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Toggle or Push/Pull Actuator Thermal Circuit Breaker

Product Facts

- 0.5 amp to 50 amp ratings may be used as on/off switch
- Cannot be reset against overload
- W23 has visible trip indicator
- Screw termination
- Trip-free operation
- W23 and W31 are UL 1077 Recognized as Supplementary Protectors, File E69543, and CSA Accepted as Supplementary Protectors (Appliance Component Protectors), File LR15734



W23



W31

Specifications

Electrical Data @ +25°C

Calibration — Will continuously carry 100% of rating, may trip between 101% and 134% of rating at 77°F [25°C]. Must trip at 135% in one hour.

Maximum Operating Voltages — 50 VDC or 250 VAC (to 400 Hz).

Interrupting Capacity — 0.5-25 amp models — 2,500 amps at 50 VDC, 1000 amps at 250 VAC. 26-50amp models — 1000 amps at 50 VDC or 250 VAC.

Resettable Overload Capacity — Ten times rated current.

Dielectric Strength — Over 1,500 volts RMS.

Current Rating in Amps	Maximum Resistance in Ohms ± 30%
1	.61
5	.03
10	.01
15	.006
20	.004
30	.003
40	.002
50	.002

Mechanical/Environmental Data

Endurance Cycling — More than 6,000 cycles at 100% of rating, or 10,000 mechanical cycles.

Humidity — Will meet requirements of MIL-STD-202, Method 106.

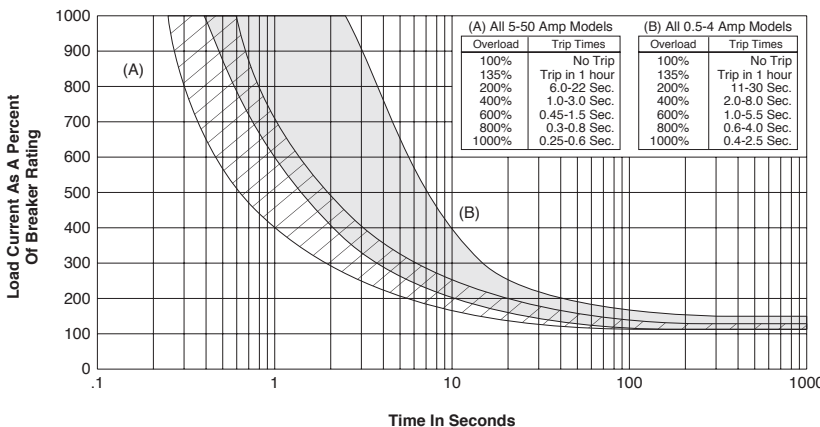
Salt Spray — Will meet requirements of MIL-STD-202, Method 101, Test Condition B.

Termination — Two #8-32 screw terminals.

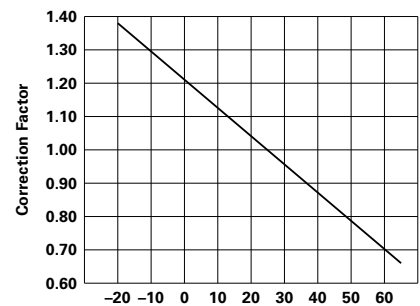
Mounting — W23 — Threaded bushing, 3/8 [9.53 mm] diameter. W31 — Threaded bushing, 15/32 [11.91 mm] diameter, with or without anti-rotation flats.

Weight — Less than 2 oz. [57g].

Time Vs. Current Trip Curve @ +25°C



Ambient Compensation Chart



Ambient Temperature In Degrees Centigrade (°C)

To use this chart: Read up from the ambient temperature to the curve, and across to find a correction factor. Multiply the breaker rating by the correction factor to determine the compensated rating. Calculate the overloads in terms of the compensated rating to use the published trip curve.

Toggle or Push/Pull Actuator Thermal Circuit Breaker (Continued)

Ordering Information

Typical Part Number: **W 23 — X 1 A 1 G — 5**

Designator
W = Circuit breaker

Series Number
23 = Single pole, push/pull

Circuit Function
X = Series trip

Button
1 = Black with white amp rate marking and white trip band

Mounting Bushing
A = 3/8 - 24 threaded bushing .375 [9.53] long, silver color

Amp Rating

0.5	3	7.5	20	35
1	4	10	25	40
2	5	15	30	50

Mounting Hardware
A = Knurled nut/hex nut installed
G = Two hex nuts/lockwasher installed
Z = No mounting hardware supplied

Terminals (See drawings for relative terminal positions):
1 = Screw terminals situated 90° to each other with #8-32 screws and washers installed
3 = Screw terminals situated parallel to each other pointing upward with #8-32 screws and washers installed

Stock Items - The following items are normally maintained in stock for immediate delivery.

W23-X1A1G-1	W23-X1A1G-7.50	W23-X1A1G-25	W23-X1A1G-50
W23-X1A1G-2	W23-X1A1G-10	W23-X1A1G-30	
W23-X1A1G-3	W23-X1A1G-15	W23-X1A1G-35	
W23-X1A1G-5	W23-X1A1G-20	W23-X1A1G-40	

Ordering Information

Typical Part Number: **W 31 — X 2 M 1 G — 5**

Designator
W = Circuit breaker

Series Number
31 = Single pole, toggle actuator

Circuit Function
X = Series trip

Mounting Bushing
1 = 15/32-32 threaded bushing .320 [8.13] long, round, silver color
2 = 15/32-32 threaded bushing .320 [8.13] long, double "D," silver color

Toggle
M = Silver color metal toggle, round, with amp rate marking on end

Amp Rating

0.5	3	7.5	20	35
1	4	10	25	40
2	5	15	30	50

Mounting Hardware
A = Knurled nut/hex nut installed
G = Two hex nuts/lockwasher installed
Z = No mounting hardware supplied

Terminals (See drawing for relative terminal positions):
1 = Screw terminals situated 90° to each other with #8-32 screws and washers installed
5 = Screw terminals situated parallel to each other pointing downward with #8-32 screws and washers installed

Stock Items - The following items are normally maintained in stock for immediate delivery.

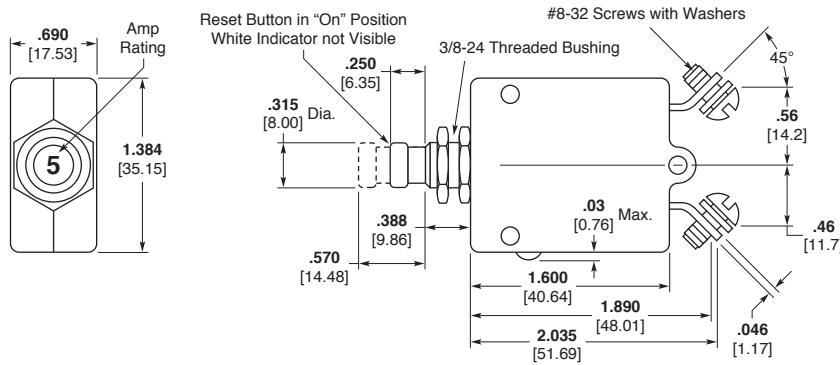
W31-X2M1G-1	W31-X2M1G-10	W31-X2M1G-35
W31-X2M1G-2	W31-X2M1G-15	W31-X2M1G-40
W31-X2M1G-3	W31-X2M1G-20	W31-X2M1G-50
W31-X2M1G-5	W31-X2M1G-25	
W31-X2M1G-7.50	W31-X2M1G-30	



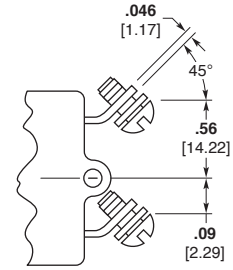
Toggle or Push/Pull Actuator Thermal Circuit Breaker (Continued)

W23 Outline Dimensions

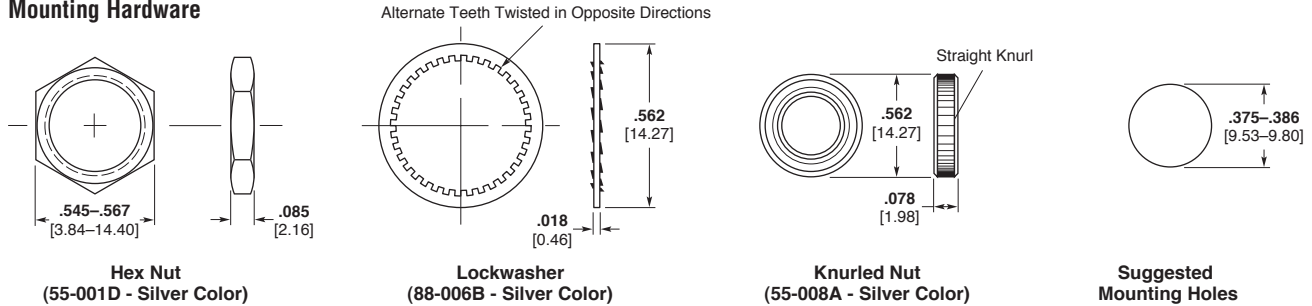
Terminal Style 1



Terminal Style 3

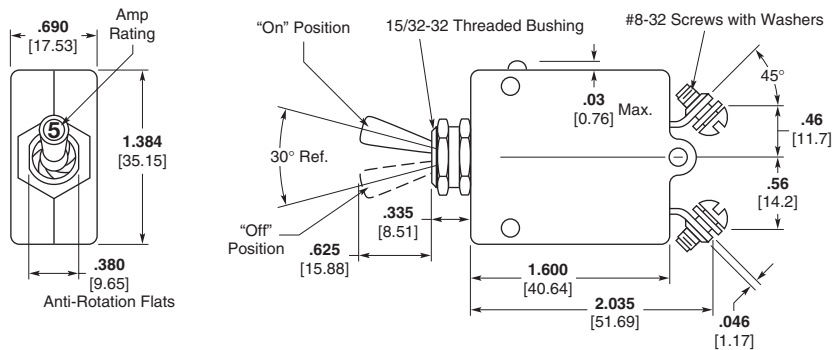


Mounting Hardware

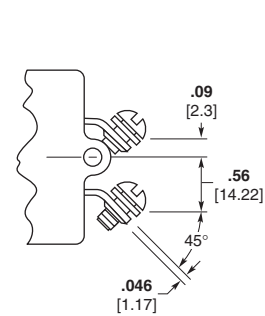


W31 Outline Dimensions

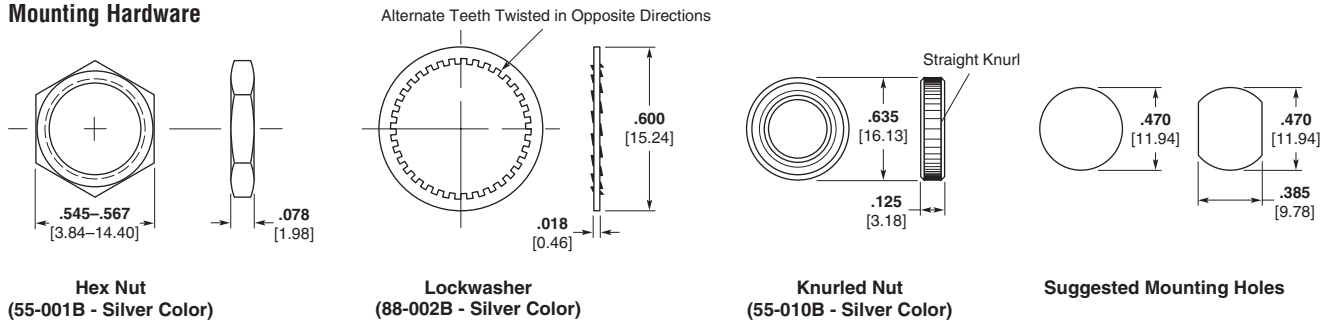
Terminal Style 1



Terminal Style 5






Mounting Hardware



Magnetic Hydraulic Circuit Breakers

Product Facts

- Designed for the international market
- Ratings to 50 amps
- Heavy duty #10-32 stud connections (W9)
- Optional 10 amp auxiliary switch
- Several delay curve options
- Trip free operation
- UL Recognized as Supplementary Protector under UL 1077, File E69543 
- CSA Accepted as a Supplementary Protector, File LR15734 
- VDE Approved to VDE 0642/EN 60 934 (Circuit Breakers for Equipment) License No. 73782 



Typical Resistance and Impedance

Current (Amps)	DC Resistance (Ohms)	50/60 Hz. Impedance (Ohms)
0.2	90	90
1.0	1.2	1.2
2.0	0.28	0.28
5.0	0.04	0.04
10.0	0.013	0.013
20.0	0.004	0.005
30.0	0.0027	0.002
40.0	0.002	0.002
50.0	0.0015	0.0015

Tolerance: 0.1 – 4.99 ± 15%; 5 – 9.99 ± 20%; 10 – 15 ± 25%; 16 – 30 ± 50%.

