREMENTS OF
* IEC STANDARDS 947-4-1 AND 947-5-1 LOW VOLTAGE DIRECTIVE

* IEC = INTERNATIONAL ELECTROTECHNICAL COMMISSION

SPECIFICATIONS CLASS 78

COIL

Pull-in Voltage:	75% of Nominal Voltage or less for DC, 80% of nominal or less for AC.
Dropout:	DC -10% min., AC - 30% min.
Max. Voltage:	110%
Coil Resistance:	±15% AC & DC
Coil Insulation:	Class "B" coil insulation system (130˚C per UL standard 1446)
Maximum tolerable coil dissipation:	2.3 Watts DC, 2.55 VA (60Hz) AC, approx. 5 minutes max. @ 40˚C
Duty:	Continuous

CONTACTS

Contact Configurations:	SPDT, DPDT, 4PDT.
Contact Material:	1 Amp Bifurcated Silver Gold plated. 3 AMP Silver Gold flashed 5 Amp, Silver Cadmium Oxide. 10 & 15 AMP, Silver Cadmium Oxide.
Contact Resistance:	100 Milliohms Max.(3, 5, 10 & 15AMP) @ 6V, 1 AMP 50 Milliohms Max. (1 AMP) @ 6V, 0.1 AMP
Contact Rating:	**4PDT-** Bifurcated 1Amp @ 120/240 VAC 30VDC. 1/16HP (2.8A FLA), 120VAC. Pilot duty - 5A make, 1/2A break, 1 A continuous, 120 VAC **4PDT-** 3 Amps @ 120/240 VAC, 30VDC, 1/10HP 120/240VAC, C300 pilot duty. **4PDT-** 5 Amps @ 120/240 VAC, 30VDC, 1/6 HP 120/240VAC, C300 pilot duty **DPDT** -10 Amps @ 120/240VAC, 30VDC.1/3 HP,120VAC. 1/2HP 240VAC. **SPDT** -15 Amps @ 120/240VAC, 30VDC.1/3 HP 120VAC, 1/2 HP 240VAC.

TIMING

Operate Time:	25mS Max. @ Nominal Voltage.
Release Time:	25 mS Max. @ Nominal Voltage.

DIELECTRIC STRENGTH

Coil to Frame:	1500 V rms
Across Open Contacts:	1000 V rms
Contact to Frame:	1500 V rms
Insulation Resistance:	100 Megohms Min. @ 500 VDC.

TEMPERATURE

Ambient Temperature:	-40˚C to + 70˚C @ Rated Operation

VIBRATION RESISTANCE

Functional:	10 to 55 Hz; 1mm (Double Amplitude

SHOCK RESISTANCE

Mechanical Durability:	Mechanical Durability, 1000 m/s^2 (approx.100 G).
Malfunction Durability:	Malfunction Durability, 200 m/s^2 (approx. 20 G).

LIFE EXPECTANCY

Mechanical (No Load):	10,000,000 Operations (AC & DC).
Electrical (rated Load):	200,000 Operations Min. (at rated Resistive load).

MISCELLANEOUS

Enclosure:	Clear Polycarbonate Dust Cover, Molded.
Weight:	**SPDT & DPDT** 1.41 oz, (Approx. 40 g) , **4PDT** 2.47 oz. (Approx. 70 g).

NEW
EPOXY SEALED VERSIONS AVAILABLE. CONSULT FACTORY.

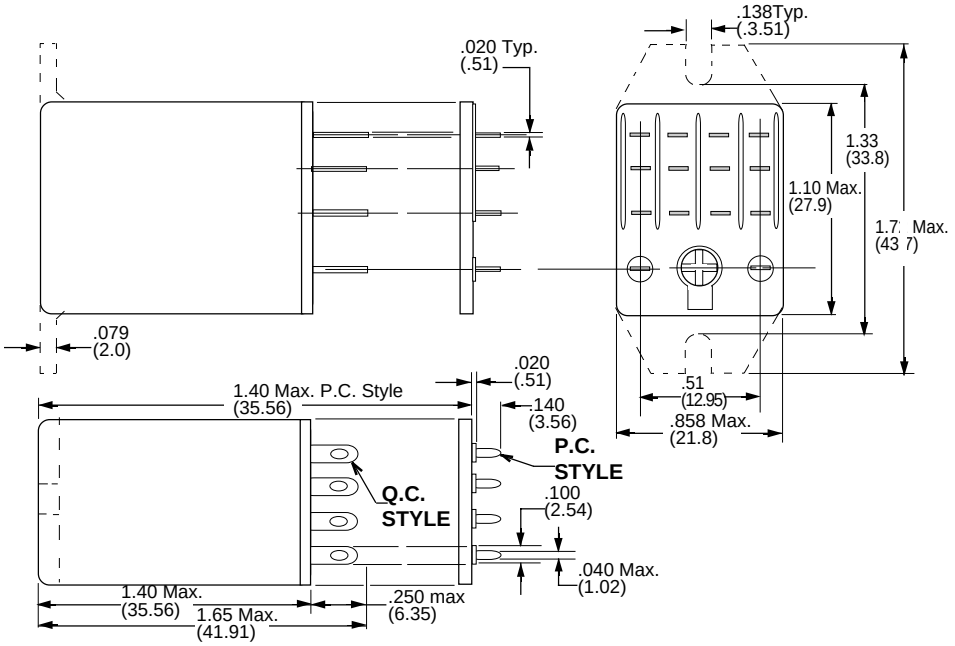
*** RELEVANT IEC CONTACT UTILIZATION CATEGORIES**

CE	**AC-1, AC-3, DC-1, AC-15**
	(SEE SECTION 11 FOR RELEVANT UTILIZATION CATEGORIES.)

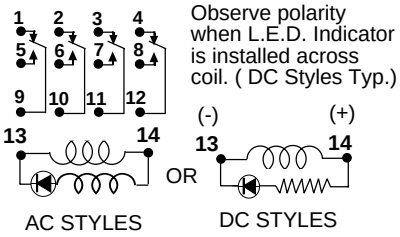
ICE CUBE STYLE SOLDER/PLUG-IN OR PC BOARD RELAY

OUTLINE DIMENSIONS
Dimensions shown in INCHES and (MILLIMETERS)

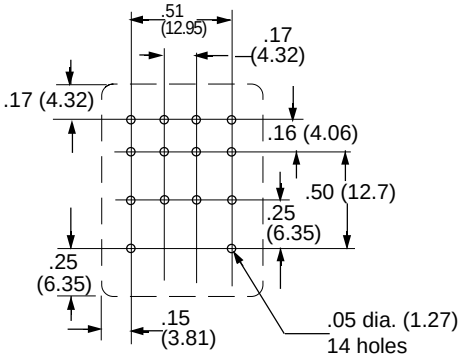
Optional FLANGED COVER available on special order as Non-Stock.



WIRING DIAGRAM
FOR 4PDT RELAY

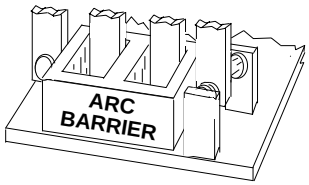


ALL INDICATOR LAMP STYLE RELAYS HAVE AN ADDITIONAL LAMP CIRCUIT INSTALLED ACROSS COIL.



P.C MOUNTING HOLE LAYOUT
(BOTTOM VIEW)

ALL 4 POLE RELAYS HAVE OPPOSITE POLARITY ARC BARRIERS AS A STANDARD FEATURE. ARC BARRIERS PROVIDE GREATER VOLT-AGE PROTECTION BETWEEN ADJACENT POLES



NEW!
1 AMP

4PDT RELAYS

CONTACTS	Coil measured @ 25˚C			CROSS REFERENCE TO		
BIFURCATED 1 AMP	Nominal Input Voltage	Nominal Resistance (Ohms)	Nominal Power (Approx.)	POTTER & BRUMFIELD	IDEC	OMRON
AC OPERATED COIL - SOLDER/PLUG-IN STYLE.						
W78ATCSX-2	12 VAC	46	1.2VA	KHAU17A96-12	RY42S-U-AC12V	MY4Z-UA-AC12
W78ATCSX-3	24VAC	180	1.2VA	KHAU17A96-24	RY42S-U-AC24V	MY4Z-UA-AC24
W78ATCSX-5	120 VAC	4430	1.2VA	KHAU17A96-120	RY42S-U-AC110/120V	MY4Z-UA-AC120
W78ATCSX-6	240 VAC	15,700	1.2VA	KHAU17A96-240	RY42S-U-AC220/240V	MY4Z-UA-AC240
AC OPERATED COIL - SOLDER/PLUG-IN WITH INDICATOR LAMP.						
W78ANTCSX-4	24 VAC	180	1.2VA		RY42S-UL-AC24V	MY4ZN-UA-AC12
W78ANTCSX-5	120VAC	4430	1.2VA	KHAU17A96N-120	RY42S-UL-AC110/120V	MY4ZN-UA-AC24
W78ANTCSX-7	240 VAC	15,700	1.2VA		RY42S-UL-AC220/240V	MY4ZN-UA-AC240
DC OPERATED COIL - SOLDER/PLUG-IN STYLE						
W78TCSX-1	6 VDC	40	0.9W	KHAU17D96-6	RY42S-U-DC6V	MY4Z-UA-DC6
W78TCSX-2	12 VDC	160	0.9W	KHAU17D96-12	RY42S-U-DC12V	MY4Z-UA-DC12
W78TCSX-3	24VDC	650	0.9W	KHAU17D96-24	RY42S-U-DC24V	MY4Z-UA-DC24
W78TCSX-5	110 VDC	11,000	1.1W	KHAU17D96-110	RY42S-U-DC100/110V	MY4Z-UA-DC110
DC OPERATED COIL - SOLDER/PLUG-IN WITH INDICATOR LAMP						
W78NTCSX-5	24 VDC	650	0.9W	KHAU17D96L-24	RY42S-UL-DC24V	MY4ZN-UA-DC24

PART NUMBERS SHOWN ALSO **AVAILABLE THRU STOCKING DISTRIUBUTION.**

SEE SECTION 10 FOR MATING SOCKETS

4PDT RELAYS - 3 AMP

CONTACTS	Coil measured @ 25˚C			CROSS REFERENCE TO		
3 AMP	Nominal Input Voltage	Nominal Resistance (Ohms)	Nominal Power (Approx.)	POTTER & BRUMFIELD	IDEC	OMRON
AC OPERATED COIL - SOLDER/PLUG-IN STYLE.						
W78ACSX-2	12 VAC	46	1.2VA	KHAU17A91-12	RY4S-U-AC12V	MY4-UA-AC12
W78ACSX-3	24VAC	180	1.2VA	KHAU17A91-24	RY4S-U-AC24V	MY4-UA-AC24
W78ACSX-5	120 VAC	4430	1.2VA	KHAU17A91-120	RY4S-U-AC110/120V	MY4-UA-AC120
W78ACSX-6	240 VAC	15,700	1.2VA	KHAU17A91-240	RY4S-U-AC220/240V	MY4-UA-AC240
AC OPERATED COIL - SOLDER/PLUG-IN WITH INDICATOR LAMP.						
W78ANCSX-24	24 VAC	180	1.2VA		RY4S-UL-AC24V	MY4N-UA-AC12
W78ANCSX-25	120VAC	4430	1.2VA	KHAU17A91N-120	RY4S-UL-AC110/120V	MY4N-UA-AC24
W78ANCSX-26	240 VAC	15,700	1.2VA	KHAU17A91N-240	RY4S-UL-AC220/240V	MY4N-UA-AC240
DC OPERATED COIL - SOLDER/PLUG-IN STYLE						
W78CSX-1	6 VDC	40	0.9W	KHAU17D91-6	RY4S-U-DC6V	MY4-UA-DC6
W78CSX-2	12 VDC	160	0.9W	KHAU17D91-12	RY4S-U-DC12V	MY4-UA-DC12
W78CSX-3	24VDC	650	0.9W	KHAU17D91-24	RY4S-U-DC24V	MY4-UA-DC24
W78CSX-6	110 VDC	11,000	1.1W	KHAU17D91-110	RY4S-U-DC100/110V	MY4-UA-DC110
DC OPERATED COIL - SOLDER/PLUG-IN WITH INDICATOR LAMP						
W78NCSX-23	24 VDC	650	0.9W	KHAU17D91N-24	RY4S-UL-DC24V	MY4N-UA-DC24
AC OPERATED - PRINTED CIRCUIT STYLE						
W78APCX-3	24 VAC	180	1.2VA	KHAE17A11-24	RY4V-U-AC24V	MY4-02-UA-AC24
W78APCX-5	12 0 VAC	4430	1.2VA	KHAE17A11-120	RY4V-U-AC110/120V	MY4-02-UA-AC120
DC OPERATED - PRINTED CIRCUIT STYLE						
W78PCX-2	12 VDC	160	0.9W	KHAE17D11-12	RY4V-U-DC12V	MY4-02-UA-DC12
W78PCX-3	24 VDC	650	0.9W	KHAE17D11-24	RY4V-U-DC24V	MY4-02-UA-DC24
W78PCX-6	110 VDC	11,000	1.1W	KHAE17D11-110	RY4V-U-DC100/110V	MY4-02-UA-DC110

4PDT RELAYS - 5 AMP

CONTACTS	Coil measured @ 25˚C			CROSS REFERENCE TO	
5 AMP	Nominal Input Voltage	Nominal Resistance (Ohms)	Nominal Power (Approx.)	POTTER & BRUMFIELD	IDEC
AC OPERATED COIL - SOLDER/PLUG-IN STYLE.					
	12 VAC	46	1.2VA	KHAU17A21-12	RY4S-U-AC12V
W78KACSX-15	24VAC	180	1.2VA	KHAU17A21-24	RY4S-U-AC24V
W78KACSX-17	120 VAC	4430	1.2VA	KHAU17A21-120	RY4S-U-AC110/120V
W78KACSX-18	240 VAC	15,700	1.2VA	KHAU17A21-240	RY4S-U-AC220/240V
DC OPERATED COIL - SOLDER/PLUG-IN STYLE					
W78KCSX-12	12 VDC	160	0.9W	KHAU17D21-12	RY4S-U-DC12V
W78KCSX-13	24VDC	650	0.9W	KHAU17D21-24	RY4S-U-DC24V

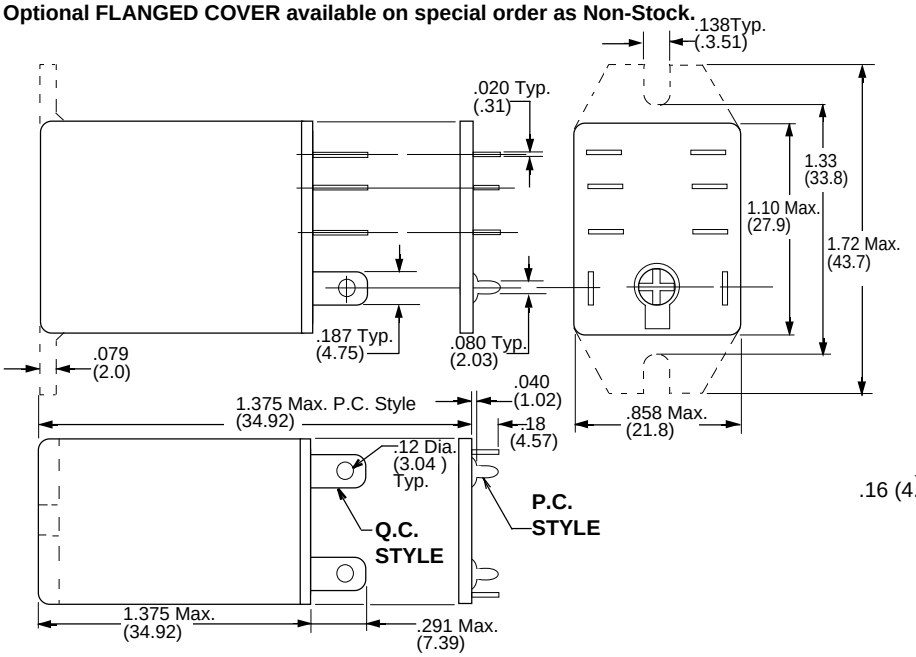
PART NUMBERS SHOWN ALSO **AVAILABLE THRU STOCKING DISTRIUBUTION.**

SEE SECTION 10 FOR MATING SOCKETS

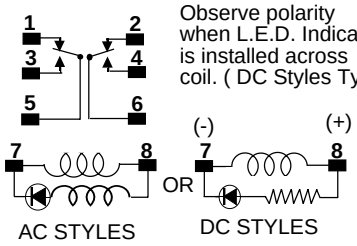
ICE CUBE STYLE SOLDER/PLUG-IN OR PC BOARD RELAY

OUTLINE DIMENSIONS
Dimensions shown in INCHES and (MILLIMETERS)

Optional FLANGED COVER available on special order as Non-Stock.

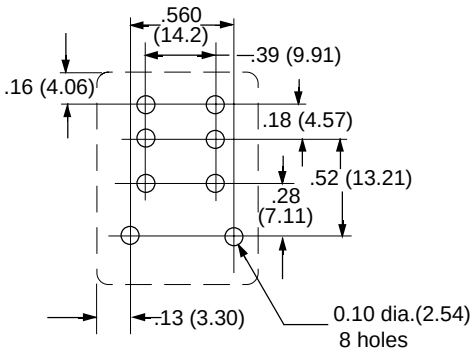


DOUBLE POLE DOUBLE THROW



Observe polarity when L.E.D. Indicator is installed across coil. (DC Styles Typ.)

ALL INDICATOR LAMP STYLE RELAYS HAVE AN ADDITIONAL LAMP CIRCUIT INSTALLED ACROSS COIL.



P.C MOUNTING HOLE LAYOUT
(BOTTOM VIEW)

DPDT RELAYS - 10 AMPS

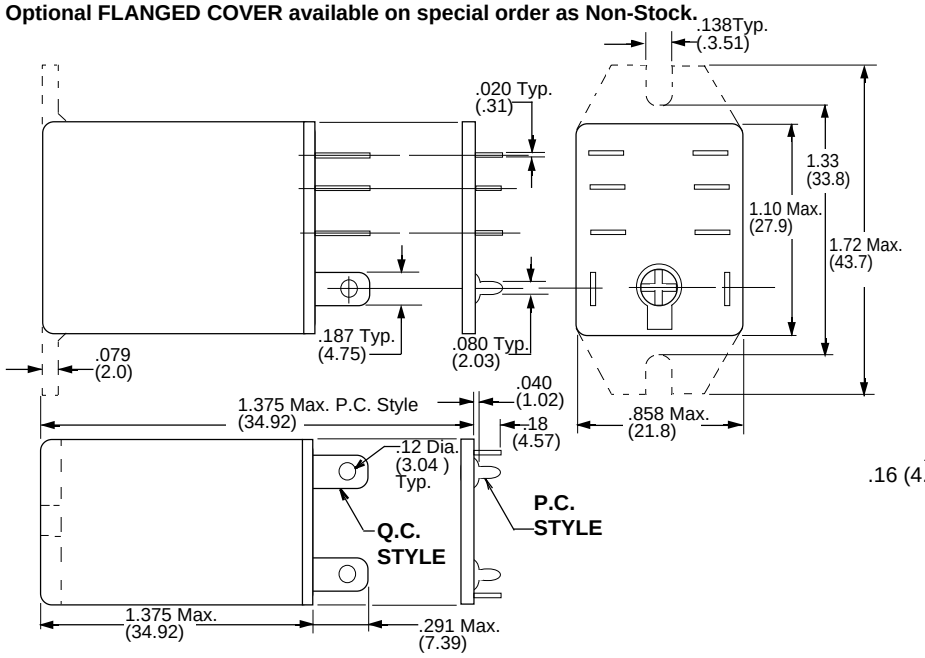
DPDT, 10 AMP		Coil measured @ 25˚C			CROSS REFERENCE TO*		
STANDARD COVER	TOP FLANGE COVER	Nominal Input Voltage	Nominal Resistance (Ohms)	Nominal Power (Approx.)	POTTER & BRUMFIELD	IDEC	OMRON
AC OPERATED COIL - SOLDER/PLUG-IN STYLE.							
W78ARCSX-7	78ARCSX-1	6 VAC	12.2	1. VA	K10P11A15-6	RH2B-U-AC6V	LY2-UA-AC6
W78ARCSX-9	78ARCSX-3	24VAC	180	1.2VA	K10P11A15-24	RH2B-U-AC24V	LY2-UA-AC24
W78ARCSX-11	78ARCSX-5	120 VAC	4430	1.2VA	K10P11A15-120	RH2B-U-AC110/120V	LY2-UA-AC120
W78ARCSX-12	78ARCSX-6	240 VAC	15,700	1.2VA	K10P11A15-240	RH2B-U-AC220/240V	LY2-UA-AC240
AC OPERATED COIL - SOLDER/PLUG-IN WITH INDICATOR LAMP.							
W78ARNCSX-6		24 VAC	180	1.2VA		RH2B-UL-AC24V	LY2N-UA-AC24
W78ARNCSX-5		120VAC	4430	1.2VA	K10L11A15-120	RH2B-UL-AC110/120V	LY2N-UA-AC120
W78ARNCSX-7		240 VAC	15,700	1.2VA		RH2B-UL-AC220/240V	LY2N-UA-AC240
DC OPERATED COIL - SOLDER/PLUG-IN STYLE							
W78RCSX-6	78RCSX-1	6 VDC	40	0.9W	K10P11D15-6	RH2B-U-DC6V	LY2-UA-DC6
W78RCSX-7	78RCSX-2	12 VDC	160	0.9W	K10P11D15-12	RH2B-U-DC12V	LY2-UA-DC12
W78RCSX-8	78RCSX-3	24VDC	650	0.9W	K10P11D15-24	RH2B-U-DC24V	LY2-UA-DC24
W78RCSX-9	78RCSX-4	48 VDC	2,600	0.9W	K10P11D15-48	RH2B-U-DC48V	LY2-UA-DC48
W78RCSX-10	78RCSX-5	110 VDC	11,000	1.1W	K10P11D15-110	RH2B-UL-DC100/110V	LY2-UA-DC110
DC OPERATED COIL -SOLDER/PLUG-IN WITH INDICATOR LAMP							
W78RNCSX-6		24 VDC	650	0.9W		RH2B-UL-DC24V	LY2N-UA-DC24
AC OPERATED COIL -P.C. TERMINAL STYLE							
W78ARPCX-5		120 VAC	4430	1.2VA	K10P11A55-120	RH2V2-U-AC110/120V	LY2-0-UA-AC120
W78ARPCX-6		240 VAC	15,700	1.2VA	K10P11A55-240	RH2V2-U-AC220/240V	LY2-0-UA-AC240
DC OPERATED COIL -P.C. TERMINAL STYLE							
W78RPCX-1		6VDC	40	0.9W	K10P11D55-6	RH2V2-U-DC6V	LY2-0-UA-DC6
W78RPCX-2		12 VDC	160	0.9W	K10P11D55-12	RH2V2-U-DC12V	LY2-0-UA-DC12
W78RPCX-3		24 VDC	650	0.9W	K10P11D55-24	RH2V2-U-DC24V	LY2-0-UA-DC24

PART NUMBERS SHOWN ALSO **AVAILABLE THRU STOCKING DISTRIUBUTION.** *** Applies to Standard Cover**
SEE SECTION 10 FOR MATING SOCKETS

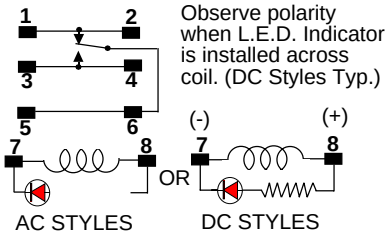
OUTLINE DIMENSIONS

Dimensions shown in INCHES and (MILLIMETERS)

Optional FLANGED COVER available on special order as Non-Stock.

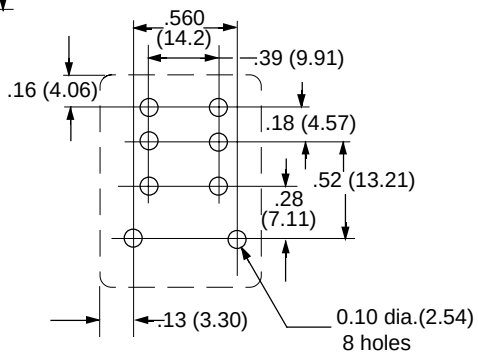


SINGLE POLE DOUBLE THROW



Observe polarity when L.E.D. Indicator is installed across coil. (DC Styles Typ.)

ALL INDICATOR LAMP STYLE RELAYS HAVE AN ADDITIONAL LAMP CIRCUIT INSTALLED ACROSS COIL.



P.C MOUNTING HOLE LAYOUT
(BOTTOM VIEW)

SPDT RELAYS - 15 AMPS

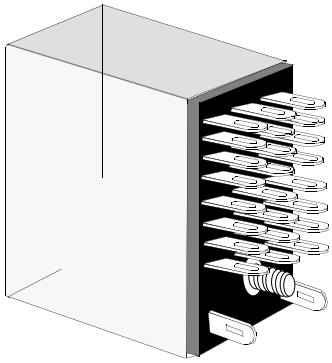
SPDT, 15 AMP		Coil measured @ 25˚C			CROSS REFERENCE TO *
STANDARD COVER	TOP FLANGE COVER	Nominal Input Voltage	Nominal Resistance (Ohms)	Nominal Power (Approx.)	OMRON
AC OPERATED COIL - SOLDER/PLUG-IN STYLE.					
W78ARCSX-108	78ARCSX-33	12 VAC	46	1.2VA	LY1-UA-AC12
W78ARCSX-109	78ARCSX-34	24VAC	180	1.2VA	LY1-UA-AC24
W78ARCSX-111	78ARCSX-36	120 VAC	4430	1.2VA	LY1-UA-AC120
W78ARCSX-112	78ARCSX-37	240 VAC	15,700	1.2VA	LY1-UA-AC240
AC OPERATED COIL - SOLDER/PLUG-IN WITH INDICATOR LAMP					
W78ARNCSX-8		24 VAC	180	1.2VA	LY1N-UA-AC24
W78ARNCSX-9		120VAC	4430	1.2VA	LY1N-UA-AC120
W78ARNCSX-10		240 VAC	15,700	1.2VA	LY1N-UA-AC240
DC OPERATED COIL - SOLDER/PLUG-IN STYLE					
W78RCSX-96	78RCSX-31	6 VDC	40	0.9W	LY1-UA-DC6
W78RCSX-97	78RCSX-32	12 VDC	160	0.9W	LY1-UA-DC12
W78RCSX-98	78RCSX-33	24VDC	650	0.9W	LY1-UA-DC24
W78RCSX-100	78RCSX-35	110 VDC	11,000	1.1W	LY1-UA-DC110
DC OPERATED COIL - SOLDER/PLUG-IN WITH INDICATOR LAMP					
W78RNCSX-10		24 VDC	650	0.9W	LY1N-UA-DC24
AC OPERATED COIL -P.C. TERMINAL STYLE					
W78ARPCX-81		12 VAC	46	1.2VA	LY1-0-UA-AC12
W78ARPCX-82		24 VAC	180	1.2VA	LY1-0-UA-AC24
W78ARPCX-84		120 VAC	4430	1.2VA	LY1-0-UA-AC120
DC OPERATED COIL -P.C. TERMINAL STYLE					
W78RPCX-79		12 VDC	160	0.9W	LY1-0-UA-DC12
W78RPCX-83		24 VDC	650	0.9W	LY1-0-UA-DC24
W78RPCX-85		110 VDC	11,000	1.1W	LY1-0-UA-DC110

* **Applies to Standard Cover**

PART NUMBERS SHOWN ALSO **AVAILABLE THRU STOCKING DISTRIUBUTION.**

SEE SECTION 10 FOR MATING SOCKETS

MINIATURE ENCLOSED INDUSTRIAL RELAY



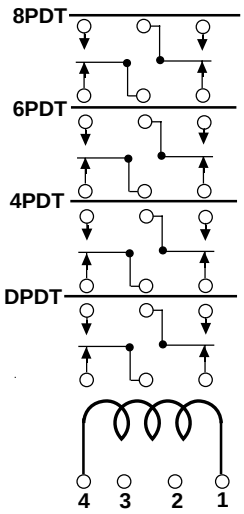
Standard **Class 67** miniature industrial relays are designed for applications requiringDPDT to 8PDT contacts where space and weight are of prime importance.
Shatter resistant, see-thru plastic covers are utilized to protect against dust, tampering and electrical shock.
The 67T models have Bifurcated Contacts and are designed for low level switching applications.
SEE SECTION 10 FOR MATING SOCKETS.

CONTACT MATERIAL: SILVER GOLD OVERLAY
RATED 3 or 5 AMPS @ 32VDC/120VAC

The Class 67 Relays have combination solder/plug-in terminals with a 3-48UNC stud or printed circuit terminals.

UL RECOGNIZED
FILE NO. E52197

WIRING DIAGRAM



Bottom View

TYPICAL CONTACT LIFE EXPECTANCY FOR SWITCHING RESISTIVE LOADS @ 25˚C

Load Current	Load Voltage	Number of Operations
		Standard adjustment
5.0A	28 VDC	5×10^4
5.0A	120VAC	5×10^4
2.0A	28VDC/120VAC	1.5×10^6
1.0A	28VDC/120VAC	1.2×10^7
0.5A	28VDC/120VAC	-
0.1A	28VDC/120VAC	5×10^7
0.1A	6 VDC	-
50mA	6 VDC	5×10^7
30mA	6 VDC	-
1mA	6 VDC	-
10A	10mVDC	5×10^7

CLASS 67 TYPICAL TIMING VALUES

POLES	DPDT	4PDT	6PDT	8PDT
OPERATE TIME	012	.014	.016	.018
RELEASE TIME	.008	.008	.008	.008

Measured at Nominal Voltage @ 25˚C

SPECIFICATIONS CLASS 67

COIL

Pickup voltage:	80% of nominal voltage or less.
Dropout voltage:	10% of nominal or more.
Coil resistance:	± 10% measured @ 25˚C
Maximum coil dissipation:	2.2 watts
Coil Temperature rise:	30˚C per watt
Maximum coil temperature:	105˚C

CONTACTS

Contact material:	Silver, Gold overlay
Contact resistance:	50 milliohms max. initial

CAPACITANCE

Between contacts:	2 pf, typ.
Contact to coil:	2 pf, typ.
Coil to frame:	30 pf, typ.

DIELECTRIC STRENGTH

Contact to coil:	1500 V rms
Across open contacts:	500 V rms
Coil to frame:	1000 V rms
Contacts to frame:	1500 V rms
Insulation resistance:	1000 megohms @ 25˚C & 50% R.H.

TEMPERATURE

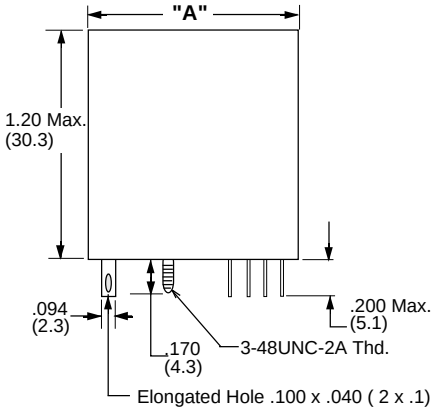
Operating:	-55˚C to + 70˚C
Storage:	-55˚C to +105˚C

MISCELLANEOUS

Solder-bath temperature:	+525˚F (260˚C) 10 seconds max.
Enclosure Material:	Polycarbonate see thru plastic cover.
Operating Position:	Any
Weight:	0.77 to 1.4 oz. (22 to 40 grams)

OPTIONS:
Other options such as other coil voltages, sensitivities, contact arrangements and epoxy sealing are available on special order. Consult Factory for special requirements.

OUTLINE DIMENSIONS
Dimensions shown in INCHES and (MILLIMETERS)



All Contact Terminals are .010 Thick
all coil terminals are .018 Thick.

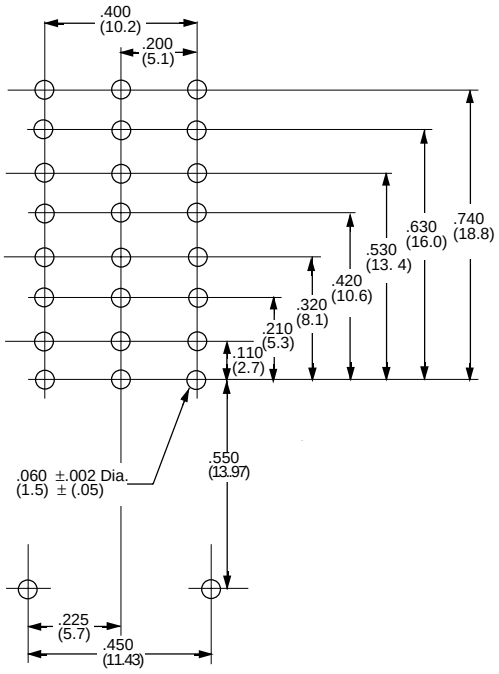
DIMENSIONS

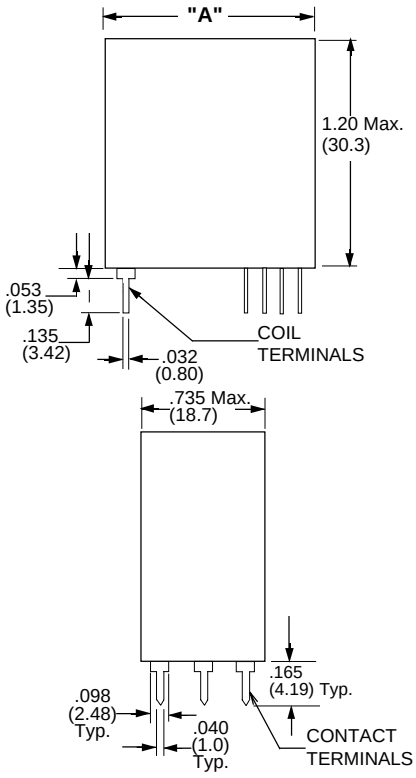
Tolerances ± .010 Inches

CONTACT CONFIGU-RATION	**"A"** DIM.
DPDT	.978 (24.8)
4PDT	1.156 (29.4)
6PDT	1.374 (34.9)
8PDT	1.592 (40.4))

P.C RELAY PIN LAYOUT

SUGGESTED PRINTED CIRCUIT BOARD LAYOUT
FOR RELAYS WITH PRINTED CIRCUIT TERMINALS





All Contact Terminals are **.010 Thick.**
All Coil Terminals are **.018 Thick.**

MINIATURE ENCLOSED INDUSTRIAL RELAY

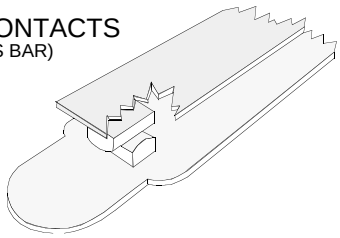
DC OPERATED - SOLDER TERMINAL or PLUG-IN STYLE						
STANDARD CONTACTS		COIL Measured @ 25˚C				
PART NUMBERS	CONTACT RATING	NOMINAL INPUT VOLTAGE	NOMINAL RESISTANCE (OHMS)	NOMINAL POWER (WATTS)	CONTACT CONFIGU-RATION	CROSS REFERENCE TO POTTER & BRUMFIELD
W67RCSX-1	5 AMPS	5	52	1/2W	DPDT	**R10E1(X or Y)2-V28**
W67RCSX-2	5 AMPS	12	185	3/4W	DPDT	**R10E1(X or Y)2-V185**
W67RCSX-3	5 AMPS	24	700	1W	DPDT	**R10E1(X or Y)2-V700**
W67RCSX-4	5 AMPS	48	2500	1W	DPDT	**R10E1(X or Y)2-V2.5K**
W67RCSX-5	5 AMPS	115	15,000	1W	DPDT	**R10E1(X or Y2-V15.0K**
W67RCSX-6	5 AMPS	5	52	1/2W	4PDT	**R10E1(X or Y)4-V28**
W67RCSX-7	5 AMPS	12	185	3/4W	4PDT	**R10E1(X or Y)4-V185**
W67RCSX-8	5 AMPS	24	700	1W	4PDT	**R10E1(X or Y)4-V700**
W67RCSX-9	5 AMPS	48	2500	1W	4PDT	**R10E1(X or Y)4-V2.5K**
W67RCSX-10	5 AMPS	115	15,000	1W	4PDT	**R10E1(X or Y)4-V15.0K**
W67RCSX-12	5 AMPS	12	90	1.5W	6PDT	**R10E1(X or Y)6-V185**
W67RCSX-13	5 AMPS	24	430	1.5W	6PDT	**R10E1(X or Y)6-V700**
W67RCSX-17	5 AMPS	12	72	2W	8PDT	**R10E1(X or Y)8-V185**
W67RCSX-18	5 AMPS	24	350	2W	8PDT	**R10E1(X or Y)8-V700**
DC OPERATED - BIFURCATED CONTACTS - FOR LOW LEVEL SWITCHING APPLICATIONS						
W67TRCSX-2	3 AMPS	12	185	3/4W	DPDT	**R10E1(P or Z)2-V185**
W67TRCSX-3	3 AMPS	24	700	1W	DPDT	**R10E1(P or Z)2-V700**
W67TRCSX-7	3 AMPS	12	185	3/4W	4PDT	**R10E1(P or Z)4-V185**
W67TRCSX-8	3 AMPS	24	700	1W	4PDT	**R10E1(P or Z)4-V700**
W67TRCSX-12	3 AMPS	12	90	1.5W	6PDT	**R10E1(P or Z)6V185**
W67TRCSX-13	3 AMPS	24	430	1.5W	6PDT	**R10E1(P or Z)6-V700**
W67TRCSX-17	3 AMPS	12	72	2W	8PDT	**R10E1(P or Z)8-V185**
W67TRCSX-18	3 AMPS	24	350	2W	8PDT	**R10E1(P or Z)8-V700**

DC OPERATED - PRINTED CIRCUIT STYLE						
STANDARD CONTACTS		COIL Measured @ 25˚C				
PART NUMBERS	CONTACT RATING	NOMINAL INPUT VOLTAGE	NOMINAL RESISTANCE (OHMS)	NOMINAL POWER (WATTS)	CONTACT CONFIGU-RATION	CROSS REFERENCE TO POTTER & BRUMFIELD
W67RPCX-2	5 AMPS	12 VDC	185	1W	DPDT	**R10E2(X or Y)2-V185**
W67RPCX-3	5 AMPS	24 VDC	700	1W	DPDT	**R10E2(X or Y)2-V700**
W67RPCX-7	5 AMPS	12 VDC	185	1W	4PDT	**R10E2(X or Y)4-V185**
W67RPCX-8	5 AMPS	24 VDC	700	1W	4PDT	**R10E2(X or Y)4-V700**
W67RPCX-12	5 AMPS	12 VDC	90	1.5W	6PDT	**R10E2(X or Y)6-V185**
W67RPCX-13	5 AMPS	24 VDC	430	1.5W	6PDT	**R10E2(X or Y)6-V700**

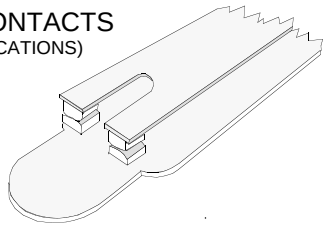
CLASS 67 - AC OPERATED RELAYS - SOLDER TERMINAL or PLUG-IN STYLE 50/60 Hz						
STANDARD CONTACTS		COIL Measured @ 25˚C				
PART NUMBERS	CONTACT RATING	NOMINAL INPUT VOLTAGE	NOMINAL RESISTANCE (OHMS)	NOMINAL POWER (WATTS)	CONTACT CONFIGU-RATION	CROSS REFERENCE TO POTTER & BRUMFIELD
W67ARCSX-5	5 AMPS	120 VAC	-	1.5VA	DPDT	**R10E1(X or Y)2-120V**
W67ARCSX-10	5 AMPS	120 VAC	-	2.5VA	4PDT	**R10E1(X or Y)4-120V**
W67ARCSX-15	5 AMPS	120 VAC	-	2.5VA	6PDT	**R10E1(X or Y)6-120V**

Part numbers shown also **available thru Stocking Distribution.**

STANDARD CONTACTS
(5 AMP CROSS BAR)

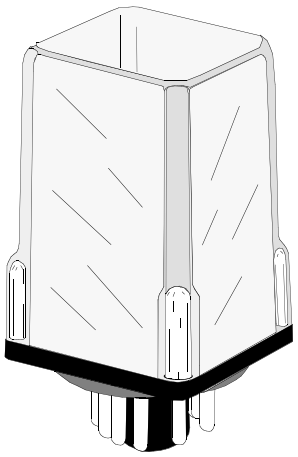


BIFURCATED CONTACTS
(LOW LEVEL APPLICATIONS)



SEE SECTION 10 FOR MATING SOCKETS

FEATURES



Plug-in, 8 or 11 pin "Octal Style Base" with see thru plastic dust cover. Standard **SPDT, DPDT** or **3PDT** contact arrangements. Other contact arrangements available on special order.

Dielectric Strength to 1500 Vrms.

8 or 11 pin octal style plug-in are standard and Interchangeable with other general purpose relays of this type.

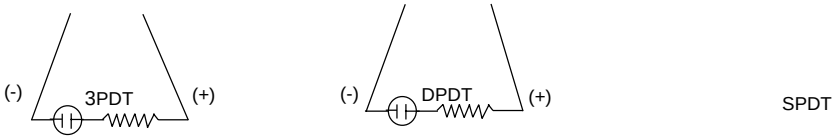
Available with combinations of Indicator lamps, push to test button and Blow-out Magnets for DC switching applications.

MANUFACTURED UNDER QUALITY SYSTEM
ISO 9002 & QS 9000

Recognized Component mark for Canada and the United States.
c UL us
UL Recognized
File No. E43641

WIRING DIAGRAM

VIEWED FROM PIN END

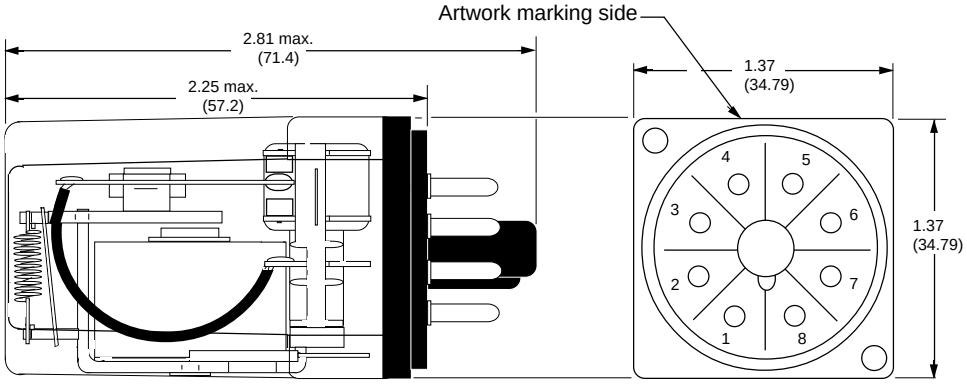


SPDT

ALL INDICATOR LAMP STYLE RELAY HAVE AN ADDITIONAL LAMP CIRCUIT INSTALLED ACROSS COIL. OBSERVE COIL POLARITY WHEN L.E.D. INDICATOR IS INSTALLED ACROSS COIL (DC STYLES TYP.).

OUTLINE DIMENSIONS

Dimensions are shown in Inch and (Millimeter).



CONTACT RATINGS TABLE

POLES	120 VAC	240 VAC	28 VDC
SPDT	12 AMP 1/3 HP	12 AMP 1/2 HP	10 AMP
DPDT	12 AMP 1/3 HP	10 AMP 1/2 HP	10 AMP
3PDT	10 AMP 1/3 HP	10 AMP 1/2 HP	10 AMP

**SEE SECTION 10
FOR
MATING SOCKETS**

CLASS A314 & 250

8 OR 11 PIN OCTAL PLUG-IN WITH SEE THRU DUST COVER.
Enclosure is a clear high impact plastic (polycarbonate) dust cover that is screwed to the base to protect against dust, damage and tampering.

Recognized Component mark for Canada and the United States.
UL Recognized
File No. E43641

SPECIFICATIONS SERIES A314 & 250 RELAYS

COIL

Pull-in voltage:	80% of nominal voltage or less. for DC coils 85% of nominal voltage or less for AC coils.
Drop-out:	10% of nominal voltage or more.
Coil resistance:	± 10 % measured @ 25 ˚C
Minimum sensitivity:	125 milliwatts per pole
Nominal power:	1.2 Watts for DC coils, 2 VA-2.75VA for AC coils
Maximum coil dissipation:	Capability of DC coils 3.0 Watts max.
Duty:	Continuous

CONTACTS

Contact material:	3/16" silver cadmium oxide, gold flashed Std. Gold Diffused also available.
Contact resistance:	50 milliohms maximum initial resistance at rated current
Minimum Load:	12 V @ 100 Milliamps

TIMING

Operate time:	15 mS or less at nominal voltage.
Release time:	10 mS or less at nominal Voltage.

DIELECTRIC STRENGTH

Contacts to coil:	1500 V rms
Across open contacts:	500 V rms
Pole to pole:	1500 V rms
Contacts to frame:	1500 V rms
Insulation resistance:	1,000 Megohms min. @ 500 VDC

TEMPERATURE

Ambient Temperature (Operating):	-45˚C to +55˚C (AC), -45˚C to +70˚C (DC)
Non operating storage:	-45˚C to +105˚C

SHOCK RESISTANCE

Operating:	5 G's,
Non operating:	20 G's

VIBRATION RESISTANCE

Operating:	5 G's, 10 Hz to 55 Hz

MISCELLANEOUS

Enclosure:	Plastic dust cover with octal plug.
Insulation material:	Molded plastic
Operating Position:	Any
Terminals:	8 or 11 pin octal plug-in
Weight:	3 1/2 ozs. 99.2 g approx.

**SEE SECTION 10
FOR
MATING SOCKETS**

Magnecraft & Struthers-Dunn

RELAYS CAN BE ORDERED EITHER BY MAGNECRAFT OR STRUTHERS-DUNN PART NUMBERS LISTED BELOW

DUAL MARKED PART NUMBERS		CONTACT CONFIGU-RATION	COIL Measured @ 25˚C			CROSS REFERENCE TO	
Struthers-Dunn SERIES A314	Magnecraft CLASS 250CP		NOMINAL INPUT VOLTAGE	NOMINAL RESIS-TANCE	NOMINAL POWER	POTTER & BRUMFIELD *	IDEC
AC OPERATED							
A314XAX48P-24A	W250ACPX-3	SPDT	24 VAC	-	2.0VA	KRPA5AG (or GF) -24	-
A314XAX48P-120A	W250ACPX-4	SPDT	120VAC	-	2.0VA	KRPA5AG (or GF) -120	-
A314XBX48P-24A	W250ACPX-8	DPDT	24 VAC	-	2.75VA	KRPA11AG (or GF) -24	RR2P-U-AC24V
A314XBX48P-120A	W250ACPX-9	DPDT	120VAC	-	2.75VA	KRPA11AG (or GF) -120	RR2P-U-AC120V
A314XBX48P-240A	W250ACPX-10	DPDT	240 VAC, 60 Hz 220 VAC, 50 Hz	-	2.75VA	KRPA11AG (or GF) -240	RR2P-U-AC240V
A314XCX48P-24A	W250ACPX-13	3PDT	24 VAC	-	2.75VA	KRPA14AG (or GF) -24	RR3PA-U-AC24V
A314XCX48P-120A	W250ACPX-14	3PDT	120 VAC	-	2.75VA	KRPA14AG (or GF) -120	RR3PA-U-AC120V
A314XCX48P-240A	W250ACPX-15	3PDT	240 VAC. 60 Hz 220 VAC, 50 Hz	-	2.75VA	KRPA14AG (or GF) -240	RR3PA-U-AC240V
AC OPERATED WITH INDICATOR LAMP							
A314XBX48PL-24A	W250ANCPX-26	DPDT	24 VAC		2.0VA	KRPA11AN (or NF) -24	RR2P-UL-AC24V
A314XBX48PL-120A	W250ANCPX-27	DPDT	120 VAC		2.0VA	KRPA11AN (or NF) -120	RR2P-UL-AC120V
A314XBX48PL-240A	W250ANCPX-28	DPDT	240 VAC. 60 Hz 220 VAC, 50 Hz		2.75VA	KRPA11AN (or NF) -240	RR2P-UL-AC240V
A314XCX48PL-24A	W250ANCPX-29	3PDT	24 VAC		2.0VA	KRPA14AN (or NF) -24	RR3PA-UL-AC24V
A314XCX48PL-120A	W250ANCPX-30	3PDT	120 VAC		2.0VA	KRPA14AN (or NF) -120	RR3PA-UL-AC120V
A314XCX48PL-24OA	W250ANCPX-31	3PDT	240 VAC. 60 Hz 220 VAC, 50 Hz		2.75VA	KRPA14AN (or NF) -240	RR3PA-UL-AC240V
DC OPERATED							
A314XAX48P-12D	W250CPX-2	SPDT	12 VDC	120 Ω	1.2W	KRPA5DG (or GF) -12	-
A314XAX48P-24D	W250CPX-3	SPDT	24 VDC	472 Ω	1.2W	KRPA5DG (or GF) -24	-
A314XBX48P-12D	W250CPX-6	DPDT	12VDC	120 Ω	1.2W	KRPA11DG (or GF) -12	RR2P-U-DC12V
A314XBX48P-24D	W250CPX-7	DPDT	24 VDC	472 Ω	1.2W	KRPA11DG (or GF) -24	RR2P-U-DC24V
A314XCX48P-12D	W250CPX-10	3PDT	12 VDC	120 Ω	1.2W	KRPA14DG (or GF) -12	RR3PA-U-DC12V
A314XCX48P-24D	W250CPX-11	3PDT	24 VDC	472 Ω	1.2W	KRPA14DG (or GF) -24	RR3PA-U-DC24V
DC OPERATED WITH INDICATOR LAMP							
A314XBX48PL-24D	W250NCPX-20	DPDT	24 VDC	472 Ω	1.2 W	KRPA11DN (or NF) -24	RR2P-UL-DC24V
A314XCX48PL-24D	W250NCPX-21	3PDT	24 VDC	472 Ω	1.2 W	KRPA14DN (or NF) -24	RR3PA-UL-DC24V

PART NUMBERS SHOWN ALSO AVAILABLE THRU STOCKING DISTRIBUTION

***F = GOLD FLASHED**

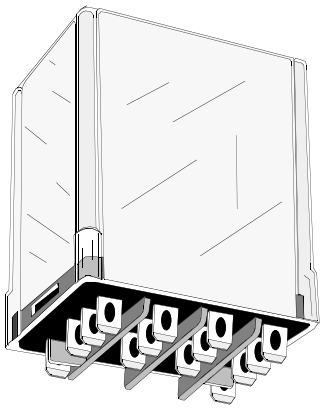
CONTACT RATINGS WITH BLOW-OUT MAGNET				
POLES	120 VAC	240 VAC	30 VDC	150 VDC
DPDT	12 AMP 1/3 HP	10 AMP 1/2 HP	10 AMP	3 AMP

RELAYS FOR DC SWITCHING

PART NUMBERS	CONTACT CONFIGU-RATION	NO. OF PINS OCTAL STYLE	COIL Measured @ 25˚C		
			NOMINAL INPUT VOLTAGE	NOMINAL RESISTANCE (OHMS)	NOMINAL POWER
AC OPERATED WITH BLOW-OUT MAGNET					
A314XBX48P69-24A	DPDT	8 PIN	24 VAC	-	2.0 VA
A314XBX48P69-120A	DPDT	8 PIN	120VAC	-	2.0 VA
DC OPERATED WITH BLOW-OUT MAGNET					
A314XBX48P69-12D	DPDT	8 PIN	12 VDC	120 Ω	1.2 W
A314XBX48P69-24D	DPDT	8 PIN	24 VDC	472 Ω	1.2 W
A314XBX48P69-110D	DPDT	8 PIN	110 VDC	10,000 Ω	1.2 W

RELAYS USING MAGNETIC BLOW-OUT MAGNETS ARE NOT AGENCY APPROVED.

GENERAL PURPOSE 4 POLE 10 AMP PLUG-IN RELAY

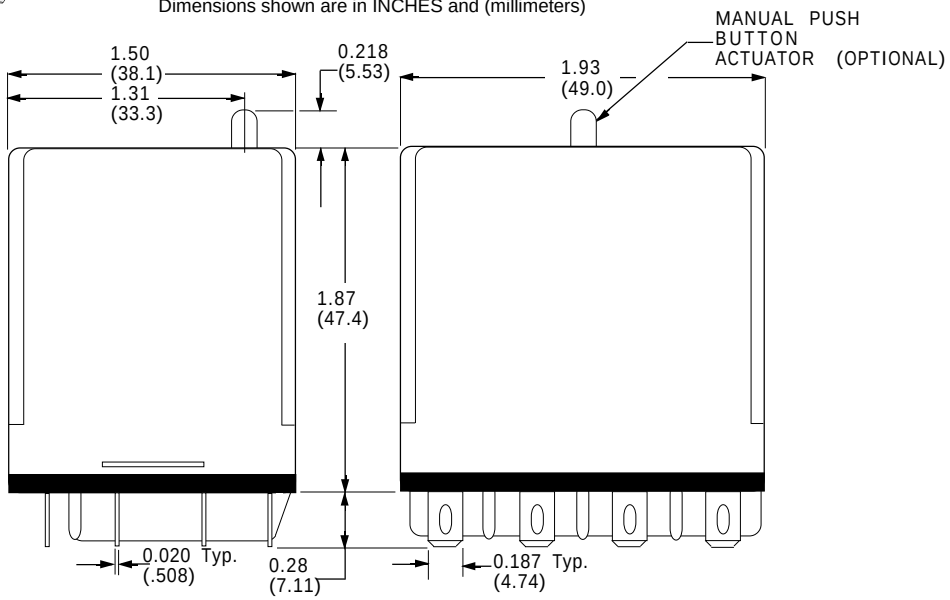


The series 284 relay is a extension of the Class 388/283 style relay except it provides for 4PDT contacts, any one set of contacts capable of switching 10 Amps (total load of 30 Amps at 120 VAC and 20 Amps at 240 VAC). This relay has the 3 way terminal design for greater flexibility in making connections. The 0.187 Spade terminals can be soldered, plugged into sockets or connected using 3/16" Q.C. Female connectors.

UL Recognized
File No. E13224

OUTLINE DIMENSIONS

Dimensions shown are in INCHES and (millimeters)



Magnecraft & Struthers-Dunn

ORDERING CODE

Typical Type No. **284 XDX C GLM -240A**

Series
284 3 way terminals
10 Amp, 4 pole

Contact Arrangements
XDX (4PDT)

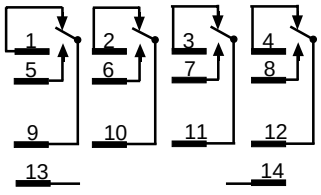
Construction Style
Open, with tapped 6-32 hole - **NO CODE**
Open, with 6-32 Stud - **CODE S**
Enclosed, 3 way terminals - **CODE C**

Options
10 Amp contacts Standard - **NO CODE**
Gold diffused contacts - **CODE G**
Indicator Lamp - **CODE L**
Manual Actuator - **CODE M**
Printed Circuit Terminals - **CODE T**
5 Amp contacts (Silver) - **CODE Y**

Coil Voltage
AC: 6, 12, 24, 48, 120, 240 (Add **"A"**)
DC: 6, 12, 24, 48, 115, 125 (Add **"D"**)

WIRING DIAGRAM

(VIEWED FROM TERMINAL END)



SEE NEXT PAGE FOR RATINGS & SPECIFICATIONS

GENERAL PURPOSE 4 POLE 10 AMP PLUG-IN RELAY

UL Recognized
File No. E13224

CONTACT RATINGS

LOAD	30VDC	120VAC	240VAC
Resistive Motor Load 80% pF.	10A	10A 1/3Hp	10A 1/2Hp

Maximum total load for 4 pole relay is 30 Amps @ 120VAC, 20Amps @ 240VAC

GENERAL SPECIFICATIONS

COIL
- Pull-in Voltage: AC: 85%, DC: 75% of nominal voltage measured at 25˚C
- Dropout Voltage: 10% of nominal voltage or more @ 25˚C
- Max. allowed voltage: 110% of nominal voltage
- Coil Resistance: ±10% Measured @ 25˚C

CONTACTS
- Contact Material: Silver Cadmium Oxide.

TIMING
- Operate Time: 15 mS Max. @ Nominal Voltage.
- Release Time: 10 mS Max. @ Nominal Voltage.

DIELECTRIC STRENGTH
- All Mutually Insulated Points: 500 V rms across open contacts
  1500 V rms between current carrying parts
- Insulation Resistance: 1000 Megohms.min. @ 500 VDC

TEMPERATURE
- Temperature Rating: AC: -45˚C to +50˚C @ Rated Operation. (+65˚C for open style)
  DC: -45˚C to +70 ˚C
  +85˚C for open style)

LIFE EXPECTANCY
- Mechanical: 10 Million Operations no load
- Electrical: 100,000 Operations @ Rated Load.

MISCELLANEOUS
- Enclosure: Clear polycarbonate
- Weight: 5.0 oz. approx..

COIL SPECIFICATIONS @ 25˚C

Nominal Voltage	Resistance Ohms ± 10%	Resistance Ohms ± 10%	Current (MA)		Power Consumption	
	AC	DC	AC	DC	AC	DC
6	3	30	560	200	3.4VA	1.2W
12	12	120	230	100	3.4VA	1.2W
24	48	480	115	50	3.4VA	1.2W
48	-	1920	-	25	3.4VA	1.2W
120AC or 115-125DC	870	8200	31	13-15	3.4VA	1.2W
240AC*	4700	-*	12	-*	3.4VA	1.2W

NOTE: * For 220-250VDC coils use a 8,200 Ω, 5 Watt resistor in series with 110-125 VDC relays

GENERAL SPECIFICATIONS

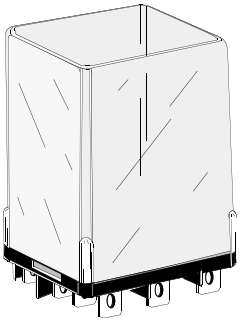
The Class 388 & 283 general purpose relays are available in a wide choice of AC or DC voltages with Indicator Lamp, Push to test button and other options. Plug-in style relays have 3-way pierced terminals. While spaced for standard plug-in Socket mounting. The flat terminals (0.187 x 0.020) also accept quick connect receptacles or direct soldering.

MANUFACTURED UNDER QUALITY SYSTEM
ISO 9002 & QS 9000

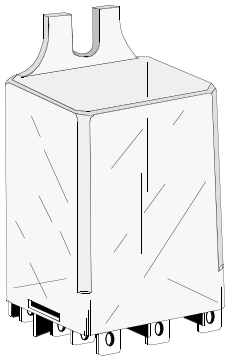
Recognized Component mark for Canada and the United States.
c UL us
UL Recognized
File No. E43641

CE
COMPLIES WITH REQUIREMENTS OF
* IEC STANDARDS 947-4-1 AND 947-5-1 LOW VOLTAGE DIRECTIVE

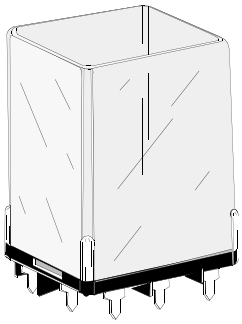
* IEC = INTERNATIONAL ELECTROTECHNICAL COMMISSION



PLUG-IN

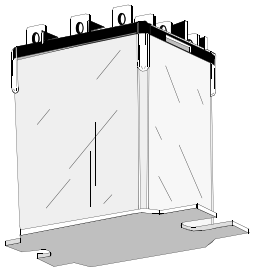


FLANGE MOUNT



P.C. MOUNT

NEW!



TOP FLANGE MOUNT

CONTACT RATINGS TABLE

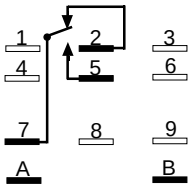
POLES	120 VAC	240 VAC	28 VDC
1 POLE	13 AMP 1/3 HP	13 AMP 1/2 HP	13 AMP
2 POLE	13 AMP 1/3 HP	12 AMP 1/2 HP	12 AMP
3 POLE	13 AMP 1/3 HP	11 AMP 1/2 HP	11 AMP

TYPICAL OPERATING CHARACTERISTICS
(For DC Voltage types only).

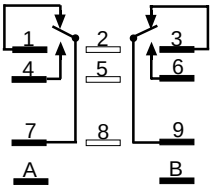
POLES	SPDT	DPDT	3PDT
MIN. OPERATE mW (SENSITIVITY)	125	250	375
OPERATE TIME (Milliseconds maximum.)	18.0	20.0	24.0
RELEASE TIME (Milliseconds Maximum.)	30.0	28.0	26.0

WIRING DIAGRAMS

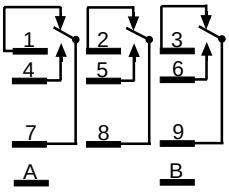
Viewed from terminal end



SPDT



DPDT



3PDT

*** RELEVANT IEC CONTACT UTILIZATION CATEGORIES**

CE	**AC-1, AC-3, DC-1, AC-15**
	(SEE SECTION 11 FOR RELEVANT UTILIZATION CATEGORIES.)

SEE SECTION 10 FOR MATING SOCKETS

SPECIFICATIONS CLASS 388 & 283 RELAYS

COIL

Pull-in voltage:	80% of nominal voltage or less. for DC coils. 85% of nominal voltage or less for AC coils.
Dropout voltage:	10% of nominal voltage or more.
Resistance:	± 10 % Measured at 25˚C
Coil power	1.2 Watts for DC coils, 2 VA to 2.75 VA for AC coils
Insulation System:	Class "B" (130˚C per UL std. 1446)
Maximum coil dissipation:	Capability of DC coils 3.0 Watts max.
Duty:	Continuous

CONTACTS

Contact material:	3/16" silver cadmium oxide, gold flashed.
Contact resistance:	50 Milliohms maximum initial resistance at rated current

DIELECTRIC STRENGTH

Contacts to coil:	2000 V rms
Across open contacts:	500 V rms
Pole to pole	2000 V rms
Contacts to frame:	2000 V rms
Insulation resistance:	1000 Megohms @ 500 VDC

TEMPERATURE

Operating:	-30˚C to +50˚C (AC), -30˚C to +65˚C (DC)
Storage	-30˚C to 100˚C

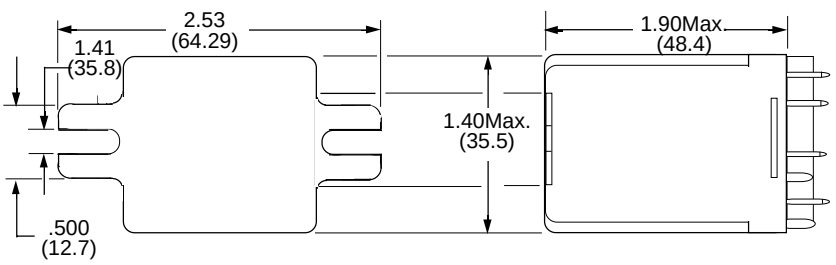
LIFE EXPECTANCY

Electrical:	100,000 Operations @ rated AC load
Mechanical:	5,000,000 Operations @ No load

MISCELLANEOUS

Operating Position:	Any
Insulation material:	Molded plastic
Enclosure:	Clear Polycarbonate dust cover
Terminals:	3/16" solder/plug-in, Printed Circuit terminals other terminals available: .205 x .032, .250 x .032 on special order. Consult Factory.
Weight:	3.1 oz.. (88 g approx. with cover).

OPTIONAL
TOP FLANGE COVER IS AVAILABLE ON SPECIAL ORDER. CONSULT FACTORY.



SEE SECTION 10 FOR MATING SOCKETS

CLASS 388 & 283 RELAY

13 AMP CONTACT RATING

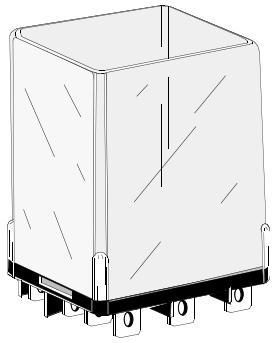
OPTIONAL INDICATOR LAMP AND PUSH TO TEST BUTTON AVAILABLE ON SPECIAL ORDER.

MANUFACTURED UNDER QUALITY SYSTEM
ISO 9002 & QS 9000

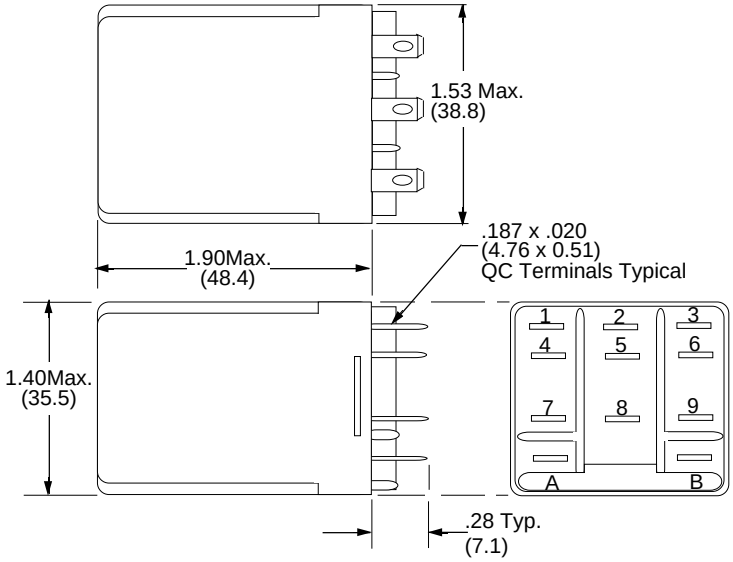
Recognized Component mark for Canada and the United States.
UL Recognized
File No. E43641

COMPLIES WITH REQUIREMENTS OF
* IEC STANDARDS 947-4-1 AND 947-5-1 LOW VOLTAGE DIRECTIVE

* IEC = INTERNATIONAL ELECTROTECHNICAL COMMISSION



OUTLINE DIMENSIONS
Dimensions shown are in "INCH" and (Millimeter)



*** RELEVANT IEC CONTACT UTILIZATION CATEGORIES**

CE	**AC-1, AC-3, DC-1, AC-15**
	(SEE SECTION 11 FOR RELEVANT UTILIZATION CATEGORIES.)

Magnecraft & Struthers-Dunn

RELAYS CAN BE ORDERED EITHER BY **MAGNECRAFT** OR **STRUTHERS-DUNN** PART NUMBERS LISTED BELOW

DUAL MARKED PART NUMBERS		CONTACT CONFIGU-RATION	COIL Measured @ 25˚C			CROSS REFERENCE TO	
CLASS 388CP	*Struthers-Dunn* CLASS A283		NOMINAL INPUT VOLTAGE	NOMINAL RESIS-TANCE	NOMINAL POWER	POTTER & BRUMFIELD †	IDEC
AC OPERATED							
W388ACPX-3	A283XAXC-24A	SPDT	24 VAC	-	2.0VA	KUP5A15 (or F) - 24	RR1BA-U-AC24V
W388ACPX-4	A283XAXC-120A	SPDT	120VAC	-	2.0VA	KUP5A15 (or F) - 120	RR1BA-U-AC120V
W388ACPX-5	A283XAXC-240A	SPDT	240 VAC, 60 Hz 220 VAC, 50 Hz	- -	2.0VA 2.0VA	KUP5A15 (or F) - 240	RR1BA-U-AC240V
W388ACPX-8	A283XBXC-24A	DPDT	24 VAC		2.0VA	KUP11A15 (or F) - 24	RR2BA-U-AC24V
W388ACPX-9	A283XBXC-120A	DPDT	120 VAC	-	2.0VA	KUP11A15 (or F) - 120	RR2BA-U-AC120V
W388ACPX-10	A283XBXC-240A	DPDT	240 VAC. 60 Hz 220 VAC, 50 Hz	- -	 2.75VA	KUP11A15 (or F) - 240	RR2BA-U-AC240V
W388ACPX-13	A283XCXC-24A	3PDT	24 VAC	-	2.75VA	KUP14A15 (or F) - 24	RR3B-U-AC24V
W388ACPX-14	A283XCXC-120A	3PDT	120 VAC	-	2.75VA	KUP14A15 (or F) - 120	RR3B-U-AC120V
W388ACPX-15	A283XCXC-240A	3PDT	240VAC, 60Hz 220 VAC, 50Hz	 -	 2.75VA	KUP14A15 (or F) - 240	RR3B-U-AC240V
DC OPERATED							
W388CPX-2	A283XAXC-12D	SPDT	12 VDC	120 Ω	1.2W	KUP5D15 (or F) - 12	RR1BA-U-DC12V
W388CPX-3	A283XAXC-24D	SPDT	24 VDC	472 Ω	1.2W	KUP5D15 (or F) - 24	RR1BA-U-DC24V
W388CPX-6	A283XBXC-12D	DPDT	12 VDC	120 Ω	1.2W	KUP11D15 (or F) - 12	RR2BA-U-DC12V
W388CPX-7	A283XBXC-24D	DPDT	24 VDC	472 Ω	1.2W	KUP11D15 (or F) - 24	RR2BA-U-DC24V
W388CPX-8	A283XBXC-110D	DPDT	110VDC	10,000 Ω	1.2W	KUP11D15 (or F) - 110	RR2B-U-DC110V
W388CPX-10	A283XCXC-12D	3PDT	12 VDC	120 Ω	1.2W	KUP14D15 (or F) - 12	RR3B-U-DC12V
W388CPX-11	A283XCXC-24D	3PDT	24 VDC	472 Ω	1.2W	KUP14D15 (or F) - 24	RR3B-U-DC24V

PART NUMBERS SHOWN ALSO **AVAILABLE THRU STOCKING DISTRIBUTION.**

† F = GOLD FLASHED

SEE GENERAL SPECIFICATIONS & WIRING DIAGRAMS FOR CLASS 388 & A283 RELAYS.

SEE SECTION 10 FOR MATING SOCKETS

COMPLIES WITH
REQUIREMENTS OF
* IEC STANDARDS
947-4-1 AND 947-5-1
LOW VOLTAGE DIRECTIVE

* IEC = INTERNATIONAL
ELECTROTECHNICAL COMMISSION

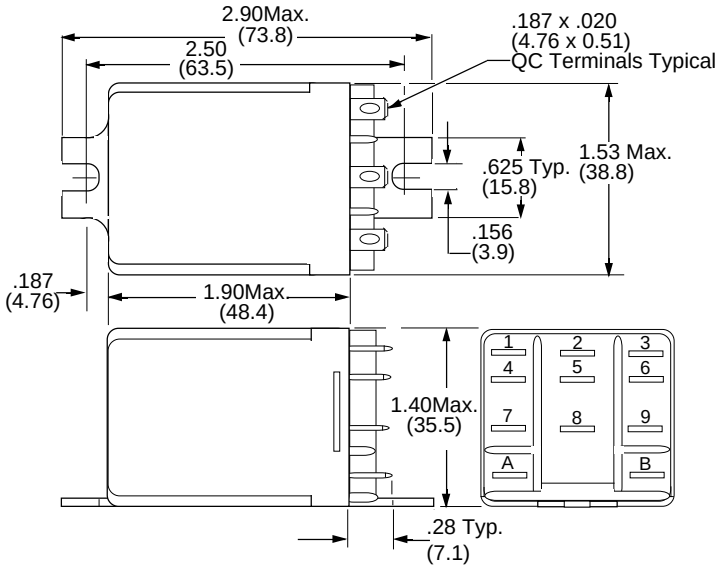
Recognized Component mark for Canada and the United States.
UL Recognized
File No. E43641

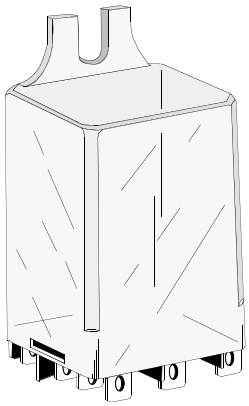
FLANGE MOUNT RELAY
13 AMP CONTACT RATING
.187 Q.C. /SOLDER TERMINALS

TOP FLANGE COVER AVAILABLE ON SPECIAL ORDER. CONSULT FACTORY

OPTIONAL INDICATOR LAMP AND PUSH TO TEST BUTTON AVAILABLE ON SPECIAL ORDER.

MANUFACTURED UNDER QUALITY SYSTEM
ISO 9002 & QS 9000





*** RELEVANT IEC CONTACT UTILIZATION CATEGORIES**

CE	**AC-1, AC-3, DC-1, AC-15**
	(SEE SECTION 11 FOR RELEVANT UTILIZATION CATEGORIES.)

Magnecraft & Struthers-Dunn

RELAYS CAN BE ORDERED EITHER BY **MAGNECRAFT** OR **STRUTHERS-DUNN** PART NUMBERS LISTED BELOW

DUAL MARKED PART NUMBERS		CONTACT CONFIGURATION	COIL Measured @ 25˚C			CROSS REFERENCE TO	
W388CQ	Struthers-Dunn A283		NOMINAL INPUT VOLTAGE	NOMINAL RESISTANCE (OHMS)	NOMINAL POWER	POTTER & BRUMFIELD †	IDEC
AC OPERATED							
W388ACQX-4	A283XAXC1-120A	SPDT	120 VAC	-	2.0VA	KUP5A55 (or F) - 120	RR1BA-US-AC120V
W388ACQX-5	A283XAXC1-240A	SPDT	240 VAC, 60Hz 220 VAC, 50 Hz	-	2.0VA	KUP5A55 (or F) - 240	RR1BA-US-AC240V
W388ACQX-9	A283XBXC1-120A	DPDT	120 VAC		2.0VA	KUP11A55 (or F) - 120	RR2BA-US-AC120V
W388ACQX-10	A283XBXC1-240A	DPDT	240 VAC. 60 Hz 220 VAC, 50 Hz	-	2.0VA	KUP11A55 (or F) - 240	RR2BA-US-AC240V
W388ACQX-14	A283XCXC1-120A	3PDT	120 VAC	-	2.75VA	KUP14A55 (or F) - 120	RR3B-US-AC120V
W388ACQX-15	A283XCXC1-240A	3PDT	240VAC, 60Hz 220 VAC, 50Hz	-	2.75VA	KUP14A55 (or F) - 240	RR3B-US-AC240V
DC OPERATED							
W388CQX-2	A283XAXC1-12D	SPDT	12 VDC	120	1.2W	KUP5D55 (or F) - 12	RR1BA-US-DC12V
W388CQX-3	A283XAXC1-24D	SPDT	24 VDC	472	1.2W	KUP5D55 (or F) - 24	RR1BA-US-DC24V
W388CQX-6	A283XBXC1-12D	DPDT	12 VDC	120	1.2W	KUP11D55 (or F) - 12	RR2BA-US-DC12V
W388CQX-7	A283XBXC1-24D	DPDT	24 VDC	472	1.2W	KUP11D55 (or F) - 24	RR2BA-US-DC24V
W388CQX-11	A283XCXC1-24D	3PDT	24 VDC	472	1.2W	KUP14D55 (or F) - 24	RR3B-US-DC24V

PART NUMBERS SHOWN ALSO **AVAILABLE THRU STOCKING DISTRIBUTION.**
SEE GENERAL SPECIFICATIONS & WIRING DIAGRAMS FOR CLASS 388 & A283 RELAYS.

†F = GOLD FLASHED

CLASS 388B & 388DB

SQUARE BASE PLUG-IN STYLE WITH MAGNETIC BLOWOUT FOR DC SWITCHING.

RATED 3 & 10 AMPS AT 150 VDC

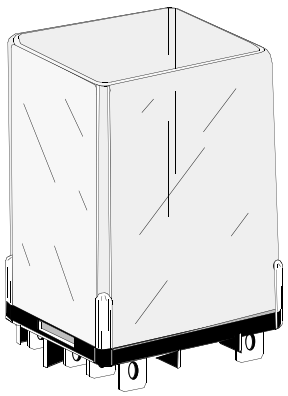
TOP FLANGE COVER AVAILABLE ON SPECIAL ORDER. CONSULT FACTORY

MANUFACTURED UNDER QUALITY SYSTEM
ISO 9002 & QS 9000

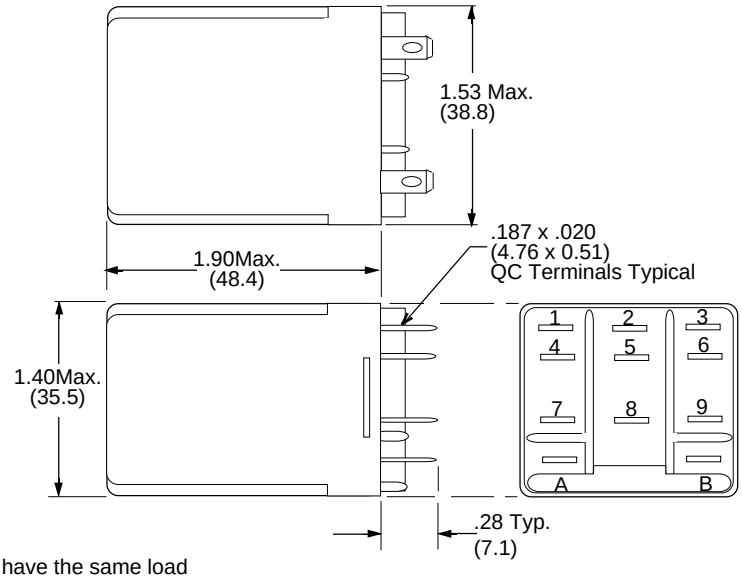
Recognized Component mark for Canada and the United States.
UL Recognized
File No. E43641
& E13224

COMPLIES WITH REQUIREMENTS OF * IEC STANDARDS 947-4-1 AND 947-5-1 LOW VOLTAGE DIRECTIVE

* IEC = INTERNATIONAL ELECTROTECHNICAL COMMISSION



OUTLINE DIMENSIONS
Dimensions shown are in "INCHES" and (Millimeters)



The Class 388B/388DB style relays have the same load specifications as the **388/283** enclosed plug-in style relays plus the additional load ratings charted on this page.
See 388& A283 General specifications.

DC LOAD RATINGS

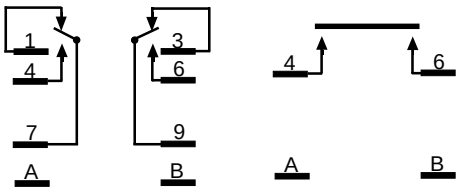
DPDT FIG. "A"		
3 AMPS	150VDC	RESISTIVE
SPDT-N.O. -DM FIG. "B"		
10 AMPS	150VDC	RESISTIVE

ALSO AVAILABLE

DPST-NO & DPST-NC CONTACT VERSIONS WITH BLOWOUT MAGNETS NOW UL APPROVED @ 5 AMPS, 150 VDC.

WIRING DIAGRAM

Viewed from terminal end



DPDT FIG. "A" **SPST-NO-DM FIG. "B"**

*** RELEVANT IEC CONTACT UTILIZATION CATEGORIES**

CE	**AC-1, AC-3, DC-1, AC-15**
	(SEE SECTION 11 FOR RELEVANT UTILIZATION CATEGORIES.)

Magnecraft & Struthers-Dunn

RELAYS CAN BE ORDERED EITHER BY **MAGNECRAFT** OR **STRUTHERS-DUNN** PART NUMBERS LISTED BELOW

DUAL MARKED PART NUMBERS		WIRING DIAG. FIG.	CONTACT CONFIGU-RATION	COIL Measured @ 25°C			CROSS REFERENCE TO POTTER/BRUMFIELD
W388B	*Struthers-Dunn* A283			NOMINAL INPUT VOLTAGE	NOMINAL RESISTANCE (OHMS)	NOMINAL POWER	
AC OPERATED WITH BLOWOUT MAGNET (3 AMP CONTACTS)							
W388ABCPX-5	**A283XBX69C-120A**	**"A"**	DPDT	120 VAC	-	2.0VA	**KUEP-11A15-120**
DC OPERATED WITH BLOWOUT MAGNET (3 AMP CONTACTS)							
W388BCPX-2	**A283XBX69C-12D**	**"A"**	DPDT	12 VDC	120	1.2W	**KUEP-11D15-12**
W388BCPX-3	**A283XBX69C-24D**	**"A"**	DPDT	24VDC	472	1.2W	**KUEP-11D15-24**
W388BCPX-5	**A283XBX69C-110D**	**"A"**	DPDT	110 VDC	10,000	1.2W	**KUEP-11D15-110**
AC OPERATED WITH BLOWOUT MAGNET (10 AMP CONTACTS)							
W388ADBCPX-5	**A283HXX69C-120A**	**'B'**	SPST-NO (DM)	120 VAC	-	2.OVA	**KUEP-3A15-120**
DC OPERATED WITH BLOWOUT MAGNET (10 AMP CONTACTS)							
W388DBCPX-2	**A283HXX69C-12D**	**'B'**	SPST-NO (DM)	12 VDC	120	1.2W	**KUEP-3D15-12**
W388DBCPX-3	**A283HXX69C-24D**	**'B'**	SPST-NO (DM)	24 VDC	472	1.2W	**KUEP-3D15-24**
W388DBCPX-5	**A283HXX69C-110D**	**'B'**	SPST-NO (DM)	110 VDC	10,000	1.2W	**KUEP-3D15-110**

PART NUMBERS SHOWN ALSO **AVAILABLE THRU STOCKING DISTRIBUTION.**

SEE SECTION 10 FOR MATING SOCKETS

GENERAL SPECIFICATIONS

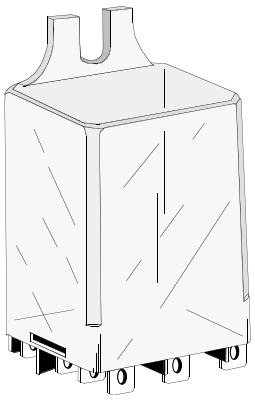
The Class 389 relays are high quality general purpose relays, designed to switch larger loads without increasing overall size. One, two and three pole relays are available with a choice of Indicator lamp, Push to test button and various contact combinations. Double make and double break styles are available only with a one pole style but is capable of switching larger loads and are especially well suited for switching motor loads. These relays are available in the 30 Amp contact range.

COMPLIES WITH REQUIREMENTS OF * IEC STANDARDS 947-4-1 AND 947-5-1 LOW VOLTAGE DIRECTIVE

* IEC = INTERNATIONAL ELECTROTECHNICAL COMMISSION

Recognized Component mark for Canada and the United States.
UL Recognized
File No. E43641

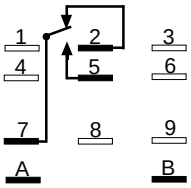
MANUFACTURED UNDER QUALITY SYSTEM
ISO 9002 & QS 9000



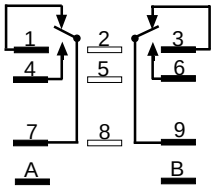
FLANGE MOUNT

WIRING DIAGRAMS

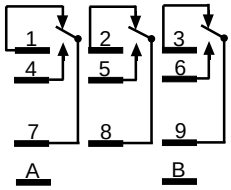
Viewed from terminal end



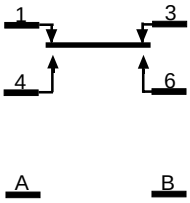
SPDT



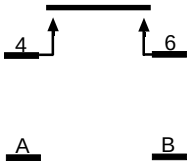
DPDT



3PDT



SPDT-NC-NO-(DB-DM)



SPST-NO-(DM)

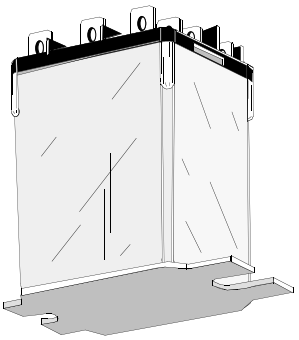
CLASS 389 DIELECTRIC WITHSTANDING VOLTAGES (VRMS) 1, 2 & 3 POLE STYLE RELAYS

POINTS WHERE VOLTAGE IS APPLIED	SPDT	DPDT	3PDT
ACROSS OPEN CONTACTS	1000	1000	1000
POLE- TO- ADJACENT POLE	-	2200	1600
COIL TO FRAME	1600	1600	1600
COIL TO CONTACTS	2200	2200	1600
CONTACT TO FRAME	1600	1600	1600
CONTACTS TO METAL MOUNTING PLATE (COVER INSTALLED)	2200	2200	1600
COIL TO METAL MOUNTING PLATE (COVER INSTALLED)	2200	2200	2200

CLASS 389D DIELECTRIC WITHSTANDING VOLTAGES VRMS) SPDT-NC-NO (DB-DM), SPST-NO - (DM)

POINTS WHERE VOLTAGE IS APPLIED	ENCLOSED STYLE
ACROSS OPEN CONTACTS	1500
COIL TO FRAME	1600
COIL TO CONTACTS	2200
CONTACT TO FRAME	1600
CONTACTS TO METAL MOUNTING PLATE (COVER INSTALLED)	2200
COIL TO METAL MOUNTING PLATE (COVER INSTALLED)	2200

NEW!



TOP FLANGE MOUNT

*** RELEVANT IEC CONTACT UTILIZATION CATEGORIES**

	AC-1, AC-3, DC-1, AC-15
	(SEE SECTION 11 FOR RELEVANT UTILIZATION CATEGORIES.)

SPECIFICATIONS CLASS 389 RELAYS

COIL

Pull-in voltage:	80% of nominal voltage or less. for DC coils. 85% of nominal voltage or less for AC coils.
Dropout voltage:	10% of nominal voltage or more.
Coil resistance:	± 10 % Measured at 25˚C
Nominal power:	1.44 Watts for DC coils, 2VA to 3.5VA for AC coils
Maximum coil dissipation:	Capability of DC coils 2.5 Watts max.
Duty:	Continuous
Insulation System:	Class "B" coil system. (130˚C per UL std. 1446).

CONTACTS

Contact material:	1/4" silver cadmium oxide, gold flashed.
Contact Gap:	.015 min. is standard.
Contact resistance:	50 Milliohms maximum initial resistance at rated current

TIMING

Operate time, (excluding bounce):	20 milliseconds max.at nominal voltage.
Release time, (excluding bounce):	20 milliseconds max.at nominal voltage.

DIELECTRIC STRENGTH

Insulation resistance:	1,000 Megohms min. @ 500 VDC

TEMPERATURE

Operating:	-30˚C to +50˚C (AC), -30˚C to +65˚C (DC)
Storage:	-30˚C to 100˚C

LIFE

Electrical:	100,000 at rated load.
Mechanical:	5 Million Operations no load

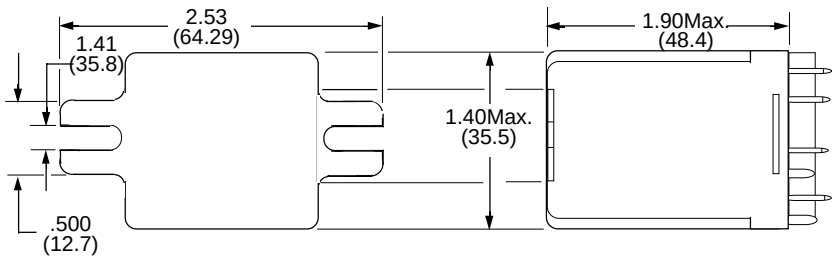
MISCELLANEOUS

Enclosure:	Clear Polycarbonate dust cover
Operating Position:	Any
Insulation material:	Molded plastic
Terminals:	1/4" x .032 Q.C. Terminals suitable for solder or Q.C. connectors, also available with Printed Circuit terminals. (.090 x .032)
Weight:	3.3 oz.. (94 g approx. with cover).

ALSO AVAILABLE

The 300 series was developed as a 600 Volt relay that would accept 1/4" booted terminals. Its extra spacing permits contact gaps to 2 millimeters when required. This increases dielectric strength across open contacts to 2500 Volts RMS. Consult factory for details or additional information.

OPTIONAL
TOP FLANGE COVER IS AVAILABLE ON SPECIAL ORDER. CONSULT FACTORY.



GENERAL CONTACT RATINGS

Recognized Component mark for Canada and the United States.
UL Recognized
File No. E43641

1, 2 & 3 POLE NEMA PILOT DUTY CONTACT RATINGS

NEMA CONTACT CODE DESIGNATION	THERMAL CONTINUOUS TEST CURRENT AMPERES	MAXIMUM CURRENT, AMPERES									
		120 VOLTS 50/60Hz		240 VOLTS 50/60Hz		480 VOLTS 50/60Hz		600 VOLTS 50/60Hz		MAXIMUM VOLT-AMPERES	
		MAKE	BREAK	MAKE	BREAK	MAKE	BREAK	MAKE	BREAK	MAKE	BREAK
A600	10	60	6.00	30	3.00	15	1.50	12	1.20	7200	720
B300	5	30	3.00	15	1.50					3600	360
B600	5	30	3.00	15	1.50	0.75	0.75	6	0.06	3600	360

CLASS 389 LOAD RATINGS

NO. OF POLES	ENCLOSED STYLE 1, 2 and 3 POLE			
	CURRENT OR HORSE-POWER	LOAD VOLTAGE	LOAD VOLTAGE FREQUENCY	TYPE OF LOAD
1 POLE	13A	28	DC	RESISTIVE
	20A	15	DC	RESISTIVE
	25A	300	50/60 Hz	RESISTIVE
	5A	600	50/60 Hz	RESISTIVE
	1HP	120	50/60 Hz	MOTOR
	1-1/2HP	208/240	50/60 Hz	MOTOR
	1HP	480/600	50/60 Hz	MOTOR
	660VA	120	50/60 Hz	PILOT DUTY
	915VA	208	50/60 Hz	PILOT DUTY
	960VA	240	50/60 Hz	PILOT DUTY
	765VA	480/600	50/60 Hz	PILOT DUTY
	B600		50/60Hz	PILOT DUTY
2 POLE	13A	28	DC	RESISTIVE
	20A	15	DC	RESISTIVE
	25A	300	50/60 Hz	RESISTIVE
	5A	600	50/60 Hz	RESISTIVE
	1HP	120	50/60 Hz	MOTOR
	1-1/2HP	208/240	50/60 Hz	MOTOR
	1HP	480/600	50/60 Hz	MOTOR
	660VA	120	50/60 Hz	PILOT DUTY
	915VA	208	50/60 Hz	PILOT DUTY
	960VA	240	50/60 Hz	PILOT DUTY
	765VA	460/600	50/60 Hz	PILOT DUTY
	B600		50/60Hz	PILOT DUTY
3 POLE	13A	28	DC	RESISTIVE
	15A	28	DC (NO)	RESISTIVE
	20A	15	DC	RESISTIVE
	20A	150	50/60 Hz	RESISTIVE
	**15A	250	50/60 Hz	RESISTIVE
	*10A	300	50/60 Hz	RESISTIVE
	1/2HP	120/208/240	50/60 Hz	MOTOR
	1HP	240	50/60 Hz	MOTOR
	3/4HP	120	50/60Hz	MOTOR
	470VA	120/240	50/60 Hz	PILOT DUTY
	445VA	208	50/60 Hz	PILOT DUTY
	B300		50/60Hz	PILOT DUTY

Not CSA rated with ** are UL Appliance rated.
All other ratings not so marked are industrial rated

* CSA rating only, not UL

CLASS 389D LOAD RATINGS

NO. OF POLES	ENCLOSED STYLE			
	CURRENT OR HORSE-POWER	LOAD VOLTAGE	LOAD VOLTAGE FREQUENCY	TYPE OF LOAD
1 POLE	30A	28	DC	RESISTIVE
	30A	300	50/60 Hz	RESISTIVE
	10A	600	50/60 Hz	RESISTIVE
	1HP	120	50/60 Hz	MOTOR
	1-1/2HP	200 thru 600	50/60 Hz	MOTOR
	765VA	120	50/60 Hz	PILOT DUTY
	915VA	208	50/60 Hz	PILOT DUTY
	960VA	240,480,600	50/60 Hz	PILOT DUTY
	A600		50/60 Hz	PILOT DUTY

CLASS 389 BALLAST LOAD RATINGS

NO. OF POLES	ENCLOSED STYLE
1 POLE	20 AMPS, 277VAC, 50/60Hz
2 POLE	20 AMPS, 277VAC, 50/60Hz
3 POLE	20 AMPS,150VAC, 50/60Hz 6-2/3 AMPS, 277VAC, 50/60Hz
DOUBLE BREAK DOUBLE MAKE (1 FORM "X" & "Z")	
1 POLE	25 AMPS, 277VAC, 50/60Hz

SQUARE BASE, 30 AMP POWER RELAY

CLASS 389D

1/4" Q.C. MALE TAB TERMINALS FOR USE WITH FEMALE QUICK CONNECT TERMINALS OR SUITABLE FOR SOLDERING.

TOP FLANGE COVER AVAILABLE ON SPECIAL ORDER. CONSULT FACTORY

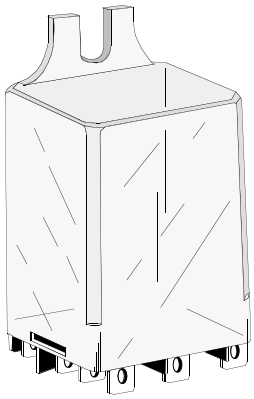
OPTIONAL INDICATOR LAMP AND PUSH TO TEST BUTTON AVAILABLE ON SPECIAL ORDER.

Recognized Component mark for Canada and the United States.
UL Recognized
File No. E43641

COMPLIES WITH REQUIREMENTS OF * IEC STANDARDS 947-4-1 AND 947-5-1 LOW VOLTAGE DIRECTIVE

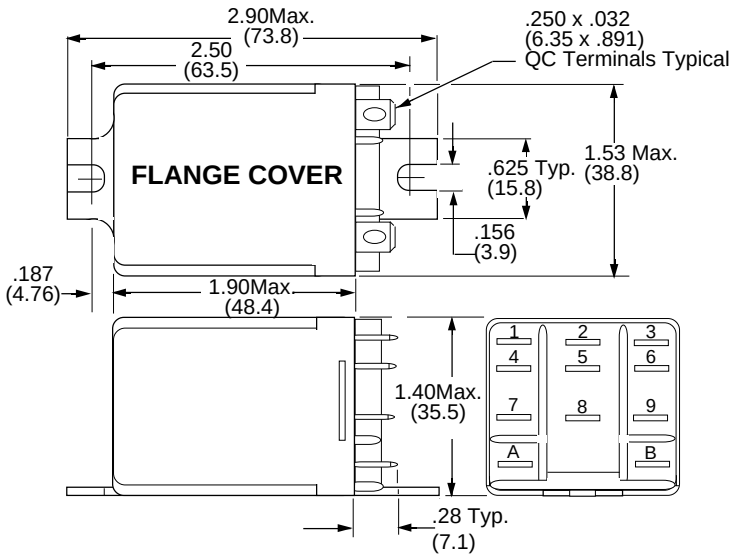
* IEC = INTERNATIONAL ELECTROTECHNICAL COMMISSION

MANUFACTURED UNDER QUALITY SYSTEM
ISO 9002 & QS 9000



OUTLINE DIMENSIONS

Dimensions shown in Inches and (millimeters).



*** RELEVANT IEC CONTACT UTILIZATION CATEGORIES**

CE	**AC-1, AC-3, DC-1, AC-15**
	(SEE SECTION 11 FOR RELEVANT UTILIZATION CATEGORIES.)

PART NUMBERS	CONTACT CONFIGU-RATION	CONTACT RATING	COIL Measured @ 25˚C NOMINAL INPUT VOLTAGE	NOMINAL RESISTANCE (OHMS)	NOMINAL POWER	CROSS REFERENCE TO POTTER & BRUMFIELD
AC OPERATED						
W389ADCX-4	SPST-NO-(DM)	30 AMP	120 VAC	-	2.75VA	**KUMP3A5G-120**
W389ADCX-5	SPST-NO-(DM)	30 AMP	240VAC, 60Hz 220 VAC, 50Hz	-	2.75VA	**KUMP3A5G-240**
W389ADZCX-3	SPDT-NO-NC (DM-DB)	30 AMP	24 VAC	-	3.75VA	**KUMP6A5G-24**
W389ADZCX-4	SPDT-NO-NC (DM-DB)	30 AMP	120VAC	-	3.75VA	**KUMP6A5G-120**
DC OPERATED						
W389DCX-2	SPST-NO-(DM)	30 AMP	12 VDC	100	1.44W	**KUMP3D5G-12**
W389DCX-3	SPST-NO-(DM)	30 AMP	24 VDC	400	1.44W	**KUMP3D5G-24**
W389DZCX-2	SPDT-NO-NC (DM-DB)	30 AMP	12 VDC	100	1.44W	**KUMP6D5G-12**
W389DZCX-3	SPDT-NO-NC (DM-DB)	30 AMP	24VDC	400	1.44W	**KUMP6D5G-24**

EXCEPTION TO CROSS REFERENCE: MAGNECRAFT RELAYS ARE RATED AT 30 AMPS , P&B 15 AMPS PART NUMBERS SHOWN ALSO **AVAILABLE THRU STOCKING DISTRIBUTION.**

SEE CLASS 389 GENERAL SPECIFICATIONS AND WIRING DIAGRAMS.

SQUARE BASE, 25 AMP POWER RELAY

COMPLIES WITH REQUIREMENTS OF IEC STANDARDS 947-4-1 AND 947-5-1 LOW VOLTAGE DIRECTIVE

* IEC = INTERNATIONAL ELECTROTECHNICAL COMMISSION

Recognized Component mark for Canada and the United States.
UL Recognized
File No. E43641

CLASS 389 RELAY

1/4" MALE TAB TERMINALS FOR USE WITH FEMALE QUICK CONNECT TERMINALS OR SUITABLE FOR SOLDERING

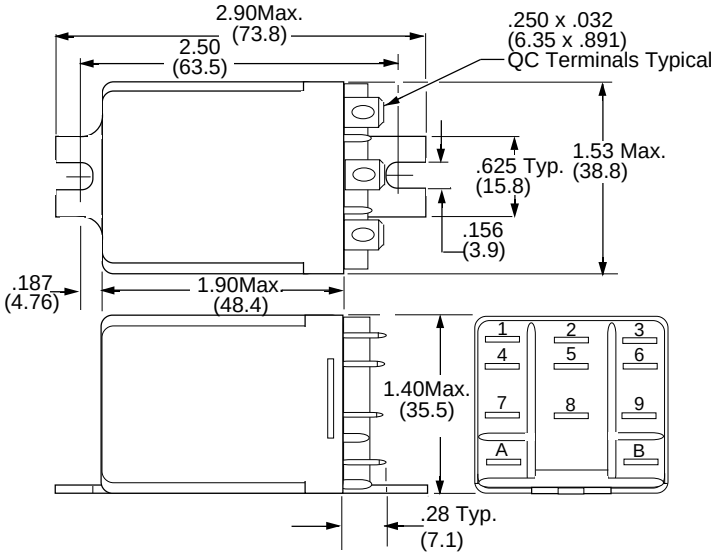
TOP FLANGE COVER AVAILABLE ON SPECIAL ORDER. CONSULT FACTORY

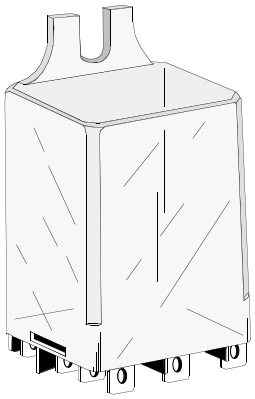
OPTIONAL INDICATOR LAMP AND PUSH TO TEST BUTTON AVAILABLE ON SPECIAL ORDER.

MANUFACTURED UNDER QUALITY SYSTEM
ISO 9002 & QS 9000

OUTLINE DIMENSIONS

Dimensions shown are in INCH and (Millimeter)





*** RELEVANT IEC CONTACT UTILIZATION CATEGORIES**

CE	**AC-1, AC-3, DC-1, AC-15**
	(SEE SECTION 11 FOR RELEVANT UTILIZATION CATEGORIES.)

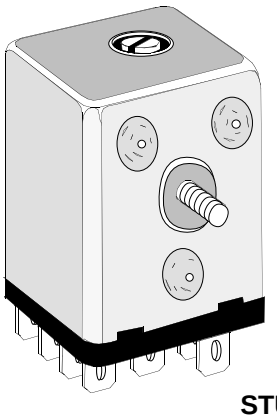
PART NUMBERS FLANGE COVER	CONTACT CONFIGU-RATION	CONTACT RATING	COIL Measured @ 25˚C NOMINAL INPUT VOLTAGE	 NOMINAL RESISTANCE (OHMS)	 NOMINAL POWER	CROSS REFERENCE TO POTTER & BRUMFIELD
AC OPERATED						
W389ACX-4	SPDT	25 AMP	120 VAC	-	2.75VA	**KUHP5A51-120**
W389ACX-8	DPDT	25 AMP	24VAC	-	2.75VA	**KUHP11A51-120**
W389ACX-9	DPDT	25 AMP	120 VAC	-	2.75VA	**KUHP11A51-120**
W389ACX-10	DPDT	25 AMP	240 VAC, 60 Hz 220 VAC, 50 Hz	-	2.75VA	**KUHP11A51-120**
W389ACX-14	3PDT	20 AMP	120 VAC	-	2.75VA	-
W389ACX-15	3PDT	20 AMP	240 VAC. 60 Hz 220 VAC, 50 Hz	-	2.75VA	-
DC OPERATED						
W389CX-2	SPDT	25 AMP	12 VDC	100	1.44W	**KUHP5D51-12**
W389CX-3	SPDT	25 AMP	24 VDC	400	1.44W	**KUHP5D51-24**
W389CX-7	DPDT	25 AMP	12VDC	100	1.44W	**KUHP11D51-12**
W389CX-8	DPDT	25 AMP	24VDC	400	1.44W	**KUHP11D51-24**
W389CX-12	3PDT	20 AMP	12 VDC	100	1.44W	-
W389CX-13	3PDT	20 AMP	24 VDC	400	1.44W	-

PART NUMBERS SHOWN ALSO **AVAILABLE THRU STOCKING DISTRIBUTION.**
SEE CLASS 389 GENERAL SPECIFICATIONS AND WIRING DIAGRAMS.

