

## High Voltage Reed Switches

See page 37

This series of switches is designed for relays which are used in high reliability areas of the electrotechnical and electronic industry including electronic medical equipment; cable tester arrays and cable test equipment; copy machines; laser optical systems and infrared equipment; test equipment. They provide high voltage stand-off and switching capability. The tungsten plated contacts give both a low stable CR and a long and reliable life.



## Tilt Switch Non-Mercury Changeover

S1234

See page 78



## Surface Mount Switch and Sensors

See page 70

The Comus Group can now supply surface mount termination for a wide range of products. The gold plated clips give good solderability and are designed to provide stability during assembly.



Mercury free changeover tilt switch with hermetically sealed gold contacts, and a case size of just 7.6mm. It's rugged construction makes this switch suitable for many uses in security products, alarm and general movement sensing. rated at 60V, 0.2A and 3VA Max.

## Magtrix Connector

See page 68

Magtrix Connectors are versatile miniature Neodymium-iron-boron nickel plated 6.0 Dia x 5mm long magnets connected to a 40 x 0.65mm Dia. copper-tin plated flexible lead, with an operating temperature of 120°C and a maximum power rating of 8 Amps. Primarily designed for use as battery connectors, they are also ideal for proximity sensor and reed switch triggering, connecting PCBs, test equipment connections and prototypes where connections need to be made quickly. These connectors are ideal for use where space is at a premium or wherever magnetic muscle is required to replace traditional methods of connection, electrical or mechanical.

MC/53GNS



## Electronic Tilt Sensor

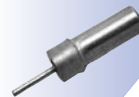
ETS 90XA  
See page 80



This electronic angle sensor is fully sealed into a rugged ABS case which will meet the requirements of IP65. The continuous linear voltage output over the full 90° Deg. range (zero +45° -45°) makes it ideal for vehicle levelling and positioning medical and engineering equipment.

## Tilt Switch Micro Miniature

Probably the smallest metal cased Tilt switch in the world measuring just 6.35mm. The hermetically sealed case and gold contacts with ratings of 0.15A 50V and 2VA Max., allows this switch to be used in equipment where space is at a premium. Ideal for security applications, hand held equipment etc.



AU2100-O  
See page 78

*From initial design to full-scale manufacturing,  
the Comus group will be with you all the way*

# SWITCHES + SENSORS

## ***All quantities considered***

*We offer a full design and assembly service and can modify many of our products to your design requirements.*

*This includes adding cable, connectors and terminals.*

*Switches can be encapsulated, assembled to PCB's or fitted into housings.*

- *Contact Group Sales Office*
- *Your nearest agent*

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***From initial design to full-scale manufacturing,  
the Comus Group will be with you all the way***

# Solid State Relays

## Introduction

### Characteristics of Solid State Relays

- No mechanical parts
- Galvanic separation between control and load circuit by opto-coupler
- Semiconductor components like triacs, thyristors, alternistors or MOS-FET's in the output

### Advantages of SSR's against Electromechanical Relays

- Nearly unlimited life expectancy
- Low control power, direct interface to microcomputer or PLC
- No contact bounce
- No sparks
- No mechanical contact wear
- Insensitivity to shock, vibration and mechanical forces as well as severe environmental conditions
- Gunther thyristor SSR's are manufactured using DCB-technology (direct copper bonding) and are approximately 100 times more resistive to temperature cycles than conventional SSR's

## Switching Types

Gunther Solid State Relays are available in two different switching types:

### Zero Cross Switching (Z-type SSR's)

After switching on the control voltage the SSR switches through within the next zero crossing of the load voltage. This switching type is suitable for resistive, capacitive and slight inductive loads.

### Random Switching (R-type SSR's)

After switching on the control voltage the SSR switches through without any delay. This switching type is suitable for inductive loads e.g. motors and magnet valves.

## Protection Circuits

### RC-Snubber

A RC-snubber limits fast load voltage changes (e.g. caused by inductive loads) at the load terminals. Solid State Relays either with or without an integrated RC-snubber are available as listed in the technical data.

### Diode

Solid State Relays for DC loads have no internal contact protection. A diode or a RC-snubber for semiconductor protection must be connected externally and is recommended for inductive loads.

### Fuses

To protect Solid State Relays the use of semiconductor fuses is recommended. To determine the suitable semiconductor fuse the max. load integral  $I^2t$  is listed in the technical data for every Solid State Relay. The value of the semiconductor fuse should be smaller than the maximum load integral  $I^2t$  of the Solid State Relay.

### Varistor

The varistor conducts overvoltages and protects the output semiconductor of AC-SSR's (triac, thyristor, alteristor) against destruction. The use of varistors is recommended - the suitable varistor type is listed in the technical data.

With Reversing Relays WG A0 a varistor is always recommended, because with reversing inductive loads (such as motors) the blocking voltage of the thyristor is easily exceeded.