Specifications

Electrical Data

Auxiliary Switch — See Auxiliary Switch Ratings Table 2 for details.

Calibration — Breakers will hold 100% of rated current. Breakers may trip between 101% and 124% of rated load

(134% for AC/DC units). Breakers must trip at 125% of rated load and above (135% for AC/DC units).

Dielectric Strength — 50/60 or 400 Hz. — 1500V; DC — 1100V.

Insulation Resistance — 100 Megohms at 500 VDC.

Endurance — 10,000 on/off cycles — 6000 at rated load, 4000 at no load. Units tested at six cycles per minute, 1 second on and 9 seconds off at 25°C ambient.

Mechanical/Environmental Data

Operating Temperature — -40°F to +185°F [-40°C to +85°C].

Humidity — Meets requirements of MIL-STD-202 method 103.

Shock — Tested per MIL-STD-202, method 213, test condition C (100g @ 6 ms).

Vibration — Tested per MIL-STD-202, method 201, 10-55 Hz., 0.06 [1.52 mm] total excursion in 2 planes.

Fungus and Moisture Resistance — Special moisture resistant finish applied to all ferrous parts. Plastic parts are made of inherently fungus resistant material.

Marking — W6 units have ON and OFF molded on the rocker of rocker actuated units (rocker actuated VDE units have international "1" and "0"). W9 units have ON and OFF molded into the area at the base of the toggle. International "1" and "0" symbols are marked on the toggle for both W6 and W9.

Mounting — Panel mounted units are mounted with two #6-32 screws from the front of the panel. Metric models for use with M3 x 0.5 screws are available. To maintain published performance specifications, units should not be mounted more than 90° from their normal upright position.

Weight — Approximately 2.5 ounces per pole.

Approvals and Ratings Table 1

W6 Series	UL/CSA (All Circuit Functions)			
Maximum Voltage	Frequency (Hz)	Current Phase	Capacity (Amps)	Interrupting Rating (Amps)
65	DC	—	0.2-50	2,000
277	50/60	1	0.2-20	5,000
277	50/60	1	21-50	2,500
277/480	50/60	3Ø-Wye	0.2-20	5,000

W9 Series	UL/CSA (All Circuit Functions)			
Maximum Voltage	Frequency (Hz)	Current Phase	Capacity (Amps)	Interrupting Rating (Amps)
65	DC	—	0.2-50	2,000
277	50/60	1	0.2-50	5,000
277/480	50/60	3Ø-Wye	0.2-20	5,000

W6 Series	VDE (Circuit Function X)			
Maximum Voltage	Frequency (Hz)	Current Phase	Capacity (Amps)	Interrupting Rating (Amps)
65	DC	—	0.2-50	2,000
250	50/60	1	0.2-30	5,000
250	50/60	1	31-50	2,000
415/240	50/60	3Ø	0.2-30	5,000

W9 Series	VDE (Circuit Function X)			
Maximum Voltage	Frequency (Hz)	Current Phase	Capacity (Amps)	Interrupting Rating (Amps)
65	DC	—	0.2-50	2,000
250	50/60	1	0.2-30	5,000
250	50/60	1	31-50	2,000
415/240	50/60	3Ø	0.2-30	5,000

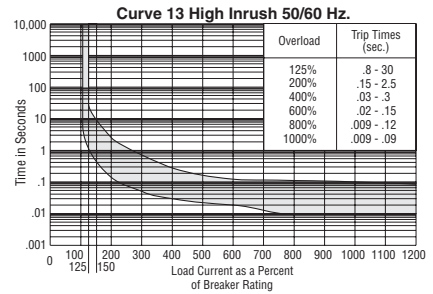
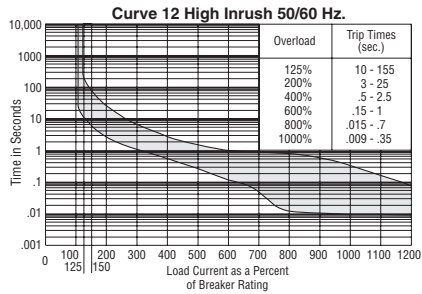
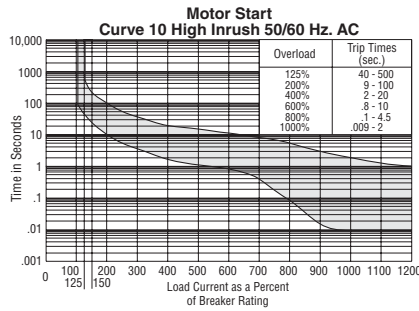
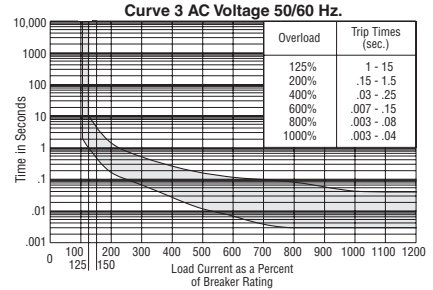
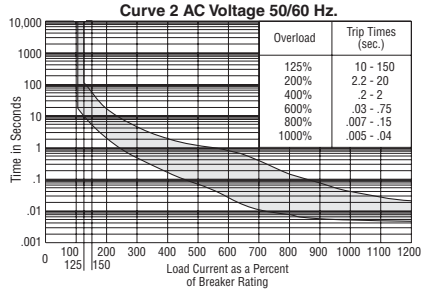
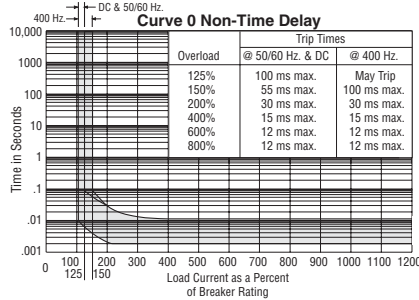
Approvals and Ratings Table 2

UL/CSA			
Switch Number	Voltage 50/60 Hz.	Current (Amps)	Terminals W x T x L
A	125	10	.093 x .020 x .250 2.36 x .51 x 6.40

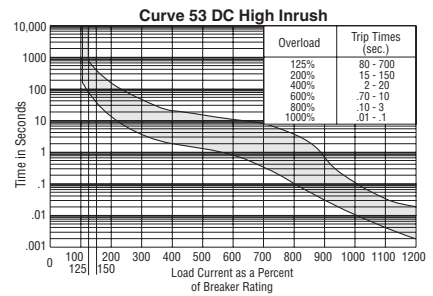
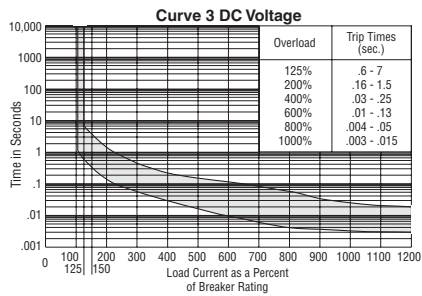
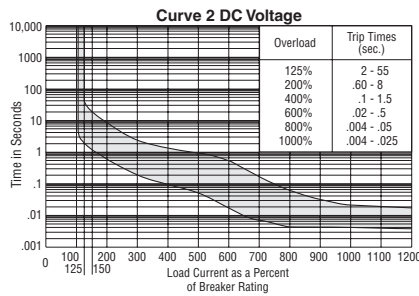
Magnetic Hydraulic Circuit Breakers (Continued)

Time vs. Current Trip Curves for W6 Series and W9 Series

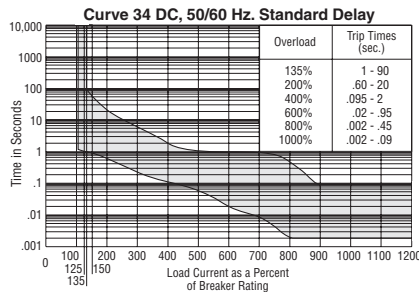
AC 50/60 Hz.



DC



AC/DC



Note: For instantaneous curves for all voltages refer to Curve 0 Non-Time Delay under the AC 50/60 Hz. heading.

Magnetic Hydraulic Circuit Breakers (Continued)

Pulse Tolerance Specifications

Pulse tolerance is defined as a single pulse of a half sine wave (1/2 cycle or 8 milliseconds) that will not trip the breaker. An inertia wheel

for increased pulse tolerance is available by specifying "P" after the time delay curve number in the ordering information. The table at right lists pulse tolerance values of standard and inertia delay models.

Voltage	Time Delay Curve	Pulse Tolerance Value	
		Standard	Inertia Delay
AC 50/60 Hz.	2	7.5	18
	3	6	18
	10	18	30
	12	18	30
	13	18	30

To determine pulse tolerance multiply breaker rating by value in table. For example, a 2A breaker with time delay curve 3 has a standard pulse tolerance of 12A (2A x 6). The same breaker with an inertia delay has a pulse tolerance of 36A (2A x 18).

Ordering Information — W6 Series

Typical Part Number: **W 67 — X 2 Q 1 2 — 20**

Circuit Breaker Mounting

W = #6-32 mounting threads
M = M3.0 x 0.5 mounting threads

Number of Poles

67 = Single pole 68 = Two pole 69 = Three pole 70 = Four pole

Circuit Function (Only X is VDE approved)

A = Series trip with auxiliary switch (.093" QC) X = Series trip

Actuator (One actuator per pole)

1 = Black toggle 3 = Black rocker 5 = Red rocker 9 = Red toggle
2 = White toggle 4 = White rocker 6 = Grey rocker

Termination

Q = .250" QC (DIN 46 244) 25A Max. VDE S = #8-32 screw T = #10-32 screw
Note: "T" termination must be used for all ratings of 31 amps or above.

VDE Approval

Blank = UL/CSA approved breaker
V = VDE approved breaker without auxiliary switch

Amp Rating (Consult Tyco Electronics for other values)

0.20	0.75	2.0	3.5	6.0	8.0	11.0	20.0	35.0	50.0
0.25	1.0	2.5	4.0	7.0	9.0	12.0	25.0	40.0	
0.50	1.5	3.0	5.0	7.5	10.0	15.0	30.0	45.0	

Time Delay Curve

0 = Instantaneous 10 = AC high inrush (Motor start)
2 = Standard delay 12 = AC high inrush version of #2
3 = Short delay 13 = AC high inrush version of #3
53 = DC high inrush 34 = Combination AC/DC standard delay
Notes: Curves may be specified with increased pulse tolerance for 1/2 cycle by adding "P" after curve. See delay curve section for availability and details.

Maximum Line Voltage (See Table 1 for current ranges)

UL/CSA Types	Voltage	VDE Types	Voltage
1 = 277 VAC	50/60 Hz	1 = 250 VAC	415/240 VAC
2 = 277/480		5 = 65 VDC	
5 = 65 VDC		7 = AC/DC 250 VAC	415/240 VAC,
7 = AC/DC 277 VAC or 65 VDC		65 VDC (Delay curve 34 must be specified)	

Stock Items - We recommend that our authorized distributors stock the following items for immediate delivery.