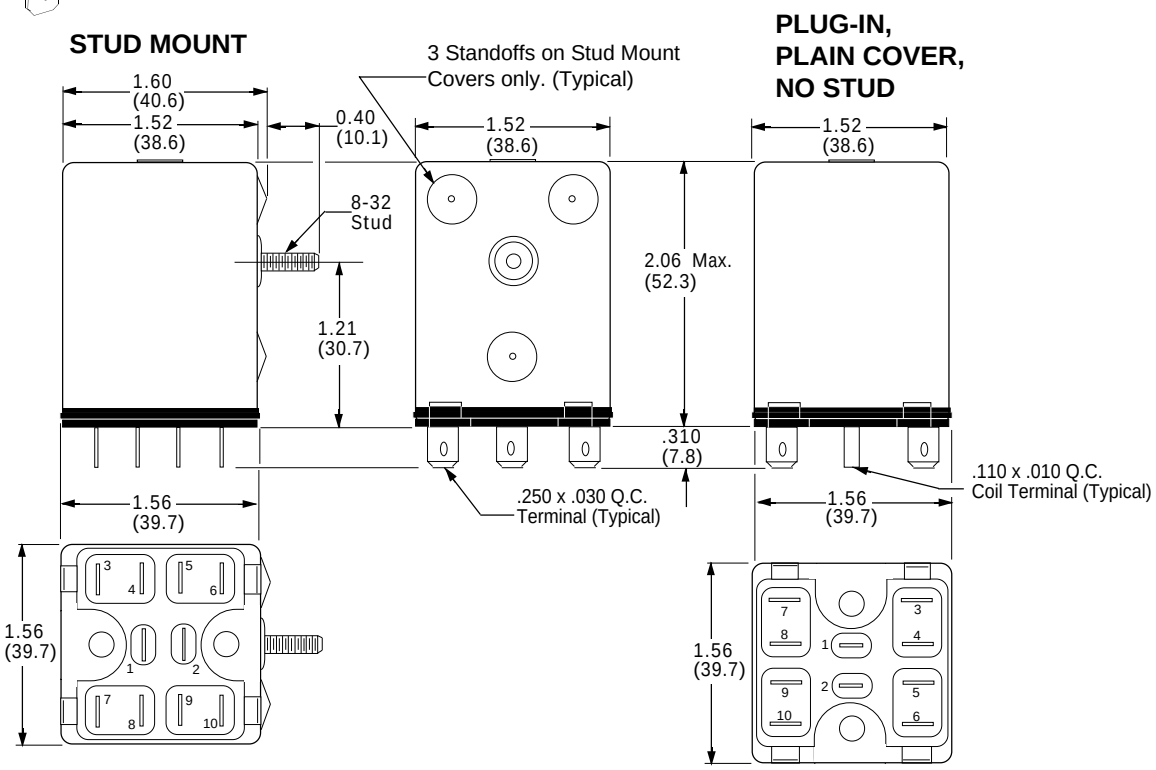
CLASS 97 POWER RELAY

PLUG-IN OR SIDE STUD MOUNT

UL Recognized
File No. E43641



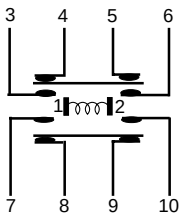
OUTLINE DIMENSIONS
Dimensions shown in Inch & (Millimeter)



Magnecraft

PART NUMBERS	COIL Measured @ 25°C		
	Nominal Input Voltage	Nominal Resistance (Ohms)	Nominal Power
STUD MOUNTING STYLE			
W97ACSX-3	120 VAC	-	8 VA
W97ACSX-4	240 VAC, 60 HZ		8 VA
	220 VAC, 50 HZ	-	
W97CSX-1	12 VDC	50	2.5 W
W97CSX-2	24 VDC	200	2.5 W
PLAIN COVER, PLUG-IN (NO STUD)			
W97ACPX-2	24 VAC	-	8 VA
W97ACPX-3	120 VAC	-	8 VA
W97ACPX-4	240 VAC, 60 HZ		8 VA
	220 VAC, 50 HZ	-	
W97CPX-1	12 VDC	50	2.5 W
W97CPX-2	24 VDC	200	2.5 W

WIRING SCHEMATIC
Viewed from Terminal End



PART NUMBERS SHOWN ALSO **AVAILABLE THRU STOCKING DISTRIBUTION.**

SPECIFICATIONS FOR CLASS 97

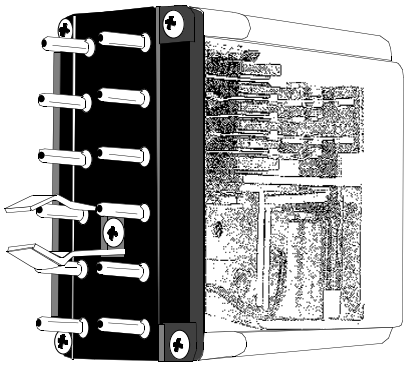
COIL	
Pull-in Voltage:	AC, 85% of Nominal Voltage or less
Dropout Voltage:	DC, 75% of Nominal Voltage or less
Max. allowed voltage:	110% of nominal voltage
Maximum Power	3 Watts
Minimum Power:	1.6 Watts
Duty	Continuous
Resistance	±10%
CONTACTS	
Contact Configuration:	DPDT-NC-NO (DB-DM)
Contact Material:	Silver Alloy
Contact Resistance:	50 Milliohms max. (Initial)
Contact Rating:	25 Amps @ 240 VAC Resistive. 25 Amps @ 277 VAC Resistive. 1 HP @ 120 VAC, 2Hp @ 240 VAC 25 Amps Resistive @ 28 VDC.
TIMING	
Operate Time:	35 mS Max. @ Nominal Voltage.
Release Time:	35mS Max. @ Nominal Voltage.
DIELECTRIC STRENGTH	
Coil to Contacts:	2000 V rms
Across Open Contacts:	1500 V rms
Pole to Pole:	2000 V rms
Contact to Frame:	2000 V rms
Insulation Resistance:	500 VDC Exceeds 100 Megohms min.
TEMPERATURE	
Operating:	-35˚C to +70˚C @ Rated Operation.
VIBRATION RESISTANCE	
Functional:	5g's; 10 to 55 Hz,
SHOCK RESISTANCE	
Functional:	10 g's
LIFE EXPECTANCY	
Mechanical (No Load):	1 Million Operations
Electrical (Rated Load):	100,000 Operations
Max. Cycle Rate:	1800 per hour
MISCELLANEOUS	
Terminals:	All Terminals on Stud mounted relays are 1/4" x .032 Quick Connect Tabs. Plug-in relays have 1/4" x .032 Quick Connect Tabs and .110 Taper Coil Terminals.
Enclosure:	Plated Steel
Operating Position:	Any
Weight:	259.4 grams

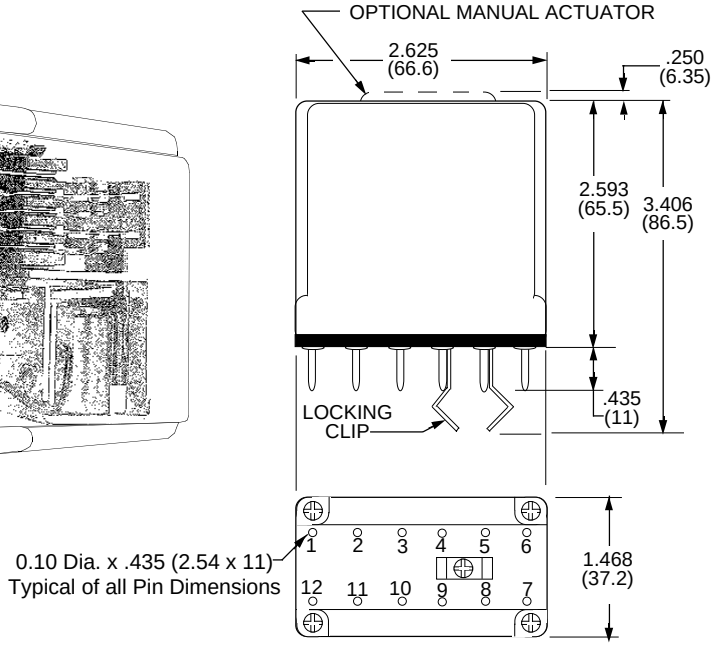
SEE SECTION 10 FOR MATING SOCKETS

300 VOLT GENERAL PURPOSE PLUG-IN RELAY

THE SERIES 219 GENERAL PURPOSE INDUSTRIAL PLUG-IN RELAYS FEATURE 12 PIN AND 14 PIN BASES. THE COIL IS ENCAPSULATED FOR PROTECTION. NUCLEAR QUALIFIED VERSIONS ARE AVAILABLE. CONSULT FACTORY.

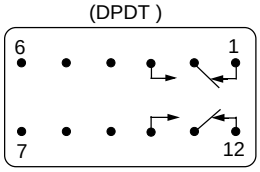
UL Recognized
File No. E13224



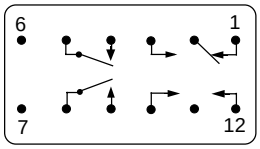


WIRING DIAGRAMS
BOTTOM VIEW

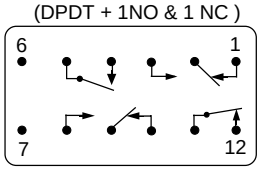
219XBXP
(DPDT)



219BBXP
(DPDT + 2 N.O.)



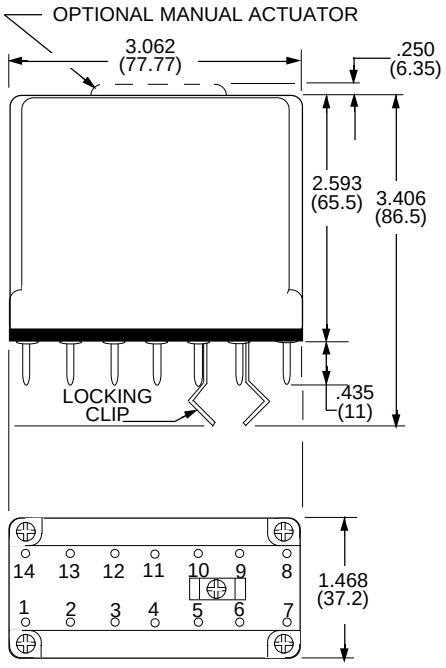
219ABAP
(DPDT + 1NO & 1 NC)



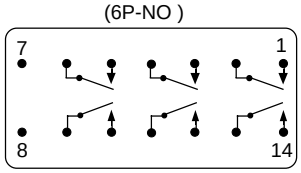
MODELS AVAILABLE

12 PIN	CONTACTS	14 PIN	CONTACTS
219BBXP	DPDT + 2 NO	219XDXP	4PDT
219XBXP	DPDT	219FXXP	6P-NO
219ABAP	DPDT + 1 NO & 1 NC	219DXBP	4P-NO + 2P-NC

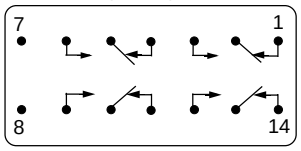
Make before break and other Contact configurations available limited only by the number of terminal pins.Contact Factory.



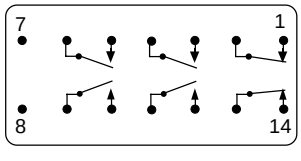
219FXXP
(6P-NO)



219XDXP
(4PDT)



219DXBP
(4P-NO + 2P-NC)



300 VOLT GENERAL PURPOSE PLUG-IN RELAY

219 GENERAL SPECIFICATIONS

COIL

Pull-in, min. AC	85% of Nominal Voltage
Pull-in min. DC	80 % of Nominal Voltage
Overvoltage, max.	110% of nominal, voltage

CONTACTS

Contact Material:	Silver Cadmium Oxide, Gold diffused (Standard)

TIMING

Operate Time:	25 mS Max. @ Nominal Voltage.
Release Time:	20 mS Max. @ Nominal Voltage.

DIELECTRIC STRENGTH

All Mutually Insulated Points:	1500 V rms
Insulation :	1/4" over surface, 1/8" thru Air

TEMPERATURE

Rated Operation:	-10˚C to +60˚C

LIFE EXPECTANCY

Mechanical:	10 Million Operations no load
Electrical:	100,000 Operations @ Rated Load.

MISCELLANEOUS

Enclosure:	Clear polycarbonate.
Operating Position:	Vertical, Contacts Up
Weight:	8.5 oz. (241 g) approx.

COIL SPECIFICATIONS @ 25˚C

AC RELAYS 50/60 HZ (COIL DATA @ 60HZ Voltage					DC RELAYS, 1.8 WATTS (2.5 W @ 125VDC)			
Nominal Voltage	Resistance Ohms ± 10%	Milliamperes Cold	Milliamperes Hot	Impedance Ohms	Nominal Voltage	Resistance Ohms ± 10%	Milliamperes Cold	Milliamperes Hot
6	1.1	1500	840	7.2	6	15.5	385	304
12	4.2	750	410	27	12	63.5	189	147
24	15.5	375	200	120	24 (28)*	250	96	77
120	540	75	40	2700	32	375	86	62
240	2100	32	17	13,400	115/125*	6200	20	16

* Note: Stock 24 Vdc and 115 Vac relays have nameplates stamped 24-28 and 115-125 Vdc respectively. These relays operate at 80% of the lower voltages and operate within allowable temperature rises at higher voltages. 250 Vdc - Use 125 Vdc relay and series resistor (6000 Ω, 5 W) not supplied.

CONTACT RATINGS

VOLTS	MAKE	CARRY	BREAK RESISTIVE	BREAK INDUCTIVE
24 VDC	30A	10A	10A	10A
120 VAC	30A	10A	10A	3A
240 VAC	30A	10A	5A	1A
28 VDC	30A	10A	10A	3A
125 VDC	30A	10A	0.5A	0.1A
For versions with suffix "69" Permanent Magnet Blowouts				
125 VDC SM	30A	10A	1.5A	0.5A
125 VDC DM	30A	10A	4A	1.5A
250 VDC SM	30A	10A	0.5A	150 mA
250 VDC DM	30A	10A	1.5A	0.5A

Magnecraft & Struthers-Dunn

ORDERING CODE

Typical Type No. **219 XBX P L -24D**

Series
219 Industrial plug-in style

Contact Arrangements
XBX (DPDT)
ABA (DPDT + 1 Pole-NO & 1 Pole NC)
BBX (2 Pole-NO & DPDT)
XDX (4 PDT)
FXX (6 Pole-NO)
DXB (4 Pole-NO & 2 Pole-NC)

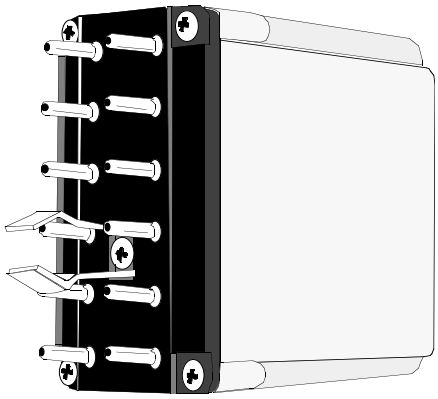
Standard Features
Polycarbonate Cover- **CODE "P"**

Optional Features
Indicator Lamp - **CODE "L"**
Manual Actuator- **CODE "M"**
130˚C Coil - **CODE "U"**
Bifurcated Contacts - **CODE "33"**
Perm. Magnet Blowout- **CODE "69"**

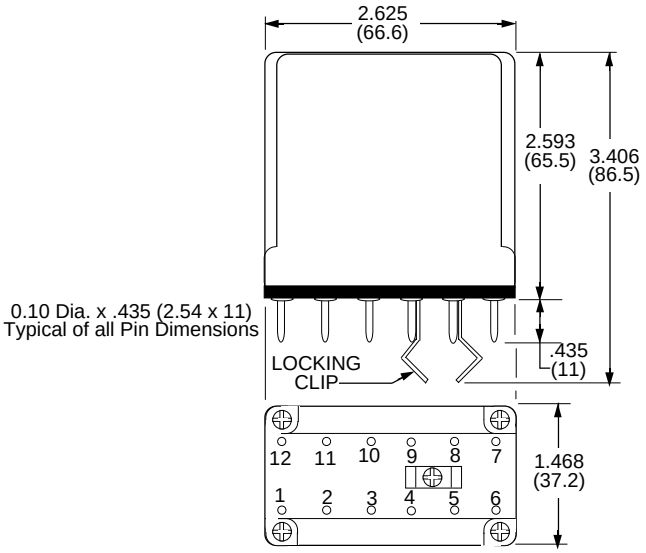
Coil Voltage
AC: 6, 12, 24, 120, 240 (Add **"A"**)
DC: 6, 12, (24-28), 32, 115/125 (Add **"D"**)
Coil Voltages & Frequencies must be specified.

SEE SECTION 10 FOR MATING SOCKETS

INDUSTRIAL PLUG-IN ALARM RELAY 5 AMP, 2 POLE



The RSX1800 Series Alarm Relay consists of a pair of 2 pole or 3 pole relays enclosed in a clear plastic cover. Wired to a 12 Pin Industrial plug. The relay is wired so that it performs the basic functions of Interfacing between a alarm point and an alarm light and/or an acoustic sounding device. The RSX1800 operates from a normally closed trouble contact, while the RSX1800Z operates from a normally open trouble contact. Either a sustained or momentary alarm condition will energize the relay when signalled by an external trouble contact. The Alarm can be allowed to continue until the trouble has been corrected, at which time it automatically resets.



COIL DATA

Measured at 25˚C

AC Coils, 50/60Hz			AC Coils, 50/60Hz		
Volts	Ohms	mA	Volts	Ohms	mA
6	10.7	200	6	35	170
12	41.1	100	12	150	80
24	170	59	24	560	43
120	4500	10	115-125	11,000	10.5

Magnecraft & Struthers-Dunn

ORDERING CODE

Typical Type No. **RSX1800 S 120A**

Series

219 Industrial plug-in style Alarm relay
5 Amp, 2 Pole

Design for Trouble Contacts

Operate from N.C. trouble contact- **CODE S***
Operate from N.O. Trouble contact- **CODE Z***

Coil Voltage

AC: 6, 12, 24, 120, (Add **"A"**)
DC: 6, 12, 24 110-125 (Add **"D"**)

* Codes "S" & "Z" are 120 VAC only. All other codes are "AD" for NC input or "ZZ" for NO input.

SEE SECTION 10 FOR MATING SOCKETS

INDUSTRIAL PLUG-IN ALARM RELAY 5 AMP, 2 POLE

LEGEND

K1 - Alarm/Silencing Relay.
K2 - Alarm/Silencing Relay.
A - Horn & optional Flasher.
TT - Lamp test (optional).
L1 - Line voltage.
R - Reset (optional for manual reset only.
S - Horn Silence (acknowledge).
F - Flasher (Optional).
N - Neutral.
Relays are supplied only with the items and wiring shown within the rectangles in schematics.

NOTE: For additional alarms, jumper to like terminals as shown.

GENERAL SPECIFICATIONS

CONTACTS
Contact Material: Silver Cadmium Oxide.

Rating: 5 AMP, 120Vac/30Vdc Resistive
20 mS Max. @ Nominal Voltage.

TIMING
Operate Time: 25 Milliseconds max.
Release Time: 20 milliseconds max.

DIELECTRIC STRENGTH
Across open contacts: 500 V rms
Between all mutually insulated current carrying parts: 1500 V rms

TEMPERATURE
Rated Operation: -10˚C to +70˚C

LIFE EXPECTANCY
Mechanical: 20 Million Operations no load
Electrical: 500,000 Operations @ Rated Load.

MISCELLANEOUS
Enclosure: Clear polycarbonate.
Operating Position: Any
Weight: 8.8 oz (250 g) approx.

MANUAL RESET (RSX1800S)

Manual (Push-button) Reset Sequence.	K1	K2	Flasher	Horn	Lamp
1- Normal	ON	ON	OFF	OFF	OFF
2- Alarm	OFF	ON	ON	ON	Flashing
3- Acknowledge	OFF	OFF	OFF	OFF	ON
4- Alarm Contact Recloses	OFF	OFF	OFF	OFF	ON
5- Reset	ON	ON	OFF	OFF	OFF
6- Lamp Test	ON	ON	OFF	OFF	ON

AUTOMATIC RESET (RSX1800S)

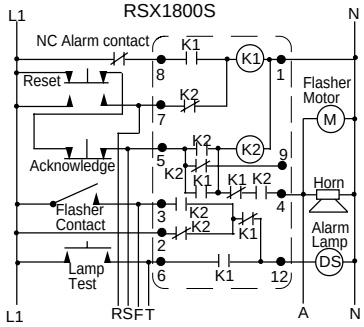
Automatic Reset Sequence.	K1	K2	Flasher	Horn	Lamp
1- Normal	ON	ON	OFF	OFF	OFF
2- Alarm	OFF	ON	ON	ON	Flashing
3- Acknowledge	OFF	OFF	OFF	OFF	ON
4- Alarm Contact Recloses	On	On	OFF	OFF	OFF
5- Lamp Out	ON	ON	OFF	OFF	ON

*** OMIT for RESET (RSX1800Z)**

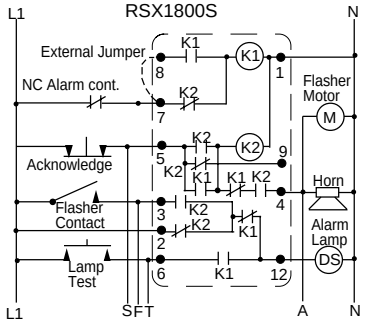
Automatic or Manual	K1	K2	Flasher	Horn	Lamp
1- Normal	OFF	ON	OFF	OFF	OFF
2- Alarm	ON	ON	ON	ON	Flashing
3- Acknowledge	ON	OFF	OFF	OFF	ON
4- Trouble Contact Reopens. Auto reset	OFF	ON	OFF	OFF	OFF
Manual reset	ON	OFF	OFF	OFF	ON
5- Reset	OFF	ON	OFF	OFF	OFF
6- Lamp Test	OFF	ON	OFF	OFF	ON

* External Jumper supplied be Customer.

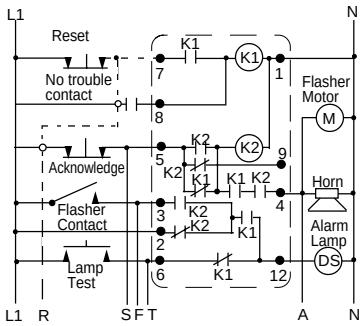
MANUAL RESET
RSX1800S



AUTOMATIC RESET
RSX1800S



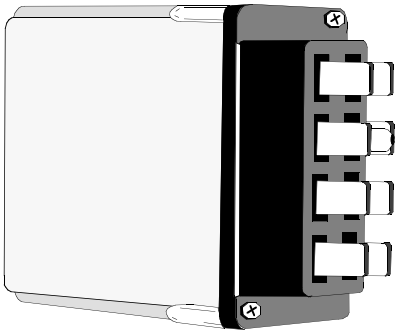
AUTO or MANUAL RESET
RSX1800Z



FLASH TRANSFER RELAY SWITCHES TUNGSTEN LOADS

CLASS 21

PLUG-IN BASE WITH POLARIZING PIN
DPDT CONTACT CONFIGURATION
SWITCHES TUNGSTEN LAMP LOADS
UP TO 20 AMPS

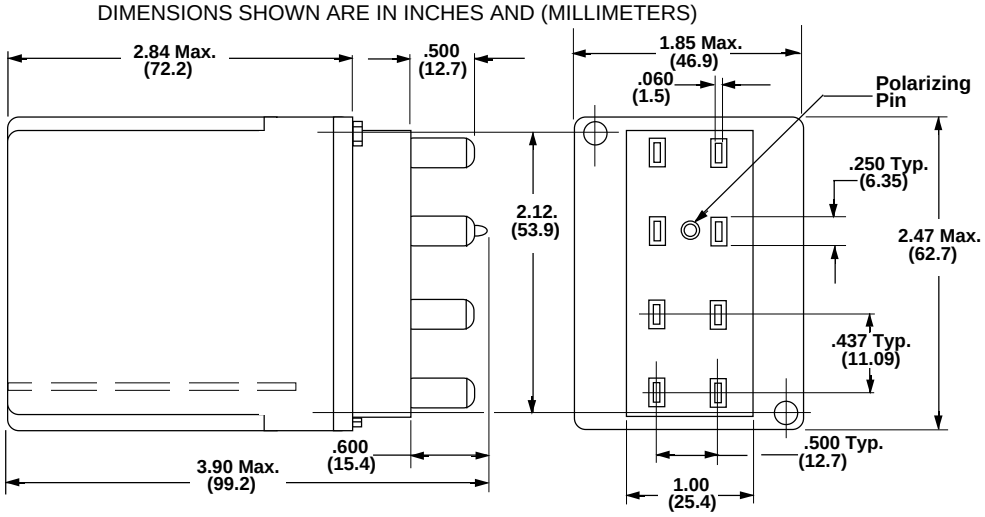


MEETS NEMA STD. TS 2- 1992
APPROVED BY D.O.T FOR:
California Minnesota Georgia
New York Illinois Texas
Oregon Colorado Missouri

Recognized Component mark for Canada and the United States.
UL Recognized
File No. E43641

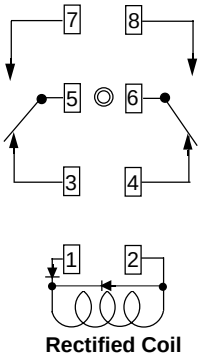
OUTLINE DIMENSIONS

DIMENSIONS SHOWN ARE IN INCHES AND (MILLIMETERS)



WIRING DIAGRAM

VIEWED FROM PIN END



Rectified Coil

SPECIFICATIONS CLASS 21 RELAY

COIL
Pull-in Voltage: AC: 70% of Nominal @ 20˚C or less
Dropout Voltage: 10% of Nominal Voltage or more
Coil Insulation : Class "B" System (130˚C) per UL 1446

CONTACTS
Contact Material: Silver alloy 3/8" dia.
Contact Configuration: DPDT
Contact Rating: 20Amps, 28VDC (Resistive).
1-1/2 HP, 120VAC (Motor)
2HP, 240VAC (Motor)
20Amps, 120VAC (Tungsten Lamp)
10Amps, 240VAC (Tungsten Lamp)

DIELECTRIC STRENGTH
Across open contacts 500 V rms
Contact to Coil: 1500 V rms
Contact to Frame: 1500 V rms

TEMPERATURE
Operating: -40˚C to +84˚C

LIFE EXPECTANCY
Electrical: 200,000 Operations min. at 20 Amps Tungsten, 120VAC.
Mechanical: 5 Million Operations MIN. (No Load)

MISCELLANEOUS
Enclosure: Clear Polycarbonate
Operating Position: Vertical contacts up or horizontal
Weight: 7.2 oz.. 204.7 Grams

Dual Marked Part Number	Contact Configuration	Coil Measured at 25˚C		Type
		Nominal Voltage	Nominal Power	
W21ACPX-2 /W21ACPXD-5	DPDT	120VAC	4.0 VA	* Rectified

* Rectified type coil provides:
1. Chatter Free operation in Brownout conditions down to 85VAC and will not overheat up to 130VAC.
2. Less Power consumption and less Heating.

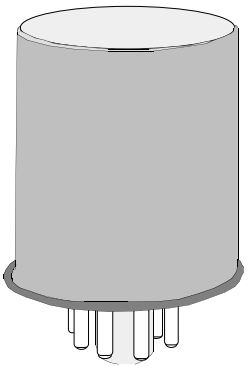
PART NUMBERS SHOWN ALSO **AVAILABLE THRU STOCKING DISTRIBUTION.**

CLASS 88HP

8 OR 11 PIN OCTAL BASE

HERMETICALLY SEALED STEEL CAN

Enclosure is filled with dry nitrogen,solder sealed and then electronically leak checked to prevent contamination of Internal parts. The case is painted gray to protect against the elements.



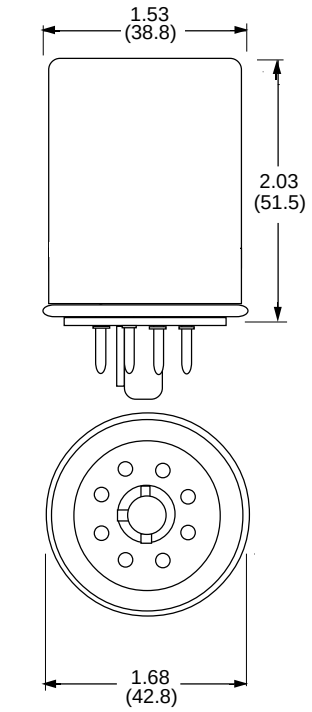
WIRING DIAGRAM

VIEWED FROM PIN END

DPDT 3PDT

OUTLINE DIMENSIONS

Dimensions are shown in Inch and (Millimeter).



CONTACT RATINGS TABLE

POLES	120 VAC	240 VAC	28 VDC
2 POLE	12 AMP 1/3 HP	8 AMP 1/2 HP	10 AMP
3 POLE	10 AMP 1/3 HP	6 AMP 1.2 HP	10 AMP

SPECIFICATIONS CLASS 88HP RELAY

COIL

Pull-in voltage:	80% of nominal voltage or less. For DC coils 85% of nominal voltage or less. For AC coils.
Dropout:	10% of nominal voltage or more.
Coil resistance	± 10 % measured @ 25 ˚C
Nominal power:	1.5 Watts for DC coils, 3VA for AC coils
Max.coil Dissipation:	DC coils 3.0 Watts max.
Duty:	Continuous

CONTACTS

Contact material:	3/16" silver cadmium oxide, gold flashed.
Contact resistance:	50 Milliohms maximum initial resistance at rated current

TIMING

Operate time:	25mS or less at nominal voltage.
Release time:	20mS or less at nominal Voltage.

DIELECTRIC STRENGTH

Contacts to coil:	1500 V rms
Across open contacts:	1000 V rms
Pole to pole	1500 V rms
Contacts to frame:	1500 V rms
Insulation resistance:	10,000 megohms min. @ 500 VDC

TEMPERATURE

Operating:	-10˚C to +50˚C (AC), -10˚C to +60˚C (DC)
Storage:	-30˚C to 105˚C

SHOCK RESISTANCE

Operating:	5 G's
Non operating:	20 G's

VIBRATION RESISTANCE

Operating:	5 G's, 10 Hz to 55 Hz
Non operating:	5 G's, 10 Hz to 55 Hz

MISCELLANEOUS

Enclosure:	Hermetically Sealed Steel Can with octal plug.
Terminals	8 or 11 pin octal plug-in
Operating Position:	Any
Weight:.	5 ozs. 141.7 g approx.

PART NUMBERS	CONTACT CONFIGU-RATION	NO. OF PINS OCTAL STYLE	COIL Measured @ 25˚C NOMINAL INPUT VOLTAGE	NOMINAL RESISTANCE (OHMS)	NOMINAL POWER	CROSS REFERENCE TO POTTER & BRUMFIELD*
AC OPERATED 50/60Hz Operation.						
W88AHPX-24	DPDT	8 PIN	120VAC	-	3.0VA	**KR11AGE (or GF) 120**
W88AHPX-36	3PDT	11 PIN	120VAC	-	3.0VA	**KR14AGE (or GF) 120**
DC OPERATED						
W88HPX-33	DPDT	8 PIN	12 VDC	100	1.5W	**KR11DGE (or GF) 12**
W88HPX-34	DPDT	8 PIN	24 VDC	400	1.5W	**KR11DGE (or GF) 24**
W88HPX-51	3PDT	11PIN	24 VDC	400	1.5W	**KR14DGE (or GF) 24**

PART NUMBERS SHOWN ALSO **AVAILABLE THRU STOCKING DISTRIBUTION**

SPDT and other special contact combinations along with other coil voltages up to 240VAC are available. Consult Factory.

* **GF = GOLD FLASHED**

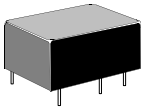
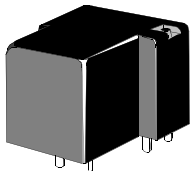
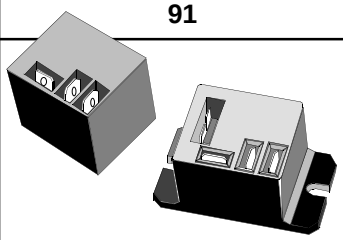
SEE SECTION 10 FOR MATING SOCKETS

PRINTED CIRCUIT BOARD

RELAYS

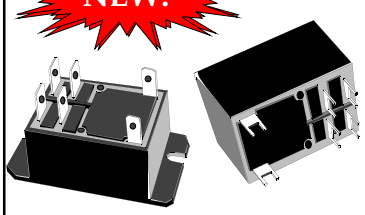
1 TO 30 AMPERES

HI-CURRENT P.C. BOARD RELAYS

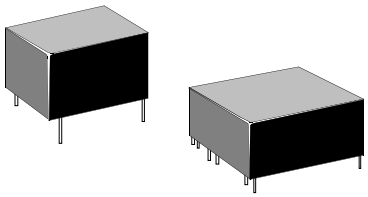
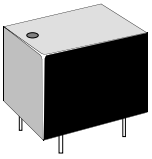
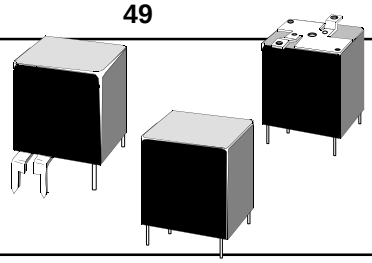
RELAY SERIES	276	90		91	
		 CE Pending			
FEATURES	SUBMINIATURE EPOXY SEALED IMMERSION CLEANABLE STANDARD 0.1 GRID PATTERN SINGLE SIDE STABLE DESIGN 5KV SURGE RESISTANCE COIL TO FRAME. MEETS 4mm INTERNATIONAL SPACING COIL TO CONTACT.	EPOXY SEALED IMMERSION CLEANABLE. STANDARD 0.1 GRID PATTERN CLASS "B" OR "F" INSULATION SYSTEM MEETS UL 508 & UL 873 SPACING		EPOXY SEALED IMMERSION CLEANABLE. P.C. BOARD OR FLANGE MOUNT STYLES. CLASS "F" INSULATION SYSTEM. SPADE TERMINALS ACCEPT 1/4" Q.C. CONNECT TERMINALS. & 3/16"' COIL Q.C. TERMINALS.	
CONTACT DATA CONTACT CONFIGURATION:	SPST-NO, SPDT	SPST-NO	SPDT	SPST-NO	SPDT
MAXIMUM ALLOWABLE CONTACT LOAD:	(SPST-NO) 10A, 250 VAC/30 VDC (SPDT) 7 A, 250 VAC/30 VDC	30A, 240 VAC 20A, 30 VDC	20 A 240 VAC (NO) 15 A,240 VAC (NC) 10A, 30 VDC	30A, 240 VAC 20A, 30 VDC	20 A 240 VAC (NO) 15 A,240 VAC (NC) 10A, 30 VDC
CONTACT MATERIAL:	SILVER ALLOY	SILVER CADMIUM OXIDE		SILVER CADMIUM OXIDE	
CONTACT RESISTANCE:	100 MILLIOHMS (INITIAL)	50 MILLIOHMS (INITIAL)		50 MILLIOHMS (INITIAL)	
INSULATION CHARACTERISTICS DIELECTRIC STRENGTH	2000 V rms	1500 V rms		2500 V rms	
COIL DATA AC - VOLTAGE:	NOT AVAILABLE	NOT AVAILABLE		24, 120 & 240 VAC	
DC - VOLTAGE:	5, 6, 12, & 24VDC	5, 12, 24 & 110 VDC		NOT AVAILABLE	
POWER:					
VA,: (AC)	-	-		2 VA	
WATTS,: (DC)	200 MILLIWATTS	930 MILLIWATTS		-	
GENERAL DATA					
AMBIENT TEMPERATURE OPERATIONAL:	- 40˚ C to + 70˚ C	- 55˚ C to + 105˚ C		- 55˚ C to + 85˚ C	
STORAGE:		- 55˚ C to + 130˚ C		- 55˚ C to + 130˚ C	
TIMING VALUES OPERATE:	10 MILLISECONDS	15 MILLISECONDS		20 MILLISECONDS	
RELEASE:	10 MILLISECONDS	10 MILLISECONDS		20 MILLISECONDS	
LIFE MECHANICAL:	20 MILLION OPERATIONS	10 MILLION OPERATIONS		10 MILLION OPERATIONS	
ELECTRICAL:	100,000 OPERATIONS	100,000 OPERATIONS		100,000 OPERATIONS	
DIMENSIONS	H W L	H W L		H W L	
	.394 X .50 X .787	.805 X 1.08 X 1.30		1.10 X 1.08 X 1.27	
APPROVALS					
PAGE NUMBER	PAGE 44	PAGE 45, 46		PAGE 47,48	

Magnecraft & Struthers-Dunn

HI-CURRENT & MICRO MINIATURE P.C. RELAYS

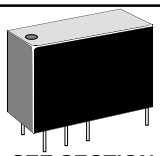
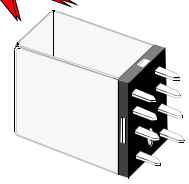
RELAY SERIES	NEW! 9A	NEW! 92	7
			
FEATURES	EPOXY SEALED IMMERSION CLEANABLE WITH TAPE SEAL. P.C. BOARD OR FLANGE MOUNT STYLES. CLASS "F" INSULATION SYSTEM. SPADE TERMINALS ACCEPT INSULATED 1/4" Q.C. CONNECT TERMINALS. & 3/16"' COIL Q.C.TERMINALS.	EPOXY SEALED IMMERSION CLEANABLE WITH TAPE SEAL. PC BOARD OR FLANGE MOUNT STYLES. CLASS "F" INSULATION SYSTEM. 1/4" SPADE TERMINALS ACCEPT 1/4' Q.C. CONNEC-TORS.	MICRO MINIATURE SIZE CONFORMS TO FCC PART 68.302, 1500V SURGE RESISTANCE, FCC 68.304 1000V DIELECTRIC STRENGTH. EXCELLENT R.F. SWITCHING CHARACTERISTICS HIGH SHOCK & VIBRATION RESISTANCE PC BOARD MOUNTING ON 0.1 GRID PATTERN 94V-0 PLASTIC, EPOXY SEALED
CONTACT DATA CONTACT CONFIGURATION:	SPST-NO | SPDT	SPST-NO | DPDT	SPDT, DPDT
MAXIMUM ALLOWABLE CONTACT LOAD:	30A, 240 VAC 20A, 30 VDC | 20 A 240 VAC 20A, 28 VDC (NO) 15A,240 VAC 10A, 28 VDC (NC)	30A, 277 VAC 20A, 28 VDC | 30A, 277 VAC 20A, 28 VDC (NO) 3A, 277 VAC 3A, 28 VDC (NC)	2 A, 24 VDC 1 A, 100 VAC (DPDT) 2A, 120 VAC (SPDT) 50uA, 50mV MIN.
CONTACT MATERIAL:	SILVER CADMIUM OXIDE	SILVER CADMIUM OXIDE	GOLD CLAD SILVER PALLADIUM CROSS BAR
CONTACT RESISTANCE:	75 MILLIOHMS (INITIAL)	100 MILLIOHMS (INITIAL)	50 MILLIOHMS, (INITIAL)
INSULATION CHARACTERISTICS DIELECTRIC STRENGTH	2500 V rms	2500 V rms	500 V rms
COIL DATA			
AC - VOLTAGE:	NOT AVAILABLE	24, 120 & 240 VAC	NOT AVAILABLE
DC - VOLTAGE:	5, 12, 24 48 & 110 VDC	12, 24 48 & 110 VDC	5, 12, & 24 VDC
POWER:			
VA,: (AC)		4 VA	-
WATTS,: (DC)	1 WATT	1.7 WATTS	330-370 MILLIWATTS
GENERAL DATA			
AMBIENT TEMPERATURE			
OPERATIONAL:	- 55˚ C to + 85˚ C	DC,- 40˚ C to + 85˚C -AC,- +65˚C	- 35˚ C to + 70˚ C
STORAGE:	- 55˚ C to + 130˚ C		
TIMING VALUES			
OPERATE:	15 MILLISECONDS	15 MILLISECONDS	4.0 MILLISECONDS
RELEASE:	15 MILLISECONDS	10 MILLISECONDS	5.0 MILLISECONDS
LIFE			
MECHANICAL:	10 MILLION OPERATIONS	5 MILLION OPERATIONS	100 MILLION OPERATIONS
ELECTRICAL:	100,000 OPERATIONS	100,000 OPERATIONS	100,000 OPERATIONS
DIMENSIONS	**H W L**	**H W L**	**H W L**
	1.10 X 1.08 X 1.27	1.10 X 1.36 X 1.27	.428 X .410 X .410
APPROVALS	c UL us	c UL us	c UL us
PAGE NUMBER	**PAGE 49, 50**	**PAGE 51, 52**	**PAGE 53, 54**

MINIATURE P.C. BOARD RELAYS

	60	178	49
			
	MINIATURE SIZE CONFORMS TO FCC PART 68.302, 1500V SURGE RESISTANCE, FCC 68.304 1000V DIELECTRIC STRENGTH. EXCELLENT R.F. SWITCHING CHARACTERISTICS HIGH SHOCK & VIBRATION RESISTANCE PC BOARD MOUNTING ON 0.1 GRID PATTERN.	MINIATURE EPOXY SEALED. P.C. BOARD MOUNTING. SWITCHES UP TO 12 AMP LOADS. CLASS "B" OR "F" INSULATION SYSTEM IMMERSION CLEANABLE. DISPLACES APPROXIMATELY .43 CUBIC INCH.	DUST COVERED DISPLACES APPROXIMATELY 1.1 CUBIC INCH. VARIETY OF MOUNTING CONFIGURATIONS. TV-5 RATINGS AVAILABLE.
	SPDT, DPDT	SPDT	SPDT
	2 A, 24 VDC 1 A, 100 VAC (DPDT) 2A, 120VAC)SPDT) 50uA, 50mV MIN.	5 AMP @ 125/250VAC, 30VDC (CLASS 178RE1-) 12 AMP @ 120VAC, 28VDC 10AMP @ 125/250 VAC, 30 VDC (CLASS 178URE1-)	3 AMPS @ 120 VAC/ 28 VDC 5 & 10 AMP @ 240VAC/28VDC
	GOLD CLAD SILVER PALLADIUM CROSS BAR 50 MILLIOHMS MAX (INITIAL) 500 V rms	SILVER CADMIUM OXIDE 100 MILLIOHMS (INITIAL) 1500 V rms	SILVER, GOLD PLATED, SILVER CADMIUM OXIDE 100 MILLIOHMS (INITIAL) 1500 V rms
	NOT AVAILABLE 5, 12, & 24 VDC - 330-370 MILLIWATTS	NOT AVAILABLE 5, 12, & 24 VDC 400 MILLIWATTS	NOT AVAILABLE 3, 5, 6, 12, & 24 VDC 400 MILLIWATTS
	- 35˚ C to + 70˚ C 4.0 MILLISECONDS 5.0 MILLISECONDS 100 MILLION OPERATIONS 100,000 OPERATIONS	- 40˚ C to +70˚ C (272) 20 MILLISECONDS 10 MILLISECONDS 10 MILLION OPERATIONS 100,000 OPERATIONS	- 55˚ C to + 85˚ C - 55˚ C to + 130˚ C 10 MILLISECONDS 7 MILLISECONDS 50 MILLION OPERATIONS 100,000 OPERATIONS
	H W L .570 X .895 X 1.10	H W L .620 X .650 X .890	H W L 1.14 X .759 X 1.25
	c UL us	c UL us	UL CSA
	PAGE 55, 56	PAGE 57, 58	PAGE 59 , 60

Magnecraft & Struthers-Dunn

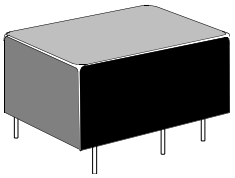
MINIATURE P.C. BOARD RELAYS

RELAY SERIES	76	1330 & 1335
	 SEE SECTION 10 FOR MATING SOCKETS	NEW! 
FEATURES	EPOXY SEALED IMMERSION CLEANABLE. MEETS 8 MILLIMETER SPACING COIL TO CONTACTS MEETS 4KV DIELECTRIC WITHSTANDING VOLTAGE.	MINIATURE SIZE ENCLOSED SEE THRU COVER WITH P.C. TERMINALS. AC OR DC OPERATION 5 AMP RESISTIVE OR 3 AMP INDUCTIVE SWITCHING.
CONTACT DATA CONTACT CONFIGURATION:	SPDT, DPDT / SPDT	DPDT
MAXIMUM ALLOWABLE CONTACT LOAD:	10 AMPS @ 250 VAC/ 30 VDC / 16AMPS @ 240 VAC/ 24 VDC	UL RATED - 5A, 120VAC, NON UL RATED - 5A, 30 VDC 3A, 120VAC INDUCTIVE. 1/8 HP, 120 VAC
CONTACT MATERIAL:	SILVER CADMIUM OXIDE	SILVER CADMIUM OXIDE
CONTACT RESISTANCE:	50 MILLIOHMS (INITIAL)	100 MILLIOHMS MAX. (INITIAL)
INSULATION CHARACTERISTICS DIELECTRIC STRENGTH	4000 V rms	1500 V rms
COIL DATA AC - VOLTAGE: DC - VOLTAGE:	SPECIAL ORDER 5,6, 12, 24 & 48 VDC	24, 120 VAC 12, 24 VDC
POWER: VA,: (AC) WATTS,: (DC)	520 MILLIWATTS	1.2 VA 1.2 W
GENERAL DATA AMBIENT TEMPERATURE OPERATIONAL: STORAGE:	- 20˚ C to + 70˚ C	- 45˚ C to + 70˚ C
TIMING VALUES OPERATE: RELEASE:	15 MILLISECONDS 10 MILLISECONDS	20 MILLISECONDS 20 MILLISECONDS
LIFE MECHANICAL: ELECTRICAL:	20 MILLION OPERATIONS 150,000 OPERATIONS	AC, 50 M. DC, 100M OPERATIONS 100,000 OPERATIONS
DIMENSIONS	H W L	H W L
	.811 X .512 X 1.14	.905 X .728 X 1.07
APPROVALS	UL CSA	c UL us LIMITED RATINGS
PAGE NUMBER	PAGE 61, 62	PAGE 63

ACTUAL SIZE

SERIES 276

DTL COMPATIBLE
SINGLE SIDE STABLE DESIGN
5KV SURGE RESISTANCE COIL TO CONTACT
MEETS INTERNATIONAL SPACING -4 mm COIL TO CONTACT



SPECIFICATIONS SERIES 276

COIL
Pull-in Voltage: 75% of Nominal Voltage or less
Dropout Voltage: 10% of nominal voltage or more
Max. allowed voltage: 110% of nominal voltage.
Coil Resistance: ±10%
Nominal Power: 200mW Approx.

CONTACTS
Contact Material: Silver Alloy
Contact Resistance: 100 Milliohms initial @ 6VDC, 1 Amp

TIMING
Operate Time: 10 mS Max. @ Nominal Voltage.
Release Time: 10 mS Max. @ Nominal Voltage.

DIELECTRIC STRENGTH
Contacts to Coil: 2000 V rms
Across open contacts: 1000 V rms
Surge voltage resistance: 5000 V rms between coil and contacts
Insulation Resistance: 500 VDC Exceeds 1000 Megohms min..

TEMPERATURE
Operating:: -40˚C to +70˚C

VIBRATION RESISTANCE
Functional: 10g's 10 to 55Hz, .06" DA

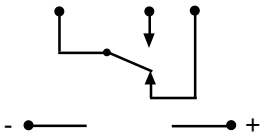
SHOCK RESISTANCE
Functional: 100g's no damage

LIFE
Electrical (Rated Load): 100,000 Operations
Mechanical (No Load): 20 Million Operations

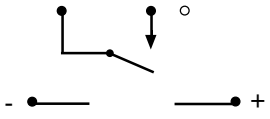
MISCELLANEOUS
Operating Position: Any
Enclosure: Plastic Cover, Epoxy sealed,
Weight: 0.2 oz. (5.5 grams) approx.

LOW LEVEL LOADS: NOT SUITABLE BELOW 20 WATTS

WIRING DIAGRAM
BOTTOM VIEW

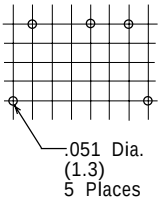


SPDT

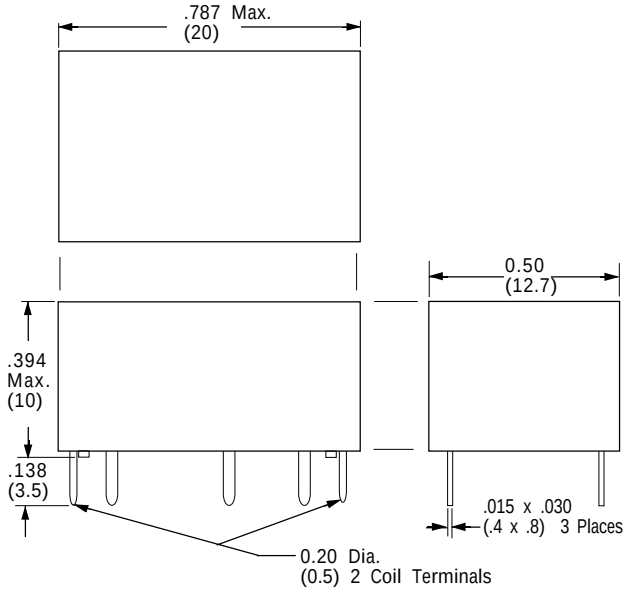


SPST-NO

CIRCUIT BOARD SPACING
Layout shown is on a 0.100 Grid
BOTTOM VIEW



OUTLINE DIMENSIONS
Dimensions shown are in "Inch" and (Millimeter)



CONTACT LOAD RATINGS

LOAD CONDITION	SPST-NO	SPDT
RESISTIVE LOADS:	10 AMPS @ 250 VAC 10 AMPS @ 30 VDC	7 AMPS @ 250 VAC 7 AMPS @ 30 VDC
* MAX. SWITCHING POWER:	300 WATTS (DC) 2500 VA (AC)	210 WATTS (DC) 1750 VA (AC)
* MAX. SWITCHING CURRENT:	10 AMPERES	7 AMPERES
* MAX. SWITCHING VOLTAGE:	125 VDC 380 VAC	125 VDC 380 VAC
MOTOR:	1/6 HP @ 120 VAC	1/10 HP @ 120 VAC
PILOT DUTY:	B300	B300

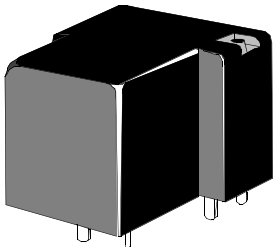
* Voltage current, and power ratings in the table above are independent maximums and no single value is to be exceeded.

Magnecraft & Struthers-Dunn

Part Numbers	Contact Configuration	COIL - Measured at 25˚C		
		Nominal Input Voltage	Nominal Resis-tance (Ohms)	Nominal power (mW)
276AXXH-5D	SPST-NO	5 VDC	125	200
276AXXH-6D	SPST-NO	6 VDC	180	200
276AXXH-12D	SPST-NO	12 VDC	720	200
276AXXH-24D	SPST-NO	24 VDC	2880	200
276XAXH-5D	SPDT	5 VDC	125	200
276XAXH-6D	SPDT	6 VDC	180	200
276XAXH-12D	SPDT	12 VDC	720	200
276XAXH-24D	SPDT	24 VDC	2880	200

PART NUMBERS SHOWN ALSO **AVAILABLE THRU STOCKING DISTRIBUTION.**
NOTE: Coil polarity must be observed. Relay is polarized with a permanent magnet and will not be damaged with reverse polarity but will not operate with reverse polarity.

30 AMP MINIATURE P.C. BOARD RELAY



CLASS 90 RELAY

SPST-N.O. or SPDT
CLASS "B" OR "F" INSULATION
EPOXY SEALED.
BREAKAWAY NIB OVER VENT HOLE (REMOVED AFTER CLEANING).

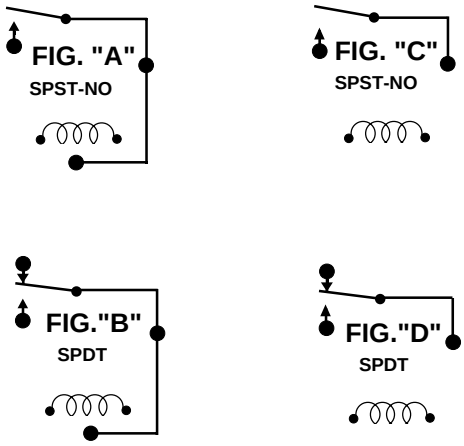
Class 90 printed circuit board relays provide an inexpensive means of switching loads up to 30 amps. Designed primarily for the appliance industry and HVAC markets, they are also well suited for load management, automotive and other applications.

Recognized Component mark for Canada and the United States.
UL Recognized
File No. E13224

CE Pending

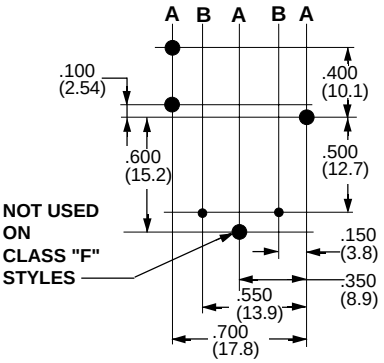
WIRING DIAGRAM

BOTTOM VIEW



PC BOARD LAYOUT

(Bottom View)

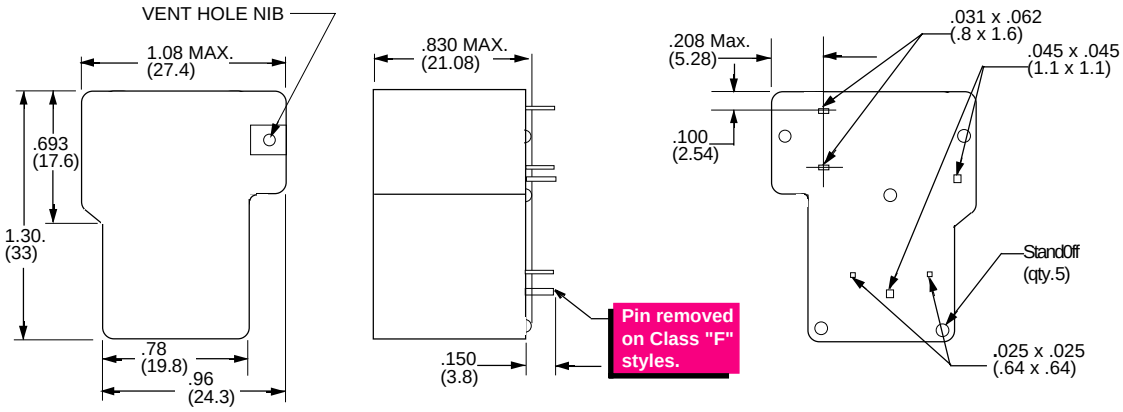


Drill "A" Holes .086 (2.19).
Drill "B" Holes .046 (1.17).

OUTLINE DIMENSIONS

(Actual Size)

Dimensions are in Inchs and (Millimeters)



SPECIFICATIONS CLASS 90

COIL

Pull-in Voltage:	75% of Nominal Voltage or less
Dropout Voltage:	10% of Nominal Voltage or more.
Coil Power:	2.8 Watts Max.
Duty:	Continuous
Insulation System:	Class "B" (130˚C) or Class "F" (155˚C
Coil Resistance:	±10% measured at 25˚C

CONTACTS

Contact Configuration:	SPST-N.O., SPDT
Contact Material:	Silver Cadmium Oxide.
Contact Resistance:	50 Milliohms Max. Initial Value.

TIMING

Operate Time:	15 mS Max. @ Nominal Voltage.
Release Time:	10mS Max. @ Nominal Voltage.

DIELECTRIC STRENGTH

Across open Contacts	1000 V rms
Contacts to Coil:	1500 V rms
Insulation Resistance:	500 Megohms under normal conditions 100 Megohms High Temp, High humidity.

TEMPERATURE

Operating:	-55˚C to +105˚C
Storage:	-55˚C to +130˚C
Relative Humidity:	Up to 93% @ 40˚C.
Atmospheric Pressure:	650 to 800 mmHg.

VIBRATION RESISTANCE

Functional:	10 to 55 Hz @ Double Amplitude of 1 mm.

SHOCK RESISTANCE

Functional:	10 g's for 11 mS, no Contact Opening > 100uS,
Mechanical:	100 g's

LIFE

Electrical (Rated Load):	Operations: **See Table Below**
Mechanical (No Load):	10 million Operations .

MISCELLANEOUS

Operating position:	Any
Enclosure:	94V-0 Flammability rating, Epoxy sealed Immersion cleanable.
Weight:	27 Grams approximately.

SILVER CADMIUM OXIDE CONTACT RATINGS **FIGURE "C" & "D"** MEETS UL 508 & UL 873 SPACING .

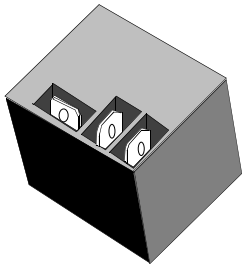
Voltage	Load Type	SPST N.O.	SPDT N.O.	OPERATIONS	SPDT N.C.	OPERATIONS
AC	Resistive	30A @ 240VAC	20A @ 240VAC	100,000	2-10A @ 240VAC, (i&R)	100,000
	Resistive	20A @ 277 VAC	20A @ 277 VAC	100,000	15 AMP @ 240 (i)	100,000
	Ind. & Res.	12A @ 277 VAC	12A @ 277 VAC	6,000	6A @ 277VAC, I&R	6,000
	Motor	1HP @ 125VAC	1HP @ 125VAC	30,000	1/4HP @ 125VAC	
		3/4 HP @ 125VAC	3/4HP @ 125VAC	100,000		
		2HP @ 240/250VAC	2HP @ 240/250VAC	1,000	1/2HP @ 250VAC	
		470VA @ 125/240VAC	470VA @ 125/240VAC	100,000	275VA @ 125/240VAC	30,000
		30FLA/96LRA, 125VAC	30FLA/96LRA, 125VAC	30,000	10FLA/33LRA, 125VAC	30,000
		30FLA/80LRA, 240VAC	30FLA/80LRA, 240VAC	30,000	10FLA/33LRA,240VAC	30,000
		20FLA/60LRA, 277VAC	20FLA/60LRA, 277VAC	100,000		100,000
		27FLA/82.8LRA,125VAC	27FLA/82.8LRA,125VAC	100,000		100,000
	Tungsten	TV 3 @ 250VAC	TV 3 @ 250VAC	25,000	TV 3 @ 250VAC	
	Ballast	6Amp @ 277VAC	6Amp @ 277VAC	6,000	3 AMP@ 277VAC	6,000
DC	Resistive	20A @ 5-30VDC	20A @ 5-30VDC	100,000	10A @ 5-30VDC	100,000

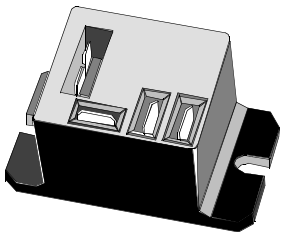
Magnecraft

PART NUMBERS	COIL Measured @ 25˚C NOMINAL INPUT VOLTAGE	NOMINAL RESISTANCE (Ohms)	NOMINAL POWER (mW)	CROSS REFERENCE POTTER & BRUMFIELD	OMRON
SPST-NO , (30 AMP) CLASS "B" INSULATION, FIG "A" WIRING					
W90S1D12-5	5VDC	27	930	**T90S1D12-5**	**G8P1114PB1USDC5**
W90S1D12-12	12VDC	155	930	**T90S1D12-12**	**G8P1114PB1USDC12**
W90S1D12-24	24VDC	660	870	**T90S1D12-24**	**G8P1114PB1USDC24**
W90S1D12-110	110VDC	13,450	900	**T90S1D12-110**	**G8P1114PB1USDC110**
SPDT, (20 AMP) CLASS "B" INSULATION, FIG "B" WIRING					
W90S5D12-5	5VDC	27	930	**T90S5D12-5**	**G8P114PB1USDC5**
W90S5D12-12	12VDC	155	930	**T90S5D12-12**	**G8P114PB1USDC12**
W90S5D12-24	24VDC	660	870	**T90S5D12-24**	**G8P114PB1USDC24**
W90S5D12-110	110VDC	13,450	900	**T90S5D12-110**	**G8P114PB1USDC110**
SPST-NO, (30 AMP) CLASS "F" INSULATION, FIG "C" WIRING					
W90S1D42-5	5 VDC	27	930	**T90S1D42-5**	**G8P1114PCFUSDC5**
W90S1D42-12	12 VDC	155	930	**T90S1D42-12**	**G8P1114PCFUSDC12**
W90S1D42-24	24 VDC	660	870	**T90S1D42-24**	**G8P1114PCFUSDC24**
W90S1D42-110	110VDC	13,450	900	**T90S1D42-110**	**G8P1114PCFUSDC110**
SPDT, (20 AMP) CLASS "F" INSULATION, FIG "D" WIRING					
W90S5D42-5	5 VDC	27	930	**T90S5D42-5**	**G8P114PCFUSDC5**
W90S5D42-12	12 VDC	155	930	**T90S5D42-12**	**G8P114PCFUSDC12**
W90S5D42-24	24 VDC	660	870	**T90S5D42-24**	**G8P114PCFUSDC24**
W90S5D42-110	110VDC	13,450	900	**T90S5D42-110**	**G8P114PCFUSDC110**

PART NUMBERS SHOWN ALSO **AVAILABLE THRU STOCKING DISTRIBUTION.**

30 AMP PC or FLANGE MOUNT MINIATURE RELAY



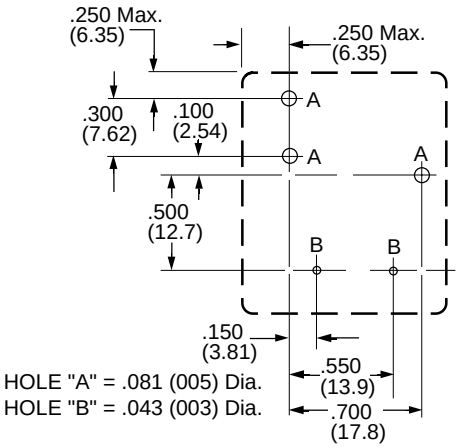


CLASS 91 RELAY

AC COIL VOLTAGES
30 AMP SWITCHING
CLASS "F" INSULATION
PC or FLANGE MOUNTED.
*** REMOVABLE TAPE SEAL OVER VENT HOLE (REMOVED AFTER CLEANING).**

PC BOARD DRILL PATTERN

BOTTOM VIEWS

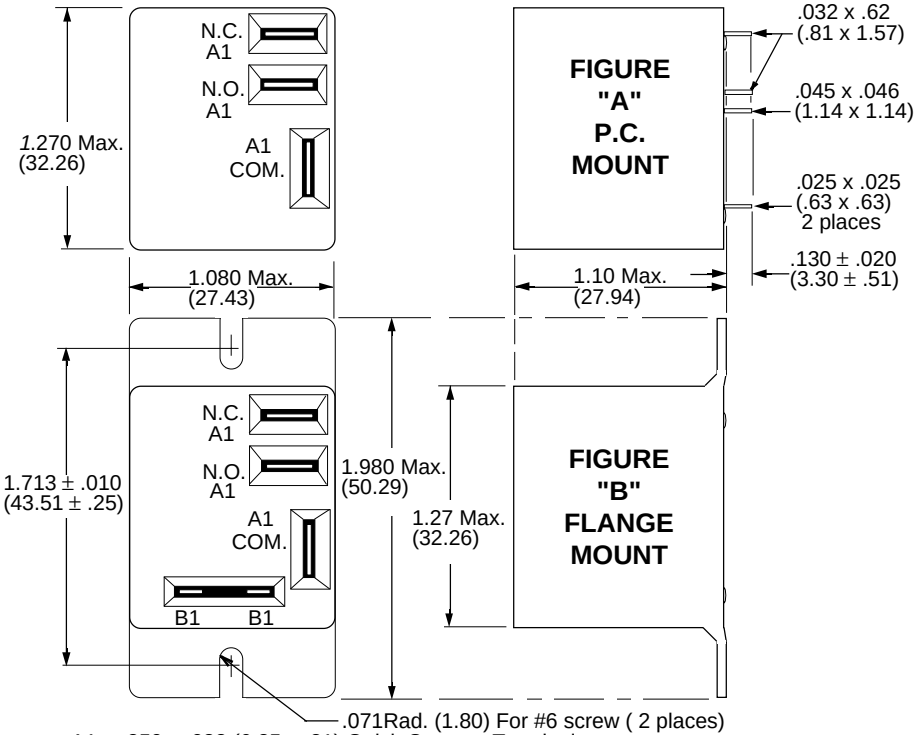


*Tape over vent hole is only supplied on the P.C. terminal versions of this relay.

OUTLINE DIMENSIONS

(Actual Size)

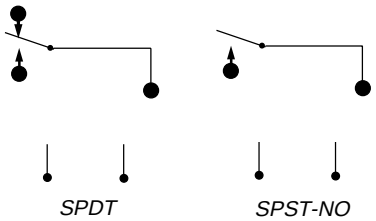
Dimensions are in "inches" & (Millimeters)



A1 = .250 x .032 (6.35 x .81) Quick Connect Terminal
B1 = .187 x .020 (4.78 x .508) Quick Connect Terminal

WIRING DIAGRAM

BOTTOM VIEWS



SPECIFICATIONS CLASS 91

COIL

Pull-in Voltage AC:	85% of Nominal Voltage or Less
Dropout voltage:	10% of Nominal voltage or More
Max. coil voltage:	120% Max.
Power consumption:	2.0VA max. AC Coils
Duty:	Continuous
Insulation System:	Class "F" (155˚C)
Coil Resistance	±10% measured @ 25˚C

CONTACT

Contact Configuration:	SPST-N.O., SPDT
Contact Material:	Silver Cadmium Oxide
Switching voltage:	277 Vac, 30VDC max.
Contact Resistance:	50 Milliohms @ 100mA, 6VDC Max.
Minimum Load:	1A, 5VDC, 12VAC

TIMING

Operate Time:	20 mS max
Release Time:	20 mS max.

DIELECTRIC STRENGTH

Between Open Contacts:	1500 V rms
Contacts to coil:	2500V rms
Insulation Resistance	1000 mΩ min. @ 500 VDC

TEMPERATURE

Operating:	-55˚C to +85˚C
Storage:	-55˚C to +130˚C

VIBRATION RESISTANCE

Functional:	10 to 55Hz 1.5 mm max. No contact opening ≥100 uS

SHOCK RESISTANCE

Functional:	10 g's for 11 mS, No contact Opening > 100 uS
Mechanical:	100 g's

LIFE

Electrical (Rated Load)	100,000 Operations
Mechanical (No Load):	1 million Operations (AC) 10 million Operations (DC)

MISCELLANEOUS

Operating Position:	Any
Enclosure:	Epoxy sealed immersion clean-able suitable for automatic circuit board processing. Max. exposure to temperature is 6 sec.@ 300˚C.
Terminals:	1/4" Q.C. Contacts, 3/16" Q.C. Coil
Weight:	33 Grams, 1.2 oz approx.

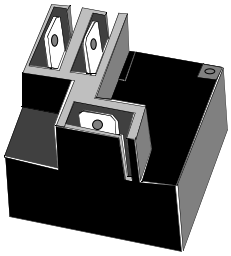
CONTACT RATINGS

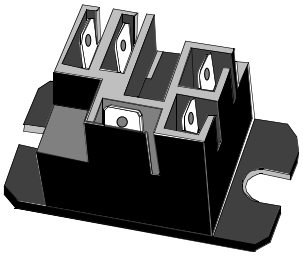
RATING	SPST-NO 50/60Hz	SPDT 50/60Hz	
	N.O.	N.O.	N.C.
RESISTIVE LOAD	30A @ 240VAC 20A @ 28VDC	20A @ 240VAC 20A @ 28 VDC	10A @ 240VAC 10A @ 28VDC
hp	1 HP @120VAC 2HP @ 240VAC	1 HP @ 125VAC 2HP @ 240VAC	1/4HP @ 120VAC 1/2HP @ 240VAC
Tungsten	TV-5, 120VAC	TV-5, 120VAC	TV-3, 120VAC
Ballast	10A, 277VAC	10A, 277VAC	3A, 277VAC
LRA/FLA	80/30 @ 240AC 98/22 @ 120AC	50/20 @ 240AC ——	20/7 @ 240AC ——

PART NUMBERS				Coil measured @ 25˚ C		
SPST-NO 30AMP P.C. MT. FIGURE "A"	SPDT 20AMP P.C. MT. FIGURE "A"	SPST-NO 30AMP-FLANGE MT. FIGURE "B"	SPDT 20AMP FLANGE MT. FIGURE "B"	NOMINAL INPUT VOLTAGE	NOMINAL RESIS-TANCE (Ohms)	NOMINAL POWER (VA)
AC OPERATED COIL						
W91S1A22-24	W91S5A22-24	W91S1A32-24	W91S5A32-24	24 VAC	-	2 VA
W91S1A22-120	W91S5A22-120	W91S1A32-120	W91S5A32-120	120 VAC	-	2 VA
W91S1A22-240	W91S5A22-240	W91S1A32-240	W91S5A32-240	240 VAC	-	2 VA

PART NUMBERS SHOWN ALSO **AVAILABLE THRU STOCKING DISTRIBUTION.**

30 AMP PC or FLANGE MOUNT MINIATURE RELAY





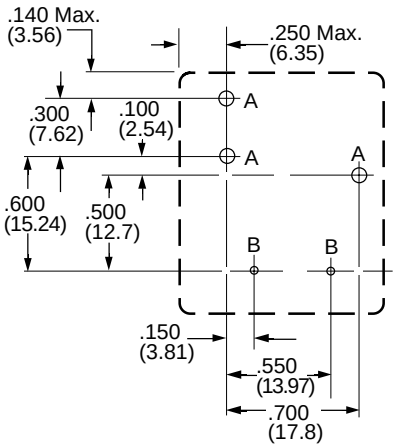
CLASS 9A RELAY

30 AMP SWITCHING.
CLASS "F" INSULATION.
PC or FLANGE MOUNTED.
EPOXY SEALED WITH REMOVABLE TAPE SEAL OVER VENT HOLE (REMOVED AFTER CLEANING).

Recognized Component mark for Canada and the United States.
UL Recognized
File No. E43641

PC BOARD DRILL PATTERN

BOTTOM VIEWS

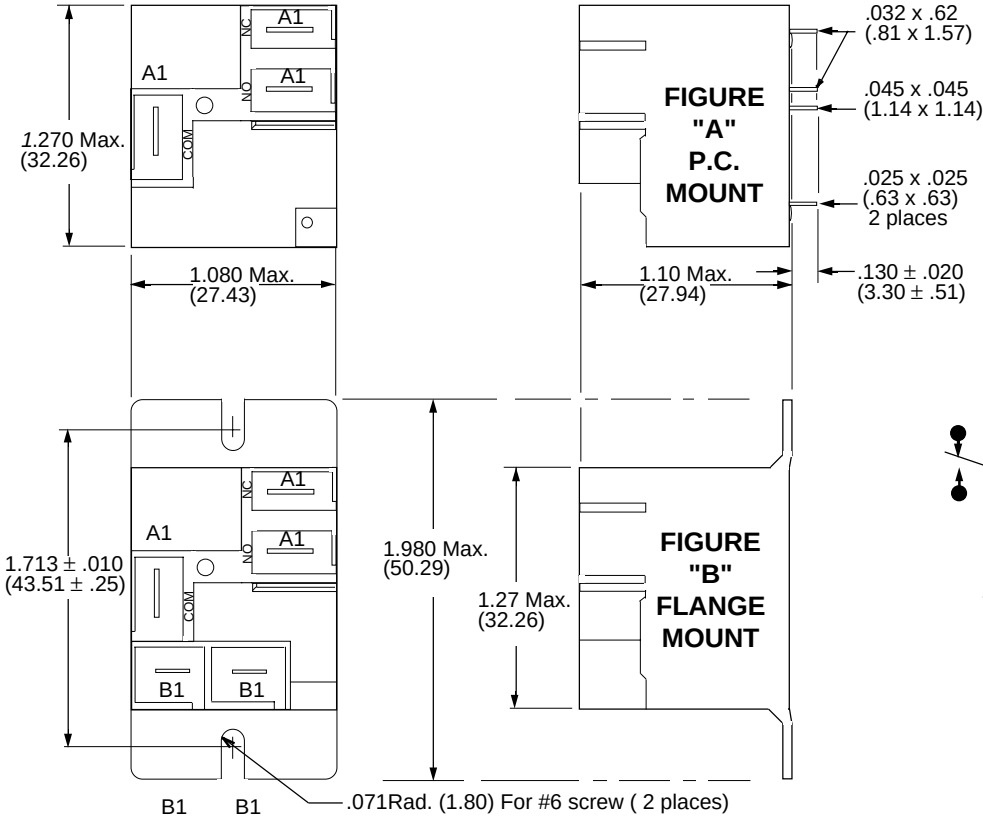


HOLE **"A"** = .081 ± .005 Dia.
(2.06 x .13)
HOLE **"B"** = .043 ± .08 Dia.
(1.09 x .08)

OUTLINE DIMENSIONS

(Actual Size)

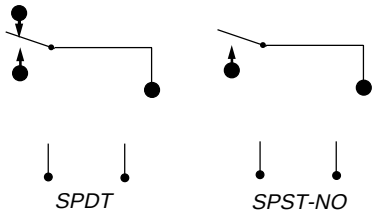
Dimensions are in "inches" & (Millimeters)



A1 = .250 X .032 (6.35 X .81) Quick Connect Terminal
B1 = .187 x .020 (4.78 x .508) Quick Connect Terminal

WIRING DIAGRAM

BOTTOM VIEWS



SPECIFICATIONS CLASS 9A

COIL

Pull-in Voltage:	75% of Nominal Voltage or Less
Dropout voltage:	10% of Nominal voltage or More
Max. coil voltage:	120% Max.
Power consumption:	2.8 Watts max.
Duty:	Continuous
Insulation System:	Class "F" (155˚C)
Coil Resistance	±10% Measured @ 25˚C

CONTACT

Contact Configuration:	SPST-N.O., SPDT
Contact Material:	Silver Cadmium Oxide
Switching voltage:	277 VAC, 28VDC max.
Contact Resistance:	75 Milliohms @ 1 min, rated current (switched)
Minimum Load:	1A, 5VDC, 12VAC

TIMING

Operate Time:	DC:15 mS typ. including bounce
Release Time:	DC:15mS typ. including bounce

DIELECTRIC STRENGTH

Between Open Contacts:	1500 V rms
Contacts to coil:	2500V rms
Insulation Resistance	1000 mΩ min. @ 500 VDC, 25˚C 50% RH

TEMPERATURE

Operating:	-55˚C to +85˚C
Storage:	-55˚C to +130˚C

VIBRATION RESISTANCE

Functional:	10 to 55Hz 1.65 mm max.No contact opening ≥100 uS

SHOCK RESISTANCE

Functional:	10 g's for 11 mS, No contact Opening > 100 µS
Mechanical:	100 g's

LIFE

Electrical (Rated Load)	100,000 Operations
Mechanical (No Load):	10 million Operations Typical

MISCELLANEOUS

Operating Position:	Any
Enclosure:	Epoxy sealed immersion cleanable suitable for automatic circuit board processing. Max. exposure soldering temperature is 4 sec.@ 500˚F.
Enclosure:	94V-O Flammability rating.
Terminals:	1/4" Q.C. & safety wells accept insulated Female Q.C. terminals.
Weight:	33 Grams, 1.2 oz approx.

CONTACT RATINGS

Meets UL 508, UL 873 and UL 1950 - 1/8" thru air - 1/4" over surface (See Foot notes)

RATING	LOAD VOLTAGE	AC Measured @ 50/60Hz				OPERATIONS
		SPST		SPDT		
		N.O.	N.C.	N.O.	N.C.	
GENERAL PURPOSE	240 VAC	30A	*15A	20A	10A	100,000
RESISTIVE	240 VAC	20A	†15A	20A	†15A	100,000
	28 VDC	20A	10A	20A	10A	100,000
RESISTIVE HEATER ††	240 VAC	25A	-	-	-	100,000
MOTOR (HP)	125 VAC	1 HP	1/4 HP	1 HP	1/4 HP	1,000
	240 VAC	2 HP	1/2 HP	2 HP	1/2 HP	1,000
MOTOR	120 VAC	22/98A	-	-	-	30,000
FLA/LRA ‡	240 VAC	30/80A	12/30A	30/80A	12/30A	30,000
TUNGSTEN	240 VAC	TV-5	-	TV-5	-	25,000
BALLAST	277 VAC	10A	3A	10A	3A	6,000
PILOT DUTY	240 VAC	470 VA	275 VA	470 VA	275 VA	6,000

* 15 Amp general purpose rating on SPST-NC contact valid only under UL 508 column B spacings and UL 873 columns B, C & D spacings. Derate to 10 Amps when used under UL 873 columns E & F spacings and UL 1950.

† 15 Amp resistive rating on SPST-NC contacts and SPDT contacts (Normally closed side only) valid only under UL 873 columns E & F spacings. Derate to 10 Amps when used under UL 508 Column B spacings, under UL 873 columns B, C & D spacings and UL 1950.

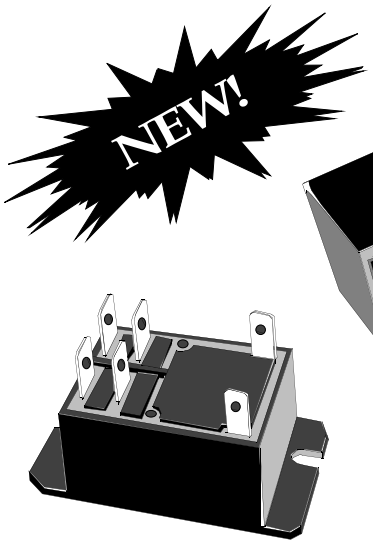
†† The resistance heater rating is not a discreet UL heater rating but is a valid UL rating that is derived from the UL general purpose category in the above table of contact ratings.

‡ FLA = Full load Amps, LRA = Locked rotor Amps.

PART NUMBERS				Coil measured @ 25˚ C		
SPST-NO 30AMP P.C. MT. FIGURE "A"	SPDT 30AMP P.C. MT. FIGURE "A"	SPST-NO 30AMP-FLANGE MT. FIGURE "B"	SPDT 30AMP FLANGE MT. FIGURE "B"	NOMINAL INPUT VOLTAGE	NOMINAL RESIS-TANCE (Ohms)	NOMINAL POWER (Watts)
DC OPERATED COIL						
W9AS1D22-5	W9AS5D22-5	W9AS1D52-5	W9AS5D52-5	5	25	1W
W9ASID22-12	W9AS5D22-12	W9ASID52-12	W9AS5D52-12	12	144	1W
W9ASID22-24	W9AS5D22-24	W9ASID52-24	W9AS5D52-24	24	576	1W
W9ASID22-48	W9AS5D22-48	W9ASID52-48	W9AS5D52-48	48	2,304	1W
W9ASID22-110	W9AS5D22-110	W9ASID52-110	W9AS5D52-110	110	12,100	1W

PART NUMBERS SHOWN ALSO **AVAILABLE THRU STOCKING DISTRIBUTION.**

30 AMP PC or FLANGE MOUNT 2 POLE RELAY



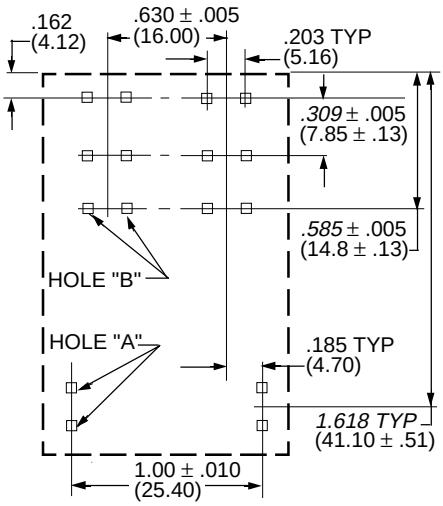
CLASS 92 RELAY

30 AMP SWITCHING.
CLASS "F" INSULATION.
PC or FLANGE MOUNTED.
EPOXY SEALED WITH
*** REMOVABLE TAPE SEAL OVER VENT HOLE (REMOVED AFTER CLEANING).**

Recognized Component mark for Canada and the United States.
UL Recognized
File No. E43641

PC BOARD DRILL PATTERN

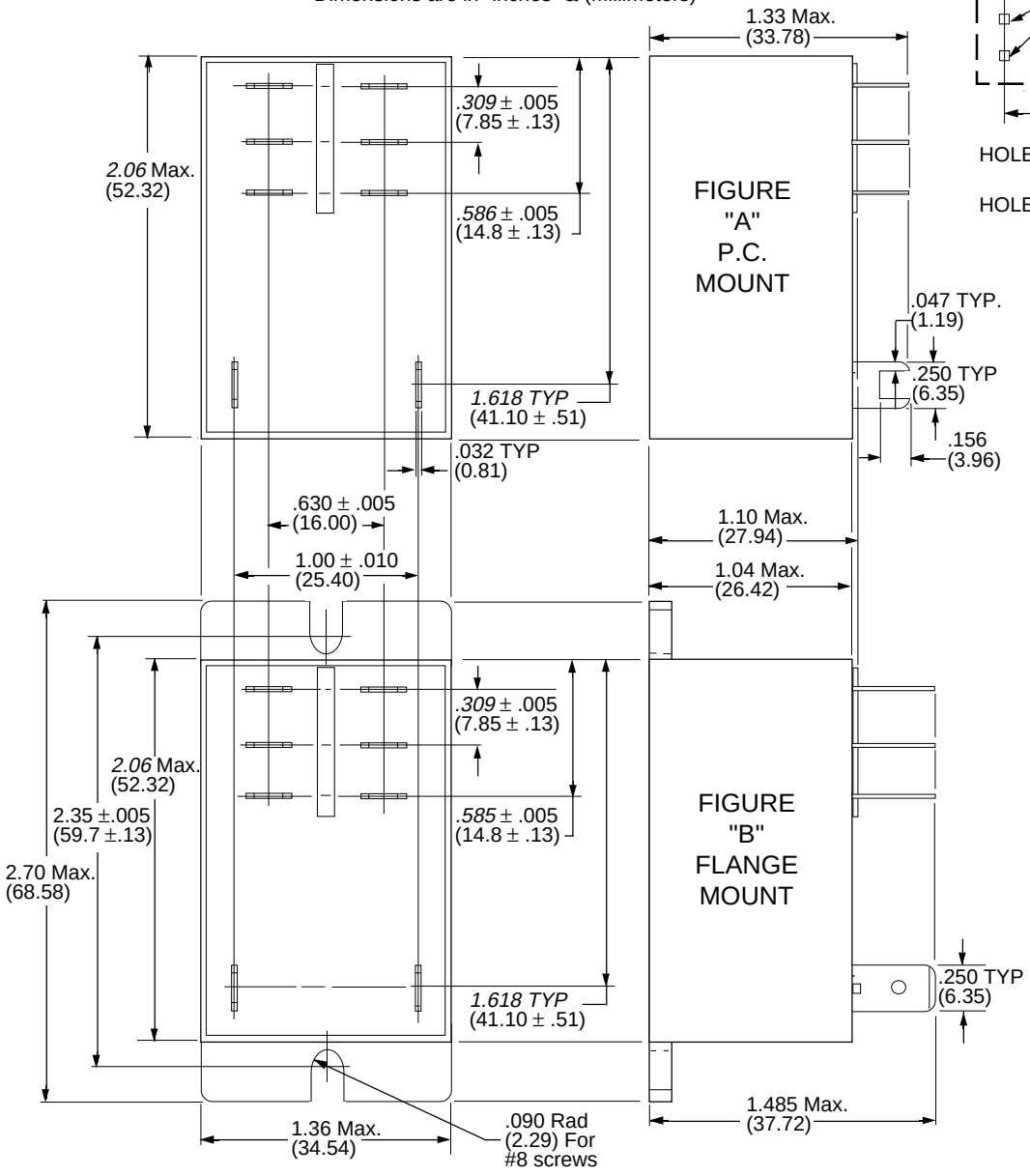
BOTTOM VIEWS



HOLE **"A"** = .072 x .050 typ.
(1.83)
HOLE **"B"** = .052 x .050 typ.
(1.32)

OUTLINE DIMENSIONS

Dimensions are in "inches" & (Millimeters)

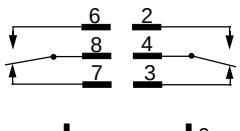


Note: An alternate P.C. Board layout Utilizes .076 ±.003 diameter holes on the layout above. Use of retangular holes is recommended for improved solderability.

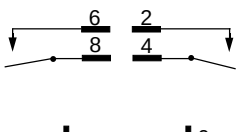
*Tape over vent hole is only supplied on the P.C. terminal versions of this relay.

WIRING DIAGRAM

TOP VIEW



DPDT



DPST-NO

Only necessary terminals are present on single throw styles.

SPECIFICATIONS CLASS 92

COIL

Pull-in Voltage:	AC: 80% of Nominal Voltage or Less DC: 75% of Nominal Voltage or Less
Dropout voltage:	10% of Nominal voltage or More
Max. coil voltage:	120% Max.
Max. Operating Frequency:	14 Operations per minute
Nominal Power:	AC Coil: 4.0VA, DC Coil: 1.7W
Duty:	Continuous
Insulation System:	Class "F" (155˚C)
Coil Resistance	±10% Measured @ 25˚C

CONTACT

Contact Configuration:	DPDT Standard
Contact Material:	Silver Cadmium Oxide
Contact Load Ratings:	SEE CONTACT LOAD RATINGS CHART
Contact Resistance:	100 Milliohms @ Initial rated current (switched)
Minimum Load:	N.O. 500 mA @ 12 VAC/VDC N.C. 100mA @ 6 VAC/VDC

TIMING

Operate Time:	DC:15 mS typ. 25ms w/ bounce
Release Time:	DC:10mS typ. 25 ms w/ bounce

DIELECTRIC STRENGTH

Between Open Contacts:	1500 V rms
Contacts to coil:	4000V rms
Insulation Resistance	10^3 meg Ω min. @ 500 VDC, 25˚C 50% RH

TEMPERATURE

Operating:	AC:-40˚C to +65˚C, DC:-40˚C to +85˚C

VIBRATION RESISTANCE

Functional:	0.065 (1.65 mm) double amplitude-10 thru 55 Hz

SHOCK RESISTANCE

Functional:	10 g's for 11 mS, 1/2 sign wave pulse with no contact opening > 100µs
Mechanical:	100 g for 11 ms 1/2 sine wave pulse

LIFE

Electrical (Rated Load)	100,000 Operations
Mechanical (No Load):	5 million Operations Typical

MISCELLANEOUS

Operating Position:	Any
Enclosure:	Epoxy sealed immersion cleanable tape sealed plastic cover.
Flammability:	94V-O Flammability rating.
Weight:	86 Grams, 3 oz approx.

CONTACT RATINGS

Meets UL 873 and UL 508 spacing - (8mm) thru air, (9.5 mm) over surface.

RATING	AC Measured @ 50/60Hz	
	DPST-N.O. & DPDT	DPDT
	N.O. CONTACTS	N.C. CONTACTS
Resistive Load	30A @ 120/277 VAC 20A @ 28 VDC	3A @ 277VAC 3A @ 28VDC
Hp	1 HP @ 120VAC 2.5 HP @ 240VAC	
Tungsten	TV-10, 120VAC	
LRA/FLA*	96/22 @ 240VAC, AC Coil 110/25.3 @ 240VAC, DC Coil	
Pilot Duty	3A @ 240 VAC	

Note: **Vent tape** must be removed to achieve listed ratings

*** FLA = Full load Amps, LRA = Locked rotor Amps.**

.

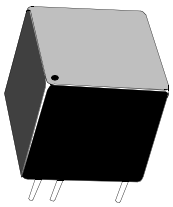
PART NUMBERS				Coil measured @ 25˚ C			CROSS REFERENCE TO OMRON The relay listed below are crossed to Magnecraft DPST-NO, 30 Amp, Flange mount, Figure "B" only. See Note below for Variations between relays.
DPST-NO 30AMP P.C. MT. FIGURE "A"	DPDT 30AMP P.C. MT. FIGURE "A"	DPST-NO 30AMP-FLANGE MT. FIGURE "B"	DPDT 30AMP FLANGE MT. FIGURE "B"	NOMINAL INPUT VOLTAGE	NOMINAL RESIS-TANCE (Ohms)	NOMINAL POWER	OMRON PART NUMBERS
AC OPERATED COIL							
		W92S7A22-24	W92S11A22-24	24 VAC	-	4 VA	G7L-2A-TUBJ-CB-AC24
		W92S7A22-120	W92S11A22-120	120 VAC	-	4 VA	G7L-2A-TUBJ-CB-AC120
		W92S7A22-240	W92S11A22-240	240 VAC	-	4 VA	G7L-2A-TUBJ-CB-AC240
DC OPERATED COIL							
W92S7D12-12	W92S11D12-12	W92S7D22-12	W92S11D22-12	12 VDC	86	1.7 W	G7L-2A-TUBJ-CB-DC12
W92S7D12-24	W92S11D12-24	W92S7D22-24	W92S11D22-24	24 VDC	350	1.7 W	G7L-2A-TUBJ-CB-DC24
W92S7D12-48	W92S11D12-48			48 VDC	1,390	1.7 W	
W92S7D12-110	W92S11D12-110	W92S7D22-110	W92S11D22-110	110 VDC	7,255	1.7 W	G7L-2A-TUBJ-CB-DC110

PART NUMBERS SHOWN ALSO **AVAILABLE THRU STOCKING DISTRIBUTION.**

G7L REPLACES G5D22423T

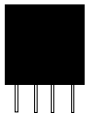
Note: The Class W92 Meets Fit and Function when replacing the Omron G7L relay. The case size (width & lenght) and mounting centers on flange are Dimensionally identical except the class 92 is lower in height. The W92 has a higher contact switching rating then the G7L and requires less coil power for operation. The 1/4" (.250) Q.C. terminals on top of the case of the Class 92 are not located in the same positions as the G7L, but wire hookup will work with existing wiring using Q.C. connectors..

SUBMINIATURE PC MOUNTABLE, EPOXY SEALED



CLASS 7
2 AMP SWITCHING IN THE WORLDS SMALLEST PACKAGE. SPDT, DPDT.

ACTUAL SIZE



The Class 7 Subminiature high reliability industrial grade relay has excellent R.F. switching characteristics.

Recognized Component mark for Canada and the United States.

UL Recognized
File No. E52197

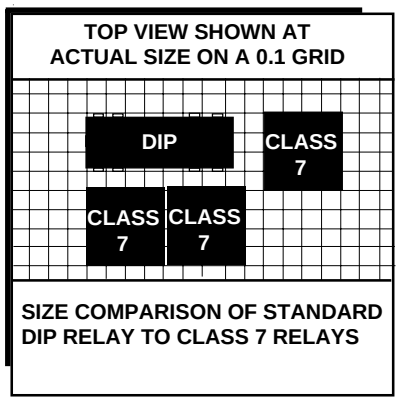
AVAILABLE WITH SPDT OR DPDT BIFURCATED GOLD CLAD SILVER-PALLADIUM CROSS BAR CONTACTS- RATED FOR LOW LEVEL TO 2.0 AMP SWITCHING.

REQUIRES ONLY .155 SQUARE INCH OF CIRCUIT BOARD SPACE.

TOTAL VOLUME OF LESS THAN A CUBIC CENTIMETER.

CONFORMS TO FCC PART 68.302. 1500 V PEAK SURGE RESISTANCE.

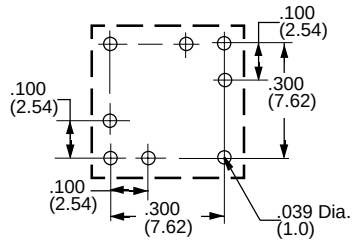
CONFORMS TO FCC PART 68.304. 1000 V DIELECTRIC WITHSTANDING VOLTAGE..



The Class 7 relays can be densely packed together without magnetic interaction from adjacent relays.

PC BOARD PATTERN

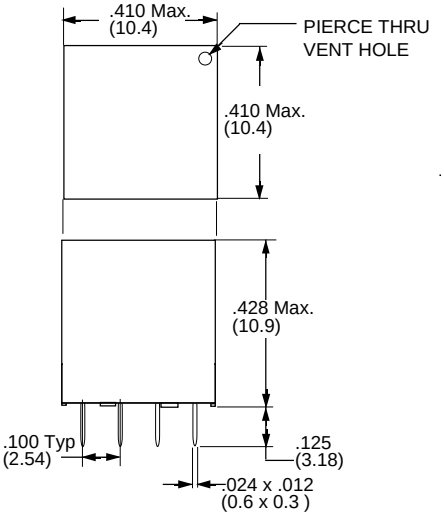
Drill Plan (TOP VIEW)



0.1 Grid Pattern

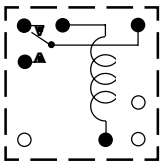
OUTLINE DIMENSIONS

Dimensions are in "INCHES" and (MILLIMETERS)

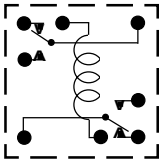


WIRING DIAGRAM

BOTTOM VIEW



SPDT



DPDT

SPECIFICATIONS CLASS 7

COIL

Coil Voltages

Pull-in Voltage:	80% of Nominal Voltage or less
Dropout:	10 % of Nominal Voltage or More
Max. allowed coil voltage:	120% of nominal voltage, duty cycle: 100%.
Nominal Power:	327 Milliwatts max., min sensitivity: 200 milliwatts.
Max. coil dissipation	0.75 watts.
Coil Resistance range:	±10%

CONTACTS

Contact Configuration:	SPDT, DPDT
Contact Rating:	SPDT: 50uA @ 50mV, 2A , 24VDC, 2A, 120VAC, DPDT: 50uA @ 50mV, 2A, 24VDC, 0.6A,100VAC,
Contact Material:	Gold Clad Silver Palladium.
Contact Resistance:	Initial 50 mΩ 100 Milliohms max @ 6VDC 10 Milliamps.

TIMING

Operate Time:	4.0 mS Max. @ Nominal Voltage. Typ.
Release Time:	5.0 mS Max. @ Nominal Voltage. Typ

DIELECTRIC STRENGTH

All Mutually Insulated Points:	500 VAC for 1 Minute, 1 Milliamp max. leakage, or 600VAC for 1 Second, 1 Milliamp leakage.
Surge Test:	Meets FCC 68.302 (1500V Surge) and 68.304 (1000V Dielectric).
Insulation Resistance:	500 VDC Exceeds 1000 Megohms.

TEMPERATURE

Operating:	-35˚C to +70˚C

VIBRATION RESISTANCE

Functional:	15 g's, 10 to 2000 Hz, No contact opening > 10 uS Max. contact chatter Destructive: 50 g'S.

SHOCK RESISTANCE

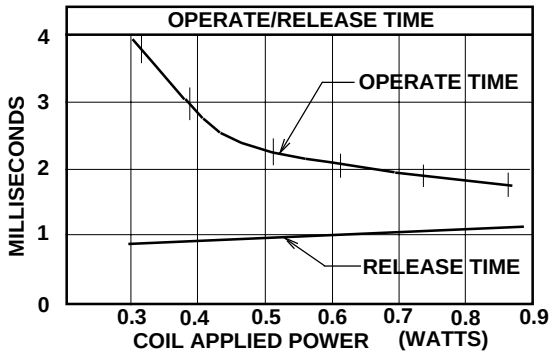
Functional	50g's 6mS half sine
Mechanical:	Destructive: 150 g's.

LIFE

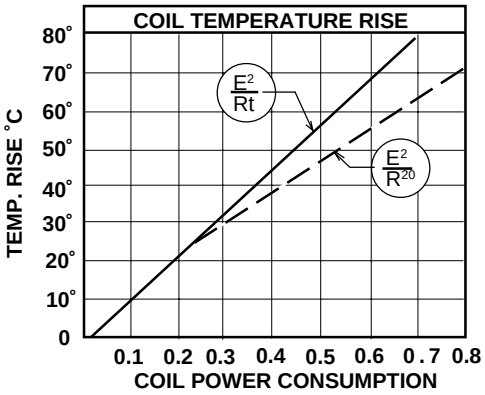
Mechanical:	100 Million Operations
Electrical:	100,000 Operations- 2 Amp 24VDC, 1.0 AMP 120VAC (Rated Load).

MISCELLANEOUS

Terminal Finish:	Terminals are solder Coated and Epoxy free to provide excellent solderability. Max. exposure to soldering temperature is 5 seconds @ 250˚C. After cleaning process, pierce a small hole in cover for venting.
Mounting Position:	Any
Enclosure:	UL, 94V-O Plastic, Epoxy Sealed.
Weight:	2.7 Grams . (.095 oz.)



After cleaning process, pierce 0.40 (1mm) hole in cover for venting.



$$\frac{E^2}{Rt} = \frac{\text{COIL VOLTAGE}}{\text{COIL RESIST. VALUE AFTER TEMP. WAS RAISED}}$$

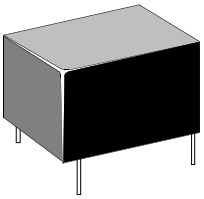
$$\frac{E^2}{R^{20}} = \frac{\text{COIL VOLTAGE}}{\text{COIL RESIST. VALUE AT 20˚C}}$$

R.F. PERFORMANCE			
Frequency	**Insertion Loss (dB)**	**VSWR**	**Isolation (dB)**
(MHz)	**Common to N.O. or N.C. Contacts**	**Common to N.O. or N.C. Contacts**	**N.O. or N.C. Contacts to Coil**
10	0.05	1.03:1	65
50	0.10	1.04:1	50
100	0.30	1.05:1	42
200	0.50	1.06:1	35
300	0.60	1.07:1	31
400	0.65	1.08:1	29
500	0.75	1.10:1	28

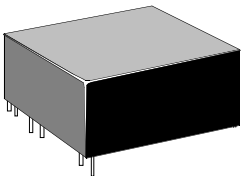
Part Numbers	Contact Configuration	COIL - Measured at 25˚C			CROSS REFERENCE
		Nominal Input Voltage	Nominal Resis-tance (Ohms)	Nominal Power (mW)	COMMUNICATIONS INSTRUMENTS INC / MIDTEX (CII / MIDTEX)
W7PCX-1	SPDT	5 VDC	75	330	**MMS105**
W7PCX-3	SPDT	12 VDC	440	330	**MMS112**
W7PCX-4	SPDT	24 VDC	1550	370	**MMS124**
W7PCX-5	DPDT	5 VDC	75	330	**MMS205**
W7PCX-7	DPDT	12 VDC	440	330	**MMS212**
W7PCX-8	DPDT	24 VDC	1550	370	**MMS224**

PART NUMBERS SHOWN ALSO **AVAILABLE THRU STOCKING DISTRIBUTION.**

MINIATURE P.C. BOARD RELAY MOUNTABLE ON 0.100 GRID



W60HE1S



W60HE2S

CLASS 60

BIFURCATED CROSS BAR CONTACTS
LOW LEVEL SWITCHING TO 2 AMPS
SPDT,DPDT CONTACTS

Recognized Component mark for Canada and the United States.

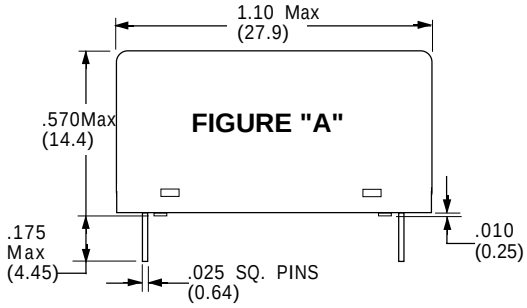
UL Recognized
File No. E52197

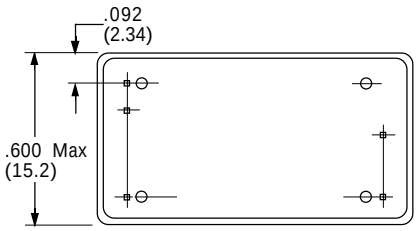
The Class 60 Miniature high reliability industrial grade relay has excellent RF switching characteristics.

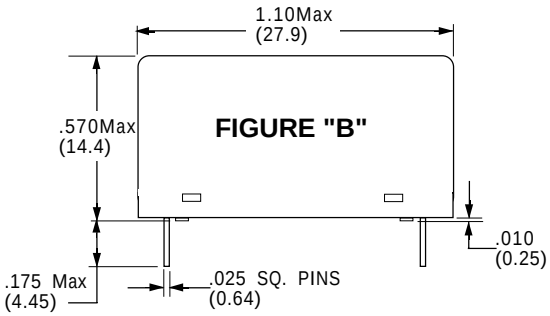
ACTUAL SIZE

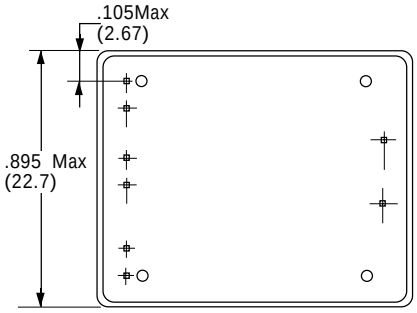
OUTLINE DIMENSIONS

DIMENSIONS SHOWN IN "INCHES" AND (MILLIMETERS)



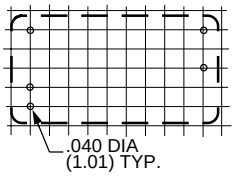




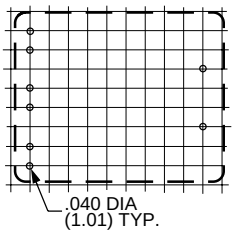


TOP VIEW SHOWN AT ACTUAL SIZE ON A 0.1 GRID

W60HE1S



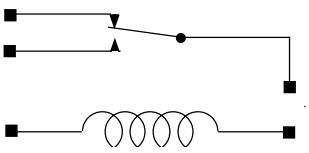
W60HE2S



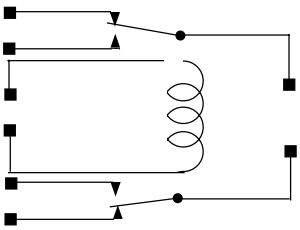
CIRCUIT DIAGRAMS

BOTTOM VIEW

SPDT



DPDT



SPECIFICATIONS CLASS 60

COIL

Pull-in Voltage:	80% of Nominal Voltage or less
Dropout Voltage:	10% of nominal voltage or more
Max. allowed voltage:	120% of nominal voltage, duty cycle 100%
Nominal power:	327mW max. min. sensitivity: 200 mW
Max. coil dissipation:	0.75 Watt
Coil Resistance	±10% Measured @ 25˚C

CONTACTS

Contact Material:	Gold Clad Silver Palladium.
Contact Resistance:	Initial 50 Milliohms @ 6VDC, 10mA 100 Milliohms max., After life: 200 mΩ
Contact Rating:	Low Level: 50uA- 50mV, SPDT: 2A-24VDC, 2A-120VAC, DPDT: 2A-24VDC, 0.6A-100VAC,

TIMING

Operate Time:	4.0 mS Max. @ Nominal Voltage.
Release Time:	10.0 mS Max. @ Nominal Voltage.
Contact bounce:	2.5 mS operate, 5.0 mS release

DIELECTRIC STRENGTH

All Mutually Insulated Points:	500 VAC for 1 Minute, 1 Milliamp max. leakage, or 600VAC for 1 Second, 1 Milliamp leakage.
Surge Test:	Meets FCC 68.302 (1500V Surge) and 68.304 (1000V Dielectric).
Insulation Resistance:	500 VDC Exceeds 1000 Megohms.

TEMPERATURE

Operating:	-35˚C to +70˚C

VIBRATION RESISTANCE

Functional:	15g's, 10 to 2000Hz, (No contact opening greater than 10μS)

SHOCK RESISTANCE

Functional:	50g's, 6mS Max.
Mechanical:	Contact Chatter Destructive 50g's.

LIFE

Electrical (Rated Load):	100,000 Operations Rated Load.
Mechanical (No Load):	100 Million Operations

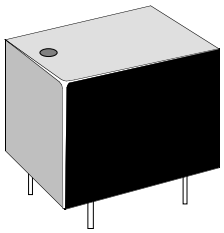
MISCELLANEOUS

Terminal Finish:	Terminals are solder Coated to provide excellent solderability. Max. exposure to soldering temperature is 5 seconds @ 250˚C.
Operating Position:	Any
Enclosure:	Plastic.
Weight:	SPDT-5.5 g's, DPDT- 9 g's approx.

PART NUMBERS	Contact Configu-ration	**COIL** Measured @ 25˚C			CROSS REFERENCE TO POTTER & BRUMFIELD
		Nominal Input Voltage	Resis-tance (Ohms)	Pull-in Power (mW)	
FIGURE "A"					
W60HE1S-5DC	SPDT	5VDC	75	200	**R50E2Y1-5V**
W60HE1S-12DC	SPDT	12VDC	440	200	**R50E2Y1-12V**
W60HE1S-24DC	SPDT	24VDC	1550	200	**R50E2Y1-24V**
W60HE1S-48DC	SPDT	48VDC	5250	200	**R50E2Y1-48V**
FIGURE "B"					
W60HE2S-5DC	DPDT	5VDC	75	200	**R50E2Y2-5V**
W60HE2S-12DC	DPDT	12VDC	440	200	**R50E2Y2-12V**
W60HE2S-24DC	DPDT	24VDC	1550	200	**R50E2Y2-24V**
W60HE2S-48DC	DPDT	48VDC	5250	200	**R50E2Y2-48V**

PART NUMBERS SHOWN ALSO **AVAILABLE THRU STOCKING DISTRIBUTION.**

MINIATURE 12 AMP EPOXY SEALED PC BOARD RELAY

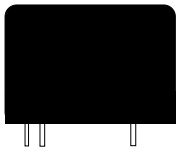


CLASS 178

5 AMP AND 12 AMP SPDT CONTACTS.
EPOXY SEALED.
CLASS "B" INSULATION SYSTEM.

WITHSTANDS THE VAPOR AND SPRAY CLEANING OF MOST FLUXING SYSTEMS. TERMINALS ARE SOLDER COATED TO PROVIDE EXCELLENT SOLDERABILITY.

Recognized Component mark for Canada and the United States.
UL Recognized
File No. E164066



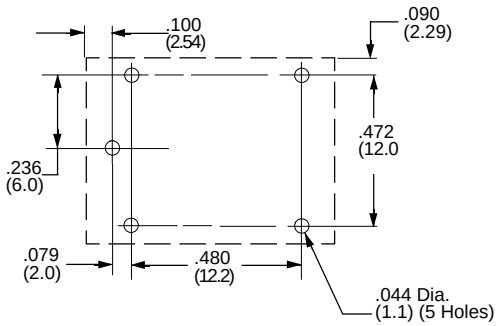
ACTUAL SIZE

UL CONTACT LOAD RATINGS

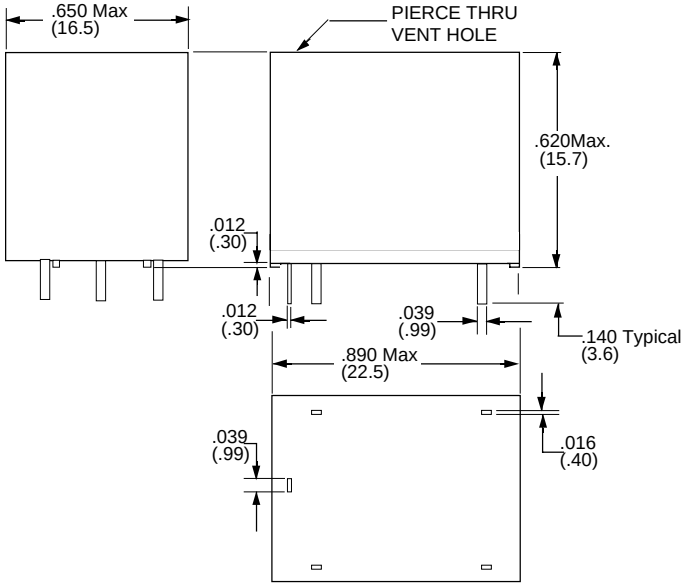
LOAD	5 AMP RELAY STYLE		12 AMP RELAY STYLE	
	LOAD	OPERATIONS	LOAD	OPERATIONS
AC	5A @125V	100,000	12A @ 120V	6,000
	5A @250V	100,000	10A @ 125V	100,000
HP	-		10A @ 250V	100,000
	1/4 @ 120V	25,000	10A, 1/4 @ 120V	100,000 N.O.
	-	-	10A, 1/4 @ 250V	25,000
	1/4 @ 120V	25,000 N.C.	10A, 1/4 @ 120V	90,000 N.C.
TV-3	120V	25,000	-	-
TV-5	-	-	125V	25,000
VA	125VA @ 120V	25,000	-	-
DC	5A @ 30V	100,000	12A @ 28V	6,000
DC	-	-	10A @ 30V	100,000 N.C*
MOTOR	5A,120VAC,pf=0.5	100,000	-	-

*N.O. CONTACT 25,000 @ 30 VDC

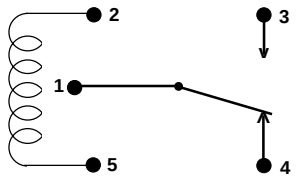
PC BOARD LAYOUT
(BOTTOM VIEW)



OUTLINE DIMENSIONS
Dimensions are in "INCH" and (MILLIMETERS)



WIRING DIAGRAM
(BOTTOM VIEW)



SPDT

SPECIFICATIONS CLASS 178

COIL

Pull-in Voltage:	75% of Nominal Voltage or less
Dropout Voltage:	10% of nominal Voltage or more.
Maximum Voltage:	110% of nominal voltage
Insulation system:	Class "B" (130˚C per UL std. 1446)
Coil Resistance:	±10% @ 25˚C
Duty:	Continuous

CONTACTS

Contact Configuration:	SPDT
Contact Material:	Silver Cadmium Oxide
Contact Resistance:	100 Milliohms @ 5VDC & 1 Amp Max.
Minimum Load:	100mA @ 12VDC

TIMING

Operate Time:	20 mS Max. @ Nominal Voltage.
Release Time:	10mS Max. @ Nominal Voltage.
Bounce Time (typical):	Operate: 1ms, typ., Release: 4 ms, typ.

DIELECTRIC STRENGTH

Contacts to Coil:	1500 VAC for 1 Minute or 1800 VAC 1 Sec
Across open Contacts:	750 VAC for 1 Minute or 800 VAC 1 Sec .
Insulation Resistance:	100 Megohms Min. @ 500 VDC

TEMPERATURE

Operating:	-40˚C to +70˚C

VIBRATION RESISTANCE

Functional:	10 to 55Hz Dual Amplitude -1.5 mm

SHOCK RESISTANCE

Functional:	10g's for 11mS (No Contact Opening >100 uS

LIFE EXPECTANCY

Electrical (Rated Load):	100,000 Operations
Mechanical (No Load):	10 Million Operations

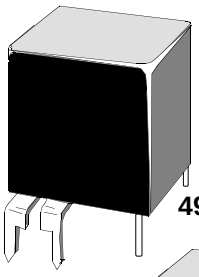
MISCELLANEOUS

Terminal Finish:	P.C. Terminals are solder Coated and Epoxy free to provide excellent solderability. Max. exposure to soldering temperature is 6 seconds @ 300˚C.
Operating Position:	Any
Enclosure:	Plastic, Epoxy sealed, suitable for Automatic Circuit Board Processing. After cleaning process, pierce a small hole in cover for venting.
Weight:	0.42 oz. (12) grams approximately.

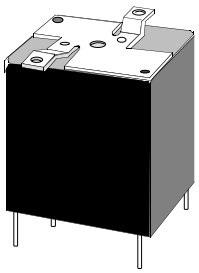
PART NUMBERS	CONTACT RATING	COIL Measured @ 25˚C			CROSS REFERENCE TO		
		NOMINAL INPUT VOLTAGE	NOMINAL RESISTANCE (OHMS)	NOMINAL POWER (mW)	POTTER & BRUMFIELD	IDEC	OMRON
W178RE1-5DC	5 AMPS	5VDC	70	400	**T70L5D131-5VDC**	**RCN1V-5G-DC5V**	**G5L-114P-PS-DC5**
W178RE1-12DC	5 AMPS	12VDC	400	400	**T70L5D131-12VDC**	**RCN1V-5G-DC12V**	**G5L-114P-PS-DC12**
W178RE1-24DC	5 AMPS	24VDC	1600	400	**T70L5D131-24VDC**	**RCN1V-5G-DC24V**	**G5L-114P-PS-DC24**
W178URE1-5DC	12 AMPS	5VDC	70	400	**T70L5D164-5VDC**	**RCN1V-10G-DC5V**	**G5LE-114P-PS-DC5**
W178URE1-12DC	12 AMPS	12VDC	400	400	**T70L5D164-12VDC**	**RCN1V-10G-DC12V**	**G5LE-114P-PS-DC12**
W178URE1-24DC	12 AMPS	24VDC	1600	400	**T70L5D164-24VDC**	**RCN1V-10G-DC24V**	**G5LE-114P-PS-DC24**

PART NUMBERS SHOWN ALSO **AVAILABLE THRU STOCKING DISTRIBUTION.**

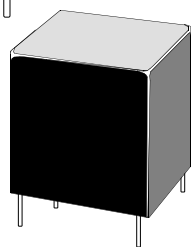
MINIATURE ENCLOSED PC BOARD RELAY - 3 TO 10 AMP



49RE1C2-



49R1C4-



49RE1C1-

CLASS 49 RELAY

LOW LEVEL TO 10 AMPS.
PRINTED CIRCUIT OR
BRACKET MOUNTING.

UL Recognized
File No. E52197

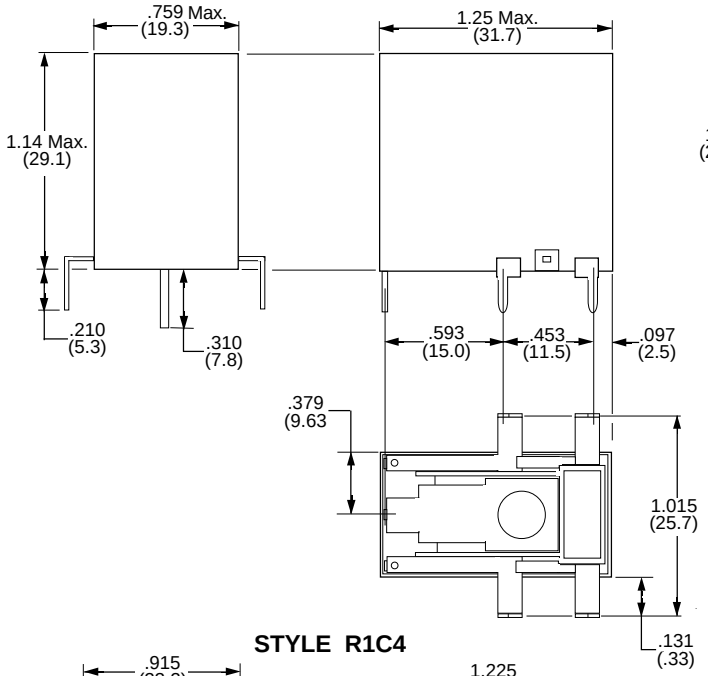
Only 1.1 cubic inches.
Variety of mounting configurations.
Printed circuit terminals.
Tapped mounting holes (49R1C4).
TV 5 rating available.
Standard pilot duty 240 VAC.
Magnetic motor controller rating
1/3 Hp at 120VAC.

OUTLINE DIMENSIONS
(Actual Size)

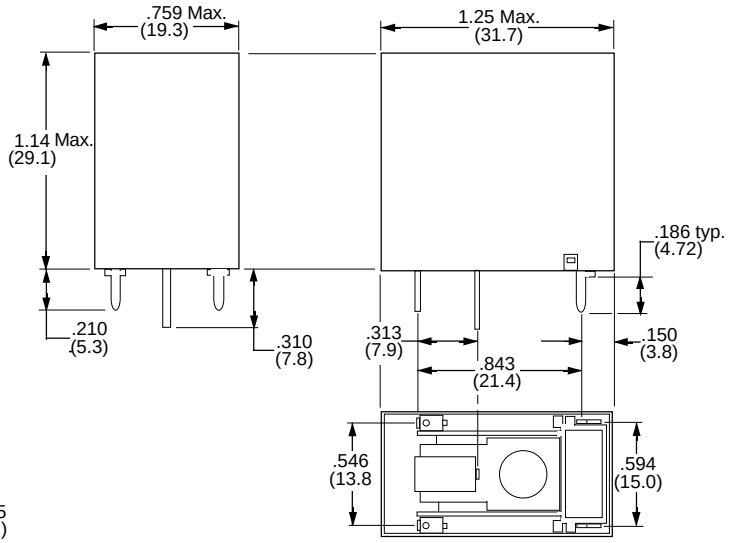
ALL DIMENSIONS ARE IN INCHES AND MILLIMETERS

Recommended P.C. board holes .067 dia.(1.7)
ALL TERMINALS ARE .056 X .025 (1.42 X 0.64)

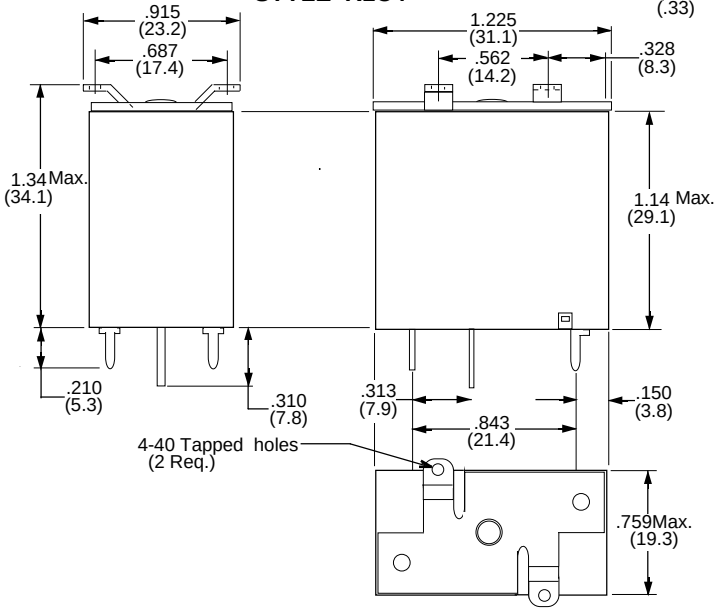
STYLE RE1C2



STYLE RE1C1



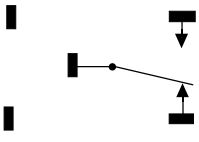
STYLE R1C4



WIRING DIAGRAMS

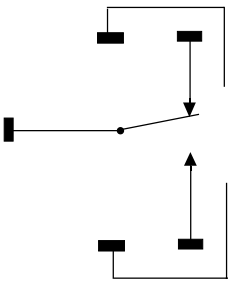
(BOTTOM VIEW)

STYLE RE1C1 R1C4



SPDT

STYLE RE1C2



SPDT

SPECIFICATIONS CLASS 49

COIL
- Pull-in Voltage: VG, VW adj. (DC) = 75% , VF, VG adj. (AC) = 80%,of nominal coil voltage or less.
- Dropout voltage: 10% of actual pull-in or more
- Max. coil voltage 120% Max.
- Duty: Continuous
- Resistance: ±10%

CONTACTS
- Contact Configuration: SPDT
- Contact Material: Silver Cad Oxide (5, 10 Amp), 3 Amp (Silver, Gold Plated).
- Contact Resistance: 100 Milliohms Max. initial Value @ 6 Vdc, 1 Amp
- Contact Rating: 5 and 10 Amp @ 120/240 AC, 3 Amp @ 120 VAC, 28 VDC resistive. Motor load: 1/3 Hp @120VAC, 10 Amp only.
  TV 3 SPST-NO, SPST-NC, SPDT
  TV 5 SPST-NO, (10 Amp only).
  SPST-NO, SPST-NC, SPDT
- Pilot Duty: B300

TIMING
- Operate: 10 mS typical (25 mS max.)
- Release Time: 7mS typical (10 mS max.)

DIELECTRIC STRENGTH
- Contacts to coil: 1,500 V rms
- Across open contacts: 500 V rms
- Coil to frame: 1,500 V rms
- Insulation Resistance: 1000 mΩ min. @ 500 VDC

TEMPERATURE
- Operating: -55˚C to +85˚C
- Storage: -55˚C to +130˚C

VIBRATION RESISTANCE
- Functional: 10 to 55 Hz @ 1.65mm Displacement

SHOCK RESISTANCE
- Functional: 10 g's
- Mechanical: 100 g's

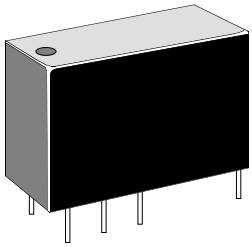
LIFE
- Electrical (Rated Load): 100,000 Operations. .
- Mechanical No Load): 50,000, 000 Operations.

MISCELLANEOUS
- Soldering temperature: 270˚C (518˚F) max. for 5 seconds max..
- Operating position: Any.
- Enclosure: Dust cover.
- Weight: 42 Grams, 1.5 oz approximately.

PART NUMBERS	COIL Measured @ 25˚C			CROSS REFERENCE	
PRINTED CIRCUIT BOARD MOUNTING	Nominal Input Voltage	Nominal Resistance (Ohms)	Pull-in Power (mW)	GUARDIAN	CORNELL DUBILIER
SPDT, 3 AMP STYLE RE1C1					
W49RE1C1VG-3DC-SIL	3 VDC	90	60		**653-3K**
W49RE1C1VG-5DC-SIL	5/6 VDC	235	60		**653-6K**
W49RE1C1VG-12DC-SIL	12 VDC	1350	60		**653-12K**
W49RE1C2VF-6DC-SIL	6 VDC	410	56		
W49RE1C2VF-12DC-SIL	12 VDC	1640	56		
W49RE1C2VF-24DC-SIL	24 VDC	6560	56		
SPDT, 5 AMP STYLE RE1C1 AND RE1C2					
W49RE1C1VG-5DC-SCO	5/6 VDC	235	60	**1345-1C-5DC**	**603-6B**
W49RE1C1VG-12DC-SCO	12 VDC	1350	60	**1345-1C-12DC**	**603-12B**
W49RE1C1VG-24DC-SCO	24 VDC	5400	60	**1345-1C-24DC**	**603-24B**
W49RE1C2VF-6DC-SCO	6 VDC	410	56		
W49RE1C2VF-12DC-SCO	12 VDC	1640	56		
W49RE1C2VF-24DC-SCO	24 VDC	6560	56		
SPDT, 10 AMP STYLE RE1C1					
W49RE1C1VW-5DC-SCO	5/6 VDC	100	135		**613-6B**
W49RE1C1VW-12DC-SCO	12 VDC	600	135		**613-12B**
W49RE1C1VW-24DC-SCO	24 VDC	2400	135		**613-24B**
SOLDER TERMINALS, BRACKET MOUNTING					
W49R1C4VG-5DC-SCO	5/6 VDC	235	60		
W49R1C4VG-12DC-SCO	12 VDC	1350	60		
SPDT,10 AMP					
W49R1C4VW-5DC-SCO	5/6 VDC	100	135		
W49R1C4VW-24DC-SCO	24 VDC	2400	135		

PART NUMBERS SHOWN ALSO **AVAILABLE THRU STOCKING DISTRIBUTION.**

MINIATURE EPOXY SEALED PC BOARD POWER RELAY



CLASS 76

5, 10 and 16 AMP. CONTACT RATINGS
EPOXY SEALED, IMMERSION CLEANABLE
MEETS 8mm SPACING 5KV DIELECTRIC

UL Recognized
File No. E13224

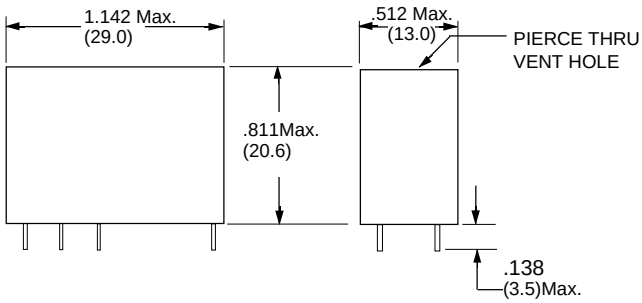
CONTACT LOAD RATINGS

FIGURE "A"	FIGURE "C"	FIGURE "B"
DPDT (5 AMP) 5AMP @ 250VAC RES. 5AMP @ 30VDC 1/4HP @ 250VAC	SPDT (10AMP) 10AMP @ 250VAC RES. 10AMP @ 30VDC 1/3HP @ 250VAC	SPDT (16AMP) 16AMP @ 240VAC RES. 16AMP @ 24VDC 1/2HP @ 250VAC

OUTLINE DIMENSIONS

(Actual Size)

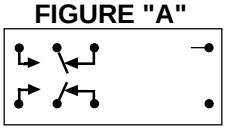
All Dimensions are in inches and (millimeters)



WIRING DIAGRAM

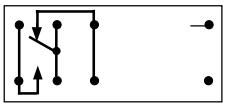
(BOTTOM VIEW)

FIGURE "A"



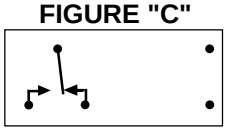
FOOT PRINT FOR
70-475 SOCKET

FIGURE "B"



FOOT PRINT FOR
70-475 SOCKET

FIGURE "C"



FOOT PRINT FOR
70-478 SOCKET

DRILLING PLAN

(BOTTOM VIEW)

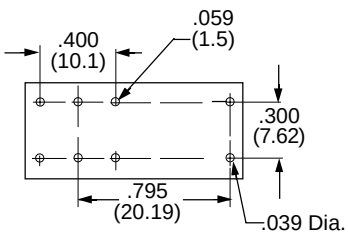


FIGURE "A"

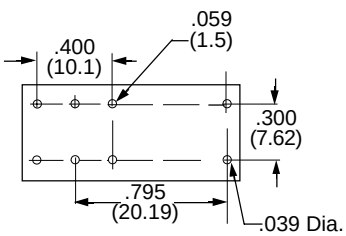


FIGURE "B"

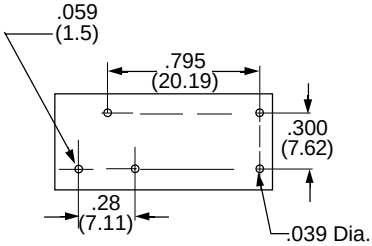


FIGURE "C"

SEE SECTION 10
FOR
MATING SOCKETS

SPECIFICATIONS CLASS 76

COIL

Pull-in Voltage:	DC-75% of Nominal Voltage or less
Dropout Voltage:	5% of Nominal Voltage or More
Nominal Power:	600 mW(1 pole) 800 mw (2 pole)Approx..
Coil Resistance	±10% Measured @ 20˚C

CONTACTS

Contact Material:	Silver Cadmium Oxide
Contact Resistance:	100 Milliohms Max.
Max.cycle rate:	30 Operations per Minute @ rated Load.
Minimum Switching Load:	10 VDC @ 10 mA

TIMING

Operate Time:	15 mS Max. @ Nominal Voltage.
Release Time:	10 mS Max. @ Nominal Voltage.
Bounce Time: (Mean Value)	1.2 mS Approx.

DIELECTRIC STRENGTH

Contacts to Coil:	5000 V rms, for 1 Minute
Across Open Contacts:	1000 V rms, for 1 Minute
Creepage & Clearance	8 Millimeters Min. Coil & Contacts
Insulation Resistance:	500VDC Exceeds 100 Megohms

TEMPERATURE

Operating:	-30˚C to +70˚C
Humidity:	45 - 85% RH

VIBRATION RESISTANCE

Functional:	10 to 55 Hz Dual Amplitude 1.5mm

SHOCK RESISTANCE

Functional:	10 g's Min
Mechanical:	100 g Min.

LIFE

Electrical (Rated Load):	100,000 Operations min.
Mechanical (No Load):	10,000,000 Operations min.

MISCELLANEOUS

Operating position:	Any
Enclosure:	Epoxy sealed for protection during automatic wave soldering & cleaning process. After cleaning process, pierce a small hole in cover for venting.
Weight:	13 Grams approx.

PART NUMBERS	FIG.	COIL Measured @ 20˚C		CONTACT CONFIGU-RATION	CONTACT RATING	CROSS REFERENCE		
		NOMINAL INPUT VOLTAGE	Nominal Resistance (Ohms)			POTTER & BRUMFIELD	OMRON	AROMAT
W76EURCPCX-14	**"C"**	5 VDC	47	SPDT	10 AMP	**RKS-5DG-05**	**G2R-14-DC5**	**JW1FEN-DC5V**
W76EURCPCX-15	**"C"**	6 VDC	68	SPDT	10 AMP	**RKS-5DG-06**	**G2R-14-DC6**	**JW1FEN-DC6V**
W76EURCPCX-16	**"C"**	12 VDC	275	SPDT	10 AMP	**RKS-5DG-12**	**G2R-14-DC12**	**JW1FEN-DC12V**
W76EURCPCX-17	**"C"**	24 VDC	1,100	SPDT	10 AMP	**RKS-5DG-24**	**G2R-14-DC24**	**JW1FEN-DC24V**
W76EURCPCX-18	**"C"**	48 VDC	4,170	SPDT	10 AMP	**RKS-5DG-48**	**G2R-14-DC48**	**JW1FEN-DC48V**
W76EURCPCX-61	**"A"**	5 VDC	47	DPDT	5 AMP	**RKS-11DG-05**	**G2R-24-DC5**	**JW2EN-DC5V**
W76EURCPCX-62	**"A"**	6 VDC	68	DPDT	5 AMP	**RKS-11DG-06**	**G2R-24-DC6**	**JW2EN-DC6V**
W76EURCPCX-63	**"A"**	12 VDC	275	DPDT	5 AMP	**RKS-11DG-12**	**G2R-24-DC12**	**JW2EN-DC12V**
W76EURCPCX-64	**"A"**	24 VDC	1,100	DPDT	5 AMP	**RKS-11DG-24**	**G2R-24-DC24**	**JW2EN-DC24V**
W76EURCPCX-146	**"B"**	5 VDC	47	SPDT	16 AMP	**RKS-5DW-05**	**G2R-1-E-DC5**	
W76EURCPCX-147	**"B"**	6 VDC	68	SPDT	16 AMP	**RKS-5DW-06**	**G2R-1-E-DC6**	
W76EURCPCX-148	**"B"**	12 VDC	275	SPDT	16 AMP	**RKS-5DW-12**	**G2R-1-E-DC12**	
W76EURCPCX-149	**"B"**	24 VDC	1,100	SPDT	16 AMP	**RKS-5DW-24**	**G2R-1-E-DC24**	
W76EURCPCX-150	**"B"**	48 VDC	4,170	SPDT	16 AMP	**RKS-5DW-48**	**G2R-1-E-DC48**	

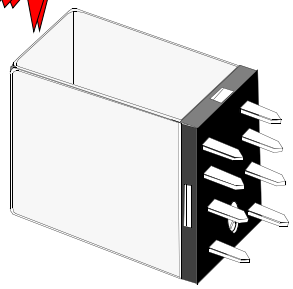
PART NUMBERS SHOWN ALSO **AVAILABLE THRU STOCKING DISTRIBUTION.**

ENCLOSED MINIATURE 2 POLE RELAY

NEW!

SPACE SAVING DPDT, P.C. BOARD RELAY
AC OR DC OPERATED COIL.
RATED: 5 AMPS RESISTIVE, 3 AMPS INDUCTIVE

Recognized Component mark for Canadian and the United States.
c UL us PENDING
UL Recognized
File No. E52197



MANUFACTURED UNDER QUALITY SYSTEM
ISO 9002 & QS 9000

SPECIFICATIONS CLASS 1330 & 1335

COIL

Pull-in Voltage:	75% of Nominal Voltage or less for AC or DC Coils
Dropout:	DC -10% min.or more.
Max. Voltage:	110%
Coil Resistance:	±10% @ 25˚C
Duty:	Continuous

CONTACTS

Contact Configurations:	DPDT
Contact Material:	Silver Cadmium Oxide, .93 Dia. (2.36).
Contact Resistance:	100 Milliohms Max.
Contact Rating:	UL RATED - 5 Amperers @ 120 VAC resistive NOT UL RATED - 30 VDC resistive, 3 Amperes Inductive, 1/8 Hp @ 120 VAC.

TIMING

Operate Time:	20mS Max. AC, 15 mS Max. DC @ Nominal Voltage, 25˚C.
Release Time:	20mS Max. AC, 15 mS Max. DC @ Nominal Voltage, 25˚C.

DIELECTRIC STRENGTH

Coil to Frame:	1500 V rms
Across Open Contacts:	500 V rms
Contact to Frame:	1500 V rms
Insulation Resistance:	1500 Megohms Min.

TEMPERATURE

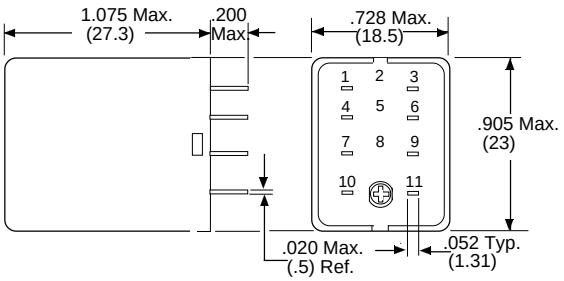
Ambient Temperature:	-45˚C to + 70˚C @ Rated Operation.

LIFE EXPECTANCY

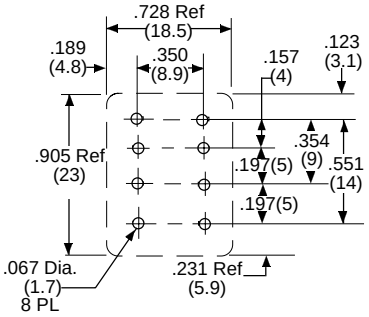
Mechanical	AC operated Device in excess of 50 million operations DC operated devices, in excess of 100 million operations.
Electrical (rated Load):	100,000 Operations Min. (at rated Resistive load).

MISCELLANEOUS

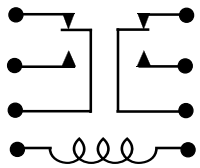
Operating Position:	Any.
Insulating Material:	Molded parts are diallyl phthalate for higher arc resistance.
Enclosure:	Clear heat resistant Polycarbonate Dust Cover.
Weight:	Approximately 3/4 oz.



P.C. BOARD LAYOUT



CIRCUIT DIAGRAM



Magnecraft

PART NUMBERS	Coil Measured at 25˚C			CROSS REFERENCE TO GUARDIAN
	Nominal Input Voltage	Nominal Resistance (Ohms)	Nominal Power	
AC OPERATED COILS				
W1330P-2C-24A	24 VAC	245 Ω	1.2 VA	**1330P-2C-24A**
W1330P-2C-120A	120 VAC	5400 Ω	1.2 VA	**1330P-2C-120A**
DC OPERATED COILS				
W1335P-2C-12D	12 VDC	125 Ω	1.2 W	**1335P-2C-12D**
W1335P-2C-24D	24 VDC	500 Ω	1.2 W	**1335P-2C-24D**

PART NUMBERS SHOWN ALSO AVAILABLE **THRU STOCKING DISTRIBUTION.**

REED RELAYS

FOR

PRINTED CIRCUIT BOARD

APPLICATIONS

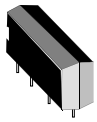
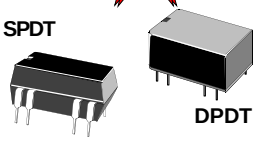
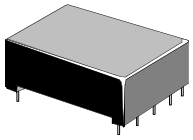
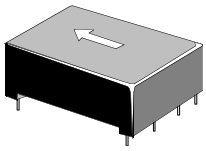
4 VA TO 100 VA.

COAXIAL RELAYS

FOR R.F. SWITCHING.

Magnecraft & Struthers-Dunn

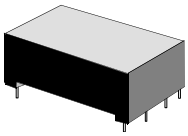
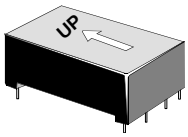
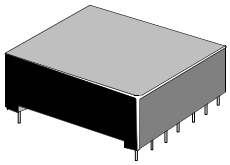
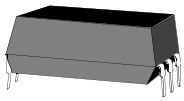
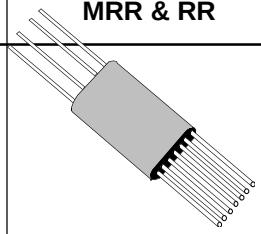
PRINTED CIRCUIT BOARD REED RELAYS

RELAY SERIES	"SIP"	"DIP" NEW! DPDT DIP	101	131 MERCURY
		 SPDT DPDT SOCKET AVAILABLE SEE SECTION 10		
FEATURES	EPOXY MOLDED CONSTRUCTION. STANDARD 0.1 GRID SPACING. AVAILABLE WITH OR WITHOUT SUPPRESSION DIODE ACROSS COIL.. .	SPDT - EPOXY MOLDED CONSTRUCTION. DPDT - ENCAPSULATED CONSTRUCTION. STANDARD 0.1 GRID SPACING. AVAILABLE WITH SUPPRESSION DIODE ACROSS COIL. CLASS 107 PROVIDES 4 HOOK- UP PINS TO COIL.. ELECTROSTATIC SHIELD OPTIONAL.	ENCAPSULATED CONSTRUCTION OR EPOXY MOLDED WITH SIDE TERMINALS STANDARD 0.1 GRID OR OPTIONAL 0.15 SPACING. NON LATCHING SINGLE COIL OR SINGLE & DUAL COIL MAGNETIC LATCHING. ELECTROSTATIC SHIELD OPTIONAL.	ENCAPSULATED CONSTRUCTION. STANDARD 0.1 GRID OR OPTIONAL 0.15 SPACING. POSITION SENSITIVE VERTICAL MOUNTING. EXCELLENT FOR LOW LEVEL SWITCHING. ELECTROSTATIC SHIELD OPTIONAL.
CONTACT CONFIGURATION:	SPST-NO, SPST-NC	SPST-NO, or NC, SPDT, DPDT	1 to 3PST-NO,	SPST-NO, DPST-N0
MAXIMUM CONTACT RATING:	MAX. SWITCHING 0.5 AMPS or 200 VDC @ 10 VA MAX.CARRY LOAD 1.5 AMPS	MAX. SWITCHING 0.5 AMPS or 100 VDC @ 4VA -10VA MAX.CARRY LOAD 1.5 AMPS	MAX. SWITCHING 0.5 AMPS or 200 VDC @ 10 VA MAX.CARRY LOAD 2.0 AMPS	MAX. SWITCHING 2.0 AMPS or 500 VDC @ 50 VA MAX.CARRY LOAD 3.0 AMPS
CONTACT MATERIAL:	RHODIUM	RHODIUM	RHODIUM	MERCURY (Hg)
CONTACT RESISTANCE:	100 MILLIOHMS (INITIAL)	100 MILLIOHMS (INITIAL)	100 MILLIOHMS (INITIAL)	50 MILLIOHMS (INITIAL)
INSULATION CHARACTERISTICS DIELECTRIC STRENGTH:	1500 V rms	1000 V rms	500 VDC	1000 V rms
COIL DATA DC - VOLTAGE RANGE:	5, 12, 24 VDC	5, 12, 24 VDC	5, 12, 24 VDC	5, 12, 24 VDC
NOMINAL POWER:	270 mW Max.	650 mW Max.	380 mW Max.	625 mW Max.
GENERAL DATA AMBIENT TEMPERATURE OPERATIONAL:	- 40˚ C to + 85˚ C	- 40˚ C to + 85˚ C	- 40˚ C to + 85˚ C	- 37˚ C to + 85˚ C
TIMING VALUES MAX. OPERATE:	1 MILLISECONDS	1 MILLISECONDS	1 MILLISECONDS	2 MILLISECONDS
MAX. RELEASE:	1 MILLISECONDS	1 MILLISECONDS	1 MILLISECONDS	2 MILLISECONDS
LIFE MECHANICAL:	100 MILLION OPERATIONS	100 MILLION OPERATIONS	100 MILLION OPERATIONS	100 MILLION OPERATIONS
ELECTRICAL:	50 MILLION OPERATIONS	50 MILLION OPERATIONS	50 MILLION OPERATIONS	40 MILLION OPERATIONS
DIMENSIONS:	H W L	H W L	H W L	H W L
	.290 X .280 X .750	.275 X .300 X .750 .338 X .393 X .750 (DPDT)	.355 X .400 to .900 X 1.15	.355 X PG.39 X 1.15
MOUNTING POSITION:	ANY	ANY	ANY	VERTICAL ± 15˚
APPLICATION DATA:	**PAGE 68, 69**	**PAGE 71 thru 75**	**MINIATURE REED SPECIFICATIONS: PAGE 76**	
PAGE NUMBER:	**PAGE 70**		**PAGE 77**	**PAGE 78**

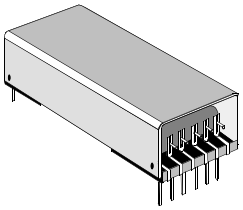
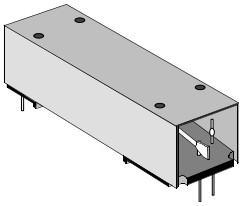
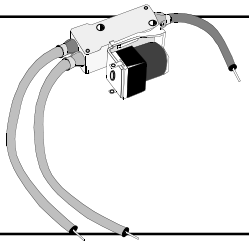
WEBSITE: www.magnecraft.com EMAIL:info@magnecraft.com FAX ON DEMAND 1-800/891-2957, DOCUMENT 100

Magnecraft Struthers-Dunn

MINIATURE REED RELAYS

104	134 MERCURY	193	MR-Y	MRR & RR
				
DUST COVER STANDARD. ENCAPSULATED CONSTRUCTION OPTIONAL STANDARD 0.1 GRID OR OPTIONAL 0.15 GRID SPACING AVAILABLE.	DUST COVER STANDARD. ENCAPSULATED CONSTRUCTION OPTIONAL STANDARD 0.1 GRID OR OPTIONAL 0.15 SPACING AVAILABLE. POSITION SENSITIVE. VERTICAL MOUNTED.	DUST COVER STANDARD. ENCAPSULATED CONSTRUCTION OPTIONAL STANDARD 0.1 GRID OR OPTIONAL 0.15 GRID SPACING. UP TO 4PDT OR 6PST CONTACT ARRANGEMENTS.	EPOXY MOLDED. STANDARD 0.1 GRID OR OPTIONAL 0.15 GRID SPACING AVAILABLE. MAGNETIC SHIELDING. END TERMINALS. TTL COMPATIBLE.	EPOXY MOLDED AXIAL LEAD REED RELAY EXTERNAL MAGNETIC SHIELDING FIXED TO BODY. SOLID LEADS
SPDT, DPDT	SPDT, DPDT	1 to 4PDT, 1 to 6PST	1 & 2PST-NO or NC SPDT, DPDT	1 to 12PST-NO 0r NC
MAX SWITCHING 0.25 AMPS or 100VDC @ 4 VA MAX.CARRY LOAD 0.5 AMP	MAX SWITCHING 1.0 AMPS or 500VDC @ 50 VA MAX.CARRY LOAD 2.0 AMP.	MAX SWITCHING 0.5 AMPS or 200VDC @ 10 VA MAX.CARRY LOAD 2.0 AMP	MAX SWITCHING 0.5 AMPS or 200VDC @ 10 VA MAX.CARRY LOAD 1.5 AMP	MAX SWITCHING 0.5 AMP or 200VDC @ 10 VA MAX.CARRY LOAD 1.5 AMPS
RHODIUM 200 MILLIOHMS (INITIAL)	MERCURY 100 MILLIOHMS (INITIAL)	RHODIUM 200 MILLIOHMS (INITIAL)	RHODIUM 200 MILLIOHMS (INITIAL)	RHODIUM 200 MILLIOHMS (INITIAL)
500 V rms	1000 V rms	500 V rms	500 V rms	500 V rms
5, 12, 24 VDC 626 mW Max.	5, 12, 24 VDC 620 mW Max.	5, 12, 24 VDC 1030 mW Max.	5, 12, 24 VDC 450 mW Max.	6 to 48 VDC 400 mW Max.
-40˚C to + 85 ˚C 1 MILLISECONDS 1 MILLISECONDS 100 MILLION OPERATIONS 50 MILLION OPERATIONS	-37 ˚C to + 85 ˚C 2 MILLISECONDS 3 MILLISECONDS 100 MILLION OPERATIONS 40 MILLION OPERATIONS	-40 ˚C to + 85 ˚C 1 MILLISECONDS 1.5 MILLISECONDS 100 MILLION OPERATIONS 50 MILLION OPERATIONS	-40˚C to + 85 ˚C 1 MILLISECONDS 1 MILLISECONDS 100 MILLION OPERATIONS 50 MILLION OPERATIONS	-40 ˚C to + 85 ˚C 5 MILLISECONDS 5 MILLISECONDS 200 MILLION OPERATIONS 10 MILLION OPERATIONS
H W L	H W L	H W L	H W L	DIAMETER
.355 X .5 to .7 X 1.15	355 X .5 to .5 X 1.15	.355 X .4 to .9 X 1.15	.312 X 0.4 X .950	.655 X 1.875
ANY	VERTICAL ± 15˚	ANY	ANY	ANY
PAGE 79	**PAGE 80**	**PAGE 81, 82**	**PAGE 83, 84**	**PAGE 85, 86**

P.C. BOARD REED RELAYS & COAXIAL

RELAY SERIES	RRN	102	120 COAXIAL
			
FEATURES	OPEN END CONSTRUCTION WITH METAL COVER MAGNETIC SHIELDING 0.2 GRID SPACING SINGLE PIECE GLASS FILLED BOBBIN AND TERMINALSUPPORT VARIOUS CONTACT ARRANGE-MENTS.	OPEN END CONSTRUCTION DRY REED SWITCHING UP TO 3.0 AMPS @ 250 VDC. METAL COVER/SHIELD STANDARD 0.2 GRID SPACING.	150 WATT SWITCHING UP TO 470 MHz. RG58C/U CABLE, 12" LONG STANDARD. 50 OHM IMPEDANCE 1 FORM C (DPDT) R.F. SWITCHING CONTACTS.
CONTACT DATA CONTACT CONFIGURATION:	See Catalog Page	SPST-NO	SPDT
MAXIMUM CONTACT RATING:	MAX SWITCHING 0.5 or 1.0 AMP or 250VDC @ 10 or 15 VA	MAX SWITCHING 1.0 or 3.0 AMPS or 250VDC @ 15 or 100 VA MAX.CARRY LOAD 2 or 3.5 AMPS	150 Watts up to 470 MHz
CONTACT MATERIAL: CONTACT RESISTANCE:	RHODIUM 200 MILLIOHMS (INITIAL)	RHODIUM 200 MILLIOHMS (INITIAL)	SILVER ALLOY GOLD FLASHED 50 MILLIOHMS (INITIAL)
INSULATION CHARACTERISTICS DIELECTRIC STRENGTH:	1500 V rms	1500 V rms	1,500 V rms
COIL DATA			
DC - VOLTAGE RANGE:	6 to 48 VDC	12, 24 VDC	12 VDC
NOMINAL POWER:	700 mW Max.	800 mW Max	1.44 Watts
GENERAL DATA			
AMBIENT TEMPERATURE OPERATIONAL:	-40 ˚C to + 85 ˚C	-40 ˚C to + 85 ˚C	- 55˚ C to + 65˚ C
TIMING VALUES MAX. OPERATE: MAX. RELEASE:	 6 MILLISECONDS 6 MILLISECONDS	 5 MILLISECONDS 6 MILLISECONDS	 15 MILLISECONDS 7 MILLISECONDS
LIFE MECHANICAL: ELECTRICAL:	 200 MILLION OPERATIONS 10 MILLION OPERATIONS	 100 MILLION OPERATIONS 20 MILLION OPERATIONS	 100,000 OPERATIONS 5 MILLION OPERATIONS
DIMENSIONS	H W L	H W L	H W L
	.641 X 0.74 X 2.50	0.65 X 0.76 X 2.67	.1.62 X.703 X 1.73
MOUNTING POSITION	ANY	ANY	ANY
PAGE NUMBER	**PAGE 87, 88**	**PAGE 89**	**PAGE 90**

HOW REED RELAYS WORK

The term reed relay covers dry reed relays and mercury-wetted contact relays, all of which use hermetically sealed reed switches. In both types, the reeds (thin, flat blades) serve multiple functions - as conductor, contacts, springs, and magnetic armatures.

DRY REED RELAYS

Dry reed relays have become an important factor in the relay field. They have the advantage of being hermetically sealed and resistant to atmospheric contamination. They have fast operate and release times and when operated within their rated contact loads, have very long life. A typical dry reed switch capsule is shown in Figure 1.

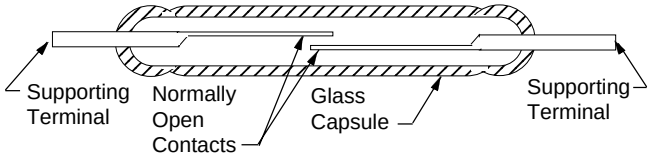


Figure 1. Construction of Switch Capsule of Typical Dry Reed switch (SPST-NO)

In the basic SPST-NO design, two opposing blades are sealed into a narrow glass capsule and overlapped at their free ends. The contact area is plated typically with rhodium to produce a low contact resistance when contacts are drawn together. The capsule is made of glass and filled with a dry inert gas and then sealed. The capsule is surrounded by an electromagnetic coil. When the coil is energized, the normally open contacts are brought together; when the coil voltage is removed, the blades separate by their own spring tension. Some reeds contain permanent magnets for magnetic biasing to achieve normally closed contacts (SPST-NC) or SPDT contact combinations. The current rating, which is dependent upon the size of the blade and the type and amount of plating, may range from low level to 1 amp. Effective contact protection is essential when switching loads other then dry resistive loads.

MERCURY-WETTED CONTACT RELAYS.

Mercury wetted contacts consist of a glass-encapsulated reed with its base immersed in a pool of mercury and the other end capable of moving between one or two stationary contacts. The mercury flows up the reed by capillary action and wets the contact surfaces of the moving end of the reed as well as the contact surfaces of the stationary contacts. A mercury to mercury contact is maintained in the closed position. The capsule is surrounded by an electromagnetic coil and operates in the same manner as a dry reed.

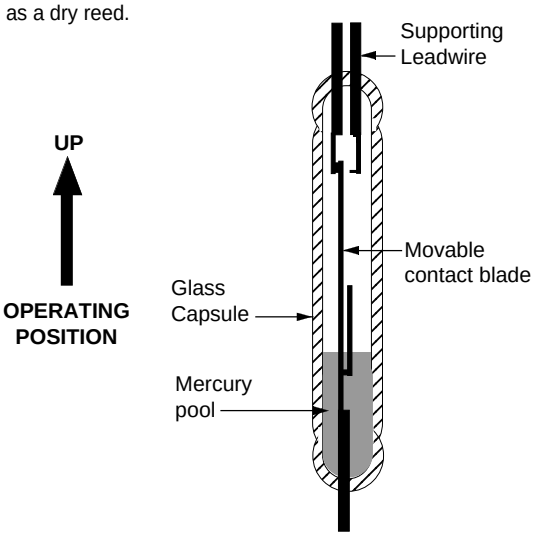


Figure 2. Miniature Mercury-wetted contact switch (SPDT)

MERCURY-WETTED CONTACT RELAYS. (CONTINUED)

Mercury wetted contacts are fast in operation and have relatively good load carrying capacity and long life. The mercury films are reestablished at each contact closure and contact erosion is eliminated.. The mercury films are stretchable, there is no contact bounce and because it is a mercury contact, the contact resistance is very low and ideal for low level switching applications.

The disadvantages of this type of reed relay are the freezing point of mercury (-38˚C), poor resistance to shock and vibration and the need to mount the relay in a near vertical position.

These relays are used for a variety of switching applications such as found in computers, business machines, machine tool control systems, and laboratory instruments.

CONTACT COMBINATIONS.

The switches used in dry reed relays provide SPST-NO, SPST-NC, SPDT contact combinations.

The SPST-NO corresponds with the basic switch capsule design (Fig.1).

The SPST-NC results from a combination of the SPST-NO switch and a permanent magnet strong enough to pull the contacts closed but able to open when coil voltage is applied to the relay coil.

In typical true SPDT designs, the armature is mechanically tensioned against the normally closed contact, and is moved to the normally open contact upon application of a magnetic field. The SPDT contact combination can also be achieved by joining a SPST-NO switch with an appropriately adjusted SPST-NC switch, and jumping one side of both switches together to form the movable contact system.

Latching contacts, defined as contacts which remain in the position to which they were driven, and staying in that position when coil power is removed from the relay coil.

Latching switches are manufactured by using a SPST-NO contact, and biasing it with a permanent magnetic that is strong enough to hold the contacts closed, but not strong enough to hold the contact closed when coil power is applied to the coil. The switching process is than reversed by simply reversing the relay coil polarity to close the switch.

MAGNETIC FIELDS

Reed relays in general can be characterized as susceptible to the influences of external magnetic fields. It is important to keep reed relays at a proper distance from each other because of the possibility of magnetic-interaction between them. Proper magnetic shielding must be used to contain stray magnetic fields. When installing reed relays into equipment, one should be aware of the devices within that equipment which can produce magnetic fields. The relays being installed into that equipment should be positioned as far away as possible from any stray magnetic fields and should be shielded to prevent false operations.

ELECTRICAL CHARACTERISTICS

SENSITIVITY: The input power required to operate dry reed relays is determined by the sensitivity of the particular reed switch used, by the number of switches operated by the coil, by the permanent magnet biasing (if used), and the efficiency of the coil and the effectiveness of its coupling to the blades. Minimum input required to effect closure ranges from the very low milliwatt level for a single sensitive capsule to several watts for multipole relays.

OPERATE TIME: The coil time constant, overdrive on the coil, and the characteristics of the reed switch determine operate time. With the maximum overdrive voltage applied to the coil, reed relays will operate in approximately the 200 microsecond range. When driven at rated coil voltage, usually the relays will operate at about one millisecond.

RELEASE TIME: With the coil unsuppressed, dry reed switch contacts release in a fraction of a millisecond. SPST-NO contacts will open in as little as 50 microseconds. Magnetically biased SPST-NC and SPDT switches reclose from 100 microseconds to 1 millisecond respectively.

ELECTRICAL CHARACTERISTICS (Continued)
RELEASE TIME (Continued)

If the relay coil is suppressed, release times are increased. Diode suppression can delay release times for several milliseconds, depending on coil characteristics, coil voltage, and reed release characteristics.

CONTACT BOUNCE

Dry reed contacts bounce on closure as with any other hard contact relay. The duration of bounce on a Dry reed switch is typically very short, and is in part dependent on drive level. In some of the faster devices, the sum of the operate time and bounce is relatively constant. As drive is increased, the operate time decreases with bounce time increasing.
The normally closed contacts of a SPDT switch bounce more then the normally open contacts. Magnetically biased SPST-NC contacts exhibit essentially the same bounce characteristics as SPST-NO switches.

CONTACT RESISTANCE

The reeds (blades) in a dry reed switch are made of magnetic material which has a high volume resistivity, terminal-to-terminal resistance is somewhat higher than in some other types of relays. Typical specification limits for initial resistance of a SPST-NO reed relay is 0.200 ohms max (200 milliohms).

INSULATION RESISTANCE

A dry reed switch made in a properly controlled internal atmosphere will have an insulation resistance of 10^{12} to 10^{13} ohms or greater. When it is assembled into a relay, parallel insulation paths reduce this to typical values of 10^{9} ohms. Depending on the particular manner of relay construction, exposure to high humidity or contaminating environments can appreciably lower final insulation resistance.

CAPACITANCE.

Reed capsules typically have low terminal-to-terminal capacitance. However, in the typicall relay structure where the switch is surrounded by a coil, capacitance from each reed to the coil act to increase capacitance many times. If the increased capacitance is objectionable, it can be reduced by placing a grounded electrostatic shield between the switch and coil.

DIELECTRIC WITHSTAND VOLTAGE

With the exception of the High-Voltage dry reed switches (capsules that are pressurized or evacuated), the dielectric strength limitation of relays is determined by the ampere turn sensitivity of the switches used. A typical limit is 200 VAC. The dielectric withstand voltage between switch and coil terminals is usually 500 VAC.

THERMAL EMF

Since thermally generated voltages result from thermal gradients within the relay assembly, relays built to minimize this effect often use sensitive switches to reduce required coil power, and thermally conductive materials to reduce temperature gradients. Latching relays, which may be operated by a short duration pulse, are often used if the operational rate is not changed for longer periods of time because coil power is not required to keep the relay in the on or off position after the initial turn on or turn off pulse.

NOISE

Noise is defined as a voltage appearing between terminals of a switch for a few milliseconds following closure of the contacts. It occurs because the reeds (blades) are moving in a magnetic field and because voltages are produced within them by magnetostrictive effects. From an application standpoint, noise is important if the signal switched by the reed is to be used within a few milliseconds immediately following closure of the contacts. When noise is critical in an application, a peak-to-peak limit must be established by measurement techniques, including filters which must be specified for that particular switching application.

ENVIRONMENTAL CHARACTERISTICS

Reed relays are used in essentially the same environments as other types of relays. Factors influencing their ability to function would be temperature extremes beyond specified limits

VIBRATION

The reed switch structure, with so few elements free to move, has a better defined response to vibration than other relay types. With vibration inputs reasonably separated from the resonant frequency, the reed relay will withstand relatively high inputs, 20 g's or more. At resonance of the reeds, the typical device can fail at very low input levels. Typical resonance frequency is 2000 hz.

SHOCK

Dry reed relays will withstand relatively high levels of shock. SPST-NO contacts are usually rated to pass 30 to 50 g's, 11 milliseconds, half sign wave shock, without false operation of contacts. Switches exposed to a magnetic field that keep the contacts in a closed position, such as in the biased latching form, demonstrate somewhat lower resistance to shock. Normally closed contacts of mechanically biased SPDT switches may also fail at lower shock levels.

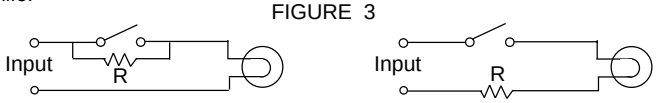
TEMPERATURE

Differential expansion or contraction of reed switches and materials used in relay assemblies can lead to fracture of the switches. Reed relays are capable of withstanding temperature cycling or temperature shock over a range of at least -50˚C to + 100˚C. These limits should be applied to the application to prevent switch failure.

CONTACT PROTECTION

Tungsten lamp, inductive and capacitive discharge load are extremely detrimental to reed switches and reduce life considerably. Illustrated below are typical suppression circuits which are necessary for maximum contact life.

FIGURE 3



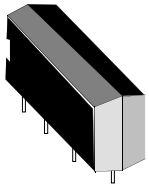
Initial turn-on current is generally 10 times higher than the rated operating current of the lamp. A current limiting resistor in series with the load, or a bleeder resistor across the contacts will suppress the inrush current. Thesesame circuits can be used with capacitive loads, as shown in Figure 3.

FIGURE 4

DC inductive loads call for either a diode or a thyristor to be placed across the load. These circuits are necessary to protect the contacts when inductive loads are to be switched in a circuit, as shown in Figure 4.

CLASS 117 "SIP"

0.5 AMP SWITCHING
SPST-N.O. OR N.C. CONTACTS

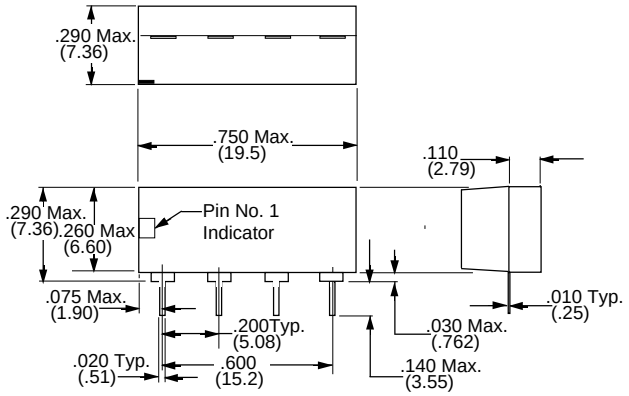


SPECIFICATIONS CLASS 117SIP

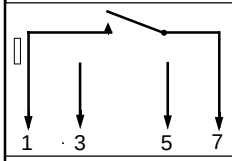
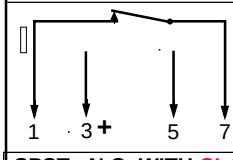
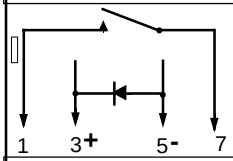
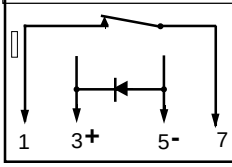
Package Material:	Epoxy, molded
Contact Material:	Rhodium
Ambient Temperature:	- 40˚C to + 85˚C
Dielectric Strength:	150 V rms Across open contacts
	500 V rms all other points
Insulation Resistance:	1000 Megohms Min.
Capacitance:	1.0 pF typical coil to contacts
Shock Resistance:	50 G's
Vibration Resistance:	20 G's to 200 Hz
Operate Time:	1 Millisecond Max.
Release Time:	1 Millisecond Max.
Life	50 Million operations , 5-10V @ 10 mA
	100 Million operations no load

OUTLINE DIMENSIONS

Dimensions shown are in "INCHES" & (Millimeters)

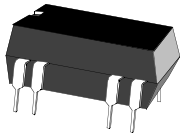


CONSULT FACTORY FOR COMPLETE PART NUMBER WITH REQUIRED OPTIONS

CIRCUIT DIAGRAM TOP VIEW	PART NUMBERS	COIL Measured @ 25˚C					MAXIMUM CONTACT RATING		CROSS REFERENCE TO	
		NOMINAL INPUT VOLTAGE	MAXIMUM PULL-IN	MINIMUM DROPOUT	NOMINAL RESISTANCE (OHMS)	NOMINAL POWER (mW)	SWITCHING LOAD	CONTINUOUS CARRY CURRENT	HAMLIN	POTTER & BRUMFIELD
SPST - N.O.										
	**W117SIP-1**	5	4.0	0.5	500	50			**3621A0500**	**JWS-117-1**
	W117SIP-3	12	9.6	1.0	1870	77			**3621A1200**	**JWS-117-3**
	W117SIP-5	24	19.2	2.0	3200	180			**3621A2400**	**JWS-117-5**
SPST - N.C.										
	**W117SIP-22**	5	4.0	0.5	500	50			-	**JWD-171-12**
	W117SIP-23	12	9.6	1.0	1200	120			-	**JWD-171-14**
	W117SIP-24	24	19.2	2.0	2200	270	**10VA 0.5 AMP 200VDC**	**1.5 AMPS**	-	**JWD-171-15**
SPST - N.O. WITH CLAMPING DIODE										
	**W117SIP-6**	5	4.0	0.5	500	50			**3621A0510**	**JWS-117-6**
	W117SIP-8	12	9.6	1.0	1870	77			**3621A1210**	**JWS-117-8**
	W117SIP-10	24	19.2	2.0	3200	180			**3621A2410**	**JWS-117-10**
SPST - N.C. WITH CLAMPING DIODE										
	**W117SIP-18**	5	4.0	0.5	500	50			-	**JWD-171-17**
	W117SIP-25	12	9.6	1.0	1200	120			-	**JWD-171-19**
	W117SIP-26	24	19.2	2.0	2200	220			-	**JWD-171-30**

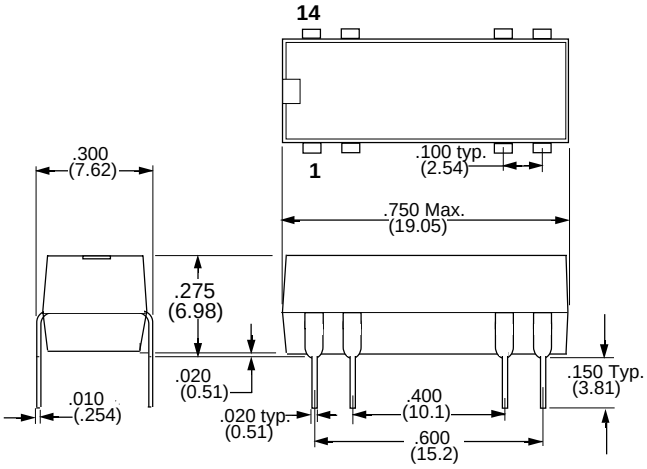
NOTE: MAGNECRAFT FOOT PRINT IS IDENTICAL TO COMPETITOR PART NUMBERS SHOWN. COIL RESISTANCE MAY DIFFER SLIGHTLY FOR THE NOMINAL VOLTAGES SHOWN.

PART NUMBERS SHOWN ALSO AVAILABLE **THRU STOCKING DISTRIBUTION.**



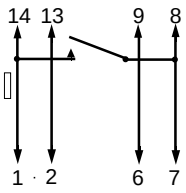
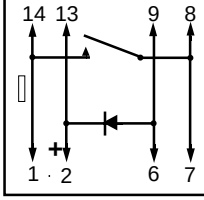
107 DIP RELAY

EPOXY MOLDED
PROVIDES 4 HOOK-UP PINS TO COIL.



SPECIFICATIONS CLASS 107DIP

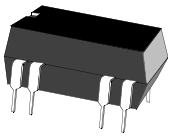
Package Material:	Epoxy, molded
Contact Material:	Rhodium
Ambient Temperature:	- 40˚C to + 85˚C
Dielectric Strength:	150 V rms Across open contacts 500 V rms all other points
Insulation Resistance:	1000 Megohms Min.
Capacitance:	2.0 pF typical coil to contacts
Operate Time:	1 Milliseconds Max @ Nominal.
Release Time:	1 Milliseconds Max @ Nominal.
Shock Resistance:	50 G's
Vibration Resistance:	20 G's to 200 Hz
Life	50 Million operations at 5-10V @ 10mA 100 Million operations no load
Operating Position:	Any
Weight:	1 gram approx.

CIRCUIT DIAGRAM TOP VIEW	RELAY PART NUMBERS	COIL Measured @ 25˚C					MAX. CONTACT RATING		CROSS REFERENCE TO POTTER & BRUMFIELD
		NOMINAL INPUT VOLTAGE	MAXIMUM PULL-IN	MINIMUM DROPOUT	NOMINAL RESIS-TANCE (OHMS)	NOMINAL POWER (mW)	MAXIMUM SWITCHING LOAD	MAXIMUM CONTINUOUS CARRY CURRENT	
SPST - N.O.							10VA 0.5 AMP 100 VDC	1.5 AMPS	
	**W107DIP-1**	5	3.8	0.5	500	50			**JWD-107-1**
	W107DIP-3	12	9.0	1.0	1200	120			**JWD-107-3**
	W107DIP-4	24	18.0	2.0	2200	260			-
SPST - N.O. WITH CLAMPING DIODE									
	**W107DIP-5**	5	3.8	0.5	500	50			**JWD-107-5**
	W107DIP-7	12	9.0	1.0	1200	120			**JWD-107-7**
	W107DIP-8	24	18.0	2.0	2200	260			-

PART NUMBERS SHOWN ALSO AVAILABLE **THRU STOCKING DISTRIBUTION.**
All DIP configurations are available with Magnetic Shielding (internal) and /or Low level applications on special order.
Contact factory for special part numbers.

SEE SECTION 10 FOR MATING SOCKET

SPECIFICATIONS 171DIP & 172 (SPDT)

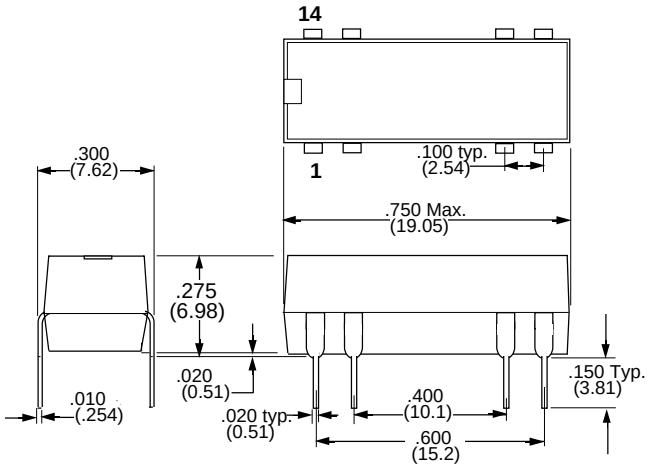


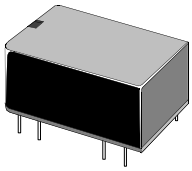
171 & 172 (SPDT)

Package Material:	Epoxy, molded
Contact Material:	Rhodium or Mercury (as selected)
Ambient Temperature:	- 40˚C to + 85˚C
Dielectric Strength:	150 V rms Across open contacts
	500 V rms all other points
Insulation Resistance:	1000 Megohms Min.
Capacitance:	1.0 pF typical coil to contacts
Shock Resistance:	50 G's
Vibration Resistance:	20 G's to 200 Hz
Operate Time:	1 Millisecond max.
Release Time:	1 Millisecond max.
Life	50 Million operations, 5-10V @ 10mA
	100 Million operations Low Level

OUTLINE DIMENSIONS

Dimensions shown are in "INCHES" & (Millimeters)



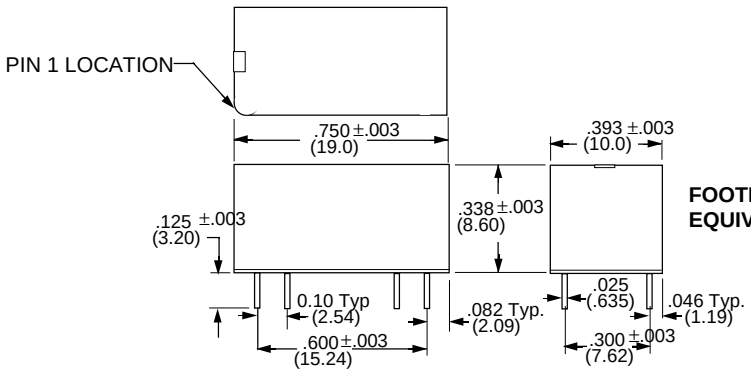


PACKAGE STYLE
FOR W172 DIPS
DPDT

SPECIFICATIONS 172DIP (DPDT)

Package Material	Plastic
Contact Material:	Rhodium
Coil Resistance:	± 10% @ 20˚C
Contact Resistance:	150 MΩ max.
Ambient Temperature:	- 40˚C to + 85˚C
Dielectric Strength::	150 VDC min.
Coil to contact:	500 VDC min.
Insulation Resistance:	1000 Megohms Min.
Operate Time	0.7 Millisecond max. (including bounce)
Release Time:	1 Millisecond max.
Life:	50 million operations, 50V/50mA:
	80 million operations, 10v/10mA:

Dimensions shown are in "INCHES" & (Millimeters)

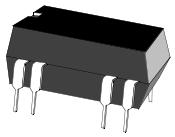


FOOTPRINT AND SCHEMATIC IS PIN FOR PIN EQUIVALENT TO FORMER DPDT MODELS

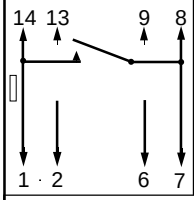
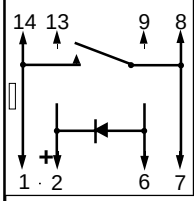
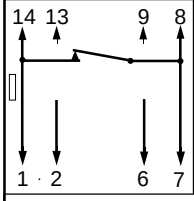
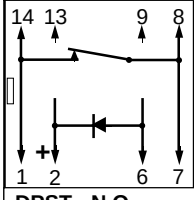
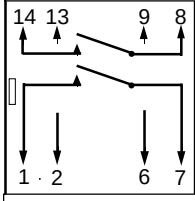
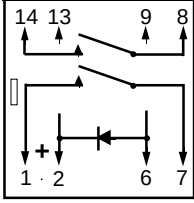
WHEN SPACING DIP RELAYS, EXCEPT FOR THE LATCH VERSION, THE RELAYS REQUIRE 3/4 INCH SPACING FROM THE SIDE OF THE ADJACENT RELAYS. LATCH RELAYS REQUIRE 1 INCH SPACING BETWEEN ADJACENT RELAYS FROM END TO END AND CENTER LINE TO CENTER LINE.

SEE SECTION 10 FOR MATING SOCKET

DUAL IN-LINE PACKAGE REED RELAY

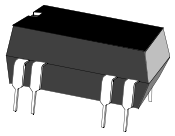


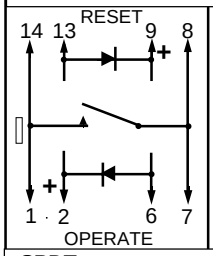
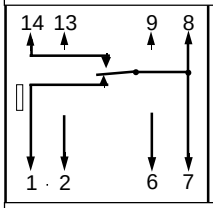
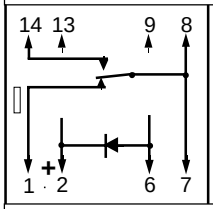
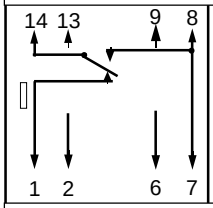
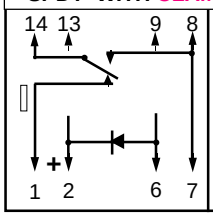
MIL SPECIFICATION MIL-83516/1 AND /4 VERSIONS AVAILABLE CONSULT FACTORY

CIRCUIT DIAGRAM TOP VIEW	PART NUMBERS	COIL Measured @ 25˚C					MAXIMUM CONTACT RATING		CROSS REFERENCE TO	
		NOMINAL INPUT VOLTAGE	MAXIMUM PULL-IN	MINIMUM DROPOUT	NOMINAL RESIS-TANCE (OHMS)	NOMINAL POWE (mW)	SWITCHING LOAD	CONTINUOUS CARRY CURRENT	HAMLIN	POTTER & BRUMFIELD
SPST - N.O.									**HE-**	
	**W171DIP-2**	5	3.8	0.5	500	50	10VA 0.5 AMP 100VDC	1.5 AMPS	**721A0500**	-
	W171DIP-4	12	9.0	1.0	1200	120			**721A1200**	-
	W171DIP-5	24	18.0	2.0	2200	270			**721A2400**	**JWD-171-5**
SPST - N.O. WITH CLAMPING DIODE										
	**W171DIP-7**	5	3.8	0.5	500	50	10VA 0.5 AMP 100VDC	1.5 AMPS	**721A0510**	-
	W171DIP-9	12	9.0	1.0	1200	120			**721A1210**	-
	W171DIP-10	24	18.0	2.0	2200	270			**721A2410**	**JWD-171-10**
SPST - N.C.										
	**W171DIP-12**	5	3.8	0.5	500	50	10VA 0.5 AMP 100VDC	1.5 AMPS	**721B0500**	**JWD-171-12**
	W171DIP-14	12	9.0	1.0	1200	120			**721B1200**	**JWD-171-14**
	W171DIP-15	24	18.0	2.0	2200	270			**721B2400**	**JWD-171-15**
SPST - N.C. WITH CLAMPING DIODE										
	**W171DIP-17**	5	3.8	0.5	500	50	10VA 0.5 AMP 100VDC	1.5 AMPS	**721B0510**	**JWD-171-17**
	W171DIP-19	12	9.0	1.0	1200	120			**721B1210**	**JWD-171-19**
	W171DIP-20	24	18.0	2.0	22 00	270			**721B2410**	**JWD-171-20**
DPST - N.O.										
	**W171DIP-21**	5	3.8	0.5	125	125	10VA 0.5AMP 100VDC	1.5 AMPS	**722A0500**	**JWD-171-21**
	W171DIP-23	12	9.0	1.0	500	300			**722A1200**	**JWD-171-23**
	W171DIP-24	24	18.0	2.0	2000	270			**722A2400**	**JWD-171-24**
DPST - N.O. WITH CLAMPING DIODE										
	**W171DIP-25**	5	3.8	0.5	200	125	10VA 0.5 AMP 100VDC	1.5AMPS	**722A0510**	**JWD-171-25**
	W171DIP-27	12	9.0	1.0	500	290			**722A1210**	**JWD-171-27**
	W171DIP-28	24	18.0	2.0	2200	270			**722A2410**	**JWD-171-28**

PART NUMBERS SHOWN ALSO AVAILABLE **THRU STOCKING DISTRIBUTION**

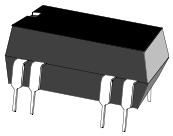
SEE SPECIFICATIONS AND OUTLINE DIMENSIONS FOR 171DIP



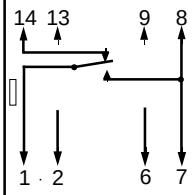
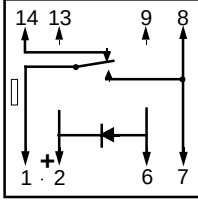
CIRCUIT DIAGRAM TOP VIEW	PART NUMBERS	COIL Measured @ 25˚C					MAXIMUM CONTACT RATING		CROSS REFERENCE TO	
		NOMINAL INPUT VOLTAGE	MAXIMUM PULL-IN	MINIMUM DROPOUT	NOMINAL RESIS-TANCE (OHMS)	NOMINAL POWER (mW)	SWITCHING LOAD	CONTINUOUS CARRY CURRENT	HAMLIN	POTTER & BRUMFIELD
MAGNECRAFT & STRUTHERS-DUNN - SPST-NO LATCHING									**HE-**	
	**MRRDL1AS8-5D**	5	3.8	0.5	750	35	10VA 0.5AMP 100VDC	1.5 AMPS		
	MRRDL1AS8-12D	12	9.0	1.0	1000	145				
	MRRDL1AS8-24D	24	18.0	2.0	4600	125				
SPDT										
	**W172DIP-141**	5	3.8	0.5	200	125	4VA .25 AMP 100VDC	0.5AMPS	**721C0500**	**JWD-172-155**
	W172DIP-145	12	9.0	1.0	1000	144			**721C1200**	**JWD-172-157**
	W172DIP-146	24	18.0	2.0	2200	180			**721C2400**	**JWD-172-158**
SPDT WITH CLAMPING DIODE										
	**W172DIP-147**	5	3.8	0.5	200	125	4VA .25 AMP 100VDC	0.5AMPS	**721C0510**	**JWD-172-159**
	W172DIP-149	12	9.0	1.0	1000	144			**721C1210**	**JWD-172-161**
	W172DIP-150	24	18.0	2.0	2200	180			**721C2410**	**JWD-172-162**
SPDT										
	**W172DIP-31**	5	3.8	0.5	500	125	4VA .25 AMP 100VDC	0.5AMPS	**721E0500**	-
	W172DIP-33	12	9.0	1.0	1000	290			**721E1200**	-
	W172DIP-34	24	18.0	2.0	2200	270			**721E2400**	-
SPDT WITH CLAMPING DIODE										
	**W172DIP-35**	5	3.8	0.5	500	125	4VA .25 AMP 100VDC	0.5 AMPS	**721E0510**	-
	W172DIP-37	12	9.0	1.0	1000	300			**721E1210**	-
	W172DIP-38	24	18.0	2.0	2200	270			**721E2410**	-

PART NUMBERS SHOWN ALSO **AVAILABLE THRU STOCKING DISTRIBUTION**

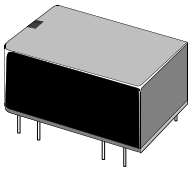
DUAL IN-LINE PACKAGE REED RELAY



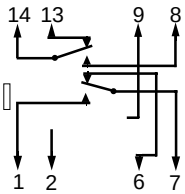
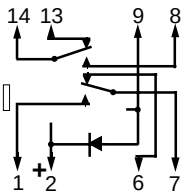
171 & 172 (SPDT)

CIRCUIT DIAGRAM TOP VIEW	PART NUMBERS	COIL Measured @ 25˚C					MAXIMUM CONTACT RATING		CROSS REFERENCE TO	
		NOMINAL INPUT VOLTAGE	MAXIMUM PULL-IN	MINIMUM DROPOUT	NOMINAL RESIS-TANCE (OHMS)	NOMINAL POWER (mW)	SWITCHING LOAD	CONTINUOUS CARRY CURRENT	HAMLIN HE-	POTTER & BRUMFIELD
SPDT										
	**W172DIP-1**	5	3.8	0.5	200	125	4VA .25 AMP 100VDC	0.5 AMPS	**721R0500**	**JWD-172-1**
	W172DIP-3	12	9.0	1.0	500	300			**721R1200**	**JWD-172-3**
	W172DIP-4	24	18.0	2.0	2200	270			**721R2400**	**JWD-172-4**
SPDT WITH CLAMPING DIODE										
	**W172DIP-5**	5	3.8	0.5	200	125	4VA .25 AMP 100VDC	0.5 AMPS	**721R0510**	**JWD-172-5**
	W172DIP-7	12	9.0	1.0	500	300			**721R1210**	**JWD-172-7**
	W172DIP-8	24	18.0	2.0	2200	270			**721R2410**	**JWD-172-8**

SEE SPECIFICATIONS AND OUTLINE DIMENSIONS FOR 172DIP (SPDT)



PACKAGE STYLE FOR W172 DIPS DPDT

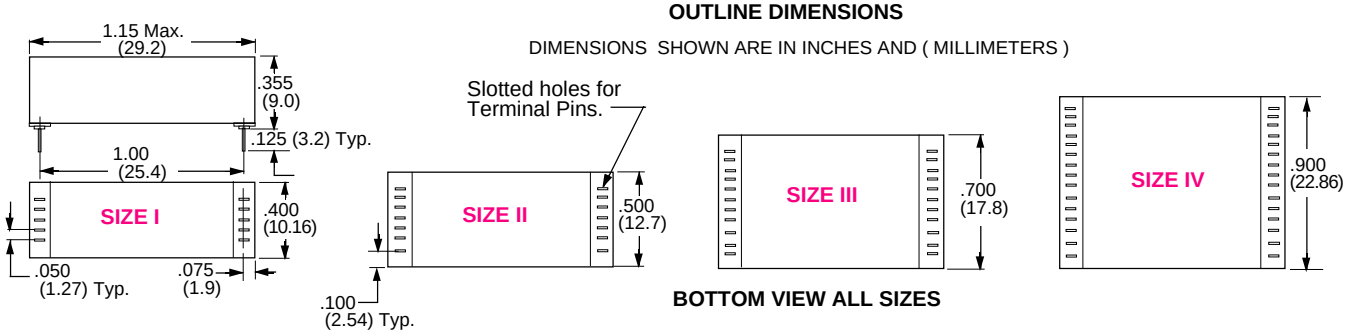
CIRCUIT DIAGRAM TOP VIEW	PART NUMBERS	COIL Measured @ 25˚C					MAXIMUM CONTACT RATING		
		NOMINAL INPUT VOLTAGE	MAXIMUM PULL-IN	MINIMUM DROPOUT	NOMINAL RESIS-TANCE (OHMS)	NOMINAL POWER (mW)	SWITCHING LOAD	CONTINUOUS CARRY CURRENT	
DPDT									
	**W172DIP-17**	5	3.8	0.3	46	540	10VA 0.5 AMP 100VDC	1.0 AMPS	**172 DIPS WITH DPDT CONTACT ARRANGEMENTS HAVE A NEW PACKAGE STYLE. NEW PACKAGE SWITCHES HIGHER CURRENT UP TO 0.5 AMP @ 100 VDC**
	W172DIP-19	12	9.0	0.3	266	540			
	W172DIP-20	24	18.0	0.3	1066	540			
DPDT WITH CLAMPING DIODE									
	**W172DIP-21**	5	3.8	0.3	46	540	10VA 0.5 AMP 100VDC	1.0 AMPS	
	W172DIP-23	12	9.0	0.3	266	540			
	W172DIP-24	24	18.0	0.3	1066	540			

SEE SPECIFICATIONS AND OUTLINE DIMENSIONS FOR 172DIP (DPDT)

PART NUMBERS SHOWN ALSO AVAILABLE **THRU STOCKING DISTRIBUTION**

OUTLINE DIMENSIONS

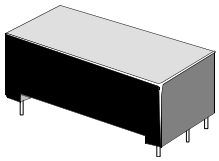
DIMENSIONS SHOWN ARE IN INCHES AND (MILLIMETERS)



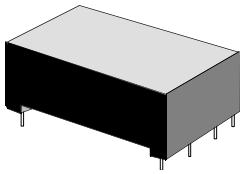
BOTTOM VIEW ALL SIZES

STANDARD PRINTED CIRCUIT RELAY HAS 1.00" X 0.1" GRID SPACING

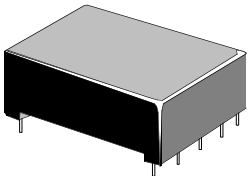
SIZE I



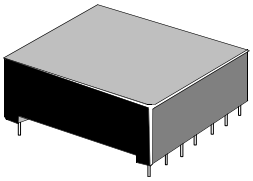
SIZE II



SIZE III



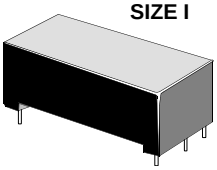
SIZE IV



RELAY CLASS	101/193	104/193	131	134
CONTACT CONFIGURATION:	SPST-NO SPST-NO Latching (SPST-NO) 3PST-NO Latching up to 6PST-NO	SPDT, DPDT for 104 Series SPDT,DPDT, 3PDT,4PDT (193 Series)	SPST-NO or DPST-NO Mercury	Mercury (SPDT) Mercury DPDT
CONTACT RATING MAX. (Resistive Load) SWITCHING VOLTAGE MAX. SWITCHING CURRENT MAX. CARRY CURRENT MAX.	10 VA 200DC/130 AC 0.5 AMPS 2 AMPS	4VA 100 VDC 0.5 AMPS 1 AMPS	50VA 500 VDC 2 AMPS 3 AMPS	50VA 500 VDC 2 AMPS 3 AMPS
INITIAL CONTACT RESISTANCE (IN MILLIOHMS):	200 Milliohms Max.		100 Milliohms Max. Contact resistance Stability ± 10% over Life.	
INSULATION RESISTANCE (Ohms) TESTED AT 100 VDC:	10^9 Min.		10^{10} Min.	10^{10} Min.
DIELECTRIC STRENGTH: MIN. ACROSS OPEN CONTACTS: MIN. BETWEEN MUTUALLY INSULATED POINTS:	200 VDC 500 VDC		1000 VDC 1000 VDC	1000 VDC 1000 VDC
CAPACITANCE: (non-shielded relay) ACROSS OPEN CONTACTS: OPEN CONTACTS TO COIL: CLOSED CONTACTS TO COIL:	3pf Typical Form "A" 2.0 pF Typ. Form "C" 3.0pF Typ.		.3pF 2.0 pF 3.0pF	.9pF 2.0 pF 2.5pF
TEMPERATURE: MAX. AMBIENT OPERATING (˚C)	85 ˚C or (120 ˚C -70˚ x [Coil Power]) whichever is lower			
TEMPERATURE: MIN. AMBIENT OPERATING (˚C)	- 40˚C		- 37˚C	
STORAGE TEMPERATURE:	- 60˚C to + 105˚C		- 40˚C to + 105˚C	
MOUNTING POSITION:	ANY		Vertical ± 15˚	
LIFE AT RATED LOAD: With appropriate Contact protection (End of life 1 Ohm)	10 Million Operations 100 Million Operations at Low level		40×10^8 3×10^8 at low level	50×10^8 5×10^8 at low level
OPERATE TIME: (Typical- in Micro-Sec.]).	1.0 mS, for N.O. 1.0 mS, for N.C.		2.0 mS, for N.O.	2300 µS 2000 µS
TYPICAL RELEASE TIME: (in Micro-Sec.) Diode Suppression: No Suppression:	1.0 mS, for N.O. 1.5 mS, for N.C.		1.0 mS for NO 1.5 mS for NC	2.0 mS 2.5 mS
PACKAGING:	Dust covered, Epoxy Encapsulated is Standard.			

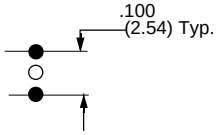
CLASS 101 DRY MINIATURE REED RELAY

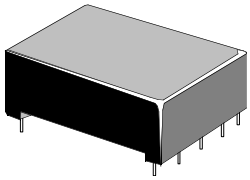
SIZE I



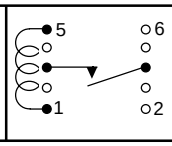
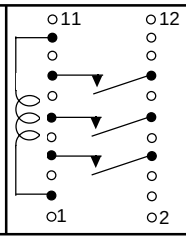
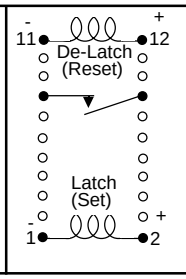
PIN SPACING OF 0.100" IS STANDARD. PIN SPACING OF 0.150 IS AVAILABLE ON SPECIAL ORDER. ALSO AVAILABLE ARE MODELS WITH ELECTROSTATIC SHIELDS. CONSULT FACTORY FOR PART NUMBERS. NON-STANDARD SCHEMATICS AND PIN-OUTS CAN ALSO BE PRODUCED FOR SPECIFIC CUSTOMER REQUIREMENTS.

Spacing between filled in circles in schematics are on a .100 Grid Pattern. Pin omitted on unfilled circles.





SIZE III

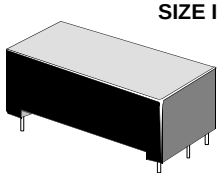
CASE SIZE	CIRCUIT DIAGRAM TOP VIEW	PART NUMBERS	COIL MEASURED AT 25˚C					MAX. CONTACT RATING		
			NOMINAL INPUT VOLTAGE	MAXIMUM PULL-IN	MINIMUM DROPOUT	NOMINAL RESIS-TANCE (OHMS)	NOMINAL POWER (mW)	MAX. SWITCHING LOAD	SWITCHING CURRENT & VOLTAGE	CARRY CURRENT
SPST-NO										
I		**W101MPCX-2** **W101MPCX-3**	12 24	9.0 18.0	1.0 2.0	1400 3300	102 175	10 VA	0.5 AMP 200 VDC	2 AMPS
3PST-NO										
III		**W101MPCX-5** **W101MPCX-6** **W101MPCX-7**	5 12 24	4.0 9.0 18.0	0.5 1.0 2.0	90 430 1500	280 340 380	10 VA	0.5 AMP 200 VDC	2 AMPS
SPST-NO MAGNETIC LATCH										
III		**W101LMPCX-16** **W101LMPCX-17**	5/5 12/12	3.8 9.0 To Set or Reset	- -	425/425 2500/2500	60 60	10 VA	0.5 AMP 200 VDC	2 AMPS

PART NUMBERS SHOWN AVAILABLE THRU STOCKING DISTRIBUTION

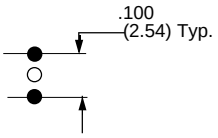
CLASS 131 MERCURY

PIN SPACING OF 0.100" IS STANDARD. PIN SPACING OF 0.150 IS AVAILABLE ON SPECIAL ORDER. ALSO AVAILABLE ARE MODELS WITH ELECTROSTATIC SHIELDS. CONSULT FACTORY FOR PART NUMBERS. NON-STANDARD SCHEMATICS AND PIN-OUTS CAN ALSO BE PRODUCED FOR SPECIFIC CUSTOMER REQUIREMENTS.

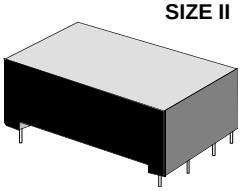
SIZE I



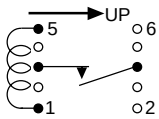
Spacing between filled in circles in schematics are on a .100 Grid Pattern. Pin omitted on unfilled circles.



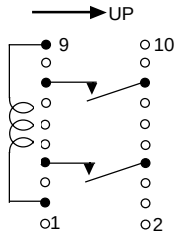
SIZE II



SPST-NO MERCURY

1		**W131MPCX-3** **W131MPCX-4**	12 24	9.0 18.0	1.0 2.0	330 1400	435 410	50 VA	2.0 AMP 500 VDC	3 AMPS

DPST-NO MERCURY

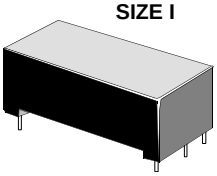
I		**W131MPCX-7** **W131MPCX-8**	12 24	9.0 18.0	1.0 2.0	230 1200	626 480	50 VA	2.0 AMP 500 VDC	3 AMPS

PART NUMBERS SHOWN AVAILABLE THRU STOCKING DISTRIBUTION

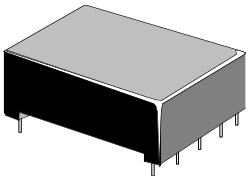
For Class 131 allow a minimum of 30 seconds after mounting for excess Mercury to clear from the contacts before using.

CLASS 104 DRY MINIATURE REED RELAY

SIZE I

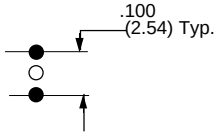


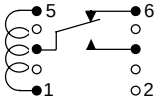
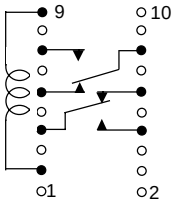
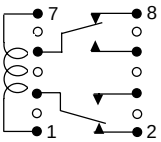
SIZE III



PIN SPACING OF .100" IS STANDARD. PIN SPACING OF .150 IS AVAILABLE ON SPECIAL ORDER. ALSO AVAILABLE ARE MODELS WITH ELECTROSTATIC SHIELDS. CONSULT FACTORY FOR PART NUMBERS. NONSTANDARD SCHEMATICS AND PIN-OUTS CAN ALSO BE PRODUCED FOR SPECIFIC CUSTOMER REQUIREMENTS.

Spacing between filled in circles in schematics are on a .100 Grid Pattern. Pin omitted on unfilled circles.



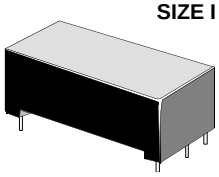
CASE SIZE	CIRCUIT DIAGRAM TOP VIEW	PART NUMBERS	COIL MEASURED AT 25°C					MAX. CONTACT RATING		
			NOMINAL INPUT VOLTAGE	MAXIMUM PULL-IN	MINIMUM DROPOUT	NOMINAL RESIS-TANCE (OHMS)	NOMINAL POWER (mW)	MAX. SWITCHING LOAD	SWITCHING CURRENT & VOLTAGE	CARRY CURRENT
SPDT										
I		**W104MPCX-3**	24	18.0	2.0	2600	220	4 VA	0.25 AMP 100VDC	0.5 AMPS
DPDT										
I		**W104MPCX-6**	12	9.0	1.0	230	626	4 VA	0.25 AMP 100VDC	0.5 AMPS
DPDT										
I		**W104MPCX-149** **W104MPCX-150** **W104MPCX-151**	5 12 24	4.0 9.0 18.0	0.5 1.0 2.0	45 230 1200	556 626 480	4 VA	0.25 AMP 100VDC	0.5 AMPS

PART NUMBERS SHOWN AVAILABLE THRU STOCKING DISTRIBUTION

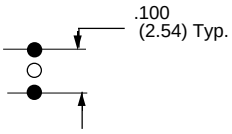
CLASS 134 MERCURY

PIN SPACING OF .100" IS STANDARD. PIN SPACING OF .150 IS AVAILABLE ON SPECIAL ORDER. ALSO AVAILABLE ARE MODELS WITH ELECTROSTATIC SHIELDS. CONSULT FACTORY FOR PART NUMBERS. NONSTANDARD SCHEMATICS AND PIN-OUTS CAN ALSO BE PRODUCED FOR SPECIFIC CUSTOMER REQUIREMENTS.

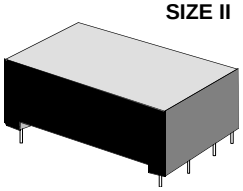
SIZE I



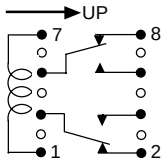
Spacing between filled in circles in schematics are on a .100 Grid Pattern. Pin omitted on unfilled circles.



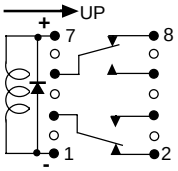
SIZE II



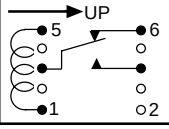
DPDT MERCURY

I		**W134MPCX-7** **W134MPCX-8**	5 12	4.0 9.6	0.5 1.0	45 230	560 620	50 VA	1.0 AMP 500 VDC	2.0 AMPS

DPDT MERCURY WITH CLAMPING DIODE

I		**W134MPCX-10** **W134MPCX-11**	5 12	4.0 9.6	1.0 1.0	45 230	560 620	50 VA	1.0 AMP 500 VDC	2.0 AMPS

SPDT MERCURY

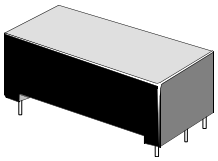
I		**W134MPCX-1** **W134MPCX-2** **W134MPCX-3**	5 12 24	4.0 9.0 18.0	0.5 1.0 2.0	60 330 1400	417 435 410	50 VA	1.0 AMP 500 VDC	2.0 AMPS

PART NUMBERS SHOWN AVAILABLE THRU STOCKING DISTRIBUTION

For Class 134 allow a minimum of 30 seconds after mounting for excess Mercury to clear from the contacts before using.

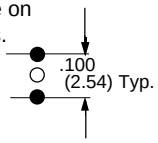
CLASS 193 DRY MINIATURE REED RELAY

SIZE I

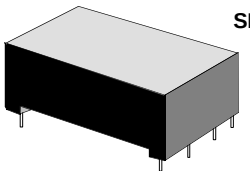


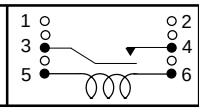
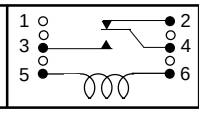
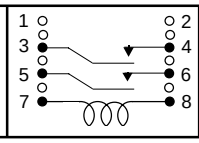
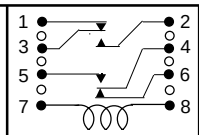
PIN SPACING OF 0.100" IS STANDARD. PIN SPACING OF 0.150 IS AVAILABLE ON SPECIAL ORDER. ALSO AVAILABLE ARE MODELS WITH ELECTROSTATIC SHIELDS. CONSULT FACTORY FOR PART NUMBERS. NONSTANDARD SCHEMATICS AND PIN-OUTS CAN ALSO BE PRODUCED FOR SPECIFIC CUSTOMER REQUIREMENTS.

Spacing between filled in circles in schematics are on .100 Grid Patterns. Pin omitted on unfilled circles.



SIZE II



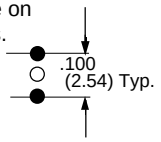
CASE SIZE	CIRCUIT DIAGRAM (Top View)	PART NUMBERS	COIL MEASURED AT 25°C					MAX. CONTACT RATING		
			NOMINAL INPUT VOLTAGE	MAXIMUM PULL-IN	MINIMUM DROPOUT	NOMINAL RESIS-TANCE (OHMS)	NOMINAL POWER (mW)	MAX. SWITCHING LOAD	SWITCHING CURRENT & VOLTAGE	CARRY CURRENT
SPST-N.O.										
I		W193RE1A3-5S	5	4.0	0.5	500	50	10 VA	0.5 AMP 200 VDC	2 AMPS
		W193RE1A3-12G	12	9.0	1.0	420	350			
		W193RE1A3-24G	24	18.0	2.0	2300	250			
SPDT										
I		W193RE1C3-5S	5	4.0	0.5	350	70	4 VA	0.5 AMP 100 VDC	1 AMP
		W193RE1C3-12G	12	9.0	1.0	420	350			
		W193RE1C3-24G	24	18.0	2.0	2300	250			
DPST-N.O.										
I		W193RE2A3-6G	5	4.0	0.5	70	360	10 VA	0.5 AMP 200 VDC	2 AMP
		W193RE2A3-12G	12	9.0	1.0	280	500			
		W193RE2A3-24G	24	18.0	2.0	1500	390			
DPDT										
I		W193RE2C3-6G	5	4.0	0.5	70	360	4 VA	0.5 AMP 100 VDC	1 AMP
		W193RE2C3-12G	12	9.0	1.0	280	500			
		W193RE2C3-24G	24	18.0	2.0	1500	390			

PART NUMBERS SHOWN AVAILABLE THRU STOCKING DISTRIBUTION

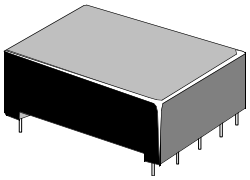
CLASS 193 DRY MINIATURE REED RELAY

PIN SPACING OF 0.100" IS STANDARD. PIN SPACING OF 0.150 IS AVAILABLE ON SPECIAL ORDER. ALSO AVAILABLE ARE MODELS WITH ELECTROSTATIC SHIELDS. CONSULT FACTORY FOR PART NUMBERS. NONSTANDARD SCHEMATICS AND PIN-OUTS CAN ALSO BE PRODUCED FOR SPECIFIC CUSTOMER REQUIREMENTS.

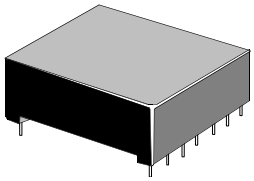
Spacing between filled in circles in schematics are on .100 Grid Patterns. Pin omitted on unfilled circles.