W67-A2Q12-5	W67-X2Q12-5	W67-X2Q13-1	W67-X2Q13-25	W67-X2Q52-15	W68-X2Q12-5	W68-X2Q12-30	W69-X2Q12-15
W67-A2Q12-10	W67-X2Q12-7	W67-X2Q13-2	W67-X2Q13-30	W67-X2Q52-20	W68-X2Q12-7	W68-X2Q13-15	W69-X2Q12-20
W67-X2Q10-3	W67-X2Q12-10	W67-X2Q13-3	W67-X2Q50-5	W67-X2Q52-30	W68-X2Q12-10	W68-X2Q110-10	W69-X2Q12-25
W67-X2Q10-5	W67-X2Q12-15	W67-X2Q13-10	W67-X2Q50-10	W67-X2Q110-15	W68-X2Q12-15	W68-X2Q110-20	W69-X2Q12-30
W67-X2Q12-2	W67-X2Q12-20	W67-X2Q13-15	W67-X2Q52-5	W67-X2Q110-20	W68-X2Q12-20	W69-X2Q12-5	W69-X2Q110-20
W67-X2Q12-3	W67-X2Q12-30	W67-X2Q13-20	W67-X2Q52-10	W68-X2Q12-3	W68-X2Q12-25	W69-X2Q12-10	W69-X2Q110-30

Ordering Information — W9 Series

Typical Part Number: **W 91 — X 1 1 2 — 20**

Circuit Breaker Mounting

W = #6-32 mounting threads
M = M3.0 x 0.5 mounting threads

Number of Poles

91 = Single pole 92 = Two pole 93 = Three pole 94 = Four pole

Circuit Function (Only X is VDE approved)

A = Series trip with auxiliary switch (.093" QC) X = Series trip

Actuator (One actuator per pole)

1 = Black toggle 2 = White toggle

Maximum Line Voltage (See Table 1 for current ranges)

UL/CSA Types	Voltage	VDE Types	Voltage
1 = 227 VAC	50/60 Hz	1 = 250 VAC	415/240 VAC
2 = 277/480		5 = 65 VDC	
5 = 65 VDC		7 = AC/DC 250 VAC	415/240 VAC,
7 = AC/DC 277 VAC or 65 VDC		65 VDC (Delay curve 34 must be specified)	

VDE Approval

Blank = UL/CSA approved breaker
V = VDE approved breaker without auxiliary switch

Amp Rating (Consult Tyco Electronics for other values)

0.20	0.75	2.0	3.5	6.0	8.0	11.0	20.0	35.0	50.0
0.25	1.0	2.5	4.0	7.0	9.0	12.0	25.0	40.0	
0.50	1.5	3.0	5.0	7.5	10.0	15.0	30.0	45.0	

Time Delay Curve

0 = Instantaneous 10 = AC high inrush (Motor start)
2 = Standard delay 12 = AC high inrush version of #2
3 = Short delay 13 = AC high inrush version of #3
53 = DC high inrush 34 = Combination AC/DC standard delay
Notes: Curves may be specified with increased pulse tolerance for 1/2 cycle by adding "P" after curve. See delay curve section for availability and details.

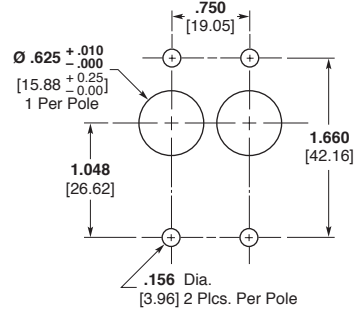
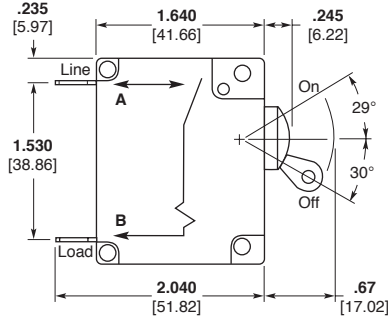
Stock Items - We recommend that our authorized distributors stock the following items for immediate delivery.

W91-X112-1	W91-X112-15	W91-X113-15	W91-X152-40	W92-X112-5	W92-X112-30	W92-X1110-30	W93-X112-30
W91-X112-2	W91-X112-20	W91-X150-5	W91-X152-50	W92-X112-7	W92-X112-40	W93-X112-5	W93-X112-40
W91-X112-3	W91-X112-40	W91-X152-10	W91-X1110-20	W92-X112-10	W92-X112-50	W93-X112-10	W93-X112-50
W91-X112-5	W91-X112-50	W91-X152-15	W92-X112-1	W92-X112-15	W92-X113-15	W93-X112-15	W93-X1110-20
W91-X112-7	W91-X113-5	W91-X152-20	W92-X112-2	W92-X112-20	W92-X113-20	W93-X112-20	W93-X1110-30
W91-X112-10	W91-X113-10	W91-X152-30	W92-X112-3	W92-X112-25	W92-X1110-20	W93-X112-25	

Magnetic Hydraulic Circuit Breakers (Continued)

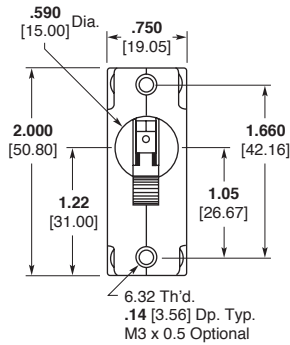
Outline Dimensions — Toggle Actuator Models

W6 Series

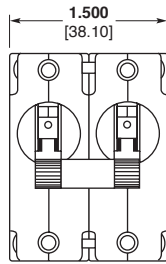


Panel Mounting Cutout

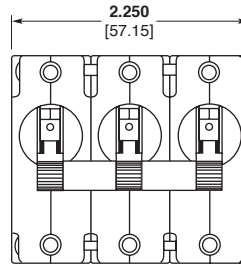
W6 Series



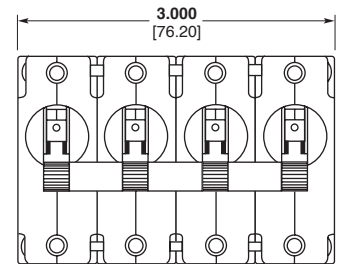
1 Pole



2 Pole



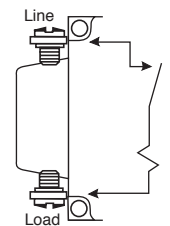
3 pole



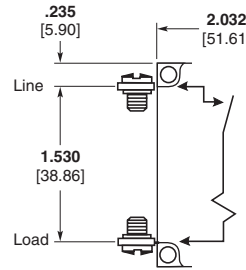
4 Pole

Note:

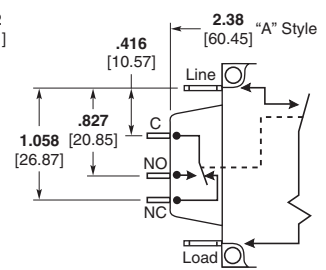
Multi-pole models furnished with separate handle tie hardware.



VDE Models W/Screw Terminals



UL/CSA Models W/Screw Terminals



UL/CSA/VDE Models W/Aux. Switch

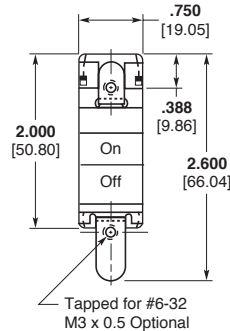
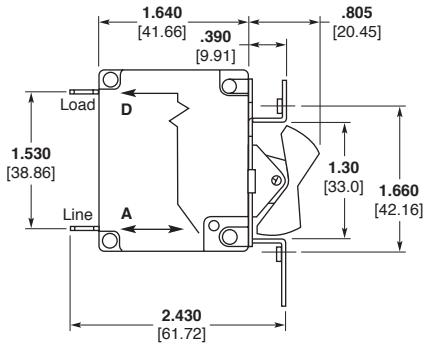
Notes:

1. Terminal protrusion dimensions are referenced from back of mounting panel.
2. Main terminals are male quick connect type .250 [6.35] wide x .031 [.79] thick x .377 [9.58] long. Optional 8-32 x .250 [6.35] or 10-32 x .250 [6.35] screw type.
3. Panel mounting cutout detail mtg. detail tol.: ±.005 [.13] unless noted. Add additional cutouts to correspond to number of poles. Outline drawing tolerance ± .015 [.38] unless noted.

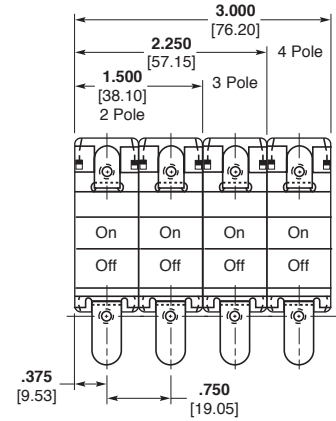
Magnetic Hydraulic Circuit Breakers (Continued)

**Outline Dimensions —
Rocker Actuator Models**

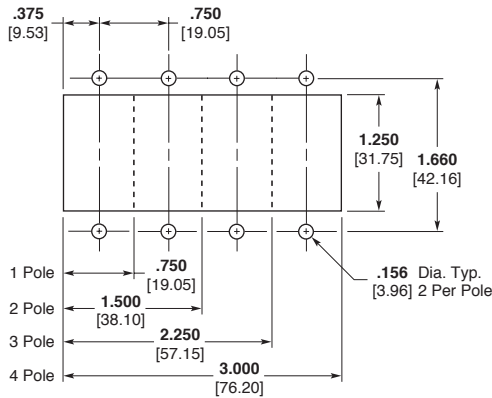
W6 Series



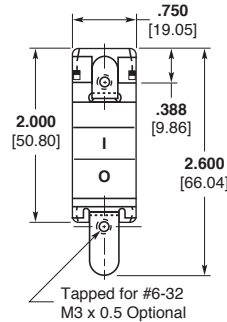
1 Pole



2, 3 & 4 Pole



Panel Mounting Cutout



VDE Rocker Marking

Notes:

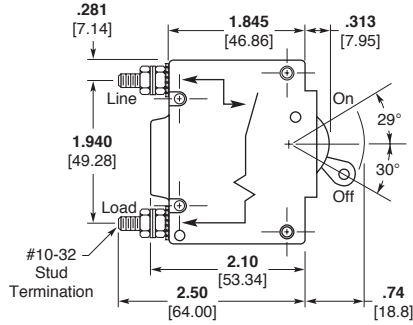
1. Outline drawing tolerance $\pm .015$ [0.38] unless noted.
2. Mounting Detail Tol.: $\pm .005$ [0.13] unless noted.



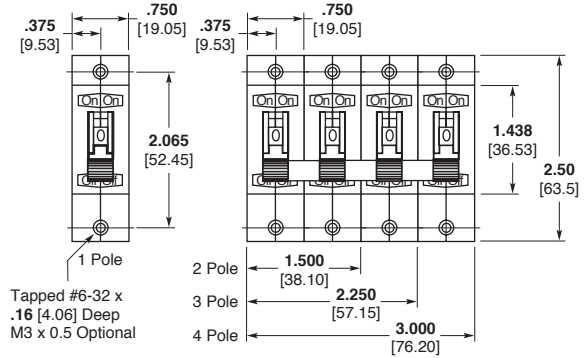
Magnetic Hydraulic Circuit Breakers (Continued)

Outline Dimensions

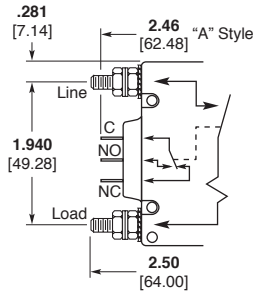
W9 Series



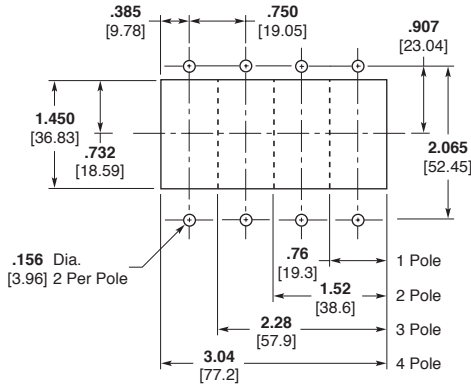
Series Trip Model



Series Trip Model



**Series Trip Model
With Common Enclosed
Auxiliary Switch**



Panel Mounting Cutout Detail

Notes:

1. Terminal protrusion dimensions are referenced from the back of the mounting panel.
2. Mounting detail tolerance $\pm .005$ [0.13] unless noted.
3. Outline drawing tolerance $\pm .015$ [0.38] unless noted.