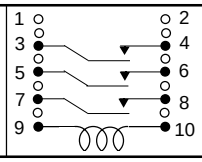
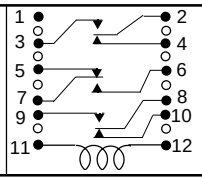
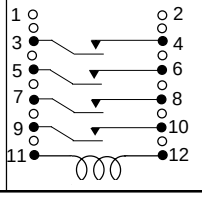
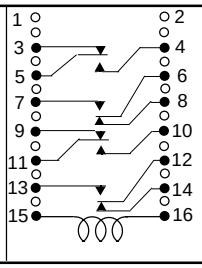


SIZE III



SIZE IV

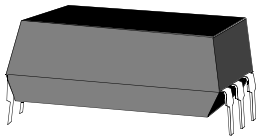


CASE SIZE	CIRCUIT DIAGRAM (Top View)	PART NUMBERS	COIL MEASURED AT 25˚C					MAX. CONTACT RATING		
			NOMINAL INPUT VOLTAGE	MAXIMUM PULL-IN	MINIMUM DROPOUT	NOMINAL RESIS-TANCE (OHMS)	NOMINAL POWER (mW)	MAX. SWITCHING LOAD	SWITCHING CURRENT & VOLTAGE	CARRY CURRENT
3PST-N.O.										
III		W193RE3A3-6G	5	4.0	0.5	50	500	10 VA	0.5 AMP 200 VDC	2 AMP
		W193RE3A3-12G	12	9.0	1.0	210	690			
		W193RE3A3-24G	24	18.0	2.0	1150	500			
3PDT										
III		W193RE3C3-6G	5	4.0	0.5	50	500	4 VA	0.5 AMP 100 VDC	1 AMP
		W193RE3C3-12G	12	9.0	1.0	210	690			
		W193RE3C3-24G	24	18.0	2.0	1150	500			
4PST-N.O.										
III		W193RE4A3-6G	5	4.0	0.5	50	500	10 VA	0.5 AMP 200 VDC	2 AMP
		W193RE4A3-12G	12	9.0	1.0	210	690			
		W193RE4A3-24G	24	18.0	2.0	1150	500			
4PDT										
IV		W193RE4C3-6G	5	4.0	0.5	35	720	4 VA	0.5 AMP 100 VDC	1 AMP
		W193RE4C3-12G	12	9.0	1.0	140	1030			
		W193RE4C3-24G	24	18.0	2.0	770	750			

PART NUMBERS SHOWN AVAILABLE THRU STOCKING DISTRIBUTION

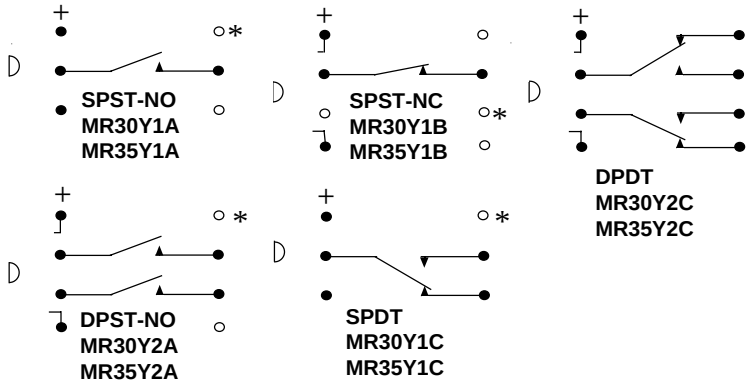
P.C. TERMINAL, MOLDED MINIATURE REED RELAY

The MR-Y Series epoxy molded miniature reed relay has terminal pins on each end and spaced 1 inch apart. It is available with two grid spacings - 0.1 inch or 0.15 inch. Available contacts range from SPST-NO to DPDT configurations. As an option, Mercury reeds are available in limited contact configurations. Lower power coils are also available in addition to optional diode across the coil and electrostatic shielding.



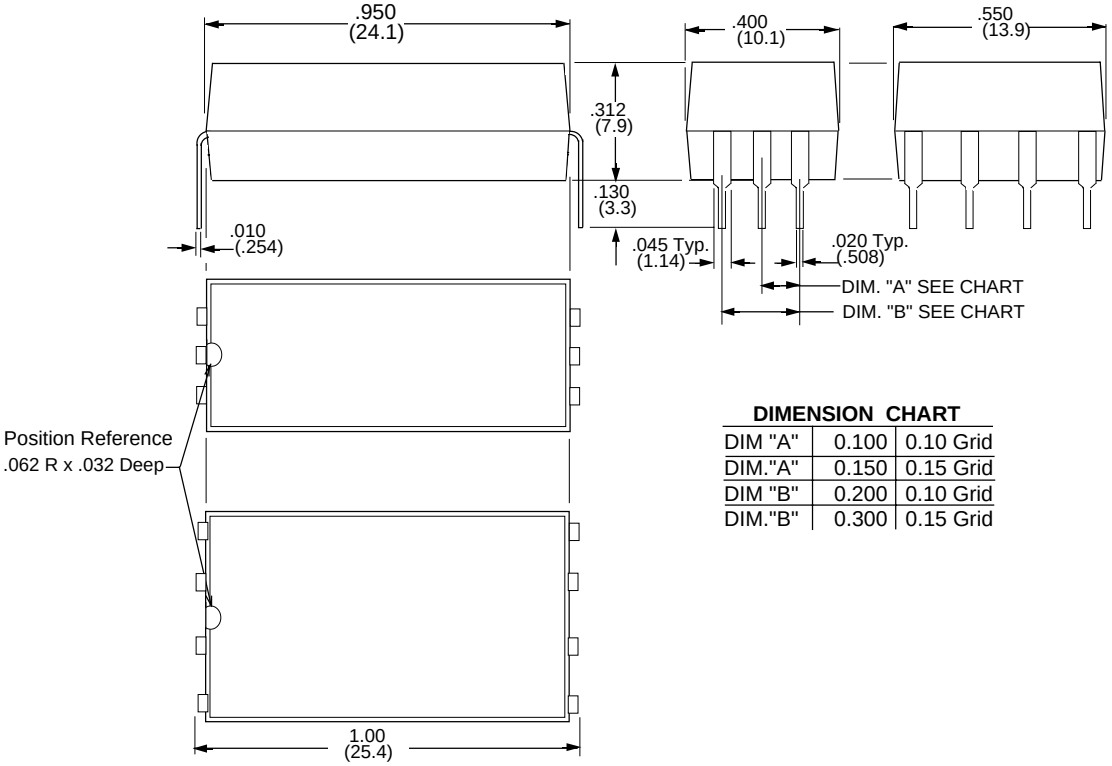
WIRING DIAGRAM

Top View



OUTLINE DIMENSIONS

Dimensions shown are in Inches and (Millimeter)



DIMENSION CHART

DIM "A"	0.100	0.10 Grid
DIM."A"	0.150	0.15 Grid
DIM "B"	0.200	0.10 Grid
DIM."B"	0.300	0.15 Grid

P.C. TERMINAL, MOLDED MINIATURE REED RELAY

SPECIFICATIONS MR-Y

(Not all Data applies to HG Relays)

Package Material:	Epoxy, molded
Contact Material:	Rhodium
Dielectric Strength:	200 V rms Across Open Contacts 1500 V rms All other points
Insulation Resistance:	1000 Megohms Min.
Capacitance:	0.4 pF typical coil to contacts
Shock Resistance:	50 G's
Vibration Resistance:	20 G's to 2000 Hz
Operate & Release Time:	2 Milliseconds Max.
Life:	10 Million operations at rated load SPST,DPST-NO & NC 100 Million operations no load SPST,DPST-NO & NC 5 Million operations at rated load SPDT, DPDT contacts. 50 Million operations no load, SPDT, DPDT contacts.

COIL DATA

Power Consumption (mW) - Coil Resistance, Nominal Voltage ± 10% @ 25˚C

SPST, DPST			SPDT, DPDT	
VDC	OHMS	mW	OHMS	mW
5	150	167	80	313
12	575	250	320	450
24	2150	268	1500	384

Must operate at 80% of nominal voltage @ 25˚C
Low Power Coils available:
Single Pole - 25mW
Double Pole - 65mW

CONTACT DATA

Material - Rhodium on Dry Reeds

Contacts	Max. VDC	Max. mA	VA
SPST-NO	200	500	10
SPST-NC	200	500	10
SPDT, DPDT	28	250	3
SPST-NO (HG)	500	2000	50
SPDT, DPDT(HG)	200	1000	28

Magnecraft & Struthers-Dunn

ORDERING CODE

Typical Type No. **MR30Y 2A RV -12D**

Series
MR30Y- 0.1 grid, end terminal Min. P.C. Reed Relay
MR35Y- 0.15 grid, end terminal Min. P.C. Reed Relay

Contact Arrangements
1A - SPST-NO
2A - DPST-NO
1B - SPST-NC
1C - SPDT
2C - DPDT

Options
Electrostatic Shield (see wiring diagrams)- **CODE E**
Low Power Coils (Dry Reeds Only) - **CODE R**
Diode across Coil (Observe Polarity) - **CODE V**
Mercury Reed Contact, position sensitive SPST-NO or SPDT - **CODE Z**

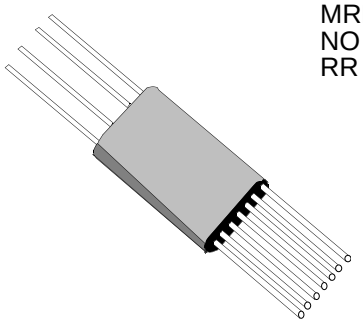
Coil Voltage (DC only)
DC: 5, 12, 24 (Add **"D"**)

+ Polarity must be observed for models with Form "B" contacts or optional Diode.

*Terminal for optional Electrostatic Shield.

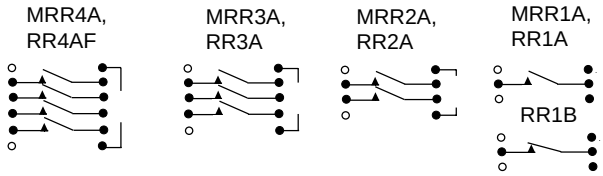
HG Contact relays are position sensitive.

AXIAL LEAD, SHIELDED REED RELAY



The MRR and RR Series Axial lead epoxy molded reed relays have solid wire leads on each end. They are available with two grid spacings - 0.1 inch for the MRR series and 0.2 inch for the RR series. Available contacts - UP TO 12PST-NO for the MRR series, and 1 -4PST-NO or NC for the RR series. The MRR and RR series come with an external Half shield fixed to the body of the relay.

WIRING DIAGRAM (Terminal view)



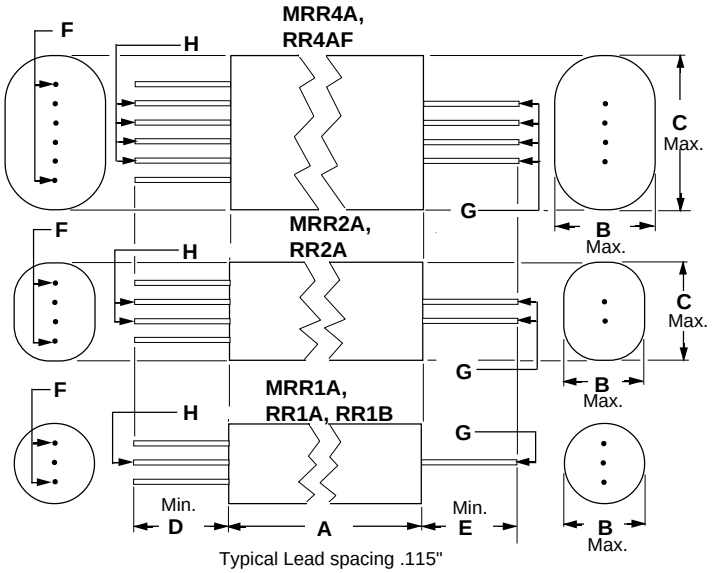
DIMENSIONAL CHART FOR MRR & RR SERIES RELAYS

SERIES	DIMENSIONS (Inches)							
	A	B	C	D	E	F	G	H
MRR1A	1.062	.425	.425					
MRR2A	± .005	.440	.515	.500	.500	.028	.028	.018 X .030
MRR4A		.535	.810					
RR1A, RR1B		.655	.655					
RR2A	1.875	.670	.840	.875	.500	.035	.035 X .061	.055
RR4AF		.810	1.385					

To convert Inch dimensions to Millimeter use 25.4 x Dimension = Millimeters.

OUTLINE DIMENSIONS

See dimensional chart above



Typical Lead spacing .115"

Typical Lead spacing .115"

SPECIFICATIONS MRR & RR

Contact Material:	Rhodium
Ambient Temperature:	- 40˚C to + 85˚C
Dielectric Strength:	MRR 400 V rms Across open contacts RR 500 V rms Across open contacts 1500 V rms All other points
Insulation Resistance:	1000 Megohms Min.
Capacitance:	0.4 pF typical coil to contacts
Shock Resistance:	50 G's
Vibration Resistance:	MRR - 20 G's to 2000 Hz RR - 10 G's to 450 Hz
Operate & Release Time:	2 to 10 Milliseconds based on the amount of contacts.
Life:	10 Million operations at rated load 200 Million operations no load

COIL DATA MRR SERIES

Coil Resistance & Nominal Voltage Measured at ± 10% @ 25˚C.

	SPST-NO	DPST-NO	4PST-NO	12PST-NO
VDC	OHMS	OHMS	OHMS	OHMS
6	288	144	72	24
12	1152	576	288	94
24	4600	2300	1152	384
48	—	—	3300	1536

Must operate at 70% of nominal voltage @ 25˚C

COIL DATA RR SERIES

Coil Resistance & Nominal Voltage Measured at ± 10% @ 25˚C.

	SPST-NO or NC	DPST-NO	4PST-NO
VDC	OHMS	OHMS	OHMS
6	90	36	24
12	360	145	94
24	1440	580	384
48	5760	2300	1536

Must operate at 80% of nominal voltage @ 25˚C

Options RR only - Preformed leads welded lead extensions.

CONTACT DATA MRR SERIES

Material - Rhodium on Dry Reeds

Contacts	Max. VDC	Max. mA	VA
1-4PST-NO	200	500	10

CONTACT DATA RR SERIES

Material - Rhodium on Dry Reeds

Contacts	Max. VDC	Max. AMPS	VA
1-4PST-NO	250	1.0	15
SPST-NC	250	1.0	15

NOTE: Voltage, Current, and Power ratings in the tables above are independent maximums and no single value is to be exceeded. Ratings are based on noninductive, straight resistive, AC or DC loads without inrush. Other loads require contact protection and /or de-rating.

Magnecraft & Struthers-Dunn

ORDERING CODE

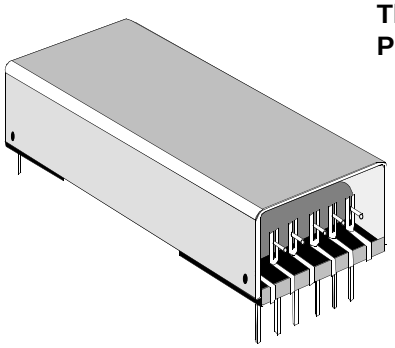
Typical Type No. **MRR** or **RR** **2A** **-12D**

Series
- **MRR**- 0.1" Lead spacing
- **RR**- 0.2" Lead spacing

Contact Arrangements
- 1A - SPST-NO
- 2A - DPST-NO
- 3A - 3PST-NO
- 4A - 4PST-NO
- 1B - SPST-NC (RR series Only)

Coil Voltage (DC only)
- **DC:** 6, 12, 24, 48 (Add **"D"**)
  (5 volt and other voltages available)

OPEN STYLE, METAL COVER/SHIELD REED RELAY

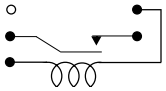


The RRN Series is a open construction, one piece nylon bobbin, P.C. terminal assembly with a metal Cover/Shield (3 sided).

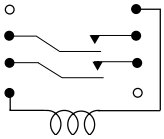
* WIRING DIAGRAMS

(Top View)

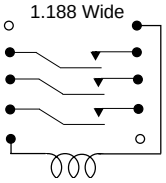
RRN1A
.740 Wide



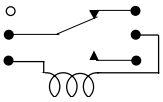
RRN2A
.958 Wide



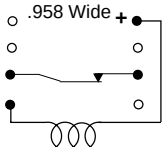
RRN3A
1.188 Wide



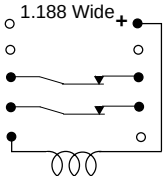
RRN1C
.740 Wide



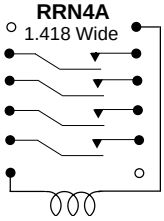
RRN1B
.958 Wide



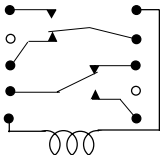
RRN2B
1.188 Wide



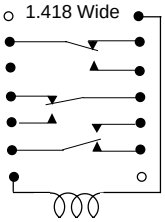
RRN4A
1.418 Wide



RRN2C
1.418 Wide



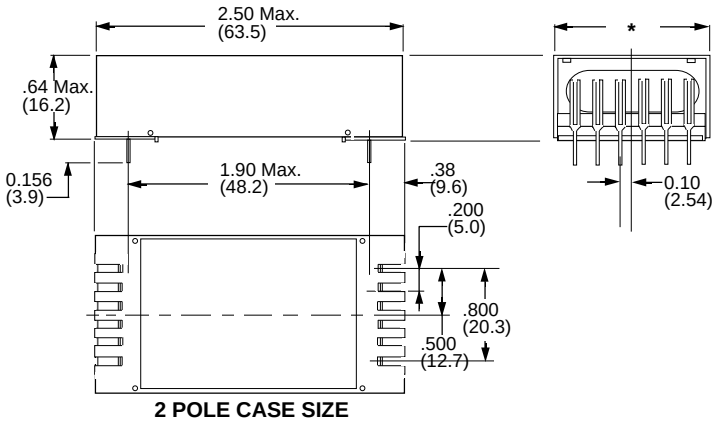
RRN3C
1.418 Wide



OUTLINE DIMENSIONS

Shown in Inchs and (Millimeters)

*** See Wiring Diagrams for Width.**



2 POLE CASE SIZE

Terminals on 0.2 Inch grid. The 1 and 3 pole units have the middle terminals on the center line.

SPECIFICATIONS RRN

Contact Material:	Rhodium
Ambient Temperature:	- 40˚C to + 85˚C
Dielectric Strength:	500 V rms Across open contacts 1500 V rms All other points
Insulation Resistance:	1000 Megohms Min.
Capacitance:	0.4 pF typical coil to contacts
Shock Resistance:	50 G's
Vibration Resistance:	RR - 10 G's to 450 Hz
Operate Time:	6 Milliseconds max. depending on 6 Milliseconds worst case.
Release Time:	10 Million operations at rated load
Life:	200 Million operations no load all 1-4PST-NO & SPST-NC 50 Million Operations at no load for all SPDT, DPDT Contacts.

COIL DATA

Coil Resistance & Nominal Voltage Measured at ± 10% @ 25˚C

NOM. VDC	1 POLE OHMS	2 POLE OHMS	3 POLE OHMS	4 POLE OHMS
6	150	100	50	40
12	600	400	200	150
24	2400	1600	800	600
48	4000	4000	3000	2300

Must operate at 80% of nominal voltage @ 25˚C

CONTACT DATA

Contacts	Max. VDC	Max. Amps	VA
1-4PST-NO	250	1.0	15
1-2PST-NC	250	1.0	15
SPDT, DPDT	250	0.5	10

NOTE: Voltage, Current, and Power ratings in the table above are independent maximums and no single value is to be exceeded. Ratings are based on noninductive, straight resistive, AC or DC loads without inrush. Other loads require contact protection or de-rating.

Magnecraft & Struthers-Dunn

ORDERING CODE

Typical Type No. **RRN** **3A** **EV** **-12D**

Series
RRN- Semi open, 3 sided shield

Contact Arrangements
1A - SPST-NO
2A - DPST-NO
3A - 3PST-NO
4A - 4PST-NO
1B - SPST-NC
2B -DPST-NC
1C - SPDT
2C - DPDT

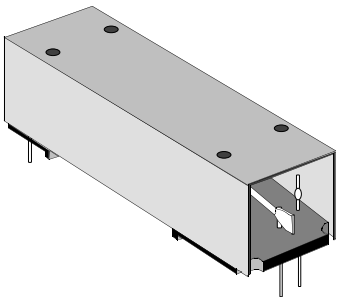
Options
Electrostatic Shield (Consult Factory For Wiring **Code E**
Diode Across Coil (Observe Polarity, Consult Factory) **Code V**

Coil Voltage (DC only)
DC: 6, 12, 24, 48 (Add **"D"**)
(5 volt and other voltages available)

SPECIAL OPTIONS

Special Wiring .
Magnetic Latch Version . **Consult Factory**

OPEN STYLE, METAL COVER/SHIELD REED RELAY

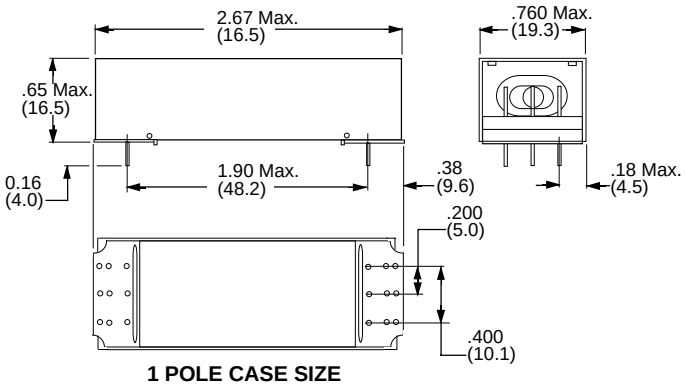


102MPCX/RMPCX

SPST-N.O.
METAL SHIELD ON THREE SIDES.
0.2 GRID SPACING.

OUTLINE DIMENSIONS

Dimensions shown are in Inch and (Millimeter)

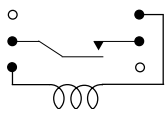
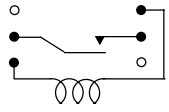


1 POLE CASE SIZE

GENERAL SPECIFICATIONS 102

RELAY CLASS	102	102R
Contact Resistance Initial:	200	200
Dielectric Withstanding voltage: Across Open Contacts:	700 VDC	450 VDC
Between all other mutually Insulated points.:	1000 VDC	
Operate Time (mS):	1.0	2.0
Bounce Time No Diode (mS):	2	2

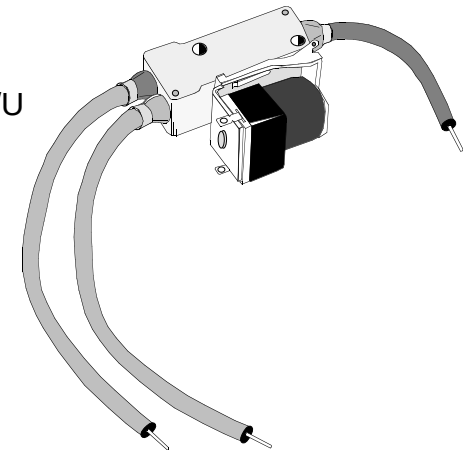
RELAY CLASS	102	102R
Capacitance, Non Shield, N.O.:	1.0 pf	1.5 pf
Insulation Resistance:	10^9 at 100 VDC	
Coil Dissipation (mW)	50 to 1.5W	600
Mounting Position:	Any	
Shock (Non operation):	30 G's 11mS ± 1 mS 1/2 Sign	
Vibration:	10 G"s 10 to 1000 Hz	
Temperature Range (operating):	-40˚C to + 85˚C	
Life At rated load:	200 Million	20 Million @1A, 115V rms

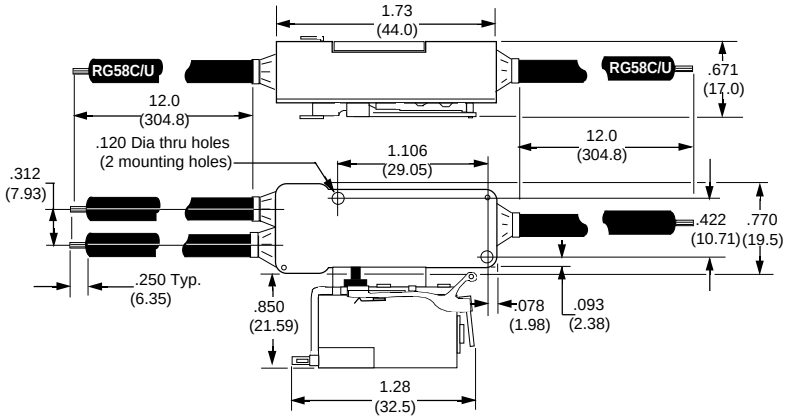
CIRCUIT DIAGRAM (TOP VIEW)	PART NUMBERS	COIL MEASURED AT 25˚C					MAX. CONTACT RATING		
		NOMINAL INPUT VOLTAGE	MAXIMUM PULL-IN	MINIMUM DROPOUT	NOMINAL RESIS-TANCE (OHMS)	NOMINAL POWER (mW)	SWITCHING LOAD	SWITCHING CURRENT & VOLTAGE	CARRY CURRENT
SPST-N.O. 1 AMP									
	**W102MPCX-7**	12	9.0	1.0	250 Ω	580 mW	**15VA**	**1 AMP 250VDC**	**2 AMPS**
	W102MPCX-8	24	18.0	2.0	1000 Ω				
SPST-N.O. 3 AMP									
	**W102RMPCX-2**	12	9.0	1.0	250 Ω	580 mW	**100VA**	**3 AMP 250VDC**	**3.5 AMPS**
	W102RMPCX-3	24	18.0	2.0	1000 Ω				

PART NUMBERS SHOWN AVAILABLE THRU STOCKING DISTRIBUTION

120 COAXIAL RELAY

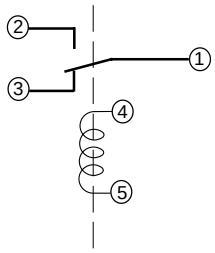
PANEL MOUNT WITH RG58C/U
CABLE (50 OHM)
SWITCHING UP TO 470 MHz





WIRING DIAGRAM

Side View Coil Down



GENERAL SPECIFICATIONS CLASS 120

CONTACTS

R.F. Load rating:	150 Watts max. up to 470 MHz
Contact Configuration:	SPDT (1 Form "C")
Contact Resistance (Initial):	50 Milliohms max.
VSWR (Voltage Standing Wave Ratio)	1.25 to 1 max., up to 460 MHz
Cross Talk:	40 DB min., up to 470 MHz.

TIMING

Operate Time:	15 mS Max. @ Nominal Voltage.
Release Time:	7 mS Max. @ Nominal Voltage.

DIELECTRIC STRENGTH

All Mutually Insulated current carrying parts to ground:	1000 V rms @ Sea level
Insulation Resistance:	1000 Megohms min. 500 V

TEMPERATURE

Rated Operation:	-55˚C to +65˚C

LIFE EXPECTANCY

Mechanical:	100,000 Operations @ Rated Load.
Electrical:	5 Million Operations no load

MISCELLANEOUS

Mounting:	Panel mount with 2 mount holes.
Connectors:	None
Cable Type:	RG58C/U, 12" long, with stripped wire length of .250"
Cable Impedance:	50 Ohms
Weight:	3 ozs. 85.0 grams approx.

PART NUMBER	CONTACT CONFIGURATION	COIL Measured @ 25˚C	
		NOMINAL INPUT VOLTAGE	NOMINAL RESISTANCE (OHMS)
DC OPERATED			
W120X-14	SPDT	12 VDC	100

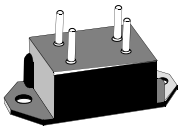
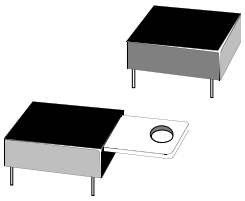
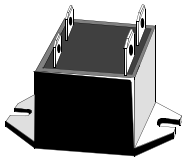
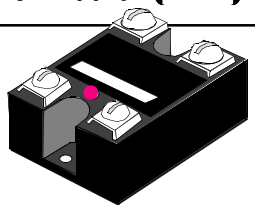
PART NUMBERS SHOWN AVAILABLE THRU STOCKING DISTRIBUTION

SOLID STATE RELAYS

(SSR)

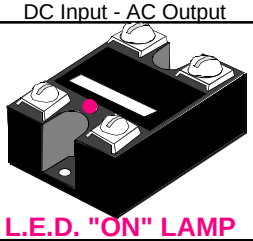
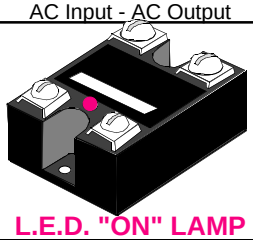
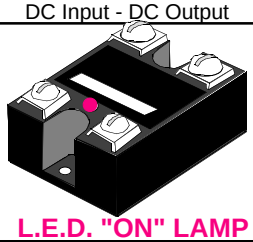
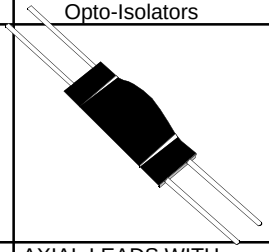
1.5 TO 75 AMPERES

SOLID STATE RELAYS

RELAY SERIES	226	230E & 230T	231	CLASS 6 (DTX)
NEW! L.E.D. L.E.D INDICATES RELAY IS IN THE OPERATE MODE.				 L.E.D. "ON" LAMP
FEATURES	5 OR 12 VDC INPUT AC, TRIAC OUTPUT UP TO 7 AMP LOADS PHOTO ISOLATED, RANDOM TURN-ON COMPATABLE WITH TTL GATES. MOUNTS ON TO-3 TRANSISTOR HEAT SINKS FOR ADDED CURRENT RATING.	P.C. MOUNT STYLE. 5 OR 12 VDC INPUT AC OUTPUT TYPE 230E HAS 1.5 AMP LOAD RATING TYPE 230T HAS 3.0 AMP LOAD RATING ZERO VOLTAGE SWITCHING. TYPE 230T HAS BUILT IN HEAT SINK.	Q.C. TERMINAL, FLANGE MOUNT STYLE. 5 OR 12 VDC INPUT AC OUTPUT UP TO 4 AMP LOADS. ZERO VOLTAGE SWITCHING. FLANGE ALSO SERVES AS THE HEAT SINK.	DC CONTROLLED INPUT, AC TRIAC OUTPUT UP TO 10 AMP LOADS PHOTO ISOLATED, ZERO VOLTAGE SWITCHING. 4000 Vrms ISOLATION INPUT TO OUTPUT. INTERNAL RC (SNUBBER) NETWORK
OUTPUT DATA OUTPUT CONFIGURATION:	SPST-NO	SPST-NO / SPST-NO	SPST-NO	SPST-NO
MAXIMUN ALLOWABLE OUTPUT VOLTAGE & LOAD:	7 AMPS @ 260 OR 380 VAC	1.5 AMPS @ 140 OR 280VAC (230E) / 3.0AMPS @ 140 OR 280 VAC (230T)	4 AMPS @ 140 OR 280 VAC	10 AMPS @ 140 OR 280 VAC
OUTPUT DEVICE:	TRIAC	SCR	SCR	TRIAC
MINIMUM LOAD:	50 MILLIAMPS	25 MILLIAMPS	25MILLIAMPS	50 MILLIAMPS
INSULATION CHARACTERISTICS DIELECTRIC STRENGTH	2500 V rms	2500 V rms	2500 V rms	4000 V rms
INPUT DATA AC - VOLTAGE: DC - VOLTAGE: MAXIMUM PULL-IN VOLTAGE: MINIMUM DROP-OUT VOLTAGE: INPUT IMPEDANCE:	NOT AVAILABLE 5 & 12 DC 4.3 & 10.3 VDC) 1.5 VDC 15 MILLIAMPS MAX	NOT AVAILABLE 5 & 12 VDCVDC 4.0 & 9.3 VDC 2.0 VDC 15 MILLIAMPS MAX.	NOT AVAILABLE 5 & 12 VDCVDC 4.0 & 9.3 VDC 2.0 VDC 16 MILLIAMPS MAX.	NOT AVAILABLE 3 TO 32 VDC 3 VDC 1 VDC 1500 Ω
GENERAL DATA AMBIENT TEMPERATURE OPERATIONAL: STORAGE:	- 40˚ C to + 65˚ C - 30˚ C to + 100˚ C	- 30˚ C to + 80˚ C - 40˚ C to + 100˚ C	- 30˚ C to + 80˚ C - 40˚ C to + 100˚ C	- 30˚ C to + 80˚ C - 40˚ C to + 120˚ C
RESPONSE TIME OPERATE MAX.: RELEASE MAX:	16 mS TURN ON 60 mS TURN OFF	1/2 CYCLE	1/2 CYCLE	1/2 CYCLE
INSULATION RESISTANCE:	10^{10} Ω	10^{10} Ω	10^{10} Ω	10^{10} Ω
MOUNTING:	TO-3	P.C.	TO-3	PANEL
DIMENSIONS	H W L .780 X .670 X .990	H W L 0.25 X 0.5 X .875	H W L .700 X .860 X .860	H W L .78 X 1.75 X 2.25
APPROVALS				
SPECIFICATIONS PAGE:	**PAGE 94, 95**	**PAGE 96**	**PAGE 101**	**PAGE 102, 103**
PAGE NUMBER	**PAGE 97,98**	**PAGE 99, 100**		**PAGE104**

Magnecraft & Struthers-Dunn

SOLID STATE RELAYS & OPTO ISOLATORS

RELAY SERIES	6 (DSX) DC Input - AC Output	6 (ASX) AC Input - AC Output	6 (DDX) DC Input - DC Output	301T Opto-Isolators
NEW! L.E.D. L.E.D. INDICATES RELAY IS IN THE OPERATE MODE.	 L.E.D. "ON" LAMP	 L.E.D. "ON" LAMP	 L.E.D. "ON" LAMP	
FEATURES OPTIONAL SAFETY COVER FOR CLASS 6 AVAILABLE SEE PAGE 88	DC CONTROLLED INPUT, AC BACK TO BACK SCR OUTPUT 2.5 TO 75 AMP LOADS PHOTO ISOLATED, ZERO VOLTAGE SWITCHING. 4000 Vrms ISOLATION INPUT TO OUTPUT. INTERNAL RC (SNUBBER) NETWORK RFI SUPPRESSION.	AC CONTROLLED INPUT, AC BACK TO BACK SCR OUTPUT 2.5 TO 75 AMP LOADS PHOTO ISOLATED, ZERO VOLTAGE SWITCHING. 4000 Vrms ISOLATION INPUTTO OUTPUT. INTERNAL RC (SNUBBER) NETWORK RFI SUPPRESSION.	DC CONTROLLED INPUT, DC OUTPUT 12, 25 & 40 AMP LOADS TRANSFORMER ISOLATED, 2500 Vrms ISOLATION INPUT TO OUTPUT. RFI SUPPRESSION.	AXIAL LEADS WITH SHRINK TUBE CASE AC & DC INPUTS AND OUTPUTS HIGH INPUT & OUTPUT ISOLATION TURN ON 10KΩ TURN OFF 100KΩ. IDEAL FOR TRIGGERING SCR'S & TRIACS OR LOW VOLTAGE ON-OFF SWITCH.
OUTPUT DATA OUTPUT CONFIGURATION:	SPST-NO	SPST-NO	SPST-NO	SPST-NO
MAXIMUN ALLOWABLE OUTPUT VOLTAGE & LOAD:	2.5 TO 75 AMPS @ 140 OR 280 VAC	2.5 TO 75 AMPS @ 140 OR 280 VAC	12, 25 & 40 AMPS @ 0 TO 200 VDC	0.2 WATTS 250VAC/VDC
OUTPUT DEVICE:	SCR	SCR	TRANSISTOR	-
MINIMUM LOAD:	50 MILLIAMPS	50 MILLIAMPS	20 MILLIAMPS	-
INSULATION CHARACTERISTICS DIELECTRIC STRENGTH	4000 V rms	4000 V rms	2500 V rms	1000 V rms
INPUT DATA AC - VOLTAGE:	NOT AVAILABLE	90 TO 280 VAC	NOT AVAILABLE	120 VAC
DC - VOLTAGE:	3 TO 32 VDC	80 TO 140 VDC	3.5 TO 32 VDC	2.0 TO 120 VDC
MAXIMUM PULL-IN VOLTAGE:	3 VDC	90 VAC/80VDC	3.5 VDC	TO 10K Ω
MINIMUM DROP-OUT VOLTAGE:	1 VDC	10 VAC/10VDC	1 VDC	100k Ω
INPUT IMPEDANCE:	1500 Ω	60K Ω	1000 Ω	-
GENERAL DATA AMBIENT TEMPERATURE OPERATIONAL:	- 30˚ C to + 80˚ C	- 30˚ C to + 80˚ C	- 0˚ C to + 80˚ C	- 40˚ C to + 60˚ C
STORAGE:	- 40˚ C to + 120˚ C	- 40˚ C to + 120˚ C	- 40˚ C to + 120˚ C	
RESPONSE TIME OPERATE MAX.:	1/2 CYCLE	10 mS	100 uSec	-
RELEASE MAX:		40 mS	1.0 mSec	
INSULATION RESISTANCE:	10^{10} Ω	10^{10} Ω	10^{10} Ω	10^{9} Ω
MOUNTING:	PANEL	PANEL	PANEL	AXIAL LEADS/SOLDER
DIMENSIONS	H W L	H W L	H W L	H W L
	0.78 X 1.75 X 2.25	0.78 X 1.75 X 2.25	0.78 X 1.75 X 2.25	0.45 X .438 X 1.4
APPROVALS	c UL us	c UL us	c UL us	UL
PAGE NUMBER	**PAGE 105**	**PAGE 106**	**PAGE 107**	**PAGE 108**

WEBSITE: www.magnecraft.com EMAIL:info@magnecraft.com FAX ON DEMAND 1-800/891-2957, DOCUMENT 100

INTRODUCTION:

SOLID STATE RELAY (SSR) is a relay with isolated input and output, whose functions are achieved by means of electronic components without the use of moving parts as found in Electromechanical relays.

PRINCIPLE OF OPERATION:

Solid State Relays are similar to Electromechanical relays, in that both use a control circuit and a separate circuit for switching the load. When voltage is applied to the input of the SSR, the relay is energized by a light emitting diode. The light from the diode is beamed into a light sensitive semiconductor which, in the case of zero voltage crossover relays, conditions the control circuit to turn on the output solid state switch at the next zero voltage crossover. In the case of nonzero voltage crossover relays, the output solid state switch is turned on at the precise voltage occurring at the time. Removal of the input power disables the control circuit and the solid state switch is turned off when the load current passes through the zero point of its cycle.

APPLICATIONS:

Solid State Relays are specially suitable in many applications.
Listed below are some typical applications.

Microprocessor-based Controls.
Computers and Computer Peripherals.
Process control Systems using PLCs
Temperature Control Systems.
Business Machines
Medical Equipment
Uninterrupted Power Supplies (UPS).
Communication
Traffic Signals, etc.

APPLICATION AND SELECTION CRITERIA FOR SOLID STATE RELAYS:

The Chart below indicates the areas in which SSR's (Solid State Relays) or EMR (Electromechanical Relays) has better capabilities. **(X)** Indicates the Better choice.

	SSR	EMR
Long Life	X	
Temperature Cycling		X
Shock and Vibration Resistant	X	
Immunity to False Operation due to Transients		X
Generation of RFI, EMI	X	
Multipole		X
Multithrow (SPDT)		X
Size (includes Heat Sink) for Equivalent Load Handling		X
Contact Bounce	X	
Arcless Switching	X	
Acoustic Noise	X	
Zero Voltage Switching	X	
Ease Of Diagnosing Malfunction		X
IC Compatibility	X	
Immunity to Humidity, Salt Spray & Dirt	X	

LOAD CONSIDERATIONS

A major portion of application problems with SSR's result from operating conditions which specific loads impose upon an SSR. The following types of loads point out the potential problems that can occur with SSR's.

LOAD CONSIDERATIONS (cont.)

DC LOADS: All loads should be considered inductive and a Diode should be placed across the load to absorb any inductive surge on turnoff.

RESISTIVE LOADS: Loads of constant value resistance are probably the simplest application of SSR's. Proper attention to the steady state current ratings and applied blocking voltage specifications normally will result in trouble-free operation.

LAMP LOADS: Incandescent lamp loads, though basically resistive, present some special problems. Because the resistance of a cold tungsten filament is about five to ten percent of the heated value, a large inrush current can occur. The period of the inrush current can range from one half cycle to several cycles., depending on the thermal time constant of the filament. It is essential to verify that this inrush current is within the surge specifications of the SSR. Also check that the lamp rating of the SSR is not exceeded. This is a UL rating based on the inrush of a typical lamp. Because of the unusually low filament resistance at the time of turn-on, a zero voltage turn-on characteristic is particularly desirable with tungsten lamps.. It has been demonstrated that a zero voltage turn-on can extend the life of tungsten lamps by limiting inrush current.

CAPACITIVE LOADS: Caution must be used with low impedance capacitive loads to verify that the di/dt capabilities are not exceeded. The di/dt of a discharged capacitive load with out external limiting impedance can approach infinity. Zero voltage turn-on is a particularly valuable means of limiting di/dt with capacitive loads.

MOTORS: Specifically, motors frequently have severe inrush currents during starting and can impose unusual voltages during turnoff. The inrush currents connected to mechanical loads having high starting torque or inertia should be carefully determined to verify that they are within the surge capabilities of the SSR. A current shunt and Oscilloscope should be used to examine the duration of the inrush current. Motor starting may frequently reoccur at short intervals and the affect of repetitive inrush currents on the thermal operating point of an SSR must be considered. Check the motor operating current and locked rotor current versus the SSR motor rating. The possibility of abnormally stalled rotor conditions which draw much higher than normal currents should be considered. An extended stalled rotor condition may require an oversized SSR or fuse protection. The generated EMF of certain motors can require an SSR to have a blocking voltage greater than might be expected from steady state line voltage. The voltage applied to an SSR by a motor circuit during turnoff should be examined with an oscilloscope to verify hat the applied voltages are safely below the specified SSR blocking voltages. Otherwise lock-on or erratic turnoff of the motor may occur. Some motor circuits may require higher than normal blocking voltage, transient limiting devices, or other techniques to control the voltage which must be blocked by an SSR during deceleration or direction reversal.

APPLICATION DATA

TRANSFORMERS

In controlling transformers, the characteristics of the secondary load should be considered because it reflects the effective load on the SSR. Voltage transients from secondary load circuits, similarly, are frequently transformed and can be imposed on the SSR. Transformers present a special problem in that, depending on the state of the transformer flux at the time of turnoff, the transformer may saturate during the first half-cycle of subsequent applied voltage. This saturation can impose a very large current (Commonly ten to one hundred times rated primary current) on the SSR and exceed its half-cycle surge rating.

SSR's having random turn-on may have a better chance of survival than a zero voltage turn-on device for they commonly require the transformer to support only a portion of the first half-cycle of the voltage. On the other hand, a random turn-on device will frequently close at the essentially zero voltage point (start of the half-cycle) and then the SSR must sustain the worst-case saturation current. A zero voltage turn-on device has the advantage that it turns on in a known, predictable mode and will normally immediately demonstrate (dependent on turnoff flux polarity) the worst-case condition. The use of an oscilloscope is recommended to verify that the half-cycle surge capability of the SSR is not exceeded. The severity of the transformer saturation problem varies greatly, dependent on the magnetic material of the transformer, saturated primary impedance, line impedance, etc.

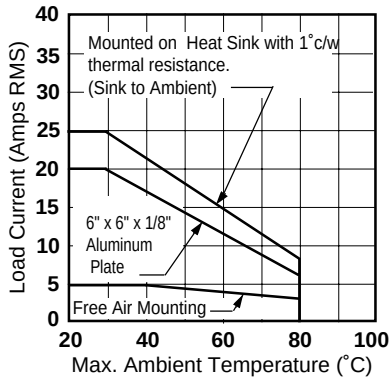
A safe rule of thumb in applying an SSR to a transformer primary is to select an SSR having a half-cycle current surge rating (RMS) greater than the maximum applied line voltage (RMS) divided by the transformer primary resistance. The primary resistance is usually easily measured and can be relied on as a minimum impedance limiting the first half-cycle of inrush current. The presence of some residual flux plus the saturated reactance of the primary will then further limit, in the worst case, the half-cycle surge safely within the surge rating of the SSR.

SELECTING THE PROPER SSR

NOMINAL LOAD CURRENT: Initially select a relay whose current rating exceeds the normal load current. Using the load current vs. temperature chart for that relay, check the actual current capacity at the ambient temperature to which the relay will be subjected.

As an example, the chart below shows that a 25 ampere relay provided with a suitable heat sink can safely carry a maximum of 17 amperes continuously at 40˚C ambient. Since heat degrades the output semiconductor every effort should be made to keep the operating temperature of the SSR as low as possible

25 Amp Styles



PROTECTING THE OUTPUT SWITCH

An SSR is a four layer semiconductor having 3 terminals: Cathode, Anode and Gate. Normally it blocks current in both the forward and reverse directions. The SCR is triggered on in the forward direction by a small gate current. The SCR remains on until load current decreases to a value less than necessary to maintain the SCR in the on state. When switching AC, two SSR's are connected in inverse parallel.

A Triac also has 3 terminals, like the SCR, it normally blocks current in both directions; but may be triggered in either direction by a small gate current

Both SCR's and Triacs are members of the thyristor family. Therefore, we use this term to denote both devices. There are 4 ways to put a thyristor into a conducting mode. Only one method is desirable and the other three are the source of most application problems.

The 4 methods of Thyristor turn-on are -

A. Gate Turn-on: By injecting a controlled current into the gate (the desired method).

B. Forward Breakover Turn-on: A voltage in excess of the Breakover (or Peak Blocking) voltage across Thyristor.

C. DV/DT turn-on: A voltage which rises faster than the Thyristor can tolerate, and still remain in the off state.

D. Thermal Turn-on: Allowing the temperature of the thyristor to go beyond the value sufficient to cause excessive leakage current, causing turn-on and possible thermal runaway.

The last three methods can be protected against as follows. In those situations where high peak voltage transients occur, effective protection can be obtained by using metal oxide varistors (MOV). The MOV is a bidirectional voltage sensitive device that has low impedance when its design voltage threshold is exceeded.

HEAT SINKING

It is important to select the right size heat sink for your applications. SSR's will typically generate 1.2 watts per amp of load current. The maximum junction temperature of the output device is 115˚C. The total wattage is divided by the thermal resistance to get the temperature difference between the output device junction and the ambient temperature. For example a 25 Amp SSR with a 20 Amp load applied dissipates 24 watts when mounted on a aluminum plate 6" X 6" X 1/8" with thermal grease applied between the SSR base and aluminum plate. This combination produces a output junction temperature rise of 24 watts. 24W times (1˚ c/w relay + 1˚ c/w (heat sink) = a operating temperature of 48˚C.

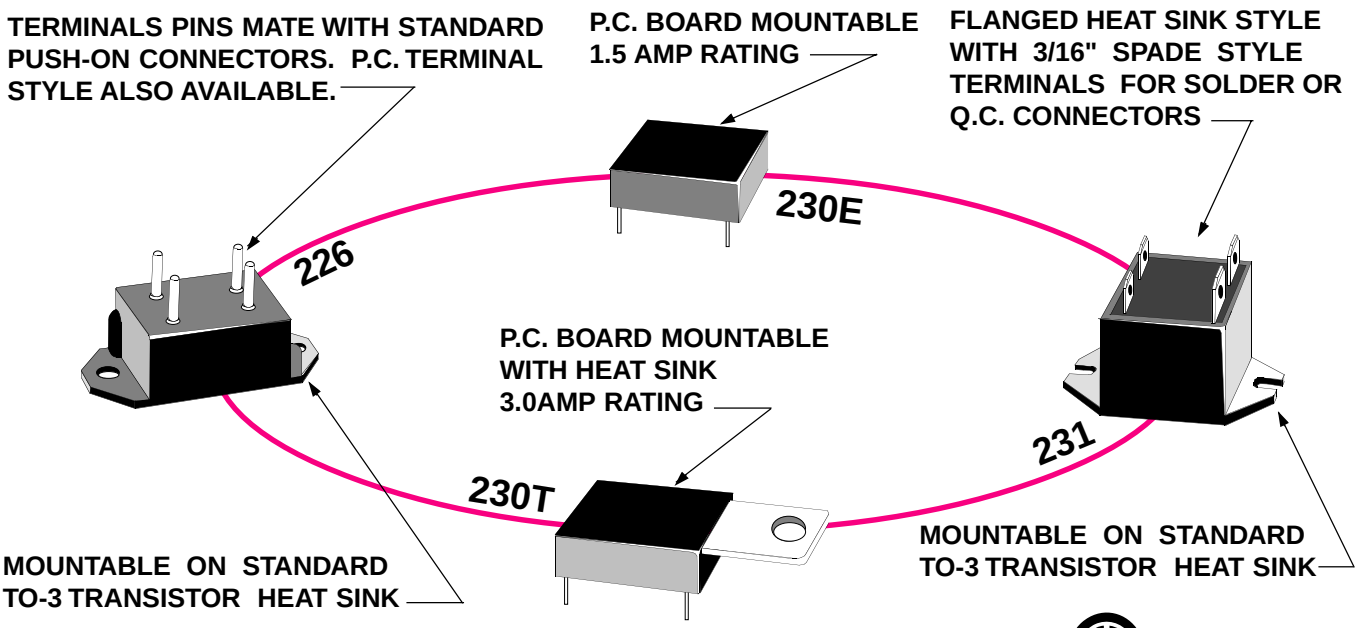
FUSING

THE SSR has a I^2T rating which is a measure of the amount of energy it can safely handle without damage. The I^2T rating of the fuse is a measure of the amount of energy the fuse will pass to the SSR. To protect the SSR, the I^2T of the Fuse should be less than that of the SSR. An SSR exposed to a surge greater than its non-repetitive rating will normally fail as a shorted unit.

EXPRESSIONS USED IN SPECIFICATIONS

$\frac{dv}{dt}$ equals the maximum permissable rate of change of voltage in volts/microseconds

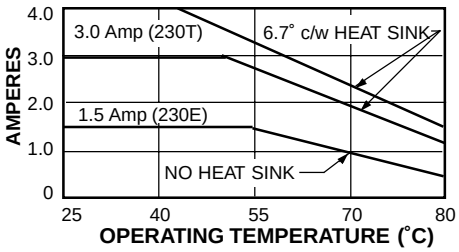
V =	Line Voltage
I =	Load Current
(PF)=	Load Power Factor
f =	Line Frequency
L =	Inductance in Henrys
C =	Capacitance in microfarads
R_1 & R_2 =	Resistance in Ohms



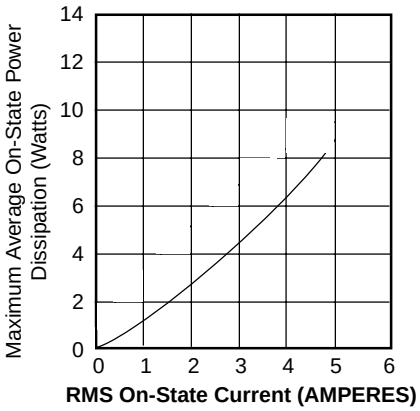
UL Recognized
File No. E52197

TYPICAL DERATING CURVES

CLASS 230E, 230T, 231D

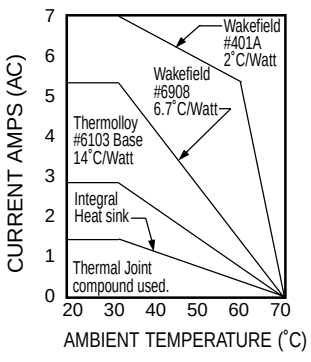


CLASS 230/231

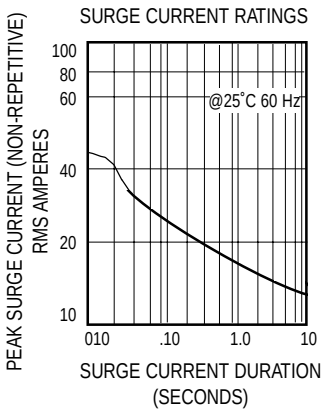


CLASS 226 CURRENT RATINGS

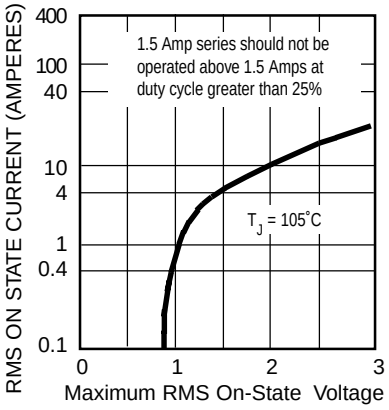
OUTPUT CURRENT RATINGS
VS
AMBIENT TEMPERATURE



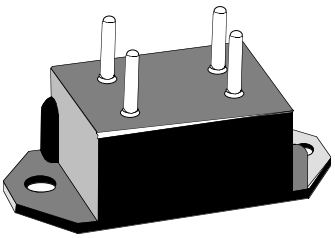
SURGE CURRENT RATINGS



CLASS 230/231



MINIATURE SOLID STATE RELAY



CLASS 226

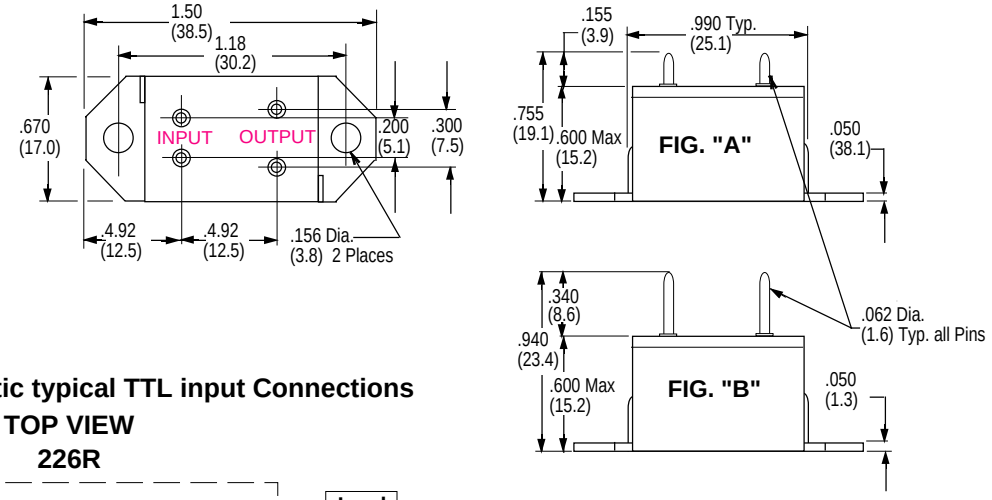
UP TO 7 AMPS
SPST—NO
DC INPUTS
AC OUTPUTS

RANDOM VOLTAGE TURN ON

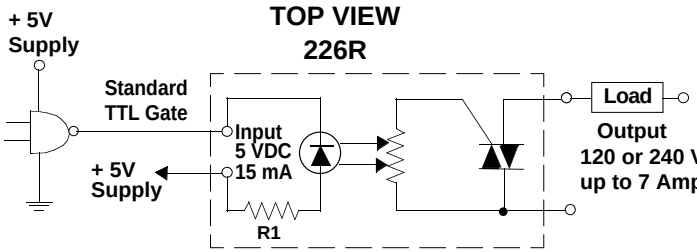
COMPATIBLE WITH TTL GATES. PRINTED CIRCUIT AND PUSH-ON TERMINAL PIN VERSIONS.

UL Recognized
File No. E52197

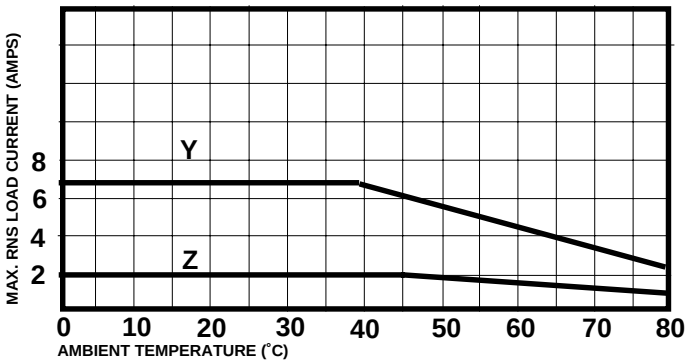
Dimensions shown in Inch and (Millimeters).



Series 226 Schematic typical TTL input Connections



THERMAL DERATING CURVE



Y= WITHOUT EXTERNAL HEAT SINK.
Z= WITH HEAT SINK HAVING θSA= 3.2˚C/W.

INPUT CHARACTERISTICS	5 or 12 VDC
Input Impedance	5V= 240 Ohms / 12V=820 Ohms Typ.
Response Time	Turn-on 10 mS max., Turn-off 60 mS max.
Maximum Rate of Rise of Off State Voltage dv/dt	100V/uSec blocking 4V/uSec commutating
OUTPUT CHARACTERISTICS	**120 VAC or 240 VAC**
Rated Load Current (Amps rms)	7 Amperes
Input Current (Typ.) 5VDC	10 Ma
Maximum off State Leakage current I_D (RMS)	0.1 mA @ 25˚C
Non-Repetitive Surge Current one Cycle (Amps peak)	100 Amperes
Maximum rms Overload current for 1 second	18 Amperes
Max I^2T For Fusing (t= 8-3ms) A^2 sec	24 Amperes
Thermal Resistance Junction To Case (T_1, Max.= 115^{0}C) ^{0}c/w	3.4˚c/w

SPECIFICATIONS CLASS 226

INPUT CHARACTERISTICS

Reverse Polarity Protected:	NO
Input Filtered for transients less than one millisecond.:	NO

OUTPUT CHARACTERISTICS

Rated Load Current: I_T (RMS):	7 Amps
Line Voltage Range (VAC):	W226R & RE-7 Models: 120 VAC, W226R & RE-8 Models: 240 VAC
Maximum output voltage (VAC):	W226R & RE-7 Models: 260 VAC, W226R & RE-8 Models: 380 VAC
Non-Repetitive Peak Voltage V_{DSM} (Blocking Voltage):	W226R & RE-7 Models: 400 VAC, W226R & RE-8 Models: 700 VAC
Minimum Load Current $I_{T\ MIN}$ (RMS) to maintain "On":	50 mA
Maximum Off State Leakage current I_D (RMS):	0.1 mA @ 25˚C, 1.0 mA @ 65˚C
Maximum RMS On-State Voltage V_T (RMS) Maximum Voltage drop across relay output @ rated current:	W226R & RE-7 Models: 1.8V, W226R & RE-8 Models: 3.6 V
Minimum off-state dv/dt:	100V/uSec blocking 4V/uSec commutating

MISCELLANEOUS

Contact configuration:	SPST-NO
Dielectric Strength V_{ISO} (Input-Output Isolation):	2500 VAC
Insulation Resistance R_{ISO} @ 500VDC:	$10^{10}\ \Omega$
Operating temperature Range:	-30°C to +80°C
Storage temperature Range:	-40°C to +100°C
Life:	Greater than 100 million operations
Mounting:	TO-3
Weight:	0.45 oz. (13 g)

PUSH-0N TERMINAL RECEPTACLES

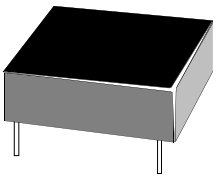
	MOLEX	WINCHESTER
FOR 18-22 AWG	02-06-1103	156-10185
FOR 24-30	02-06-1132	156-10245

Magnecraft

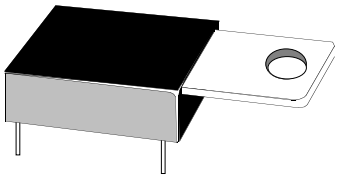
PART NUMBERS	FIGURE	INPUT (Over Operating Temperature Range)			0UTPUT (Over Operating Temperature Range)		
		INPUT VOLTAGE	MAX. PULL-IN VOLTAGE	MIN. DROPOUT VOLTAGE	NOMINAL VOLTAGE	MAX. VOLTAGE	OUTPUT CURRENT
PUSH ON TERMINALS							
W226R-7-5A1	**A**	5 VDC	4.3 VDC	1.4 VDC	120 VAC	260 VAC	7 AMPS
W226R-7-12A1	**A**	12 VDC	10.3 VDC	2.5 VDC	120 VAC	260 VAC	7 AMPS
W226R-8-5A1	**A**	5 VDC	4.3 VDC	1.4 VDC	240 VAC	380 VAC	7 AMPS
W226R-8-12A1	**A**	12 VDC	10.3 VDC	2.5 VDC	240 VAC	380 VAC	7 AMPS
PRINTED CIRCUIT TERMINALS							
W226RE-7-5A1	**B**	5 VDC	4.3 VDC	1.4 VDC	120 VAC	260 VAC	7AMPS
W226RE-7-12A1	**B**	12 VDC	10.3 VDC	2.5 VDC	120 VAC	260 VAC	7AMPS
W226RE-8-5A1	**B**	5 VDC	4.3 VDC	1.4 VDC	240 VAC	380 VAC	7 AMPS
W226RE-8-12A1	**B**	12 VDC	10.3 VDC	2.5 VDC	240 VAC	380 VAC	7AMPS

All current ratings are based on use of suitable thermally conductive compound (e.g. silicone grease between the SSR mounting base and mounting surface of suitable heat sink).

Part Numbers shown also available thru Stocking Distribution.



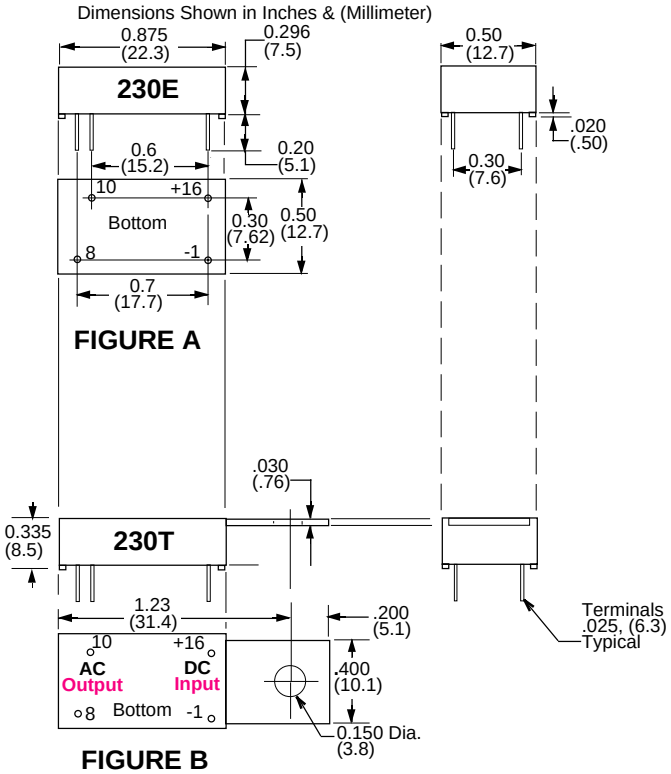
CLASS 230 E
1.5 AMP RATED



CLASS 230T
4.0 AMP RATED

CLASS 230

1.5 & 3 AMP SWITCHING
SPST—NO
DC INPUTS, AC OUTPUTS
ZERO VOLTAGE SWITCHING.



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UL Recognized
File No. E52197

PIN 16 = + DC INPUT
PIN 1 = DC INPUT
PIN 8 = AC LOAD OUTPUT
PIN 10 = AC LOAD OUTPUT

INPUT CHARACTERISTICS	5 or 12 VDC
Input Impedance (Current @ Nominal Voltage)	13mA typical / 16 mA max.
Response Time	1/2 Cycle
Maximum Rate of Rise of Off State Voltage dv/dt	200V/uSec blocking 4V/uSec commutating
OUTPUT CHARACTERISTICS	**120 VAC or 240 VAC**
Rated Load Current (Amps rms)	230E 1.5 Amps, 230T 3.0 Amps
Maxium off State Leakage current I_D (RMS)	1 mA max.
Non-Repetitive Surge Current one Cycle (Amps peak)	20 Amperes
Maximum rms Overload current for 1 second	5 Amperes
Max I^2T For Fusing (t= 8-3ms) A^2 sec	4.5 Amperes
Thermal Resistance Junction To Case (T_J, Max.= 115^{0}C) ^{0}c/w	230T 8˚c/w

SPECIFICATIONS CLASS 230

INPUT CHARACTERISTICS

Reverse Polarity Protected:	NO
Input Filtered for transients less than one millisecond.:	NO

OUTPUT CHARACTERISTICS

Rated Load Current: I_T (RMS):	W230E Models: 1.5 Amps, W230T Models: 3 Amps
Line Voltage Range (VAC):	120 VAC or 240 VAC
Maximum output voltage (VAC):	140 VAC or 280 VAC
Non-Repetitive Peak Voltage V_{DSM} (Blocking Voltage):	120V Models: 400 VAC, 240V Models: 500 VAC
Minimum Load Current $I_{T\ MIN}$ (RMS) to maintain "On":	20 mA @ 25˚C
Maximum Off State Leakage current I_D (RMS):	1.0 mA max.
Maximum RMS On-State Voltage V_T (RMS) @ rated current:	1.7 V
Maximum rate of rise off-state voltage dv/dt:	200V/uSec

MISCELLANEOUS

Contact configuration:	SPST-NO
Dielectric Strength V_{ISO} (Input-Output Isolation):	2500 VAC
Insulation Resistance R_{ISO} @ 500VDC:	$10^{10}\ \Omega$
Operating temperature Range:	-30°C to +80°C
Storage temperature Range:	-40°C to +100°C
Life:	Greater than 100 million operations
Mounting	P.C.
Weight:	0.37 oz. (10.6 g)

PUSH-0N TERMINAL RECEPTACLES

	MOLEX	WINCHESTER
FOR 18-22 AWG	02-06-1103	156-10185
FOR 24-30	02-06-1132	156-10245

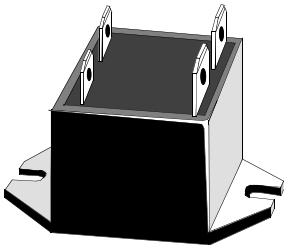
Magnecraft

PART NUMBERS	FIGURE	INPUT (Over Operating Temperature Range)			0UTPUT (Over Operating Temperature Range)			CROSS REFERENCE
		INPUT VOLTAGE	MAX. PULL-IN VOLTAGE	MIN. DROPOUT VOLTAGE	NOMINAL VOLTAGE	MAX. VOLTAGE	OUTPUT CURRENT	CP CLARE/ THETA-J
PRINTED CIRCUIT TERMINALS								
W230E-1-5	**A**	5 VDC	4.0 VDC	2.0 VDC	120 VAC	140 VAC	1.5 AMPS	**0FA1202**
W230E-2-5	**A**	5 VDC	4.0 VDC	2.0 VDC	240 VAC	280 VAC	1.5 AMPS	**0FA2402**
W230E-1-12	**A**	12 VDC	9.3 VDC	2.0 VDC	120 VAC	140 VAC	1.5 AMPS	**0FB1202**
W230E-2-12	**A**	12 VDC	9.3 VDC	2.0 VDC	240 VAC	280 VAC	1.5 AMPS	**0FB2402**
PRINTED CIRCUIT TERMINALS WITH HEAT SINK								
W230T-3-5	**B**	5 VDC	4.0 VDC	2.0 VDC	120 VAC	140 VAC	3 AMPS	**0FA1205D**
W230T-4-5	**B**	5 VDC	4.0 VDC	2.0 VDC	240 VAC	280 VAC	3 AMPS	**0FA2405D**
W230T-3-12	**B**	12 VDC	9.3 VDC	2.0 VDC	120 VAC	140 VAC	3 AMPS	**0FB1205D**
W230T-4-12	**B**	12 VDC	9.3 VDC	2.0 VDC	240 VAC	280VAC	3 AMPS	**0FB2405D**

All current ratings are based on use of suitable thermally conductive compound (e.g. silicone grease between the SSR mounting base and mounting surface of suitable heat sink).

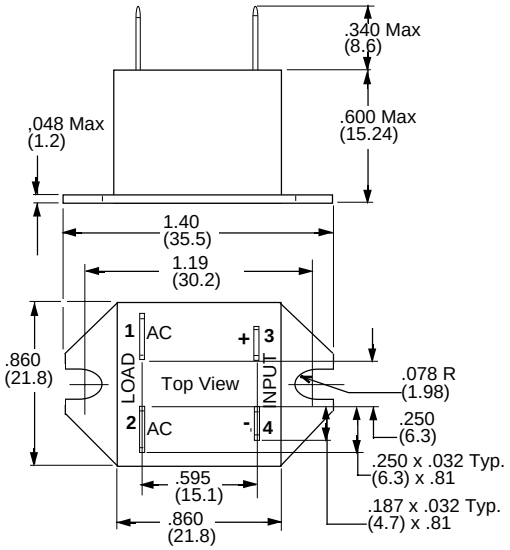
Part Numbers shown also available thru Stocking Distribution.

MINIATURE SOLID STATE RELAY



CLASS 231

4 AMPS
SPST—NO
DC INPUTS,
AC OUTPUTS
ZERO VOLTAGE
SWITCHING.



Dimensions Shown in Inches & (Millimeters)

UL Recognized
File No. E52197

INPUT CHARACTERISTICS	5 or 12 VDC
Input Impedance (Current @ Nominal Voltage)	13mA typical / 16 mA max.
Response Time	1/2 Cycle
Maximum Rate of Rise of Off State Voltage dv/dt	200V/uSec blocking 10V/uSec commutating
OUTPUT CHARACTERISTICS	**120 VAC or 240 VAC**
Rated Load Current (Amps rms)	4 Amperes
Maximum off State Leakage current I_D (RMS)	1 mA @ 25˚C
Non-Repetitive Surge Current one Cycle (Amps peak)	20 Amperes
Maximum rms Overload current for 1 second	5 Amperes
Max I^2T For Fusing (t= 8-3ms) A^2 sec	4.5 Amperes
Thermal Resistance Junction To Case (T_J, Max.= 115^{0}C) ^{0}c/w	6˚c/w

THE W231 SSR HAS THE SAME ELECTRICAL SPECIFICATIONS AS LISTED FOR THE W230 SSR's. THE EXCEPTION IS THE CLASS W231 IS RATED AT 4.0 AMPS.

Magnecraft

QUICK DISCONNECT TERMINALS
WITH .060 DIA. HOLES
TERMINALS 1 & 2, .250 X .032 BRASS
TERMINALS 3 & 4, .187 X .032 BRASS

PART NUMBERS	INPUT (Over Operating Temperature Range)			OUTPUT (Over Operating Temperature Range)			CROSS REFERENCE
	INPUT VOLTAGE	MAX. PULL-IN VOLTAGE	MIN. DROPOUT VOLTAGE	NOMINAL VOLTAGE	MAX. VOLTAGE	OUTPUT CURRENT	CP CLARE/ THETA-J
FLANGE MOUNT							
W231D-3-5	5 VDC	4.0 VDC	2.0 VDC	120 VAC	140 VAC	4 AMPS	**0FA1205**
W231D-4-5	5 VDC	4.0 VDC	2.0 VDC	240 VAC	280 VAC	4 AMPS	**0FA2405**
W231D-3-12	12 VDC	9.3 VDC	2.0 VDC	120 VAC	140 VAC	4 AMPS	**0FB1205**
W231D-4-12	12 VDC	9.3 VDC	2.0 VDC	240 VAC	280 VAC	4 AMPS	**0FB2405**

All current ratings are based on use of suitable thermally conductive compound (e.g. silicone grease between the SSR mounting base and mounting surface of suitable heat sink).
Mounting: TO-3 Style.
Weight: .57oz. (16.2 grams).
Part Numbers shown also available thru Stocking Distribution.

SPECIFICATIONS SOLID STATE RELAY

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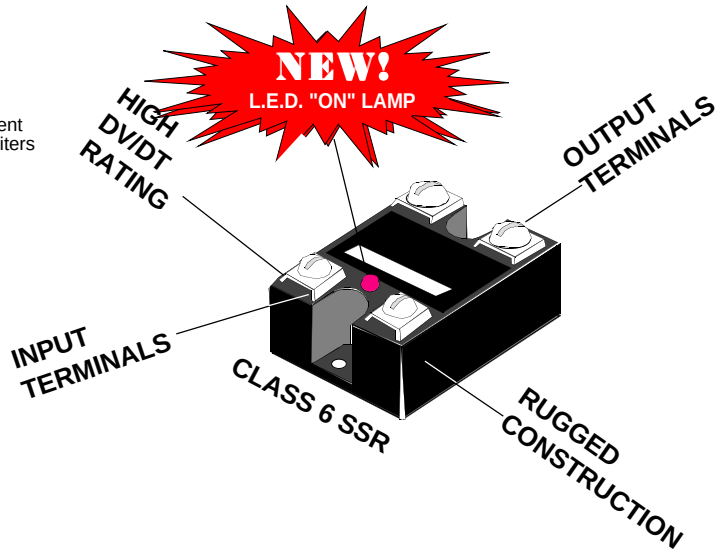
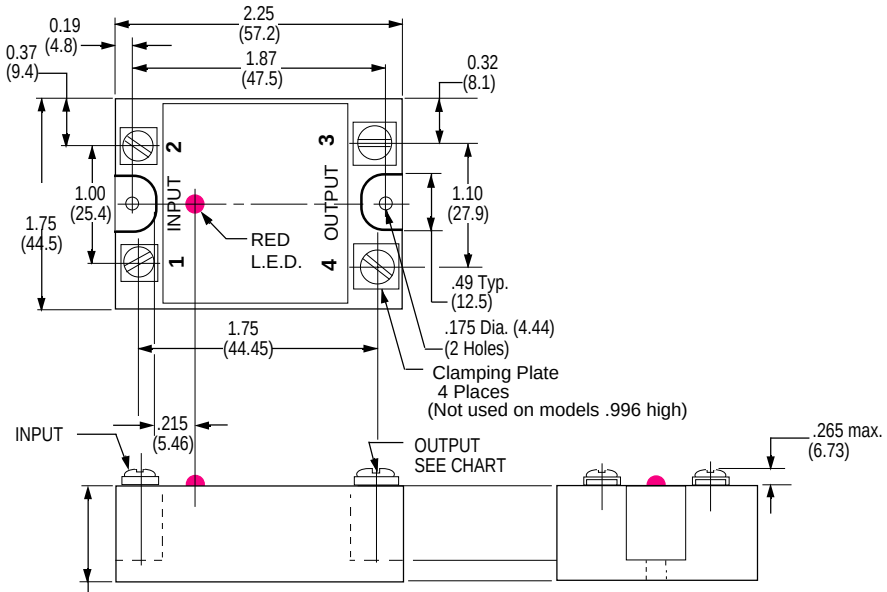


OUTLINE DIMENSIONS

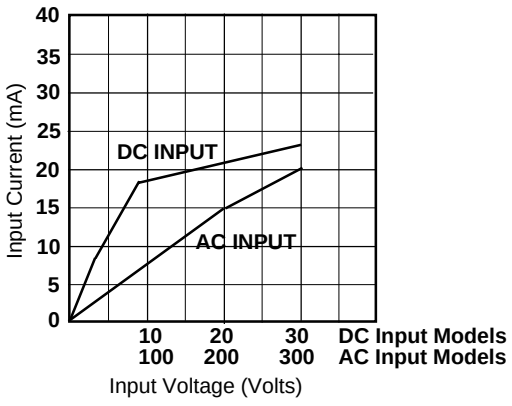
Dimensions shown in Inch and (Millimeter).



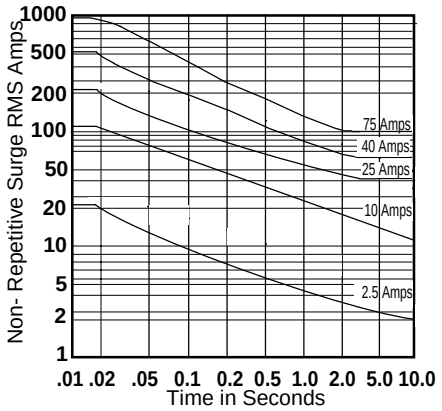
INPUT & OUTPUT SCREW SIZE
(Shown in Millimeters)

UP TO 40 AMP	
INPUT	OUTPUT
3.5 mm	4 mm
ABOVE 40 AMP	
3.5 mm	6 mm

CLASS 6
TYPICAL INPUT CURRENT



SURGE: OUTPUT 120 & 240 VAC



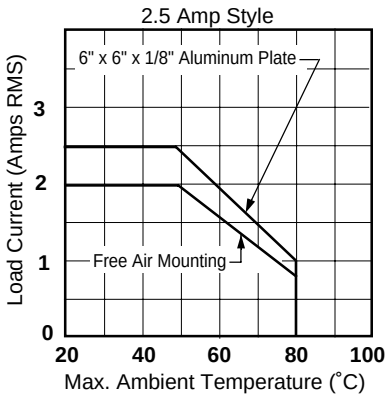
Surge: Curves represent relay tolerance to load surge currents as to magnitude and duration of both repetitive and non-repetitive surge currents.

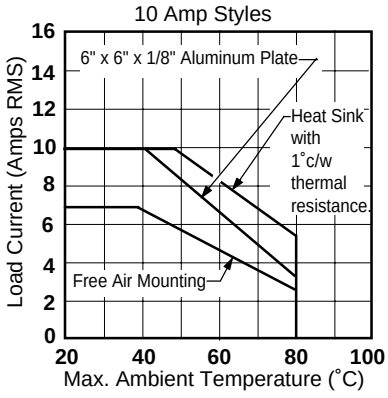
GENERAL SPECIFICATIONS

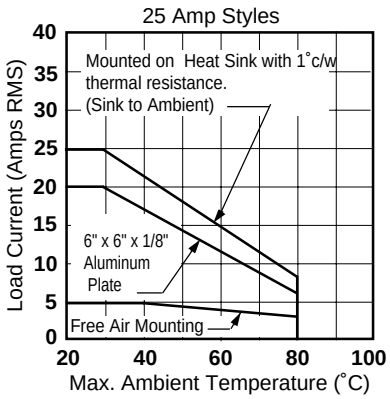
SPECIFICATIONS CLASS 6 SOLID STATE RELAYS

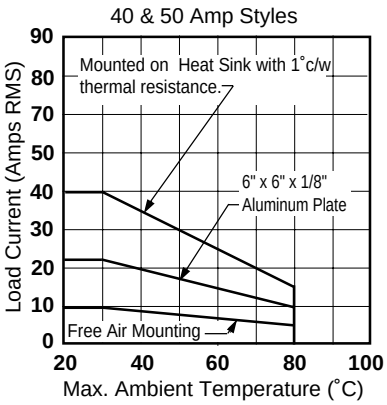
INPUT CHARACTERISTICS	
Input voltage range:	3-32 VDC, 90-280 VAC or 0 to 200VDC
Power indicator:	L.E.D. Lamp
Reverse Polarity Protected:	YES: DC Input with AC output styles only.
Input Filtered for transients less than one millisecond.:	No
Control current:	12 mA @ 5Vdc, 10 mA @ 120 Vac
OUTPUT CHARACTERISTICS	
Contact rating:	2 Amps to 75 Amps
Line Voltage Range (VAC)	W61 Models: 24-120VAC, W62 Models: 40-240 VAC
Maximum output voltage (VAC):	W61: 140VAC, W62: 280 VAC
Non-Repetitive Peak Voltage V_{DSM} (Blocking Voltage)	W61: 300VAC , W62: 600VAC
Minimum Load Current $I_{T\ MIN}$ (RMS) to maintain "On"	Up to 40 amp Models: 50 ma, 50 to 75 Amp models: 250mA
Maximum Off State Leakage current I_D (RMS)	Up to 40 amp Models: 8 mA, 50 to 75 Amp models: 10mA
Maximum RMS On-State Voltage V_T (RMS) Maximum	
Voltage drop across relay output @ rated current:	Up to 40 amp Models: 1.6V, 50 to 75 Amp models: 1.8 V
Minimum off-state dv/dt:	500v/usec
MISCELLANEOUS CHARACTERISTICS	
Contact configuration:	SPST-NO (1 FORM A)
Dielectric Strength V_{ISO} (Input-Output Isolation)	4000 VAC, DDX models 2500 VAC
Insulation Resistance R_{ISO} @ 500VDC	$10^{10}\ \Omega$
Operating temperature Range	-40°C to +80°C
Storage temperature Range	-40°C to +100°C
Life:	Greater than 100 million operations
Weight	2.5 to 50 AMP Models: 4 oz. (110 g)
	75 AMP Models: 6.8 oz. (192 g)
	25 AMP & 40 AMP, DDX Models: 4.76 oz. (135 g)

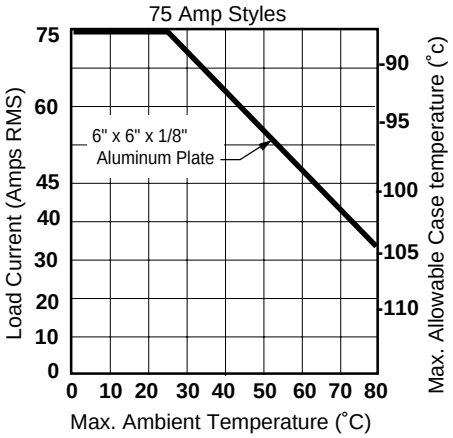
Thermal Derating Curve & Load Characteristics











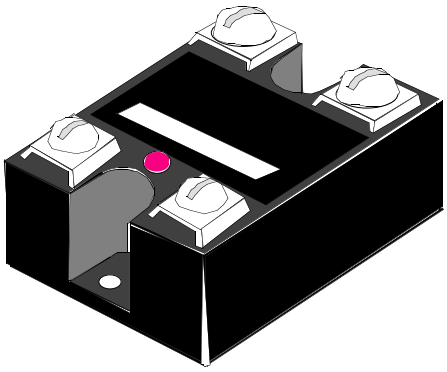
All current ratings in the following pages are based on use of suitable thermally conductive compound (e.g. silicone grease between the SSR mounting base and mounting surface of suitable heat sink).

DC CONTROLLED INPUT TRIAC OUTPUT SSR

High Transient Capability—Single output features back to back SCR's and internally mounted RC (snubber) network for high dv/dt applications.
Photo-Isolated, Zero Voltage Switching—Optically coupled for 4000 VAC isolation between input and output and RFI suppression.

CLASS 6

DC CONTROLLED INPUT
WITH L.E.D. "ON" LAMP.
AC TRIAC OUTPUT.



UL Recognized
File No. E52197

Recognized to Canadian safety requirements under the Component Recognition Program of Underwriters Laboratories Inc.

INPUT CHARACTERISTICS	3 to 32 VDC
Input Impedance	1500 ohms minimum
Response Time	1/2 Cycle Max.
Maximum Rate of Rise of Off State Voltage dv/dt	200 Volts per microsecond
OUTPUT CHARACTERISTICS	**120 or 240 VAC**
Rated Load Current (Amps rms)	10.0
U/L Incandescent Lamp Ampere Ratings	7.0
U/L Motor Load Ampere Ratings	4.5
Non-Repetitive Surge Current one Cycle (Amps peak)	100
Maximum rms Overload current for 1 second	24
Max I^2T For Fusing (t= 8-3ms) A^2 sec	42
Thermal Resistance Junction To Case (T_J, Max.= 115^{0}C) ^{0}c/w	2.1

SEE CLASS 6 GENERAL SPECIFICATIONS

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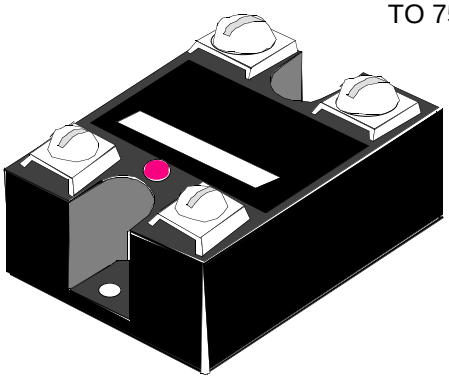
PART NUMBERS	INPUT (Over Operating Temperature Range)			0UTPUT (Over Operating Temperature Range)			CROSS REFERENCE TO:		
	CONTROL VOLTAGE RANGE	MAX. PULL-IN VOLTAGE	MIN. DROPOUT VOLTAGE	NOMINAL VOLTAGE RANGE	MAX. VOLTAGE	MAX. CURRENT RATING	CRYDOM	IDEC	POTTER & BRUMFIELD
W6110DTX-1	3-32 VDC	3 VDC	1 VDC	24-120AC	140 VAC	10 AMPS	**TD1210**	-	**SSRT120D10**
W6210DTX-1	3-32 VDC	3 VDC	1 VDC	48-240AC	280 VAC	10 AMPS	**TD2410**	-	**SSRT240D10**

All current ratings are based on use of suitable thermally conductive compound (e.g. silicone grease between the SSR mounting base and mounting surface of suitable heat sink).
Part Numbers shown also available thru stocking distribution.

DC CONTROLLED SOLID STATE RELAY

CLASS 6

DC CONTROLLED INPUT
WITH L.E.D. "ON" LAMP.
AC SCR OUTPUTS UP
TO 75 AMPS.



High Transient Capability—Single output features back to back SCR's an internal mounted RC (snubber) network for high dv/dt applications.
Photo-Isolated, Zero Voltage Switching—Optically coupled for 4000 VAC isolation between input, output and RFI suppression.

UL Recognized File No. E52197 c

Recognized to Canadian safety requirements under the Component Recognition Program of Underwriters Laboratories Inc.

INPUT CHARACTERISTICS	3 to 32 VDC					
Input Impedance	400 ohms @ 3 VDC Typical					
Response Time	1/2 Cycle Max.					
Maximum Rate of Rise of Off State Voltage dv/dt	200	500 Volts per microsecond				
OUTPUT CHARACTERISTICS	**120 VAC or 240 VAC**					
Rated Load Current (Amps rms)	2.5	10	25	40	50	75
U/L Incandescent Lamp Ampere Ratings	2.0	8.0	16	30	30	39
U/L Motor Load Ampere Ratings	1.0	4.5	8	14	14	25
Non-Repetitive Surge Current one Cycle (Amps peak)	100	100	250	350	350	1150
Maximum rms Overload current for 1 second	5	24	40	80	100	150
Max I^2T For Fusing (t= 8-3ms) A^2 sec	72	72	800	1250	1250	5000
Thermal Resistance Junction To Case (T_J, Max.= 115°C) °c/w	8.5	1.78	1.02	0.63	0.63	0.63
Minimum Load current, (mA).	50	50	120	250	250	250

SEE CLASS 6 GENERAL SPECIFICATIONS

Magnecraft

PART NUMBERS	INPUT (Over Operating Temperature Range)			OUTPUT (Over Operating Temperature Range)			CROSS REFERENCE TO:		
	CONTROL VOLTAGE RANGE	MAX. PULL-IN VOLTAGE	MIN. DROPOUT VOLTAGE	NOMINAL VOLTAGE RANGE	MAX. VOLTAGE	NAX. CURRENT RATING	CRYDOM	IDEC	POTTER & BRUMFIELD
W6102DSX-1	3-32 VDC	3 VDC	1 VDC	24-120AC	140 VAC	2.5 AMPS	**D1202**	-	**EOM1DA22-4-32**
W6110DSX-1	3-32 VDC	3 VDC	1 VDC	24-120AC	140 VAC	10 AMPS	**D1210**	**RSSD-10A**	**EOM1DA42-4-32**
W6125DSX-1	3-32 VDC	3 VDC	1 VDC	24-120AC	140 VAC	25 AMPS	**D1225**	**RSSD-25A**	**SSR240D25**
W6140DSX-1	3-32 VDC	3 VDC	1 VDC	24-120AC	140 VAC	40 AMPS	**D1240**	**RSSD-40A**	-
W6150DSX-1	3-32 VDC	3 VDC	1 VDC	24-120AC	140VAC	50 AMPS		**RSSD-50A**	**SSR240D50**
W6175DSX-1	3-32 VDC	3 VDC	1 VDC	24-120AC	140VAC	75 AMPS		**RSSD-75A**	**SSR240D80**
W6202DSX-1	3-32 VDC	3 VDC	1 VDC	48-240AC	280 VAC	2.5 AMPS	**D2402**	-	-
W6210DSX-1	3-32 VDC	3 VDC	1 VDC	48-240AC	280 VAC	10 AMPS	**D2410**	**RSSD-10A**	**EOM1DA44-4-32**
W6225DSX-1	3-32 VDC	3 VDC	1 VDC	48-240AC	280 VAC	25 AMPS	**D2425**	**RSSD-25A**	**SSR240D25**
W6240DSX-1	3-32 VDC	3 VDC	1 VDC	48-240AC	280 VAC	40 AMPS	**D2440**	**RSSD-40A**	-
W6250DSX-1	3-32 VDC	3 VDC	1 VDC	48-240AC	280 VAC	50 AMPS	**D2450**	**RSSD-50A**	**SSR240D50**
W6275DSX-1	3-32 VDC	3 VDC	1 VDC	48-240AC	280 VAC	75 AMPS	**D2475**	**RSSD-75A**	**SSR240D80**

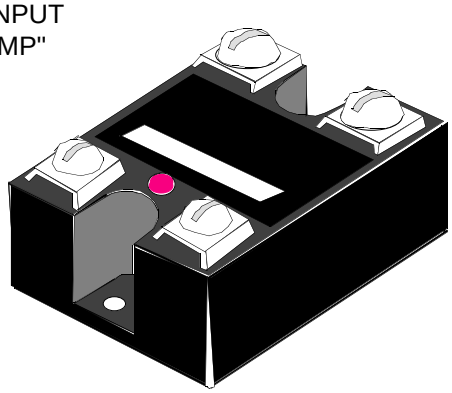
All current ratings are based on use of suitable thermally conductive compound (e.g. silicone grease between the SSR mounting base and mounting surface of suitable heat sink).
Part Numbers shown also available thru stocking distribution.

AC CONTROLLED SOLID STATE RELAY

High Transient Capability—Single output features back to back SCR's and internally mounted RC (snubber) network for high dv/dt applications.
Photo-Isolated, Zero Voltage Switching—Optically coupled for 4000 VAC isolation between input and output and RFI suppression.

CLASS 6

AC CONTROLLED INPUT
WITH L.E.D. "ON LAMP"
AC SCR OUTPUT.



UL Recognized
File No. E52197

Recognized to Canadian safety requirements under the Component Recognition Program of Underwriters Laboratories Inc.

INPUT CHARACTERISTICS	90 to 280 VAC or 80 to 140 VDC					
Input Impedance	13K ohms @ 120VAC typical					
Response Time	10 mS Turn ON, 40 mS Turn OFF.					
Maximum Rate of Rise of Off State Voltage dv/dt	200	500 Volts per microsecond				
OUTPUT CHARACTERISTICS	**120 VAC or 240 VAC**					
Rated Load Current (Amps rms)	2.5	10	25	40	50	75
U/L Incandescent Lamp Ampere Ratings	2.0	8.0	16	30	30	39
U/L Motor Load Ampere Ratings	1.0	4.5	8.0	14	14	25
Non-Repetitive Surge Current one Cycle surge (Amps peak)	100	100	250	350	350	1150
Maximum rms Overload current for 1 second	5	24	40	80	100	150
Max I^2T For Fusing (t= 8-3ms) A^2 sec	72	72	800	1250	1250	5000
Thermal Resistance Junction To Case (T_J, Max.= 115^{0}C) ^{0}c/w	8.5	1.48	1.02	0.63	0.63	0.63
Minimum Load current, (mA):	50	50	120	120	120	120

SEE CLASS 6 GENERAL SPECIFICATIONS

Magnecraft

PART NUMBERS	INPUT (Over Operating Temperature Range)			OUTPUT (Over Operating Temperature Range)			CROSS REFERENCE TO:		
	CONTROL VOLTAGE RANGE	MAX. PULL-IN VOLTAGE	MIN. DROPOUT VOLTAGE	NOMINAL VOLTAGE RANGE	MAX. VOLTAGE	MAX. CURRENT RATING	CRYDOM	IDEC	POTTER & BRUMFIELD
W6110ASX-1	90 -280 VAC	90 VAC	10 VAC	24-120AC	140 VAC	10 AMPS	**A1210**	**RSSAN-10A**	-
W6125ASX-1	90 -280 VAC	90 VAC	10 VAC	24-120AC	140 VAC	25 AMPS	**A1225**	**RSSAN-25A**	**SSR240A25**
W6140ASX-1	90 -280 VAC	90 VAC	10 VAC	24-120AC	140 VAC	40 AMPS	**A1240**	**RSSAN-40A**	-
W6150ASX-1	90 -280 VAC	90 VAC	10 VAC	24-120AC	140 VAC	50 AMPS	**A1250**	**RSSAN-50A**	**SSR240A50**
W6175ASX-1	90 -280 VAC	90 VAC	10 VAC	24-120AC	140VAC	75 AMPS	**A1275**	**RSSAN-75A**	**SSR240A80**
W6202ASX-1	90 -280 VAC	90 VAC	10 VAC	48-240AC	280 VAC	2.5 AMPS	**A2402**	-	-
W6210ASX-1	90 -280 VAC	90 VAC	10 VAC	48-240AC	280 VAC	10 AMPS	**A2410**	**RSSAN-10A**	-
W6225ASX-1	90 -280 VAC	90 VAC	10 VAC	48-240AC	280 VAC	25 AMPS	**A2425**	**RSSAN-25A**	**SSR240A25**
W6240ASX-1	90 -280 VAC	90 VAC	10 VAC	48-240AC	280 VAC	40 AMPS	**A2440**	**RSSAN-40A**	-
W6250ASX-1	90 -280 VAC	90 VAC	10 VAC	48-240AC	280 VAC	50 AMPS	**A2450**	**RSSAN-50A**	**SSR240A50**
W6275ASX-1	90 -280 VAC	90 VAC	10 VAC	48-240AC	280 VAC	75 AMPS	**A2475**	**RSSAN-75A**	**SSR240A80**

Part Numbers shown also available thru stocking distribution.

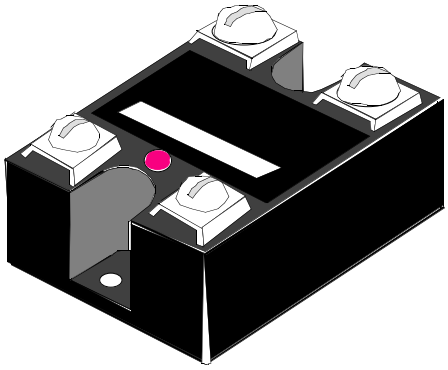
All current ratings are based on use of suitable thermally conductive compound (e.g. silicone grease between the SSR mounting base and mounting surface of suitable heat sink).

DC CONTROLLED INPUT DC OUTPUT

CLASS 6

DC CONTROLLED INPUT
DC OUTPUT

Transformer-Isolated, for 2500 VAC isolation between input and output and RFI suppression.



NEW!
L.E.D. "ON" LAMP

UL Recognized
File No. E52197

Recognized to Canadian safety requirements under the Component Recognition Program of Underwriters Laboratories Inc.

INPUT CHARACTERISTICS	3.5 to 32 VDC		
Input Impedance	1000 ohms minimum		
Response Time	100 uS: On, 1.0 mS: Off	600 uS: On, 2.6 mS Off	
Maximum Rate of Rise of Off State Voltage dv/dt	200 Volts per microsecond		
OUTPUT CHARACTERISTICS	**0 to 200 VDC**		
Rated Load Current (Amps rms)	12.0	25	40
Minimum Load current to maintain "On"	20 mA	20 mA	20 mA
Non-Repetitive Surge Current (1 cycle surge)	27	50	90
FW rectified current repetitive 60 Hz Amps peak	17	-	-
Voltage drop across output @ rated current	2.83	2.83	2.83
Max I^2T For Fusing (t= 8-3ms) A^2 sec	2.1	2.1	2.1
Thermal Resistance Junction To Case ^{0}c/w	1.06	1.06	1.06
Max. off state leakage current:	12 mA	12 mA	12 mA

SEE COMPLETE SPECIFICATIONS PAGES 83 & 84

Magnecraft

PART NUMBERS	INPUT (Over Operating Temperature Range)			0UTPUT (Over Operating Temperature Range)		CROSS REFERENCE
	CONTROL VOLTAGE RANGE	MAX. PULL-IN VOLTAGE	MIN. DROPOUT VOLTAGE	NOMINAL VOLTAGE RANGE	MAX. CURRENT RATING	CRYDOM
W6212DDX-1	3.5 - 32 VDC	3.5 VDC	1 VDC	0 -200 VDC	12 AMPS	**D2D12**
W6225DDX-1	3.5 - 32 VDC	3.5 VDC	1 VDC	0 -200 VDC	25 AMPS	**D1D20***
W6240DDX-1	3.5 - 32 VDC	3.5 VDC	1 VDC	0 -200 VDC	40 AMPS	**D1D40***

Part Numbers shown also available thru stocking distribution.

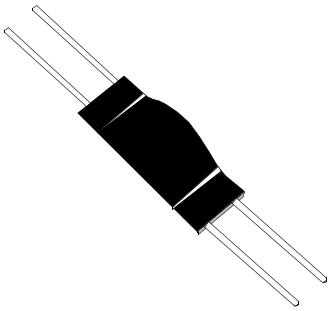
All current ratings are based on use of suitable thermally conductive compound (e.g. silicone grease between the SSR mounting base and mounting surface of suitable heat sink).

*** Crydom relays only rated at 0 - 100 VDC.**

301T OPTO-ISOLATOR

OPTICAL COUPLING PROVIDES HIGH INPUT TO OUTPUT ISOLATION. CAN BE USED AS AN ON/OFF SWITCH OR LOW VOLTAGE CONTROLLED RESISTOR. IDEAL FOR TRIGGERING SCR'S AND TRIACS.

301T OPTO-ISOLATOR
0.2 WATT OUTPUT
VAC OR VDC OUTPUTS



SPECIFICATIONS 301T

CONTACTS
Output Voltage Max:. ± 250 VDC or VAC Peak

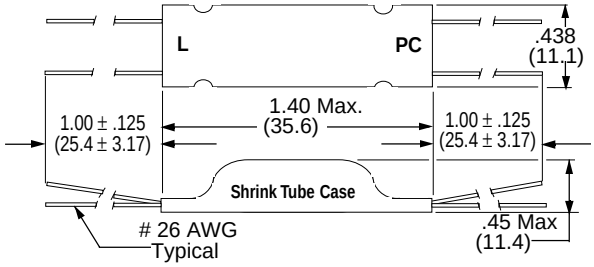
INSULATION RESISTANCE
Dielectric Strength
Across Open Contacts: 1000 V rms Between all insulated Points
Insulation Resistance: 10⁹Ohms

ENVIRONMENTAL CAPABILITIES
Ambient Temperature
Operating: -40˚C to + 60˚C

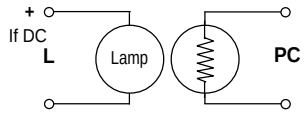
Miscellaneous
Weight: 0.04 oz (1.1 g)

NOT RECOMENDED FOR WAVE OR DIP SOLDERING. ALSO MAY BE AFFECTED BY CLEANING SOLVENTS

OUTLINE DIMENSIONS



SCHEMATIC



Magnecraft

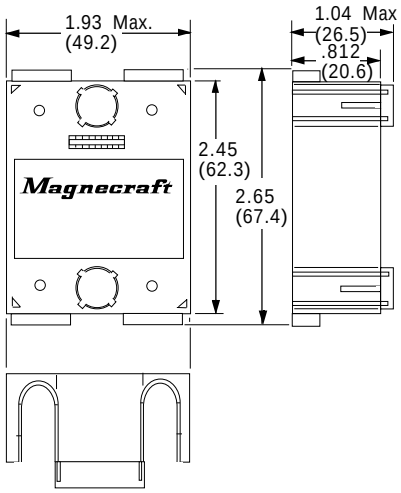
UL Recognized
File No. E104675

PART NUMBERS	INPUT			OUTPUT		RESPONSE TIME	
	LAMP TYPE	VOLTAGE	CURRENT (mA)	ON RESISTANCE (Ohms max.)	POWER DISSIPATION Per pole (mW)	TURN-ON TO 10KΩ (mS max.)	TURN-OFF TO 100KΩ (mS max.)
W301T1-2A1	LED	1.7 VDC	40	2000Ω	200	10	50
W301T1-2B1	LED	2.0 VDC	25	1000Ω	200	5	100
W301T1-12B1	INCAND.	12 VDC/AC	24	400Ω	200	150	300
W301T1-120A1	NEON	120 VDC/AC†	1.3	1200Ω	200	35	100

† Add 47KΩ Ohm external series resistor to limit current.

PART NUMBERS SHOWN ALSO AVAILABLE **THRU STOCKING DISTRIBUTION.**

OUTLINE DIMENSIONS



EMBOSSED SAFETY COVER

CLEAR COVER FOR CLASS 6 SOLID STATE RELAYS PREVENTS ELECTRICAL SHOCK HAZARDS FROM EXPOSED TERMINALS.

Magnecraft

PART NUMBER	15-700

Weight:: 0.476 oz. (13.5 g)

NOT SUPPLIED WITH RELAY. TO BE ORDERED SEPARATELY IF REQUIRED.

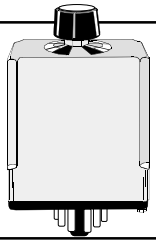
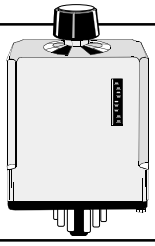
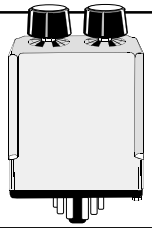
TIME DELAY RELAYS

AND

SENSORS

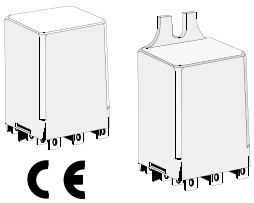
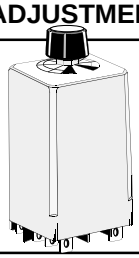
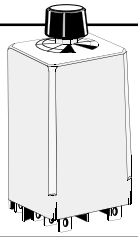
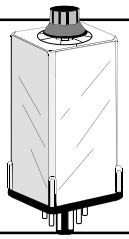
5 TO 13 AMPERES

TIME DELAY RELAYS

RELAY CLASS/SERIES	211	211 PROG	67	222
				
FEATURES	8 or 11 PIN OCTAL PLUG-IN. "ON DELAY" OR OFF DELAY" REPEATABILITY ±0.1% FIELD ADJUSTABLE BY KNOB INTERVAL, FLASHER, ONE SHOT OR ON & OFF DELAY AVAILABLE	8 or 11 PIN OCTAL PLUG-IN. 4 PROGRAMMABLE FUNCTIONS 62 PROGRAMMABLE TIMING RANGES 4 INPUT VOLTAGE RANGES REPEATABILITY ±0.1% FIELD ADJUSTABLE BY KNOB & DIP SWITCH	MINIATURE PLUG-IN "ON DELAY" REPEATABILITY ± 2% FIELD ADJUSTABLE BY SCREW DRIVER 4 POLE STYLES AVAIL-ABLE P.C. TERMINALS AVAILABLE..	8 PIN OCTAL PLUG-IN REPEAT CYCLE ON & OFF DELAY ±0.1 % REPEATABILITY FIELD ADJUSTABLE TIMING USING KNOBS.
CONTACT DATA CONTACT CONFIGURATION:	DPDT	DPDT	DPDT	DPDT
CONTACT RATING:	10 AMPS @ 120 VAC, 30VDC	10 AMPS @ 120 VAC, 30VDC	5AMPS @ 120 VAC, 28 VDC	10 AMPS, 120VAC, 28 VDC
CONTACT MATERIAL	Silver Cadmium Oxide	Silver Cadmium Oxide	Silver, Gold Overlay	Silver cadimum Oxide
CONTACT RESISTANCE:	50 MILLIOHMS Max. Initial	50 MILLIOHMS Max. Initial	50 Milliohms Max. Initial	50 MILLIOHMS Max Initial
INSULATION CHARACTERISTICS DIELECTRIC STRENGTH:	1500 V rms	1500 V rms	1250 V rms	1500 V rms
COIL DATA AC - VOLTAGE: DC - VOLTAGE: INPUT VOLTAGE RANGE	120 VAC 24 VDC AC - 90 to 130 DC - 20 to 32	120/24 VAC 24 VDC AC - 90 to 130 DC - 20 to 32	AC On Special Order 12 & 24 VDC DC - 10 to 14, 20 to 32	120 VAC DC - SPECIAL ORDER 90 to 130 VAC
REVERSE POLARITY PROTECTION:	DC MODELS ONLY	DC MODELS ONLY	DC MODELS ONLY	DC MODELS ONLY
GENERAL DATA AMBIENT TEMPERATURE OPERATIONAL: STORAGE:	- 30˚ C to + 55˚ C - 55˚ C to + 85˚ C	- 30˚ C to + 55˚ C - 55˚ C to + 85˚ C	- 30˚ C to + 80˚ C - 40˚ C to + 100˚ C	- 30˚ C to + 55˚ C - 55˚ C to + 85˚ C
TIMING VALUES OPERATE MAX.: RELEASE MAX:	0.1 Seconds to 120 Minutes 0.1 Seconds to 15 Minutes	AS SELECTED AS SELECTED	0.1 to 30 Seconds -	0.1 Second to 30 Minutes 0.1 Second to 30 Minutes
LIFE ELECTRICAL @ rated Load: MECHANICAL:	200,000 Operations 50,000,000 Operations	200,000 Operations 50,000,000 Operations	50,000 Operations 50,000,000 Operations	200,000 Operations 50,000,000 Operations
DIMENSIONS	H W L 1.75 X 2..37 X 3.5"	H W L 1.75 X 2..37 X 3.5"	H W L 1.18 X .734 X 1.37	H W L .1.75 X 2.37 X 3.49
APPROVALS	UL VDE CSA CE	UL VDE CSA CE	VDE CSA	VDE CSA CE
APPLICATION DATA:	**PAGE 113, 114**	**PAGE 117**	**PAGE 118**	**PAGE 119**
PAGE NUMBER	**PAGE 115, 116**			

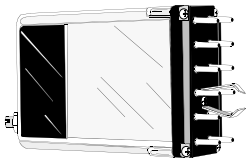
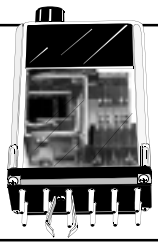
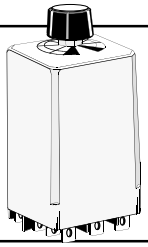
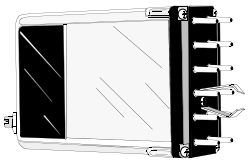
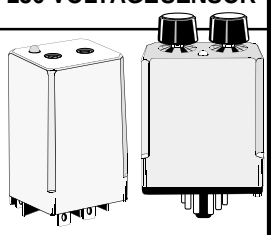
Magnecraft & Struthers-Dunn

TIME DELAY RELAYS

388 SHORT BODY	388 KNOB ADJUSTMENT	388 TRUE OFF DELAY	286/287	326/327
				
SQUARE BASE PLUG-IN OR FLANGE MOUNT ON DELAY OR OFF DELAY ±3 % REPEATABILITY FIELD ADJUSTABLE TIMING USING EXTERNAL RESISTOR	SQUARE BASE PLUG-IN ON DELAY OR OFF DELAY ±0.1 % REPEATABILITY FIELD ADJUSTABLE TIMING USING KNOB. INTERVAL, FLASHER, ONE SHOT OR ON & OFF DELAY AVAILABLE	SQUARE BASE PLUG-IN OFF DELAY ±3 % REPEATABILITY FIELD ADJUSTABLE TIMING USING KNOB. POWER TO INPUT NOT REQUIRED DURING TIMING CYCLE.	RETANGULAR PLUG-IN 286 -ON DELAY, 287 - 0FF DELAY ±3 % REPEATABILITY TIMING FIELD ADJUSTABLE BY KNOB OR EXTERNAL RESISTOR. 1, 2 & 3 POLE 10 AMP SWITCHING.	8 or 11 PIN OCTAL PLUG-IN. "ON DELAY" OR OFF DELAY" ± 3% REPEATABILITY FIELD ADJUSTABLE BY KNOB OR EXTERNAL RESISTOR. 1, 2 & 3 POLE 10 AMP SWITCHING.
DPDT	DPDT	DPDT	SPDT, DPDT, 3PDT	SPDT, DPDT, 3PDT
12 AMPS, 120VAC, 28 VDC	12 AMPS, 120VAC, 28 VDC	12 AMPS @ 120 VAC, 28 VDC	10 AMPS @ 120/240 VAC, 28 VDC	10 AMPS @ 120/240 VAC, 28 VDC
Silver cadimum Oxide 50 MILLIOHMS Max Initial 1500 V rms	Silver cadimum Oxide 50 MILLIOHMS Max Initial 2000 V rms	Silver Cadimum Oxide 50 MILLIOHMS Max.initial 2000 V rms	Silver Cadimum Oxide 50 MILLIOHMS Max.initial 1500 V rms	Silver Cadimum Oxide 50 MILLIOHMS Max.initial 1500 V rms
120 VAC 24 VDC 90 to 130 VAC 20 to 32 VDC DC MODELS ONLY	120 VAC 24 VDC 90 to 130 VAC 20 to 32 VDC DC MODELS ONLY	120 VAC 24 VDC 90 to 130 VAC 20 to 32 VDC DC MODELS ONLY	24 to 240VAC 12 to 115-125 VDC 85% Of Nominal 80% Of Nominal DC MODELS ONLY	24 to 240VAC 12 to 115-125 VDC 85% Of Nominal 80% Of Nominal DC MODELS ONLY
- 30˚ C to + 55˚ C - 55˚ C to + 85˚ C 0.1 to 120 Seconds 0.1 to 120 Seconds 100,000 Operations 5,000,000 Operations	- 30˚ C to + 55˚ C - 55˚ C to + 85˚ C 0.1 to 120 Seconds 1.0 to 180 Seconds 100,000 Operations 5,000,000 Operations	- 10˚ C to + 55˚ C - 55˚ C to + 85˚ C - 0.6 to 60 Seconds 100,000 Operations 5,000,000 Operations	- 10˚ C to + 70˚ C - 0.1 to 300 Seconds 100,000 Operations 10,000,000 Operations	- 10˚ C to + 70˚ C - 0.1 to 300 Seconds 100,000 Operations 10,000,000 Operations
H W L	H W L	H HW W L L	H W L	H W L
1.40 X 1.53 X 1.90	1.40 X 1.53 X 3.52 LG. 1.40 X 1.53 X 3.02 MED.	1.40 X 1.53 X 3.52	1.37 X .1.50 X 3.35	1.37 X 1.37 X 3.0
PAGE 120, 121	PAGE 122, 123	PAGE 124	PAGE 125, 126	PAGE 127, 128

TIME DELAY RELAYS & SENSORS

SEE SECTION 10 FOR SOCKETS

	236/237/238	246/247	235 CURRENT SENSOR	349 VOLTAGE SENSOR	236 VOLTAGE SENSOR
					
	12 PIN STYLE PLUG-IN. WITH LOCKING CLIP 236 - ON DELAY, 237 - OFF DELAY, 238 - ONE SHOT SCREWDRIVER OR EXTERNAL RESISTOR ADJUSTABLE. ±10 % REPEATABILITY. 1,2 & 3 POLE 10 AMP SWITCHING	12 PIN STYLE PLUG-IN. WITH LOCKING CLIP STYLE 246 - ON DELAY, STYLE 247 - OFF DELAY ±3% REPEATABILITY. 2 - 4 POLE CONTACT ARANGEMENTS LARGE CHOICE OF OPTIONS	SQUARE BASE PLUG-IN. 1.5 TO 15 AMP SENSING RANGE. ±2% REPEATABILITY SPDT CONTACT ARANGEMENTS FIELD ADJUSTABLE WITH KNOB	12 PIN STYLE PLUG-IN. WITH LOCKING CLIP 85 to 135 VAC 50 TO 400 Hz SENSING RANGE. 1 AND 3 PHASE SENSING. LARGE CHOICE OF OPTIONS	SQUARE BASE OR OCTAL PLUG-IN UP TO 552 VAC OR 30 VDC SENSING RANGE. ±1% REPEATABILITY LED POWER INDICATOR FIELD ADJUSTABLE WITH SCREW DRIVER OR KNOB
	SPDT, DPDT, 3PDT	SEE CATALOG PAGE	SPDT	SEE CATALOG PAGE	SPDT, DPDT
	10 AMPS @ 120/240 VAC, 28 VDC	10 AMPS @ 120/240 VAC, 28 VDC	10 AMPS @ 120VAC/ 28 VDC	10 AMPS @ 120/240 VAC, 28 VDC	10 - 13 AMPS @ 120/240 VAC, 28 VDC
	Silver Cadimum Oxide 50 MILLIOHMS Max.initial 1500 V rms	Silver Cadmium Oxide or Gold Diffused 50 MILLIOHMS Max. Initial 1500 V rms	Silver Cadmium Oxide 50 MILLIOHMS Max. Initial 2500 V rms	Silver Cadmium Oxide or Gold Diffused 50 MILLIOHMS Max. Initial 1500 V rms	Silver Cadmium Oxide 50 MILLIOHMS Max. Initial 2000 V rms
	24 to 240VAC 12 to 115-125 VDC 85% Of Nominal 80% Of Nominal DC MODELS ONLY	24 to 240 VAC 12 TO 110-125 VDC - - DC MODELS ONLY	120 VAC - - - -	120VAC - - - N/A	120 to 480 VAC 24 VDC - - N/A
	- 10˚ C to + 70˚ C - 0.2 to 200 Seconds 100,000 Operations 10,000,000 Operations	- 10˚ C to + 70˚ C - 0.1 to 300 Seconds 100,000 Operations 10,000,000 Operations	- 30˚ C to + 55˚ C - 40˚ C to + 85˚ C 1.5 to 15 Amps 200,000 Operations 5,000,000 Operations	- 10˚ C to + 60˚ C 85 TO 135 VAC 100,000 Operations 10,000,000 Operations	- 30˚ C to + 55˚ C - 40˚ C to + 85˚ C SEE CATALOG PAGE 100,000 Operations 5,000,000 Operations
	H W L	H W L	H W L	H W L	H W L
	1.46 X 2.62 X 4.56	1.46 X 2.62 X 4.42	1.40 X 1.53 X 3.52	1.46 X 2.62 X 4.56	1.75 X 2.37 X 3.49 1.40 X 1.53 X 2.90
	PAGE 129, 130	PAGE 131	PAGE 132	PAGE 133	PAGE 134, 135

DESCRIPTIONS OF TIME DELAY FUNCTIONS

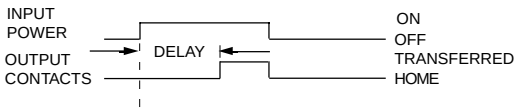
APPLICATION DATA

WHAT A TIME DELAY RELAY IS:

A Time Delay relay is a combination of an electromechanical output relay and a control circuit. The control circuit is comprised of solid state components and timing circuits that control operation of the relay and timing range. Typical time delay functions include On-Delay, Off-Delay, Repeat cycle, One Shot, Batch Control Interval, On-Delay & Off Delay (Combination) and True Off Delay. Each function is explained below. Time delay relays have a broad choice of timing ranges from less than one second to hours. There is a choice of timing controls from calibrated external knob, screwdriver adjusted or internally fixed timing for specific applications. The output contacts on the electromechanical output relay are direct wired to the output terminals. The contact load ratings are specified for each specific type of time delay relay.

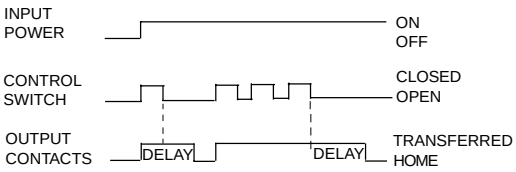
TIMING FUNCTIONS:

ON-DELAY- (SLOW OPERATE RELAY) Upon application of power to the input, the time delay period begins. At the end of the time delay period, output contacts transfer. Input power must be removed to return output contacts to home position and reset the control circuit. If input power is interrupted before a timing period ends, timing stops. When input power is restored , timing starts from the beginning.
Special requirements for Class 211 programmable relays: To function as an On-Delay timer, as described above, a jumper wire must be connected in place of the external control switch.



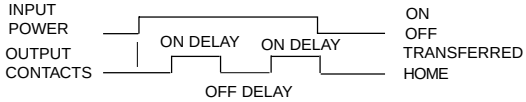
Some typical Applications: Cascade starting, Air Conditioning & heating controls, Burglar Alarms, Power Outage delay, instrument Control.

OFF-DELAY (SLOW RELEASE RELAY)
Continuous power must be applied to input during all timing sequences. Upon closure of external control switch, output contacts transfer. Upon opening control switch, the timing period begins. When timing period ends, output contacts return home. To repeat this timing cycle, the control switch must be re-closed and then opened. If input power is interrupted during timing cycle, the output contacts return to home position and the control switch must be closed and reopened to start the timing from the beginning. If the control switch closes during a timing period, timing stops and output contacts remain transferred. When control switch is opened, timing will start again from the beginning. The timing period can be extended, repeatedly using the control switch in this way until the last initiated timing period is permitted to end and output contacts return home.



Some typical Applications: Air Conditioning, automatic Door Controls, Lighting Controls, burglar alarms, Vending Machines, conveyor systems, instrument control.

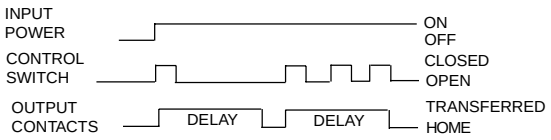
REPEAT CYCLE (FLASHER) - Upon application of power to the input, the Off time delay Period begins. The contacts transfer at the end of the Off time Delay Period and the ON time delay period begins. At the end of the ON time delay period output contacts return home and OFF time delay period begins again. This sequence will continue as long as input power is supplied to the Input Pins.



Some typical Applications: Signs, Product testing, signal devices, machine control, Signal warning devices, conveyor control.

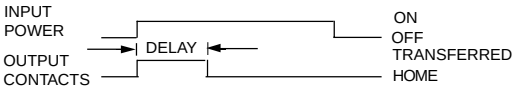
TIMING FUNCTIONS (Continued)

ONE SHOT (MOMENTARY ACTUATION)
Continuous power must be applied to the input during all timing sequences. Upon closure of external control Switch, output contacts transfer and timing period begins. When timing period ends, output contacts return home. Once the timing period begins, the control switch may remain closed or opened without affecting timing. To repeat this cycle, the control switch must be open, or opened at the end of the timing period, and then closed to start timing period over again.



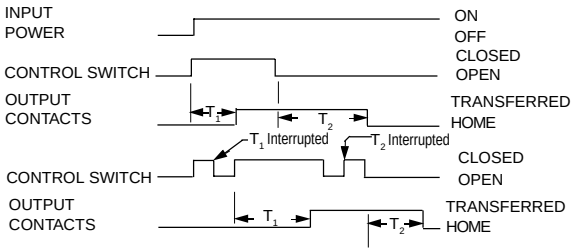
Some typical Applications: Vending machines, dispensing controls, machine control, welding control,

BATCH CONTROL (INTERVAL)
Upon application of power to the input, the output contacts transfer and the delay period begins. At the end of the time delay period, the output contacts return home. Input power must be interrupted to recycle timer.



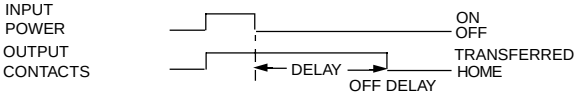
Some typical Applications: Machine control, End of process alarm, Welding control, Photographic timing.

ON-DELAY & OFF-DELAY- (COMBINATION)
Continuous power must be applied to the input during all timing sequences. Upon closure of the external control switch, first time delay period T_1 begins. When T_1 period ends, output contacts transfer. Then, When control switch is opened, second delay period T_2 begins. When T_2 ends, output contacts return home. To repeat this timing cycle, repeat this sequence from the beginning. If the prevailing open or closed status of the control switch is changed during either T_1 or T_2 Timing periods, timing stops. Position of output contacts remain as they were. Returning control switch to its pre-changed position restarts interrupted timing period from the beginning and normal timing resumes.



Some typical Applications: Cascade starting & stopping of heavy loads, laboratory equipment, machine control

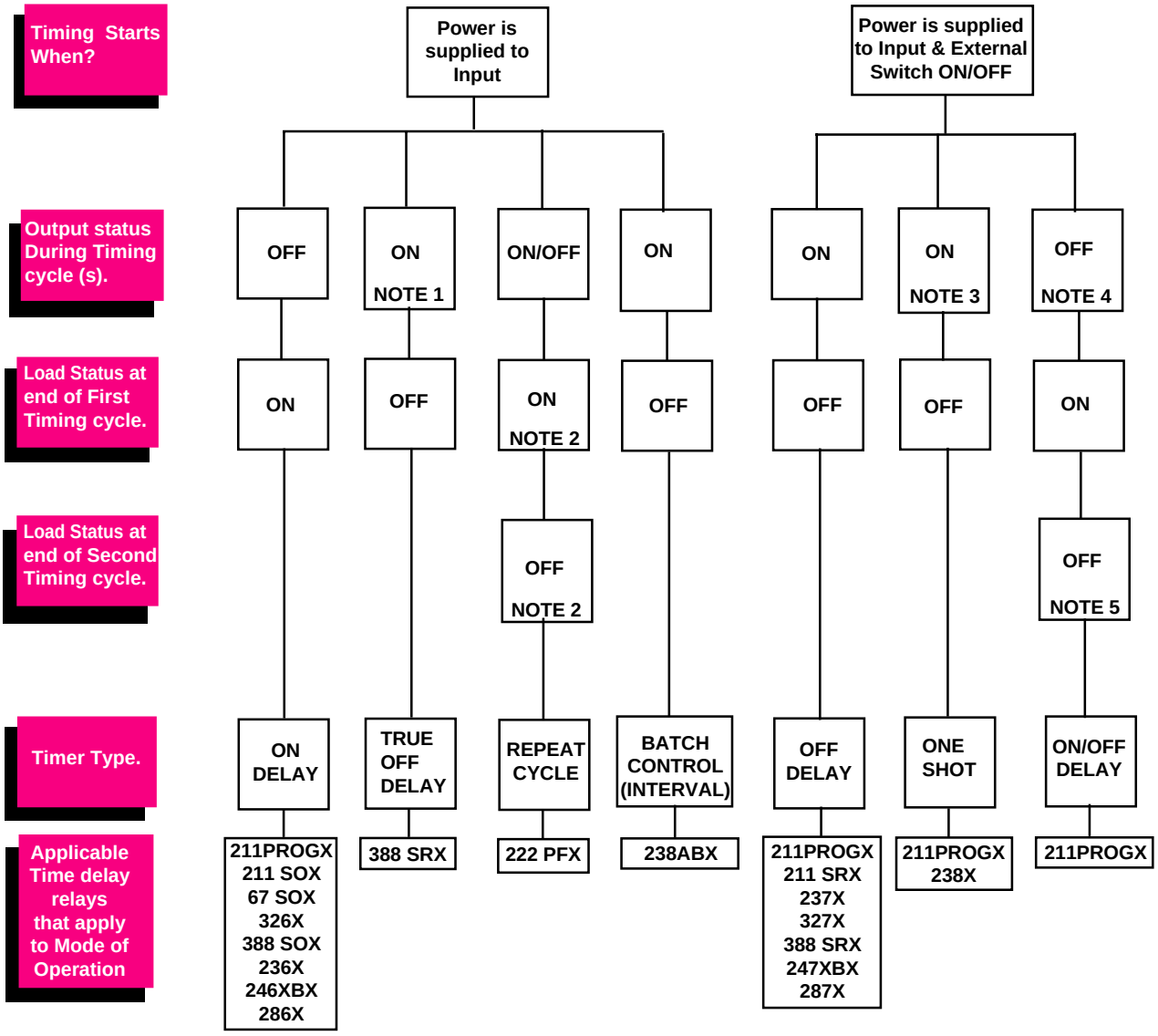
TRUE OFF DELAY- (SLOW RELEASE)
Upon application of power to the input, output contacts transfer. The delay period begins when power is removed from the input. If power is supplied to input during the timing period, time is reset and time delay period starts over again when power is removed from the input.



Some typical Applications: Loss of power alarm control, Burglar alarms.

SELECTING A TIMER'S MODE OF OPERATION

Selecting the correct Mode of operation (Timing Function) can be easily done by following the ladder diagram below. When selecting the proper relay for your application, you must determine if the timer will be controlled by input power only, or the use of an external switch. The next item to take into consideration is the load status during the timing cycle(s), and the contact status after the timing cycle.

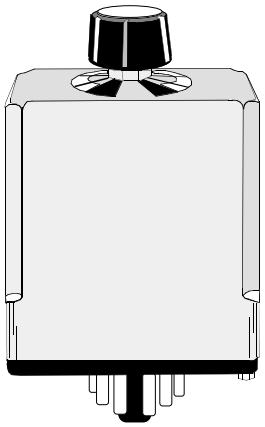


NOTES:

1. Momentary power supplied to the input. Input power not required for timing cycle.
2. Continues to repeat timing cycles until power is removed from input
3. Upon closure of External switch, relay contacts switch and time period begins. The timing is not affected by the duration of the External switch closure.
4. External switch is maintained closed, relay contacts switch at the end of first timing cycle.
5. External switch is maintained open for second timing cycle.

Footnote: ON = Relay coil energized, contacts switched. OFF = Relay coil de-energized, contacts in normal position.

OCTAL 8 & 11 PIN TIME DELAY RELAY



CLASS 211

± 0.1 % REPEATABILITY
DPDT, 10 AMP CONTACTS
FIELD ADJUSTABLE TIMING

WHEN USED WITH SOCKET
70-464-1 (8PIN)
70-465-1 (11 PIN)

UL Recognized
File No: E43641

COMPLIES WITH REQUIREMENTS OF
* IEC STANDARDS
947-4-1 AND 947-5-1
LOW VOLTAGE DIRECTIVE.

*1EC = INTERNATIONAL ELECTROTECHNICAL COMMISSION

THE CLASS 211 TIME DELAY RELAY MAKES USE OF HYBRID CIRCUITRY, COMBINING INTEGRATED CIRCUITS FOR A MULTITUDE OF TIMING FUNCTIONS, AND THE RELIABILITY OF RELAY TECHNOLOGY.

*** RELEVANT IEC CONTACT UTILIZATION CATEGORIES**

AC-1, AC-3, DC-1, AC-15

(SEE SECTION 11 FOR RELEVANT UTILIZATION CATEGORIES.)

SPECIFICATIONS CLASS 211 TIME DELAY RELAYS

TIMING

Operating Modes Available:	On Delay, Off Delay
Timing Adjustments Available:	0.1 to 1 Sec, thru 8 to 120 Minutes
Repeatability (repeat Accuracy when Stabilized):	±0.1% max. or ± 33 mS AC min. or ± 10 mS DC. min.@ Constant voltage & temperature
Timing change over temperature and voltage range:	± 10%
Timing Tolerance high end of range:	- 0 to + 40%
Timing Tolerance low end of range::	+ 0 to - 40%
Reset time:	100 Milliseconds Max.

CONTACTS

Contact Configuration::	DPDT (2 Form C)
Contact Rating:	10 Amps @ 120VAC/30VDC Resistive Load, 1/2 Hp @ 240 VAC, 1/3 Hp @120 VAC, NEMA B300 Pilot Duty.
Contact Life:	200,000 Operations @ 120VAC, 10Amp resistive Load. 1,000,000 Operations @ 120 VAC,5 Amp Resistive Load 2,000,000 Operations @ 120VAC, 2 Amps Resistive Load.
Mechanical Life:	50,000,000 Operations.

INPUT

Temperature Range (Operate):	- 30 ˚C to + 55˚C
Temperature Range (Storage):	- 55˚C to + 85˚C
Steady State Input Current:	20 mA @ 120 VAC, 40 mA @ 24 VDC, 20 mA @ 48 VDC 80 mA @ 24 VDC, 15 mA @ 230 VAC, 80 mA @ 12 VDC.

PROTECTION

Reverse Polarity:	DC models only
Transient:	UL 508 Surge test: 5000V for 50 uS
Noise Immunity:	NEMA ICS2-230 2500 VAC

DIELECTRIC STRENGTH

Coil to Contacts:	1500 V rms
Across Open Contacts:	1000 V rms

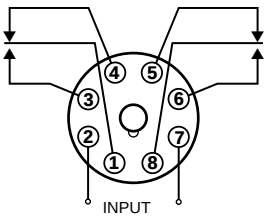
MECHANICAL

Enclosure:	Polycarbonate dust cover.
Mounting:	Standard 8 or 11 Pin Octal
Operating Position:	Any
Weight:	4 oz. (115 grams)

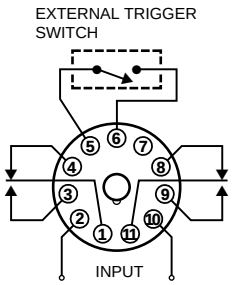
OCTAL 8 & 11 PIN TIME DELAY RELAY

WIRING DIAGRAMS
VIEWED FROM PIN END

ON DELAY

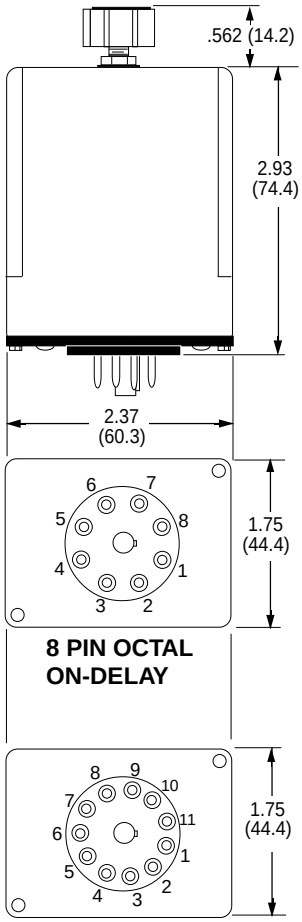


OFF DELAY



EXTERNAL SWITCH SHALL NOT BE CONNECTED TO ANY EXTERNAL LOAD OR VOLTAGE. DAMAGE TO INTERNAL COMPONENTS CAN OCCUR.

OUTLINE DIMENSIONS
Dimensions shown in Inches and (Millimeters)



Magnecraft

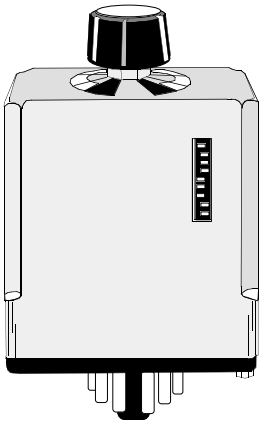
PART NUMBERS	NOMINAL INPUT VOLTAGE	TIMING RANGE	CROSS REFERENCE TO POTTER & BRUMFIELD
ON DELAY			
W211ACPSOX-18	120 VAC	0.1 to 1.0 Seconds	**CDB-38-70001**
W211ACPSOX-5	120 VAC	0.1 to 10 Seconds	**CDB-38-70003 ***
W211ACPSOX-7	120 VAC	1.0 to 180 Seconds	**CDB-38-70005 ***
W211ACPSOX-8	120 VAC	2.0 to 300 Seconds	**CGB-38-70005M**
W211ACPSOX-60	120 VAC	1.0 to 15 Minutes	**CGB-38-70010M**
W211ACPSOX-61	120 VAC	2.0 to 30 Minutes	**-**
W211ACPSOX-62	120 VAC	4.0 to 60 Minutes	**CGB-38-70050M**
W211ACPSOX-63	120 VAC	8.0 to 120 Minutes	**CB-1007B70**
W211CPSOX-1	24 VDC	0.1 to 10 Seconds	**CDD-38-30003 ***
W211CPSOX-3	24 VDC	1.0 to 180 Seconds	**CDD-38-30005 ***
OFF DELAY			
W211ACPSRX-5	120 VAC	0.1 to 10 Seconds	**CHB-38-70011**
W211ACPSRX-7	120 VAC	1.0 to 180 Seconds	**CHB-38-70013**
W211ACPSRX-8	120 VAC	2.0 to 300 Seconds	**-**
W211ACPSRX-60	120 VAC	1.0 to 15 Minutes	**-**
W211CPSRX-1	24 VDC	0.1 to 10 Seconds	**CHD-38-30011**
W211CPSRX-3	24 VDC	1.0 to 180 Seconds	**CHD-38-30013**

PART NUMBERS SHOWN ALSO **AVAILABLE THRU STOCKING DISTRIBUTION.**

*** ADDITIONAL EQUIVALENTS TO P&B**

W211ACPSOX-5	**W211CPSOX-1**
CGB-38-70010S	CHD-38-30001
CHB-38-70001	CB-1028D-30
CKB-38-70010	
CB-1003B-70	
W211ACPSOX-7	**W211CPSOX-3**
CKB-38-70180	CHD-38-30003
CHB-38-70003	CB-1030D-30
CB-1005B-70	

SEE SECTION 10
FOR
MATING SOCKETS



THE CLASS 211 TIME DELAY RELAY MAKES USE OF HYBRID CIRCUITRY, COMBINING INTEGRATED CIRCUITS FOR A MULTITUDE OF TIMING FUNCTIONS, AND THE RELIABILITY OF RELAY TECHNOLOGY.

CLASS 211 PROGRAMMABLE TIME DELAY RELAY

± 0.1 % REPEATABILITY
3 INPUT VOLTAGE RANGES
† 4 PROGRAMMABLE FUNCTIONS
† 62 PROGRAMMABLE TIMING RANGES
RATED AT 10 AMPS, DPDT CONTACTS

WHEN USED WITH SOCKET 70-465-1

UL Recognized
File No: E43641

SEE SECTION 10 FOR MATING SOCKETS

† SELECTION OF TIMING RANGE AND TIMING FUNCTIONS ARE OBTAINED BY SETTING SWITCH POSITIONS IN A DIP SWITCH BANK

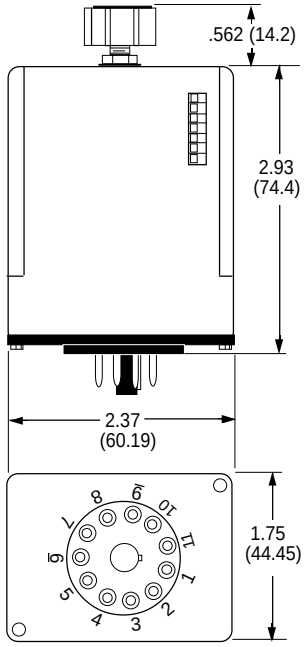
COMPLIES WITH REQUIREMENTS OF * IEC STANDARDS 947-4-1 AND 947-5-1 LOW VOLTAGE DIRECTIVE.

*1EC = INTERNATIONAL ELECTROTECHNICAL COMMISSION

*** RELEVANT IEC CONTACT UTILIZATION CATEGORIES**

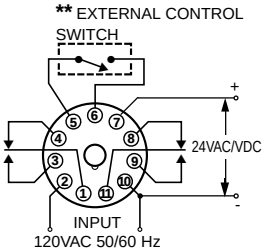
	AC-1, AC-3, DC-1, AC-15
	(SEE SECTION 11 FOR RELEVANT UTILIZATION CATEGORIES.)

OUTLINE DIMENSIONS
Shown in Inches and (Millimeters)



11 PIN OCTAL PLUG-IN

WIRING DIAGRAMS
VIEWED FROM PIN END



To function as a On-Delay timer, a jumper wire must be connected in place of the external control switch.

SPECIFICATIONS CLASS 211PROG TDR

TIMING

Operating Modes Available:	On Delay, Off Delay, One Shot, On & Off Delay
Timing Adjustments Available:	0.1 to 1 Sec, thru 12 to 120 Minutes
Repeatability (repeat Accuracy when Stabilized):	±0.1% max. or ± 33 mS AC min., or ± 10 mS DC.
Timing change over tempera-ture and voltage range:	± 10%
Timing Tolerance:	± 20 %
Reset time:	100 mS Relay On (200 mS max Relay Off)

CONTACTS

Contact Configuration:	DPDT (2 Form C)
Contact Rating:	10 Amps @ 120VAC/30VDC Resistive Load, 1/2 Hp @ 240 VAC, 1/3 Hp @ 120 VAC, NEMA B300 Pilot Duty.
Contact Life:	200,000 Operations @ 120VAC, 10 Amp resistive Load. 1,000,000 Operations @ 120VAC, 5 Amp Resistive Load 2,000,000 Operations @ 120VAC, 2 Amps Resistive Load.
Mechanical Life:	100,000,000 Operations.

INPUT

Temperature Range (Operate):	- 30 ˚C to + 55˚C
Temperature Range (Storage):	- 40˚C to + 85˚C
Steady State Input Current:	45 mA Max..

PROTECTION

Reverse Polarity:	Yes
Transient:	UL 508 Surge test: 5000V for 50 uS
Noise Immunity:	NEMA ICS2-230 2500VAC

DIELECTRIC STRENGTH

Coil to Contacts:	1500 V rms
Across Open Contacts:	1000 V rms

MECHANICAL

Enclosure:	Polycarbonate dust cover.
Mounting:	Standard 11 Pin Octal
Mounting Position:	Any
Weight:	4 oz. (115 grams)

Magnecraft

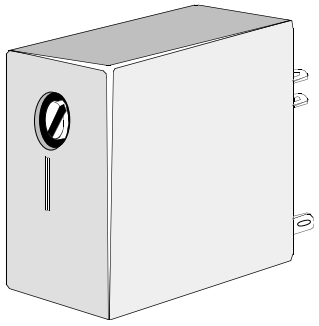
PART NUMBER	NOMINAL INPUT VOLTAGE	TIMING RANGE
ON DELAY, OFF DELAY, ONE SHOT, ON & OFF DELAY		
W211PROGX-1	120 VAC, 50/60Hz 24VAC/VDC on Pin 7	62 Programmable Timing Ranges.

PART NUMBERS SHOWN ALSO **AVAILABLE THRU STOCKING DISTRIBUTION.**

**EXTERNAL CONTROL SWITCH REQUIRED FOR OFF DELAY, ONE SHOT AND ON & OFF DELAY FUNCTIONS.
EXTERNAL SWITCH SHALL NOT BE CONNECTED TO ANY EXTERNAL LOAD OR VOLTAGE. DAMAGE TO INTERNAL COMPONENTS CAN OCCUR.

UL Recognized
File No: E43641

CLASS 67 TIME DELAY RELAY
± 2% REPEATABILITY
DC OPERATION
PLUG-IN/SOLDER TERMINALS



SPECIFICATIONS CLASS 67 TIME DELAY RELAYS

TIMING
- Operating Modes Available: On Delay,
- Timing Adjustments Available: 0.1 to 240 Seconds
- Repeatability (repeat Accuracy when Stabilized): ± 2% max. @ Nominal Voltage, 25˚C
- Reset time: 100 Milliseconds Max

CONTACTS
- Contact Configuration: DPDT (2 Form "C").
- Contact Rating: 5 Amps @ 120VAC/28 VDC Resistive
- Contact Life: 50,000 Operations @ 120 VAC 5 Amps Resistive
  1,500,000 Operations @ 120VAC, 2 Amps resistive Load.
  12,000,000 Operations @ 120 VAC 1Amp Resistive Load
- Mechanical Life: 50,000,000 Operations

INPUT
- Nominal Input Voltage: 12 VDC, 24 VDC
- Temperature Range (Operate): -30˚C to + 55˚C
- Temperature Range (Storage): -50˚C to +85˚C
- Steady State Input Current: 40 mA @ 24 VDC, 80 mA @ 12 VDC

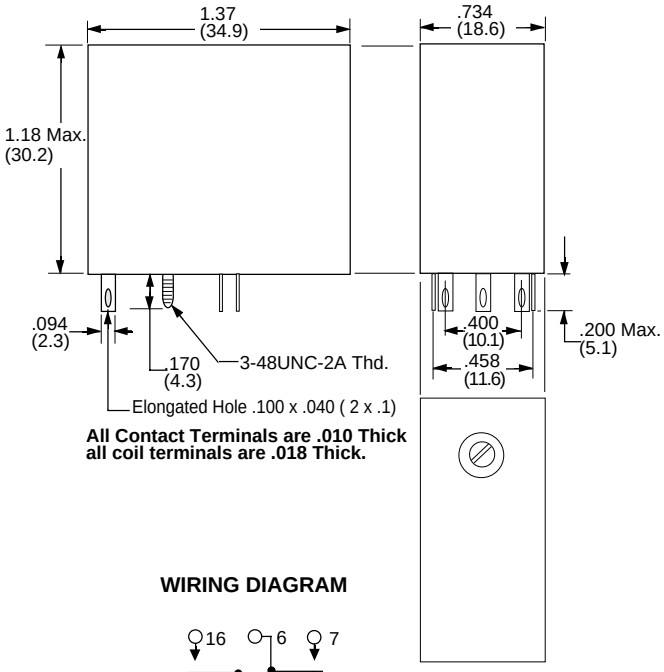
PROTECTION
- Reverse Polarity: DC models only
- Transient: Twice Nominal Voltage for 1 Millisecond

DIELECTRIC STRENGTH
- Coil to Contacts: 500 V rms
- Across Open Contacts: 1250 V rms

MECHANICAL
- Enclosure: Polycarbonate dust cover.
- Mounting: Socket Plug-in/Solder. Also Available with P.C. Terminals.
- Weight: 1.2 oz. 35.2 Grams

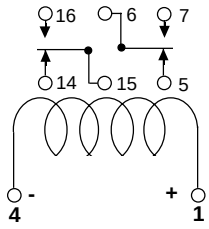
Special Note: **Use 6 Pole Socket** with plug-in style relays. .

OUTLINE DIMENSIONS
Dimensions shown are in Inches and (Millimeters).



All Contact Terminals are .010 Thick all coil terminals are .018 Thick.

WIRING DIAGRAM



VIEWED FROM PIN END

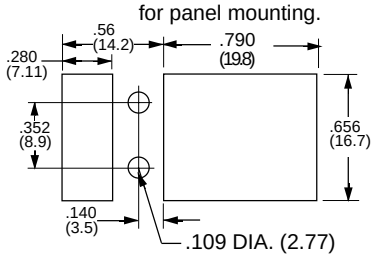
Magnecraft

PART NUMBERS	NOMINAL INPUT VOLTAGE	TIMING RANGE	CROSS REFERENCE TO POTTER & BRUMFIELD
"ON" DELAY			
W67CPSOX-1	12 VDC	0.1 to 30 Seconds	**R12-3012X2E1**
W67CPSOX-2	24 VDC	0.1 to 30 Seconds	**R12-3024X2E1**

PART NUMBERS SHOWN ALSO **AVAILABLE THRU STOCKING DISTRIBUTION**

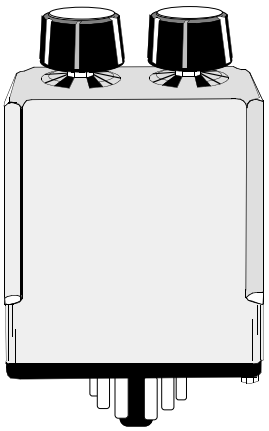
OTHER COIL VOLTAGES, TIMING RANGES, P.C. TERMINALS AND 4PDT CONTACT COMBINATION AVAILABLE ON SPECIAL ORDER.
120 VAC INPUT DESIGN AVAILABLE, CONTACT FACTORY.

CHASSIS CUTOUT
for panel mounting.



SEE SECTION 10 FOR MATING SOCKETS

OCTAL 8 PIN REPEAT CYCLE TIMER



CLASS 222

± 0.1 % REPEATABILITY
DPDT, 10 AMP CONTACTS
FIELD ADJUSTABLE ON AND OFF TIME.

SEE SECTION 10 FOR MATING SOCKETS

UL Recognized
File No. E43641

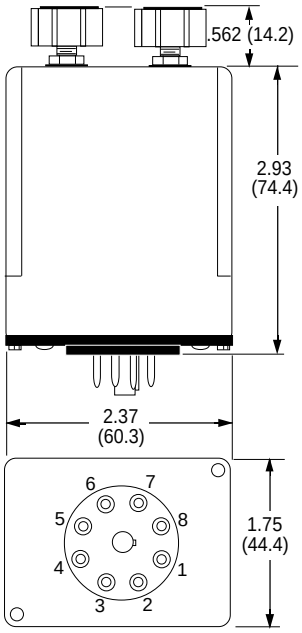
COMPLIES WITH
REQUIREMENTS OF
* IEC STANDARDS
947-4-1 AND 947-5-1
LOW VOLTAGE DIRECTIVE.

*1EC = INTERNATIONAL
ELECTROTECHNICAL COMMISSION

*** RELEVANT IEC CONTACT UTILIZATION CATEGORIES**

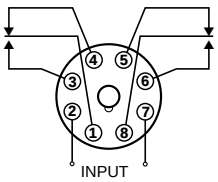
	AC-1, AC-3, DC-1, AC-15
	(SEE SECTION 11 FOR RELEVANT UTILIZATION CATEGORIES.)

THE CLASS 222 REPEAT CYCLE TIME DELAY RELAY CAN BE ADJUSTED TO ACHIEVE INDEPENDENT TIME SETTINGS FOR BOTH **"ON"** AND **"OFF"** TIMING RANGES.



8 PIN OCTAL
ON-DELAY

WIRING DIAGRAMS
VIEWED FROM PIN END



SPECIFICATIONS CLASS 222 REPEAT CYCLE TIMER

TIMING

Operating Modes Available:	Repeat cycle timing only.
Timing Adjustments Available:	0.1 to 1 Sec, to 24 hours
Repeatability (repeat Accuracy when Stabilized):	±0.1% max. or ± 33 mS AC min. or ± 10 mS DC min. at constant voltage & temperature..
Timing change over tempera- ture and voltage range:	± 10%
Timing Tolerance high end of range:	- 0 to + 40%
Timing Tolerance low end of range::	+ 0 to - 40%
Reset time:	100 Milliseconds Max.

CONTACTS

Contact Configuration:	DPDT (2 Form C)
Contact Rating:	10 Amps @ 120VAC/30VDC Resistive Load, 1/2 Hp @ 240 VAC, 1/3 Hp @ 120 VAC, NEMA B300 Pilot Duty.
Contact Life:	200,000 Operations @ 120VAC, 10Amp resistive Load. 1,000,000 Operations @ 120 VAC 5 Amp Resistive Load 2,000,000 Operations @ 120VAC 2 Amps Resistive Load.
Mechanical Life:	50,000,000 Operations.

INPUT

Temperature Range (Operate):	- 30 ˚C to + 55˚C
Temperature Range (Storage):	- 55˚C to + 85˚C
Steady State Input Current:	25 mA @ 120 VAC, 45 mA @ 24 VDC, 24 mA @ 48 VDC 85 mA @ 24 VDC, 25 mA @ 230 VAC.

PROTECTION

Reverse Polarity:	DC models only
Transient:	UL 508 Surge test: 5000V for 50 uS
Noise Immunity:	NEMA ICS2-230 2500VAC

DIELECTRIC STRENGTH

Coil to Contacts:	1500 V rms
Across Open Contacts:	1000 V rms

MECHANICAL

Enclosure:	Polycarbonate dust cover.
Mounting:	Standard 8 Pin Octal
Mounting Position:	Any
Weight:	5 oz. (132 grams)

Magnecraft

PART NUMBERS	NOMINAL INPUT VOLTAGE	TIMING RANGE "ON" (T1) TIMING	TIMING RANGE "OFF" (T2) TIMING	CROSS REFERENCE TO POTTER & BRUMFIELD
REPEAT CYCLE				
W222ACPFX-11	120 VAC	0.1 to 10 Seconds	0.1 to 10 Seconds	**CRB-48-70010**
W222ACPFX-16	120 VAC	3 to 300 Seconds	3 to 300 Seconds	**-**
W222ACPFX-27	120 VAC	2 to 30 Minutes	2 to 30 Minutes	**-**

PART NUMBERS SHOWN ALSO **AVAILABLE THRU STOCKING DISTRIBUTION.**
OTHER VOLTAGES AND TIMING RANGES AND AVAILABLE THRU SPECIAL ORDER. CONTACT FACTORY.

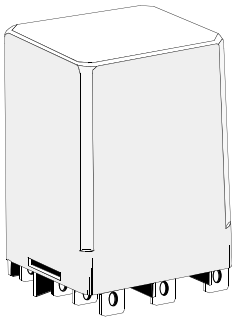
UL Recognized
File No: E43641

COMPLIES WITH
REQUIREMENTS OF
* IEC STANDARDS
947-4-1 AND 947-5-1
LOW VOLTAGE DIRECTIVE.

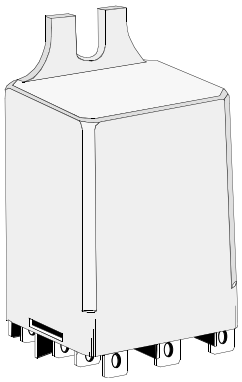
*1EC = INTERNATIONAL
ELECTROTECHNICAL COMMISSION

CLASS 388
SHORT BODY
EXTERNAL
RESISTANCE
ADJUSTABLE

± 3 % REPEATABILITY
DPDT, 12 AMP CONTACTS
FIELD ADJUSTABLE TIMING
"ON" or "OFF" DELAY FUNCTIONS



PLUG-IN STYLE



FLANGE MOUNT STYLE

*** RELEVANT IEC CONTACT UTILIZATION CATEGORIES**

AC-1, AC-3, DC-1, AC-15
(SEE SECTION 11 FOR RELEVANT UTILIZATION CATEGORIES.)

SPECIFICATIONS CLASS 388 TIME DELAY RELAYS

TIMING

Operating Modes Available:	On Delay, Off Delay
Timing Adjustments Available:	.1 to 1 Seconds to 24 Hours
Repeatability:	±0.1% max. or ± 33 mS AC min. or ± 10 mS DC.@ Constant Voltage & Temperature.
Percent Timing change over temperature and voltage Range:	± 10%
Timing Tolerance high end	- 0 to + 40%
Timing Tolerance low end:	+ 0 to - 40%

CONTACTS

Contact Configuration:	DPDT (2 Form C)
Contact Rating:	12 Amps @ 120 VAC/28 VDC Resistive 1/3 HP, 120 VAC, 1/2 HP, 240 VAC B300 Pilot Duty.
Contact Life:	100,000 Operations @ 120 VAC 12 Amps Resistive Load. 1,000,000 Operations @ 28 VDC 5 Amps Resistive Load.
Mechanical Life:	5,000,000 Operations

INPUT

Temperature Range (Operate):	- 30 ˚C to + 55˚C
Temperature Range (Storage):	- 55˚C to + 85˚C
Steady State Input Current:	20 mA @ 120 VAC, 60 mA @ 24 VDC,

PROTECTION

Reverse Polarity:	DC models only
Transient:	Twice nominal voltage for 1 millisecond

DIELECTRIC STRENGTH

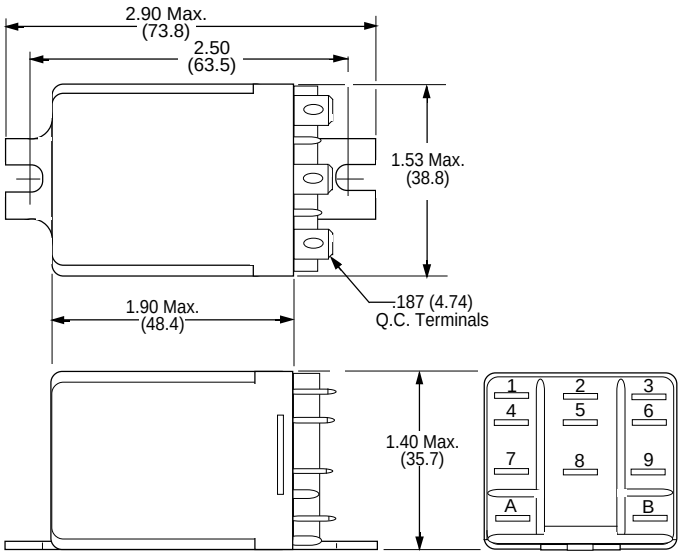
Coil to Contacts:	1500 V rms
Across Open Contacts:	1000 V rms

MECHANICAL

Enclosure:	Polycarbonate dust cover.
Operating Position:	Any
Weight:	3 oz. 96 grams

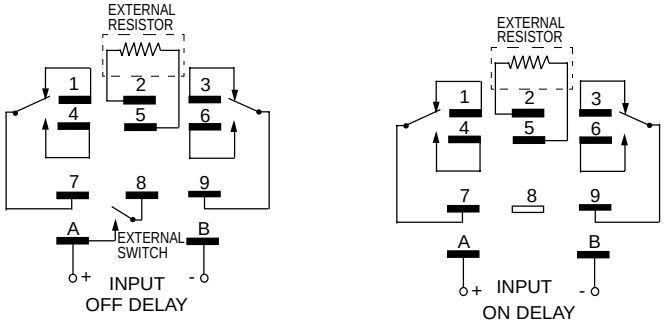
12 AMP ADJUSTABLE TIME DELAY RELAY

OUTLINE DIMENSIONS
Dimensions Shown in "Inches " & (Millimeters).



THE PLUG-IN STYLE TIMER HAS THE SAME CASE DIMENSIONS AS THE FLANGE MOUNT STYLE EXCEPT IT HAS NO FLANGE AND IT IS ALSO SOCKET MOUNTABLE.

WIRING DIAGRAMS FOR FIXED STYLE TIME DELAY RELAYS
Voltage must be applied to terminals "A" & "B" continuously.



THE EXTERNAL TRIGGER SWITCH SHOULD NOT BE CONNECTED TO ANY EXTERNAL LOAD OR VOLTAGE SOURCE. DAMAGE TO INTERNAL COMPONENTS CAN OCCUR.

Magnecraft

PART NUMBER	NOMINAL INPUT VOLTAGE	TIMING RANGE	EXTERNAL RESISTOR	CROSS REFERENCE TO POTTER & BRUMFIELD
ON DELAY PLUG-IN STYLE				
W388ACPSOX-1	120 VAC	0.1 to 10 Seconds	20K OHMS PER SECOND	**CUF-41-70010**
W388ACPSOX-2	120 VAC	1.0 to 120 Seconds		**CUF-41-70120**
W388CPSOX- 1	24 VDC	0.1 to 10 Seconds	16 K OHMS PER SECOND	**CUH-41-30010**
W388CPSOX-2	24 VDC	1.0 to 120 Seconds		**CUH-41-30120**
ON DELAY SURFACE MOUNT FLANGE STYLE				
W388ACQSOX-1	120 VAC	0.1 to 10 Seconds	20 K OHMS PER SECOND	**CUF-42-70010**
W388ACQSOX-2	120 VAC	1.0 to 120 Seconds		**CUF-42-70120**
W388CQSOX-2	24 VDC	1.0 to 120 Seconds		**CUH-42-30120**
OFF DELAY PLUG-IN STYLE				
W388CPSRX-22	24 VDC	1.0 to 120 Seconds	16KΩ per Second	-

PART NUMBERS SHOWN ALSO **AVAILABLE THRU STOCKING DISTRIBUTION.**

SEE SECTION 10
FOR MATING SOCKETS

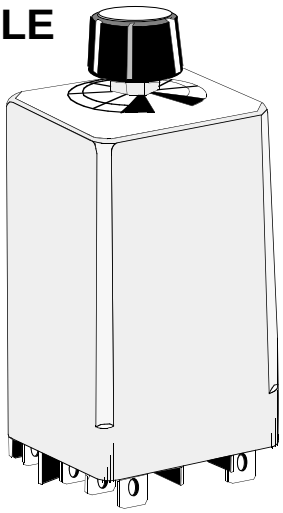
UL Recognized
File No: E43641

COMPLIES WITH
REQUIREMENTS OF
* IEC STANDARDS
947-4-1 AND 947-5-1
LOW VOLTAGE DIRECTIVE.

*1EC = INTERNATIONAL
ELECTROTECHNICAL ICOMMISSION

CLASS 388 ADJUSTABLE

CHOICE OF LONG or MEDIUM BODY
± 0.1 % REPEATABILITY
DPDT, 12 AMP CONTACTS
FIELD ADJUSTABLE TIMING
"ON" or "OFF" DELAY FUNCTIONS



*** RELEVANT IEC CONTACT UTILIZATION CATEGORIES**

AC-1, AC-3, DC-1, AC-15
(SEE SECTION 11 FOR RELEVANT UTILIZATION CATEGORIES.)

SPECIFICATIONS CLASS 388 TIME DELAY RELAYS

TIMING

Operating Modes Available:	On Delay, Off Delay
Timing Adjustments Available:	.1 to 1 Seconds to 8 to 120 Minutes
Repeatability:	±0.1% ± 33 mS AC min. or ± 10 mS DC. @ Constant Voltage & Temperature.
Timing change over temperature and voltage Range:	± 10%
Timing Tolerance high end:	- 0 to + 40%
Timing Tolerance low end:	+ 0 to - 40%
Reset Time:	100 mS Max.

CONTACTS

Contact Configuration:	DPDT (2 Form C)
Contact Rating:	12 Amps @ 120 VAC/28 VDC Resistive 1/3 HP, 120 VAC, 1/2 HP, 240 VAC NEMA B300 Pilot Duty.
Contact Life:	100,000 Operations @ 120 VAC 12 Amps Resistive Load. 1,000,000 Operations @ 120 VAC 5 Amps Resistive Load 2,000,000 Operations @ 120 VAC 2 Amps Resistive Load.
Mechanical Life:	5,000,000 Operations

INPUT

Temperature Range (Operate):	- 30 ˚C to + 55˚C
Temperature Range (Storage):	- 55 ˚C to + 85˚C
Steady State Input Current:	20 mA @ 120 VAC, 60 mA @ 24 VDC, 20mA @ 48 VDC, 80 mA @ 24 VAC, 15 mA @ 230 VAC, 120mA @ 12 VDC

PROTECTION

Reverse Polarity:	DC models only
Transient:	UL 508 Surge test: 5000V for 50 uS (Long Body Only). Twice Nominal for 1 Millisecond (Medium Body Only).
Noise Immunity:	NEMA ICS2-230: 2500 VAC (Long Body Only).

DIELECTRIC STRENGTH

Coil to Contacts:	2000 V rms
Across Open Contacts:	1000 V rms

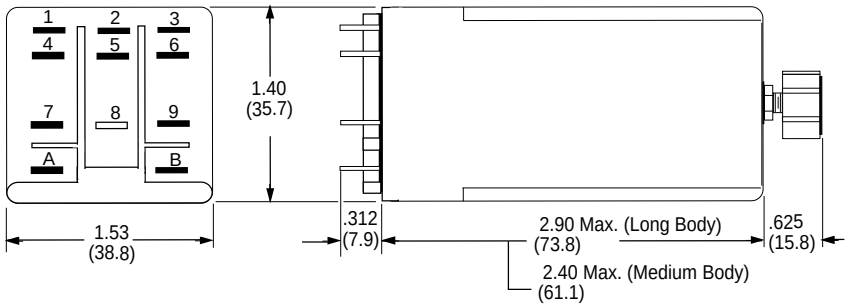
MECHANICAL

Enclosure:	Polycarbonate dust cover.
Terminals:	3/16" Q.C. Terminals. P.C. Available.
Mounting Position:	Any
Weight:	Aprox. 4 oz., 96 grams

12 AMP ADJUSTABLE TIME DELAY RELAY

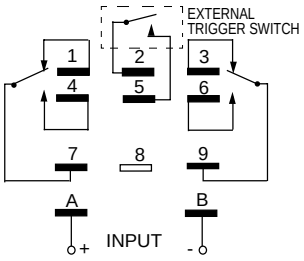
OUTLINE DIMENSIONS

Dimensions are Shown In Inches and (Millimeters).

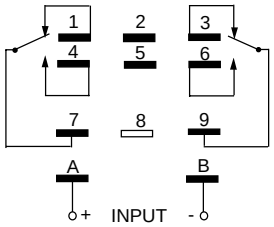


WIRING DIAGRAMS FOR ADJUSTABLE STYLE TIME DELAY RELAYS

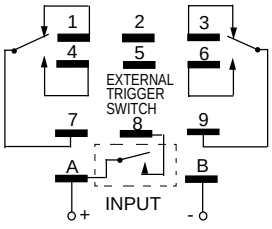
Voltage must be applied to terminals "A" & "B" continuously.



OFF DELAY LONG BODY



ON DELAY LONG & MEDIUM BODY



OFF DELAY MEDIUM BODY

THE EXTERNAL TRIGGER SWITCH SHOULD NOT BE CONNECTED TO ANY EXTERNAL LOAD OR VOLTAGE SOURCE. DAMAGE TO INTERNAL COMPONENTS CAN OCCUR.

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PART NUMBERS	NOMINAL INPUT VOLTAGE	TIMING RANGE	CROSS REFERENCE TO POTTER & BRUMFIELD
ON DELAY - LONG BODY			
W388ACPSOX-42	120 VAC	0.1 to 10 Seconds	-
W388ACPSOX-44	120 VAC	1.0 to 180 Seconds	-
OFF DELAY - LONG BODY			
W388CPSRX-2	24 VDC	0.1 to 10 Seconds	-
W388CPSRX-4	24VDC	1.0 to 180 Seconds	-
OFF DELAY - MEDIUM BODY			
W388ACPSRX-101	120 VAC	1.0 to 120 Seconds	-
ON DELAY - MEDIUM BODY			
W388ACPSOX-101	120 VAC	1.0 to 120 Seconds	**CLB-51-70120 ***
OFF DELAY - MEDIUM BODY			
W388CPSRX-23	24 VDC	1.0 to 120 Seconds	-
ON DELAY - MEDIUM BODY			
W388CPSOX-101	24 VDC	1.0 to 120 Seconds	-

* THE CASE LENGTH ON THE MAGNECRAFT MEDIUM BODY IS 2.40 LONG VS P&B, 2.156 LONG.
PART NUMBERS SHOWN ALSO **AVAILABLE THRU STOCKING DISTRIBUTION.**

**SEE SECTION 10
FOR MATING SOCKETS**

ADJUSTABLE TRUE OFF DELAY RELAY

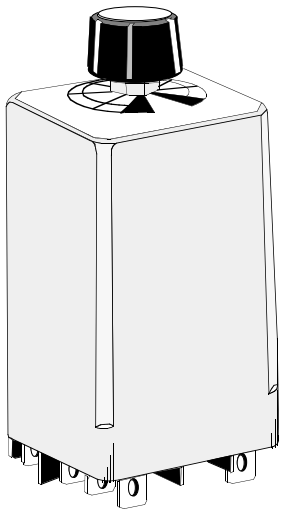
UL Recognized
File No: E43641

COMPLIES WITH
REQUIREMENTS OF
* IEC STANDARDS
947-4-1 AND 947-5-1
LOW VOLTAGE DIRECTIVE.

*1EC = INTERNATIONAL
ELECTROTECHNICAL COMMISSION

CLASS 388
TRUE OFF DELAY

DOES NOT REQUIRE CONTROL POWER DURING TIMING CYCLE
± 3% REPEAT TIMING ACCURACY
FIELD ADJUSTABLE



The Class 388 Adjustable True Off Delay Relay combines a Solid State Timing circuit with a state of the art Magnetic Latching relay. This combination allows the relay to Pull-in when power is applied to the input. Timing starts when power is removed from the input and at the end of the preset timing period the relay will dropout.

*** RELEVANT IEC CONTACT UTILIZATION CATEGORIES**

AC-1, AC-3, DC-1, AC-15
(SEE SECTION 11 FOR RELEVANT UTILIZATION CATEGORIES.)

SPECIFICATIONS CLASS 388 TRUE OFF DELAY

TIMING

Operating Modes Available:	True Off Delay
Timing Adjustments Available:	0.1 to 10 Seconds thru 0.5 to 5 Minutes
Repeatability:	± 3% @ Nominal Voltage & 25˚C
Reset time:	100 mS Max.

INPUT

Temperature Range Operate:	- 10˚C to + 55˚C
Temperature Range Storage:	- 40˚C to + 85˚C
Input Current:	10 mA @ 120VAC, 15 mA @ 24VDC fixed

CONTACTS

Contact Configuration:	DPDT (2 Form C)
Contact Rating:	12 Amps @ 120 VAC/28 VDC Resistive 1/3 HP, 120 VAC, 1/2 HP, 240 VAC NEMA B300 Pilot Duty.
Contact Life:	100,000 Operations @ 120 VAC 12 Amps Resistive Load. 1,000,000 Operations @ 120 VAC 5 Amps Resistive Load 2,000,000 Operations @ 120 VAC 2 Amps Resistive Load.

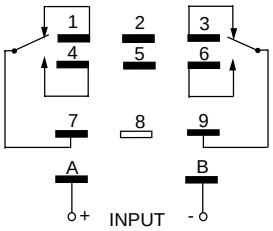
DIELECTRIC STRENGTH

Coil to Contacts:	2000 V rms
Across Open Contacts:	1000 V rms
Transient:	2000 VAC for 50 Microseconds
Reverse Polarity Protection:	(DC Models Only)

MECHANICAL

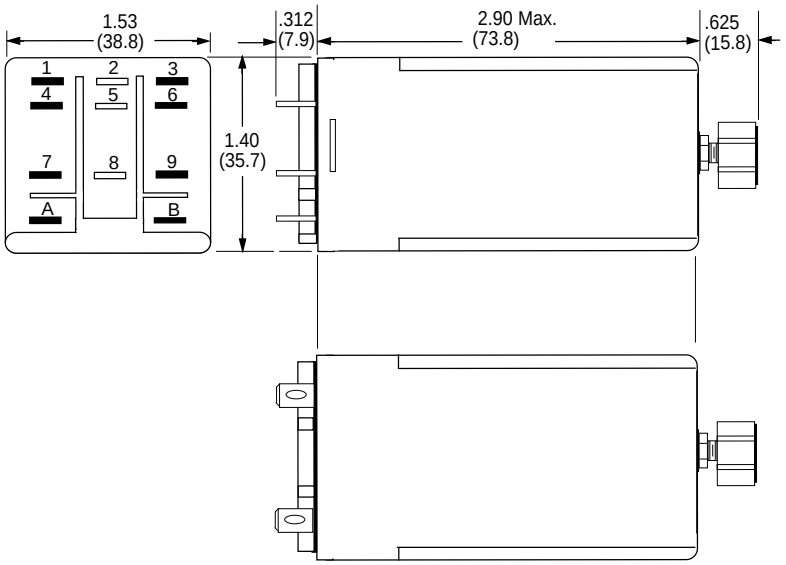
Enclosure:	Polycarbonate dust cover
Mounting:	Square Base Plug-in
Terminals:	3/16" X .020" Quick Connect, P.C. Terminals Available
Weight:	4 oz. 96 grams

WIRING DIAGRAM
Viewed from Pin End



Observe polarity on DC models

OUTLINE DIMENSIONS
Dimensions are Shown In Inches and Millimeter



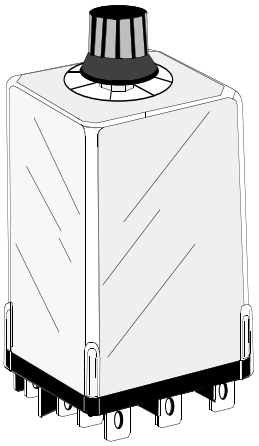
Magnecraft

PART NUMBERS	NOMINAL INPUT VOLTAGE	TIMING RANGE
AC OPERATED		
W388ACPSRX-29	120 VAC	0.6 to 60 Seconds
W388ACPSRX-30	120 VAC	0.1 to 10 Seconds
DC OPERATED		
W388CPSRX-35	24 VDC	0.1 to 10 Seconds
W388CPSRX-36	24 VDC	0.6 to 60 Seconds

PART NUMBERS SHOWN ALSO **AVAILABLE THRU STOCKING DISTRIBUTION.**

SEE SECTION 10 FOR MATING SOCKETS

10 AMP SQUARE BASE TIME DELAY RELAY



SERIES 286 ON DELAY, 287 OFF DELAY
AC OR DC INPUT
1, 2 OR 3 POLE 10 AMP CONTACTS.

UL Recognized
File No. E13224

The series 286 On Delay & 287 Off Delay Time Delay Relays have timing ranges from 0.1 to 300 Seconds. The 286 timer has up to three poles and the 287 timer has up to two poles. The 286 & 287 time delay relays are rated at 10 Amps, 120/240 Vac, 28 Vdc.

SEE SECTION 10 FOR MATING SOCKETS

GENERAL SPECIFICATIONS SERIES 306 TIMER

INPUT
Coil Voltage
- Nominal Voltage: **AC:** 24 to 240, **DC:** 12 to 125
- Minimum Oper. Voltage: AC - 85% of Nominal; DC - 80% of Nominal
- Max. allowed voltage: 110% of nominal voltage

CONTACTS
- Contact Material: Silver Cadmium Oxide.
- Rating: 10 Amps @ 120/240 VAC; 10 Amps @ 28 VDC; 1/3 Hp@ 120AC; 1/2 Hp @ 240 VAC

OPERATIONAL CHARACTERISTICS
- Repeatability: ± 3% @ 20˚C to 25˚C (AC +16 mS)
- Accuracy: Adjustable ± 10% Within temperature & voltage range. Fixed: ± 10% @ 25˚C
- Recycle Time: 100 mS up to 60 Seconds\ 150 mS, 60 to 300 Seconds

INSULATION CHARACTERISTICS
- Dielectric Strength: 500 V rms across open contacts
- All Mutually Insulated Points: 1500 V rms between current carrying parts
- Insulation Resistance: 1000 Megohms min. @ 500 VDC.
- Transient Protection: 5 mS, 0 to 2000 V 20 uSec peak
- False Contacting: No false contacting is power is interupted during timing.
- Inverse polarity protection: DC coil are polarity protected.

ENVIRONMENTAL CAPABILITIES
- Ambient Temperature Rating: 10˚C to +70 ˚C

LIFE EXPECTANCY
- Mechanical: 10 Million Operations no load
- Electrical: 100,000 Operations @ Rated Load.

MISCELLANEOUS
- Enclosure: Clear Polycarbonate
- Weight: 5.0 oz approx. (142 g)

Magnecraft & Struthers-Dunn

Typical Part Number **286 XAX C 001 F 120A**

Series
286 - ON DELAY
287 - OFF DELAY

Contact Arrangements
XAX (SPDT)
XBX (DPDT)
XCX (3PDT)

Mounting Options
- C Plug-in
- C1[Note 1] Bracket
- CS1[Note 1] Top Stud
- C2 Side Tapped Hole
- CS2 Side Stud

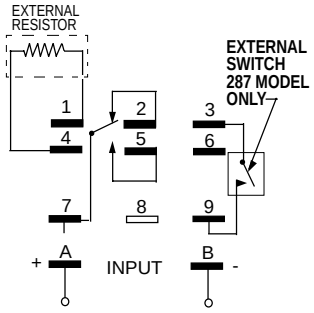
Timing Ranges
- 0.1 - 1.0 Sec - **Code 001**
- 0.2 - 2.0 Sec - **Code 002**
- 1.0 - 10 Sec - **Code 010**
- 3.0 - 30 Sec - **Code 030**
- 6.0 - 60 Sec - **Code 060**
- 18 - 180 Sec - **Code 180**
- 30 - 300 Sec - **Code 300**

Adjustment Options
- Adjustment Knob) - **No Code**
- Fixed Delay - Specify Fixed Time & **Code F ***
- Remote Adjustment - **Code R ****

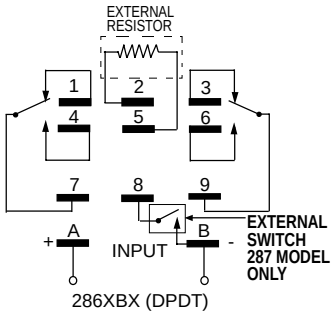
Operating Voltage
- AC; 24, 48, 120, 240 **(Add "A")**
- DC; 12, 24, 48, 115-125 **(Add "D")**

(F * Models) - timing code does not apply. Specify single delay time requirement
(R ** Models)- Available only for SPDT and DPDT models. External potentiometer required.
Example of typical fixed time delay relay part number- **286XBXCS1-3.5F-120A** (ON DELAY, DPDT, TOP STUD, 3.5 SEC FIXED, 120 VAC COIL INPUT)

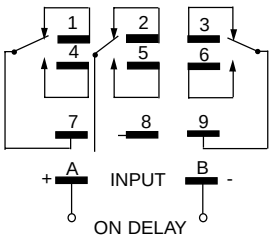
WIRING DIAGRAM
Viewed from Terminal Side



286XAX (SPDT)
287XAX (SPDT)



286XBX (DPDT)
287XBX (DPDT)



ON DELAY
286XCX

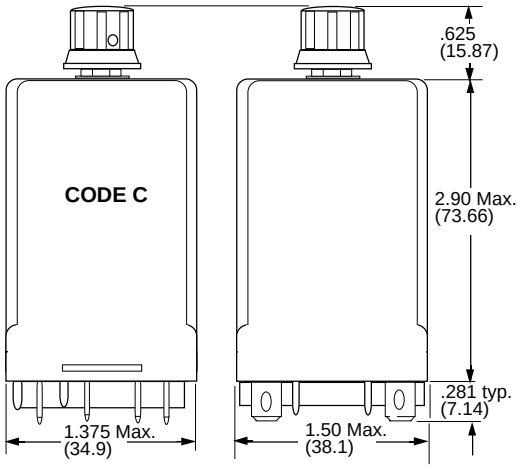
SEE SECTION 10 FOR MATING SOCKETS

Notes:
Note 1: Bracket & top stud Not available with adjustable timing.

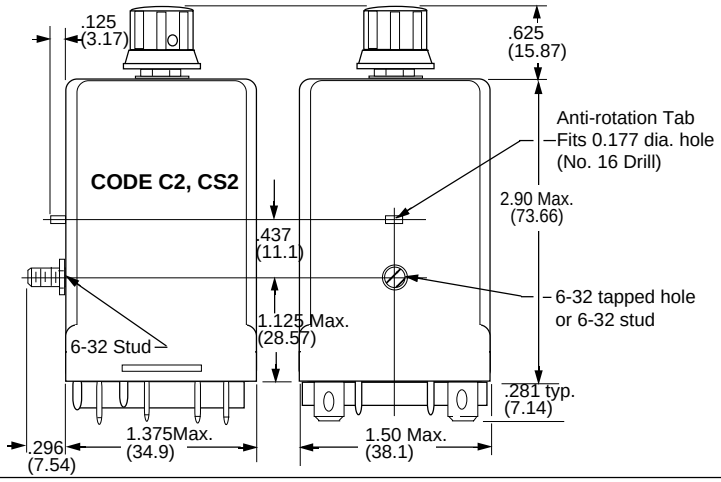
OUTLINE DIMENSIONS

Dimensions shown are in INCHES and (millimeters)

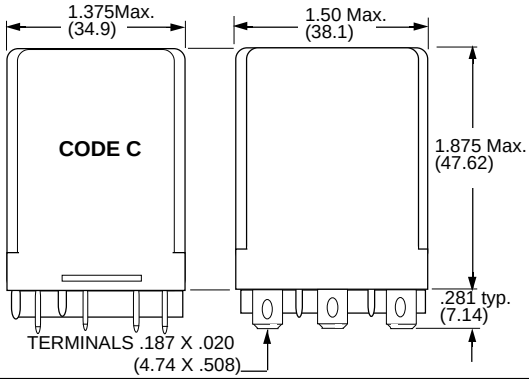
PLUG-IN, ADJUSTABLE TIMING



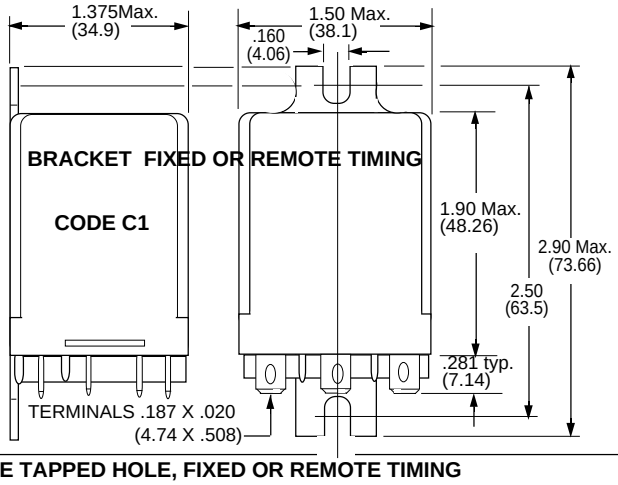
SIDE STUD OR TAPPED HOLE, ADJUSTABLE TIMING



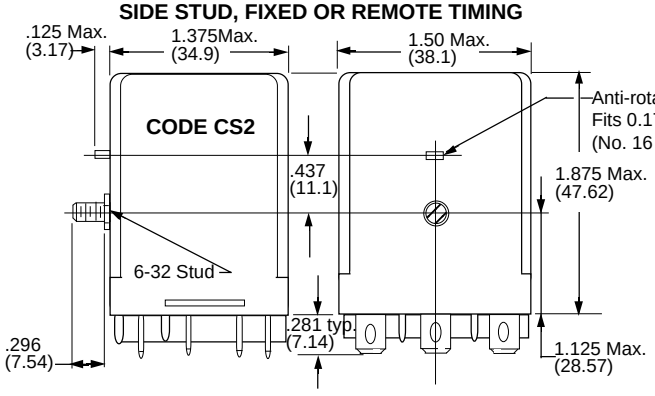
PLUG-IN FIXED OR REMOTE TIMING



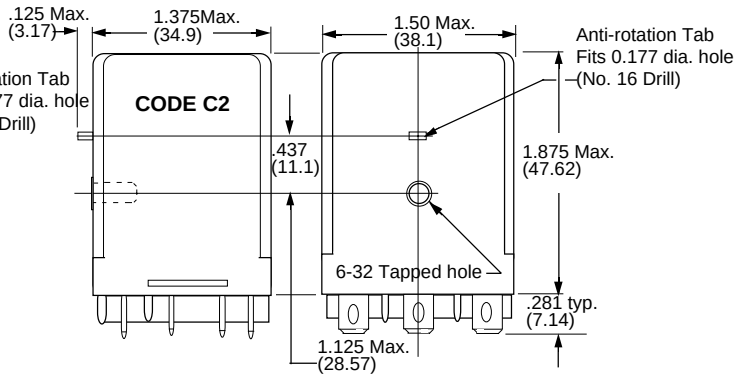
BRACKET FIXED OR REMOTE TIMING



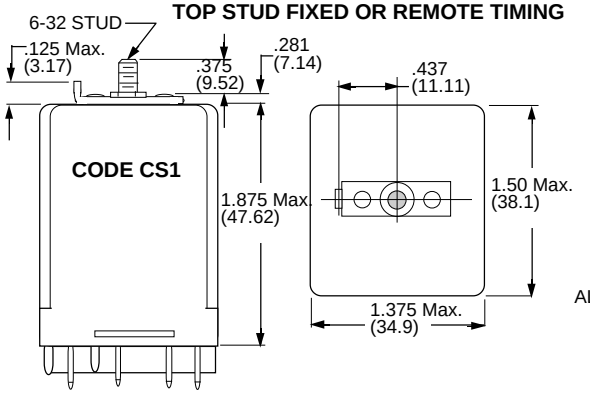
SIDE STUD, FIXED OR REMOTE TIMING

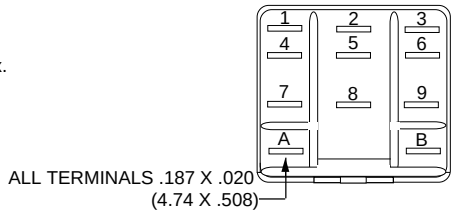


SIDE TAPPED HOLE, FIXED OR REMOTE TIMING

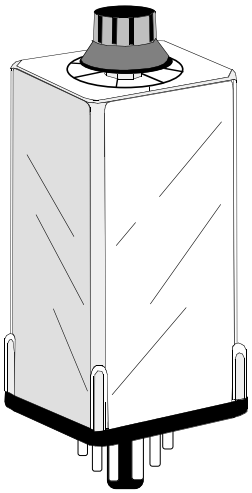


TOP STUD FIXED OR REMOTE TIMING





OCTAL 8 & 11 PIN TIME DELAY RELAY



SERIES 326 ON DELAY, & 327 OFF DELAY
AC OR DC INPUT
1, 2 OR 3 POLES
8 OR 11 PIN OCTAL BASES
TIMING: FIXED, ADJUSTABLE OR REMOTE

UL Recognized
File No. E13224

GENERAL SPECIFICATIONS SERIES 306 TIMER

INPUT
Coil Voltage

Nominal Voltage:	**AC:** 24 to 240, **DC:** 12 to 125
Minimum Oper. Voltage:	AC - 85% of Nominal DC - 80% of Nominal
Max. allowed voltage:	110% of nominal voltage

CONTACTS

Contact Material:	Silver Cadmium Oxide.
Rating:	10 Amps @ 120/240 VAC 10 Amps @ 30 VDC 1/3 Hp@ 120AC 1/2 Hp @ 240 VAC

OPERATIONAL CHARACTERISTICS

Repeatability:	DC: ± 3% @ 20˚C. AC: ± 3% +16 mS @ 20˚C.
Accuracy:	Adjustable ± 10% Within temperature & voltage range.
Switching time of output relay:	20 mS
Min. waiting time before starting next cycle (reset time):	100 mS (for timing cycle up to 60 sec.) 150 mS (for timing cycle 60 to 300 sec)

INSULATION CHARACTERISTICS

Dielectric Strength: All Mutually Insulated Points	500 V rms across open contacts 1500 V rms between mutually insulated conductive elements.
Insulation Resistance:	1000 Megohms min. @ 500 VDC.
Transient Protection:	5 mS, 0 to 2000 V 20 uSec peak

ENVIRONMENTAL CAPABILITIES

Ambient Temperature Rating:	-10˚C to +70 ˚C

LIFE EXPECTANCY

Mechanical:	10 Million Operations no load
Electrical:	100,000 Operations @ Rated Load.

MISCELLANEOUS

Enclosure:	Clear Polycarbonate
Weight:	5.0 oz approx. (142 g)

Magnecraft & Struthers-Dunn

Typical Part Number **326 XAX 48P 001 F 120A**

Series
326 - 0N DELAY
327 - OFF DELAY

Contact Arrangements
XAX (SPDT)
XBX (DPDT)
XCX (3PDT)

Construction Style
Octal style plug-in - **Code 48P**
Non Standard Wiring - **Code 48P-K**

Timing Ranges
0.1 - 1.0 Sec - **Code 001**
0.2 - 2.0 Sec - **Code 002**
1.0 - 10 Sec - **Code 010**
3.0 - 30 Sec - **Code 030**
6.0 - 60 Sec - **Code 060**
18 - 180 Sec - **Code 180**
30 - 300 Sec - **Code 300**

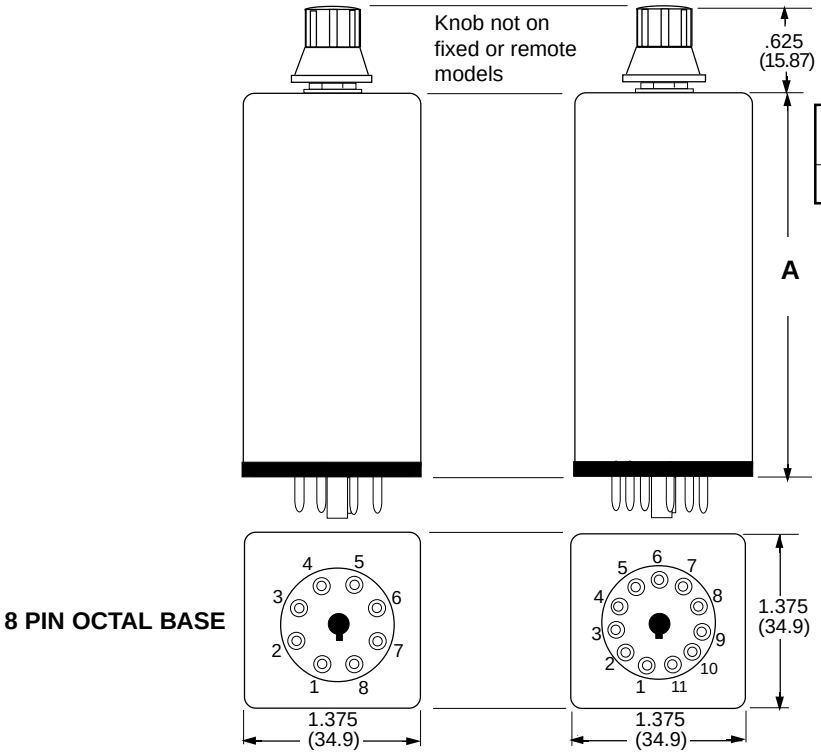
Adjustment
Adjustment Knob) - **No Code**
Fixed Delay - Specify Fixed Time & **Code F ***
Remote Adjustment - **Code R ****

Operating Voltage
AC; 24, 48, 120, 240 **(Add "A")**
DC; 12, 24, 48, 115-125 **(Add "D")**

(F * Models) - timing code does not apply. Specify single delay time requirement
(R ** Models)- Available only for SPDT and DPDT models. External fixed or adjustable resistor required.
Example of typical fixed time delay relay part number- **326XBX48P3.5F-120A**
(ON DELAY, DPDT, OCTAL PLUG, 3.5 SEC FIXED, 120 VAC POWER INPUT)

SEE SECTION 10 FOR MATING SOCKETS

OUTLINE DIMENSIONS



DIMENSION A

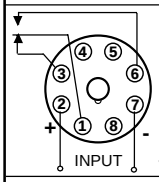
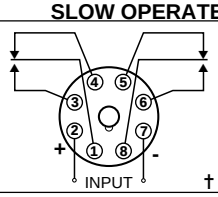
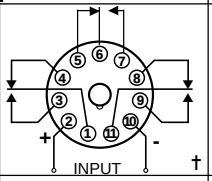
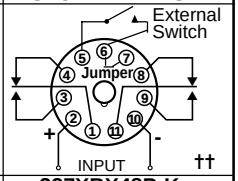
ADJUSTABLE WITH KNOB STYLE	FIXED OR REMOTE STYLE 326 Only
3.0 (76.2)	2.25 (57.15)

Dimensions shown are in INCHES and (millimeters)

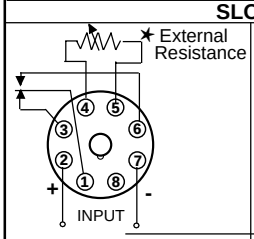
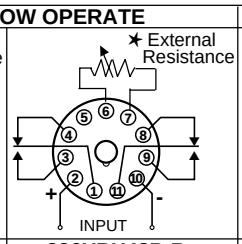
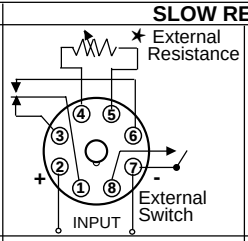
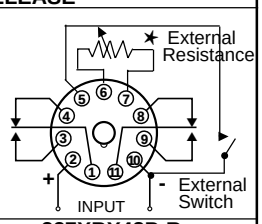
WIRING DIAGRAMS

(VIEWED FROM PIN END) ✶ ✶

MODELS WITH INTERNAL TIMING RESISTOR

SLOW OPERATE			SLOW RELEASE
			
326XAX48P	326XBX48P	326XCX48P	327XBX48P-K Non Standard

MODELS WITH EXTERNAL (REMOTE) TIMING RESISTOR

SLOW OPERATE		SLOW RELEASE	
			
326XAX48P-R	326XBX48P-R	327XAX48P-R	327XBX48P-R

✶ External Resistor for remote timing adjustment on models 326 or 327 with code R.

† This Diagram also applies to fixed time (code F) models.

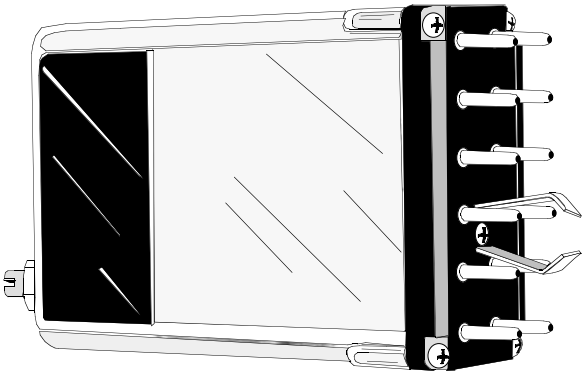
†† Duplicates wiring of some similar relays made by others.

✶ ✶ Observe Polarity on DC input models

12 PIN, 10 AMP, TIME DELAY RELAY

SERIES 236 ON DELAY, 237 OFF DELAY & 238 BATCH CONTROL INTERVAL (SEE NOTE 3)
AC OR DC INPUT
DPDT OR DPDT WITH 1 N.O. CONTACT ON SERIES 236 & 238
12 PIN PLUG-IN WITH LOCKING CLIP
TIMING: SCREWDRIVER ADJUSTABLE OR FIXED

UL Recognized
File No. E13224



The Series 236, 237 and 238 Time Delay Relay consists of a standard 219 industrial relay and a solid state timing module to provide delayed transfer of relay contacts after application of power or activation of control switch. The relay and timing module are enclosed in a flame resistant polycarbonate cover.

GENERAL SPECIFICATIONS

INPUT

Nominal Voltage:	**AC:** 24 to 240, **DC:** 12 to 125
Minimum Oper. Voltage:	AC - 85% of Nominal DC - 80% of Nominal
Max. allowed voltage:	110% of nominal voltage

CONTACTS

Contact Material:	Silver Cadmium Oxide.
Rating:	10 Amps @ 120 VAC res. 10 Amps @ 28 VDC

OPERATIONAL CHARACTERISTICS

Repeatability:	DC: ± 3%: @ 20˚C. AC: ± 3% +16 mS @ 20˚C.
Accuracy:	Adjustable: ± 10% Within temperature & voltage range. Fixed: ± 10% @ 25˚C
Min. waiting time before starting next cycle (Reset Time):	100 mS (for timing cycle up to 60 sec. 150 mS for timing cycle 60 to 300 sec.

INSULATION CHARACTERISTICS

Dielectric Strength:	500 V rms across open contacts, 1500 V rms between output contacts and ground (Locking clip). (See note 4).
Insulation Resistance:	1000 Megohms min. @ 500 VDC.
Transient Protection:	5 mS, 0 to 2000 V 20 uSec peak
False Contacting:	No false contacting if power is interupted during timing.
Inverse polarity protection:	DC operated are polarity protected. but will not operate if polarity is reversed.

ENVIRONMENTAL CAPABILITIES

Ambient Temperature Rating:	- 10˚C to +70 ˚C

LIFE EXPECTANCY

Mechanical:	10 Million Operations no load
Electrical:	100,000 Operations @ Rated Load.

MISCELLANEOUS

Enclosure:	Clear Polycarbonate
Weight:	8.6 oz approx. (244 g)

Magnecraft & Struthers-Dunn

Typical Part Number **236 ABX P 020 120A**

Series
236 - ON DELAY
237 - OFF DELAY
238 - BATCH CONTROL INTERVAL

Contact Arrangements
ABX (DPDT & 1 N.O. Contact) 236 & 238 only).
XBX (DPDT)

Mounting Options
P (Plug-in)

Timing Ranges
0.2 - 12 Sec - **Code 012****
0.2 - 20 Sec - **Code 020**
2.0 - 200 Sec - **Code 200**

Adjustment Options
Adjustment Screw) - **No Code**
Fixed Delay - Specify Fixed Time & **Code F ***

Operating Voltage
AC; 24, 48, 120, 240 **(Add "A")**
DC; 12, 24, 48, 115-125 **(Add "D")**

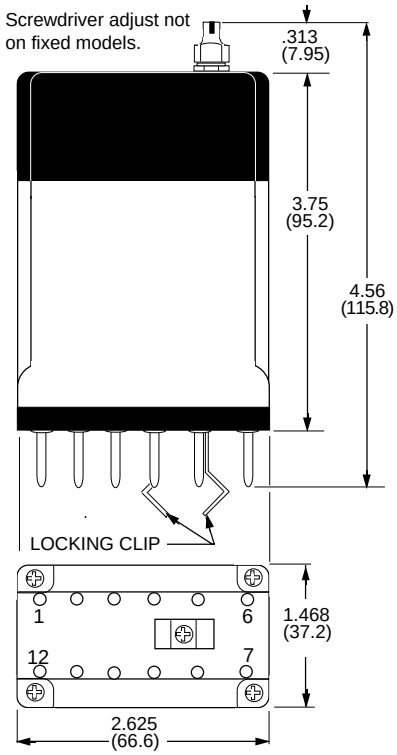
Code 012- 12 Second timing not available on 237 & 238 models.**
(F * Models) - timing code does not apply. Specify single delay time requirement.
Example of typical fixed time delay relay part number- **236XBXP-3.5F-120A**
(ON DELAY, DPDT, 3.5 SEC FIXED, 120 VAC INPUT POWER).

NOTES:
1. **236,237,238 -** External resistor (to program time delay) or jumper (for built-in timing) must be connected to terminals 8 & 9.
2. **237** models require an external control switch between terminals 5 & 6.
3. **238** switches contacts when input power is applied and starts timing. Contacts switch back to original position at end of timing cycle. Power must be removed to reset timer. If input power is interupted during the timing cycle, timing ends immediately and the relay resets.
4. Dielectric withstanding voltage testing of the Control circuit may damage the solid state components.

SEE SECTION 10 FOR MATING SOCKETS

OUTLINE DIMENSIONS

Dimensions shown are in INCHES and (millimeters)



† TIMING * RESISTANCE CHART

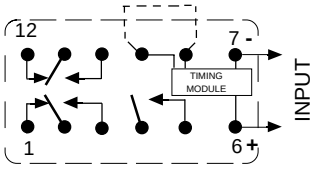
236 RANGE: O.2 TO 12 SEC 20K OHMS PER EA.3 SEC 100 K OHMS MAX.
236 RANGE: 0.2 TO 20 SEC 100K OHMS PER EA.7 SEC 500 K OHMS MAX
237/238 RANGE: 0.2 TO 20 SEC. 100K OHMS PER EA.6 SEC 500 K OHMS MAX.
236 RANGE: 2.0 TO 200 SEC 200K OHMS PER EA.60 SEC 1 MEG OHM MAX.
237/238 RANGE: 2.0 TO 200 SEC 200K OHMS PER EA.55 SEC. 1 MEG OHM MAX.

***** USE RESISTOR RATED 1/4 WATT OR MORE.

EXAMPLE WIRING DIAGRAMS

Viewed from Top of Relay

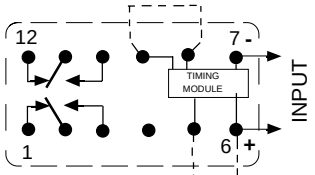
† Jumper or External Resistor



236ABXP

ON DELAY
DOUBLE POLE DOUBLE THROW WITH NORMALLY OPEN CONTACT

† Jumper or External Resistor



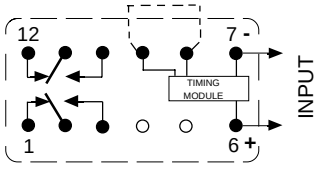
OFF DELAY

237XBXP

External control switch
DOUBLE POLE DOUBLE THROW

† If the jumper wire shown in each diagram is replaced by a resistor, delay time will be added to that which is produced by an internal fixed resistor on fixed time models (code F) or any setting on screwdriver adjustable models. See timing resistance chart above. Relay will not operate without a jumper or resistor. Also see note 1.

† Jumper or External Resistor

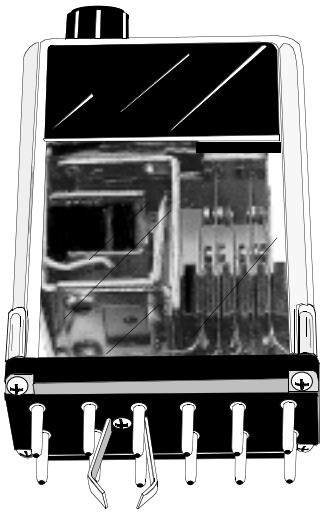


BATCH CONTROL INTERVAL (SEE NOTE 3)

DOUBLE POLE DOUBLE THROW

238XBXP

INDUSTRIAL 10 AMP, ON-DELAY & OFF DELAY TIMER



SERIES 246 & 247
± 3% REPEATABILITY
PLUG-IN WITH SELF LOCKING CLIP

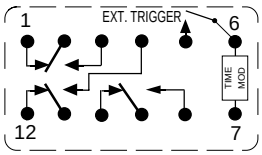
UL Recognized
File No. 13224

Listed when used with Type 29390 Socket

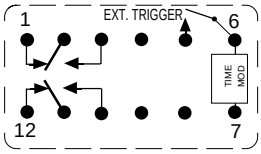
® Series 246 CSA Certified

The series 246 & 247 Time Delay Relays are a ON-Delay or Off Delay Function times, with timing ranges from 0.1 to 300 Seconds. The 246 Timer comes in either 2 - 4 poles, and the 247 comes in 2 & 3 Pole models. Both timers incorporate a class 219 relay along with a Solid State timing module. Both timers have a large choice of options and switch up to 30 amp loads.

OFF DELAY FUNCTION

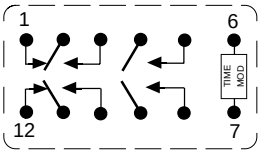


247XCXP

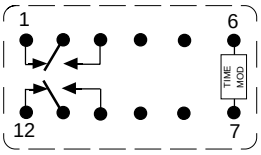


247XBXP

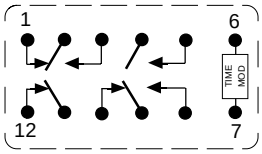
ON DELAY FUNCTION



246BBXP

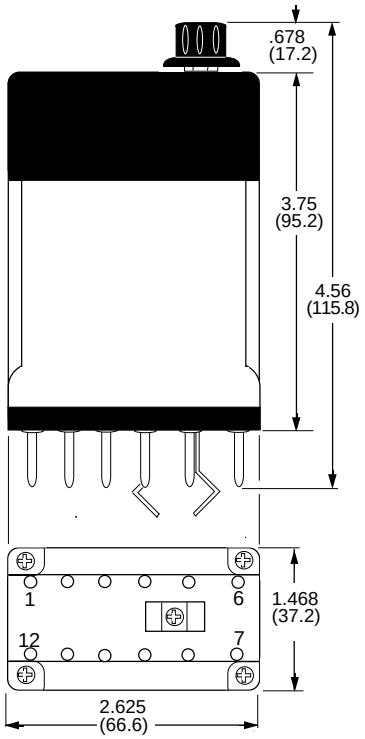


246XBXP



246ABAP

Dimensions shown are in INCHES and (millimeters)



CONTACT LOAD SPECIFICATIONS

Voltage	Make	Carry	Resistive	Inductive
24 VDC	30A	10A	10A	10A
120 VAC	30A	10A	10A	3A
240 VAC	30A	10A	5A	1A
28 VDC	30A	10A	10A	3A
125 VDC	30A	10A	0.5A	0.1A
For Versions with suffix "69" Permant Magnet Blowouts				
125 VDC (SM)	30A	10A	1.5A	0.5A
125 VDC (DM)	30A	10A	4A	1.5A
250 VDC (SM)	30A	10A	0.5A	150mA
250 VDC (DM)	30A	10A	1.5A	0.5A

Magnecraft & Struthers-Dunn

Typical Part Number **247 XBX P L - 010 __ - 120A**

Series
246 - **On Delay**, Plug-in 2-4 Pole
247 - **Off Delay**, Plug-in, 2 & 3 Pole

Contact Arrangements
XBX (2 Form "C")
XCX (3 Form "C")
ABA (1 Form A & 2 Form C & 1 Form B).
BBX (2 Form A & 2 Form C) 246 Only.

Standard Features
Plug-in With Polycarbonate Cover - **Code P**

Options
Indicator Lamp- **Code L**
Manual Actuator - **Code M**
Bifurcated Contacts (5 Amps max) - **Code 33**
Permanent Magnet, Blowout **Code 69**

Timing Ranges
0.1 - 1.0 Sec - **Code 001**
0.2 - 2.0 Sec - **Code 002**
1.0 - 10 Sec - **Code 010**
3.0 - 30 Sec - **Code 030**
6.0 - 60 Sec - **Code 060**
18 - 180 Sec - **Code 180**
30 - 300 Sec - **Code 300**

Adjustment
Adjustment Knob) - **No Code**
Fixed - Timing Code does not apply. Ex. 3F = 3 Sec
Fixed) **Code F**
Remote Adj. (Ext Pot Required) - **Code R**

Operating Voltage
AC; 24, 48, 120, 240 **(Add "A")**
DC; 12, 24, 48, 110-125 **(Add "D")**

GENERAL SPECIFICATIONS SERIES 246 & 247 TIMER

INPUT
Coil Voltage
Minimum Operate Voltage: AC - 85% of Nominal; DC - 80% of Nominal
Max. allowed voltage: 110% of nominal voltage

CONTACTS
Contact Material: Silver Cadmium Oxide. - Gold Diffused

OPERATIONAL CHARACTERISTICS
Repeatability: ± 3% @ 25˚C (AC +16 mS)
Accuracy: Adjustable ± 10% Within temperature & voltage range.
Recycle Time: 100 mS up to 60 Sec., 150 mS 60 to 300 Sec.
False Contacting: No false contacting if power is interrupted during timing cycle.
Polarity Protection: DC inputs

INSULATION CHARACTERISTICS
Dielectric Strength: 500 V rms across open contacts
All Mutually Insulated Points: 1500 V rms between current carrying parts & Parts to Ground.
Transient Protection: 5 mS 0 to 2000V, 20 uSec peak
Insulation Resistance: 1000 MΩ min. @ 500 VDC

ENVIRONMENTAL CAPABILITIES
Ambient Temperature Rating: AC: -10˚C to +45˚C @ Rated Operation. DC: -10˚C to +70 ˚C

LIFE EXPECTANCY
Mechanical: 10 Million Operations no load
Electrical: 100,000 Operations @ Rated Load. 500,000 @ 1/2 Rated Load.

MISCELLANEOUS
Enclosure: Clear polycarbonate
Weight: 8 oz. (227 g)

SEE SECTION 10 FOR MATING SOCKETS

SPECIFICATIONS CLASS 235 CURRENT SENSOR

CURRENT SENSING:

Sense Current Range:	1.5 to 15 Amperes
Repeatability:	± 2% at constant Voltage & Temperature ± 10% over Voltage & Temperature Range.
Input Current:	15 mA (1.7 VA)
Current Sensor Resistance:	5 Milliohms
Temperature Range Operate:	- 10˚C to + 55˚C
Temperature Range Storage:	- 40˚C to + 85˚C

CONTACTS

Contact Combinations:	SPDT (1 Form C)
Contact Rating	10 Amps @ 120 VAC, 6 Amps @ 28 VDC.
Transient:	2000 V rms for 5 Microseconds

LIFE EXPECTANCY;

Electrical	200,000 Operations @ Rated Load
Mechanical:	5,000,000 Operations @ No Load

DIELECTRIC STRENGTH

Coil to Contacts:	2500 V rms
Across Open Contacts:	500 V rms

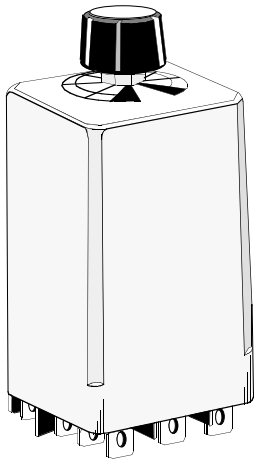
MECHANICAL

Terminals:	Choice of 1/4" or 3/16" Quick Connect terminals.
Mounting:	6-32 Tapped Hole & anti rotation Tab or Plug-in with 3/16" terminals.
Mounting Bracket:	Optional.
Enclosure:	Polycarbonate dust cover.
Weight:	4 oz. (113 g) approx.