High Performance Signal Level Relays

T0-5 Relays

- Hermetically Sealed
- Standard or Sensitive Coils
- Optional Diodes/Transistors



Sensitive Version



Standard Version



Standard Version

- Standard Coil
- Sensitive Coil
- Diode Version
- Dual Diode Version
- Transistor Version
- Long Life Version
- Spreader Pads
- RF Performance (GHz)

P/N Series	Contact Form	Contact Rating	Coil Voltage	Temperature Rating	Vibration	Shock	Mil-Spec	Features/Options																							
HM	2 Form C	Up to 1A	5 to 30 Vdc	-55° to +85°C	10 G's	30 G's	Commercial	●									●	1													
HMD	2 Form C	Up to 1A	5 to 30 Vdc	-55° to +85°C	10 G's	30 G's	Commercial	●										●	1												
HS	2 Form C	Up to 1A	5 to 48 Vdc	-55° to +85°C	10 G's	30 G's	Commercial		●										●	1											
HSD	2 Form C	Up to 1A	5 to 48 Vdc	-55° to +85°C	10 G's	30 G's	Commercial		●	●										●	1										
MA	2 Form C	Up to 1A	5 to 30 Vdc	-65° to +125°C	30 G's	75 G's	M39016/9	●												●	1.5										
1MA	1 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	75 G's	M39016/7	●													●	1.5									
MAD	2 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	75 G's	M39016/15	●		●												●	1.5								
1MAD	1 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	75 G's	M39016/23	●		●													●	1.5							
MADD	2 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	75 G's	M39016/20	●			●													●	1.5						
1MADD	1 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	75 G's	M39016/24	●				●													●	1.5					
MAT	2 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	75 G's	M28776/1	●																	●	1.5					
1MAT	1 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	75 G's	M28776/5	●																		●	1.5				
MAV	2 Form C	Up to 1A	5 to 30 Vdc	-65° to +125°C	380 G's	150 G's	M39016/9 Design	●																			●				
MAVD	2 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	380 G's	150 G's	M39016/15 Design	●		●																		●			
MAVDD	2 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	380 G's	150 G's	M39016/20 Design	●			●																	●			
MS	2 Form C	Up to 1A	5 to 48 Vdc	-65° to +125°C	30 G's	75 G's	M39016/11		●																			●	1.5		
1MS	1 Form C	Up to 1A	5 to 40 Vdc	-65° to +125°C	30 G's	75 G's	M39016/10		●																				●	1.5	
MSD	2 Form C	Up to 1A	5 to 48 Vdc	-65° to +125°C	30 G's	75 G's	M39016/16		●	●																			●	1.5	
1MSD	1 Form C	Up to 1A	5 to 40 Vdc	-65° to +125°C	30 G's	75 G's	M39016/25		●	●																			●	1.5	
MSDD	2 Form C	Up to 1A	5 to 48 Vdc	-65° to +125°C	30 G's	75 G's	M39016/21		●		●																		●	1.5	
1MSDD	1 Form C	Up to 1A	5 to 40 Vdc	-65° to +125°C	30 G's	75 G's	M39016/26		●			●																	●	1.5	
MST	2 Form C	Up to 1A	5 to 48 Vdc	-65° to +125°C	30 G's	75 G's	M28776/3		●																				●	1.5	
1MST	1 Form C	Up to 1A	5 to 40 Vdc	-65° to +125°C	30 G's	75 G's	M28776/4		●																				●	1.5	
MSV	2 Form C	Up to 1A	5 to 48 Vdc	-65° to +125°C	380 G's	150 G's	M39016/11 Design		●																				●		
MSVD	2 Form C	Up to 1A	5 to 48 Vdc	-65° to +125°C	380 G's	150 G's	M39016/16 Design		●	●																			●		
MSVDD	2 Form C	Up to 1A	5 to 48 Vdc	-65° to +125°C	380 G's	150 G's	M39016/21 Design		●		●																		●		
PRMA	2 Form C	Up to 1A	5 to 30 Vdc	-65° to +125°C	30 G's	75 G's	COTS Version*	●																					●	1.5	
PR1MA	1 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	75 G's	COTS Version*	●																					●	1.5	
PRMAD	2 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	75 G's	COTS Version*	●		●																				●	1.5
PR1MAD	1 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	75 G's	COTS Version*	●		●																				●	1.5
PRMADD	2 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	75 G's	COTS Version*	●			●																			●	1.5
PR1MADD	1 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	75 G's	COTS Version*	●				●																		●	1.5
PRMAT	2 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	75 G's	COTS Version*	●																						●	1.5
PR1MAT	1 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	75 G's	COTS Version*	●																						●	1.5
PRMS	2 Form C	Up to 1A	5 to 48 Vdc	-65° to +125°C	30 G's	75 G's	COTS Version*		●																					●	1.5
PR1MS	1 Form C	Up to 1A	5 to 40 Vdc	-65° to +125°C	30 G's	75 G's	COTS Version*		●																					●	1.5
PRMSD	2 Form C	Up to 1A	5 to 48 Vdc	-65° to +125°C	30 G's	75 G's	COTS Version*		●	●																				●	1.5
PR1MSD	1 Form C	Up to 1A	5 to 40 Vdc	-65° to +125°C	30 G's	75 G's	COTS Version*		●	●																				●	1.5
PRMSDD	2 Form C	Up to 1A	5 to 48 Vdc	-65° to +125°C	30 G's	75 G's	COTS Version*		●		●																			●	1.5
PR1MSDD	1 Form C	Up to 1A	5 to 40 Vdc	-65° to +125°C	30 G's	75 G's	COTS Version*		●			●																		●	1.5
PRMST	2 Form C	Up to 1A	5 to 48 Vdc	-65° to +125°C	30 G's	75 G's	COTS Version*		●																					●	1.5
PR1MST	1 Form C	Up to 1A	5 to 40 Vdc	-65° to +125°C	30 G's	75 G's	COTS Version*		●																					●	1.5

* Commercial-Off-The-Shelf

High Performance Signal Level Relays (Continued)

.100 Grid Relays

- Hermetically Sealed
- Standard or Sensitive Coils
- Optional Diodes/MOSFETs



Sensitive Version



MOSFET Version



Surface Mount Version

P/N Series	Contact Form	Contact Rating	Coil Voltage	Temperature Rating	Vibration	Shock	Mil-Spec	Features/Options							
								Standard Coil	Sensitive Coil	Diode Version	Dual Diode Version	MOSFET Version	Surface Mount Version	Mounting Pads	RF Performance (GHz)
HC	2 Form C	Up to 1A	5 to 26.5 Vdc	-55° to +85°C	10 G's	30 G's	Commercial	●						●	1
HCD	2 Form C	Up to 1A	5 to 26.5 Vdc	-55° to +85°C	10 G's	30 G's	Commercial	●	●					●	1
HCS	2 Form C	Up to 1A	5 to 48 Vdc	-55° to +85°C	10 G's	30 G's	Commercial		●					●	1
HCS D	2 Form C	Up to 1A	5 to 48 Vdc	-55° to +85°C	10 G's	30 G's	Commercial		●	●				●	1
SHC	2 Form C	Up to 1A	5 to 26.5 Vdc	-55° to +85°C	10 G's	30 G's	Commercial	●						●	1
SHCD	2 Form C	Up to 1A	5 to 26.5 Vdc	-55° to +85°C	10 G's	30 G's	Commercial	●	●					●	1
SHCS	2 Form C	Up to 1A	5 to 48 Vdc	-55° to +85°C	10 G's	30 G's	Commercial		●					●	1
SHCS D	2 Form C	Up to 1A	5 to 48 Vdc	-55° to +85°C	10 G's	30 G's	Commercial		●	●				●	1
MGA	2 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	75 G's	M39016/17	●						●	1.5
MGAD	2 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	75 G's	M39016/18	●	●					●	1.5
MGADD	2 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	75 G's	M39016/19	●		●				●	1.5
MGAT	2 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	75 G's	M28776/6	●				●		●	1.5
SMGA	2 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	75 G's	M39016/17 Design	●						●	1.5
SMGAD	2 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	75 G's	M39016/18 Design	●	●					●	1.5
SMGADD	2 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	75 G's	M39016/19 Design	●		●				●	1.5
MGS	2 Form C	Up to 1A	5 to 48 Vdc	-65° to +125°C	30 G's	75 G's	M39016/41		●					●	1.5
MGSD	2 Form C	Up to 1A	5 to 48 Vdc	-65° to +125°C	30 G's	75 G's	M39016/42		●	●				●	1.5
MGSD D	2 Form C	Up to 1A	5 to 48 Vdc	-65° to +125°C	30 G's	75 G's	M39016/43		●		●			●	1.5
MGST	2 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	75 G's	M28776/7		●			●		●	1.5
SMGS	2 Form C	Up to 1A	5 to 48 Vdc	-65° to +125°C	30 G's	75 G's	M39016/41 Design		●					●	1.5
SMGSD	2 Form C	Up to 1A	5 to 48 Vdc	-65° to +125°C	30 G's	75 G's	M39016/42 Design		●	●				●	1.5
SMGSD D	2 Form C	Up to 1A	5 to 48 Vdc	-65° to +125°C	30 G's	75 G's	M39016/43 Design		●		●			●	1.5
PRMGA	2 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	75 G's	COTS Version*	●						●	1.5
PRMGAD	2 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	75 G's	COTS Version*	●	●					●	1.5
PRMGADD	2 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	75 G's	COTS Version*	●		●				●	1.5
PRMGAT	2 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	75 G's	COTS Version*	●				●		●	1.5
PRMGS	2 Form C	Up to 1A	5 to 48 Vdc	-65° to +125°C	30 G's	75 G's	COTS Version*		●					●	1.5
PRMGSD	2 Form C	Up to 1A	5 to 48 Vdc	-65° to +125°C	30 G's	75 G's	COTS Version*		●	●				●	1.5
PRMGSD D	2 Form C	Up to 1A	5 to 48 Vdc	-65° to +125°C	30 G's	75 G's	COTS Version*		●		●			●	1.5
PRMGST	2 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	75 G's	COTS Version*		●		●			●	1.5

* Commercial-Off-The-Shelf

High Frequency Relays

- Hermetically Sealed
- Standard or Sensitive Coils
- Standard or High Performance Versions
- Excellent RF Performance



Standard T0-5 Package



Sensitive Grid Package

P/N Series	Contact Form	Contact Rating	Coil Voltage	Temperature Rating	Vibration	Shock	Mil-Spec	Features/Options							
								Standard Coil	Sensitive Coil	Ground Pins	T0-5 Package	Grid Package	RF Performance (GHz)		
MW3	2 Form C	Up to 1A	5 to 26.5 Vdc	-55° to +85°C	10 G's	30 G's	Commercial	●	●	●			●	3	
MW3S	2 Form C	Up to 1A	5 to 26.5 Vdc	-55° to +85°C	10 G's	30 G's	Commercial		●	●	●			●	3
MW4	2 Form C	Up to 1A	5 to 26.5 Vdc	-55° to +85°C	10 G's	30 G's	Commercial	●						●	4
MW4S	2 Form C	Up to 1A	5 to 26.5 Vdc	-55° to +85°C	10 G's	30 G's	Commercial		●					●	4
MW6	2 Form C	Up to 1A	5 to 26.5 Vdc	-55° to +85°C	10 G's	30 G's	Commercial	●						●	6
MW6S	2 Form C	Up to 1A	5 to 26.5 Vdc	-55° to +85°C	10 G's	30 G's	Commercial		●					●	6
MW3HP	2 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	100 G's	Commercial	●		●	●			●	3
MW3HPS	2 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	100 G's	Commercial		●	●	●			●	3
MW4HP	2 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	100 G's	Commercial	●						●	4
MW4HPS	2 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	100 G's	Commercial		●					●	4
MW6	2 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	100 G's	Commercial	●						●	6
MW6HPS	2 Form C	Up to 1A	5 to 26.5 Vdc	-65° to +125°C	30 G's	100 G's	Commercial		●					●	6

RF Performance Excellence - MW series high frequency relays are designed to provide excellent insertion loss repeatability over the frequency range from DC to 6 GHz. Exceptional isolation performance makes the MW series relays the logical choices for high performance RF applications.

High Performance Subminiature Relays

1/5 Size Relays

- Hermetically Sealed
- Optional Terminals
- Optional Mounting Styles



P/N Series	Contact Form	Contact Rating	Coil Voltage	Temperature Rating	Vibration	Shock	Mil-Spec	Features/Options
3SBC	2 Form C	Up to 2A	5 to 36 Vdc	-65° to +125°C	30 G's	100 G's	M39016/13, 37, 38	Standard Coil, Grid Version, Latching Design, Low Profile, Optional Diode, Optional Dual Diode, Long Life Version, Excellent RF Switching
3SBH	4 Form C	Up to 2A	6 to 36 Vdc	-65° to +125°C	30 G's	100 G's	M39016/14, 53, 54	
3SBM	4 Form C	Up to 2A	6 to 26.5 Vdc	-65° to +125°C	30 G's	150 G's	M39016/31, 35, 36	
3SCC	2 Form C	Up to 2A	5 to 36 Vdc	-40° to +125°C	30 G's	100 G's	Commercial	
3SDH	4 Form C	Up to 2A	6 to 36 Vdc	-40° to +125°C	30 G's	100 G's	Commercial	

Half Size Relays

- Hermetically Sealed
- Optional Terminals
- Optional Mounting Styles



P/N Series	Contact Form	Contact Rating	Coil Voltage	Temperature Rating	Vibration	Shock	Mil-Spec	Features/Options
C	1 Form C	Up to 10A	6 to 26.5 Vdc	-65° to +125°C	20 G's	100 G's	M39016 Design	Standard Coil, Bifilar Coil, Sensitive Coil, Latching Design, Optional Diode, Long Life Version, Coaxial Cables, Excellent RF Switching
HFC	2 Form C	Up to 2A	5 to 26.5 Vdc	-55° to +85°C	10 G's	30 G's	Commercial	
HFC4A	2 Form C	Up to 4A	5 to 26.5 Vdc	-55° to +85°C	10 G's	30 G's	Commercial	
HFC5A	2 Form C	Up to 5A	5 to 26.5 Vdc	-55° to +85°C	10 G's	30 G's	Commercial	
HFV	2 Form C	Up to 2A	5 to 48 Vdc	-65° to +125°C	30 G's	100 G's	M39016/6	
HFV4A	2 Form C	Up to 4A	5 to 48 Vdc	-65° to +125°C	30 G's	100 G's	M39016/6 Design	
HFV5A	2 Form C	Up to 5A	5 to 26.5 Vdc	-65° to +125°C	30 G's	100 G's	M39016/6 Design	
HMB	2 Form C	Up to 2A	6 to 26.5 Vdc	-65° to +125°C	30 G's	100 G's	M39016/22	
HMS	2 Form C	Up to 2A	5 to 36 Vdc	-65° to +125°C	20 G's	100 G's	M39016/44	
LR	4 Form C	Up to 2A	5 to 48 Vdc	-65° to +125°C	30 G's	100 G's	M39016 Design	
LS	2 Form C	Up to 2A	5 to 48 Vdc	-65° to +125°C	30 G's	100 G's	Commercial	
RFK	1 or 2 Form C	Up to 2A	6 to 26.5 Vdc	-65° to +85°C	20 G's	100 G's	Commercial	
SR	4 Form C	Up to 2A	6 to 26.5 Vdc	-65° to +125°C	20 G's	100 G's	M39016/40	
SS	6 Form C	Up to 2A	6 to 26.5 Vdc	-65° to +125°C	20 G's	100 G's	M39016 Design	



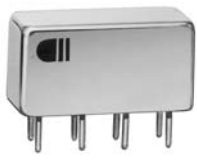
Full Size Relays

- Hermetically Sealed
- Optional Terminals
- Optional Mounting Styles








P/N Series	Contact Form	Contact Rating	Coil Voltage	Temperature Rating	Vibration	Shock	Mil-Spec	Features/Options
02	2 Form C	Up to 2A	6 to 26.5 Vdc	-65° to +125°C	20 G's	100 G's	M5757/8	Standard Coil, Bifilar Coil, Special Wiring Available, Latching Design, Optional Diode, Multi-pole Configurations, Coaxial Cables, Excellent RF Switching
07	2 Form C	Up to 10A	6-120 Vdc, 115 Vac	-65° to +125°C	30 G's	100 G's	M5757/23**	
3SAM	2 Form C	Up to 2A	6 to 24 Vdc	-65° to +125°C	30 G's	150 G's	M39016/32	
3SDM	2 Form C	Up to 2A	6 to 24 Vdc	-65° to +125°C	30 G's	150 G's	M39016 Design	
FW	2 Form C	Up to 3A	6.3 to 110 Vdc	-65° to +125°C	20 G's	100 G's	M5757/10	
FW5A	2 Form C	Up to 5A	6.3 to 110 Vdc	-65° to +125°C	20 G's	100 G's	M5757/10 Design	
RD4	4 Form C	Up to 2A	6 to 26.5 Vdc	-65° to +125°C	20 G's	100 G's	M5757/7	
RD6	6 Form C	Up to 2A	6 to 26.5 Vdc	-65° to +125°C	20 G's	100 G's	M5757/1	
RFB	1 or 2 Form C	Up to 2A	6 to 26.5 Vdc	-65° to +85°C	20 G's	100 G's	M5757 Design	
SF	2 Form C	Up to 2A	1.8 to 40 Vdc	-65° to +125°C	15 G's	100 G's	M5757/13 Design	
SF5A	2 Form C	Up to 5A	1.8 to 40 Vdc	-65° to +125°C	15 G's	100 G's	M5757/13 Design	

High Reliability Space Relays

Products	Services	Features
<p>Half Size Non-Latching 1, 2, 4, 6 Form C configurations, low level to 10 amps switching</p> <p>Half Size Latching 2 and 4 Form C configurations, low level to 2 amps switching</p> <p>1/5 Size Non-Latching 2 and 4 Form C configurations, low level to 2 amps switching</p> <p>1/5 Size Latching 4 Form C, low level to 2 amps switching</p> <p>T0-5/.100 Grid 2 Form C, round and square outlines, low level to 1 amp switching</p> 	<p>CII Hi-Rel products from Tyco Electronics are extensively tested to assure that your reliability standards and requirements are met or exceeded. Our services include:</p> <ul style="list-style-type: none"> • Precision cleaning • Small particle inspection • Particle impact noise detection • Serialized test data • High shock testing • Test profiles can be tailored to individual customer requirements.  	<ul style="list-style-type: none"> • High shock ratings • High vibration ratings • Latching versions • Class 100 cleanroom • Welded assemblies <p>Applications</p> <ul style="list-style-type: none"> • Space satellites (telecommunications) • Weather tracking • Surveillance • Infrared observation instrumentation • Missile systems • Torpedo guidance circuits

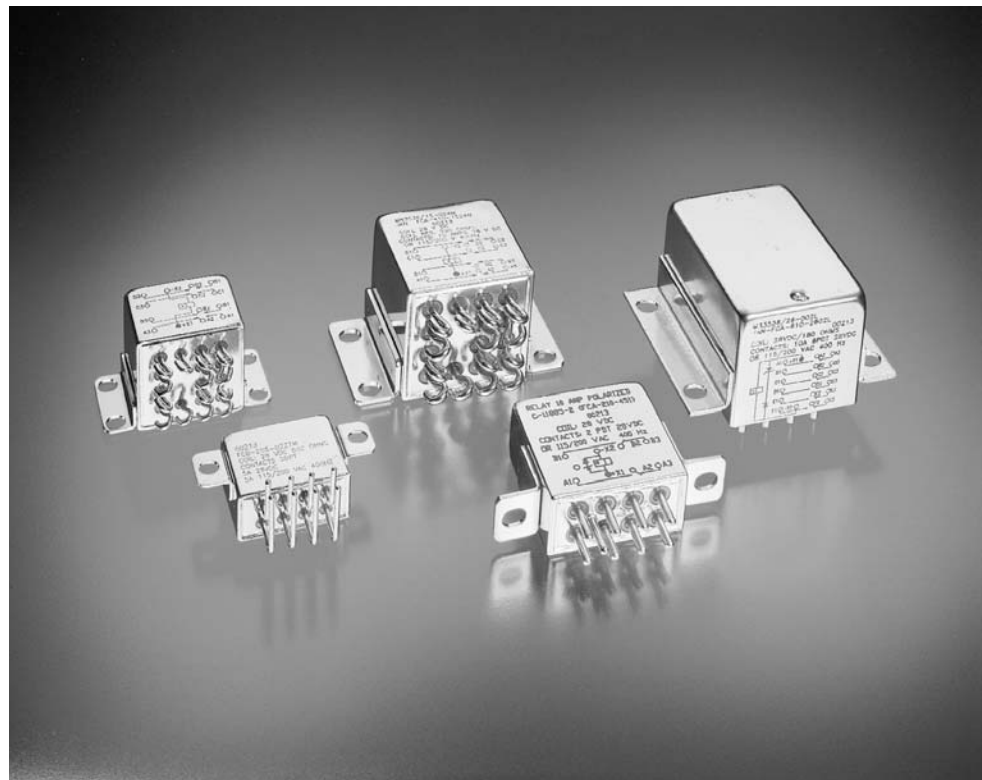
CII — High Performance Solid State Relays

DS11 Series	DS13 Series	JDS9-1Y	JPS10 Series	PS12-1Y
 <p>COTS Version Available</p>	 <p>COTS Version Available</p>	 <p>COTS Version Available</p>	 <p>COTS Version Available</p>	 <p>COTS Version Available</p>
DESC 88062 Qualified	DESC 90091 Qualified	M28750/9 Qualified	M28750/10 Qualified	DESC 86031 Qualified
60 Vdc Output Voltage	60 Vdc Output Voltage	250 Vrms Output Voltage	250 Vrms Output Voltage	250 Vrms Output Voltage
2 Adc Output Current	2 Adc Output Current	2 Arms Output Current	25 Arms Output Current	10 Arms Output Current
<ul style="list-style-type: none"> • Hermetically sealed DIP package • Thick film hybrid construction • Optically isolated • Low on-resistance (MOSFET output) • Optional switch status, short circuit protection, trip status 	<ul style="list-style-type: none"> • Hermetically sealed DIP package • Thick film hybrid construction • Optically isolated • Low on-resistance (MOSFET output) • Optional switch status, short circuit protection, trip status 	<ul style="list-style-type: none"> • Hermetically sealed DIP package • Thick film hybrid construction • Optically isolated • Zero voltage turn-on • High transient immunity • 3.8-32 Vdc current regulated input 	<ul style="list-style-type: none"> • Rugged encapsulated module • Optically isolated • Zero voltage turn-on • High transient immunity • 3.8-32 Vdc current regulated input 	<ul style="list-style-type: none"> • Rugged encapsulated module • Optically isolated • Zero voltage turn-on • High transient immunity • 3.8-32 Vdc current regulated input

FCA/FCB Family Mid-Range Relays

Product Facts

- 5-25 Amp contacts
- 1-6 Form C (SPDT - 6PDT)
- Hermetically sealed
- All welded construction
- Standard size (FCA) and miniature (FCB) models
- Balanced force
- Permanent magnet drive
- Various mounting and termination options
- AC and DC coils
- Suppression available
- QPL approved versions
- Complements our growing line of relays for military / aerospace applications
 - CII signal-level and solid state relays
 - HARTMAN power relays, contactors, sensors and panels
 - KILOVAC contactors and high voltage relays
 - WILMAR protective relays



Overview of Specifications

Series	FCA-125	FCB-205	FCA-210	FCA-212
Applicable Mil-Spec*	M6106/19	M83536/1 & 2	M83536/9 & 10	—
Max. Contact Rating	25 Amps	5 Amps	10 Amps	12 Amps
Contact Form	SPDT	DPDT	DPDT	DPDT
Case Dimensions † L x W x H	1.025 x .525 x 1.125 ‡ (26.04 x 13.34 x 31.91)	.810 x .410 x .640 (20.57 x 10.41 x 16.26)	1.025 x .525 x 1.125 ‡ (26.04 x 13.34 x 31.91)	1.025 x .525 x 1.125 ‡ (26.04 x 13.34 x 31.91)
Weight	1.6 oz. (45.4 grams)	.54 oz. (15.4 grams)	1.6 oz. (45.4 grams)	1.6 oz. (45.4 grams)
Temperature Range	-70°C to +125°C	-70°C to +125°C	-70°C to +125°C	-70°C to +125°C
Shock §	200G, 6 ms	200G, 6 ms	200G, 6 ms	200G, 6 ms
Vibration, Sinusoidal §	30G, 33-3000 hz	30G, 70-3000 hz	30G, 33-3000 hz	30G, 33-3000 hz
Altitude	300,000 ft	300,000 ft	300,000 ft	300,000 ft

Series	FCB-310	FCA-325	FCB-405	FCA-410	FCA-610
Applicable Mil-Spec*	—	M83536/32 & 33	M83536/5 & 6	M83536/15 & 16	M83536/25 & 26
Max. Contact Rating	10 Amps	25 Amps	5 Amps	10 Amps	10 Amps
Contact Form	3PDT	3PDT	4PDT	4PDT	6PDT
Case Dimensions † L x W x H	.810 x .810 x .640 (20.57 x 20.57 x 16.26)	1.015 x 1.015 x 1.00 (25.79 x 25.79 x 25.4)	.810 x .810 x .640 (20.57 x 20.57 x 16.26)	1.015 x 1.015 x 1.00 (25.79 x 25.79 x 25.4)	1.483 x 1.053 x 1.010 (37.67 x 26.75 x 25.65)
Weight	.99 oz. (28.15 grams)	2.89 oz. (82 grams)	.83 oz. (26.4 grams)	2.72 oz. (77 grams)	4.16 oz. (117.94 grams)
Temperature Range	-70°C to +125°C	-70°C to +125°C	-70°C to +125°C	-70°C to +125°C	-70°C to +125°C
Shock §	200G, 6 ms	200G, 6 ms	200G, 6 ms	200G, 6 ms	50G, 6-9 ms
Vibration, Sinusoidal §	30G, 70-3000 hz	30G, 33-3000 hz	30G, 70-3000 hz	30G, 70-3000 hz	20G, to 3000 hz
Altitude	300,000 ft	300,000 ft	300,000 ft	300,000 ft	300,000 ft

* Not all models in the series are QPL listed.