CLASS 235 CURRENT SENSOR

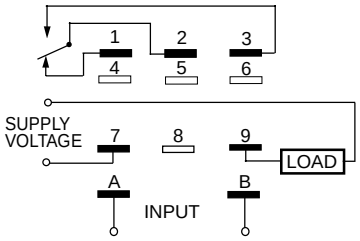
± 2 % REPEATABILITY
SPDT, 10 AMP CONTACTS
FIELD ADJUSTABLE CURRENT SETTINGS.

UL Recognized
File No. 62636



The Class 235 Current Sensing Relay combines a Solid State Sensor with a SPDT, 10 Amp relay. The Sensor is field adjustable for detecting AC Current levels in equipment. The sensor is non-latching and has no time delay.

WIRING DIAGRAM



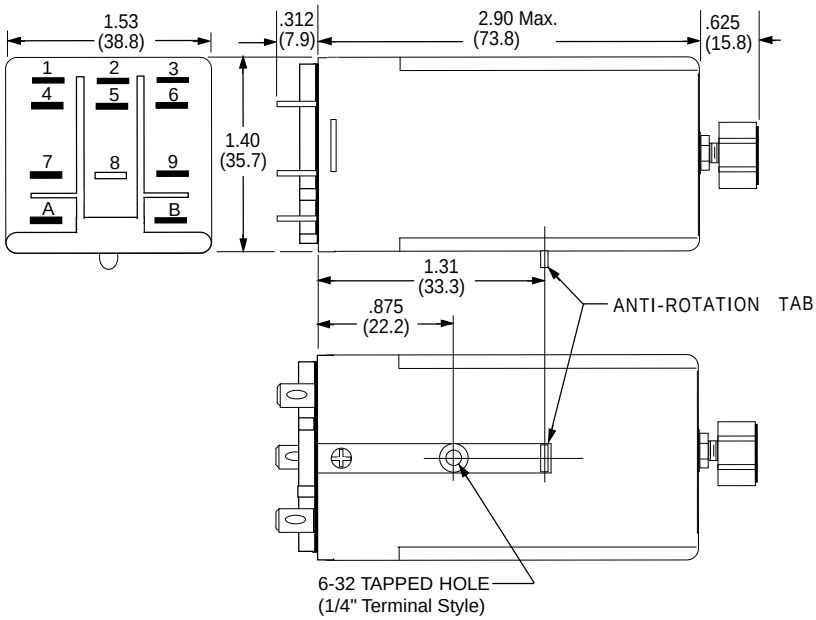
Continuous Voltage must be supplied to Input.

VIEWED FROM TERMINAL SIDE

SEE SECTION 10 FOR MATING SOCKETS

OUTLINE DIMENSIONS

Dimensions are Shown In Inches and (Millimeters)



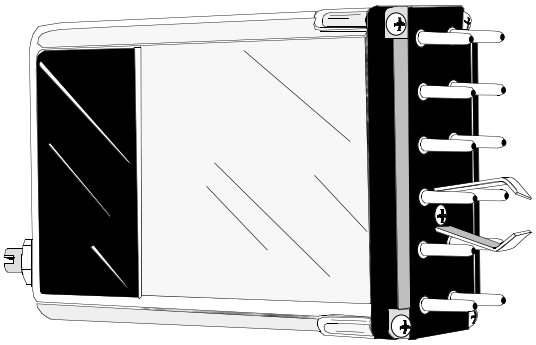
Magnecraft

PART NUMBERS	NOMINAL INPUT VOLTAGE	CURRENT RANGE	TERMINAL SIZE
W235ACX-2	120 VAC	1.5 to 15 Amps	1/4" (.250)
W235ACX-3	120 VAC	1.5 to 15 Amps	3/16" (.187)

PART NUMBERS SHOWN ALSO **AVAILABLE THRU STOCKING DISTRIBUTION.**

NOTE: 3/16" (.187) TERMINALS ARE **SOCKET MOUNTABLE**.
1/4" (.250) TERMINALS, **NO SOCKET AVAILABLE FOR THIS STYLE.**

OVER/UNDER VOLTAGE SENSING, 10 AMP, 2-4 POLE

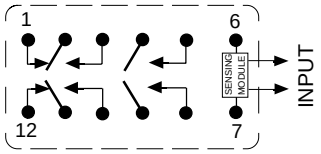


SERIES 349
FREQUENCY 50 to 400 Hz
PULL-IN ADJUSTABLE
BETWEEN 85 to 135 VAC
10 AMP CONTACTS

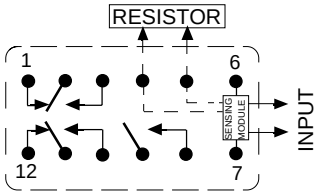
The Series 349 Under/Over Voltage Sensing Relay incorporates a Series 219 relay and an Electronic Module. Pull-in Voltage is adjustable between 85 and 135 VAC for frequencies from 50 to 400 Hz. Models available for Single and Three Phase sensing with differential (between pull-in and Dropout) Adjustable from 2 to 14 Volts by external fixed or adjustable resistor. Single Phase relays are also available with standard 3 volt fixed differential and other fixed values up to 14 volts, on special order.

349 ABXP & XBXP Style the Differential Adjustment is Externally Adjustable from 3 to 14 Volts.

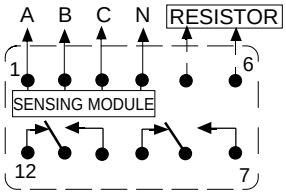
Differential 4.0 volts ± 1 Volt nonadjustable



SINGLE PHASE -349BBXP



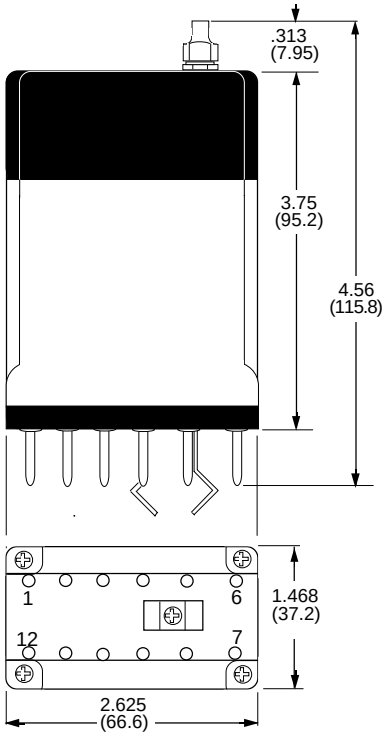
SINGLE PHASE -349ABXP



THREE PHASE -349XBXP

OUTLINE DIMENSIONS

Dimensions shown are in INCHES and (millimeters)



CONTACT LOAD SPECIFICATIONS

Voltage	Make	Carry	Resistive	Inductive
24 VDC	30A	10A	10A	10A
120 VAC	30A	10A	10A	3A
240 VAC	30A	10A	5A	1A
28 VDC	30A	10A	10A	3A
125 VDC	30A	10A	0.5A	0.1A
For Versions with suffix "69" Permanent Magnet Blowouts				
125 VDC (SM)	30A	10A	1.5A	0.5A
125 VDC (DM)	30A	10A	4A	1.5A
250 VDC (SM)	30A	10A	0.5A	150mA
250 VDC (DM)	30A	10A	1.5A	0.5A

GENERAL SPECIFICATIONS SERIES 349 SENSOR

INPUT
- Module Voltage: Adjustment 85 to 135 VAC, 50 to 400 Hz
- AC Current Drain: De-energized -15 mA, Energized - 50 mA

CONTACTS
- Contact Material: Silver Cadmium Oxide. - Gold Diffused

OPERATIONAL CHARACTERISTICS
- Operate time: 25 Milliseconds
- Release Time: 25 Milliseconds

INSULATION CHARACTERISTICS

Dielectric Strength
- Across Open Contacts: 500 V rms
- All Mutually Insulated Points: 1500 V rms
- Insulation Resistance: 1000 Megohms min. @ 500VDC.

ENVIRONMENTAL CAPABILITIES
- Ambient Temperature Rating: -10˚C to +60˚C @ Rated Operation.

LIFE EXPECTANCY
- Mechanical: 20 Million Operations no load
- Electrical: 100,000 Operations @ Rated Load. 500,000 @ 1/2 Rated Load.

MISCELLANEOUS
- Enclosure: Clear polycarbonate
- Weight: 10 oz. (284 g)

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Typical Part Number **349 BBX P L33- 85-135A**

Series
349 Sensor -Plug-in, Over/Under Voltage Relay, 10A, 2 -4 poles

Contact Arrangement & Function
BBX - 2 Form A & 2 Form C, (Single Phase) 4V ± 1V Fixed.
ABX - 1 Form A & 2 Form C, (Single Phase) Ext. Adjustment, 3 to 14V
XBX - 2 Form C, (3 Phase) External Adjustment, 3 to 14V

Standard Features
Plug-in With Polycarbonate Cover - **Code P**

Options
Indicator Lamp- **Code L**
Manual Actuator - **Code M**
Bifurcated Contacts (5 Amps max) - **Code 33**
Permanent Magnet, Blowout **Code 69**

Operating Voltage
AC; 85 to 135 **(Add "A")**
DC; Consult Factory
Note: For non-Standard Differential Consult Factory

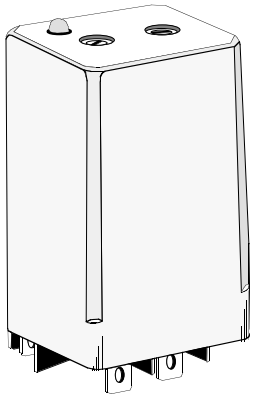
SEE SECTION 10 FOR MATING SOCKETS

The Class 236 Voltage Sensing Relay combines a Solid State Sensor with a SPDT, 13 Amp or DPDT 10 Amp relay.
The Sensor is field adjustable for Pull-in & Dropout .
The 236 can be used either as a over or under voltage detecting relay.
The sensor is non-latching and has no time delay.

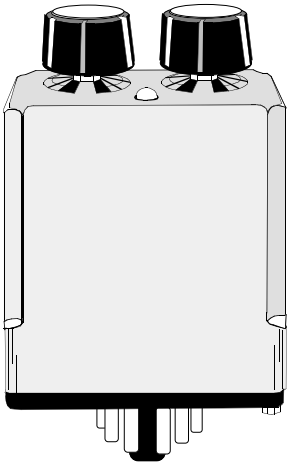
Applications: Brownout protection, warning of under voltage conditions and Over voltage protection. **Prevents equipment burnout.**

CLASS 236 VOLTAGE SENSOR

Ul Recognized
File No. 62636



±1 % REPEATABILITY
SPDT, 13 AMP CONTACTS
FIELD ADJUSTABLE



±1 % REPEATABILITY
DPDT, 10 AMP CONTACTS
FIELD ADJUSTABLE

SPECIFICATIONS CLASS 236 CURRENT SENSOR

VOLTAGE SENSING:

Nominal Input:	120,240,480 VAC 50/60Hz, 24VAC, 24 VDC. Other AC & DC Voltages Available.
Adjustment Range:	Pull-in 75% to 115% of Nominal Voltage. Dropout 75% to 95% of Pickup setting.
Repeatability:	± 1% @ constant Voltage & Temperature
Input Current:	15 mA (1.7 VA)
Current Sensor Resistance:	Relay "Off" 2 mA max. Relay "On" 22 mA max. @ 120AC (2.7 VA) 12 mA 240AC max. (2.9VA), 7 mA max. 480 AC (3.41 VA)
Temperature Range Operate:	- 30˚C to + 55˚C
Temperature Range Storage:	- 40˚C to + 85˚C

CONTACTS

Contact Combinations:	**SPDT** (1 Form C), **DPDT** (2 Form "C")
Contact Rating	**SPST**: 13 Amps @ 240 VAC, 28 VDC Res. 1/3 HP @ 120 VAC, 1/2 HP @ 240/480 AC, 3 AMPS @ 480 VAC, NEMA B300 Pilot Duty **DPDT**: 10 AMPS @ 240 VAC/28 VDC Res. 1/3Hp @ 120 VAC, 1/2 Hp 240 VAC NEMA B300 Pilot Duty.
Contact Life Electrical:	**SPDT:** 100,000 Operations @ 13 Amps, 240AC Res. **DPDT:** 100,000 Operations @ 10 Amps, 240AC Res.
Contact Life Mechanical:	**SPDT**:5,000,000 Operations **DPDT**: 50,000,000 Operations.
Transient:	UL 508 Surge 5000 V for 50 microseconds
Noise Immunity:	NEMA ICS2-230, 2500 VAC

DIELECTRIC STRENGTH

Breakdown:	UL 508 Surge 5KV 1.2 x 50 Microseconds.
Coil to Contacts:	2500 V rms
Across Open Contacts:	1000 V rms

MECHANICAL

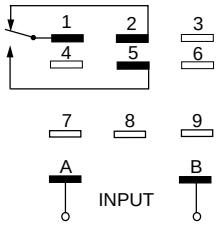
Terminals:	3/16" (.187) Quick Connect terminals. or 8 Pin Octal base
Enclosure:	Polycarbonate dust cover.
Power "ON" Indicator:	L.E.D. (Green)
Weight:	4 oz. 124.4 g, 5 oz 155.5g (8 pin octal)

**SEE SECTION 10
FOR MATING SOCKETS**

ADJUSTABLE VOLTAGE SENSING RELAY

WIRING DIAGRAMS

VIEWED FROM PIN END

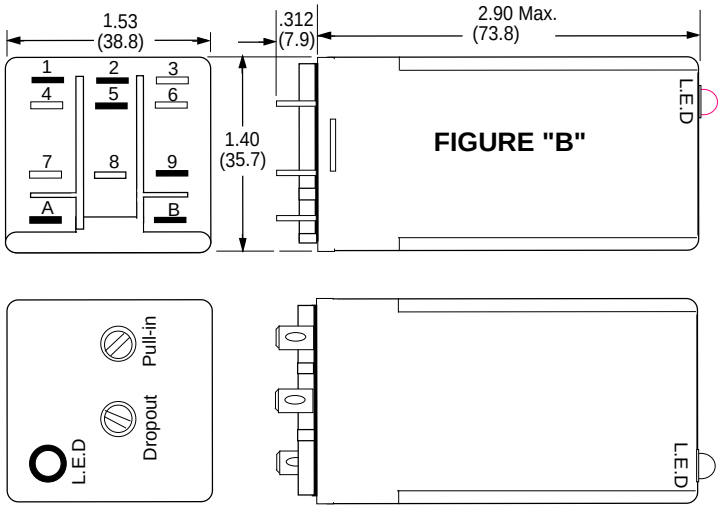


SQUARE BASE

Continuous Voltage must be supplied to Input.

OUTLINE DIMENSIONS

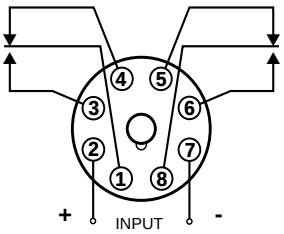
Dimensions are Shown In Inches and (Millimeters)



Screw Driver Adjustable with Graduated scale.

WIRING DIAGRAMS

VIEWED FROM PIN END

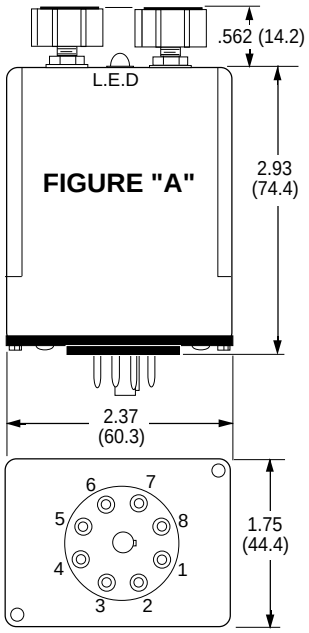


8 PIN OCTAL

Continuous Voltage must be supplied to Input.

OUTLINE DIMENSIONS

Dimensions are Shown In Inches and (Millimeters)



Magnecraft

PART NUMBERS	FIG.	NOMINAL INPUT VOLTAGE	VOLTAGE PULL-IN RANGE	VOLTAGE DROP-OUT RANGE	CROSS REFERENCE TO POTTER & BRUMFIELD
W236ACX-1	**B**	120 VAC	90 to 138 VAC	75% to 95% of Pickup Voltage Setting	-
W236ACX-2	**B**	208/220 240 VAC	180 to 276 VAC		-
W236ACX-4	**B**	480 VAC	360 to 552 VAC		-
W236ACPX-1	**A**	120 VAC	92 to 140 VAC	90 to 138 VAC	**CSJ-38-70010**
W236ACPX-4	**A**	24 VAC	20 to 30 VAC	18 to 28VAC	**CSJ-38-30010**
W236CPX-1	**A**	24 VDC	20 to 30 VDC	18 to 28 VDC	**CSL-38-30010**

PART NUMBERS SHOWN ALSO **AVAILABLE THRU STOCKING DISTRIBUTION.**

POWER RELAYS

AND

CONTACTORS

15 TO 200 AMPERES

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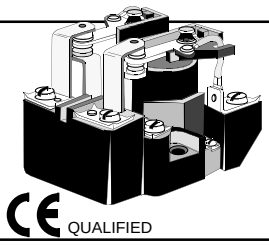
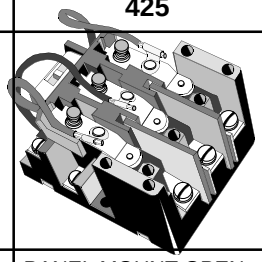
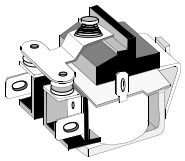
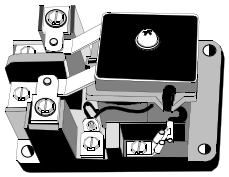
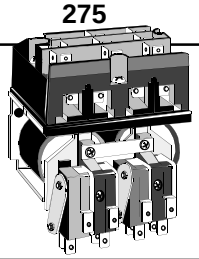
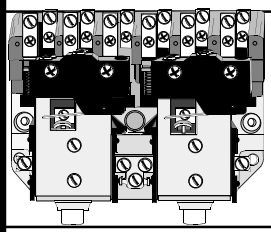
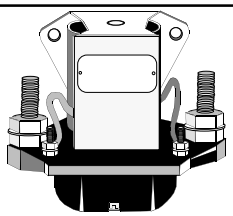
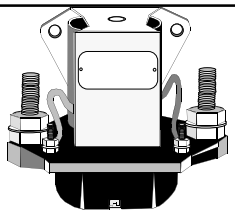
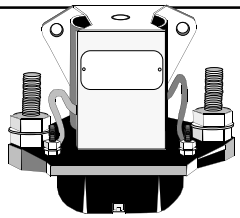
POWER RELAYS & CONTACTORS

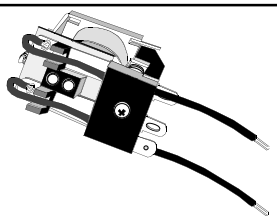
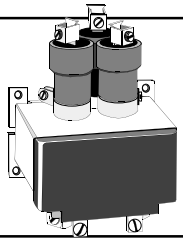
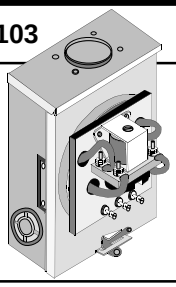
RELAY SERIES	199	425	88UKD	415
	 CE QUALIFIED			
FEATURES	PANEL MOUNT, OPEN STYLE CONSTRUCTION MULTI CONTACT CONFIGURATIONS UP TO 50 AMPS SWITCHING. MAGNETIC BLOWOUT FOR DC SWITCHING CLASS "B" INSULATION SYSTEM SCREW & BOX TERMINALS	PANEL MOUNT OPEN STYLE CONSTRUCTION 3PDT CONTACT CONFIGURATIONS UP TO 30 AMP SWITCHING SCREW TERMINALS INSULATED ARMATURE TO 600V AVAILABLE	COMPACT OPEN STYLE RELAY WITH 6-32 TAPPED HOLE & ANTI-ROTATION TAB FOR PANEL MOUNT. SWITCHES UP TO 3O AMPS 1/4" SPADE LUG TERMINALS DOUBLE MAKE CONTACTS	PANEL MOUNT, COMPACT SIZE, OPEN STYLE CONSTRUCTION. MULTI CONTACT CONFIGURATIONS. SCREW TERMINALS. OPTIONAL HIGH VOLTAGE AND HIGH INRUSH CONTACTS, Q.C. TERMINALS, MAGNET BLOWOUT. SPECIAL LOW POWER COILS AVAILABLE.
CONTACT DATA CONTACT CONFIGURATION:	SEE CATALOG PAGE	3PDT	SPST-N.0. (DM)	SEE CATALOG PAGE
MAXIMUM ALLOWABLE CONTACT LOAD:	30 AMPS UP TO 300 VAC, 28 VDC, (STD.) BOX TERMINAL SPST-DM -UP TO 50A. WITH MAGNETIC BLOWOUT UP TO 20AMP DC	25 AMP @120-240VAC 17AMP @ 277VAC 10AMP @ 600VAC 30AMP @ 30VDC	30 AMPS @ 300VAC/28VDC 5 AMPS 600VAC	15 AMPS @ 120VAC 1/2HP 10 AMPS @ 240VAC 1HP 15 AMPS @ 30VDC
CONTACT MATERIAL:	SILVER CADMIUM OXIDE,	SILVER CADMIUM OXIDE	SILVER ALLOY GOLD FLASHED	SILVER CADMIUM OXIDE
CONTACT RESISTANCE:	50 MILLIOHMS (INITIAL)	50 MILLIOHMS (INITIAL)	50 MILLIOHMS (INITIAL)	50 MILLIOHMS (INITIAL)
INSULATION CHARACTERISTICS DIELECTRIC STRENGTH	2200 V rms	2500 V rms	3000 V rms	1500 V rms
COIL DATA AC - VOLTAGE:	24, 120 & 240 VAC	6 to 480 VAC	24, 120 & 240 VAC	6 to 240 VAC
DC - VOLTAGE:	6, 12, 24, 110 VDC	6 to 220 VDC	12, 24 & 110 VDC	6 to 125 VDC (Use power resistor for 250VDC)
POWER VA,: (VAC)	10 VA	11 VA	3 VA	6VA
WATTS,: (VDC)	2.0 WATTS	4.0 WATTS	1.5 WATTS	3.5 WATTS
GENERAL DATA AMBIENT TEMPERATURE OPERATIONAL:	- 30˚ C to + 50˚ C (AC.) - 30˚ C to + 60˚ C (DC)	- 55˚ C to + 45˚ C (AC) - 55˚ C to + 80˚ C (DC)	- 10˚ C to + 50˚ C (AC) - 10˚ C to + 60˚ C (DC)	- 45˚ C to + 55˚ C - 45˚ C to + 55˚ C
STORAGE:	- 30˚ C to + 100˚ C			
TIMING VALUES OPERATE:	40 MILLISECONDS	30 MILLISECONDS		25 MILLISECONDS
RELEASE:	35 MILLISECONDS	15 MILLISECONDS		10 MILLISECONDS
LIFE MECHANICAL:	5 MILLION OPERATIONS	10 MILLION OPERATIONS	5 MILLION OPERATIONS	AC- 50M, - DC-100M OPER'S.
ELECTRICAL:	100,000 OPERATIONS	100,000 OPERATIONS	100,000 OPERATIONS	200,000 OPERATIONS
DIMENSIONS	D W L	D W L	D W L	D W L
	2.53 X 2.50 X 2.43-3.12	2.30 X 2.50 X 3.24	.1.40 X 1.25 X 1.93	1.75 X 1.87 X 2.75
APPROVALS	UL SP CE	UL SP	SP	UL SP
PAGE NUMBER	**PAGE 140 THRU 146**	**PAGE 147**	**PAGE 148**	**PAGE 149, 150**

CONTACTORS

275	575	101	102	103
				
2 COIL, COMPACT MOTOR REVERSING CONTACTOR. 1/4" DUAL Q.C. TERMINALS WITH UP TO 4 OPTIONAL AUXILIARY SWITCHES. ENCAPSULATED COIL USED FOR AC OR DC MODELS MECHANICAL INTERLOCK, CENTER OFF WHEN BOTH COILS NOT ENERGIZED.	2 COIL, MOTOR REVERSING CONTACTOR MECHANICAL INTERLOCK COILS SCREW TERMINALS WITH OPTIONAL 5A AUXILIARY SWITCHES AVAILABLE. RATED UP TO 7.5 HP	HEAVY DUTY DC SOLENOID STYLE CONTACTOR. CHOICE OF CONTACT CONFIGURATIONS RATED UP TO 50 AMPS CONTINUOUS CONTACTS ENCLOSED WITH MOLDED PLASTIC COVER. AC COILS AVAILABLE	HEAVY DUTY DC SOLENOID STYLE CONTACTOR. CHOICE OF CONTACT CONFIGURATIONS RATED UP TO 100 AMPS CONTINUOUS CONTACTS ENCLOSED WITH MOLDED PLASTIC COVER. AC COILS AVAILABLE	HEAVY DUTY DC SOLENOID STYLE CONTACTOR. CHOICE OF CONTACT CONFIGURATIONS RATED UP TO 200 AMPS CONTINUOUS CONTACTS ENCLOSED WITH MOLDED PLASTIC COVER. AC COILS AVAILABLE
6 POLE-DM (3 PER COIL)	6 POLE-DM (3 PER COIL)	SEE CATALOG PAGE	SEE CATALOG PAGE	SEE CATALOG PAGE
15 AMPS @120VAC/1HP 10AMPS @ 240VAC/1.5HP 5AMPS @ 480/600/3HP 15AMPS @ 30VDC 5AMPS @ 125VDC 1AMP @ 250VDC	30 AMPS @120 VAC, 1.5HP 30 AMPS @240VAC, 3HP 15 AMPS @480 VAC, 7.5HP 15 AMPS @600 VAC, 7.5HP 15 AMPS @ 115VDC 2 AMPS @ 230 VDC	50 AMPS @ 120/240VAC, 30 VDC	100 AMPS @ 120/240VAC, 30 VDC	200 AMPS @ 120/240VAC, 30 VDC
SILVER CADMIUM OXIDE 100 MILLIOHMS (INITIAL)	SILVER CADMIUM OXIDE 100 MILLIOHMS (INITIAL)	SILVER CADMIUM OXIDE 50 MILLIOHMS (INITIAL)	SILVER CADMIUM OXIDE 50 MILLIOHMS (INITIAL)	SILVER CADMIUM OXIDE 50 MILLIOHMS (INITIAL)
2500 V rms	2500 V rms	1500 V rms	1500 V rms	1500 V rms
12 to 240 VAC 12 to 120 VDC 16.7 VA 4.9 WATTS	24 to 550VAC 12 to 240 VDC 22 VA 10 WATTS	- 12, 28, 48 VDC - 9 WATTS	- 12, 28, 48 VDC - 11.6 WATTS	- 12, 28, 48 VDC - 14 WATTS
- 45˚ C to + 50˚ C (AC) - 45˚ C to + 70˚ C (DC) 50 MILLISECONDS 30 MILLISECONDS 500,000 OPERATIONS 100,000 OPERATIONS	- 40˚ C to + 50˚ C (AC) - 40˚ C to + 50˚ C (DC) 60 MILLISECONDS 30 MILLISECONDS 500,000 OPERATIONS 100,000 OPERATIONS	- 45˚ C to + 65˚ C (DC) 60 MILLISECONDS 30 MILLISECONDS 500,000 OPERATIONS 100,000 OPERATIONS	- 45˚ C to + 65˚ C (DC) 60 MILLISECONDS 30 MILLISECONDS 500,000 OPERATIONS 100,000 OPERATIONS	- 45˚ C to + 65˚ C (DC) 60 MILLISECONDS 30 MILLISECONDS 500,000 OPERATIONS 100,000 OPERATIONS
D W L	D W L	D W L	D W L	D W L
2.75 X 2.985 6 X 3.62	3.00 X 5.25 X 4.43	1.84 X 2.34 X 2.50	2.09 X 3.12 X 3.00	2.65 X 4.25 X 3.00
PAGE 151, 152	**PAGES 153, 154**	**PAGES 155, 156**	**PAGES 155, 156**	**PAGES 155, 156**

Magnecraft & Struthers-Dunn

POWER , GFI AND MDR RELAYS

RELAY SERIES	214 (GFI)	MDR	102, 103
			
FEATURES	SMALL OPEN STYLE GROUND FAULT INTERRUPT RELAY. MAX. OVER LOAD 120 AMPS @ 120VAC PIERCED SOLDER LUG TERMINALS WITH #17 AWG SILICONE WIRE MOUNTING WITH 6-32 TAPPED HOLE & ANTI-ROTATION TAB	MERCURY DISPLACEMENT RELAY (MDR) UP TO 3 POLES, NO OR NC & COMBINATIONS OF NO & NC ENCAPSULATED COIL.. UP TO 100 AMPS SWITCHING LOW CONTACT RESISTANCE PANEL MOUNTED VERTICAL ± 15°	HEAVY DUTY DC SOLENOID STYLE LIGHTING CONTACTOR, MOUNTS TO WATT HOUR METER ENCLOSURE. DPST-NO-DM CONTACT CONFIGURATION. RATED UP TO 50 & 100 AMPS CONTINUOUS DUTY. CONTACTS ENCLOSED IN MOLDED PLASTIC COVER. DC COILS AND AC FULL WAVE RECTIFIED COILS.
CONTACT DATA CONTACT CONFIGURATION:	DPDT (2 FORM C)	1 to 3PST-NO or NC	DPST-NO-DM
MAXIMUM ALLOWABLE CONTACT LOAD:	20 AMPS @ 120/240VAC 20 AMPS @ 30 VDC 120AMPS @ 120VAC (10 CYCLES)	35 TO 100 AMPS @ 120-480VAC. 25-50 AMPS @ 600VAC 100 AMPS, 24-48 VDC 80 AMPS, 120VDC	50 & 100 AMPS @ 120/240VAC, 30 VDC
CONTACT MATERIAL:	SILVER, CADMIUM OXIDE	MERCURY	SILVER CADMIUM OXIDE
CONTACT RESISTANCE:	50 MILLIOHMS (INITIAL)	2 MILLIOHMS	50 MILLIOHMS (INITIAL)
INSULATION CHARACTERISTICS DIELECTRIC STRENGTH:	2000 V rms	2650 V rms	1500 V rms
COIL DATA AC - VOLTAGE: DC - VOLTAGE: **POWER** VA, (VAC): WATTS, (DC):	6, 12, 24, 120 VAC 6, 12, 24, 110-125 VDC - -	120 & 240 VAC 24 VDC 33 VA 9 WATTS	12 to 240 VAC 6 to 220 VDC - 20 WATTS
GENERAL DATA AMBIENT TEMPERATURE OPERATIONAL:	- 45° C to + 65° C	- 35° C to + 60° C	- 45° C to + 65° C (DC)
STORAGE:			
TIMING VALUES OPERATE: RELEASE:	15 MILLISECONDS 15 MILLISECONDS	50 MILLISECONDS 100 MILLISECONDS	60 MILLISECONDS 30 MILLISECONDS
LIFE MECHANICAL: ELECTRICAL:	10 MILLION OPERATIONS 100,000 OPERATIONS	5 MILLION OPERATIONS 100,000 OPERATIONS	500,000 OPERATIONS 100,000 OPERATIONS
DIMENSIONS	D W L	D W L	D W L
	1.37 X 1.00 X 2.10	3.36 X 3.75 X 5.06	3.0 X 6.0 X 6.0
APPROVALS			
GENERAL SPECIFICATIONS & APPLICATION DATA:		**PAGE 158, 159**	
PAGE NUMBER	**PAGE 157**	**PAGE 160 THRU 164**	**PAGES 165**

OPEN STYLE 30 AMP POWER RELAY

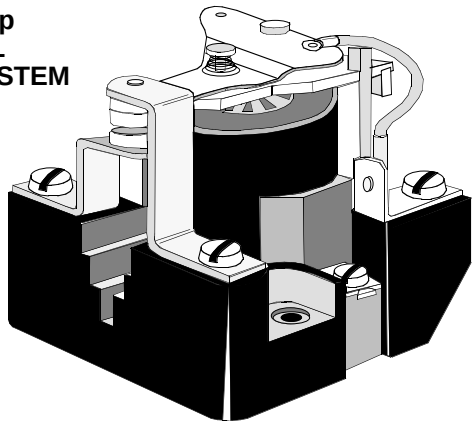
UL Listed
File No. E43641

COMPLIES WITH
REQUIREMENTS OF
* IEC STANDARDS
947-4-1 AND 947-5-1
LOW VOLTAGE DIRECTIVE

* IEC = INTERNATIONAL
ELECTROTECHNICAL COMMISSION

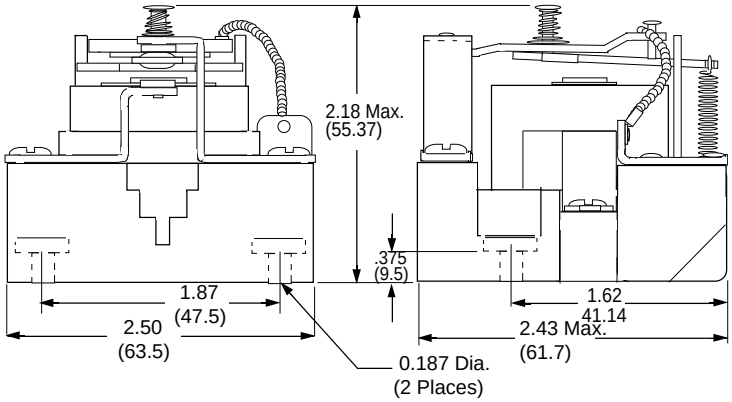
CLASS 199 SPDT

30 AMP - 1-1/2 Hp
CLASS "B" COIL
INSULATION SYSTEM



OUTLINE DIMENSIONS

Dimensions shown in Inch & (Millimeters)



UP

VERTICAL MOUNTING
RECOMMENDED WITH
CONTACTS UP

SPECIFICATIONS CLASS 199

COIL
Pull-in Voltage: 80% DC Coils, 85% AC coils of nominal voltage or Less @ 25˚C
Dropout Voltage: 10% of Nominal Voltage or More @ 25˚C
Coil Resistance: ± 10% @ 25˚C
Max. Coil Dissipation: DC Coils-4 Watts Max. Continuous.

CONTACTS
Contact Combination: SPDT
Contact Rating: 30 Amps up to 300VAC, 50/60Hz
5 Amps @ 480/600 VAC, 50/60HZ
0.75pF Inductive Load. 1-1/2 HP Motor Load @ 120 thru 600 VAC, 50/60 Hz.
30 Amps @ 28 VDC Resistive Load
NEMA A 600 Pilot Duty 50/60Hz
Contact Material: Silver Cadmium Oxide, Gold Flashed. 5/16" Diameter Standard.

TIMING
Operate time: 40 Milliseconds Max. @ Nominal V
Release Time: 30 Milliseconds Max. @ Nominal V

DIELECTRIC STRENGTH
Between Open Contacts: 1500 V rms
Mutually Insulated
Conductive elements: 2200 V rms

TEMPERATURE
Operating Range: (AC) -30˚C to +50˚C, (DC) -30˚C +60˚C
Non-Operating Storage range: -30˚C to +100˚C

LIFE
Electrical (Rated Load): 100,000 Operations
Mechanical (No Load): 5,000,000 Operations

MISCELLANEOUS
Coil Terminals: 6-32 Binder Head Screws
Contact Terminals: 8-32 Binder Head Screws
Base Material: Molded Phenolic, UL Recognized (QMFZ2)
Weight: 8 oz. - 227 Grams approx. (SPDT)

*** RELEVANT IEC CONTACT UTILIZATION CATEGORIES**

CE	**AC-1, AC-3, DC-1, AC-15**
	SEE SECTION 11, FOR RELEVANT UTILIZATION CATEGORIES

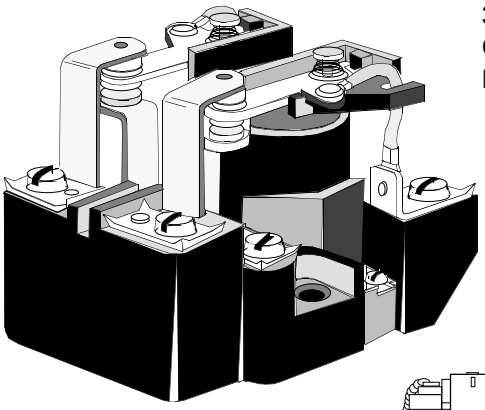
Magnecraft

PART NUMBERS	COIL Measured @ 25˚C			CROSS REFERENCE POTTER & BRUMFIELD
	NOMINAL INPUT VOLTAGE	NOMINAL RESISTANCE (OHMS)	NOMINAL POWER	
AC OPERATED (SPDT)				
W199AX-4	120 VAC	-	10 VA	**PRD5AGO-120**
DC OPERATED (SPDT)				
W199X-2	12 VDC	70	2.0 W	**PRD5DGO-12**
W199X-3	24 VDC	290	2.0 W	**PRD5DGO-24**

PART NUMBERS SHOWN ALSO **AVAILABLE THRU STOCKING DISTRIBUTION.**

AUXILIARY CONTACTS AND OTHER COIL VOLTAGES ARE AVAILABLE ON SPECIAL ORDER. CONTACT FACTORY FOR SPECIAL REQUIREMENTS.

OPEN STYLE 30 AMP POWER RELAY



CLASS 199 DPDT

30 AMP - 1-1/2 Hp
CLASS "B" COIL
INSULATION SYSTEM

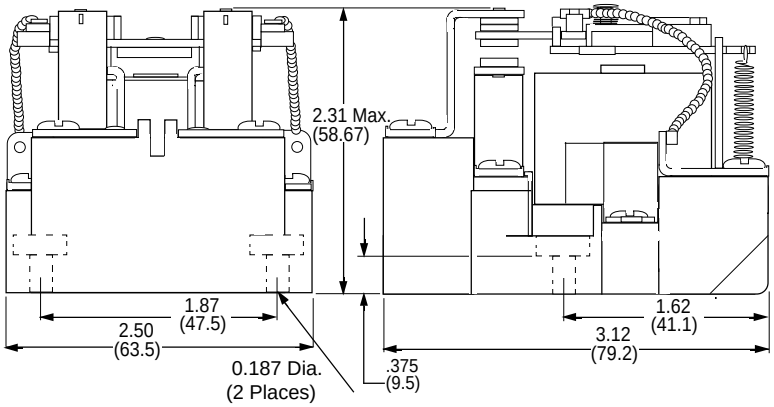
UL Listed
File No. E43641

COMPLIES WITH
REQUIREMENTS OF
* IEC STANDARDS
947-4-1 AND 947-5-1
LOW VOLTAGE DIRECTIVE

* IEC = INTERNATIONAL
ELECTROTECHNICAL COMMISSION

OUTLINE DIMENSIONS

Dimensions shown in Inch & (Millimeters)



UP

VERTICAL MOUNTING
RECOMMENDED WITH
CONTACTS UP

*** RELEVANT IEC CONTACT UTILIZATION CATEGORIES**

	AC-1, AC-3, DC-1, AC-15
	SEE SECTION 11, FOR RELEVANT UTILIZATION CATEGORIES

Magnecraft

PART NUMBERS	COIL Measured @ 25˚C			CROSS REFERENCE POTTER & BRUMFIELD
	NOMINAL INPUT VOLTAGE	NOMINAL RESIS-TANCE (OHMS)	NOMINAL POWER	
AC OPERATED (DPDT)				
W199AX-13	24 VAC	-	10 VA	**PRD11AGO-24**
W199AX-14	120 VAC	-	10 VA	**PRD11AGO-120**
W199AX-15	240 VAC, 60 Hz			**PRD11AGO-240**
	220 VAC, 50 Hz	-	10 VA	
DC OPERATED (DPDT)				
W199X-11	6 VDC	18	2.0 W	**PRD11DGO-6**
W199X-12	12 VDC	70	2.0 W	**PRD11DGO-12**
W199X-13	24 VDC	290	2.0 W	**PRD11DGO-24**
W199X-14	110 VDC	6000	2.0 W	**PRD11DGO-110**
RECTIFIED, AC OPERATED (DPDT)				
W199AXD-38 †	208, 240, 277 VAC	-	See Note ††	

PART NUMBERS SHOWN ALSO **AVAILABLE THRU STOCKING DISTRIBUTION.**

† Built in Coil Diodes provide a wide range of Nominal Coil input voltages. This relay is suitable to Operate within a range of 208 Vac thru 277 Vac.

†† 208 Vac = 2.3 VA, 240 Vac = 3.0 VA, 277 Vac = 4.0 VA.

AUXILIARY CONTACTS AND OTHER COIL VOLTAGES ARE AVAILABLE ON SPECIAL ORDER. CONTACT FACTORY FOR SPECIAL REQUIREMENTS.

SPECIFICATIONS CLASS 199

COIL
Pull-in Voltage: 80% DC Coils, 85% AC coils of nominal voltage or Less @ 25˚C
Dropout Voltage: 10% of Nominal Voltage or More @ 25˚C
Coil Resistance: ± 10% @ 25˚C
Max. Coil Dissipation: DC Coils-4 Watts Max. Continuous.

CONTACTS
Contact Combinations: DPDT
Contact Rating each Pole: 30 Amps up to 300VAC, 50/60Hz
5 Amps @ 480/600 VAC 50/60Hz, 0.75pF Inductive Load. 1-1/2 HP Motor Load (each Pole) @ 120 thru 600 VAC, 50/60 Hz. 2 HP Motor Load @ 200 thru 600 VAC, 50/60 Hz only when using two poles to switch both sides of Load.
30 Amps @ 28 VDC Resistive Each Pole.
NEMA A600 Pilot Duty 50/60HZ
Contact Material: Silver Cadmium Oxide, Gold Flashed. 5/16" Diameter Standard.

TIMING
Operate time: 40 Milliseconds Max. @ Nominal V
Release Time: 30 Milliseconds Max. @ Nominal V

DIELECTRIC STRENGTH
Between Open Contacts: 1500 V rms
Mutually Insulated Conductive elements: 2200 V rms

TEMPERATURE
Operating Range: (AC) -30˚C to +50˚C, (DC) -30˚C +60˚C
Non-Operating Storage range: -30˚C to +100˚C

LIFE
Electrical (Rated Load): 100,000 Operations
Mechanical (No Load): 5,000,000 Operations

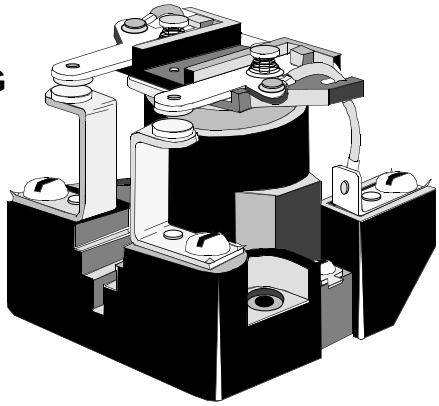
MISCELLANEOUS
Coil Terminals: I 6-32 Binder Head Screws
Contact Terminals: 8-32 Binder Head Screws
Base Material: Molded Phenolic, UL Recognized (QMFZ2)
Weight: 11 oz. - 311 Grams approx. (DPDT)

UL Listed
File No. E43641

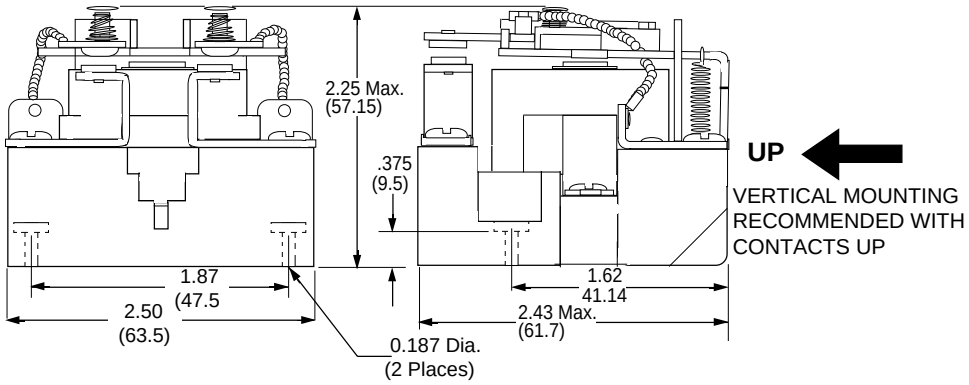
COMPLIES WITH REQUIREMENTS OF
* IEC STANDARDS 947-4-1 AND 947-5-1 LOW VOLTAGE DIRECTIVE

* IEC = INTERNATIONAL ELECTROTECHNICAL COMMISSION

CLASS 199 DPST-NO
1-1/2 HP PER POLE
2 Hp - 2 POLE SWITCHING
CLASS "B" COIL INSULATION SYSTEM



OUTLINE DIMENSIONS
Dimensions shown in Inch & (Millimeters)



SPECIFICATIONS CLASS 199

COIL

Pull-in Voltage:	80% DC Coils, 85% AC coils of nominal voltage or Less @ 25˚C
Dropout Voltage:	10% of Nominal Voltage or More @ 25˚C
Coil Resistance:	± 10% Measured @ 25˚C
Max. Coil Dissipation:	DC Coils-4 Watts Max. Continuous.

CONTACTS

Contact Combinations:	DPST-NO
Contact Rating each Pole:	Each pole rated 30 Amps up to 300 VAC, 50/60Hz, 5 Amps @ 480/600VAC ,0.75pF Inductive load. 1-1/2 HP Motor Load (each Pole) @ 120 thru 600 VAC, 50/60 Hz. 2 HP Motor Load @ 200 thru 600 VAC, 50/60 Hz only when using two pole to switch both sides of Load 30 Amps @ 28 VDC Resistive load each Pole. NEMA A600 Pilot Duty 50/60Hz
Contact Material:	Silver Cadmium Oxide, Gold Flashed. 5/16" Diameter Standard.

TIMING

Operate time	40 Milliseconds Max. @ Nominal V
Release Time:	35 Milliseconds Max. @ Nominal V

DIELECTRIC STRENGTH

Between Open Contacts:	1500 V rms
Mutually Insulated Conductive elements:	2200 V rms

TEMPERATURE

Operating Range:	(AC) -30˚C to +50˚C, (DC) -30˚C +60˚C
Non-Operating Storage range:	-30˚C to +100˚C

LIFE

Electrical (Rated Load):	100,000 Operations
Mechanical (No Load):	5,000,000 Operations

MISCELLANEOUS

Coil Terminals:	6-32 Binder Head Screws
Contact Terminals:	8-32 Binder Head Screws
Base Material:	Molded Phenolic, UL Recognized (QMFZ2)
Weight:	9 oz. - 255 Grams approx... (DPST-NO)

*** RELEVANT IEC CONTACT UTILIZATION CATEGORIES**

CE	**AC-1, AC-3, DC-1, AC-15**
	SEE SECTION 11, FOR RELEVANT UTILIZATION CATEGORIES

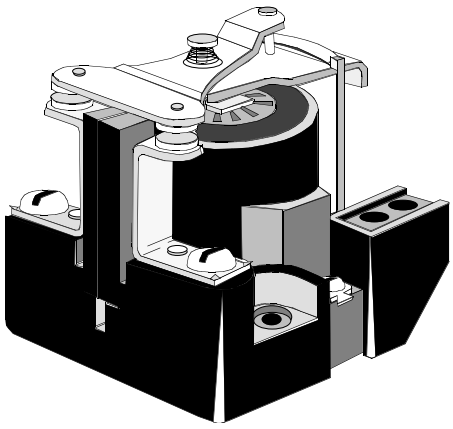
Magnecraft

PART NUMBERS DPST-NO	COIL Measured @ 25˚C NOMINAL INPUT VOLTAGE	NOMINAL RESISTANCE (OHMS)	NOMINAL POWER	CROSS REFERENCE POTTER & BRUMFIELD
AC OPERATED (DPST-NO)				
W199AX-8	24 VAC	-	10 VA	**PRD7AGO-24**
W199AX-9	120 VAC	-	10 VA	**PRD7AGO-120**
W199AX-10	240 VAC, 60 Hz			**PRD7AGO-240**
	220 VAC, 50 Hz	-	10 VA	
DC OPERATED (DPST-NO)				
W199X-7	12 VDC	70	2.0 W	**PRD7DGO-12**
W199X-8	24 VDC	290	2.0 W	**PRD7DGO-24**

PART NUMBERS SHOWN ALSO **AVAILABLE THRU STOCKING DISTRIBUTION.**

AUXILIARY CONTACTS AND OTHER COIL VOLTAGES ARE AVAILABLE ON SPECIAL ORDER. CONTACT FACTORY FOR SPECIAL REQUIREMENTS.

OPEN STYLE POWER RELAY



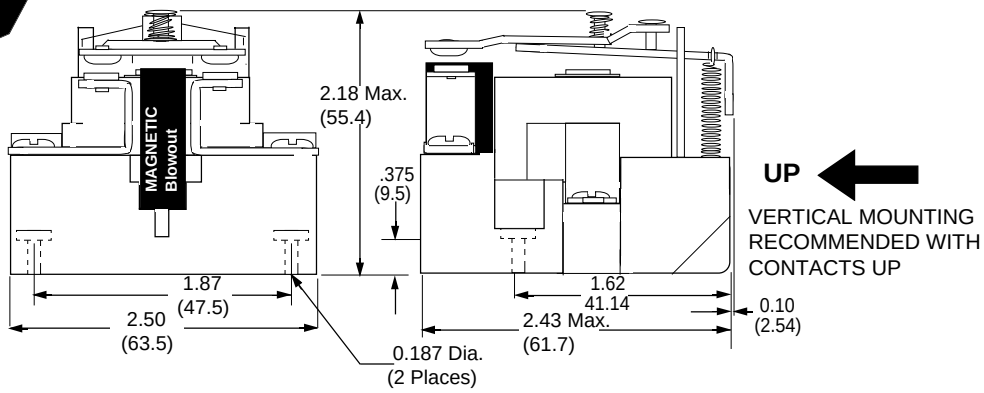
CLASS 199DB
SPST-NO-DM WITH MAGNETIC BLOWOUT FOR DC ARC QUENCING

UL Listed
File No. E43641

COMPLIES WITH REQUIREMENTS OF
* IEC STANDARDS 947-4-1 AND 947-5-1
LOW VOLTAGE DIRECTIVE

* IEC = INTERNATIONAL ELECTROTECHNICAL COMMISSION

OUTLINE DIMENSIONS
Dimensions shown in Inch & (Millimeters)



SPECIFICATIONS CLASS 199

COIL

Pull-in Voltage:	80% DC Coils, 85% AC coils of nominal voltage or Less @ 25˚C
Dropout Voltage:	10% of Nominal Voltage or More @ 25˚C
Coil Resistance:	± 10% Measured @ 25˚C
Max. Coil Dissipation:	DC Coils-4 Watts Max. Continuous.

CONTACTS

Contact Combinations:	SPST-NO-DM Double Make
Contact Rating :	30 Amps up to 300 VAC, 50/60Hz, 5 Amps @ 480/600Vac,0.75pFInductive Load. 1-1/2 HP Motor Load (each Pole) @ 120 thru 600 VAC, 50/60 Hz. 2 HP Motor Load @ 200 thru 600 VAC, 50/60 Hz only when using two poles to switch. 30 Amps @ 28 VDC Resistive Each Pole.
Additional Ratings, with Blowout Magnet for DC switching:	NEMA A600 Pilot Duty 50/60Hz 20 Amps @ 110 VDC, Resistive; 8 Amps at 220 VDC, Resistive, 4 Amps @ 325VDC Resistive. 2 amps @ 500 VDC resistive. For Inductive Loads, contacts must be derated accordingly. Capacitive loads must be limited to insure that inrush current will not exceed 100 Amps.
Contact Material:	Silver Cadmium Oxide, Gold Flashed. 5/16" Diameter Standard.

TIMING

Operate time:	40 Milliseconds Max. @ Nominal V
Release Time:	30 Milliseconds Max. @ Nominal V

DIELECTRIC STRENGTH

Between Open Contacts:	1500 V rms
Mutually Insulated Conductive elements:	2200 V rms

TEMPERATURE

Operating Range:	(AC) -30˚C to +50˚C, (DC) -30˚C +60˚C
Non-Operating Storage range:	-30˚C to +100˚C

LIFE

Electrical (Rated Load):	100,000 Operations
Mechanical (No Load):	5,000,000 Operations

MISCELLANEOUS

Coil Terminals:	6-32 Binder Head Screws
Contact Terminals:	8-32 Binder Head Screws
Base Material:	Molded Phenolic, UL Recognized (QMFZ2)
Weight:	8 oz. - 227 Grams approx. (SPST-NO-DM)

*** RELEVANT IEC CONTACT UTILIZATION CATEGORIES**

CE	**AC-1, AC-3, DC-1, AC-15**
	SEE SECTION 11, FOR RELEVANT UTILIZATION CATEGORIES

Magnecraft

PART NUMBER	COIL Measured @ 25˚C			CROSS REFERENCE POTTER & BRUMFIELD
	NOMINAL INPUT VOLTAGE	NOMINAL RESIS-TANCE (OHMS)	NOMINAL POWER	
AC OPERATED (SPST-NO-DM WITH			**MAGNETIC BLOWOUT)**	
W199ADBX-4	120 VAC	-	10 VA	**PRD3AJ0-120**

PART NUMBERS SHOWN ALSO **AVAILABLE THRU STOCKING DISTRIBUTION.**

AUXILIARY CONTACTS AND OTHER COIL VOLTAGES ARE AVAILABLE ON SPECIAL ORDER. CONTACT FACTORY FOR SPECIAL REQUIREMENTS.

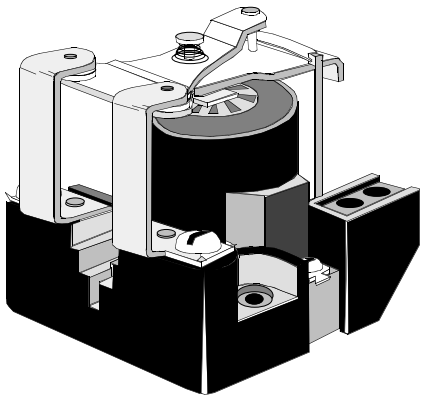
UL Listed
File No. E43641

COMPLIES WITH REQUIREMENTS OF
* IEC STANDARDS 947-4-1 AND 947-5-1 LOW VOLTAGE DIRECTIVE

* IEC = INTERNATIONAL ELECTROTECHNICAL COMMISSION

CLASS 199 SPST-NC-DB OR SPST-NO-DM

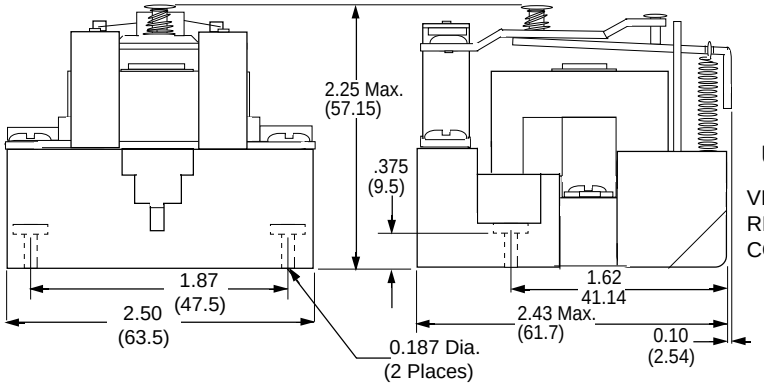
RATED 30 AMPS @ 2 HP
CLASS "B" COIL INSULATION SYSTEM



SPST-NC-DB

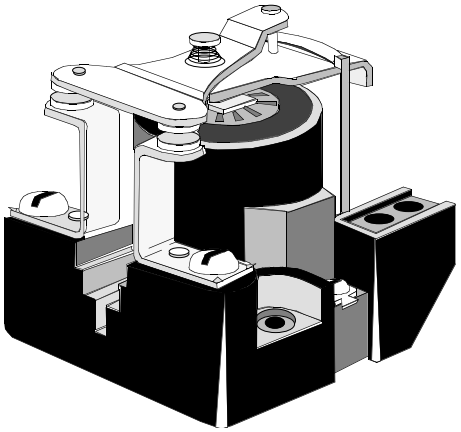
OUTLINE DIMENSIONS

Dimensions shown in Inch & (Millimeters)



UP

VERTICAL MOUNTING RECOMMENDED WITH CONTACTS UP



SPST-NO-DM

SPECIFICATIONS CLASS 199

COIL

Pull-in Voltage:	80% DC Coils, 85% AC coils of nominal voltage or Less. @ 25˚C
Dropout Voltage:	10% of Nominal Voltage or More @ 25˚C
Coil Resistance:	± 10% @ 25˚C
Max. Coil Dissipation:	DC Coils-4 Watts Max. Continuous.

CONTACTS

Contact Combinations:	SPST-NC (Double Break SPST-NO (Double Make
Contact Rating SPST-NO-DM:	30 Amps up to 300 VAC, 50/60Hz 12 Amps @ 480, 10 Amps @ 600VAC,50/60 0.75pFInductive Load. 2 HP Motor Load @ 120 thru 600 VAC, 50/60 Hz. 30 Amps @ 28 VDC Resistive load. NEMA A600 Pilot Duty 50/60Hz
:Contact Material:	Silver Cadmium Oxide, Gold Flashed. 5/16" Diameter Standard.

TIMING

Operate time	40 Milliseconds Max. @ Nominal V
Release Time:	30 Milliseconds Max. @ Nominal V

DIELECTRIC STRENGTH

Between Open Contacts:	1500 V rms
Mutually Insulated Conductive elements:	2200 V rms

TEMPERATURE

Operating Range:	(AC) -30˚C to +50˚C, (DC) -30˚C +60˚C
Non-Operating Storage range:	-30˚C to +100˚C

LIFE

Electrical (Rated Load):	100,000 Operations
Mechanical (No Load):	5,000,000 Operations

MISCELLANEOUS

Coil Terminals:	6-32 Binder Head Screws
Contacts Terminals:	8-32 Binder Head Screws
Base Material:	Molded Phenolic, UL recognized (QMz2)
Weight:	8 oz. - 227 Grams approx.

*** RELEVANT IEC CONTACT UTILIZATION CATEGORIES**

CE	**AC-1, AC-3, DC-1, AC-15**
	SEE SECTION 11, FOR RELEVANT UTILIZATION CATEGORIES

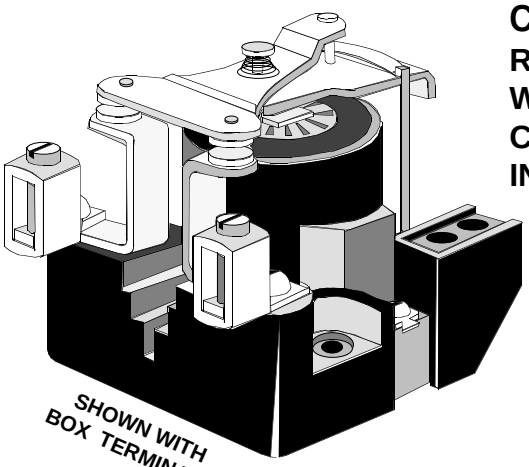
Magnecraft

PART NUMBERS	COIL Measured @ 25˚C			CROSS REFERENCE POTTER & BRUMFIELD
	NOMINAL INPUT VOLTAGE	NOMINAL RESISTANCE (OHMS)	NOMINAL POWER	
DC OPERATED (SPST-NC-DB WITH 30 AMP SCREW TERMINALS)				
W199DYX-2	12 VDC	70	2.0 W	**PRD4DG0-12**
AC OPERATED (SPST-NO-DM WITH 30 AMP SCREW TERMINALS)				
W199ADX-4	120 VAC	-	10 VA	**PRD3AG0-120**
W199ADX-5	240 VAC, 60 Hz			**PRD3AG0-240**
	220 VAC, 50 Hz	-	10 VA	
DC OPERATED (SPST-NO-DM WITH 30 AMP SCREW TERMINALS)				
W199DX-2	12 VDC	70	2.0 W	**PRD3DG0-12**
W199DX-3	24 VDC	290	2.0 W	**PRD3DG0-24**

PART NUMBERS SHOWN ALSO **AVAILABLE THRU STOCKING DISTRIBUTION.**

AUXILIARY CONTACTS AND OTHER COIL VOLTAGES ARE AVAILABLE ON SPECIAL ORDER. CONTACT FACTORY FOR SPECIAL REQUIREMENTS.

DOUBLE MAKE POWER RELAYS



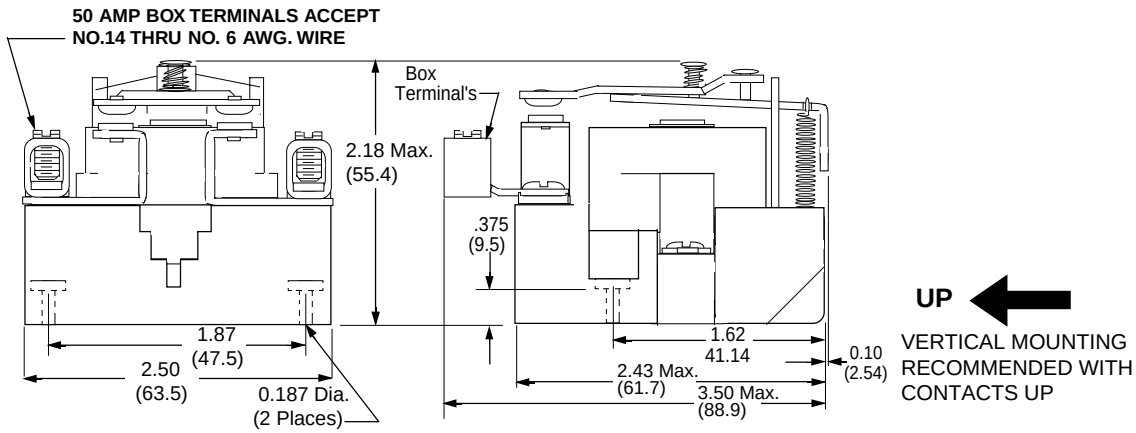
CLASS 199 SPST-NO-DM
RATED 50 AMPS - 2HP
WITH BOX TERMINALS.
CLASS "B" COIL
INSULATION SYSTEM

UL Listed
File No. E43641

COMPLIES WITH
REQUIREMENTS OF
* IEC STANDARDS
947-4-1 AND 947-5-1
LOW VOLTAGE DIRECTIVE

* IEC = INTERNATIONAL
ELECTROTECHNICAL COMMISSION

OUTLINE DIMENSIONS
Dimensions shown in Inch & (Millimeters)



*** RELEVANT IEC CONTACT UTILIZATION CATEGORIES**

CE	**AC-1, AC-3, DC-1, AC-15**
	SEE SECTION 11, FOR RELEVANT UTILIZATION CATEGORIES

Magnecraft

PART NUMBERS	COIL Measured @ 25˚C			CROSS REFERENCE POTTER & BRUMFIELD
	NOMINAL INPUT VOLTAGE	NOMINAL RESIS-TANCE (OHMS)	NOMINAL POWER	
AC OPERATED (SPST-NO-DM WITH 50 AMP BOX TERMINALS)				
W199ADEX-4	120 VAC	-	10 VA	**PRD3AP4-120**
DC OPERATED (SPST-NO-DM WITH 50 AMP BOX TERMINALS)				
W199DEX-3	24 VDC	290	2.0 W	**PRD3DP4-24**

PART NUMBERS SHOWN ALSO **AVAILABLE THRU STOCKING DISTRIBUTION.**
AUXILIARY CONTACTS AND OTHER COIL VOLTAGES ARE AVAILABLE ON SPECIAL ORDER. CONTACT FACTORY FOR SPECIAL REQUIREMENTS.

SPECIFICATIONS CLASS 199

COIL
- Pull-in Voltage: 80% DC Coils, 85% AC coils of nominal voltage or Less. @ 25˚C
- Dropout Voltage: 10% of Nominal Voltage or More @ 25˚C
- Coil Resistance: ± 10% @ 25˚C
- Max. Coil Dissipation: DC Coils-4 Watts Max. Continuous.

CONTACTS
- Contact Combinations: SPST-NO Double Make
- Contact Ratings : 50 Amps up to 300 VAC, 50/60Hz
  50 Amps @ 28 VDC Resistive load. Loads must be current limited as not to exceed 100 Amp inrush Currents.
  NEMA A600 Pilot Duty 50/60Hz
- Contact Material: Silver Cadmium Oxide, Gold Flashed. 5/16" Diameter Standard.

TIMING
- Operate time: 40 Milliseconds Max. @ Nominal V
- Release Time: 30 Milliseconds Max. @ Nominal V

DIELECTRIC STRENGTH
- Between Open Contacts: 1500 V rms
- Mutually Insulated Conductive elements: 2200 V rms

TEMPERATURE
- Operating Range: (AC) -30˚C to +50˚C, (DC) -30˚C +60˚C
- Non-Operating Storage range: -30˚C to +100˚C

LIFE
- Electrical (Rated Load): 100,000 Operations
- Mechanical (No Load): 5,000,000 Operations

MISCELLANEOUS
- Coil Terminals: 6-32 Binder Head Screws
- Contacts Terminals: 8-32 Binder Head Screws
- Base Material: Molded Phenolic, UL Recognized (QMFZ2)
- Weight: 8 oz. - 227 Grams approx.

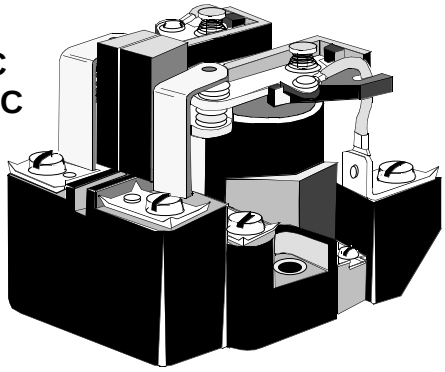
DC SWITCHING POWER RELAY

UL Listed
File No. E43641

COMPLIES WITH REQUIREMENTS OF
* IEC STANDARDS 947-4-1 AND 947-5-1 LOW VOLTAGE DIRECTIVE

* IEC = INTERNATIONAL ELECTROTECHNICAL COMMISSION

CLASS 199B
DPDT WITH MAGNETIC BLOWOUT FOR DC ARC QUENCHING
10 AMP @ 110 VDC
CLASS "B" COIL INSULATION SYSTEM



SPECIFICATIONS CLASS 199

COIL

Pull-in Voltage:	80% DC Coils, 85% AC coils of nominal voltage or Less @ 25˚C
Dropout Voltage:	10% of Nominal Voltage or More ™ 25˚C
Coil Resistance:	± 10% @ 25˚C
Max. Coil Dissipation:	DC Coils-4 Watts Max. Continuous.

CONTACTS

Contact Combinations:	DPDT
Contact Rating :	30 Amps up to 300 VAC, 50/60Hz 5 Amps @ 480/600VAC ,0.75pFInductive Load. 1-1/2 HP Motor Load (each Pole) @ 120 thru 600 VAC, 50/60 Hz. 2 HP Motor Load @ 200 thru 600 VAC, 50/60 Hz only when using two poles to switch both sides of Load 30 Amps @ 28 VDC Resistive Each Pole. NEMA A600 Pilot Duty 50/60 Hz
DC Ratings:	10 Amps @ 110 VDC, Resistive; 4 Amps at 220 VDC, Resistive, 2 Amps @ 325VDC Resistive. For inductive Loads, contacts must be derated accordingly. Capacitive loads must have current limiting to insure that inrush current will not exceed 50 Amps
Contact Material:	Silver Cadmium Oxide, Gold Flashed. 5/16" Diameter Standard.

TIMING

Operate time:	40 Milliseconds Max. @ Nominal V
Release Time:	30 Milliseconds Max. @ Nominal V

DIELECTRIC STRENGTH

Between Open Contacts:	1500 V rms
Mutually Insulated Conductive elements:	2200 V rms

TEMPERATURE

Operating Range:	(AC) -30˚C to +50˚C, (DC) -30˚C +60˚C
Non-Operating Storage range:	-30˚C to +100˚C

LIFE

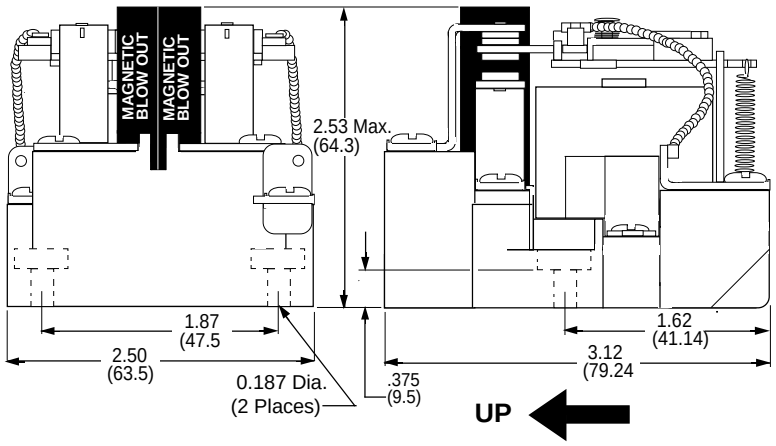
Electrical (Rated Load)	100,000 Operations
Mechanical (No Load)	5,000,000 Operations

MISCELLANEOUS

Coil Terminals:	6-32 Binder Head Screws
Contact Terminals:	8-32 Binder Head Screws
Base Material	Molded Phenolic, UL Recognized (QMFZ2)
Weight:	11 oz. - 312 Grams approx.. (DPDT)

OUTLINE DIMENSIONS

Dimensions shown in Inch & (Millimeters)



VERTICAL MOUNTING RECOMMENDED WITH CONTACTS UP

*** RELEVANT IEC CONTACT UTILIZATION CATEGORIES**

CE	**AC-1, AC-3, DC-1, AC-15**
	SEE SECTION 11, FOR RELEVANT UTILIZATION CATEGORIES

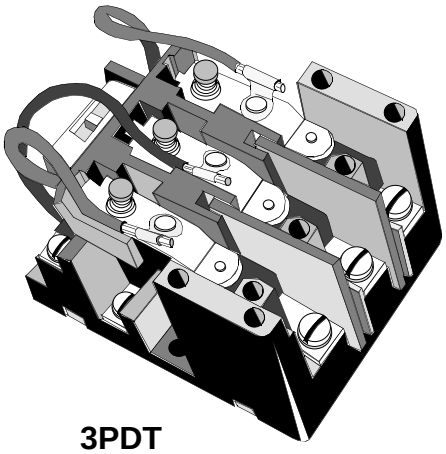
Magnecraft

PART NUMBERS	COIL Measured @ 25˚C			CROSS REFERENCE POTTER & BRUMFIELD
	NOMINAL INPUT VOLTAGE	NOMINAL RESIS-TANCE (OHMS)	NOMINAL POWER	
AC OPERATED (DPDT WITH BLOW OUT MAGNET)				
W199ABX-14	120 VAC	-	10 VA	**PRD11AJ0-120**
DC OPERATED (DPDT WITH BLOW OUT MAGNET)				
W199BX-14	110 VDC	6000	2.0 W	**PRD11DJ0-110**

PART NUMBERS SHOWN ALSO **AVAILABLE THRU STOCKING DISTRIBUTION.**

AUXILIARY CONTACTS AND OTHER COIL VOLTAGES ARE AVAILABLE ON SPECIAL ORDER. CONTACT FACTORY FOR SPECIAL REQUIREMENTS.

OPEN STYLE - 3 POLE, 30 AMP POWER RELAY

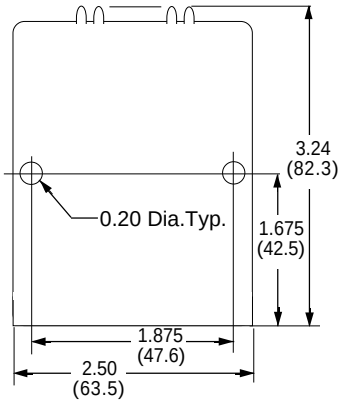


3PDT

The series 425 Power relay is capable of handling up to 30 Amps and 1 Hp Loads. The Series 425 has sufficient spacing to allow for 600 Vac contact ratings . The Design features a enclosed coil, Screw Terminals and Silver Cadmium Oxide contacts as standard. The Series 425 has a wide choice of options to choose from.

OUTLINE DIMENSIONS

Dimensions shown are in INCHES and (millimeters)



UP

VERTICAL MOUNTING RECOMMENDED WITH CONTACTS UP

CONTACT LOAD RATINGS 3 POLE RELAYS

Load	30/DC	120-240/AC	208-240/AC	277/AC	600/AC
General Duty	30A	25A	25A	17A	10A
Motor (45% PF)	1Ø 1HP◊	1Ø 1HP◊	3Ø 3HP	-	-

◊ PER POLE

COIL SPECIFICATIONS 3 POLE RELAYS @ 25˚C

Nominal Voltage	Resistance Ohms ± 10%	Resistance Ohms ± 10%	Current (MA)		Power Consumption	
	AC	DC	AC	DC	AC	DC
12	1.8	35.5	1600	333	11VA	4.0W
24	6.7	142	820	169	11VA	4.0W
48	27	568	410	84	11VA	4.0W
120 *	170	2980	85	18-21	11VA	4.0W
240 **	680	-	43	-	11VA	
480	2720	-	22	-	11VA	

* AC Coil is 120V, 50/60Hz, DC Coil is 110-125VD

** For 220 VDC use 3600 Ω, 10 Watt resistor in series with 110 VDC relay.

1, 2, and 3 Pole Relays

Min. Operate: AC: 85% of nominal Voltage or less @ 25˚C
DC: 75% of nominal Voltage or less @ 25˚C

Max. Over Voltage: 110% of nominal

Magnecraft & Struthers-Dunn

ORDERING CODE

Typical Type No. **425 XCX ___ -120A**

Series
425 Screw Terminal, 30A, 1-3 Pole

Contact Arrangements
Insulated Armature Types (600V)

CXX 3PST-NO
XCX 3PDT

Options

Tungsten Contacts (High Inrush) - **CODE W**
0.25 inch quick connect terminals- **CODE 18**
1 Aux. Contact (SPDT Snap Switch, 10A) - **CODE 90**
2 Aux. Contact (SPDT Snap Switches, 10A) - **CODE 91**

Coil Voltage
AC: 6, 12, 24, 48, 120, 240, 480 (Add **"A"**)
DC: 6, 12, 24, 48, 110 -125 (Add **"D"**)

ULRecognized
File No. E13224

GENERAL SPECIFICATIONS

CONTACTS
Contact Material: Silver Cadmium Oxide.

TIMING
Operate Time: 30 mS Max. @ Nominal Voltage.
Release Time: 15 mS Max. @ Nominal Voltage.

INSULATION CHARACTERISTICS
Dielectric Strength: 2500 V rms between Mutually insulated current carrying parts and those parts to ground.
Insulation Resistance: 500 VDC Exceeds 1000 Megohms.

ENVIRONMENTAL CAPABILITIES
Ambient Temperature Rating: AC: -55˚C to +45˚C @ Rated Operation.
DC: -55˚C to +80 ˚C

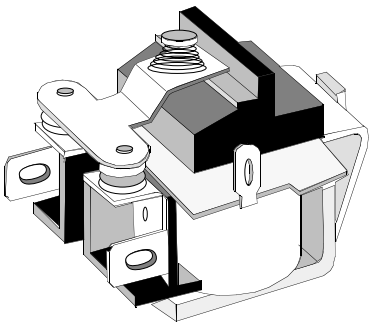
LIFE EXPECTANCY
Mechanical: 10 Million Operations no load
Electrical: 100,000 Operations @ Rated Load.

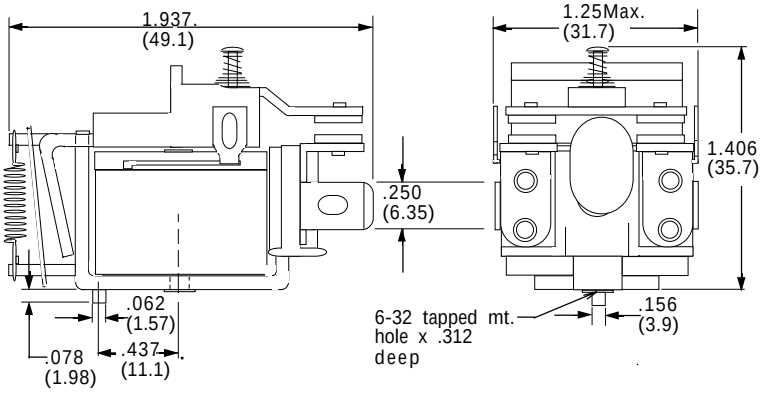
MISCELLANEOUS
Enclosure: Open Style
Weight: Small Base 9oz. large base 11 oz.approx.

CLASS 88UKD RELAY

SIDE COIL SOLDER TERMINALS
SPST-N.O. DM, RATED 30 AMPS
1/4"QUICK CONNECT /SOLDER TERMINALS
SWITCHES UP TO 1 HP AT 600 VAC

UL Recognized
File No. E43641





SPECIFICATIONS 88UKD

COIL

Pull-in Voltage (AC):	85% of Nominal Voltage or less
Pull-in Voltage (DC):	80% of Nominal Voltage or less
Dropout Voltage:	10% of nominal voltage or more
Max. allowed voltage	110% of nominal voltage
Coil Resistance:	±10% Measured @ 25˚C

CONTACTS

Contact Material:	1/4' silver alloy, gold flashed.
Contact Resistance:	Initial 50 Milliohms @ rated current.
Contact Rating:	30 Amps up to 300VAC/28VDC, Resistive Load 5 Amps @ 600VAC Resistive.Load 1 HP @ 120-600 VAC Motor load.

TIMING

Operate Time:	25 mS Max. @ Nominal Voltage.
Release Time:	20 mS Max. @ Nominal Voltage

DIELECTRIC STRENGTH

Contacts to coil:	3000 V rms
Across open contacts:	1000 V rms
Contacts to frame:	3000 V rms
Insulation Resistance:	1000 megohms min. @ 500 VDC

TEMPERATURE

Operating:	-10˚C to +50˚C @ Rated Operation. (AC) -10˚C to +60˚C @ Rated Operation. (DC)

VIBRATION RESISTANCE

Functional:	5g's 10 to 55Hz.

SHOCK RESISTANCE

Functional:	5g's 11mS Max.

LIFE EXPECTANCY

Mechanical:	5 Million Operations
Electrical:	100,000 Operations @ Rated Load.

MISCELLANEOUS

Contact Insulation:	Movable & stationary contacts are mounted on a molded plastic barrier insulator.
Style:	Open style construction.
Mounting:	6-32 tapped hole and locating tab.
Weight:	85 Grams, 3 oz. approx.

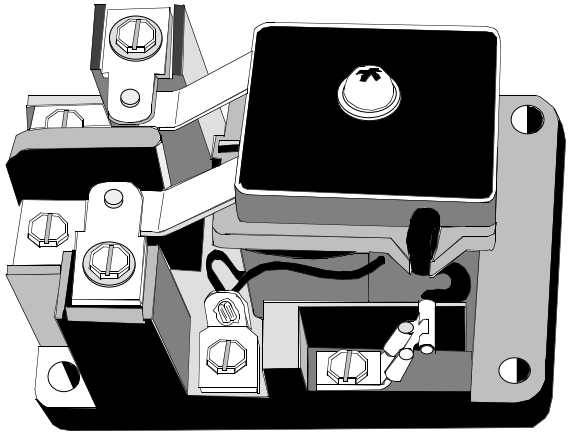
PART NUMBERS	Coil Measured @ 25˚C			CROSS REFERENCE TO POTTER & BRUMFIELD
	NOMINAL INPUT VOLTAGE	NOMINAL RESISTANCE (OHMS)	NOMINAL POWER	
AC OPERATED COIL				
W88UKADX-3	24VAC	-	3VA	**KR-3AH-24**
W88UKADX-4	120VAC	-	3VA	**KR-3AH-120**
W88UKADX-5	240VAC,60Hz 220VAC,50Hz	-	3VA	**KR-3AH-240**
DC OPERATED COIL				
W88UKDX-2	12 VDC	100	1.5W	**KR-3DH-12**
W88UKDX-3	24 VDC	400	1.5W	**KR-3DH-24**
W88UKDX-4	110 VDC	8000	1.5W	**KR-3DH-110**

PART NUMBERS SHOWN ALSO **AVAILABLE THRU STOCKING DISTRIBUTION.**

SCREW TERMINAL 15 AMP, 1 AND 2 POLE POWER RELAY

Listed (XBX Only)
file No. E13224

The Series 415 is a compact, 15 amp base mounted industrial relay. It is a versatile relay that offers a variety of contact configurations and options. Excellent contact life assures long mechanical life and contact reliability on low level loads. Screw terminals are standard. Options include: high voltage or high inrush contacts, quick connect terminals, permanent magnet blowout and low power DC coils.

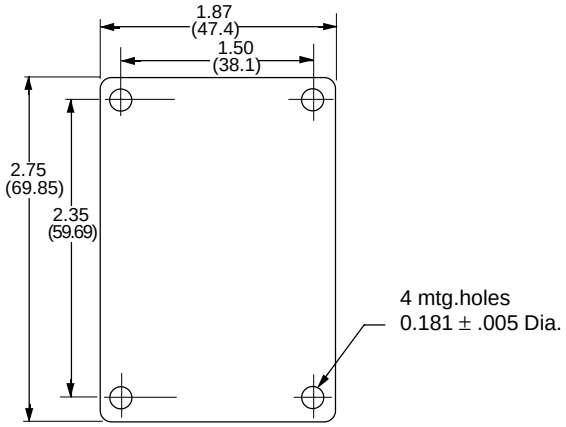


UP

VERTICAL MOUNTING
RECOMMENDED WITH
CONTACTS UP

OUTLINE DIMENSIONS

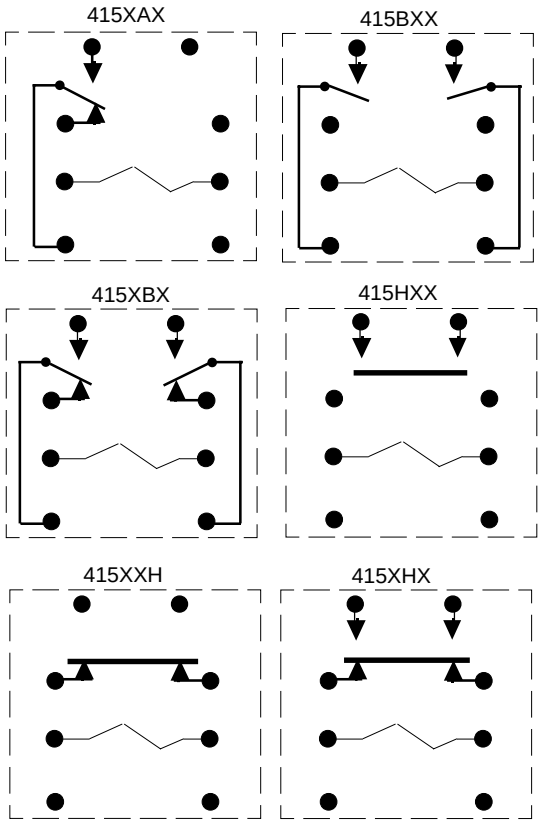
Dimensions shown in Inch and (Millimeters)



MAXIMUM DEPTH DIMENSION OF CONTACTOR 1.75", (44.45)

WIRING DIAGRAMS

TOP VIEW



Magnecraft & Struthers-Dunn

ORDERING CODE

Typical Type No. **415 XBX 18 -120A**

Series
415 Screw Terminals, 15 Amp
1 and 2 pole

Contact Arrangements
BXX (DPST-NO.
HXX (SPST-NO-DM
XAX (SPDT)
XBX (DPDT)
XHX (SPDT-DB-DM
XXH (SPST-NC-DB

Options
0.25 inch quick connect terminals - **CODE 18**
Permanent Magnet Blowout - **CODE 69**
(Consult Factory for other options)

Coil Voltage
AC: 6, 12, 24, 48, 120, 240, (Add **"A"**)
DC: 6, 12, 24, 32, 48, 115-125 (Add **"D"**)

Special coils: Low Power (mW), series coils.
High Inrush contacts: 10 Amps continuous, 150 Amp Inrush.
High Voltage Contacts: Up to 4KV

CONTACT RATINGS

LOAD	30/VDC	120VAC	240VAC
RESISTIVE MOTOR (80% pF)	15A -	15A 1/2HP	10A 1HP

AC COIL SPECIFICATIONS @ 25˚C (6VA)

Nominal Voltage (60HZ)	Resistance Ohms ± 10%	mA @ nominal voltage	
		Inrush Current	Sealed Coil
6	1.5	1800	1000
12	6.3	900	500
24	25	450	250
48	100	225	125
120	620	90	50
240	2500	45	25

DC COIL SPECIFICATIONS @ 25˚C (3.5W)

Nominal Voltage (VDC)	Resistance Ohms ± 10%	mA @ nominal voltage	
		Coils Cold	Coils Hot
6	10	600	500
12	40	300	250
24	155	150	125
32	390	112	95
48	620	75	62
*115/125	4000	31	26

* 220-250 VDC relays supplied with resistor in series with 115/125 VDC coil.

CROSS REFERENCE
STRUTHERS-DUNN TO WARD LEONARD

STRUTHERS-DUNN	WARD LEONARD
DC COIL 2 POLE N.O.	
415BXX-6D	105-1420
415BXX-12D	105-3420
415BXX-24D	105-4420
415BXX-110D	105-6420
DC COIL 2 POLE N.C..	
415XXB-6D	105-1421
415XXB-12D	105-3421
415XXB-24D	105-4421
415XXB-110D	105-6421
DC COIL DPDT	
415XBX-6D	105-1422
415XBX-12D	105-3422
415XBX-24D	105-4422
415XBX-110D	105-6422
AC COIL 2 POLE N.O..	
415BXX-6A	105-1520
415BXX-12A	105-3520
415BXX-24A	105-4520
415BXX-120A	105-6520
AC COIL 2 POLE N.C..	
415XXB-6A	105-1521
415XXB-12A	105-3521
415XXB-24A	105-4521
415XXB-120A	105-6521
415XXB-240A	105-7521
AC COIL DPDT	
415XBX-6A	105-1522
415XBX-12A	105-3522
415XBX-24A	105-4522
415XBX-120A	105-6522
415XBX-240A	105-7522

NOTE:
THE 105 STYLE IS SLIGHTLY SMALLER WITH A DIFFERENT MOUNTING HOLE PATTERN.

GENERAL SPECIFICATIONS

COIL
- Pull-in Voltage: 80% of nominal voltage or less measured at 25˚C
- Dropout Voltage: 10% of nominal voltage or more @ 25˚C
- Max. allowed voltage: 110% of nominal voltage
- Coil Resistance: ±10% Measured @ 25˚C

CONTACTS
- Contact Material: Silver Cadmium Oxide.

TIMING
- Operate Time: 25 mS Max. @ Nominal Voltage.
- Release Time: 10mS Max. @ Nominal Voltage.

DIELECTRIC STRENGTH
- All Mutually Insulated Points: 1500 V rms between all mutually Insulated current carrying parts and those parts to ground.
- Insulation Resistance: 500 VDC Exceeds 1000 Megohms.

TEMPERATURE
- Temperature Rating: AC: -45˚C to +55˚C @ rated operation. DC: -45˚C to +70˚C @ rated operation

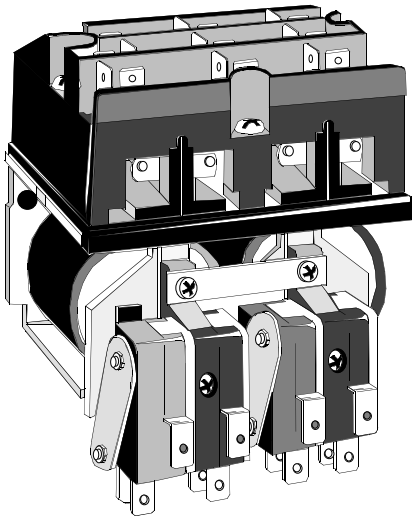
LIFE EXPECTANCY
- Mechanical: 20 Million Operations no load
- Electrical: 200,000 Operations @ Rated Load. 500,000 Operations @ 1/2 rated load.

MISCELLANEOUS
- Weight: 4 oz. (113 g) approx.

MOTOR REVERSING CONTACTOR, 1 & 3 HP, 6 POLE

UL Recognized
File No. E13224B

The Series A275 relay is a 2 coil, compact motor reversing contactor which finds extensive applications in the Industrial door operator Industry, the hoist Industry and electronic wheel balancers, to name a few. The A275 has Q.C. coil terminals extending out the back (opposite the contact terminals), mechanically interlocked armatures is a standard feature.

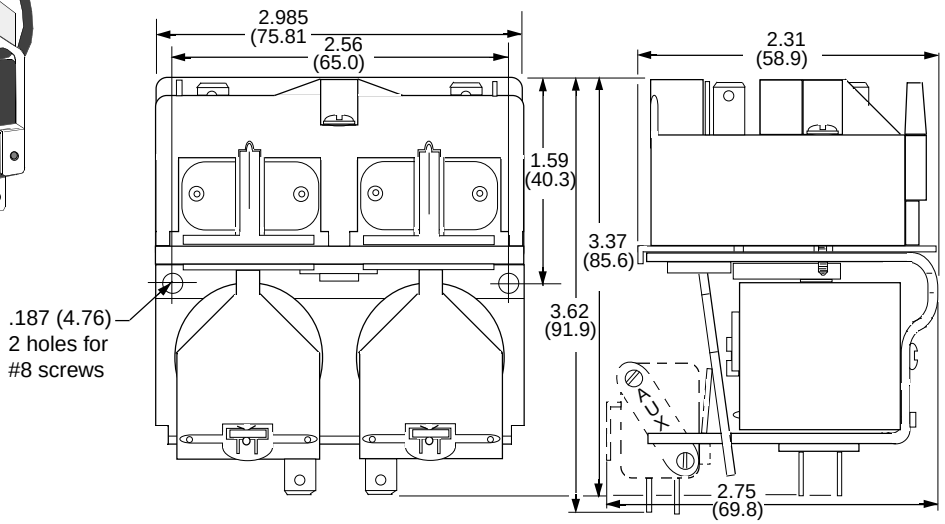


UP

RECOMMENDED
MOUNTING POSITION

OUTLINE DIMENSIONS

Dimensions shown in Inch and (Millimeters)



Magnecraft & Struthers-Dunn

ORDERING CODE

Typical Type No. **A275 KXX 90 -24A**

Series
A275, 1/4" Terminals, motor reversing.
Continuous , 1 & 2 Hp, 3 pole models

Contact Arrangements
KXX (3PDM-NO., per coil)

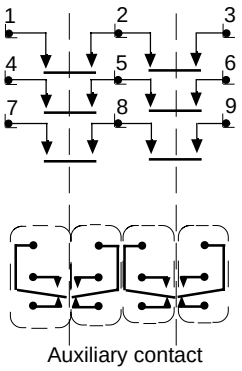
Options
2 Aux. contacts, each SPDT
(1 per coil) 1/4" Q.C. terminals - **CODE 90**
4 Aux. contacts, each SPDT
(2 per coil) 1/4" Q.C. terminals - **CODE 91**
Rectified Coil - **CODE V2**

Coil Voltage
AC: 12, 24, 110, 120, 220, 240 (Add **"A"**)
DC: 12, 24, 32, 48, 120 (Add **"D"**)

OPTIONS (CONSULT FACTORY)

WIRING DIAGRAM

TOP VIEW
Main contact terminals are
numbered on contactor



Auxiliary contact
Snap Switches

MOTOR REVERSING CONTACTOR, 1 & 3 HP, 6 POLE

GENERAL SPECIFICATIONS

COIL

Pull-in Voltage:	AC: 85%, DC: 80% of nominal voltage measured at 25˚C
Dropout Voltage:	10% of nominal voltage or more @ 25˚C
Max. allowed voltage:	110% of nominal voltage
Coil Resistance:	±10% Measured @ 25˚C

CONTACTS

Contact Material:	Silver Cadmium Oxide.

TIMING

Operate Time:	50 mS Max. @ Nominal Voltage.
Release Time:	30 mS Max. @ Nominal Voltage.

DIELECTRIC STRENGTH

All Mutually Insulated Points:	2500 V rms between all mutually Insulated current carrying parts and those parts to ground.
Insulation Resistance:	500 VDC Exceeds 1000 Megohms.

TEMPERATURE

Temperature Rating:	AC: -45˚C to +50˚C @ rated operation. DC: -45˚C to +70 ˚C @ rated operation.

LIFE EXPECTANCY

Mechanical:	5 Million Operations no load
Electrical:	100,000 Operations @ Rated Load. 500,000 Operations @ 1/2 rated load.

MISCELLANEOUS

Weight:	1 pound, approx..

CONTACT RATINGS

AC CONTACTS: Rated with all contacts in use, not rated per pole.

VOLTAGE (60HZ)	PHASE	MOTOR LOADS (HP)	RESISTIVE LOAD (AMPS)
120	1 - 2 - 3	1	15
240	1	1.5	10
240	2 - 3	3	10
480/600	2 - 3	3	5

DC COIL SPECIFICATIONS @ 25˚C

Nominal Voltage	Resistance Ohms ± 10%	Power Consumption
12	31.0	4.5W
24	125	4.6W
32	210	4.9W
48	500	4.6W
120	3240	4.4W

Polypropylene encapsulated coils

DC CONTACTS

VOLTAGE (DC)	RESISTIVE LOAD (AMPS)
30	15
125	5

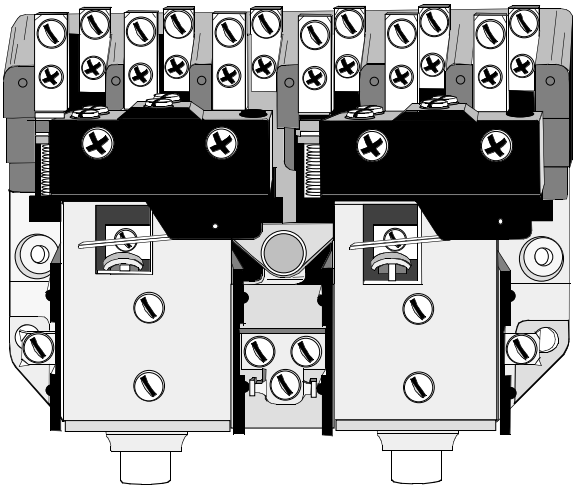
600 volt spacing to ground.
300 volt spacing for auxiliary contacts.

AC COIL SPECIFICATIONS @ 25˚C

Nominal Voltage	Resistance Ohms ± 10%	Power Consumption
12V/50-60hz	1.24	17VA
24V/50-60hz	4.63	16.7VA
110V/50-120V/60hz	125	16.8VA
220V/50-240V/60hz	500	16.8VA

2 COIL MOTOR REVERSING CONTACTOR 1.5 - 7.5HP, 6 POLE

The Series A575 relay is rated to 7.5 HP. Two sets of 3 pole, double-make, N.O. contacts are mechanically Interlocked to prevent simultaneous closure. Front mounted auxiliary contacts are available for electrical lockup and lockout. All versions have silver cadmium oxide contacts. The A575 motor reversing contactor is widely used for control of overhead doors, elevators, hoists, machine tools, and other similar devices that requires frequent jogging.

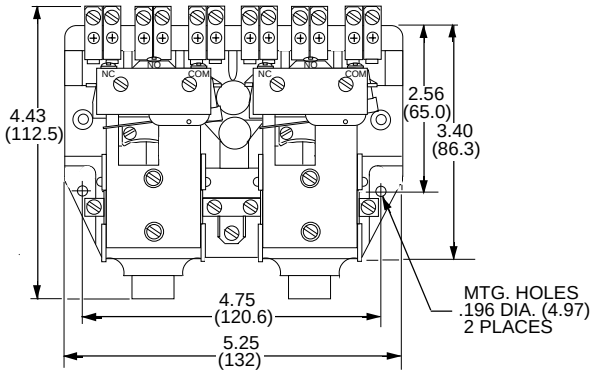


UP

RECOMMENDED
MOUNTING POSITION

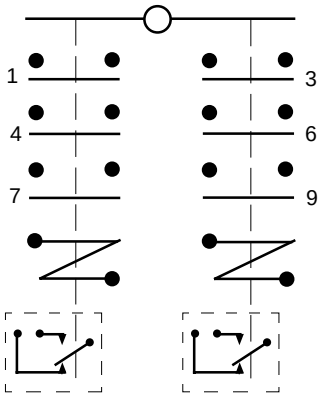
UL Recognized
File No. E13224

OUTLINE DIMENSIONS
Dimensions shown in Inch and (Millimeters)



MAXIMUM DEPTH DIMENSION OF CONTACTOR 3.00", (76.2)

WIRING DIAGRAM



AUXILIARY
CONTACTS

Magnecraft & Struthers-Dunn

ORDERING CODE
Typical Type No. **A575 KXX 90 -24A**

Series
A575, Screw Terminals, 2 coil motor rev. contactor, 1.5 - 7.5 HP

Contact Arrangements
KXX (3PDM-NO., per coil)

Options
1 Form SPST-NO & SPST-NC Aux. contacts per coil, Rated 5 Amps - **CODE 74**
SPDT Aux. contact per coil Rated 5 Amps. - **CODE 90**

Coil Voltage
AC: 12, 24, 120, 240, 440, 550 (Add **"A"**)
DC: 12, 24, 115-125, 240 (Add **"D"**)

Mechanical Interlock omitted, Consult Factory

OPTIONS (CONSULT FACTORY)

GENERAL SPECIFICATIONS

COIL

Pull-in Voltage:	AC: 85%, DC: 80% of nominal voltage measured at 25˚C
Dropout Voltage:	10% of nominal voltage or more @ 25˚C
Max. allowed voltage:	110% of nominal voltage
Coil Resistance:	±10% Measured @ 25˚C

CONTACTS

Contact Material:	Silver Cadmium Oxide.

TIMING

Operate Time:	60 mS Max. @ Nominal Voltage.
Release Time:	30 mS Max. @ Nominal Voltage.

DIELECTRIC STRENGTH

All Mutually Insulated Points:	2500 V rms between all mutually Insulated current carrying parts and those parts to ground.
Insulation Resistance:	500 VDC Exceeds 1000 Megohms.

TEMPERATURE

Temperature Rating:	-40˚C to +50˚C @ rated operation.

LIFE EXPECTANCY

Mechanical:	5 Million Operations no load
Electrical:	100,000 Operations @ Rated Load.
	250,000 Operations @ 1/2 rated load.

MISCELLANEOUS

Weight:	1.5 pounds, approx..

AC COIL SPECIFICATIONS @ 25˚C (22VA)

Nominal Voltage	Resistance Ohms ± 10%	Nominal Current
12	1.00	1.833 AMP
24	5.30	0.917 AMP
*120	92.0	0.183 AMP
240	420	0.920 AMP
440	2100	0.050 AMP
550	3100	0.040 AMP

* AC coil is 120, 50-60HZ

DC COIL SPECIFICATIONS @ 25˚C (10 WATT)

Nominal Voltage	Resistance Ohms ± 10%	Nominal Current
12	16.5	0.727
24	58.2	0.412
**120	1,450	0.083
240	4,200	0.055

** DC coil is 110-125 VDC

CONTACT RATINGS

LOAD	VOLTAGE (60HZ)	PHASE	MOTOR LOADS (HP)	RESISTIVE LOAD (AMPS)
3PST-DM-NO (per pole)	120	1	1-1/2	30
	208/240	1	3	30
	208/240	2 - 3	5	30
	480/600	2 - 3	7-1/2	15

DC CONTACTS

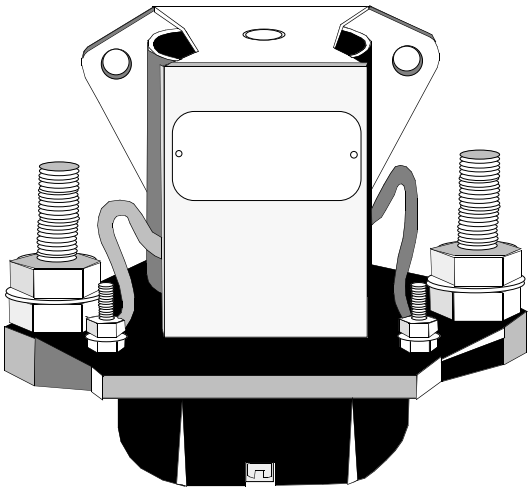
LOAD	VOLTAGE (DC)	RESISTIVE LOAD (AMPS)
3PST-DM-NO (per pole)	115	15
	230	2

AUXILIARY CONTACTS

LOAD	VOLTAGE (AC)	RESISTIVE LOAD (AMPS)
1 FORM "A"	120	5
"B" OR "C"	240	5

50,100 & 200 AMP SINGLE POLE DC CONTACTORS

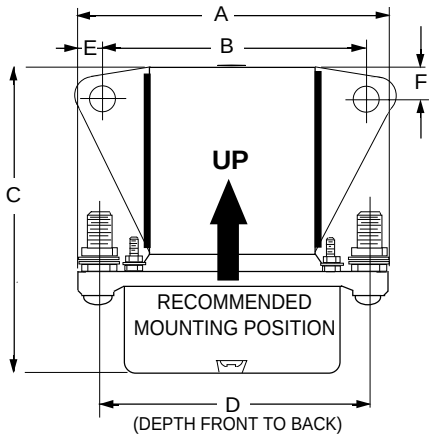
The Series 101, 102 and 103 are DC solenoid-actuated, heavy duty contactors. Each contactor has a single pole, double-make normally open contact. Contacts are enclosed with a molded plastic cover. The series 101 is rated at 50 amps continuous duty. The series 102 is rated 100 amps continuous and the series 103 is rated at 200 amps continuous. Coils are rated for DC only, as standard. The powerful magnetic structure creates very high contact pressure which results in very reliable and low resistance contacts, making them suitable for power applications in telecommunications, elevator and rail mass transit as well as other Industries.



UP

RECOMMENDED
MOUNTING POSITION

OUTLINE DIMENSIONS



Dimensions shown in Inch and (Millimeters)

Dim.	101HXX	102HXX	103HXX
A	2.69 (68.33)	3.38 (85.73)	4.25 (107.9)
B	1.87 (47.4)	2.25 (57.1)	2.40 (60.9)
C	2.50 (63.5)	3.22 (81.79)	3.53 (89.66)
D	1.84 (46.7)	2.09 (53.0)	2.65 (67.31)
E	0.40 (10.1)	0.56 (14.2)	0.92 (23.3)
F	0.43 (10.9)	0.50 (12.7)	0.56 (14.2)

Mounting holes (2) - .265 (6.73) Inch Dia.

Magnecraft & Struthers-Dunn

ORDERING CODE

Typical Type No. **102 HXX -28D**

Series
101 Screw Term., 50 Amp, 1 pole
102 Screw Term., 100 Amp, 1 pole
103 Screw Term., 200 Amp, 1 pole

Contact Arrangements
HXX- 1 Pole D.M.- N.O. Standard.
HXH- 2 Pole D.B. -1 N.C. and 1 N.O.103 only.
JXX- 2 Pole D.M. N.O
XRX- SPDT-M-B (Make before break, 103 only)
XXH- 1Pole-D.B. + 1NC (103 only)

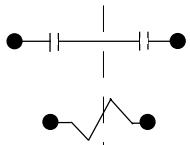
Coil Voltage
DC: 12, 28, 48, (Add **"D"**)

Note: Contact arrangements other than the standard HXX will require a 3 digit suffix number to be added to the type number. This is done by the factory and will be shown after the contact arrangement code. Contact factory for suffix number.

OPTIONS (CONSULT FACTORY)

AC COIL INPUT VOLTAGES
NON STANDARD DC COIL VOLTAGES

WIRING DIAGRAM



101HXX
102HXX
103HXX

GENERAL SPECIFICATIONS

COIL	
Pull-in Voltage:	DC: 80% of nominal voltage measured at 25˚C
Dropout Voltage:	10% of nominal voltage or more @ 25˚C
Max. allowed voltage:	110% of nominal voltage
Coil Resistance:	±10% Measured @ 25˚C
CONTACTS	
Contact Material:	Silver Cadmium Oxide.
TIMING	
Operate Time:	60 mS Max. @ Nominal Voltage.
Release Time:	30 mS Max. @ Nominal Voltage.
DIELECTRIC STRENGTH	
All Mutually Insulated Points:	1500 V rms between all mutually Insulated current carrying parts and those parts to ground.
Insulation Resistance:	500 VDC Exceeds 1000 Megohms.
TEMPERATURE	
Temperature Rating:	-45˚C to +65˚C @ rated operation.
LIFE EXPECTANCY	
Mechanical:	500,000 Operations no load
Electrical:	100,000 Operations @ Rated Load.
TERMINALS	Coil / Load Term. 101 - #6-32 / #10-32 102 - #8-32 / #1/4-20 103 - #8-32 / #3/8-18
MOUNTING	Clearance Holes, ea. .265 in dia.
Weight	13 oz., 370 Grams

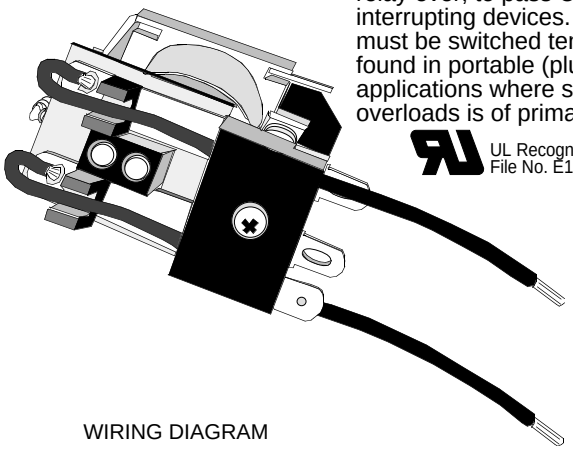
AC CONTACT RATINGS

VOLTAGE AC (60HZ)	RESISTIVE LOAD (AMPS)		
	Series 101	Series 102	Series 103
120	50	100	200
240	50	100	200
DC CONTACT RATING			
VOLTAGE (DC)	**RESISTIVE LOAD (AMPS)**		
30	50	100	200

DC COIL SPECIFICATIONS @ 25˚C

Nominal Voltage (VDC)	101HXX (9W Max)	102HXX (10.5W Max)	103HXX (13.3W Max)
	Resistance Ohms ± 10%	Resistance Ohms ± 10%	Resistance Ohms ± 10%
12	26	17	10.8
28	98	75	59
48	267	290	173

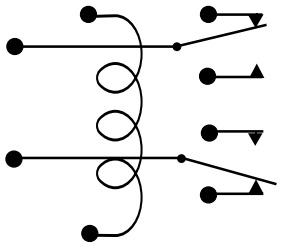
20 AMP GROUND FAULT INTERRUPT (GFI) RELAY



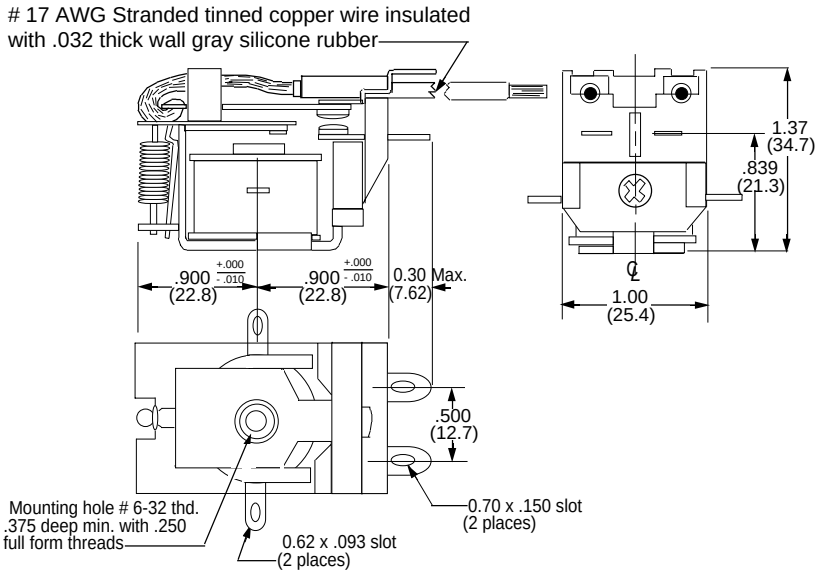
The Series 214 Ground fault interrupt relay (GFI) to our knowledge, the smallest relay ever, to pass Underwriters Laboratories 20 Amp overload test for ground fault interrupting devices. Both resistive and Inductive loads of 120 Amps at 120 volts must be switched ten times each without failure. The 214 GFI is most commonly found in portable (plug) GFI equipment. This relay is also appropriate for other applications where size, weight, and the ability to safely handle occasional severe overloads is of primary importance.

UL Recognized
File No. E13224

WIRING DIAGRAM



OUTLINE DIMENSIONS
Dimensions shown in inch and (Millimeters)



COIL SPECIFICATIONS @ 25˚C

Nominal Voltage (VDC)	AC COIL 50/60hZ		DC COIL	
	Resistance Ohms ± 10%	Nominal Power (mA)	Resistance Ohms ± 10%	Nominal Power (mA)
6	5	360	30	200
12	20	175	120	100
24	80	90	480	50
115	2000	17	10,000	11.5

NOTE: Other DC voltages available with or without rectifiers installed. AC versions without rectifiers can be supplied but not recommended. Consult Factory

VOLTAGE AC (50/60HZ)	RESISTIVE LOAD (AMPS)	
	CONTINUOUS	MAX. OVERLOAD
120	20	120 *
240	20	-
DC CONTACT RATING		
VOLTAGE (DC)	**RESISTIVE LOAD (AMPS)**	
30	20	-

* Normally open contact switched 10 times

Magnecraft & Struthers-Dunn

ORDERING CODE

Typical Type No. **214** **HXX** **-24D**

Series
Open Style, Tapped pole piece with antirotation tab. solder terminals on .Coil, # 17 AWG wire contacts.

Contact Arrangements
HXX (1 Pole double make N.O.) Standard
BXX DPST-NO (2 Form A)

Coil Voltages
AC: 6, 12, 24, 120 (Add **A**)
DC: 6, 12, 24, 110-125 (Add **"D"**)

OPTIONS
The 214 GFI is normally custom built to meet each Customers unique requirements. Consult Factory.

GENERAL SPECIFICATIONS

COIL
Pull-in Voltage: DC: 80% of nominal voltage measured at 25˚C
Dropout Voltage: 10% of nominal voltage or more @ 25˚C
Max. allowed voltage: 110% of nominal voltage
Coil Resistance: ±10% Measured @ 25˚C

CONTACTS
Contact Material: Silver Cadmium Oxide.

TIMING
Operate Time: 15 mS Max. @ Nominal Voltage.
Release Time: 15 mS Max. @ Nominal Voltage.

DIELECTRIC STRENGTH
All Mutually Insulated Points: 2000 V rms between all mutually Insulated current carrying parts and those parts to ground.
Insulation Resistance: 500 VDC Exceeds 1000 Megohms.

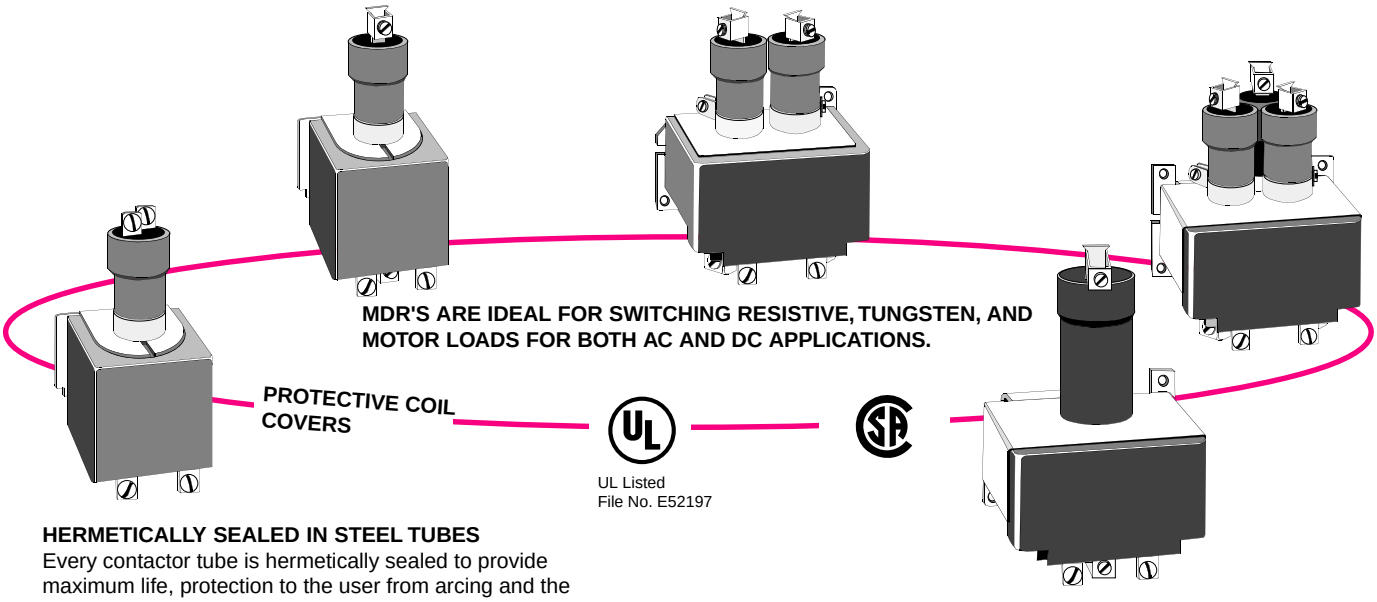
TEMPERATURE
Temperature Rating: -45˚C to +65˚C @ rated operation.

LIFE EXPECTANCY
Mechanical: 10,000,000 Operations no load
Overload: 120 VAC @ 120 Amps, 10 cycles
Electrical: 100,000 Operations @ Rated Load.

TERMINALS
Coil Load Terminals
Pierced Solder lug # 17 AWG. Silicone Rubber.

MISCELLANEOUS
Mounting position: Tapped pole piece & anti rotation Tab. Any
Weight: 2.5 oz. 71 Grams

GENERAL SPECIFICATIONS



HERMETICALLY SEALED IN STEEL TUBES
Every contactor tube is hermetically sealed to provide maximum life, protection to the user from arcing and the hazards of switching heavy loads with exposed contacts.

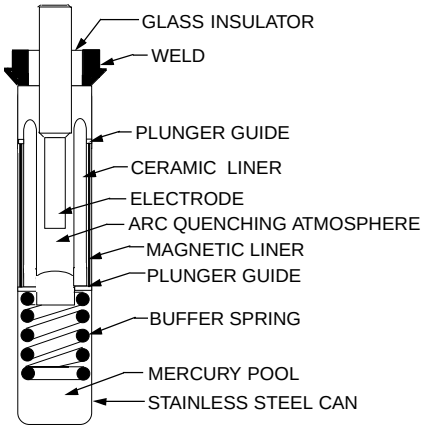
LIQUID MERCURY CONTACT
Liquid mercury means a new contact surface after every operation. Mercury is self-renewing, it cannot pit, weld, disintegrate or oxidize. The internal resistance of the contact surfaces typically measure only a few Milliohms and is ideal for switching large loads safely.

SPECIFICATIONS MERCURY DISPLACEMENT RELAYS

COIL	
Frequency of Operation:	60 per minute maximum
Pull-in voltage	80% of nominal voltage, Typ. AC & DC coils.
Dropout voltage	78% of nominal voltage, typ. AC coils 65% of nominal voltage, typ. DC coils
CONTACTS	
Material:	Mercury
Contact resistance:	.002 ohm M60 & M100 .003 ohm M30 & M35
TIMING	
Operate (at nominal voltage)	50 Milliseconds typical
Dropout (at nominal voltage)	80 Milliseconds typical
DIELECTRIC STRENGTH	
All mutually insulated points to ground:	2650 V rms
TEMPERATURE	
Operating:	- 35˚C to + 60˚C Under continuous load.
LIFE	
Mechanical: (No load)	5,000,000 Operations
Electrical (Rated load)	250,000 Operations
MISCELLANEOUS	
Insulation Material:	Class B - 130˚C & M35 pressure connectors for AWG 6-14 wire; M60 pressure connectors for AWG 2 - 12 wire
Mounting:	Vertical ±10˚
Options:	Combination of SPST-NO & SPST-NC contact configurations. available. Other coil voltages available .

APPLICATION DATA

MERCURY DISPLACEMENT TUBE



PRINCIPLE OF OPERATION

The sectional view shows our normally open style Mercury Displacement tube with the plunger assembly floating on the mercury pool.
When the coil power is off, the mercury level is below the electrode tip. No electrical path exists between the electrode and mercury pool.
When coil power is applied, the plunger is drawn down into the mercury by the pull of the magnetic field. This action raises the mercury level, so it covers the end of the electrode closing the circuit.
When coil power is turned off, the buoyant force of the mercury causes the plunger assemble to rise, dropping the mercury level, and breaking the circuit.

APPLICATION DATA

Mercury Displacement relays are ideal for adverse environments-
....Where high inrushes are encountered
....Where hermetically sealed contact operation is required because of corrosive, dirty, or moist ambient conditions.
....Where use does not permit contact maintenance.
....Where reduced noise levels are required.
....where minimum weight and size are desired.

DESIGN FEATURES

Liquid Mercury Contact - provides a new contact surface with every actuation. Mercury is self-renewing and does not pit, weld, disintegrate or oxidize.
Hermetic sealing - provides internal and external protection from arcing.
Inert Gas atmosphere - contactor tube is evacuated, then pressurized with a combination of gases which extinguish arcing and contribute to long life. The pressurized gases provide for a high dielectric withstanding voltage between contact surfaces.
Low Contact Resistance - Large electrode and mercury volume creates low contact resistance and provides high inrush current capability.
Quiet Operation - Switch clacking normally associated with conventional hard contactors, is eliminated with mercury displacement tubes and the buffer spring assembly.

APPLICATION OF "M" SERIES VS "ML" SERIES

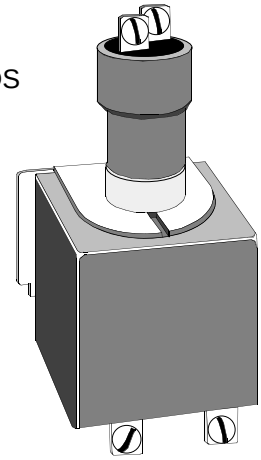
The series "ML" is physically the same as the "M" series except for the type of gases used in the contactor tubes. The "ML" series was developed for use with resistive and tungsten loads on AC power ONLY. The "ML" series will give much greater life than the "M" series for these types of loads and is intended for high activation use, such as molding machines or ovens.
The "ML" series, however is not intended for use with motor loads on AC power, or for resistive, tungsten, or motor loads on DC power. The "M" series, which is our universal series is rated to be used on all types of loads resistive, tungsten, and motor for both AC and DC power

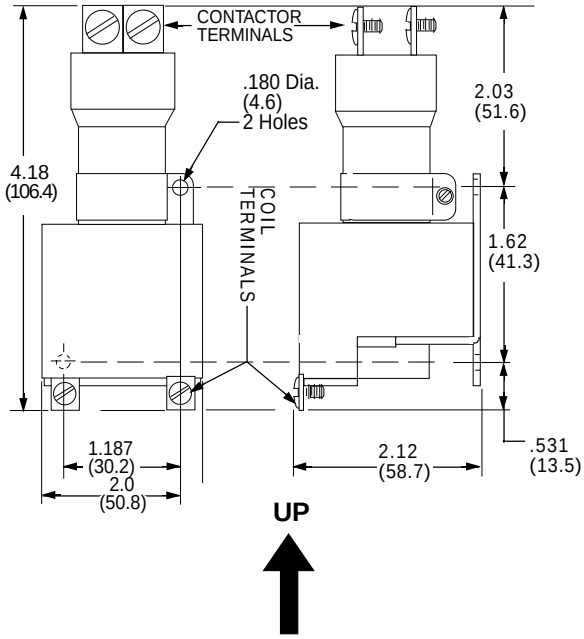
30 AMP MERCURY DISPLACEMENT RELAY

CLASS M30

RATED 30 AMPS
SWITCHES RESISTIVE
TUNGSTEN, AND MOTOR LOADS
1 POLE N.O. CONTACT

UL Listed
File No. E52197





RECOMMENDED MOUNTING POSITION ± 10˚

FOR EXTENDED LOAD LIFE WHEN SWITCHING RESISTIVE AND TUNGSTEN LOADS ORDER THE **ML30-**STYLE. OTHER COIL VOLTAGE AND CONTACT COMBINATIONS AVAILABLE. CONSULT FACTORY.

Construction in accordance with VDE 0660 and 0110 (Insulation group 380)

Weigh: 13 ozs. 370 grams

CONTACTOR RATINGS FOR M30A - M30B

VOLTAGE	PHASE	HP		MOTOR AMPS		RESISTIVE AMPS	TUNGSTEN AMPS
		1Ø	3Ø	1Ø	3Ø		
120VAC	1Ø 3Ø	2*	3*	24	19.2	30*	30*
240VAC	1Ø 3Ø	5*	7.5*	28	19	30*	15
480VAC	1Ø 3Ø	5*	10*	14	14	30*	7.5
600VAC	1Ø 3Ø	5*	10*	11.2	11	25 **	6
24VDC	DC	1/2		27		30*	30*
48VDC	DC	1/2		13.5		30*	30*
125VDC	DC	1/2		5.2		16*	16*
250VDC	DC	1/2		2.6		12*	12*

* UL and CSA Listed ** CSA only

Magnecraft

PART NUMBER	COIL Measured @ 25˚C			
	NOMINAL INPUT VOLTAGE	NOMINAL RESISTANCE (OHMS)	NOMINAL CURRENT	NOMINAL POWER
WM30A-120A	120 VAC	700	.058	7VA

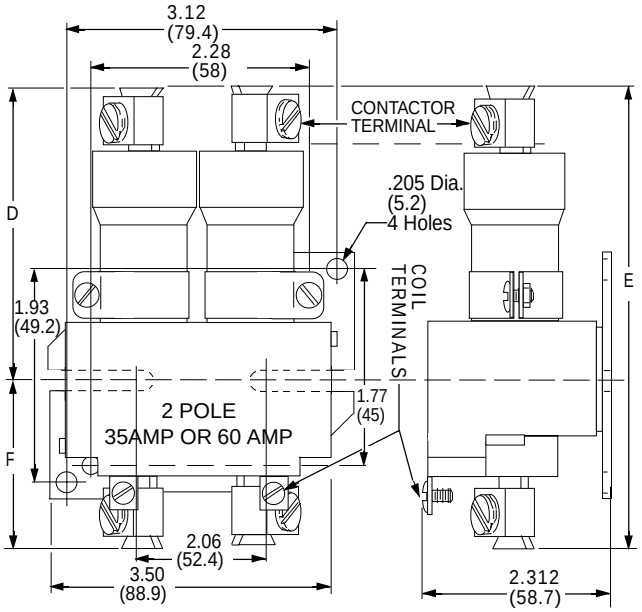
PART NUMBER SHOWN ALSO AVAILABLE THRU STOCKING DISTRIBUTION

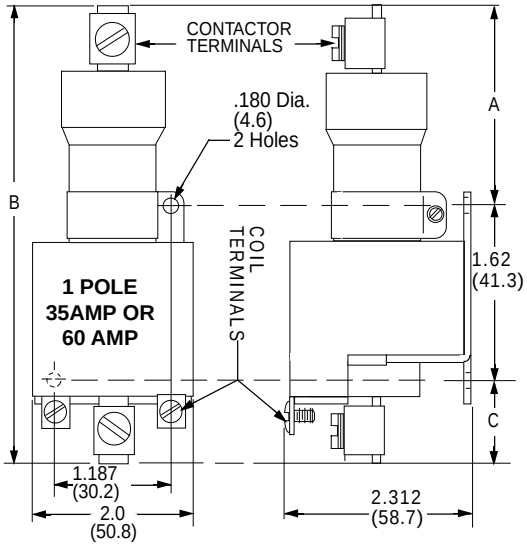
M35 AND M60 DIMENSIONS

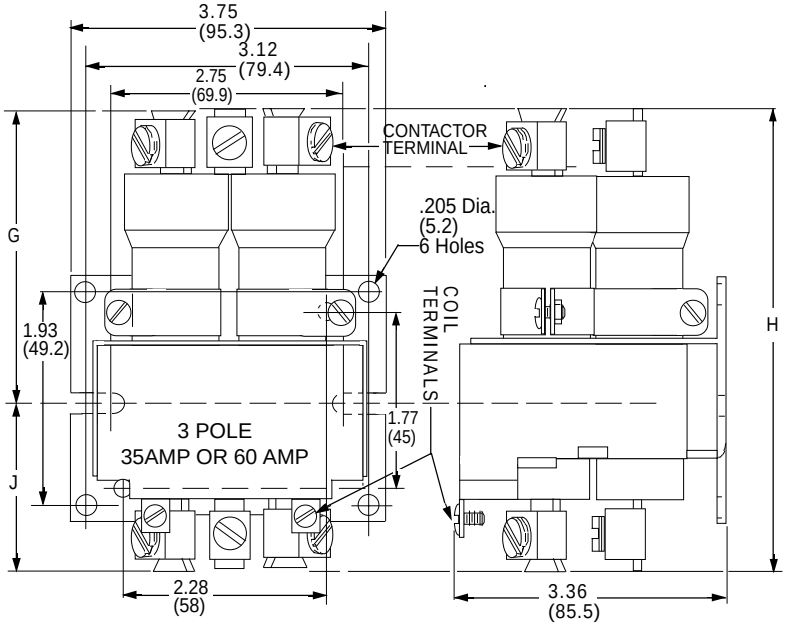
DIMEN-SION		M60A-ML60A	M60B-ML60B	M35A-ML35A	M35B-ML35B
1 POLE	A	2.375 Max. (60.3)	1.50Max. * (38.1)	2.312 Max. (58.7)	1.375 Max. (34.9)
	B	5.06 Max. (128.52)	5.062 Max. (128.52)	4.875 Max. (123.8)	4.875 Max. (123.8)
	C	1.06 Max. (27)	1.937 Max. (49.2)	0.937 Max. (23.8)	1.875 Max. (47.6)
2 POLE	D	3.250 Max. (82.6)	2.281Max. (57.9)	3.187 Max. (81.0)	2.218 Max. (56.3)
	E	5.062 Max. (128.52)	5.062 Max. (128.52)	4.875 Max. (123.8)	4.875 Max. (123.8)
	F	1.812 Max. (46.0)	2.781 Max. (70.6)	1.687 Max. (42.9)	2.656 Max. (57.4)
3 POLE	G	3.250 Max. (82.6)	2.281 Max. (57.9)	3.187 Max. (81.0)	2.218 Max. (56.3)
	H	5.062 Max. (128.52)	5.062 Max. (128.52)	4.875 Max. (123.8)	4.875 Max. (123.8)
	J	1.812 Max. (46)	2.781 Max. (70.6)	1.687Max. (42.9)	2.656 Max. (67.4)

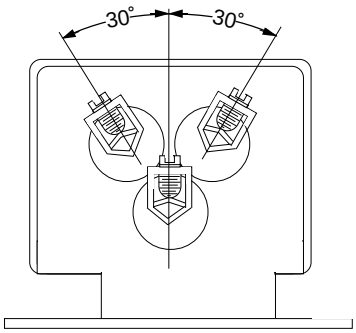
* SPST-NC outline is not shown. The SPST-NC tube is positioned lower on the coil so Dimension A is lower, but the overall height remains the same.

DIMENSIONS SHOWN IN INCHES AND (MILLIMETERS)





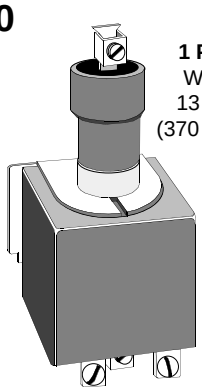




UL Listed
File No. E52197

CLASS WM35 and WM60

SWITCHES RESISTIVE, TUNGSTEN, AND MOTOR LOADS
STAINLESS STEEL TUBE S
HIGH INRUSH CAPACITY

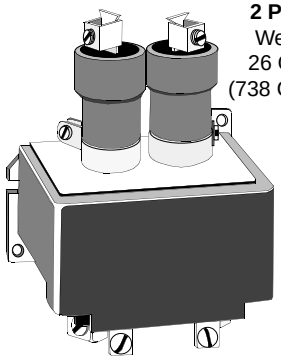


1 POLE
Weight
13 Ozs.,
(370 Grams)

CONTACTOR RATINGS FOR M35A - M35B

VOLTAGE	PHASE	HP		MOTOR AMPS		RESISTIVE AMPS	TUNGSTEN AMPS
		1Ø	3Ø	1Ø	3Ø		
120VAC	1Ø 3Ø	3*	5*	34	30	35*	35*
240VAC	1Ø 3Ø	5*	7.5*	28	19	35*	17
480VAC	1Ø 3Ø	5*	10*	14	14	35*	9
600VAC	1Ø 3Ø	5*	10*	11.2	11	25 **	7
24VDC	DC	1/2		27		35*	35*
48VDC	DC	1/2		13.5		35*	35*
125VDC	DC	1/2		5.2		16*	16*
250VDC	DC	1/2		2.6		12*	12*

* UL and CSA Listed ** CSA only



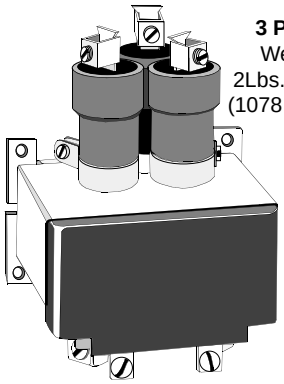
2 POLE
Weight
26 Ozs.,
(738 Grams)

CONTACTOR RATINGS FOR M60A - M60B

VOLTAGE	PHASE	HP		MOTOR AMPS		RESISTIVE AMPS	TUNGSTEN	
		1Ø	3Ø	1Ø	3Ø		AMPS "A" (N.O.)	AMPS "B" (N.C.)
120VAC	1Ø 3Ø	3*	5*	34	30	60*	60*	45*
240VAC	1Ø 3Ø	5*	10*	28	28	60*	30	22.5
480VAC	1Ø 3Ø	7.5*	15*	21	21	60*	15	11.2
600VAC	1Ø 3Ø	7.5*	15*	16	17	50 **	12	9
24VDC	DC	3/4		39		60*	50*	50*
48VDC	DC	3/4		19.5		60*	50*	50*
125VDC	DC	3/4		7.4		40*	40*	40*
250VDC	DC	3/4		3.7		20*	20*	20*

* UL and CSA Listed ** CSA only

SEE MDR GENERAL SPECIFICATIONS AND DIMENSIONS.



3 POLE
Weight
2Lbs. 6 ozs.,
(1078 Grams)

UP

RECOMMENDED MOUNTING POSITION ± 10˚

Magnecraft

PART NUMBERS	COIL Measured @ 25˚C NOMINAL INPUT VOLTAGE	NOMINAL RESIS-TANCE (OHMS)	NOMINAL CURRENT (AMPS)	NOMINAL POWER
1 POLE NORMALLY OPEN CONTACT				
WM35A-120A **WM35A-240A**	120 VAC 240VAC, 60HZ 220VAC, 50HZ	700 2,800	.058 .029	7VA 7VA
WM35A-24D	24VDC	186	.120	3.5W
2 POLE NORMALLY OPEN CONTACTS				
WM35AA-120A **WM35AA-240A**	120 VAC 240VAC, 60HZ 220VAC, 50HZ	218 1,200	.135 .063	16.5VA 16.5VA
WM35AA-24D	24VDC	98	.232	6W
3 POLE NORMALLY OPEN CONTACTS				
WM35AAA-120A **WM35AAA-240A**	120 VAC 240VAC, 60HZ 220VAC, 50HZ	111 430	.220 .117	28VA 28VA
WM35AAA-24D	24VDC	64	.375	9W
1 POLE NORMALLY CLOSED CONTACT				
WM35B-120A	120VAC	460	.115	13VA

Magnecraft

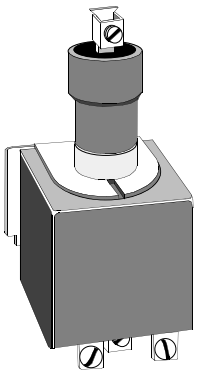
PART NUMBERS	COIL Measured @ 25˚C NOMINAL INPUT VOLTAGE	NOMINAL RESIS-TANCE (OHMS)	NOMINAL CURRENT (AMPS)	NOMINAL POWER
1 POLE NORMALLY OPEN CONTACT				
WM60A-120A **WM60A-240A**	120 VAC 240VAC, 60HZ 220VAC, 50HZ	700 2,800	..058 .029	7VA 7VA
WM60A-24D	24VDC	186	.120	3.5W
2 POLE NORMALLY OPEN CONTACTS				
WM60AA-120A **WM60AA-240A**	120 VAC 240VAC, 60HZ 220VAC, 50HZ	218 1,200	.135 .063	16.5VA 16.5VA
WM60AA-24D	24VDC	98	.232	6W
3 POLE NORMALLY OPEN CONTACTS				
WM60AAA-120A **WM60AAA-240A**	120 VAC 240VAC, 60HZ 220VAC, 50HZ	111 430	.220 .117	28VA 28VA
WM60AAA-24D	24VDC	64	.375	9W
1 POLE NORMALLY CLOSED CONTACT				
WM60B-120A	120VAC	460	.115	13VA

35 AND 60 AMP MERCURY DISPLACEMENT RELAYS

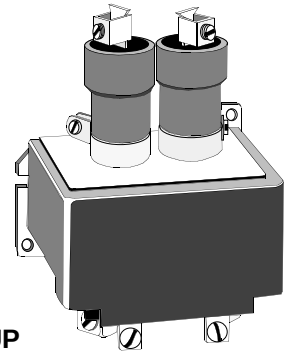
UL Listed
File No. E52197

CLASS WML35 and WML60

RECOMMENDED FOR MUCH LONGER LIFE
WHEN SWITCHING RESISTIVE AND TUNGSTEN LOADS.
AVAILABLE FOR AC LOADS ONLY.
NOT RECOMMENDED FOR SWITCHING DC LOADS.

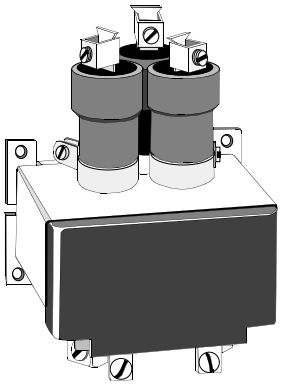


1 POLE
Weight
13 Ozs., (370 Grams)



UP

2 POLE
Weight
26 Ozs., (738 Grams)



3 POLE
Weight
2Lbs. 6 ozs., (1078Grams)

RECOMMENDED MOUNTING
POSITION ± 10˚

CONTACTOR RATINGS FOR ML35A - ML35B

VOLTAGE	RESISTIVE AMPS	TUNGSTEN AMPS
120VAC	35*	35*
240 VAC	35*	17
480VAC	35*	9
600VAC	25 **	7

* UL and CSA Listed ** CSA only

CONTACTOR RATINGS FOR ML60A - ML60B

VOLTAGE	RESISTIVE AMPS	TUNGSTEN	
		AMPS "A" (N.O.)	AMPS "B" (N.C.)
120VAC	60*	60*	45*
240VAC	60*	30	22.5
480VAC	60*	15	11.2
600VAC	50 **	12	9

* UL and CSA Listed ** CSA only

Magnecraft

PART NUMBERS	COIL Measured @ 25˚C			
	NOMINAL INPUT VOLTAGE	NOMINAL RESIS-TANCE (OHMS)	NOMINAL CURRENT (AMPS)	NOMINAL POWER
1 POLE NORMALLY OPEN CONTACT				
WML35A-120A	120 VAC	700	..058	7VA
WML35A-240A	240VAC, 60HZ	2,800	.029	7VA
	220VAC, 50HZ			
2 POLE NORMALLY OPEN CONTACTS				
WML35AA-120A	120 VAC	218	.135	16.5VA
WML35AA-240A	240VAC, 60HZ	1,200	.063	16.5VA
	220VAC, 50HZ			
3 POLE NORMALLY OPEN CONTACTS				
WML35AAA-120A	120 VAC	111	.220	28VA
WML35AAA-240A	240VAC, 60HZ	430	.117	28VA
	220VAC, 50HZ			

Magnecraft

PART NUMBERS	COIL Measured @ 25˚C			
	NOMINAL INPUT VOLTAGE	NOMINAL RESIS-TANCE (OHMS)	NOMINAL CURRENT (AMPS)	NOMINAL POWER
1 POLE NORMALLY OPEN CONTACT				
WML60A-120A	120 VAC	700		7VA
WML60A-240A	240VAC, 60HZ	2,800		7VA
	220VAC, 50HZ			
2 POLE NORMALLY OPEN CONTACTS				
WML60AA-120A	120 VAC	218		16.5VA
WML60AA-240A	240VAC, 60HZ	1,200		16.5VA
	220VAC, 50HZ			
3 POLE NORMALLY OPEN CONTACTS				
WML60AAA-120A	120 VAC	111		28VA
WML60AAA-240A	240VAC, 60HZ	430		28VA
	220VAC, 50HZ			

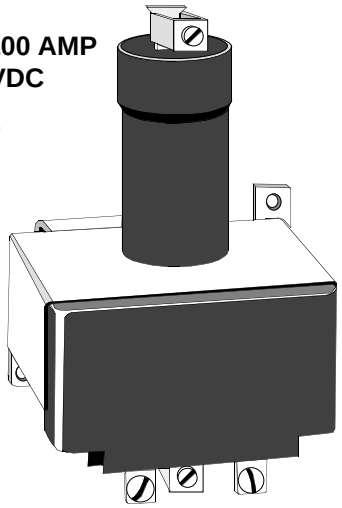
PART NUMBER SHOWN ALSO **AVAILABLE THRU STOCKING DISTRIBUTION**

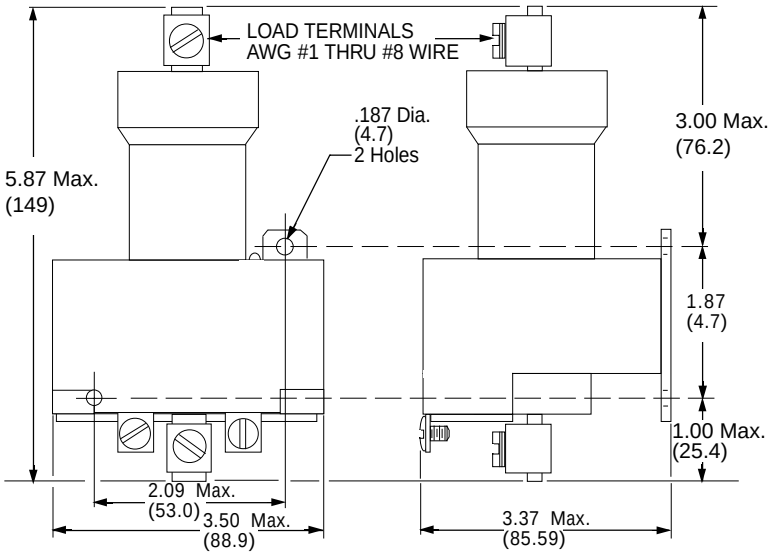
CLASS WM100

CAPABLE OF SWITCHING 100 AMP LOADS UP TO 480 VAC /48VDC

AVAILABLE IN 1 POLE N.O. CONTACTS ONLY.

UL Listed
File No. E52197





RECOMMENDED MOUNTING POSITION ± 10˚

SPECIFICATIONS FOR WM100

COIL

Frequency of Operation:	60 per minute max.
Pull-in voltage:	80% of nominal voltage, Typ. AC & DC coils.
Dropout voltage:	78% of nominal voltage, typ. AC coils. 65% of nominal voltage, typ. DC coils.

CONTACTS

Material:	Mercury.
Contact resistance:	.,001 ohm Typical.

TIMING

Operate (at nominal voltage):	50 Milliseconds typical.
Dropout (at nominal voltage):	100 Milliseconds typical.

DIELECTRIC STRENGTH

Across open Contact:	2650 V rms.
Coil to Contact:	2650 V rms.
Contact to Frame:	2650 V rms.
Coil to Frame:	2650 V rms.

TEMPERATURE

Operating:	- 35˚C to + 60˚C Under continuous load.

LIFE

Mechanical (No load):	5,000,000 Operations.
Electrical (Rated load):	100,000 Operations.

MISCELLANEOUS

Insulation Material:	Class B - 130˚C.
Terminals:	# 1 thru 8 AWG wire.
Options:	Coil Voltages from 12VAC to 480VAC, 5VDC. thru 250VDC. Consult Factory.
Weight:	15.87 ozs. 450 grams.

Magnecraft

PART NUMBERS	COIL Measured @ 25˚C			
	NOMINAL INPUT VOLTAGE	NOMINAL RESIS-TANCE (OHMS)	NOMINAL CURRENT (AMPS)	NOMINAL POWER
1 POLE NORMALLY OPEN CONTACT				
WM100A-120A	120 VAC	73.5	.275	33VA
WM100A-240A	240VAC, 60HZ 220VAC, 50HZ	300	.138	33VA
WM100A-24D	24VDC	53	.380	10W

PART NUMBER SHOWN ALSO **AVAILABLE THRU STOCKING DISTRIBUTION**

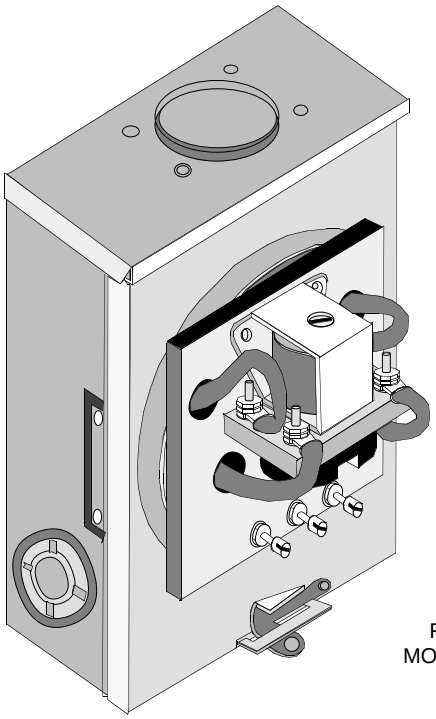
CONTACTOR RATINGS FOR M100

VOLTAGE	RESISTIVE AMPS	TUNGSTEN AMPS	HORSEPOWER SINGLE PHASE
120VAC	100	100*	3
240VAC	100	60	5
480VAC	100	30*	15
600VAC	80*	24*	10*
24VDC	100	100	1.5*
48VDC	100	100	1.5*
120VDC	80	80	1.5*
250VDC	40	40	1.5*

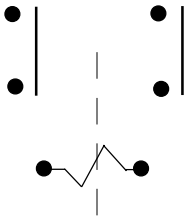
* NON UL RATING

50 &100 AMP, 2-POLE LIGHTING CONTACTORS

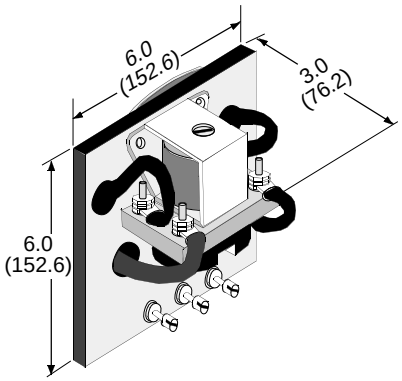
The Series 102 and 103 are solenoid types utilizing a DC coils with a full wave bridge rectifiers which allows the device to operate from an AC supply. Coil power consumption is less than 10 watts for the series 102, less than 20 watts for the 103. The contacts are Double make type, each set capable of switching and continuously carrying at least 50 Amps for the series 102 and 100 Amps for the series 103 at up to 480 volts AC. The contactors are typically constructed and wired to be directly interchangeable with existing hour meter base with separate wire leads for connection to the controlling device. Because of their compact construction, these contactors can be adapted to retrofit almost any existing type. Contact our Factory for details.



WIRING DIAGRAM



102JXX
103JXX



UP

RECOMMENDED
MOUNTING POSITION

AC CONTACT RATINGS

VOLTAGE AC (60HZ)	RESISTIVE LOAD (AMPS) Series 102	Series 103
120	100	200
240	100	200
DC CONTACT RATING		
VOLTAGE (DC)	**RESISTIVE LOAD (AMPS)**	
30	100	200

UNITS WIRED FOR 50 & 100 AMP LAMP LOAD SERVICE

Magnecraft & Struthers-Dunn

ORDERING CODE

Typical Type No. **102** **JXX** **-110D**

Series
102 Screw Term., 50 Amp.
103 Screw Term., 100 Amp.

Contact Arrangements

JXX- 2 Pole D.M. N.O

Coil Voltage
DC: 6 to 220 (Add **"D"**)
AC, FULL WAVE RECTIFIED: 12 to 240 (Add **"A"**)

WATT HOUR METER BOX NOT SUPPLIED WITH 102/103 CONTACTOR.

GENERAL SPECIFICATIONS

COIL
Pull-in Voltage: DC: 80% of nominal voltage measured at 25˚C
Dropout Voltage: 10% of nominal voltage or more @ 25˚C
Max. allowed voltage: 110% of nominal voltage
Coil Resistance: ±10% Measured @ 25˚C

CONTACTS
Contact Material: Silver Cadmium Oxide.

TIMING
Operate Time: 60 mS Max. @ Nominal Voltage.
Release Time: 30 mS Max. @ Nominal Voltage.

DIELECTRIC STRENGTH
All Mutually Insulated Points: 1500 V rms between all mutually Insulated current carrying parts and those parts to ground.
Insulation Resistance: 500 VDC Exceeds 1000 Megohms.

TEMPERATURE
Temperature Rating: -45˚C to +65˚C @ rated operation.

LIFE EXPECTANCY
Mechanical: 500,000 Operations no load
Electrical: 100,000 Operations @ Rated Load.

TERMINALS

Coil	Load Term.
102 - #8-32	#1/4-20
103 - #8-32	#3/8-18

MISCELLANEOUS
Mounting: Wall Mounting..
Weight: 42 oz., 1.2 kg Grams>

LATCHING, SEQUENCE

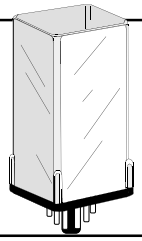
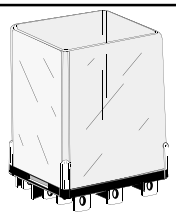
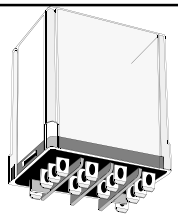
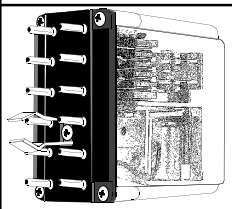
AND

STEPPER RELAYS

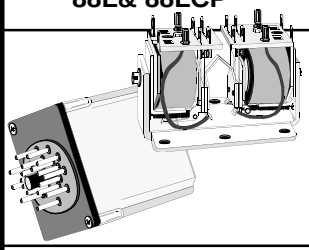
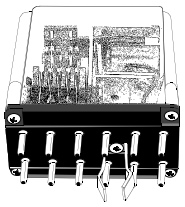
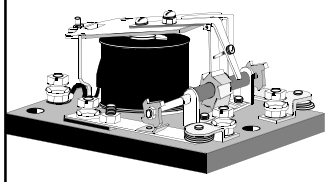
5 TO 30 AMPERES

Magnecraft & Struthers-Dunn

LATCHING RELAYS TO 10 AMP

RELAY SERIES	250ML	388ML/285	308	255
				
FEATURES	OCTAL 11 PIN PLUG-IN DUAL COIL LATCHING SELF-MAINTAINING SET AND RESET COILS MAINTAINS LAST POSITION WITHOUT POWER AC OR DC COILS	PERMANENT MAG-NETIC LATCHING RELAY SINGLE OR DUAL COIL 3 WAY TERMINALS: SOLDER, 0.187" Q.C. OR PLUG IN. HIGH SENSITIVITY COILS AVAILABLE AC OR DC INPUT	PERMANENT MAG-NETIC LATCHING RELAY 3 WAY TERMINALS: SOLDER, 0.187" Q.C. OR PLUG IN. AC OR DC INPUT NO FALSE TRANSFER WITH 5 TIMES NOMINAL VOLTAGE PULSE	2 COIL MECHANICAL LATCHING. SINGLE LEVEL SOCKET WIRING CONTINUOUS DUTY COILS BOTH COILS MAY BE ENERGIZED SIMULTA-NEOUSLY WITHOUT DAMAGE.
CONTACT DATA CONTACT CONFIGURATION:	DPDT	DPDT	4PDT	SPDT, 3PDT, OR UP TO 4 FORM A, OR FORM B .
MAXIMUM ALLOWABLE CONTACT LOAD:	10 AMPS @ 120 VAC/ 30 VDC	10 AMPS @ 120/240VAC 10 AMPS @ 28 VDC	10 AMPS @ 120, 1/3 HP 10AMPS @ /240, 1/2 HP 10 AMPS @ 28 VDC	30AMPS @ 120 CARRY 10A, BREAK 10A. 30AMPS @ /240 CARRY 10A, BREAK 5A. 30 AMPS @ 125 VDC CARRY 10A, BREAK 0.5A.
CONTACT MATERIAL:	SILVER CADMIUM OXIDE GOLD FLASHED	SILVER CADMIUM OXIDE GOLD FLASHED	SILVER CADMIUM OXIDE	SILVER CADMIUM OXIDE OR GOLD DIFFUSED
CONTACT RESISTANCE:	100 MILLIOHMS (INITIAL)	50 MILLIOHMS (INITIAL)	50 MILLIOHMS (INITIAL)	50 MILLIOHMS (INITIAL)
INSULATION CHARACTERISTICS DIELECTRIC STRENGTH:	1500 V rms	1500 V rms	1500 V rms	1500 V rms
COIL DATA AC - VOLTAGE: DC - VOLTAGE:	24, 120, 240 12 , 24, 110	120 12, 24	6 to 240 6 to 125	6 to 240 6 to 125 (250V WITH SERIES RESISTOR)
POWER: VA,: (VAC) WATTS,: (VDC)	6 VA 1.64 WATTS	3.4VA 1.9 WATTS	3.4 VA 1.2 -1.9 WATTS	5 OP 3 RESET 1.8 OP 1.9 RESET
GENERAL DATA AMBIENT TEMPERATURE OPERATIONAL: STORAGE:	- 45° C to + 70° C	- 45° C to + 70° C	- 45° C to + 70° C	- 10° C to + 60° C
TIMING VALUES OPERATE: RELEASE:	30 MILLISECONDS 30 MILLISECONDS	25 ms AC/15 ms DC 25 ms AC/15 ms DC	25 ms AC/15 ms DC 25 ms AC/15 ms DC	25 MILLISECONDS 20 MILLISECONDS
LIFE MECHANICAL: ELECTRICAL:	10 MILLION OPERATIONS 100,000 OPERATIONS	10 MILLION OPERATIONS 100,000 OPERATIONS	10 MILLION OPERATIONS 100,000 OPERATIONS	10 MILLION OPERATIONS 100,000 OPERATIONS
DIMENSIONS	**H W L**	**H W L**	**H W L**	**H W L**
	1.41 x 1.41 x 3.17	1.40 X 1.53 X 1.90	1.50 X 1.93 X 1.87	2.62 X 1.46 X 4.56
APPROVALS	Pending	c US		
APPLICATION DATA:	**PAGE 169**	**PAGE 171, 172**	**PAGE 173, 174**	**PAGE 175, 176**
PAGE NUMBER:	**PAGE 170**			

LATCHING & STEPPING RELAYS

RELAY SERIES	88L& 88LCP	311	C85
			
FEATURES	OPEN STYLE OR ENCLOSED STYLE DUAL COIL, MECHANICAL LATCHING. UP TO 6 FORM "C", 3 POLES PER COIL AC 50/60HZ, & DC COILS AVAILABLE SOLDER TERMINALS OR 20 PIN OCTAL PLUG-IN	SEQUENCE (STEPPING) RELAY SINGLE COIL CONTINUOUS DUTY. CONTACT TRANSFER ON ENERGIZING OR DE-ENERGIZING STROKE OF RELAY SINGLE LEVEL SOCKET WIRING	HEAVY DUTY SEQUENCE RELAY POSITIVE ACTION SEQUENCING CAM FRONT CONNECTED TERMINALS ANY SEQUENCE UP TO 12 STEPS
CONTACT DATA CONTACT CONFIGURATION:	UP TO 6PDT	DPDT	DPST-NO or NC & 1SPST-NC
MAXIMUM ALLOWABLE CONTACT LOAD:	0AMP 120VAC 10AMP 240VAC 10 AMP 28VDC	5 AMPS @ 120VAC 5 AMPS @ 28 VDC 0.1 AMPS 125 VDC	20AMP 120VAC 20AMP 240VAC 20 AMP 30VDC
CONTACT MATERIAL:	SILVER CADMIUM OXIDE	SILVER CADMIUM OXIDE	FINE SILVER
CONTACT RESISTANCE:	100 MILLIOHMS (INITIAL)	50 MILLIOHMS (INITIAL)	50 MILLIOHMS (INITIAL)
INSULATION CHARACTERISTICS DIELECTRIC STRENGTH:	1500 V rms	1500 V rms	1500 VAC
COIL DATA AC - VOLTAGE: DC - VOLTAGE: POWER: VA,: (VAC) WATTS,: (VDC)	120 12 6VA 2.5	6 to 240 6 to 110-125 5VA 1.8 WATTS	24 to 550 24 to 240 18VA 14 WATTS
GENERAL DATA AMBIENT TEMPERATURE OPERATIONAL: STORAGE:	- 10˚ C to + 50˚ C (AC) - 10˚ C to + 60˚ C (DC)	- 10˚ C to + 60˚ C	- 45˚ C to + 65˚ C
TIMING VALUES OPERATE: RELEASE:	25 MILLISECONDS 25 MILLISECONDS	35 MILLISECONDS 35 MILLISECONDS	50 MILLISECONDS 50 MILLISECONDS
LIFE MECHANICAL: ELECTRICAL:	5 MILLION OPERATIONS 100,000 OPERATIONS	5 MILLION OPERATIONS 100,000 OPERATIONS	500,000 OPERATIONS 100,000 OPERATIONS
DIMENSIONS	H W L 1.93 X 1.75X 2.87	H W L 2.62 X 1.46X 3.406	H W L 2.625 X 3.00 X 5.00
APPROVALS			
PAGE NUMBER	**PAGE 177, 178**	**PAGE 179**	**PAGE 180**

APPLICATION DATA

WHAT IS A SEQUENCE RELAY:

A Sequence relay is sometimes called an alternator, stepper, flip-flop, or impulse relay. The relay has the ability to open and close it's contacts in a preset sequence. All sequence relays use a ratchet or catch mechanism to cause their contacts to change state by repeated impulses to a single coil. Usually, but not always, one pulse will close a set of contacts, the next will open them, and so on back and forth. This alternating of open and closed states has many possible uses.

A Sequence relay requires a pulsed voltage to the coil of approximately 50 milliseconds for each sequence to take place. When the coil is pulsed, the relay armature moves a lever that in turn rotates the ratchet and cams to the first position in the sequence. This position will remain as long as another pulse is not introduced to the coil.

The relay is normally comprised of at least two sets of contacts to allow the contacts to alternate in combinations of open and closed states, with each pulse of voltage to the coil.

One example of possible two pole combinations, would be where one pole remains open and the other pole is closed with the first pulse applied to the coil. The second pulse could then reverse the above sequence. The third pulse could have both poles closed and the fourth pulse could open both poles. The above example could also have other sequences, depending upon the amount of teeth in the ratchet and the amount of lobes on the cams.

Figure 1 shows an example of how cam placement on the contact blades can change the position of the contacts as cams are rotated by the ratchet gear.

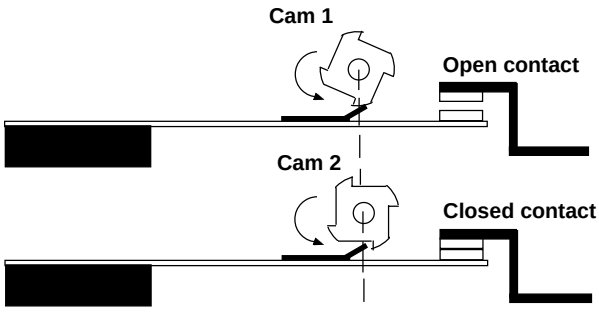


FIGURE 1

SEQUENCE APPLICATIONS:

Some typical applications for sequence relays is turning one device on and off from a single momentary contact.

SEQUENCE APPLICATIONS CONTINUED:

A typical example is remotely starting and stopping a conveyer from a single momentary push button. Several momentary push buttons might be wired in parallel to control the conveyer from a number of locations.

Another common use for sequence relays is cascade starting of multiple HVAC or other high start-up load systems, to limit the high starting current.

WHAT IS A LATCHING RELAY:

Latch relays typically use a permanent magnet or mechanical catch to hold the contacts in their last energized position without the need for continued application of coil power. They are especially useful in applications where power must be conserved, such as a battery operated device, or where it is desirable to have a relay stay in one position if power is interrupted. They should not be used to control a device that could create a safety hazard if it were to restart after a power interruption.

Mechanical latch relays are most often constructed in a way that will cause them to go to their operate position when the operate coil is energized regardless of whether the reset coil is energized or not. This "operate coil dominant" feature can be useful in applications where a relay should operate and release like a conventional relay unless a particular action takes place, at which time the release coil would drop out, latching the relay in the operate position. A pallet loader would be a good example of equipment which might utilize this type of operation.

Magnetic latching relays are typically designed to be polarity sensitive. When voltage is momentarily applied to the coil with a predetermined polarity, the relay will operate. The relay will remain in the operate position after power is removed from the coil. A permanent magnetic is designed to hold the contacts in the operate position without the need for continued power to the coil. When the polarity is reversed, and momentarily applied to the coil, the armature will push away from the coil overcoming the holding affect of the permanent magnetic, causing the contacts to reset. Both single and dual wound coils use the same principle of operation.

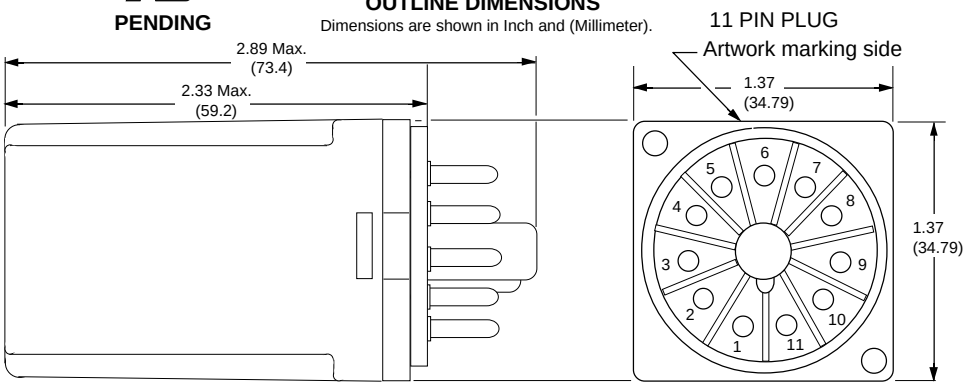
250 ML

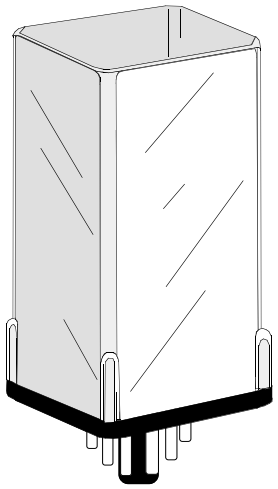
MAGNETIC LATCHING RELAY WITH 11 PIN BASE. OPERATED BY PULSED INPUT AND MAINTAINS LAST POSITION. CONTACT ARRANGEMENT: DPDT

PENDING

OUTLINE DIMENSIONS

Dimensions are shown in Inch and (Millimeter).





HERMETICALLY SEALED VERSION AVAILABLE CONSULT FACTORY

SPECIFICATIONS CLASS 250 ML

COIL

Operate Voltage::	See Table below. (Measured @ 25˚C)
Reset Voltage:	See table below. (Measured @ 25˚C)
Duty cycle @ nominal voltage:	Dual coil are intermittent duty.
Coil resistance:	± 10 % measured @ 25 ˚C
Max. allowable voltage:	5 X nominal voltage with no false transfer of contacts during Operate or Reset pulse.
Coil Insulation:	Class "B" system (130˚C) per UL STD. 1446
Duration of Operate & reset pulse:	50 mS Minimum.

CONTACTS

Contact material:	3/16" silver cadmium oxide, gold flashed.
Contact resistance:	50 milliohms maximum initial resistance at rated current
Minimum Load:	12 V @ 100 Milliamps
Contact Rating:	10 Amps @ 120/240 VAC, 28 VDC 1/3 Hp @ 120 VAC, 1/2 Hp @ 240 VAC.

TIMING

Operate time:	(AC) 30 mS Max. (DC) 20 mS Max. @ nominal voltage.
Release time:	(AC) 30 mS Max. (DC) 20 mS Max. @ nominal voltage.

DIELECTRIC STRENGTH

Contacts to coil:	1500 V rms
Across open contacts:	500 V rms
Pole to pole:	1500 V rms
Contacts to frame:	1500 V rms
Insulation resistance:	1,000 Megohms min. @ 500 VDC

TEMPERATURE

Ambient Temperature (Operating):	- 30˚C to +70˚C
Non operating storage:	- 30˚C to +105˚C

SHOCK RESISTANCE

Latched:	10 G's,

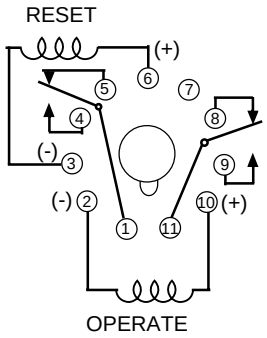
VIBRATION RESISTANCE

Operating:	5 G's, 10 Hz to 55 Hz

MISCELLANEOUS

Enclosure:	Plastic dust cover with 11 pin octal base.
Insulation material:	Molded plastic
Operating Position:	Any
Weight:	170 g (approx.)

WIRING DIAGRAM



SEE SECTION 10 FOR MATING SOCKETS

Magnecraft

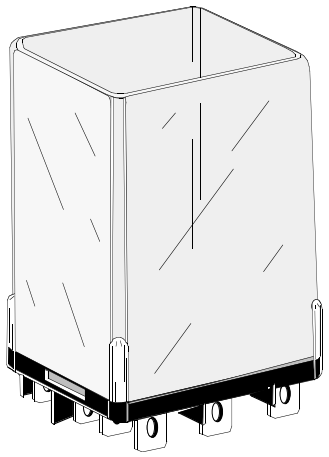
Stock Part Numbers shown also available thru Stocking Distribution

PART NUMBERS	Coil Measured @ 25˚C					CROSS REFERENCE TO IDEC
	NOMINAL VOLTAGE	OPERATE VOLTAGE MIN.	RESET VOLTAGE MIN.	COIL RESISTANCE (EA. COIL)	NOMINAL POWER	
DC OPERATED COILS						
W250ML2CPX-6	**12 VDC**	8.4 VDC	8.4 VDC	88/88 Ω	1.64 W	**RR2KP-U-DC12**
W250ML2CPX-7	**24 VDC**	16.7 VDC	16.7 VDC	350/350 Ω	1.64 W	**RR2KP-U-DC24**
W250ML2CPX-8	**110 VDC**	77 VDC	77 VDC	4000/4000 Ω	1.64 W	**RR2KP-U-DC110**
AC OPERATED COILS						
W250AML2CPX-8	**24 VAC**	19.2 VAC	19.2 VAC	52/52 Ω	6 VA	**RR2KP-U-AC24**
W250AML2CPX-9	**120 VAC**	96 VAC	96 VAC	1200/1200 Ω	6 VA	**RR2KP-U-AC120**
W250AML2CPX-9	**240 VAC**	192 VAC	192 VAC	3200/3200 Ω	6 VA	**RR2KP-U-AC240**

CLASS 388ML/285

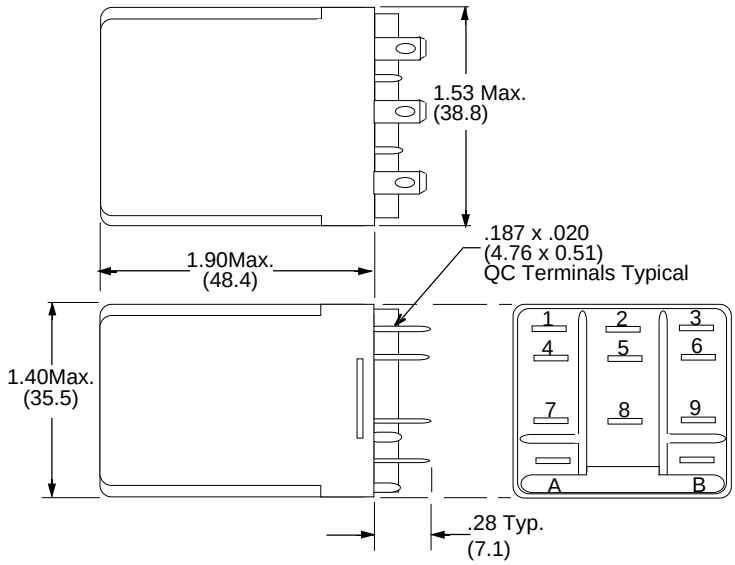
10 AMP MAGNETIC LATCH RELAY.
SINGLE OR DUAL COIL LATCHING.
1/3HP @ 120VAC
1/2 HP @ 240VAC

Recognized Component mark for Canada and the United States.
UL Recognized
File No. E43641



OUTLINE DIMENSIONS

Dimensions shown are in "Inches" and (Millimeter)



PART NUMBERS	STRUTHERS-DUNN EQUIVALENT PART NUMBERS	COIL CONFIGU-RATION	COIL Measured @ 25˚C					CROSS REFERENCE TO POTTER & BRUMFIELD
			NOMINAL INPUT VOLTAGE	OPERATE VOLTAGE (Or Less)	RESET VOLTAGE (Or Less)	NOMINAL RESIS-TANCE (OHMS)	NOMINAL POWER	
AC OPERATED, SINGLE COIL								
W388AMLCPX-9	**285XBXC-120A**	SINGLE	120 VAC	102 VAC	102 VAC	10,000	0.8VA	**KUL11A15S-120**
DC OPERATED, SINGLE COIL								
W388MLCPX-6	**285XBXC-12D**	SINGLE	12 VDC	9.0 VDC	9.0 VDC	120	1.2W	**KUL11D15S-12**
W388MLCPX-7	**285XBXC-24D**	SINGLE	24 VDC	18,0 VDC	18.0 VDC	470	1.2W	**KUL11D15S-24**
DC OPERATED, DUAL COIL								
W388ML2CPX-6	**285XBXCD-12D**	DUAL	12 VDC	9.0 VDC	9.0 VDC	88/88	1.64W	**KUL11D15D-12**
W388ML2CPX-7	**285XBXCD-24D**	DUAL	24 VDC	18.0 VDC	18.0 VDC	350/350	1.64W	**KUL11D15D-24**

PART NUMBERS SHOWN AVAILABLE THRU STOCKING DISTRIBUTION

SPECIFICATIONS CLASS 388/285

COIL

Pull-in Voltage:	AC: 85%, DC: 75% of nominal voltage measured at 25˚C
Duty Cycle (Nominal V)	Single coil are continuous duty dual coil are intermittent duty.
Pulse Duration Min.	30 Milliseconds
Max. allowed voltage:	5 x Nominal voltage with no false transfer of contacts during operate or reset pulse. 110% of nominal voltage
Coil Resistance:	±10% Measured @ 25˚C

CONTACTS

Contact Material:	Silver Cadmium Oxide, Gold Flashed.
Contact configuration:	DPDT, (3PDT available)
Contact Rating	10 Amps @ 120/240VAC, 28VDC

TIMING

Operate Time: (@ Nom. V)	AC: 30 mS max., DC: 20 mS max.
Release Time: (@ Nom. V)	AC: 30 mS max., DC: 20 mS max.

DIELECTRIC STRENGTH

Across open contacts	500 V rms
between current carrying parts to ground:	1500 V rms
Insulation Resistance:	500 VDC Exceeds 1000 Megohms.

TEMPERATURE

Temperature Rating:	AC: -45˚C to +70˚C @ Rated Operation.

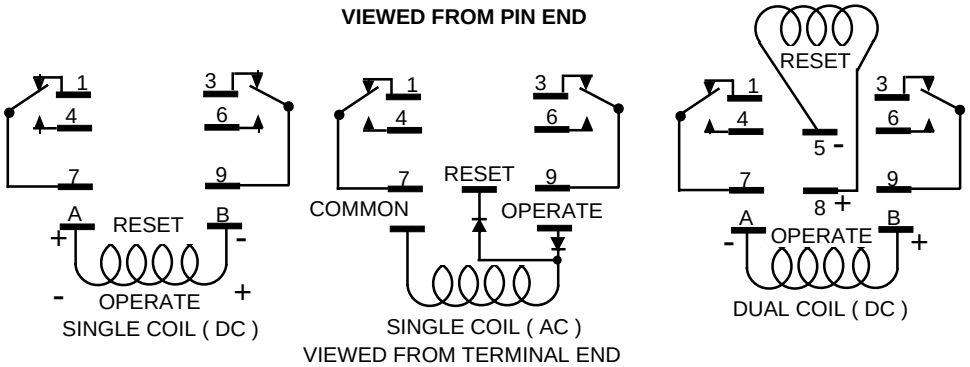
LIFE EXPECTANCY

Mechanical:	10 Million Operations no load
Electrical:	100,000 Operations @ Rated Load.

MISCELLANEOUS

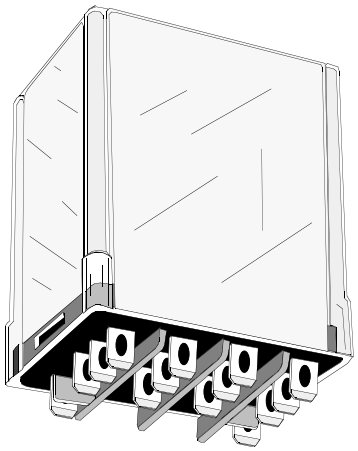
Enclosure:	Clear polycarbonate
Weight:	87 grams approx.

WIRING DIAGRAM
VIEWED FROM PIN END



SEE SECTION 10
FOR
MATING SOCKETS

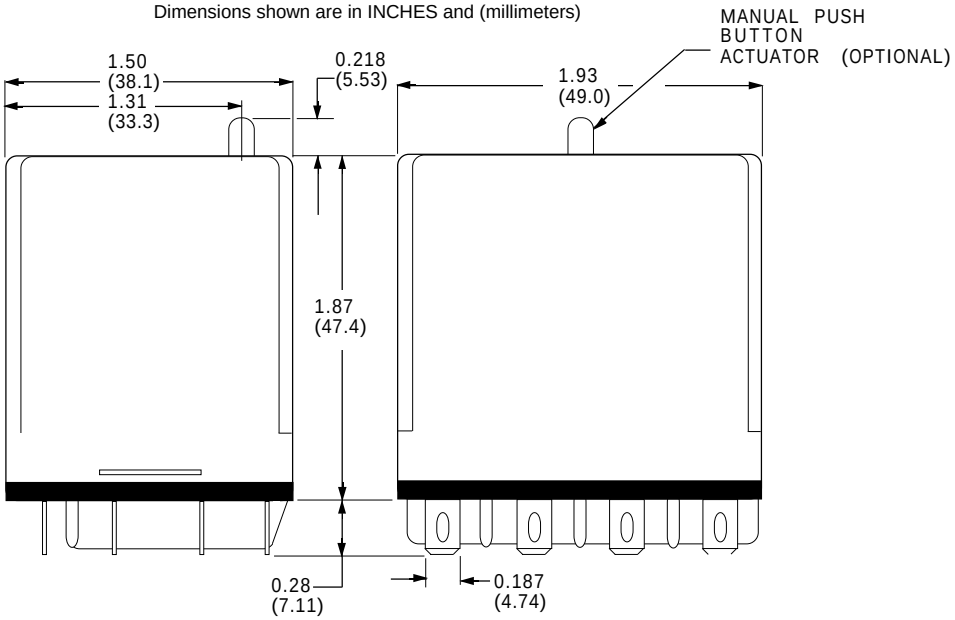
MAGNETIC LATCH 10 AMP, 4 POLE RELAY



The series 308 relay combines the basic features of the 284 series relay into a permanent magnet latch relay. It is available with a single wound AC or DC coil. To operate the single-wound DC coil, voltage of proper polarity is applied to the coil, and reset when the polarity is then reversed. For AC coils, power is applied through the operate diode or the reset diode to provide the required function.

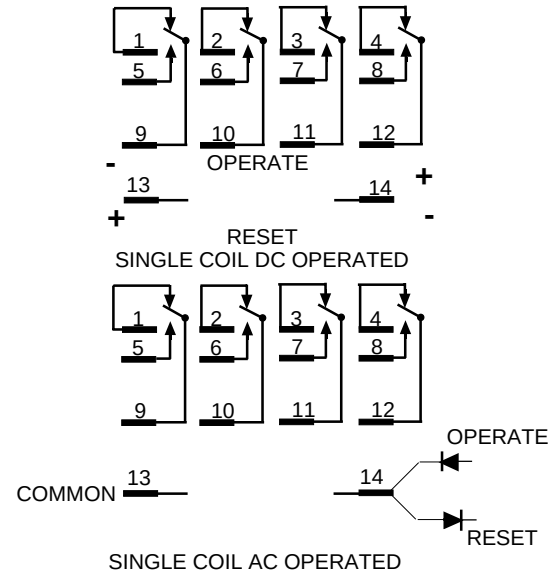
OUTLINE DIMENSIONS

Dimensions shown are in INCHES and (millimeters)



WIRING DIAGRAM

(VIEWED FROM TERMINAL END)



Magnecraft & Struthers-Dunn

ORDERING CODE

Typical Type No. **308 XDX C LMY -120A**

Series
308 3 way terminals, Magnetic latch, 10 Amp, 4 pole

Contact Arrangements
XDX (4 Form "C")

Construction Style
Enclosed, 3 way terminals - **CODE C**

Options
10 Amp contacts Standard - **NO CODE**
Gold diffused contacts - **CODE G**
Indicator Lamp - **CODE L**
Manual Actuator - **CODE M**
Printed Circuit Terminals - **CODE T**
5 Amp contacts (Silver) - **CODE Y**

Coil Voltage
AC: 6, 12, 24, 48, 120, 240 (Add **"A"**)
DC: 6, 12, 24, 48, 115, 125 (Add **"D"**)

Dual Coil Construction available. Consult Factory.

GENERAL SPECIFICATIONS

COIL

Pull-in Voltage:	AC: 85%, DC: 75% of nominal voltage measured at 25˚C
Dropout Voltage:	10% of nominal voltage or more @ 25˚C
Max. allowed voltage:	110% of nominal voltage
Coil Resistance:	±10% Measured @ 25˚C

CONTACTS

Contact Material:	Silver Cadmium Oxide.

TIMING

Operate Time:	AC: 25mS, DC: 15mS @ nom. Voltage
Release Time:	AC: 25mS, DC: 15mS @ nom. Voltage

DIELECTRIC STRENGTH

All Mutually Insulated Points:	500 V rms across open contacts 1500 V rms between current carrying parts
Insulation Resistance:	500 VDC Exceeds 1000 Megohms.

TEMPERATURE

Temperature Rating:	-45˚C to +70˚C @ Rated Operation.

LIFE EXPECTANCY

Mechanical:	10 Million Operations no load
Electrical:	100,000 Operations @ Rated Load.

MISCELLANEOUS

Enclosure:	Clear polycarbonate
Weight:	5.0 oz. approx..

CONTACT RATINGS

LOAD	30VDC	120VAC	240VAC
Resistive Motor Load 80% pF.	10A	10A 1/3Hp	10A 1/2Hp

Maximum total load for 4 pole relays is 30 Amps @ 120 VAC, 20 Amps @ 240 VAC.

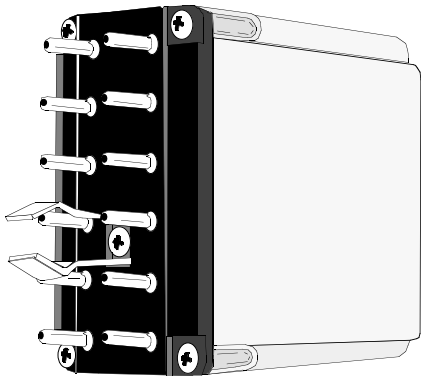
COIL SPECIFICATIONS @ 25˚C

Nominal Voltage	Resistance Ohms ± 10%	Resistance Ohms ± 10%	Current (MA)		Power Consumption	
	AC	DC	AC	DC	AC	DC
6	3	30	560	200	3.4VA	1.2W
12	12	120	230	100	3.4VA	1.2W
24	48	480	115	50	3.4VA	1.2W
48	-	1920	-	25	3.4VA	1.2W
120AC or 115-125DC	870	8200	31	13-15	3.4VA	1.9W
240AC*	4700	-*	12	-*	3.4VA	1.9W

NOTE: For 220 VDC to 250 VDC coils, use a 8,200 Ω, 5 Watt resistor in series with 110 VDC to 125 VDC relay coils.

300 VOLT LATCHING PLUG-IN RELAYS

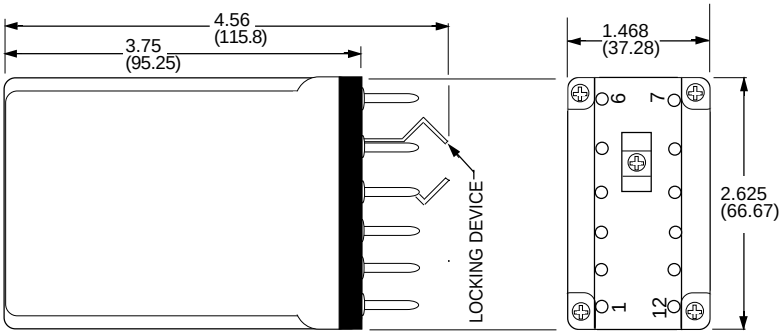
THE SERIES B255 IS A TWO COIL LATCHING VERSION OF THE GENERAL PURPOSE TYPE 219 RELAY. WHEN THE OPERATE COIL IS MOMENTARILY ENERGIZED, THE RELAY MECHANICALLY LATCHES IN THE ENERGIZED POSITION AND REMAINS IN THE ENERGIZED POSITION WITH THE POWER REMOVED FROM THECOIL. THE SECOND COIL WHEN MOMENTARLY ENERGIZED, PROVIDES ELECTRICAL RESET OF THE CONTACTS. ALL CONTACTS OPERATE FROM A COMMON ARMATURE TO PREVENT CONTACT OVERLAPPING. COILS ARE RATED FOR CONTINUOUS DUTY. NUCLEAR QUALIFIED VERSIONS ARE AVAILABLE. CONTACT THE FACTORY FOR DETAILS.



UL Recognized
File No. E13224

OUTLINE DIMENSIONS

Dimensions shown Inch & (Millimeters)



Magnecraft & Struthers-Dunn

ORDERING CODE
Typical Type No. **B255 XCX P LM -**

Series
B255 2 Coil Latch plug-in

Contact Arrangements
XBX DPDT
XCX 3PDT
ABX SPST-NO & 2 Form C
BXB DPST-NO & 2 Form B

Standard Features
Polycarbonate Cover- **CODE "P"**

Optional Features
Indicator Lamp across both coils - **CODE "L"**
Manual Actuator- **CODE "M"**
Perm. Magnet Blowout- **CODE "69"**

Coil Voltage
Coil Voltages & Frequencies must be specified.

Note: For time delay on energizing reset coil, specify 256 series in lieu of B255

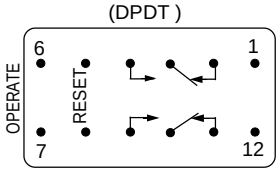
DC RELAYS, 1.8 WATTS (2.5 W @ 125VDC)

OPTIONS	SUFFIX
130˚C Coil	**U**
Coil Suppression	**V**
Light & Actuator	**LM**
Fine Silver-Gold Diffused Bifurcated Contacts	**33**

WIRING DIAGRAMS

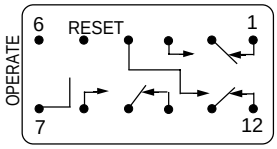
(VIEWED FROM TERMINAL END)

B255XBXP
(DPDT)



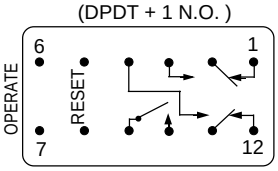
TYPE	CONTACTS
B255ABXP	DPDT + 1 NO
B255XBXP	DPDT
B255XCP	3PDT
B255BXBP	2 NO + 2 NC

B255XCXP
(3 PDT)

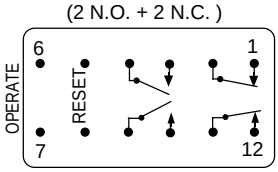


SEE SECTION 10 FOR MATING SOCKETS

B255ABXP
(DPDT + 1 N.O.)



B255BXBP
(2 N.O. + 2 N.C.)



GENERAL SPECIFICATIONS

COIL

Pull-in, min. AC	85% of Nominal Voltage
Pull-in min. DC	80 % of Nominal Voltage
Overvoltage, max.	110% of nominal, voltage

CONTACTS

Contact Material:	Silver Cadmium Oxide, & Gold Diffused (Standard)

TIMING

Operate Time: (operate coil)	25 mS Max. @ Nominal Voltage.
Release Time: (Reset coil energized)	20 mS Max. @ Nominal Voltage.

DIELECTRIC STRENGTH

All Mutually Insulated Points:	1500 V rms
Insulation :	1/4" over surface, 1/8" thru Air

TEMPERATURE

Rated Operation:	-10˚C to +60˚C

LIFE EXPECTANCY

Mechanical:	10 Million Operations no load
Electrical:	100,000 Operations @ Rated Load. 500,000 Operations 1/2 Rated Load.

MISCELLANEOUS

Enclosure:	Clear polycarbonate.
Weight:	215 g (7.58 oz.) APPROX.

UL Recognized
File No. E13224

COIL SPECIFICATIONS @ 25˚C

***AC COIL, 50/60 HZ**

	RESET COIL (3VA)		OPERATE COIL (5VA)	
Nominal Voltage	Resistance Ohms ± 10%	Coil Power (mA)	Resistance Ohms ± 10%	Coil Power (mA)
6	3.0	840	1.10	800
12	14.5	256	4.20	410
24	52.0	150	15.5	200
120	1450	26.5	540	45.0
240	5000	4.8	1815	13.2

Current inrush on all AC coils is less than twice the listed milliamperes ratings as shown in the AC coil data table.
*Currents shown in table measured at 60 Hz.

DC COIL DATA

Nominal Voltage	RESET COIL 1.4W)		OPERATE COIL (1.8W)	
	Resistance Ohms ± 10%	Coil Power (mA)	Resistance Ohms ± 10%	Coil Power (mA)
6	21.0	286	15.5	385
12	85.0	141	63.5	189
24	300	80	250	96.0
115/125	8000	14.4	6200	20.0

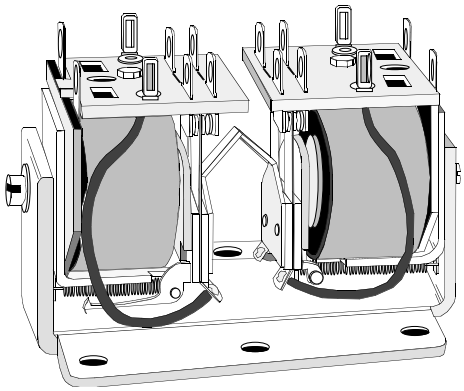
DC relays, 1.8 Watts (2.5 W @ 125VDC)

CONTACT RATINGS

VOLTS	MAKE	CARRY	BREAK	
			RESISTIVE	INDUCTIVE
24 VDC	30A	10A	10A	10A
120 VAC	30A	10A	10A	3A
240 VAC	30A	10A	5A	1A
28 VDC	30A	10A	10A	3A
125 VDC	30A	10A	0.5A	0.1A
**** For versions with suffix "69" Permanent Magnet Blowouts**				
125 VDC SM	30A	10A	1.5A	0.5A
125 VDC DM	30A	10A	4A	1.5A
250 VDC SM	30A	10A	0.5A	150 mA
250 VDC DM	30A	10A	1.5A	0.5A

**Relays with Code 69 feature (Check with factory for UL & CSA Listing).

DUAL COIL, 10 AMP LATCHING RELAYS

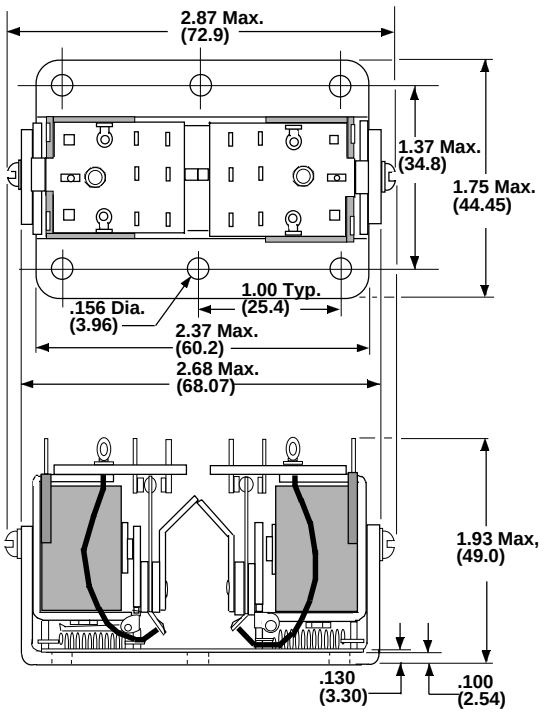


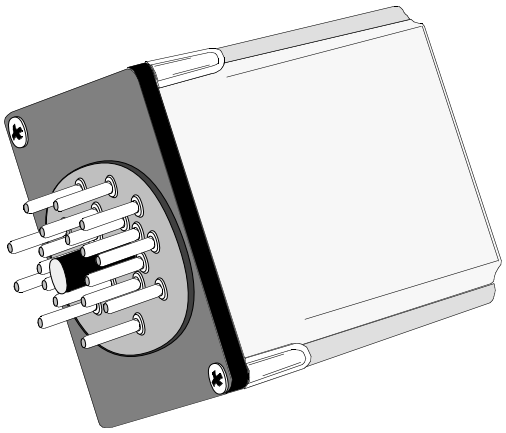
CLASS 88L

OPEN STYLE DUAL COIL
LATCHING RELAY
RATED 10 AMPS

NOTE: Applying a momentary pulse to that coil which was NOT LAST ENERGIZED, will cause a transfer of all contacts. The mechanical latch will maintain all contacts in the last transferred position even after the coil is de-energized or power is interrupted. Re-transfer of contacts can be accomplished by a momentary pulse to the other coil.

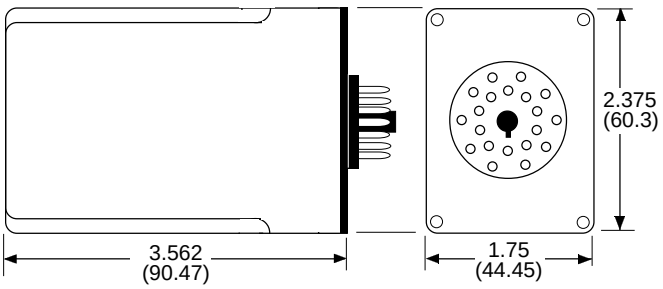
OUTLINE DIMENSIONS
Dimensions shown Inchs & (Millimeters)



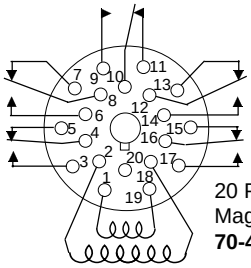


CLASS 88LCP

ENCLOSED STYLE DUAL
COIL LATCHING RELAY
RATED 10 AMPS



WIRING DIAGRAMS
Shown from Pin End



5PDT

20 Pin Octal Socket mates with Magnecraft chassis mount socket **70-454 or equivalent.**

PART NUMBER 70-454, 20 PIN SOCKET AVAILABLE.
CALL FACTORY FOR CURRENT QUOTE.

SPECIFICATIONS CLASS 88L RELAYS

COIL

Pull-in voltage:	80% of nominal voltage or less. for DC coils 85% of nominal voltage or less for AC coils 50/60 Hz operation, Measured @ 25˚C
Coil resistance:	± 10 % measured @ 25 ˚C
Nominal power:	6VA for AC coils, 3 Watts for DC coils.
Duty:	Intermittent actuation. min. pulse time 50mS @ nominal voltage. Max. pulse time 2 Minutes for AC coils, 5 Minutes for DC coils.

CONTACTS

Contact material:	3/16" silver cadmium oxide, gold flashed.
Contact resistance:	50 mΩ max. initial resistance @ rated current

TIMING

Operate time:	25 mS or less at nominal voltage.
Release time:	25 mS or less at nominal Voltage.

DIELECTRIC STRENGTH

Contacts to coil:	1500 V rms
Across open contacts:	1000 V rms
Pole to pole	1500 V rms
Contacts to frame:	1500 V rms
Insulation resistance:	1000 megohms min. 500 VDC

TEMPERATURE

Ambient Temperature (Operating):	-10˚C to +50˚C (AC), -10˚C to +60˚C (DC)
Non operating (storage):	-30˚C to 105˚C

SHOCK RESISTANCE

Operating:	5 G's
Non operating:	20 G's

VIBRATION RESISTANCE

Operating	5 G's, 10 Hz to 55 Hz
Non operating:	5 G's, 10 Hz to 55 Hz

MISCELLANEOUS

Mounting:	6 holes, 5/32" dia.for mounting plate to flat surface or 20 pin style plug-in.
Insulation material:	Fiberglass melamine
Terminals	Open style are Solder type standard, will also accept Q.C. terminals size .110. (Amp "Faston" or equivalent) Enclosed styles have 20 nickel plated brass pins
Enclosure:	"See-through " clear, polycarbonate plastic.
Operating Position:	Any
Weight:.	**Open Style:** 6-1/2 ozs. 184.3 grams approx.. **Enclosed style:** 8 ozs. 226.8 grams

Magnecraft

PART NUMBERS	CONTACT CONFIGU-RATION	COIL Measured at 25˚C			CROSS REFERENCE TO POTTER & BRUMFIELD
		NOMINAL VOLTAGE	NOMINAL RESISTANCE (OHMS)	NOMINAL POWER	
AC OPERATED, OPEN STYLE, SOLDER TERMINAL					
W88ALX-4	4PDT	120 VAC	–	6 VA	**KB-17AG-120**
DC OPERATED, OPEN STYLE, SOLDER TERMINAL					
88LX-2	4PDT	12 VDC	50Ω	2.4W	**KB-17DG-12**
AC OPERATED, ENCLOSED 20 PIN OCTAL PLUG-IN					
88ALCPX-23	5PDT	120 VAC	–	6 VA	**KBP-20AG-120**

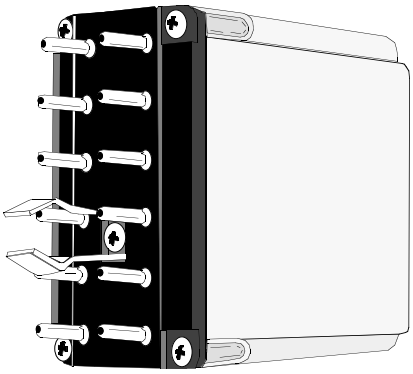
Stock Part Numbers shown below also available thru stocking distriubution

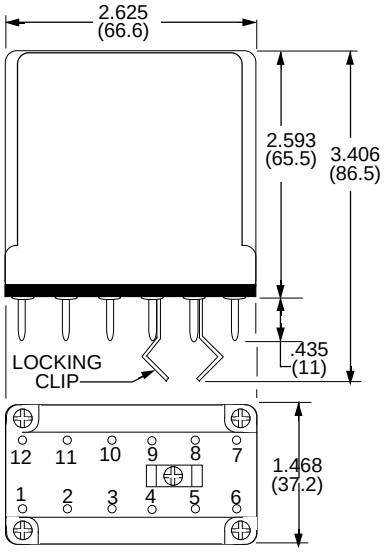
Part Numbers without a **"W"** prefix are Non-Stock Relays .

Other AC & DC coil voltages and contact combinations up to 6 poles are available on special order. Consult Factory

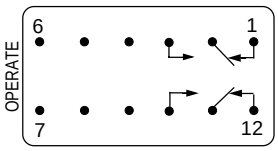
INDUSTRIAL PLUG-IN SEQUENCE (STEPPER), 5 AMP

The A311 Series Relay is a sequencing version of the 219 series general purpose relay. Contacts transfer on each Impulse to the coil. Models are available with contacts transferring when coil is energized or when de-energized. A double cam movement, one cam per snap switch, allows one or both contacts to be energized or de-energized with the cam rotating one half-step when the coil is energized and the other half step when the coil is de-energized assures reliable sequencing of the two SPDT snap switches.





WIRING DIAGRAM
Viewed from Pin Side



A311XBXP
A311XBXPR *
(DPDT)
*Transfer on Release

UL Recognized
File No. E7104

CONTACT RATINGS

LOAD	120VAC	30VDC	115VDC
Resistive	5A	5A	0.1A
Max. Inrush	12A	12A	0.25A

GENERAL SPECIFICATIONS

COIL
Pull-in, min. AC — 85% of Nominal Voltage
Pull-in min. DC — 80 % of Nominal Voltage
Overvoltage, max. — 110% of nominal, voltage

CONTACTS
Contact Material: — Silver Cadmium Oxide

TIMING
Operate Time: (operate coil) — 35 mS Max. @ Nominal Voltage.
Release Time: (Reset coil energized) — 35 mS Max. @ Nominal Voltage.

DIELECTRIC STRENGTH
Across open Contacts: — 500 V rms
Between mutually insulated current carrying parts & those parts to ground: — 1500 V rms
Insulation Resistance : — 1000 MΩ min. @ 500 VDC

TEMPERATURE
Rated Operation: — -10˚C to +60˚C

LIFE EXPECTANCY
Mechanical: — 5 Million Operations no load
Electrical: — 100,000 Operations @ Rated Load.

MISCELLANEOUS
Enclosure: — Clear polycarbonate.
Weight: — 190 g (6.70 oz.) approx.

Magnecraft & Struthers-Dunn

ORDERING CODE
Typical Type No. **A311 XBX P R L -120A**

Series
A311 Industrial plug-in ,
Sequence Relay, 5 Amp, DPDT

Contact Arrangements
XBX (2 Form C)

Standard Features
Plug-in with Polycarbonate Cover - **CODE P**

Contact Transfer
When coil is energized - **NO CODE**
when coil is de-energized **CODE R**

Options
Indicator Lamp - **CODE L**
Coil Suppression - **CODE V**

Coil Voltage
AC: 6, 12, 24, 120, 240 (Add **"A"**)
DC: 6, 12, 24, 48, 110-125 (Add **"D"**)

COIL SPECIFICATIONS @ 25˚C

AC COIL , 50/60Hz		DC COIL	
Nominal Voltage	Resistance Ohms ± 10%	Nominal Voltage	Resistance Ohms ± 10%
6	1.1	6	15.5
12	4.2	12	63.5
24	15.5	24	250
120	540	48	970
240	1815	110-125	6200

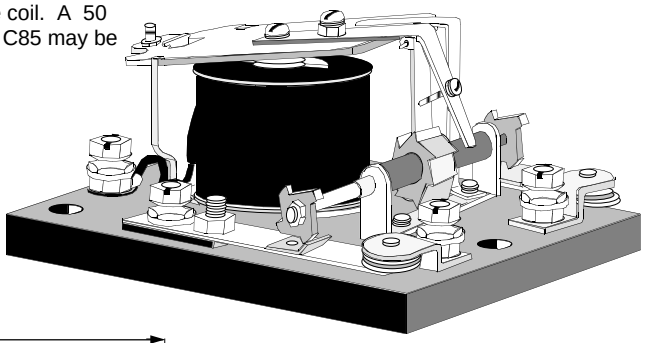
NOTE: Relays with other coil characteristics may be supplied to meet specific application requirements.
250VDC operation may be obtained by wiring a 6,200 Ω, 5 Watt resistor in series with the 110-125VDC coil. The resistor must be mounted external to the A311.

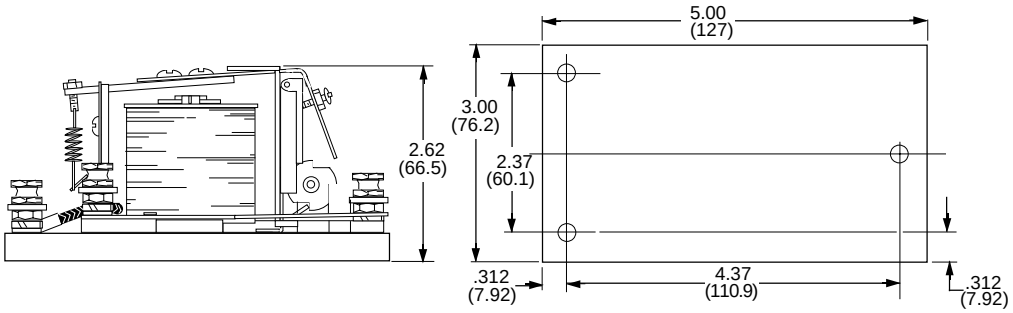
SEE SECTION 10 FOR MATING SOCKETS

SCREW TERMINAL SEQUENCE RELAY, 20 AMP, 2 POLE

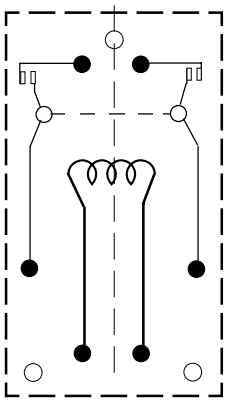
SERIES
C85

The C85 Series Relay is a base mounted, screw terminal, open style sequencing relay. This two pole relay has a single coil which operates a ratchet wheel. Control cams, on the ratchet wheel shaft, step from one position to the next on each Impulse to the coil. A 50 millisecond pulse will step the relay. Coils are for momentary duty only. The C85 may be supplied in any sequence up to 12 steps. Contacts are single throw.





WIRING DIAGRAM



GENERAL SPECIFICATIONS

COIL	
Pull-in, min. AC	85% of Nominal Voltage
Pull-in min. DC	80 % of Nominal Voltage
Overvoltage, max.	110% of nominal, voltage
CONTACTS	
Contact Material:	Fine Silver
TIMING	
Operate Time: (operate coil)	50 mS Max. @ Nominal Voltage.
Release Time: (Reset coil energized)	50 mS Max. @ Nominal Voltage.
DIELECTRIC STRENGTH	
Across open Contacts:	1500 V rms
Between mutually insulated current carrying parts & those parts to ground:	1500 V rms
Insulation Resistance :	1000 MΩ min. @ 500 VDC
TEMPERATURE	
Rated Operation:	-45˚C to +65˚C
LIFE EXPECTANCY	
Mechanical:	500,000 Operations no load
Electrical:	100,000 Operations @ Rated Load.
MISCELLANEOUS	
Terminals:	# 10-32 Studs with Hardware
Mounting:	3 clearance holes for # 8 screws
Weight	325 g (11.46 oz.)

CONTACT RATINGS

C85	24VAC	120VAC	240VAC
AC	20A	20A	10A
DC	20A	1.0A	0.25A

COIL SPECIFICATIONS @ 25˚C

AC COIL , 50/60Hz		DC COIL	
Nominal Voltage	Resistance Ohms ± 10%	Nominal Voltage	Resistance Ohms ± 10%
24	27	24	62
120	771	120	-
110-125	-	110-125	1,475
240	3,290	240	6,100
440	14,700	440	-
550	22,000	550	-

STANDARD CONTACT SEQUENCES

RELAY	STEP	1	2	3	4	(REPEAT)
	CONTACT A	0	X	0	X	
C85AXA	CONTACT B	X	0	X	0	
	CONTACT A	0	X	0	X	
C85BXX	CONTACT B	0	X	0	X	

0 = CONTACT OPEN X = CONTACT CLOSED

Magnecraft & Struthers-Dunn

ORDERING CODE

Typical Type No. **C85 AXA H3 -120A**

Series
C85 Screw Terminal
Sequence Relay, 20 Amp, 2 Pole

Contact Arrangements
AXA 1 S.B.-N.O. & 1 S.B.-N.C.
BXX 2 S.B.-N.O.

Options
Open style construction - **NO CODE**
Sheet Metal Housing (consult Factory)
For Dimensions) -**CODE H3**
7, 9, 10, 11, 12 Tooth ratchet-Consult Factory

Coil Voltage
AC: 24, 120, 240, 440, 550 (Add **"A"**)
DC: 24,110-125, 240 (Add **"D"**)

RATCHETS: 8 Tooth Standard. (7, 9, 10, 11, and 12 are Special Order). Consult Factory.
Non-Standard Coils, Specify requirement, Consult Factory.