† Case dimensions are exclusive of any mounting brackets.

‡ DC coil model case height is 1.010 (28.65).

§ Shock and vibration specifications vary by model within a given series.

Consult our website or catalog 1654761 for more detailed specifications on the products in this line.

High Performance Timers and Sensors

Timers - Solid State Output



1800/1900 Series

Delay on operate, adjustable or fixed time delay, optional mounting styles

4800 Series

Interval timers, fixed time delay, optional mounting styles

6001/6155 Series

Delay on operate, fixed time delay, 14 pin metal DIP, thick film hybrid, meets Mil-R-83726/13

Timers - Relay Output



1600/1700 Series

Delay on operate, adjustable or fixed, AC or DC input, optional mounting styles

4600/4700 Series

Interval timers, adjustable or fixed, AC or DC input, optional mounting styles

5600/5700 Series

Delay on release, adjustable or fixed, optional mounting styles

2400 Series

Delay on operate, miniature package, fixed, optional mounting styles

Sensors



1300/1350 Series

Voltage sensors, DC and AC input, optional mounting styles

1400 Series

Phase sensors, 60 or 400 Hz, optional mounting styles

7000 Series

Frequency sensors, 50 to 440 Hz, digital logic design, optional mounting styles

High Performance DC Solid State Relay / Power Controller



NEW PRODUCT

KSR-201

60 Vdc Output Voltage

2.5 Adc Output Current

Built-in Circuit Protection

- Combines isolated load switching and circuit protection capabilities
- Fast acting, bounce free switching
- Carries full rated current (2.5A) without heat sinking to 90 C
- Low output on-resistance and voltage drop
- Meets surge requirement of MIL-STD-1275 & MIL-STD-740A
- Nuclear tolerance tested
- Hermetically sealed package
- Thick film hybrid construction

Custom High Performance Solenoids

Product Facts

CII solenoids have been custom-designed and built to exacting aerospace and government specifications for more than 60 years. These "top-end" devices are engineered for applications where extreme temperatures and other severe environmental conditions may exist. High altitude, shock, acceleration and vibration associated with aircraft and missile systems are conditions which our solenoids meet with predictable reliability.

CII solenoids are used extensively in various types of air, fuel, and hydraulic valve actuators in aircraft, aerospace, medical equipment and other high reliability applications. Other typical uses include door locking and unlocking, hatch and fin latching/unlatching mechanisms, bomb rack and thrust reversing interlocks, engine throttle control and other critical designs.



Product Options

Our linear motion, tubular solenoid line ranges from models only one-half inch in diameter producing ounces of force at short strokes, to three-inch diameter models capable of 100 pounds force at one-inch strokes. Push, pull or combination motion is available.

Continuous or intermittent coils for virtually any DC voltage typically encountered in aerospace applications can be provided. AC voltages can be handled, as well, through the use of internal rectifiers. Dual coil models with low holding power may be appropriate in power sensitive equipment.

For service in harsh environments, we can build solenoids with plunger seals. As required, we can make solenoids water-resistant, fuel-resistant and with encapsulated coils. All ferrous parts are plated for protection against corrosion.

We use 200°C magnet wire insulation as our standard, and we offer higher-rated insulation as an option. Coil leads are normally provided with TEFLON or TEFZEL insulation, or we can use customer-specified mil-type connectors on the solenoids.

CII solenoids are nominally rated at 100,000 operations; however, solenoid life is related to load and duty cycle. Trade-offs in application details can provide life into the millions.

The usual operating and storage temperature range of CII solenoids is -65°C to +125°C.

Solenoids may be provided with either a flat or conical plunger face. Our solenoid engineers, with nearly 100 years combined experience, will determine the optimum plunger shape for each application.

We can supply solenoids with plungers that are internally or externally threaded, as well as clevis plungers. Additionally, we can design captive plunger solenoids, as well as units with a spring assist. For mounting purposes we can fit a solenoid with a threaded bushing or with an application-specific mounting flange.

Complete U.S. government approved qualification test facilities are on-site at our North Carolina production facility.

A prototype solenoid, custom built to a customer's requirements, can usually be shipped within 30 days.

To request a prototype, please complete our Solenoid Application Information Form on the reverse side of this page and return it to our solenoid design team.

Custom High Performance Solenoids (Continued)

Application Information Form

Customer Firm Name: _____

Customer Name: _____

Customer Address: _____

Telephone number: _____

Email address: _____

Voltage: _____ ± _____ % AC or DC (circle one)

Maximum allowable current: _____ Amps

Actuating force: _____ (Energy produced when coil is energized at start of stroke)

Holding force: _____ (Energy required at zero stroke, plunger seated on butt flange with coil energized).

Stroke: _____ inches or millimeters (circle one)

Duty cycle: Time On: _____ Time Off: _____

Cycle rate: _____ cycles per hour

Type of operation: Push or Pull (circle one)

Temperature range if other than -65°C to +125°C: _____

Coil connections: _____ Leads or Mil-type connector (circle one)

Approximate dimensions: _____

Type of mounting: _____

Applicable Mil-specs: _____

Special environmental considerations (i.e., exposure to salt spray, jet fuel, water, sand and dust): _____

End application of solenoid: _____

Special tests: _____

Application Type: New Design Replacement

Approximate quantity (annual requirement): _____

**Please return completed form to Sarah Welch, product manager for CII custom solenoids.
Fax: 828-338-1103 E-mail: swelch@tycoelectronics.com**

High Performance AC Contactors

Side Stable Contactors
Latching Contactors
Center Off Contactors



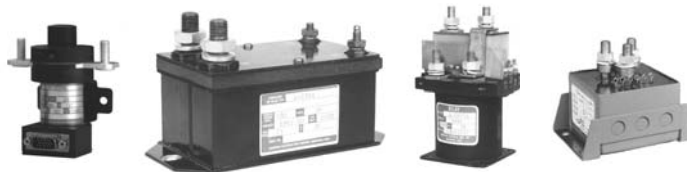
FEATURES:

- High reliability
- Meets requirements of MIL-R-6106
- Hermetic or gasket seal available
- Repairable
- Easily tailored to customer requirements

P/N	Current Rating	Description	P/N	Current Rating	Description
DH-7YC	25 Amps	4PST N.O., 115/208 VAC, 400 Hz	D-31TFA	100 Amps	3PDT, Center Off, 115/208 VAC, 400 Hz
B-347A	25 Amps	3PDT, Double Break, 115/220 VAC, 400 Hz	B-233R	120 Amps	3PDT, 115/200 VAC, 400 Hz
DH-14B-3	25 Amps	3PDT, 115/200 VAC, 400 Hz	BH-201B	120 Amps	3PST N.O., 115/200 VAC, 400 Hz
B-252	30 Amps	3PDT, Center Off, 115/200 VAC, 400 Hz	D-100A	120 Amps	3PST N.O., 115/200 VAC, 400 Hz
B-140C	30 Amps	3PDT, Center Off, 120 VAC, 60 Hz	B-435K-3	140 Amps	3PDT, Center Off, 115/200 VAC, 400 Hz
N-415A-1	30 Amps	3PDT, Double Break, 115/200 VAC, 400 Hz	B-233T	160 Amps	3PDT, 115/200 VAC, 400 Hz
SA106E	30 Amps	3PDT, 115 VAC, 400/60 Hz	B-451	175 Amps	3PST, Magnetic Latch, 115/200 VAC, 400 Hz
DH-7ZAB	50 Amps	3PDT, 115/200 VAC, 400 Hz	B-312D-1	175 Amps	3PST N.O., 120/208 VAC, 50/60 Hz
D-7GRZ	50 Amps	3PDT, 115/200 VAC, 400 Hz	B-499	35/200A	3PDT, Double Break, 115 VAC, 400 Hz/28 VDC
NN-301	50 Amps	SPDT w/Time Delay on Pickup, 115 VAC, 400 Hz	BR-301AY	200 Amps	3PST N.O., 115/200 VAC, 400 Hz
D-7GR	50 Amps	3PDT, 115/200 VAC, 400 Hz	B-393P	200 Amps	3PDT, Center Off, 120/208 VAC, 50/60/400 Hz
N-421A	50 Amps	3PST N.C., 115/200 VAC, 400 Hz	B-345LS	225 Amps	3PDT, Center Off, 115/200 VAC, 400 Hz
D-18F	50 Amps	3PDT, Center Off, 115/200 VAC, 400 Hz	B-394	250 Amps	3PDT, 115/200 VAC, 400 Hz
DR-18E-5	50 Amps	2SPST, Center Off, 115/208 VAC, 400 Hz	BH-124AA	250 Amps	3PDT, Center Off, 115/200 VAC, 400 Hz
B-227	60 Amps	3PDT, Center Off, 115/200 VAC, 400 Hz	BH-360A	250 Amps	3PDT, 115/200 VAC, 400 Hz
B-138S	60 Amps	3PST N.O., 115/200 VAC, 300-600 Hz	B-430-1	275 Amps	3PST, Magnetic Latch, 115/200 VAC, 400 Hz
DH-7BC	60 Amps	3PDT, 115/208 VAC, 400 Hz	B-429A-1	300 Amps	3PST N.O., 115/200 VAC, 400 Hz
BR-329BC	60 Amps	2PST N.O., 115 VAC, 60 Hz	B-874L	335 Amps	3PST, 200 VAC, 400 Hz
SA120B	60 Amps	3PDT, Side Stable, 115/200 VAC, 400 Hz	B-429CA	350 Amps	3PST N.O., 120/208 VAC, 400 Hz
NH-505	90 Amps	3PDT, Center Off, 115/200 VAC, 400 Hz	B-479A-1	350 Amps	3PST, Magnetic Latch, 120/208 VAC, 400 Hz
D-25BD	100 Amps	3PDT, 115/200 VAC, 400 Hz	B-484	500 Amps	3PST, Magnetic Latch, 115/200 VAC, 400 Hz

HARTMAN — High Performance DC Contactors

Side Stable Contactors
Latching Contactors
Center Off Contactors



FEATURES:

- High reliability
- Meets requirements of MIL-R-6106
- Hermetic or gasket seal available
- Repairable
- Easily tailored to customer requirements

P/N	Current Rating	Description	P/N	Current Rating	Description
A-837D	15/3A	Latching Armature Relay, 28 VDC	A-871F	200 Amps	SPDT N.O. & N.C., 28 VDC
C-28	25 Amps	2PST N.O., Latching, 40 VDC	A-1077B	230 Amps	SPDT, 28 VDC
D-7TD	50 Amps	2SPST 1 N.O. 1 N.C., 28 VDC	AH-965H	300 Amps	SPDT N.O. & N.C., 28 VDC
D-7AC	50 Amps	2SPST 1 N.O. 1 N.C., 28 VDC	A-1019	300 Amps	2PDT, Center Off, 28 VDC
DH-7KC-1	50 Amps	4PST 2 N.O. 1 N.C., 28 VDC	A-876M	300 Amps	SPDT N.C., 28 VDC
N-208	50 Amps	SPDT, Double Break, Magnetic Latch, 28 VDC	K-300	300 Amps	SPST N.O., 28 VDC
NN-233C	60 Amps	SPDT, Double Break, 28 VDC	SD130A	400 Amps	SPST N.O., Double Break, 28 VDC
SD167A	100 Amps	SPST, Side Stable, 28 VDC	A-400B	400 Amps	SPST N.O., 28 VDC
D-32AB	100 Amps	2SPST, Center Off, Double Break, 28 VDC	K-400	400 Amps	SPST N.O., 28 VDC
N-417E	100 Amps	SPDT, Double Break, 28 VDC	A-981S	400 Amps	SPDT, 28 VDC
A-885Y	100 Amps	SPDT N.O. & N.C., 28 VDC	AH-703F	400 Amps	SPST N.O., 28 VDC
NN-307	100 Amps	SPST, Double Break, 28 VDC	A-922F	600 Amps	2PST N.O., 28 VDC
SDH128	100 Amps	SPDT, Side Stable, 28 VDC	A-712T	600 Amps	SPST N.O., 28 VDC
NN-449B	100 Amps	SPDT, Double Break, 28 VDC	A-931F	600 Amps	SPST N.O., 28 VDC
DH-16CH	131 Amps	SPST, Latching, 31 VDC	A-792ST	1000 Amps	SPST N.O., 28 VDC
A-1077F	200 Amps	SPST N.O., 28 VDC	A-882	1600 Amps	SPST N.O., 28 VDC



High Performance AC/DC Contactors

Side Stable Contactors



FEATURES:

- High reliability
- Meets requirements of MIL-R-6106
- Hermetic or gasket seal available
- Lightweight construction
- Easily tailored to customer requirements