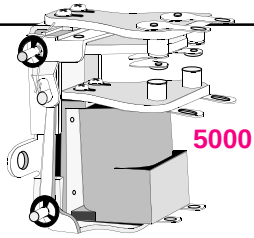
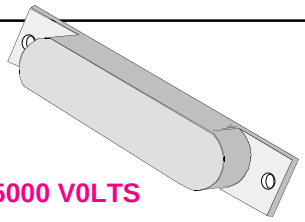
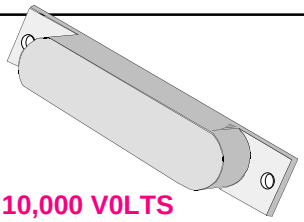
HIGH VOLTAGE

ELECTROMECHANICAL AND REED

RELAYS

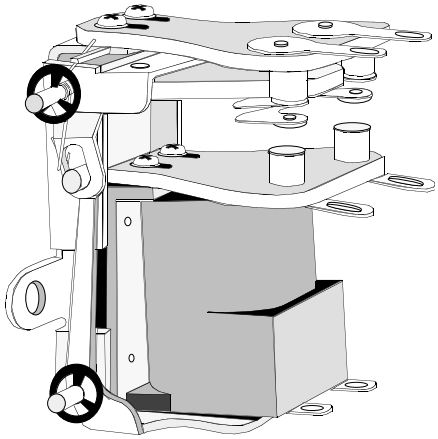
5KV TO 10KV

HI-VOLTAGE RELAYS 5KV TO 10KV

RELAY SERIES	158	102V	102HV
	 5000 V0LTS	 5000 V0LTS	 10,000 V0LTS
FEATURES	SWITCHES LOADS UP TO 1KVA. @ 5000 VOLTS DESIGNED WITH A UNIQUE DOUBLE MAKE & BREAK CONTACT DESIGN WITH GAP OF 0.40". EXCELLENT HIGH VOLTAGE ARC-OVER RESISTANCE BETWEEN CONTACTS. SOLDER TERMINAL DESIGN.	EPOXY SEALED FOR EXTRA PROTECTION FROM HIGH VOLTAGE ARC- OVER CHASSIS MOUNTING WITH SOLDER TERMINALS. EXTRA WIDE SEPARATION BETWEEN COIL AND OUTPUT CONTACTS. SWITCHES UP TO 10 MILLIAMP LOADS @ 5000 V	EPOXY SEALED FOR EXTRA PROTECTION FROM HIGH VOLTAGE ARC OVER CHASSIS MOUNTING WITH SOLDER TERMINALS. EXTRA WIDE SEPARATION BETWEEN COIL AND OUTPUT CONTACTS. SWITCHES UP TO 5 MILLIAMP LOADS @ 10,000 V
CONTACT DATA			
CONTACT CONFIGURATION:	SPDT-DB-DM	SPST-NO	SPST-NO
MAXIMUM ALLOWABLE CONTACT LOAD:	1 KVA, 5000 VDC 200 mA, 5000 V 1 Amp, 1000 V	50VA, 5000 VDC 10 mA	50VA, 10,000 VDC 5 mA
CAPACITANCE (No shield) Across open contacts:	-	2.0 pf	2.0 pf
CONTACT MATERIAL:	SILVER ALLOY GOLD FLASHED	TUNGSTEN	TUNGSTEN
CONTACT RESISTANCE:	100 MILLIOHMS (INITIAL)	200 MILLIOHMS (INITIAL)	200 MILLIOHMS (INITIAL)
INSULATION CHARACTERISTICS			
DIELECTRIC STRENGTH Across open contacts:	7,500 V rms & contacts to ground	6,000 VDC	12,000VDC
Coil to ground:	3,000 V rms		
Between all mutually insulated points:	8,500 V rms	6,000 VDC	12,000 VDC
COIL DATA			
AC - VOLTAGE:	AVAILABLE	NOT AVAILABLE	NOT AVAILABLE
DC - VOLTAGE:	24 VDC	6, 12, 24 VDC	24 VDC
WATTS,: (VDC)	5 WATTS	500-580 mW	1.5 WATTS
GENERAL DATA			
AMBIENT TEMPERATURE OPERATIONAL:	- 40˚C to + 85˚ C	- 40˚C to + 85˚C (1 Form A) - 40˚C to + 40˚C (1 Form B)	- 40˚C to + 85˚ C
STORAGE	-60˚C to + 105˚C	-60˚C to + 105˚C	-60˚C to + 105˚C
TIMING			
OPERATE:	45 MILLISECONDS	3 MILLISECONDS	3 MILLISECONDS
RELEASE:	20 MILLISECONDS	2 MILLISECONDS	2 MILLISECONDS
BOUNCE:		2.0 MILLISECONDS	2 MILLISECONDS
SHOCK (Non-operating):	10 G's -11mS, 1/2 sinewave	30 G's -11mS 1/2 sinewave	30 G's - 11mS, 1/2 sinewave
VIBRATION:	10 G'S - 10 to 55 HZ	10 G's - 10 to 1000 HZ	10 G's -10 to 1000 HZ
LIFE			
MECHANICAL:	5 MILLION OPERATIONS	10 MILLION OPERATIONS	10 MILLION OPERATIONS
ELECTRICAL:	100,000 OPERATIONS	1,000,000 OPERATIONS	1,000,000 OPERATIONS
DIMENSIONS	**H W L**	**H W L**	**H W L**
	2.28 X 2.21 X 3.12	0.75 X .875 X 4.50	0.75 X .875 X .450
APPROVALS			
PAGE NUMBER	**PAGE 183**	**PAGE 184**	**PAGE 184**

CLASS 158

SPDT-DB-DM CONTACT CONFIGURATION
SWITCHES LOADS UP TO 1KVA



SPECIFICATIONS CLASS 158

COIL

Coil Dissipation:	DC 5 Watts.

CONTACTS

Contact Material:	Silver alloy, Gold Flashed, 1/4" dia.
Contact Configuration:	SPDT-DB-DM
Switching Voltage max.:	5000 VDC
Contact Rating:	200 mA @ 5000 VDC 1 Amp @ 1000 VDC

DIELECTRIC STRENGTH

Across open contacts:	7500 V rms
Contact to Coil:	8500 V rms
Contact to Frame:	3000 V rms
Insulation Resistance:	500 VDC, Exceeds 100 MΩ

TEMPERATURE

Operating:	-40˚C to +85˚C

LIFE EXPECTANCY

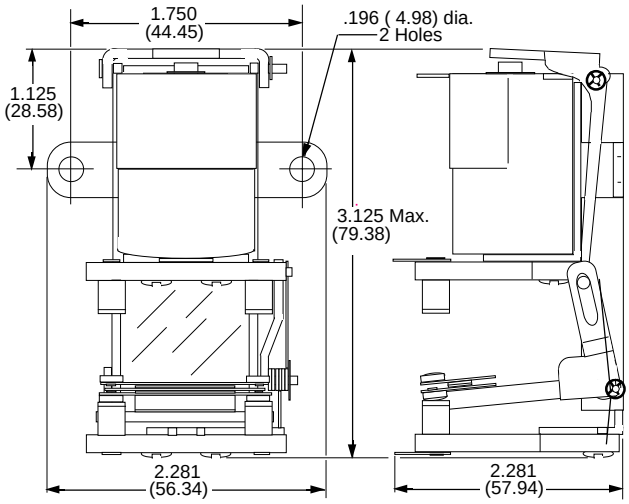
Electrical:	100,000 (Rated Load)
Mechanical:	5 Million Operations (No Load) Min.

MISCELLANEOUS

Mounting:	Bracket with 2 Clearance holes 0.196 dia.
Weight:	212.6 grams (7.48 oz.)

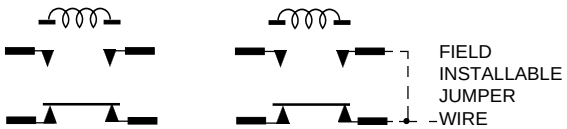
OUTLINE DIMENSIONS

DIMENSIONS SHOWN ARE IN INCHES AND (MILLIMETERS)



WIRING DIAGRAM

VIEWED FROM PIN END



SPDT-DB-DM **SPDT**

PART NUMBERS	CONTACT CONFIGURATION	Coil Measured at 25˚C		
		NOMINAL INPUT VOLTAGE	NOMINAL COIL RESISTANCE	NOMINAL POWER
W158HVX-1	**SPDT-DB-DM**	**24VDC**	**120**	**5 Watts**

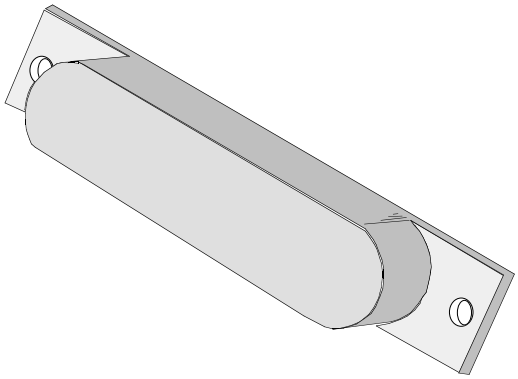
PART NUMBERS SHOWN ALSO **AVAILABLE THRU STOCKING DISTRIBUTION.**

CLASS 102V

EPOXY ENCAPSULATED HIGH VOLTAGE REED.
SPST-NO TUNGSTEN CONTACTS
SWITCHES LOADS UP 10 mA @ 5000 Volts DC

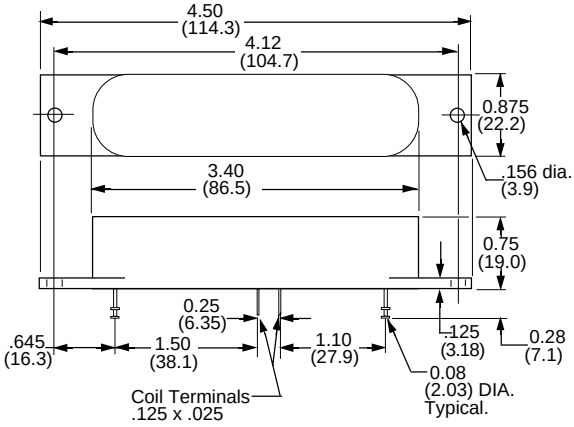
CLASS 102HV

Same as above except:
Switches 10,000 Volts with Loads up to 5 mA DC



OUTLINE DIMENSIONS

DIMENSIONS SHOWN ARE IN INCHES AND (MILLIMETERS)



Do not hook wire heavier than #22 AWG. Excess stress on terminals could cause damage to internal components

PART NUMBERS	CONTACT CONFIGURATION	Coil Measured at 25˚C		
		NOMINAL INPUT VOLTAGE	NOMINAL COIL RESISTANCE	NOMINAL POWER
	5,000 VOLTS NORMALLY OPEN			
W102VX-49	SPST-NO	6 VDC	70 Ω	500 mW
W102VX-50	SPST-NO	12 VDC	250 Ω	580 mW
W102VX-51	SPST-NO	24 VDC	1000 Ω	580 mW
	10,000 VOLTS NORMALLY OPEN			
W102HVX-3	SPST-NO	24 VDC	400 Ω	1.5 Watts

PART NUMBERS SHOWN ALSO **AVAILABLE THRU STOCKING DISTRIBUTION.**

NOTE: Other voltages and contact combinations available. Contact Factory.
Pull-in is measured at 75% of nominal voltage or less, at 25˚C
Weight: 49.2 grams, (1.74 oz.)

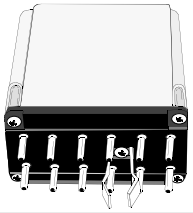
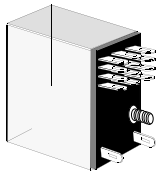
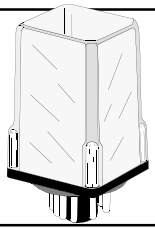
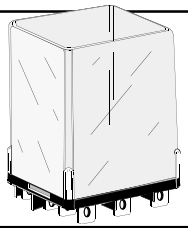
SENSITIVE

LOW INPUT POWER

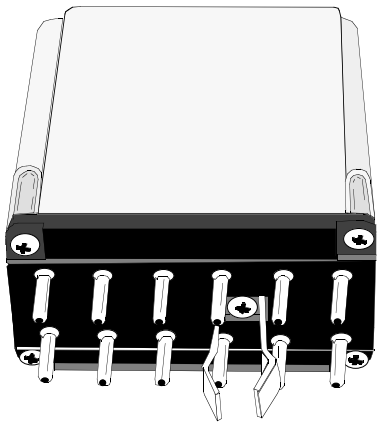
RELAYS

2 TO 5 AMPERES

SENSITIVE RELAYS 2 TO 5 AMP

RELAY SERIES	112, 112PGF	67S	392	292
				
FEATURES	LOW POWER DESIGN REQUIRES AS LITTLE AS 11.4 mW or 51.7 mW OF DC COIL POWER. AVAILABLE WITH AC OR DC COILS. CAN WITHSTAND 5 TO 10 TIMES COIL RATING UP TO 300 VOLTS 219 STYLE PLUG-IN OR OPEN STYLE	SOLDER/PLUG-IN WITH A 3-38 UNC MOUNTING STUD. UP TO 4 POLES WITH STANDARD SILVER, GOLD OVERLAY CONTACTS CHASSIS OR PC STYLE SOCKETS. INDUSTRY STANDARD FOOTPRINTS.	LOW POWER DC RELAY 125mW PER POLE. OPERATES OVER A WIDE VOLTAGE RANGE. OCTAL STYLE PLUG-IN FITS STANDARD 8 OR 11 PIN OCTAL SOCKETS	LOW POWER DC RELAY 125 mW PER POLE 3 WAY SOLDER TERMI-NALS, .187 Q.C./ PLUG-IN. OPERATES OVER A WIDE VOLTAGE RANGE. FITS STANDARD 283/388 STANDARD SOCKETS.
CONTACT DATA				
CONTACT CONFIGURATION:	SPDT, DPDT	SPDT TO 4PDT	SPDT TO 3PDT	SPDT TO DPDT
MAXIMUM ALLOWABLE CONTACT LOAD:	2Amps @ 120 VAC 1 Amp @ 240 VAC 2 Amps @ 30 VDC	3 AMP @ 120 VAC/30 VDC	5 Amps @ 120 VAC/30 VDC	5 Amps @ 120/240 VAC, 28 VDC
CONTACT MATERIAL:	FINE SILVER	SILVER, GOLD OVERLAY	SILVER	SILVER
CONTACT RESISTANCE:	50 MILLIOHMS (INITIAL)	50 MILLIOHMS (INITIAL)	50 MILLIOHMS (INITIAL)	50 MILLIOHMS (INITIAL)
INSULATION CHARACTERISTICS				
DIELECTRIC STRENGTH Across open contacts:	500 V rms	500 V rms	500 V rms	500 V rms
Between all mutually insulated current carrying parts and those parts to ground:	1,500 V rms	1,500 V rms	1,500 V rms	1,500 V rms
COIL DATA				
AC - VOLTAGE:	1.0 to 225	NOT AVAILABLE	NOT AVAILABLE	NOT AVAILABLE
DC - CURRENT:	0.08 to 21.0 mA	4.5 to 13.7 mA	15 to 139 mA 11.1 to 35 mA	15 to 139 mA 11.1 to 35 mA
POWER				
AC VA:		-	-	-
MILLIWATTS DC:	1 pole 0.2VA, 2 pole 1.0VA 1 pole **15mW**, 2 pole **52mW**	**85 to 200 mW**	**125 mW Per pole**	**125 mW Per pole**
GENERAL DATA				
AMBIENT TEMPERATURE OPERATIONAL:	- 45˚C to + 65˚ C	- 55˚ C to + 70˚ C	- 45˚C to +70˚ C	- 45˚C to + 70˚ C
TIMING				
OPERATE:	20 MILLISECONDS	18 MILLISECONDS	20 MILLISECONDS	20 MILLISECONDS
RELEASE:	20 MILLISECONDS	8 MILLISECONDS	15 MILLISECONDS	15 MILLISECONDS
LIFE				
MECHANICAL:	500,000 OPERATIONS	10 MILLION OPERATIONS	10 MILLION OPERATIONS	10 MILLION OPERATIONS
ELECTRICAL:	100,000 OPERATIONS	100,000 OPERATIONS	100,000 OPERATIONS	100,000 OPERATIONS
OPTIONS:	Special Pick-up and Dropout adjustments. Series coils to 50 Amp.	Up to 8PDT @ 50 mW per pole. P.C. Terminals, Bifurcated contacts. Epoxy	Indicator lamp (125 VDC only) Manual Actuator.	Indicator lamp (125 VDC only) Manual Actuator. P.C. socket, Q.C. socket. Stud or bracket mount. Gold diffused contacts.
DIMENSIONS	**H W L**	**H W L**	**H W L**	**H W L**
	3.62 X 1.46X 2.62	.735 X .1.158 X 1.20	2.81 X .1.37 X 1.37	2.813 X 1.37 X 1.37
APPROVALS				
PAGE NUMBER	**PAGE 187, 188**	**PAGE 189**	**PAGE 190**	**PAGE 191, 192**

2 AMP, LOW COIL POWER, 1 & 2 POLE PLUG-IN

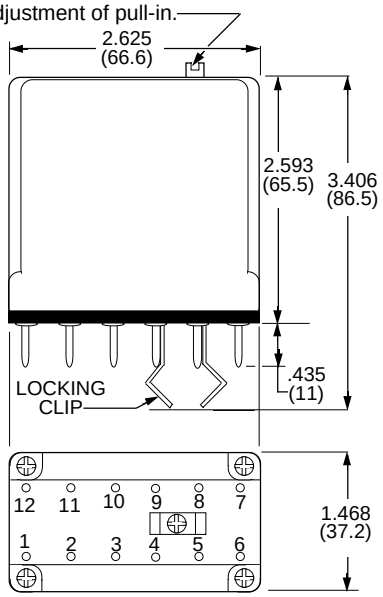


The 112 and 112-PGF Series of very low coil power relays, perform the same function but differ in physical packaging and terminations. Each is available with SPDT or DPDT contact arrangements. The coils require as little as 11.4 mW or 51.7 mW of DC coil power respectively. All 112's are available with AC or DC coils. AC coils can withstand 5 times their minimum rating, while DC coils can withstand 10 times their minimum rating, up to 300 volts. One application for this relay is to detect high resistance grounds which could have low leakage current.

OUTLINE DIMENSIONS

Dimensions are shown in INCHES and (MILLIMETERS)

Removable cover with top screw for field adjustment of pull-in.

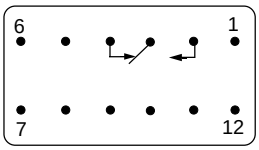


0.10 Dia. x .435 (2.54 x 11)
Typical of all Pin Dimensions

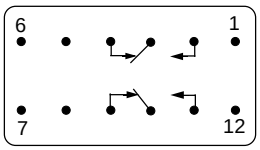
WIRING DIAGRAMS

Viewed from Pin end

112XAX-PGF
(SPDT)



112XBX-PGF
(DPDT)



112-PGF Relays have front removable covers. When cover is removed the relay can be adjusted without being plugged in.

Magnecraft & Struthers-Dunn

ORDERING CODE
Typical Type No. **112 XBX PGF Specify Coil separately**

Series
A112 base mounted, low coil power, 1 Form "C"
112 Low coil power, 1 & 2 Form "C" plug-in , 2 Form "C" base mount.

Contact Arrangements
XAX-SPDT (use with A112 base mount or 112-PGF)
XBX - DPDT
AXX SPST-NO (use with A112 base mount or 112-PGF
BXX- DPST-NO
AXA - SPST-NO +SPST-NC

Construction Style
Base mounted open style - **NO CODE**
Industrial Plug-in, Polycarbonate cover, front removable - **CODE PGF**

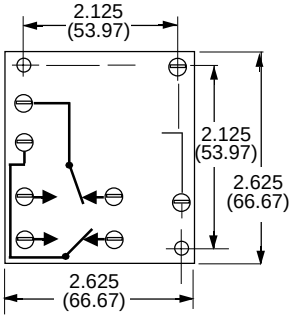
Coil Voltage
Because of the wide variety of coils, both voltage and current to choose from, specify as a separate item.

OPTIONS (CONSULT FACTORY)

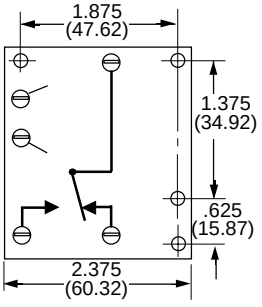
DIMENSIONS & WIRING DIAGRAMS

Front View

A112XBX-
Base mounted
open style
(DPDT)



A112XAX-
Base mounted
open style
(SPDT)



SEE SECTION 10 FOR MATING SOCKETS

GENERAL SPECIFICATIONS 112, 112-PGF

COIL
Overvoltage, max. — AC, 5 x min. voltage, DC, 10 x min. voltage (up to 300V)

CONTACTS
Contact Material: — Fine Silver

TIMING
Operate Time: — 20 mS Max. @ Nominal Voltage.
Release Time: — 20 mS Max. @ Nominal Voltage.

DIELECTRIC STRENGTH
Across open contacts: — 500 V rms
All Mutually Insulated current carrying parts to ground: — 1500 V rms

TEMPERATURE
Rated Operation: — -45˚C to +65˚C

LIFE EXPECTANCY
Mechanical: — 500,000 Operations no load
Electrical: — 100,000 Operations @ Rated Load.

MISCELLANEOUS
Enclosure: — Clear polycarbonate. (112-PGF Only)
Weight: — 7.05 oz. (200 g) approx.

Approvals for
A112XAX & XBX Only.
UL Recognized
File No. E7104

CONTACT RATINGS

LOAD	30VDC	120VAC	240VAC
AC	2A	2A	2A
DC	2A	0.25A	-

OPERATING DATA: (All Types)

Min. Voltage: Selected from coil tables
Min. Current: Selected from coil tables
Series Coils: Available for connection in series with loads up to 50 Amps for series 112, and 10 Amps for series 112-PGF.

COIL SPECIFICATIONS
Measured @ 25˚C

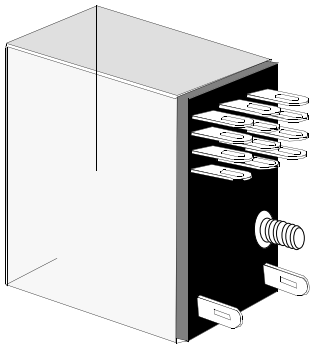
TYPES A112XAX, 112XAXPGF

AC COILS, 50/60 HZ			DC COILS		
Minimum Voltage	Minimum Milliamps	Impedance Ohms	Minimum Voltage	Minimum Milliamps	Resistance Ohms
1.0	177	6	0.08	145	0.55
1.4	143	9	0.10	117	0.84
1.6	116	13	0.12	95.0	1.26
2.0	91.0	22	0.15	73.0	2.10
2.5	74.0	34	0.19	60.0	3.10
3.5	52.5	60	0.25	43.0	5.80
4.3	41.5	100	0.30	33.0	9.00
5.0	38.0	130	0.39	31.0	12.5
6.0	31.5	190	0.49	26.0	19.0
8.5	23.0	370	0.62	18.8	33.0
12.0	19.0	630	0.78	15.5	50.0
13.5	15.7	860	0.95	12.8	74.0
16.	11.8	1,350	1.30	9.70	129
20	9.65	2,070	1.60	7.90	197
23	7.65	3,000	2.00	6.30	312
33	6.00	6,500	2.50	4.90	504
43	4.66	9,230	3.20	3.80	840
55	3.85	14,300	3.90	3.15	1,220
67	2.98	22,500	4.80	2.43	1,990
87	2.25	38,500	6.40	1.84	3,450
103	1.93	53,000	8.00	1.58	5,050
130	1.53	85,000	9.70	1.25	7,700
146	1.22	120,600	11.7	1.00	11,700
168	0.95	177,000	16.0	0.84	19,000
225	0.74	300,000	21.0	0.61	34,000

TYPES 112XBX, 112XBXPGF

AC COILS, 50/60 HZ			DC COILS		
Minimum Voltage	Minimum Milliamps	Impedance Ohms	Minimum Voltage	Minimum Milliamps	Resistance Ohms
2.34	390	6	0.18	323	0.55
2.80	310	9	0.22	260	0.84
3.25	250	13	0.27	211	1.26
4.40	200	22	0.34	165	2.10
5.50	160	34	0.41	133	3.10
6.90	114	60	0.55	95.0	5.80
9.10	910	100	0.68	76.0	9.00
10.8	83.0	130	0.86	69.0	12.5
13.1	69.0	190	1.09	57.0	19.0
20.6	50.0	370	1.37	42.0	33.0
26.5	42.0	630	1.72	35.0	50.0
30.0	35.0	860	2.11	29.0	74.0
35.0	26.0	1,350	2.77	22.0	1219
45.5	22.0	2,070	3.46	18.0	197
49.0	16.4	3,000	4.33	14.0	312
72.0	13.0	6,500	5.47	11.0	504
95.0	10.2	9,230	7.11	8.5	840
122	8.5	14,300	8.53	7.0	1,220
146	6.5	22,500	10.8	5.5	1,990
190	4.9	38,500	14.1	4.0	3,450
230	4.9	53,000	17.7	3.5	5,050

3 AMP, LOW COIL POWER, 2 & 4 POLE PLUG-IN



UL RECOGNIZED
FILE NO. E52197

TYPICAL CONTACT LIFE EXPECTANCY FOR SWITCHING RESISTIVE LOADS @ 25˚C

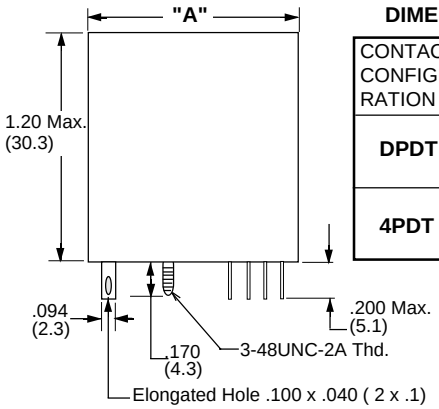
Load Current	Load Voltage	Number of Operations: Ultra sensitive
1.0A	28VDC/120VAC	5×10^5
0.5A	28VDC/120VAC	5×10^6
0.1A	6 VDC	5×10^7
1mA	6 VDC	5×10^7

CLASS 67 TYPICAL TIMING VALUES

POLES	DPDT	4PDT
OPERATE TIME	012	.014
RELEASE TIME	.008	.008

Measured at Nominal Voltage @ 25˚C

Tolerances ± .010 Inches



All Contact Terminals are .010 Thick all coil terminals are .018 Thick.

DIMENSIONS

CONTACT CONFIGU-RATION	"A" DIM.
DPDT	.978 (24.8)
4PDT	1.156 (29.4)

SPECIFICATIONS CLASS 67S

COIL

Pickup voltage:	80% of nominal voltage or less.
Dropout voltage:	10% of nominal or more.
Coil resistance:	± 10% measured @ 25˚C
Maximum coil dissipation:	2.2 watts @ 25˚C
Coil Temperature rise:	30˚C per watt
Maximum coil temperature:	105˚C

CONTACTS

Contact material:	Silver, Gold overlay
Contact resistance:	50 milliohms max. initial

CAPACITANCE

Between contacts:	2 pf, typ.
Contact to coil:	2 pf, typ.
Coil to frame:	30 pf, typ.

DIELECTRIC STRENGTH

Contact to coil:	1500 V rms
Across open contacts:	500 V rms
Coil to frame:	1000 V rms
Contacts to frame:	1500 V rms
Insulation resistance:	1000 megohms @ 25˚C & 50% R.H.

TEMPERATURE

Operating:	-55˚C to + 70˚C
Storage:	-55˚C to +105˚C

MISCELLANEOUS

Enclosure Material:	Polycarbonate see thru plastic cover.
Operating Position:	Any
Mounting:	Socket or 3-48 UNC stud
Weight:	0.77 to 1.4 oz. (22 to 40 grams)

Magnecraft

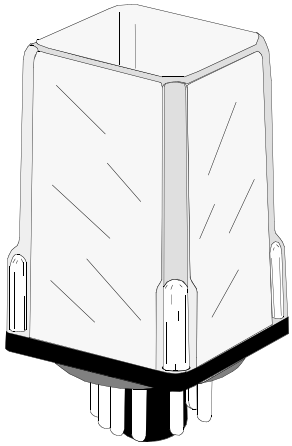
CLASS 67 - DC OPERATED - ULTRA SENSITIVE - PLUG-IN STYLE WITH 3-48 UNC STUD.							
STANDARD CONTACTS		COIL Measured @ 25˚C				CONTACT CONFIGU-RATION	CROSS REFERENCE TO POTTER & BRUMFIELD
PART NUMBERS	CONTACT RATING	NOMINAL INPUT MILLIAMPS DC	NOMINAL RESISTANCE (OHMS)	PULL-IN MILLIAMPS DC	PULL-IN WATTS		
W67SCSX-1	3 AMPS	9.4 mADC	1000	9.2 mADC	85mW	DPDT	**R10SE1(X or Y)2-J1.0K**
W67SCSX-2	3 AMPS	6.4 mADC	2500	6.3 mADC	100mW	DPDT	**R10SE1(X or Y)2-J2.5K**
W67SCSX-3	3 AMPS	4.5 mADC	5000	4.4 mADC	100mW	DPDT	**R10SE1(X or Y)2-J5.0K**
W67SCSX-6	3 AMPS	13.7 mADC	1000	13.5 mADC	200mW	4PDT	**R10SE1(X or Y)4-J1.0K**
W67SCSX-7	3 AMPS	9.1 mADC	2500	8.9 mADC	200mW	4PDT	**R10SE1(X or Y)4-J2.5K**
W67SCSX-8	3 AMPS	6.5 mADC	5000	6.3 mADC	200mW	4PDT	**R10SE1(X or Y)4-J5.0K**

Part numbers shown also **available thru Stocking Distribution.**

SEE SECTION 10 FOR MATING SOCKETS

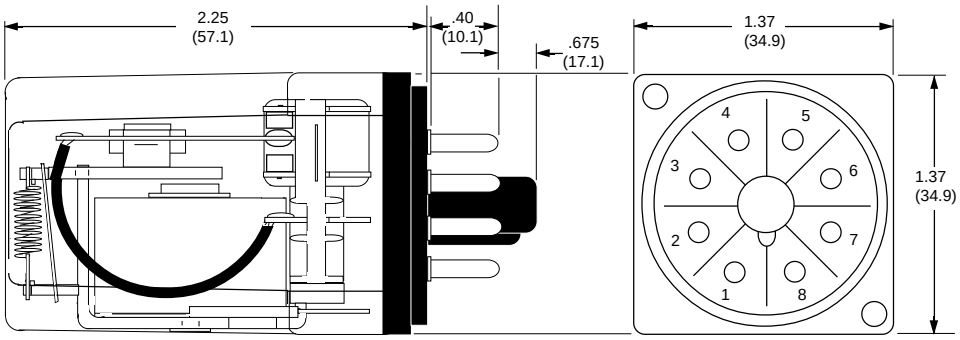
SENSITIVE PLUG-IN, 5 AMP, 1 - 3 POLES

The 392 series relay has been designed to operate at 125 Milliwatts per pole. Because of the coil sensitivity, the contacts are rated at 5 Amps. The Industry standard 8 pin octal plug is used with SPDT & DPDT contact configurations, and the 11 pin plug is used with 3PDT contact configurations. Silver contacts are standard on this 5 Amp Relay.



OUTLINE DIMENSIONS

Dimensions are shown in INCHES and (MILLIMETERS).



UL Recognized
File No. E13224

CONTACT RATINGS

LOAD	30VDC	120VAC
Resistive	5A	5A

GENERAL SPECIFICATIONS 392

CONTACTS
Contact Material: Silver

TIMING
Operate Time: 20 mS Max. @ Nominal Voltage.
Release Time: 15 mS Max. @ Nominal Voltage.

DIELECTRIC STRENGTH
Across open contacts: 500 V rms
All Mutually Insulated current carrying parts to ground: 1500 V rms
Insulation Resistance: 1000 Megohms min. 500 V

TEMPERATURE
Rated Operation: -45˚C to +70˚C

LIFE EXPECTANCY
Mechanical: 10 Million Operations no load
Electrical: 100,000 Operations @ Rated Load.

MISCELLANEOUS
Enclosure: Clear polycarbonate
Weight; 3-1/2 oz. (99.2 g approx.).

WIRING DIAGRAM

VIEWED FROM PIN END

SPDT DPDT 3PDT

COIL SPECIFICATIONS @ 25˚C

Resistance (Ohms)	SPDT 392XAX		DPDT 392XBX		3PDT 392XCX	
	mA	Volts	mA	Volts	mA	Volts
1,000	11.1	15-44	15.8	21-44	19.3	25-44
2,500	7.0	23-68	10.0	32-68	12.0	39-68
5,000	5.0	32-97	7.0	45-97	8.5	55-97
10,000	3.5	45-139	5.0	64-139	6.0	77-139

NOTES:
(1) Rates for continuous operation at 25˚C at voltages within listed ranges.
(2) Must operate at min. currents listed. Specify current when ordering
POWER CONSUMPTION: 125mW per pole @ currents listed in the coil table.

Magnecraft & Struthers-Dunn

ORDERING CODE
Typical Type No. **392 XBX 48P LM - 5.0M**

Series
Series 392 enclosed plug-in, low power consumtion coil.
Open Style (Consult Factory)

Contact Arrangements
XAX- SPDT
XBX - DPDT
XCX - 3PDT

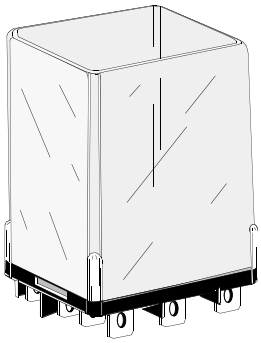
Construction Style
Open Style: (Consult Factory for mounting styles, special wiring etc.).
Enclosed Plug-in **- CODE 48P**

Options
Indicator Lamp, (125 VDC coil only.see coil specifications) - **CODE L**
Manual Actuator - **CODE M**

Operating Current (DC Only)
XAX: 11.1, 7.0, 5.0, 3.5 (Add M)
XBX: 15.8, 10.0, 7.0, 5.0 (Add M)
XCX: 19.3, 12.0, 8.5, 6.0 (Add M)

SEE SECTION 10 FOR MATING SOCKETS

SENSITIVE , 3-WAY TERMINALS, 5 AMP, 1 - 3 POLES

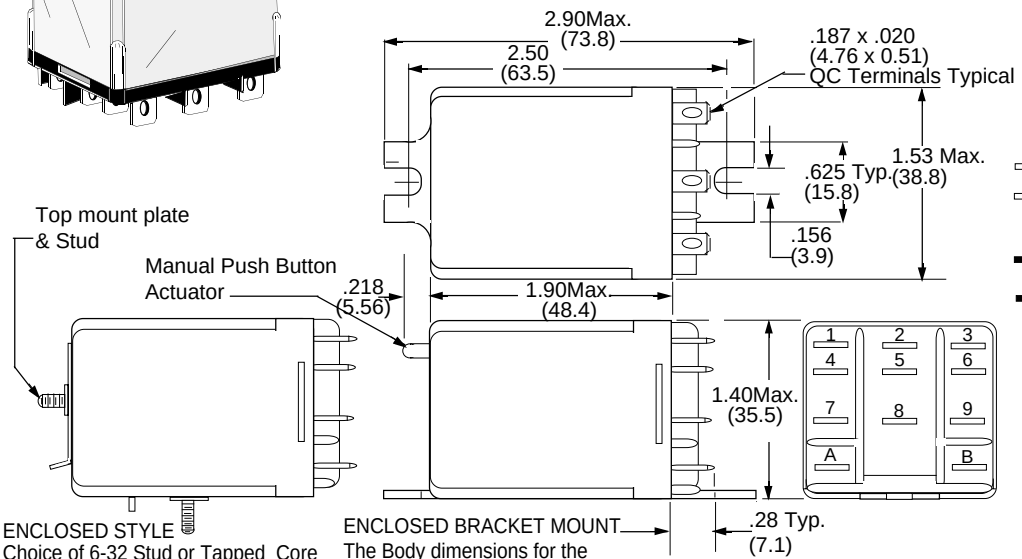


The 292 series relay has been designed to operate on 125 MILLIWATTS per pole. Because of this coil sensitivity, the contacts are rated at 5 Amps. The 3-way terminal design provides additional versatility in wiring. The 1 to 3 Form "C" contact configurations, are ideal for low current DC circuits that require up to a 5 Amp outputs. Silver contacts are standard on this 5 Amp Relay.

UL Recognized
File No. E13224

OUTLINE DIMENSIONS

Dimensions shown are in INCHES and (MILLIMETERS)



ENCLOSED STYLE
Choice of 6-32 Stud or Tapped Core with anti-rotation tab.

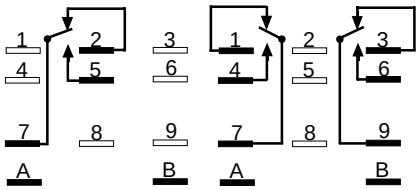
- OR -

6-32 Stud with top mounting plate and 1/8" nominal length anti rotation tab.

ENCLOSED BRACKET MOUNT
The Body dimensions for the Enclosed style Plug-in are the same as the Bracket Mount style.

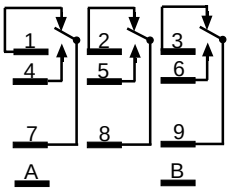
WIRING DIAGRAM

Viewed from terminal end



SPDT
292XAX

DPDT
292XBX



3PDT
292XCX

Magnecraft & Struthers-Dunn

GENERAL SPECIFICATIONS

CONTACTS
Contact Material: Silver

TIMING
Operate Time: 20 mS Max. @ Nominal Voltage.
Release Time: 15 mS Max. @ Nominal Voltage.

DIELECTRIC STRENGTH
Across open contacts: 500 V rms
All Mutually Insulated current carrying parts to ground: 1500 V rms
Insulation Resistance: 1000 Megohms min. 500 V

TEMPERATURE
Rated Operation: -45˚C to +70˚C

LIFE EXPECTANCY
Mechanical: 10 Million Operations no load
Electrical: 100,000 Operations @ Rated Load.

MISCELLANEOUS
Enclosure: Clear polycarbonate.
Weight: 3 oz. (85.05 g) approx..

COIL SPECIFICATIONS @ 25˚C

Resistance (Ohms)	SPDT 392XACX		DPDT 392XBX		3PDT 392XCX	
	mA	Volts	mA	Volts	mA	Volts
1,000	11.1	15-44	15.8	21-44	19.3	25-44
2,500	7.0	23-68	10.0	32-68	12.0	39-68
5,000	5.0	32-97	7.0	45-97	8.5	55-97
10,000	3.5	45-139	5.0	64-139	6.0	77-139

NOTES:
(1) Rates for continuous operation at 25˚C at voltages within listed ranges.
(2) Must operate at min. currents listed. Specify current when ordering

POWER CONSUMPTION: 125mW per pole @ currents listed in the coil table.

CONTACT RATINGS

LOAD	30VDC	120VAC	240VAC
Resistive	5A	5A	5A

ORDERING CODE

Typical Type No. **292 XBX CS1 L - 10D**

Series
Series 292 , 3-Way Terminals
125 Milliwatts per pole.

Contact Arrangements
XAX- SPDT (1 Form C)
XBX - DPDT (2 Form C)
XCX - 3PDT (2 Form C)

Construction Style
Open Style (Consult Factory for mounting styles, special wiring etc.)
Enclosed Plug-in **- CODE C**
Enclosed Bracket Mount **- CODE C1**
Enclosed with 6-32 Side tapped hole**- CODE C2**
Enclosed Bracket Mount **- CODE C!**
Enclosed with 6-32 side stud **- CODE CS2**

Options
Gold Diffused Contacts - **CODE G**
Indicator Lamp (125VDC Only) -**CODE L**
Manual Actuator - **CODE M**
Printed Circuit Terminals - **CODE T**

Coil Current (DC Milliamps Only).
XAX: 11.1, 7.0, 5.0, 3.5 (Add M)
XBX: 15.8, 10.0, 7.0, 5.0 (Add mA)
XCX: 19.3, 12.0, 8.5, 6.0 (Add mA)

SEE SECTION 10 FOR MATING SOCKETS

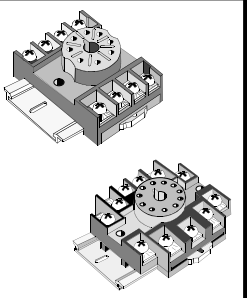
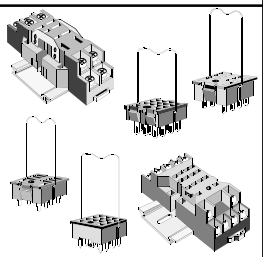
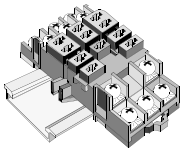
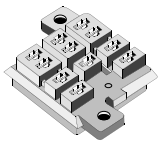
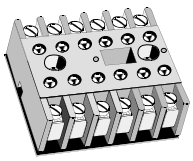
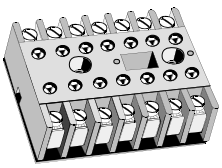
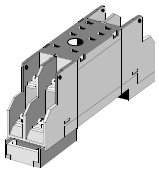
SOCKETS

AND

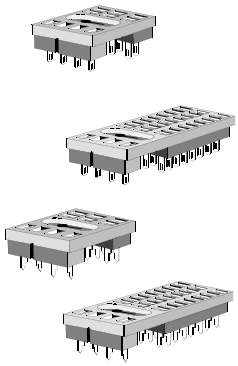
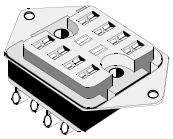
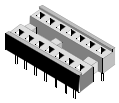
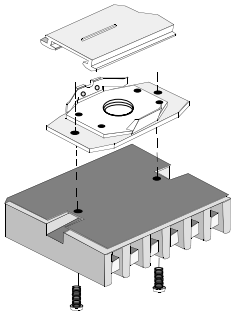
ACCESS0RIES

Magnecraft & Struthers-Dunn

SOCKET SELECTION GUIDE

	FEATURES	SOCKET PART NO.	NO. OF PINS	USE SOCKET WITH RELAY	NO. OF POLES	TERMINAL TYPES	MOUNTING	HOLD-DOWN CLIP INCLUDED	CLIP PART NO.	APPROVALS: UL	CSA	CE	PAGE NO.
	Octal base, 8 or 11 Pin socket. Panel or DIN rail mount with Screw Terminals & pressure plates. Fits all standard 8 & 11 pin octal plugs.	70-464-1 70-465-1	8 11	250 314	1, 2 3	Screw Screw	Panel or DIN Mount	Not Required	None None	Yes Yes	Yes Yes	Yes Yes	195
	Class 78 Panel Mount/DIN rail mount with screw Terminals, Chassis mount with solder terminals or P.C. mount for direct solder to P.C. board.	70-459-1 70-461-1	8 14	78R 78	1, 2 4	Screw Screw	Panel or DIN Mt. Panel or DIN Mt.	No No	16-1197 16-1197	Yes Yes	Yes Yes	Yes Yes	196
		70-401-1 70-378-1	8 14	78R 78	1, 2 4	Solder Solder	Chassis Chassis	No No	16-1197 16-1197	Yes Yes	Yes Yes	Yes Yes	197
		70-402-1 70-379-1	8 14	78R 78	1, 2 4	P.C. P.C.	P.C. P.C.	No No	16-1197 16-1197	Yes Yes	Yes Yes	Yes Yes	198
	Class 388 & 283 Square Base 11 pin Panel/DIN rail Mount, with Screw Terminals.	70-463-1	11	235, 236, 388	1, 2 3	Screw	Panel or DIN Mount	No	16-1278 or 16-1239 Long Body	Yes	Yes	Yes	199
	Class 388 & 283 Square Base Socket for blade style relays. Solder/ Plug-in, Quick connect or Printed Circuit terminals. P.C. Socket without mounting ears 70-178-2	70-124-1 70-124-2 70-178-1 70-178-2	11	235, 236, or 388,	1, 2 or 3	Solder, 3/16" Q.C. PC P.C.	Chassis Chassis P.C. P.C.	No No No No	16-722-2 16-722-2 16-722-2 16-722-2	Yes Yes Yes Yes	Yes Yes Yes Yes	Yes Yes Yes Yes	200
	219 Style Front connected wiring on one level with Screw Terminals. Mating relays have Locking Clip that mates with clip receiver in socket. All Sockets are supplied with insulated backing plate. Fits 12 pin 219 style relays.	27390	12	219 T219 246, 247 B255, A311 349, 112-PGF RSX1800 101-112 RRX164	2 to 5 Pole	Screw	Panel	No	None	Yes			201
	219 Style Front connected wiring on one level with Screw Terminals. Mating relays have Locking Clip that mates with clip receiver in socket. All Sockets are supplied with insulated backing plate. Fits 14 pin 219 style relays.	33377	14	219 14 Pin Versions	2 to 6 Pole	Screw	Panel	No	None	Yes			201
	Class 76 Panel or DIN mount Socket. Screw Terminals with pressure plates	70-478-1 70-475-1	5 8	76EU	1 2	Screw	Panel or Din rail	No	16-1264	Yes	Yes		202

SOCKET SELECTION GUIDE

	FEATURES	SOCKET PART NO.	NO. OF PINS	USE SOCKET WITH RELAY	NO. OF POLES	TERMINAL TYPES	MOUNTING	HOLD-DOWN CLIP INCLUDED	CLIP PART NO.	APPROVALS: UL	CSA	CE	PAGE NO.
	Class 67 Chassis Mount Socket has Solder terminals. Printed Circuit Socket pins are soldered directly to the P.C.Board. All sockets have relay grounding strip that connects to stud on plug-in style relays.	70-303-1	10	67	2	Solder	Chassis	Yes	16-875-1	No	No	No	203
		70-304-1	10		2	P.C.	P.C.	Yes	16-875-1	No	No	No	
		70-305-1	16		4	Solder	Chassis	Yes	16-875-2	No	No	No	
		70-306-1	16		4	P.C.	P.C.	Yes	16-875-2	No	No	No	
		70-307-1	22		6	Solder	Chassis	Yes	16-875-3	No	No	No	204
		70-308-1	22		6	P.C.	P.C.	Yes	16-875-3	No	No	No	
		70-309-1	28		8	Solder	Chassis	Yes	16-1120-8	No	No	No	
		70-310-1	28		8	P.C.	P.C.	Yes	16-1120-8	No	No	No	
	Class 97 Chassis Mount Socket with metal mounting flange.	70-312	10	97	2	Solder	Chassis	No	None	No	No	No	205
	DIP P.C. style 14 Pin Socket. Fits 0.100 board spacing.	70-276	14	DIP	1 or 2	P.C.	P.C.	No	None	No	No	No	205
	ACCESSORIES												
	DIN rail conversion kit for use on series 219 style sockets. 27390 (12 pin) and 33377 (14 pin)	CX-4092					DIN Rail			No	No	No	

8 or 11 PIN SCREW TERMINAL SOCKETS

DESIGNED FOR PANEL OR DIN MOUNT
RATED: 10 AMPS, 300V
MOLDED BASE, BREAK RESISTANT BLACK THERMOPLASTIC WITH CLOSED BACK.

Compatible with European **35 mm DIN** rail mounting.
Time saving snap in installation.
Non metallic spring mechanism eliminates mounting hardware.
Pressure clamp screw terminals hold wires mechanically secure.
Pressure clamp terminals provide excellent electrical connection.
Terminals accept up to two # 12 AWG wires.
One piece stamped metal interconnections. No welded or soldered connections.
Fits all standard 8 and 11 pin relay plugs.
Can also be surface mounted with 2 screws.

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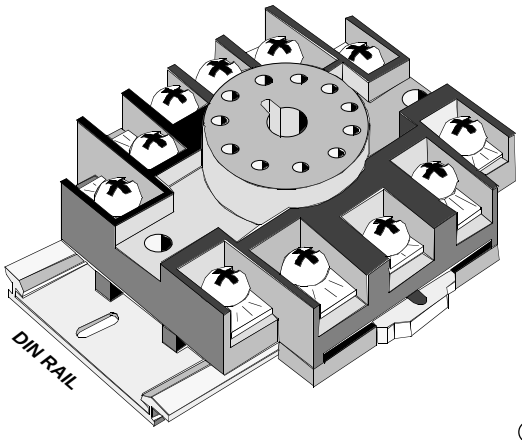
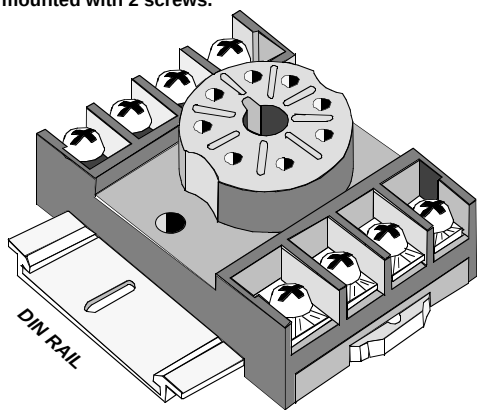
CE



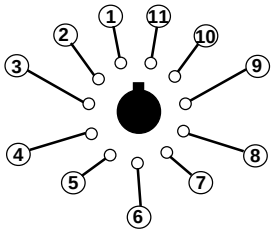
70-465-1 PANEL/DIN MOUNT SOCKET
Struthers-Dunn Equivalent Part Number 75225



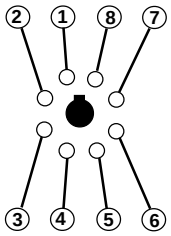
70-464-1 PANEL/DIN MOUNT SOCKET
Struthers-Dunn Equivalent Part Number 75224

WIRING DIAGRAMS

3PDT

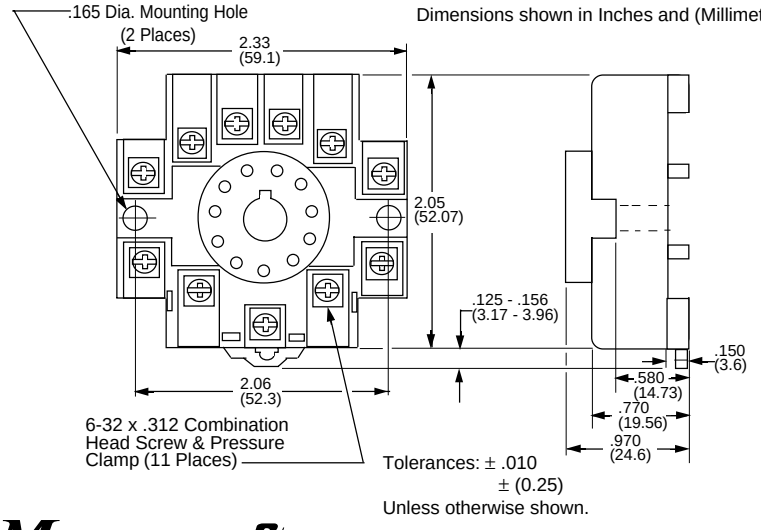


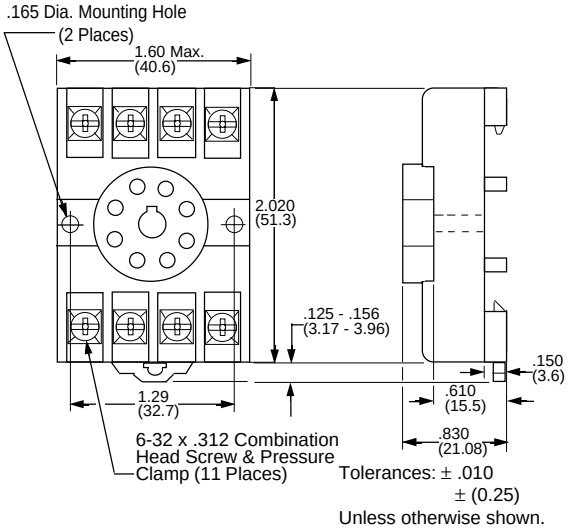
SPDT, DPDT



OUTLINE DIMENSIONS

Dimensions shown in Inches and (Millimeters)





Magnecraft

PART NUMBERS	STYLE	WEIGHT (GRAMS)	CROSS REFERENCE						
			P&B		IDEC	CUSTOM CONNECTOR	OMRON	ALLEN-BRADLEY	GRAINGER
70-464-1	8 Pin Octal Socket, Panel/DIN mount, Screw Terminals	23.8	**27E891**	**27E122**	**SR2P-06**	**OT08-PC**	**PF083A-E**	**700-HN125**	**5X852**
70-465-1	11 Pin Octal Socket, Panel/DIN mount,, Screw Terminals	75	**27E892***	**27E123**	**SR3P-06***	**OT11-PC**	**PF113A-E***	**700-HN126**	**6X156***

Part Numbers shown also available thru Stocking Distribution
Cross Reference reflects compatibility with relay foot prints. Shape, mounting, method of relay hold down, and socket internal wiring can vary.
* Track mountable but not compatible with Magnecraft mounting hole locations.

SCREW TERMINAL SOCKETS - 1, 2 & 4 POLE

Compatible with European **35 mm DIN** rail mounting.
Time saving snap in installation.
Non metallic spring mechanism eliminates mounting hardware.
Pressure clamp screw terminals hold wires mechanically secure.
Pressure clamp terminals provide excellent electrical connection.
Terminals accept up to two # 14 AWG wires for the 70-461-1, and up to #12 AWG wires for the 70-459-1 sockets.
One piece stamped metal interconnections. No welded or soldered connections.
Can also be surface mounted with 2 screws.

DESIGNED FOR PANEL OR DIN MOUNT
4 POLE: RATED 7 AMPS @ 300 VOLTS
1 & 2 POLE: RATED 10 AMPS @ 300 VOLTS

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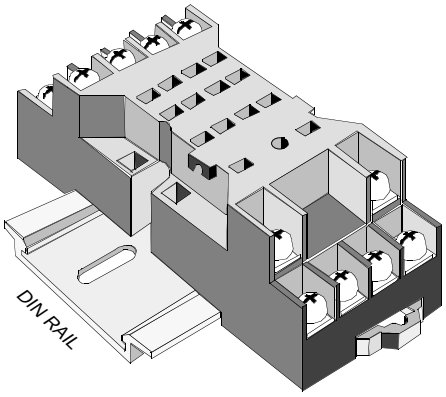
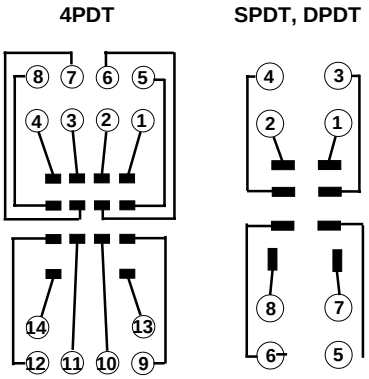
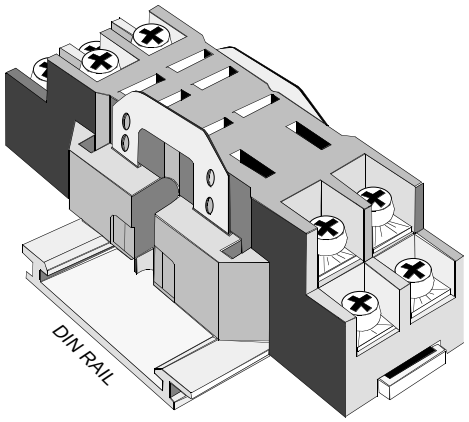


70-461-1 PANEL/DIN MOUNT SOCKET
16-1197 Spring Clip Ordered separately.
Struthers-Dunn Equivalent Part Number 75228

WIRING DIAGRAMS

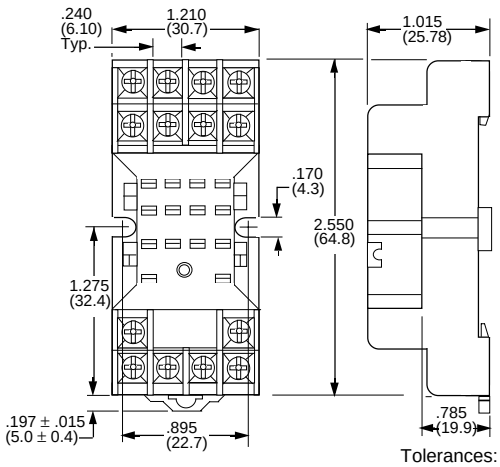




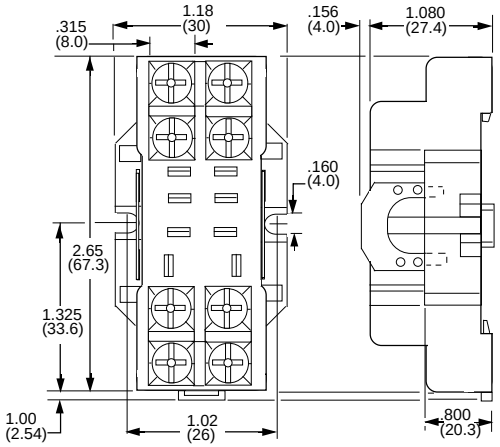
70-459-1 PANEL/DIN MOUNT SOCKET
16-1197 Spring Clip Ordered separately.
Struthers-Dunn Equivalent Part Number 75227

OUTLINE DIMENSIONS

Dimensions shown in Inches and (Millimeters)



Tolerances: ± .010
± (0.25)
Unless otherwise shown.



Tolerances: ± .010
± (0.25)
Unless otherwise shown.

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PART NUMBERS	NO. OF POLES	SOCKET STYLE	WEIGHT (GRAMS)	CROSS REFERENCE						
				P&B	P&B	IDEC	CUSTOM CONNECTOR	OMRON	ALLEN-BRADLEY	GRAINGER
70-459-1	1 or 2	Screw Terminal	49.8	**27E895**	**27E487***	**SH2B-05**	**GT08-15**	**PTF08A-E**	**700-HN116**	**2A582**
70-461-1	4	Screw terminal	42.8	**27E894**	**27E166****	**SY4S-05**	**MT14-PC**	**PYF14A-E**	**700-HN128**	**2A584**

PART NUMBERS SHOWN ALSO **AVAILABLE THRU STOCKING DISTRIBUTION.**

Cross Reference reflects compatibility with relay foot prints. Shape, mounting, method of relay hold down, and socket internal wiring can vary.
* Panel mount
** Panel mount with grounding screw.

CHASSIS MOUNT SOCKETS - 1, 2 & 4 POLE

SOLDER TERMINALS
SNAPS INTO CHASSIS
4 POLE: RATED 5 AMPS @ 300 VOLTS
1 & 2 POLE: RATED 10 AMPS @ 300 VOLTS

Sockets fit Class 78 style relays. The sockets are chassis mounted and snap into panels up to .0625 (1.56) thick. The 4 pole socket has an additional receptacle and solder terminal for grounding 4 pole relays.

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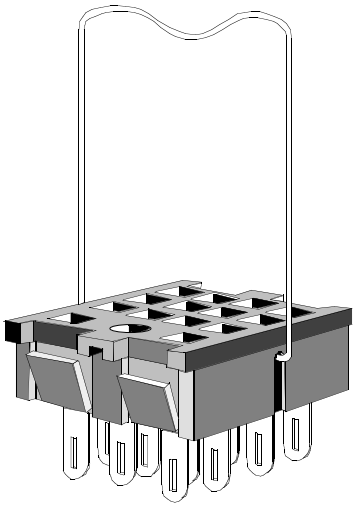
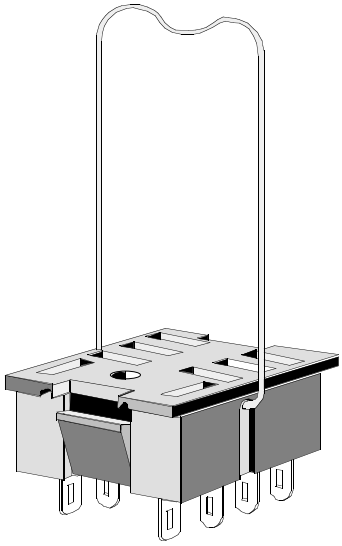


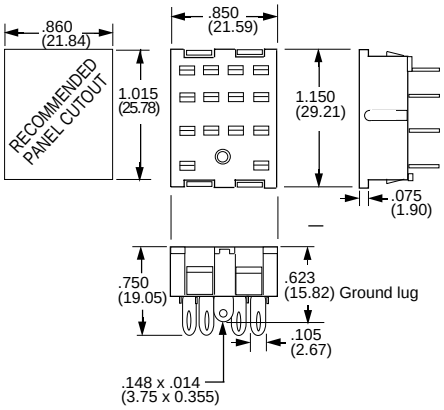
70-378-1 SOLDER TERMINAL SOCKET
16-1197 Spring Clip Ordered separately.
Struthers-Dunn Equivalent Part Number 32884



70-401-1 SOLDER TERMINAL SOCKET
16-1197 Spring Clip Ordered separately.
Struthers-Dunn Equivalent Part Number 40051

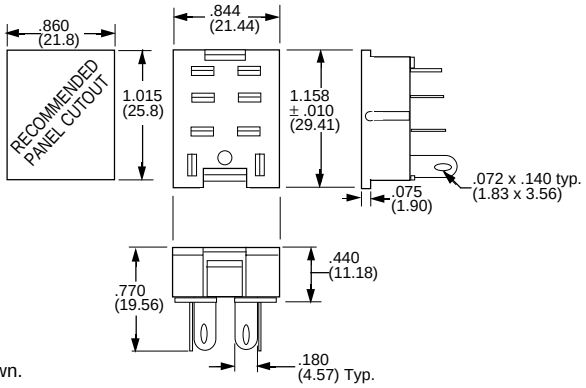
OUTLINE DIMENSIONS

Dimensions shown in Inches and (Millimeters)



SNAP FITS
INTO
CHASSIS
.0625 (1.56)
THICK

Tolerances: ± .010
± (0.25)
Unless otherwise shown.



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PART NUMBERS	NO. OF POLES	SOCKET STYLE	WEIGHT (GRAMS)	CROSS REFERENCE				
				P&B	IDEC	CUSTOM CONNECTOR	OMRON	ALLEN-BRADLEY
70-401-1	1 or 2	Solder Terminal	6.5	**27E488**	**SH2B-51**	**GR108-SLD**	**PT08**	**700-HN117**
70-378-1	4	Solder Terminal	6.2	**27E006**	**SY4S-51**	**MR14-SLD**	**PY14**	**700-HN104**

PART NUMBERS SHOWN ALSO **AVAILABLE THRU STOCKING DISTRIBUTION.**
Cross Reference reflects compatibility with relay foot prints. Shape, mounting, method of relay hold down, can vary.

PRINTED CIRCUIT TERMINAL SOCKETS - 1, 2 & 4 POLE

Sockets fit Class 78 style relays. The sockets are manufactured with "floating" (loose) P.C. terminals that allow the terminals to aline with holes in the circuit board without binding or bending to get correct fit and alignment of terminals. The 4 pole socket has an additional receptacle and solder terminal for grounding 4 pole relays.

PRINTED CIRCUIT TERMINALS
4 POLE: RATED 5 AMPS @ 300 VOLTS
1 & 2 POLE: RATED 10 AMPS @ 300 VOLTS

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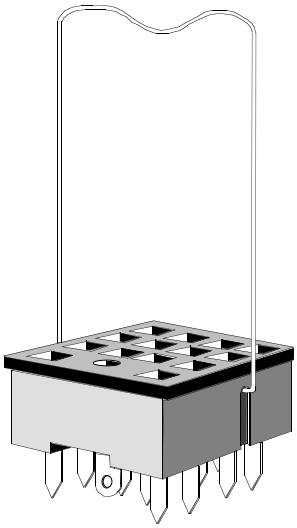
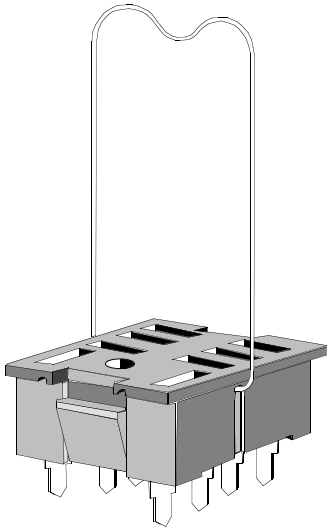


70-379-1 SOLDER TERMINAL SOCKET
16-1197 Spring Clip Ordered separately.
Struthers-Dunn Equivalent Part Number 39830

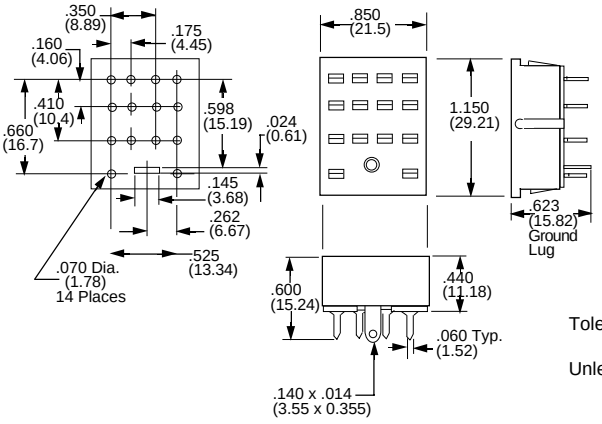


70-402-1 SOLDER TERMINAL SOCKET
16-1197 Spring Clip Ordered separately.
Struthers-Dunn Equivalent Part Number 41463

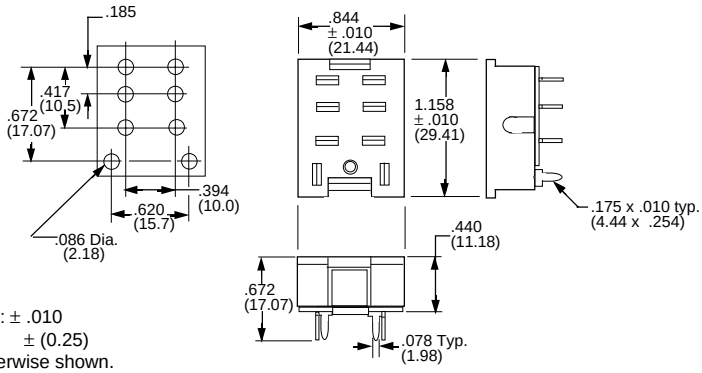
OUTLINE DIMENSIONS

Dimensions shown in Inches and (Millimeters)

RECOMMENDED PRINTED CIRCUIT LAYOUT
Viewed from component side



RECOMMENDED PRINTED CIRCUIT LAYOUT
Viewed from component side



Tolerances: ± .010
± (0.25)
Unless otherwise shown.

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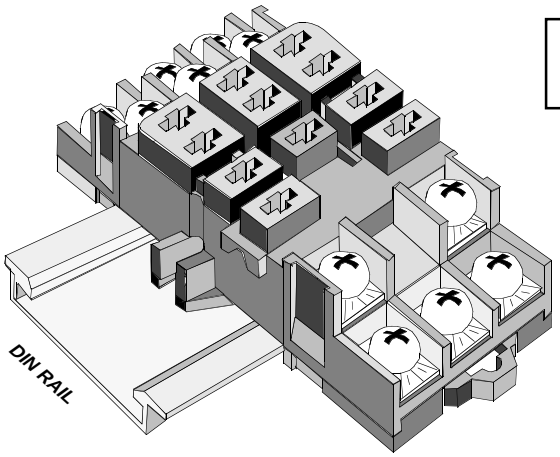
PART NUMBERS	NO. OF POLES	SOCKET STYLE	WEIGHT (GRAMS)	CROSS REFERENCE					
				P&B	IDEC	CUSTOM CONNECTOR	OMRON	ALLEN-BRADLEY	GRAINGER
70-402-1	1 or 2	Printed Circuit	5.8	**27E489**	**SH2B-62**	**GR108-PCB**	**PT08-0**	**700-HN118**	**2A583**
70-379-1	4	Printed Circuit	5.9	**27E031**	**SY4S-61**	**MR14-PCB**	**PY14**	**700-HN105**	**-**

PART NUMBERS SHOWN ALSO **AVAILABLE THRU STOCKING DISTRIBUTION.**
Cross Reference reflects compatibility with relay foot prints. Shape, mounting and method of relay hold down can vary.

SCREW TERMINAL SOCKET - 1, 2 & 3 POLE

FITS SQUARE BASE .187 (3/16") BLADE STYLE RELAYS
RATED: 15 AMPS, 300 VAC

Compatible with European **35 mm DIN** rail mounting.
Time saving snap in installation.
Non metallic spring mechanism eliminates mounting hardware.
Pressure clamp screw terminals hold wire mechanically secure.
Pressure clamp terminals provide excellent electrical connection.
Terminals accept up to two # 12 AWG wires. Break resistant thermoplastic. One piece stamped metal interconnections. No welded or soldered connections.
Can also be surface mounted with 2 screws.



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E70550

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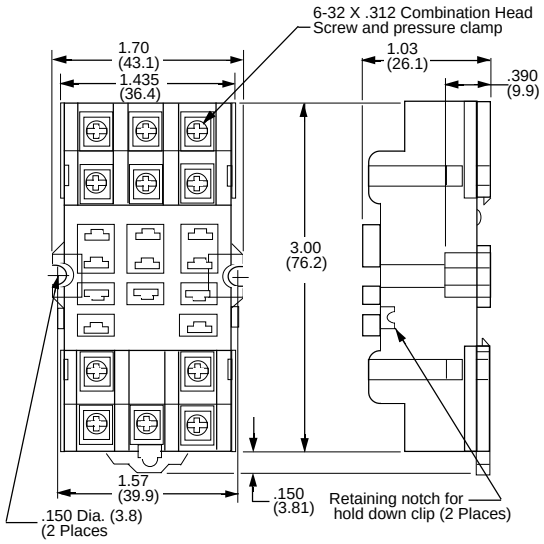
CE

70-463-1 PANEL/DIN SOCKET
16-1278 Spring Clip Ordered separately.

Struthers-Dunn Equivalent Part Number-75226

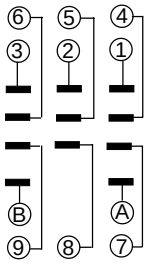
OUTLINE DIMENSIONS

DIMENSIONS ARE SHOWN IN INCHES AND (MILLIMETERS).



Tolerances: ± .010
± (0.25)
Unless otherwise shown.

WIRING DIAGRAM
TOP VIEW



Magnecraft

PART NUMBERS	STYLE	WEIGHT (GRAMS)	CROSS REFERENCE				
			P & B	IDEC	CUSTOM CONNECTOR	ALLEN-BRADLEY	GRAINGER
70-463-1 *	11 Pin, Panel/DIN rail mount, with Screw Terminals	50.6	**27E893**	**SR3B-05**	**ST11-PC**	**700-HN127**	**5X853**

Part Numbers shown also available thru Stocking Distribution

* Order **Part Number 16-1278 Hold Down Clip** for relays with a case height of 1.90" using 3/16" (.187) terminals

Cross Reference reflects compatibility with relay foot prints. Shape, mounting, method of relay hold down, and socket internal wiring can vary.

Sockets fit Class square base style relays with 3/16" (.187) terminals. The quick connect, solder terminal and printed circuit sockets have mounting tabs for mounting to panels using two screws. The 70-178-2 Printed circuit socket has no mounting tabs

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E70550

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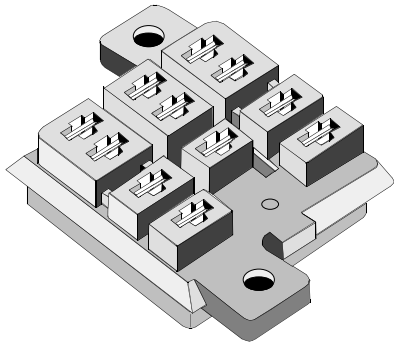
CE

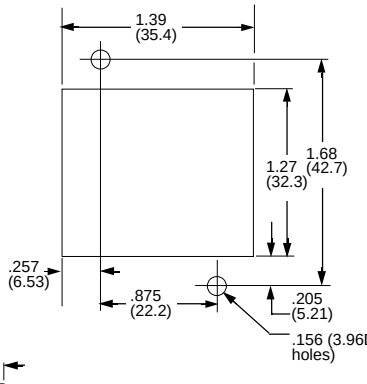
FITS SQUARE BASE .187 (3/16") BLADE STYLE RELAYS
RATED: 15 AMPS, 300 VAC



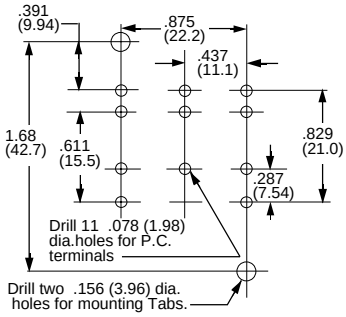
16-722-2 Spring Clip Ordered separately.

Struthers-Dunn Equivalent Part Numbers
36580 = 70-124-1
36581 = 70-124-2
36579 = 70-178-1

RECOMMENDED CHASSIS CUTOUT
BOTTOM VIEW



RECOMMENDED PRINTED CIRCUIT BOARD LAYOUT
BOTTOM VIEW



Note: Holes not required when using Fig. "B" style socket

OUTLINE DIMENSIONS
DIMENSIONS ARE SHOWN IN INCHES AND (MILLIMETERS).

FIG. "A"

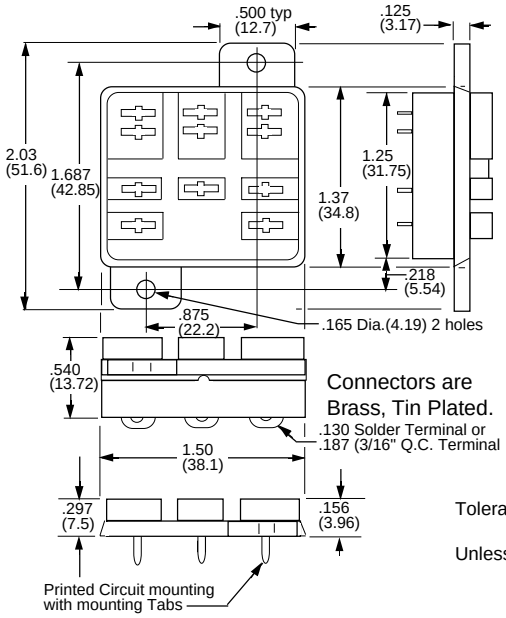
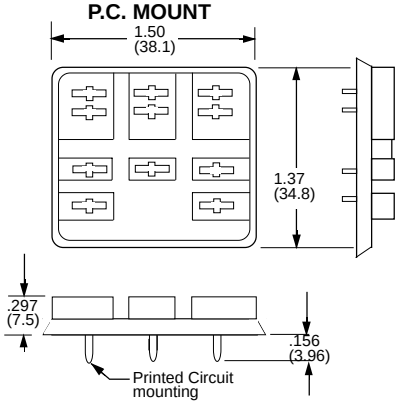


FIG. "B"
P.C. MOUNT



Tolerances: ± .010
± (0.25)
Unless otherwise shown.

Magnecraft

PART NUMBERS	FIG	STYLE	WEIGHT (GRAMS)	CROSS REFERENCE				
				P & B	IDEC	CUSTOM CONNECTOR	ALLEN-BRADLEY	GRAINGER
70-124-1	FIG "**A**"	.130 SOLDER TERMINAL	12.1	**27E043**	**SR3B-51**	**CM11-SLD**	-	-
70-124-2	FIG "**A**"	3/16" (.187) QUICK CONNECT	12.1	**27E067**	-	**CM11-QDC**	**700-HN107**	**5X854**
70-178-1	FIG "**A**"	PRINTED CIRCUIT, WITH TABS	9.4	**27E304**	-	**CM11-PCB**	-	-
70-178-2	FIG "**B**"	PRINTED CIRCUIT, NO TABS	9.4	-	-	**CM11-PCB-1S**	-	-

Part Numbers shown also available thru Stocking Distribution
Order **Part Number 16-722-2 Hold Down Clip** (Struthers-Dunn Equivalent 37067) for relays with a case height of 1.90 (48.2)
Cross Reference reflects compatibility with relay foot prints. Shape, mounting and method of relay hold down can vary.

SCREW TERMINAL SOCKETS

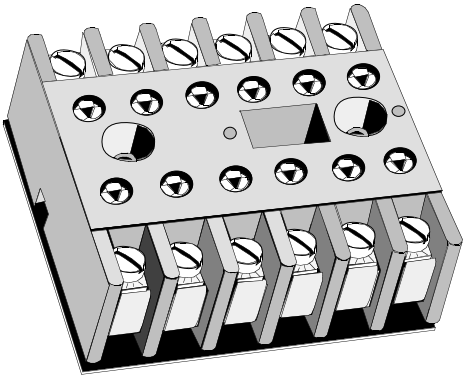
12 and 14 PIN PANEL MOUNT SOCKETS FIT ALL 219 STYLE RELAYS WITH 12 OR 14 PIN PLUGS. RATED: 10 AMPS, 600 VAC

These Industrial style sockets offer front-connected wiring on one level with screw terminals accessible and numbered for ease in installation, wiring and checkout. Sockets are polarized. The mating relay has a locking clip that snaps into the socket, eliminating any need for external holding devices. All sockets are supplied with an insulating paper back plate for greater dielectric strength.

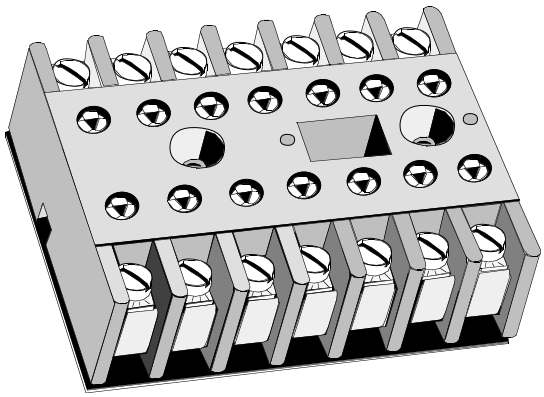
c UL us
E13224 E70550

Recognized to Canadian safety requirements under the Component Recognition Program of Underwriters Laboratories Inc.

UL LISTED WHEN USED WITH SERIES 219 RELAYS



27390 - 12 PIN PANEL MOUNT SOCKET



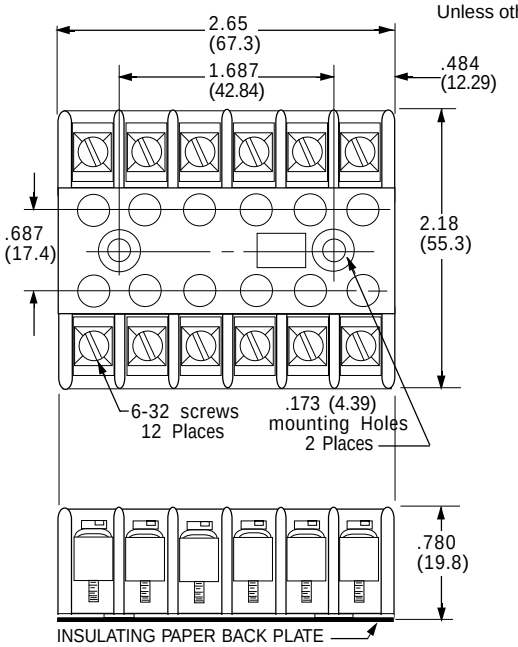
33377 - 14 PIN PANEL MOUNT SOCKET

OUTLINE DIMENSIONS

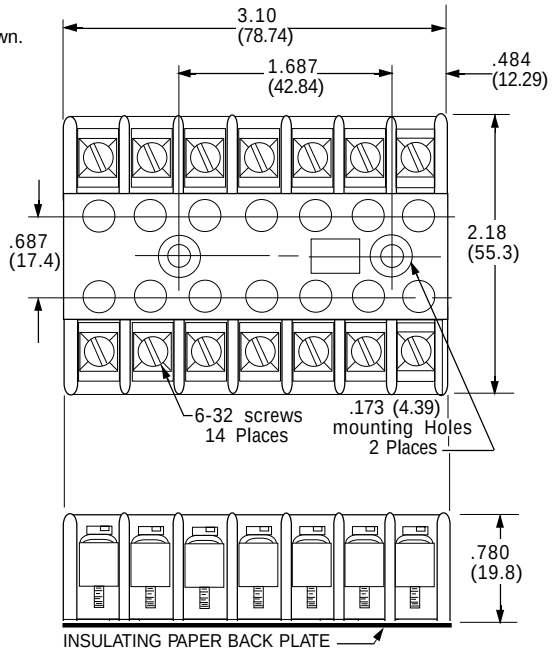
DIMENSIONS ARE SHOWN IN INCHES AND (MILLIMETERS).

Tolerances: ± .010
± (0.25)
Unless otherwise shown.

12 PIN SOCKET



14 PIN SOCKET



Magnecraft & Struthers-Dunn

PART NUMBERS	STYLE	WEIGHT (GRAMS)	CROSS REFERENCE CUSTOM CONNECTOR
27390	12 PIN SOCKET	102	**SD12-PC**
33377	14 PIN SOCKET	120	**SD14-PC**

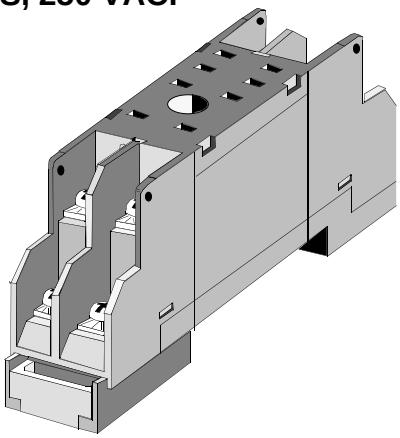
Part Number Shown also Available thru Stocking distribution

Notes: Insulating Back Plate Included with Socket
When Sockets are mounted end to end, the distance between adjacent mounting holes should be 1" minimum.

SCREW TERMINAL SOCKETS - 1 & 2 POLE

Compatible with European **35 mm DIN** rail mounting.
Time saving snap in installation.
Pressure clamp screw terminals hold wires mechanically secure.
Pressure clamp terminals provide excellent electrical connection.
Terminals accept up to two # 14 AWG wires.
One piece stamped metal interconnections. No welded or soldered connections.
Fits all standard Class 76 relays
Can also be surface mounted with 1 screw.

PANEL/DIN RAIL MOUNT.
DIELECTRIC STRENGTH 1500 V rms, 1 MINUTE.
RATED: 15 AMPS, 250 VAC.

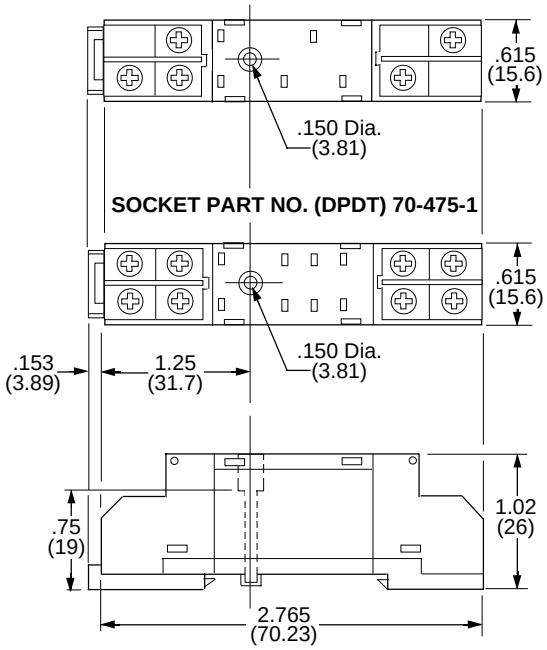


70-475-1 PANEL/DIN SOCKET
16-1321 Spring Clip Ordered separately.

OUTLINE DIMENSIONS

DIMENSIONS ARE SHOWN IN INCHES AND (MILLIMETERS).

SOCKET PART NO. (SPDT) 70-478-1



Tolerances: ± .010
± (0.25)
Unless otherwise shown.

Magnecraft

PART NUMBERS	STYLE	WEIGHT (GRAMS)	CROSS REFERENCE	
			P & B	IDEC
STANDARD FOOT PRINT FOR STYLE 76EURCPCX-				
70-478-1	SPDT, Panel/DIN mount, Screw Terminal	19.3	**27E1038**	**RP 78 604**
70-475-1	DPDT, Panel/DIN mount, Screw terminal	19.5	**27E1039**	**RP 78 605**

Part Numbers Shown also **Available thru Stocking distribution**

Cross Reference reflects compatibility with relay foot prints. Shape, mounting, method of relay hold down, and socket internal wiring can vary.

SOLDER TERMINAL SOCKETS - 2 TO 8 POLE

CHASSIS MOUNT SOCKETS
RATED: 10 AMPS MAX.

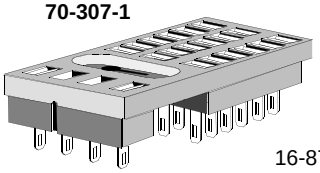
Sockets fit Class 67 style relays with solder/plug-in terminals. All sockets have an grounding strip that connects with the mounting screw to the chassis. Contact material used is spring brass, tin plated. The body material is phenolic. Dielectric strength: 1000 V rms. Insulation Resistance 10 ^{9} megohms

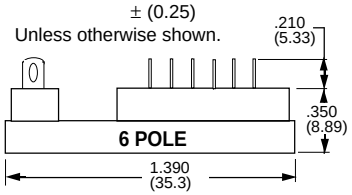
OUTLINE DIMENSIONS

DIMENSIONS ARE SHOWN IN INCHES AND (MILLIMETERS).

Tolerances: ± .010
± (0.25)
Unless otherwise shown.

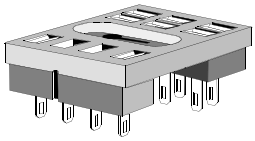
70-307-1

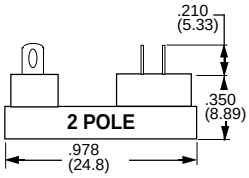




16-875-3 Spring hold down Clip included

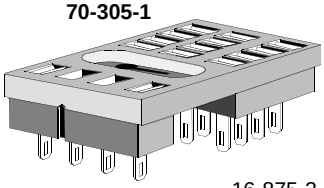
70-303-1

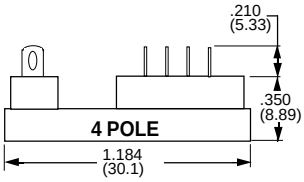




16-875-1 Spring hold down Clip included

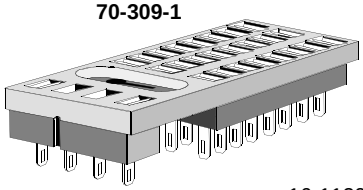
70-305-1

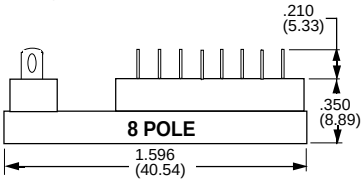




16-875-2 Spring hold down Clip included

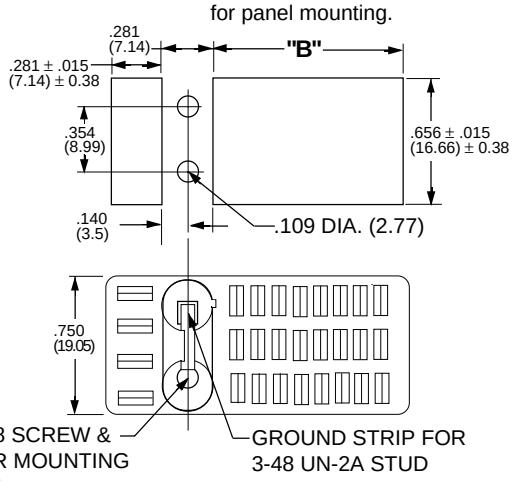
70-309-1





16-1120-8 Spring hold down Clip included

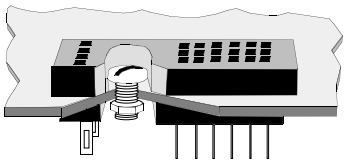
CHASSIS CUTOUT
for panel mounting.

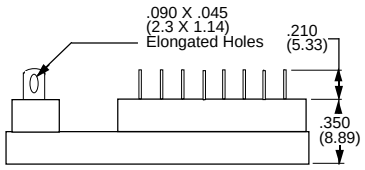


CHASSIS CUTOUT DIMENSION "B"

SPDT DPDT	4PDT	6PDT	8PDT
.343 (8.71)	.562 (14.3)	.781 (19.84)	1.00 (25.4)

CHASSIS MOUNT





Magnecraft

PART NUMBERS	NO. OF POLES	SOCKET STYLE	WEIGHT (GRAMS)	CROSS REFERENCE POTTER-BRUMFIELD
70-303-1	2	Solder Terminal	4.3	27E125
70-305-1	4	Solder Terminal	5.5	27E126
70-307-1	6	Solder Terminal	6.9	27E127
70-309-1	8	Solder Terminal	8.5	27E211

PART NUMBERS SHOWN ALSO **AVAILABLE THRU STOCKING DISTRIBUTION.**
RELAY HOLD DOWN CLIP IS INCLUDED WITH ALL SOCKETS

P.C. TERMINAL SOCKETS - 2 TO 8 POLE

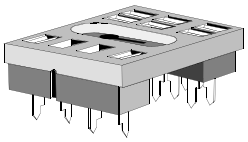
Sockets fit Class 67 style relays with solder/plug-in terminals. All sockets have an grounding strip that connects with the mounting screw to the chassis. Contact material used is spring brass, tin plated. The body material is phenolic. Dielectric strength: 1000 V rms. Insulation Resistance 10 ^{9} megohms

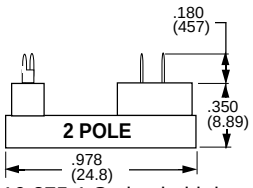
PRINTED CIRCUIT SOCKETS
RATED: 10 AMPS MAX.

OUTLINE DIMENSIONS

DIMENSIONS ARE SHOWN IN INCHES AND (MILLIMETERS).
Tolerances: ± .010
± (0.25)
Unless otherwise shown.

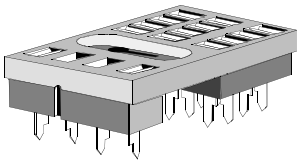
70-304-1

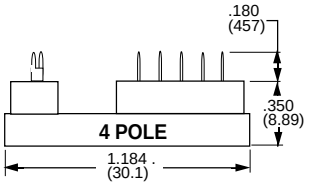




16-875-1 Spring hold down Clip included

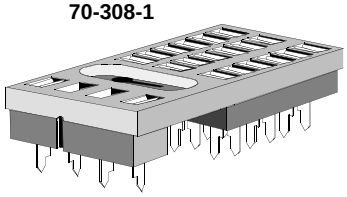
70-306-1

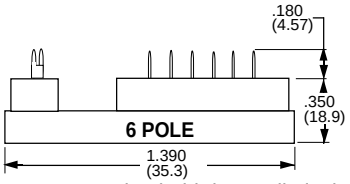




16-875-2 Spring hold down Clip included

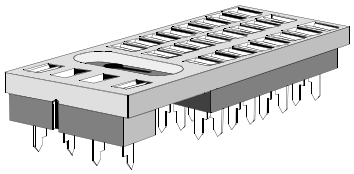
70-308-1

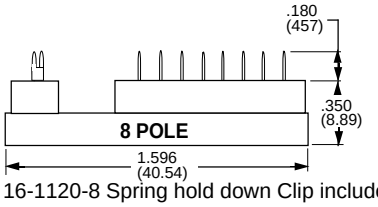




16-875-3 Spring hold down Clip included

70-310-1

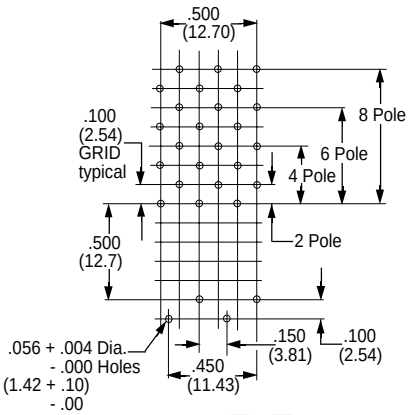


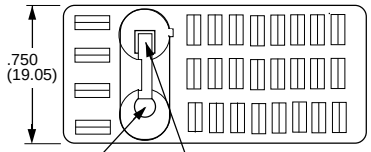


16-1120-8 Spring hold down Clip included

SUGGESTED P.C. BOARD LAYOUT

TOP VIEW (Component side of board)





USE 3-48 SCREW & NUT FOR MOUNTING SOCKET

GROUND STRIP FOR 3-48 UN-2A STUD

NOTE:
WHEN INSTALLING SOCKET(S) INTO A PRINTED CIRCUIT BOARD, USE PLUG-IN STYLE RELAYS FOR MAXIMUM TERMINAL CONTACT WITH MATING SOCKETS. PLUG-IN STYLE RELAYS HAVE A GROUNDING STUD AND ARE RECOMMENDED FOR USE WITH ALL SOCKET STYLES.

Magnecraft

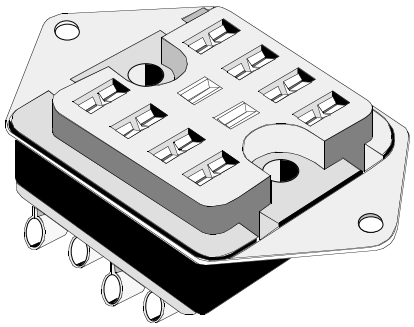
PART NUMBERS	NO. OF POLES	SOCKET STYLE	WEIGHT (GRAMS)	CROSS REFERENCE POTTER-BRUMFIELD
70-304-1	2	P.C. Terminal	4.3	27E128
70-306-1	4	P.C. Terminal	5.5	27E129
70-308-1	6	P.C. Terminal	6.9	27E130
70-310-1	8	P.C. Terminal	8.5	27E254

PART NUMBERS SHOWN ALSO **AVAILABLE THRU STOCKING DISTRIBUTION.**
RELAY HOLD DOWN CLIP IS INCLUDED WITH ALL SOCKETS

CLASS
97

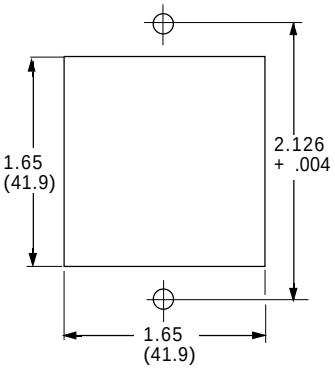
SOLDER TERMINAL SOCKET

CHASSIS MOUNT SOCKET
ACCEPTS .250 CONTACT TERMINALS
AND .110 COIL TERMINALS.
RATED: 25 AMPS



70-312

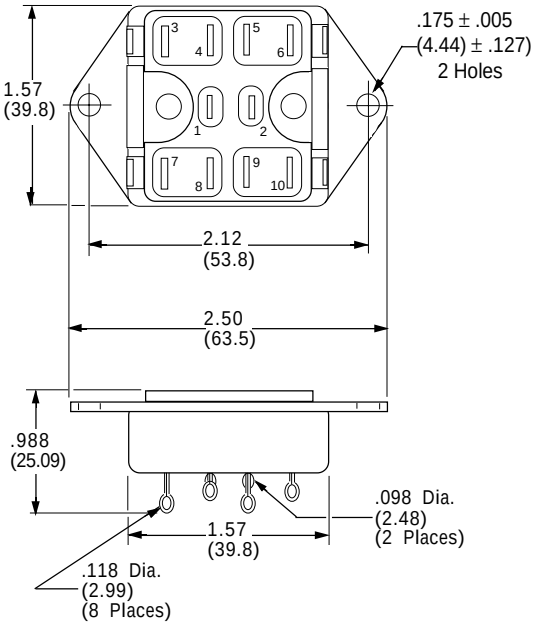
Recommended Chassis Layout



OUTLINE DIMENSIONS

DIMENSIONS ARE SHOWN IN INCHES AND (MILLIMETERS).

Tolerances: ± .010
± (0.25)
Unless otherwise shown.



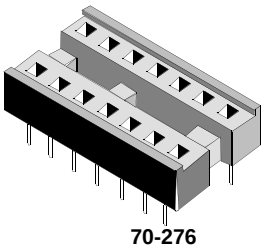
Magnecraft

Part Number	STYLE	WEIGHT (GRAMS)
70-312	10 Contact socket, Chassis Mounted, Solder Terminal	48

Part Number Shown also Available thru Stocking distribution

CLASS
DIP

P.C. TERMINAL, DUAL INLINE SOCKET



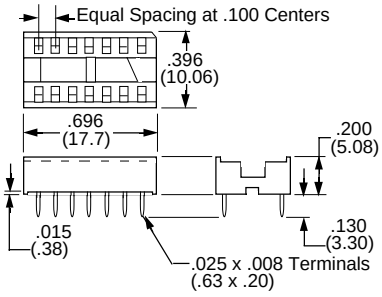
70-276

DIP (DUAL INLINE PACKAGE)
PHOSPHOR BRONZE CONTACTS, TIN PLATED
THERMOPLASTIC POLYESTER BODY
0.100 GRID SPACING

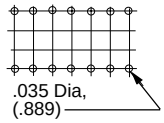
OUTLINE DIMENSIONS

DIMENSIONS ARE SHOWN IN INCHES AND (MILLIMETERS).

Tolerances: ± .010
± (0.25)
Unless otherwise shown.



Suggested Layout



0.100 Grid Pattern

Magnecraft

Part Number	STYLE	WEIGHT (GRAMS)
70-276	14 Pin DIP Socket, 0.100 Pin Spacingl	1

Part Number Shown also Available thru Stocking distribution

WEBSITE: www.magnecraft.com EMAIL:info@magnecraft.com FAX ON DEMAND 1-800/891-2957, DOCUMENT 100

CE

UTILIZATION

CATEGORIES

UTILIZATION CATEGORIES FOR LOW VOLTAGE SWITCHGEAR AND CONTROL GEAR

Nature of Current	Category	Typical Applications	Relevant I.E.C. Product Standard
AC	AC-1	Non-inductive or slightly inductive Loads, resistance furnaces	947-4
	AC-2	Slip-ring motors: Starting, switching off.	
	AC-3	Squirrel-cage motors: Starting, switching off motors during running.	
	AC-4	Squirrel-cage motors: Starting, plugging [1]), inching [2])	
	AC-5a	Switching of electric discharge lamp control	
	AC-5b	Switching of incandescent lamps.	
	AC-6a	Switching of transformers	
	AC-6b	Switching of capacitor banks.	
	AC-7a	Slightly inductive loads in household appliances and similar applications.	
	AC-7b	Motor-loads for household applications.	
	AC-8a	Hermetic refrigerant compressor motor control with manual resetting of overload releases.	
	AC-8b	Hermetic refrigerant compressor motor control with automatic resetting of overload releases.	
	AC-12	Control of resistive loads and solid state loads with isolation by optocouplers.	947-5
	AC-13	Control of solid state loads with transformer isolation.	
	AC-14	Control of small electromagnetic loads.	
	AC-15	Control of A.C. electromagnetic loads.	947-3
	AC-20	Connecting and disconnecting under no-load conditions,	
	AC-21	Switching of resistive loads, including moderate overloads.	
	AC-22	Switching of mixed resistive and inductive loads, including moderate overloads.	
	AC-23	Switching of motor loads or other highly inductive loads.	
AC and DC	A	Protection of circuits, with no rated short time withstand current	947-2
	B	Protection of circuits, with a rated short time withstand current	
DC	DC-1	Non-inductive or slightly inductive Loads, resistance furnaces	947-4
	DC-3	Shunt-motors, Starting, plugging [1]), inching [2]), dynamic breaking of motors.	
	DC-5	Series-motors, Starting, plugging [1]), inching [2]), dynamic breaking of motors.	
	DC-6	Switching of incandescent lamps.	
	DC-12	Control of resistive loads and solid state loads with isolation by optocouplers.	947-5
	DC-13	Control of DC electromagnets	
	DC-14	Control of DC electromagnetic loads having economy resistors in circuit.	
	DC-20	Connecting and disconnecting under no-load conditions	
	DC-21	Switching of resistive loads, including moderate overloads.	
	DC-22	Switching of mixed resistive and inductive loads, including moderate overloads (e.g. shunt motors)	947-3
	DC-23	Switching of highly inductive loads (e.g. series motors).	

1) By plugging is understood stopping or reversing the motor rapidly by reversing motor primary connections while the motor is running.

2) By inching (jogging) is understood energizing a motor once or repeatedly for short periods to obtain small movements of the drive mechanism

CUSTOMER SERVICE STAFF & SUPPORT

Tel: 843/393-5778 Fax: 843/393-4123

Pricing
Delivery
Cross-Reference
Return Authorization
Order Entry

Bill Moody	**Customer Service Manager**
Shelby Hall	**Sr. Customer Service Coord.**
Natalie Campbell	**Customer Service Coordinator**
Beverly Streett	**Customer Service Coordinator**
Gaye Register	**Customer Service Coordinator**

Tel: 843/393-5421 Fax: 843/393-4123

Product Quality

Jim Berg	**Q.C. Manager**

Application Engineering Assistance

Les Wynne	**MIL Spec.**
Bill Brady	**Solid State & Time Delay Relays**
Tom Mahaffey	**Industrial Relays**

Tel: 847/441-2531 Fax: 847/4412522

Gene Piskorz	**Industrial Relays**
Chuck Johnson	**P.C. Relays**

Tel: 843/393-5421 Fax: 843/393-7843

Invoices

Marjorie Bacote	**Credit Manager**

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 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.

LIMITED WARRANTY

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.

MAGNECRAFT ELECTRIC COMPANY/ MSD, Inc. assumes no risk or liability for the suitability or unsuitability or results of the use of its products, used in combinations with any electrical or electronic components, circuits, systems, assemblies, or any other material or substances, or environments. The purchaser's right under this warranty shall consist solely of requiring **MAGNECRAFT ELECTRIC COMPANY/ MSD, Inc.** to repair, or in **MAGNECRAFT'S/ MSD's** sole discretion, replace, free of charge, F.O.B., factory, any defective items received at its factory within said year, as determined by **MAGNECRAFT ELECTRIC COMPANY/ MSD, Inc.** to be defective.

All products to be returned to **MAGNECRAFT ELECTRIC COMPANY/ MSD, Inc.** for evaluation under this warranty, shall first receive a Return Authorization Number and Shipping Label from our Sales Department. All products shall be shipped to **MAGNECRAFT ELECTRIC COMPANY/ MSD, Inc.** prepaid. All products received at **MAGNECRAFT ELECTRIC COMPANY/ MSD, Inc.** without written authorization and return label, shall be returned at the sender's expense.

The failure to give or the giving of any advice or recommendations by **MAGNECRAFT ELECTRIC COMPANY/ MSD, Inc.** shall not constitute any warranty by, or impose any liability upon **MAGNECRAFT ELECTRIC COMPANY/ MSD, Inc.** The sole and exclusive remedy of the purchaser and the exclusive liability of **MAGNECRAFT ELECTRIC COMPANY/MSD, Inc.** are outlined and stated above, **AND IS IN LIEU OF ANY AND ALL OTHER WARRANTIES, EXPRESSED, IMPLIED, OR STATUTORY AS TO MERCHANTABILITY, FITNESS FOR PURPOSE SOLD, DESCRIPTION, QUALITY, PRODUCTIVENESS, OR ANY OTHER MATTER.**

In no event shall **MAGNECRAFT ELECTRIC COMPANY/ MSD, Inc.** be liable for consequential or special damages, or for the delay in the performance of this warranty.

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