P/N	Current Rating	Description	P/N	Current Rating	Description
C-8B	15 Amps	2PDT N.C., 28 VDC, 60 or 400 Hz	D-14D	50 Amps	2SPST 1N.O. 1N.C., 28 VDC or 115 VAC, 400 Hz
DH-7PF	50 Amps	4PST 2N.O. 2N.C., 28 VDC or 115 VAC, 400 Hz	BH-316A	50 Amps	3PST, 28 VDC or 115 VAC, 400 Hz

HARTMAN — DC Reverse Current Contactors

Specialty Contactors



FEATURES:

- High reliability
- Meets requirements of MIL-R-6106
- Gasket sealed
- Repairable
- Easily tailored to customer requirements

P/N	Current Rating	Description	P/N	Current Rating	Description
A-718AAP	100 Amps	SPST N.O., 28 VDC, Cutout Reverse Current	A-701D	400 Amps	SPST N.O., 28 VDC, Cutout Reverse Current
A-700AQ-4	200 Amps	SPST N.O., 28 VDC, Cutout Reverse Current	A-702AAP	600 Amps	SPST N.O., 28 VDC, Cutout Reverse Current
A-700ZF	300 Amps	SPST N.O., 28 VDC, Cutout Reverse Current	A-791M	1000 Amps	SPST N.O., 28 VDC, Cutout Reverse Current

HARTMAN — Sensors & Monitors

Voltage & Current Sensors
Phase Rotation Sensors
Ground Power Monitors
Frequency Sensors



FEATURES:

- High reliability
- Meets requirements of MIL-R-6106
- Hermetic or gasket seal available
- Lightweight construction units available
- Epoxy encapsulated units available

P/N	Current Rating	Description	P/N	Current Rating	Description
AVR-869C		SPDT, 28 VDC, 3Ø Sequence Relay	Q-50AC	0.3 Amp	SPDT, 28 VDC, Encapsulated Current Indicator
E-312P	5 Amps	SPDT, 28 VDC, 400 Hz, Overvoltage Sensor	CH-27	0.75 Amp	2PDT, 28 VDC, Current Sensor
E-381	5 Amps	SPDT, 130 VAC, 400 Hz, Undervoltage Sensor	CH-26	1 Amp	SPST, 28 VDC, Current Sensor
E-308AA	7.5 Amps	SPDT, 120 VDC, 60 Hz, 3Ø Undervoltage Sensor	A-848KK	75 Amps	2PST, 28 VDC, Automatic Drop Out
E-329E	10 Amps	3PDT, 115 VAC, Drop Out Time Delay	A-772XTB	200 Amps	SPST N.O., 28 VDC, Delayed Drop Out
E-308AH	10 Amps	3PDT, 115 VAC, Drop Out Time Delay	A-701P-1	400 Amps	SPST N.O., 28 VDC, Remote Reset
E-312A-1	10 Amps	2PDT, 440 VAC, 400 Hz, 3Ø Voltage Sensor	A-701P-3	500 Amps	SPST N.O., 28 VDC, Remote Reset
E-348	0.25 Amp	SPST N.O., 28 VDC, Overload Relay	A-792CA	600 Amps	2PST N.O., 28 VDC, Automatic Drop Out
E-308	3 Amps	SPDT, 28 VDC, Adjustment Pick-Up Voltage	E-326	1 Amp	115 VAC, 400 Hz, 3Ø Rotation Sensor
AVR-834	3 Amps	SPDT, 28 VDC, DC Voltage Sensor	E-326A	1 Amp	115 VAC, 60 Hz, 3Ø Rotation Sensor
E-311P	10 Amps	2PDT, 28 VDC, Drop Out Time Delay	E-341	2 Amps	SPDT, 208 VAC, 400 Hz, 3Ø Rotation Sensor
QR-50AF	0.25 Amp	SPST, 115 VAC, Encapsulated Current Indicator	E-326E	5 Amps	SPDT, 460 VAC, 60 Hz, 3Ø Rotation Sensor
QR-50DA	0.25 Amp	SPST, 115 VAC, Encapsulated Current Indicator	E-145Z	25 Amps	2PST, 120/208 VAC, 400 Hz, Phase Loss Relay
E-387	1 Amp	SPDT, 115 VAC, 400 Hz, Current Sensor	E-145Y	60 Amps	2PST, 120/208 VAC, 400 Hz, Phase Loss Relay
E-145AK-4	5 Amps	SPST, 115 VAC, 3Ø Current Sensor	E-327AD	1 Amp	2PST, 115 VAC, Ground Power Monitor
BE-500G-1	50 Amps	3PST N.O., 120 VAC, Overload Current Sensor	E-384	3 Amps	SPDT, 28 VDC, Under Frequency Sensor
Q-50B	0.25 Amps	SPDT, 28 VDC, Encapsulated Current Indicator			

HARTMAN — Plug-In Contactors

Side Stable Contactors
Latching Contactors
Center Off Contactors



FEATURES:

- Fast installation/removal time
- Improved maintenance safety
- High reliability
- Meets requirements of MIL-R-6106
- Lightweight construction

P/N	Current Rating	Description	P/N	Current Rating	Description
BP-353	50 Amps	3PST N.O., 115/200 VAC, 400 Hz	BPE-494	175 Amps	3PST N.O., ELCU, 115/200 VAC, 400 Hz
DP-25BD	100 Amps	3PDT, 115/200 VAC, 400 Hz	BP-494	275 Amps	3PST N.O., 115/200 VAC, 400 Hz
DP-31C	100 Amps	3PDT, Center Off, 115/200 VAC, 400 Hz	BP-493-1	385 Amps	3PST, Magnetic Latch, 115/200 VAC, 400 Hz

DC Automatic Dropout Contactors

Time Delay Relays
Phase Imbalance Sensors
Automatic Drop Out Contactors



- FEATURES:**
- High reliability
 - Meets requirements of MIL-R-6106
 - Hermetic or gasket seal available

P/N	Current Rating	Description	P/N	Current Rating	Description
E-55	2 Amps	4PDT, 28 VDC, Time Delay	A-757D	600 Amps	SPST, 28 VDC, Automatic Dropout @ 180 Amps
B-178	60 Amps	3PST, 120/208 VAC, 400 Hz, Phase Sensor			

HARTMAN — AC & DC High Voltage Contactors

AC Contactors
DC Contactors
Center Off Contactors
Latching Contactors



- FEATURES:**
- High reliability
 - Meets requirements of MIL-R-6106
 - Hermetic or gasket seal available
 - Lightweight construction units available
 - Repairable

P/N	Current Rating	Description	P/N	Current Rating	Description
CR-21A	5 Amps	3PST N.O., 440 VAC, 60 Hz or 380 VAC, 50 Hz	B-459	250 Amps	3PDT, Center Off, 208 VAC, 400 Hz
B-329P	20 Amps	3PST N.O., Dbl. Break, 260/450 VAC, 400 Hz	B-460	250 Amps	6PST, 208 VAC, 400 Hz
BR-393E	20 Amps	3PDT, Center Off, Dbl. Break, 380 VAC, 50 Hz	B-461	250 Amps	3PDT, Center Off, 120/208 VAC, 400 Hz
B-138DL	50 Amps	3PST N.O., 200 VAC, 400 Hz	BH-125TH	250 Amps	3PST N.O., 208 VAC, 400 Hz
B-140AA	60 Amps	3PDT, Center Off, 200 VAC, 400 Hz	B-124GL	250 Amps	3PDT, Center Off, Dbl. Break, 208 VAC, 400 Hz
B-138XAH	60 Amps	3PDT, 200 VAC, 400 Hz	AV-875	60 Amps	SPST N.O., 270 VDC
B-312CS	100 Amps	3PST N.O., 380 VAC, 50 Hz	A-751D-1	150 Amps	SPST N.O., 110 VDC
B-125N	150 Amps	3PST N.O., 208 VAC, 400 Hz	A-754JD	150 Amps	SPST N.O., 120 VDC
B-493E	160 Amps	3PST, Magnetic Latch, 230 VAC, 400 Hz	A-751YC	650 Amps	SPST N.O., 340 VDC

HARTMAN — Space Contactors

DC Latching Contactors



- FEATURES:**
- High reliability
 - Meets requirements of MIL-R-6106
 - Hermetically sealed
 - Lightweight construction
 - High shock, vibration, and acceleration levels

P/N	Current Rating	Description	P/N	Current Rating	Description
N-409D	50 Amps	2PDT, Double Break, Magnetic Latch, 28 VDC	N-208H	50 Amps	SPDT, Double Break, Magnetic Latch, 40 VDC

HARTMAN — Power Distribution Systems

Modular Units
Standard Panels

- FEATURES:**
- Primary and secondary power distribution
 - Main power contactors
 - Secondary power contactors/relays
 - Current and voltage sensing
 - Logic/control signals
 - Contactors/circuit breaker plug-in units
 - Power management capabilities
 - Value added
 - Space saving/weight saving designs
 - Custom designs for specific applications

Modular Units	Standard Panels
<ul style="list-style-type: none"> • Utilizes plug-in line replaceable modules installed on a panel mounting system, or back-plane. LRMs may be contactors, circuit breakers, sensing units, ELCUs, etc. • Designed as a fault-free zone with no moving parts. Intended as a permanent installation on mother vehicle. <p>FEATURES:</p> <ul style="list-style-type: none"> • Weight savings over standard discrete components • Value added • Ease of maintenance • Reduced OEM labor 	<ul style="list-style-type: none"> • Utilizes actuator and contact assemblies from discrete contactors, bussed together and packaged in one or more enclosures with external power and control connections. • Optional current/voltage sensing, fuses, circuit breakers, power monitors, etc. <p>FEATURES:</p> <ul style="list-style-type: none"> • Lightest power distribution approach • Value added • Ease of maintenance • Reduced OEM labor

These are just some of the HARTMAN products capabilities from Tyco Electronics:

- Voltage, Current & Power Sensing
- Over & Reverse Current
- Over & Under Voltage
- Over & Under Frequency
- Ground Fault & Detection
- Time Delay
- Phase Sequence, Unbalance & Failure
- Impedance Relays
- Ripple Detection
- Positive, Negative & Zero Sequence Voltage
- Signal Amplification
- Turbine Starting
- Trip-Free, Electrical & Mechanical Interlocking
- Electrical & Magnetic Latching
- Polarization
- Power Switching

High Voltage DC Relays & Contactors

28 Vdc

Aerospace Power Relays
Hi-Rel Satellite Relays
Power Controllers



P/N Series	Carry Current	Power Switching*	RF Ratings	Contact Form
AL50	50 amps	Yes	No	SPST-NO
AL90	90 amps	Yes	No	SPST-NO
AL150	150 amps	Yes	No	SPST-NO
AL350	350 amps	Yes	No	SPST-NO
AL500	500 amps	Yes	No	SPST-NO

270 Vdc

Aerospace Power Relays
Hi-Rel Satellite Relays
Power Controllers



P/N Series	Carry Current	Power Switching*	RF Ratings	Contact Form
AP5A	5 amps	Yes	No	SPST-NO
AP5B	5 amps	Yes	No	SPST-NC
AP5C	5 amps	Yes	No	SPDT
AP5P	5 amps	Yes	No	SPST-Latch
AP5R	5 amps	Yes	No	SPDT-Latch
AP10A	10 amps	Yes	No	SPST-NO
AP10B	10 amps	Yes	No	SPST-NC
AP10P	10 amps	Yes	No	SPST-Latch
AP11A	10 amps	Yes	No	SPST-NO
AP44P	15 amps	Yes	No	SPST-Latch
AP50X	50 amps	Yes	No	SPST-NO
AP90X	90 amps	Yes	No	SPST-NO
AP150X	150 amps	Yes	No	SPST-NO
AP265X	265 amps	Yes	No	SPST-NO
AP265P	265 amps	Yes	No	SPST-NO
AP350X	500 amps	Special	No	SPST-NO
CAP200	500 amps	Yes	No	SPST-NO
MAP200	500 amps	Yes	No	SPST-NO
PD5A	5 amps	Yes	No	SPST-NO
PD5B	5 amps	Yes	No	SPST-NC
PD10A	10 amps	Yes	No	SPST-NO
PD10B	10 amps	Yes	No	SPST-NC
PD10P	10 amps	Yes	No	SPST-Latch
PD90X	90 amps	Yes	No	SPST-NO
PD150X	150 amps	Yes	No	SPST-NO

12-1800 Vdc

Electric Vehicle Relays
Specialty DC Power Relays
and Contactors
Integrated Sensing



P/N Series	Carry Current	Power Switching*	RF Ratings	Contact Form
EV4	4 amps	Make Only	No	SPST-NO
EV200	500 amps	Yes	No	SPST-NO
LEV200	500 amps	Yes	No	SPST-NO
EV250A	500 amps	Yes	No	SPST-NO
EV250B	500 amps	Yes	No	SPST-NC
EV500	600 amps	Yes	No	SPST-NO

* Consult Tyco Electronics for Power Switching Level

2.0 kV

High Voltage Reed Relay
Vacuum Relay



P/N Series	Carry Current	Power Switching*	RF Ratings	Contact Form
S06CBA	6 amps	Carry Only	Yes	SPST-NO
K45C	15 amps	Carry Only	Yes	SPDT

3.0 kV

High Voltage Reed Relay



P/N Series	Carry Current	Power Switching*	RF Ratings	Contact Form
S02DNA	2 amps	Carry Only	No	SPST-NO

3.5 kV

Vacuum Relays
Gas Filled Relays



P/N Series	Carry Current	Power Switching*	RF Ratings	Contact Form
HC-5	8 amps	Make Only	No	SPDT
HC-3	15 amps	Yes	Yes	SPDT
HC-1	25 amps	Carry Only	Yes	SPDT

5.0 kV

High Voltage Reed Relays
Vacuum Relays



P/N Series	Carry Current	Power Switching*	RF Ratings	Contact Form
S06FNA	6 amps	Carry Only	Yes	SPST-NO
K41A	30 amps	Yes	Yes	SPST-NO
K41B	30 amps	Yes	Yes	SPST-NC
K41C	30 amps	Yes	Yes	SPDT
K41P	25 amps	Carry Only	Yes	SPST-Latch
K41R	25 amps	Carry Only	Yes	SPDT-Latch
K40P	35 amps	Carry Only	Yes	SPST-Latch

7.5 kV

Medical Relays
Gas Filled Relays



P/N Series	Carry Current	Power Switching*	RF Ratings	Contact Form
KM-13	10 amps	Make Only	No	DPDT
KM-17	10 amps	Make Only	No	DPDT

9 kV

High Voltage Reed Relay



P/N Series	Carry Current	Power Switching*	RF Ratings	Contact Form
S06HBA	6 amps	Carry Only	Yes	SPST-NO

High Voltage DC Relays & Contactors (Continued)

8 kV

High Voltage Reed Relays
Vacuum Relays
Gas Filled Relays



P/N Series	Carry Current	Power Switching*	RF Ratings	Contact Form
S06JNB	6 amps	Carry Only	Yes	SPST-NC
HC-6	8 amps	Make Only	No	SPDT
H-18	10 amps	Yes	Yes	SPDT
K47A	12 amps	Yes	Yes	SPST-NO
K47B	12 amps	Yes	Yes	SPST-NC
HC-4	15 amps	Yes	No	SPDT
HC-2	25 amps	No	No	SPDT
K44P	50 amps	Yes	Yes	SPST-Latch

10 kV

High Voltage Reed Relays
Vacuum Relays



P/N Series	Carry Current	Power Switching*	RF Ratings	Contact Form
S05LTA	5 amps	Yes	No	SPST-NO
S05LTB	5 amps	Yes	No	SPST-NC
K81A	10 amps	Special	No	SPST-NO
K81B	10 amps	Special	No	SPST-NC
K81C	10 amps	Special	No	SPDT
K43A	25 amps	Special	Yes	SPST-NO
K43B	25 amps	Special	Yes	SPST-NC
K43C	25 amps	Special	Yes	SPDT
K43R	24 amps	Carry Only	Yes	SPDT-Latch
K43P	24 amps	Carry Only	Yes	SPST-Latch

12 kV

Vacuum Relays



P/N Series	Carry Current	Power Switching*	RF Ratings	Contact Form
H-14	30 amps	Carry Only	Yes	DPDT
H-16	30 amps	Carry Only	Yes	DPDT

15 kV

High Voltage Reed Relays
Vacuum Relays
Gas Filled Relays



P/N Series	Carry Current	Power Switching*	RF Ratings	Contact Form
S05MTA	5 amps	Carry Only	No	SPST-NO
KC-15	12 amps	Make Only	No	SPDT
KC-16	12 amps	Make Only	No	SPDT
KC-14	15 amps	Yes	No	SPDT
KC-18	15 amps	Yes	No	SPDT
H-8	15 amps	Yes	No	SPDT
K49P	25 amps	Yes	Yes	SPST-Latch
K89P	25 amps	Yes	Yes	SPST-Latch
KC-12	30 amps	Yes	Yes	SPDT
H-26	30 amps	Carry Only	Yes	4PDT
KC-8	30 amps	Yes	Yes	SPDT
KC-2	50 amps	Carry Only	Yes	SPDT
KC-11	50 amps	Carry Only	Yes	SPDT

20 kV

Vacuum Relay



P/N Series	Carry Current	Power Switching*	RF Ratings	Contact Form
H-19	30 amps	Special	Yes	DPDT

25 kV

Vacuum Relays
Gas Filled Relays



P/N Series	Carry Current	Power Switching*	RF Ratings	Contact Form
KC-38	15 amps	Make Only	No	SPST-NC
K62A	18 amps	Special	No	SPST-NO
K62B	18 amps	Special	No	SPST-NC
K62C	18 amps	Special	No	SPDT
H-17	30 amps	Special	Yes	SPDT
KC-28	30 amps	Make Only	No	SPST-NO
KC-32	45 amps	Special	No	SPST-NC
KC-30	55 amps	Carry Only	Yes	SPST-NC
KC-22	65 amps	Special	No	SPST-NO
KC-20	110 amps	Carry Only	Yes	SPST-NO

30 kV

Vacuum Relays



P/N Series	Carry Current	Power Switching*	RF Ratings	Contact Form
H-23	30 amps	Carry Only	Yes	SPST-NC
H-24	30 amps	Carry Only	Yes	SPST-NO

35 kV

Gas Filled Relays



P/N Series	Carry Current	Power Switching*	RF Ratings	Contact Form
K61A	10 amps	Make Only	No	SPST-NO
K61B	10 amps	Make Only	No	SPST-NC
K61C	10 amps	Make Only	No	SPDT
K60C	10 amps	Make Only	No	SPDT

50 kV

Vacuum Relays
Gas Filled Relays



P/N Series	Carry Current	Power Switching*	RF Ratings	Contact Form
K64C	10 amps	Make Only	No	SPDT
H-25	30 amps	Special	No	SPDT

70 kV

Gas Filled Relays



P/N Series	Carry Current	Power Switching*	RF Ratings	Contact Form
K70A	10 amps	Make Only	No	SPST-NO
K70B	10 amps	Make Only	No	SPST-NC
K70C	10 amps	Make Only	No	SPDT

* Consult Tyco Electronics for Power Switching Level

Protective Relays

DIN Rail or Screw Mounted

- Voltage Sensitive Relays Frequency Sensitive Relays
- Paralleling Relays Phase Sequence Relays
- Current Sensitive Relays



ANSI/IEEE C37.90-1978
 UL File No. E58048
 CSA File No. LR61158
 DIN EN50022-35

WD2759-XXX Over/Under Voltage Relay

WD2759 Series AC voltage sensing relays provide voltage monitoring and protection in AC systems. Sensing voltages, number of phases, over & under voltage setpoint, and time delay are user configured. The relay operates when the externally adjustable trip point is reached. An external time delay control is provided with an adjustment of .5 to 10 seconds.

Specifications	
Nominal Operating Voltage	120, 208, 277 or 480 Vac
Nominal Frequency Range	50-400 Hz
Contact Form	C - 1 ea for UV and OV
Contact Ratings	5A @ 240 Vac
Time Delay Adjustment	0.5 to 10 secs
Dimensions	2.9"W x 2.9"H x 4.4"D
Weight	0.9 lbs

Sense Voltage	120	208	277	480
UV Adj	72-120	125-208	166-277	288-480
OV Adj	120-168	208-291	277-388	480-672

Control Voltage	-001	-002	-003
Input Vdc	18 to 54	13.5 to 32	100 to 200
Input Vac			100 to 140

WD25 Paralleling Relay

WD25 paralleling relays are used to ensure that two AC circuits are synchronized. When voltage, phase relationship, and frequency are within the selected limits the output relay will energize. Optional "dead bus" feature allows the generator to energize a dead bus. "Double dead bus" feature permits the paralleling when either bus is "hot" and the other bus is "dead".

Specifications	
Operating Voltage	120, 208, 277 or 480 Vac
Frequency Range	40-400 Hz
Contact Form	2 Form C
Dimensions	2.9"W x 2.9"H x 4.4"D
Weight	0.9 lbs

Sense Voltage	120	208	277	480
Sync Voltage	6-30% of Nominal Voltage			
Dead Bus Volt.	10-70% of Nominal Voltage			

Control Voltage	-001	-002	-003
Input Vdc	18 to 54	13.5 to 32	100 to 200
Input Vac			100 to 140

WD5051-XXX Single Phase Over Current Relay

WD5051 AC current sensing relays provide current monitoring and protection in single phase AC systems. Nominal sensing current, instantaneous over current (IOC) setpoint, time over current (TOC) setpoint, and time over current time delay are user configured. WD5051 current relays operate when the externally adjustable trip point is reached.

Specifications	
Sense Current	1, 3, 6 or 10 amps (selectable)
Contact Form	Form C - 1 ea for IOC and TOC
TOC Time Delay	0.5 to 20 secs
Dimensions	2.9"W x 2.9"H x 4.4"D
Weight	0.9 lbs

Sense Current	1 amp	3 amps	6 amps	10 amps
IOC	.2 - 1.2	.6 - 3.6	1.2 - 7.2	2 - 12
OV Adj	.2 - 1.2	.6 - 3.6	1.2 - 7.2	2 - 12

Control Voltage	-001	-002	-003
Input Vdc	18 to 54	13.5 to 32	100 to 200
Input Vac			100 to 140

WD5051-3-XXX Three Phase Over Current Relay

WD5051-3 AC current sensing relays provide current monitoring and protection in three phase AC systems. Nominal sensing current, instantaneous over current (IOC) setpoint, time over current (TOC) setpoint, and time over current time delay are user configured. WD5051 current relays operate when the externally adjustable trip point is reached.

Specifications	
Sense Current	1, 3, 6 or 10 amps (selectable)
Contact Form	Form C - 1 ea for IOC and TOC
TOC Time Delay	0.5 to 20 secs
Dimensions	2.9"W x 2.9"H x 4.4"D
Weight	0.9 lbs

Sense Current	1 amp	3 amps	6 amps	10 amps
IOC	.2 - 1.2	.6 - 3.6	1.2 - 7.2	2 - 12
OV Adj	.2 - 1.2	.6 - 3.6	1.2 - 7.2	2 - 12

Control Voltage	-001	-002	-003
Input Vdc	18 to 54	13.5 to 32	100 to 200
Input Vac			100 to 140

WD810U-XXX Over/Underfrequency Relay

WD810U over/underfrequency relays are used to provide frequency monitoring and protection. The relay operates at voltages from 120 to 480 Vac and at nominal frequencies of 50, 60, and 400 Hz. External controls include nominal frequency selection, underfrequency (UF) trip set, overfrequency (OF) trip set, and OF and UF trip time delays.

Specifications	
Nominal Operating Freq.	50, 60 or 400 Vac
Nominal Sensing Voltage	20 to 480 Vac
Frequency Range	40-400 Hz
Contact Form	Form C - 1 ea for OF and UF
Time Delay Adjustment	0.5 to 10 secs
Dimensions	2.9"W x 2.9"H x 4.4"D
Weight	0.9 lbs

Sense Frequency	50	60	400
UF Adj	40 - 50	48 - 60	360 - 400
OF Adj	50 - 60	60 - 72	400 - 480

Control Voltage	-001	-002	-003
Input Vdc	18 to 54	13.5 to 32	100 to 200
Input Vac			100 to 140

WD47-XXX Phase Sequence Relay

WD47 Series phase sequence relays are designed to monitor the correct phase rotation and loss of phase of three phase AC systems from 50 to 400 Hz. An incorrect phase sequence or loss of any phase will cause the WD47 relay to pickup. When the phase sequence is corrected or the lost phase is restored the contacts dropout.

Specifications	
Operating Voltage	120 to 480 Vac
Frequency Range	50-400 Hz
Contact Form	2 Form C
Dimensions	2.9"W x 2.9"H x 4.4"D
Weight	0.9 lbs

Control Voltage	-001	-002	-003
Input Vdc	18 to 54	13.5 to 32	100 to 200
Input Vac			100 to 140

Tyco Electronics also offers a range of WILMAR protective relays in metal enclosures for screw mounting. Many meet military requirements.