### Protection against Contact with the Terminals

In order to prevent unintentional contact with the terminals, a plastic protection cap for the Solid State Relays WG A5, WG 280, WG 480, WG A3, WG A0 and WG F is available.

## Approvals

### UL, VDE

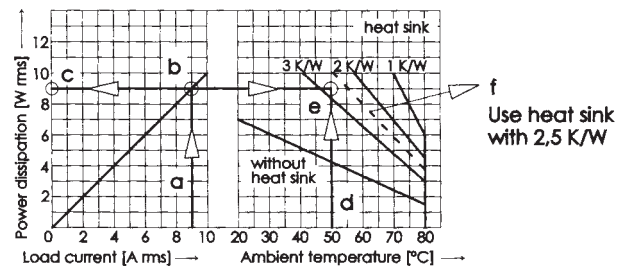
Gunther Solid State Relays have been developed according to the regulations of UL and VDE and are tested according to their requirements. Many of the Gunther SSR's are already approved by these institutions; applications for approval for the remaining series are in process.

## CE-Mark

All chassis mounting SSR's WG A5, WG 280, WG 480, WG 660, WG A3, WG A0 and WG F carry the CE-mark and comply with the EU low voltage directive 73/23/EEC. Compliance with other directives is not implied. The SSR's are components which may only be incorporated into a device which meets the requirements of relevant directives.

## Cooling

When the Solid State Relay is switched on there is a voltage drop at the output semiconductor. The load current multiplied by this voltage drop causes power dissipation and thus a thermal rise in the SSR. Therefore it is necessary to use a heat sink to prevent damage to the SSR. A derating diagram for each SSR is given on the applicable data sheet. The following is an example of how to select a heat sink for a chassis mounted AC relay using these diagrams. The load current is 9 A and the ambient temperature is 50 °C.



- Draw a vertical line in the left diagram from the desired load current (9 A) up through the curve.
- Where the vertical line intersects the curve, draw a horizontal line extending across both diagrams.
- The power dissipation is indicated at the left end of this line, 9 Watts in this case.
- Draw a vertical line in the right diagram from the specified ambient temperature (50 °C) up through the horizontal line drawn in b.
- The intersection point indicates the minimum value of thermal resistance a heat sink must have to prevent damage to the SCR, 2.8 K/W in this case.
- The required heat sink must be rated at less than 2.8 K/W. Therefore select the Gunther heat sink rated at 2.5 K/W.

Should the thermal resistance for your application fall below the line noted "without heat sink" no heat sink is required.

DC chassis mounted SSR's have a slightly different derating diagram as shown on the data sheet. To find the required heat sink draw a horizontal line for the output current and a vertical line for the ambient temperature. The intersection point indicates the minimum value of the thermal resistance as in e. (above). Follow F. to select the correct heat sink.

A heat sink cannot be used for PCB mounted devices, but derating curves are shown for them. Follow the steps above. If the intersection point falls above the curve in the right diagram you cannot use the relay for the application parameters you plotted.

On-off cycles longer than one minute cause greater than normal temperature differences in a SCR. For these applications, derate the thermal resistance found in e. (above) by an additional 0.75. In the example above, a heat sink with a thermal resistance of 2.1 K/W is required. Therefore you should select the Gunther heat sink rated at 1.6 K/W.

## Heat Sinks

The heat sinks are available from Gunther. All of them are assembled with 35 mm snap-on-rail mounting and should be mounted in a vertical position. Furthermore it is very important that air circulation is not impeded.

## Conducting Paste

The Solid State Relays should be mounted with conducting paste between the heat sink and the SSR baseplate to ensure maximum thermal conductivity. Firm mechanical mounting is very important.

# Solid State Relays

## Overloading of SSR's

### Overvoltages

The voltage across the semiconductor in the output of the SSR may not exceed the rated locking voltage. Overvoltage protection is integrated in some SSR's as listed in the technical data. All AC-SSR's have a RC-snubber in the output. Moreover, varistors or further RC-snubbers can be switched parallel to the output, if needed.

### Overloading Through Excessive Currents

The current through the SSR must remain within the specified limits. It is important to note that the inrush current can often drastically exceed that of the nominal current, e.g. with motors 5 - 10 times and with lamps 15 - 20 times higher current. The choice of the SSR should be made with reference to these criteria.

## Parameter Definition

### Control Voltage Range, Turn-Off Voltage

The listed control voltage range indicates the operating input voltage. Below the turn-off voltage the SSR must be switched off. Between the minimum control voltage and the turn-off voltage the range is not defined.

### Input Resistance, Control Current

Inside most SSR's constant current sources exist which operate the opto-coupler. This means that the input resistance changes continuously over the control voltage range. The maximum control current is listed for the maximum control voltage.

### Load Voltage Range

The listed load voltage range indicated the operating voltage for proper operation of the SSR.

### Peak-off State Voltage

Maximum peak voltage on the load terminals to prevent destruction of the semiconductor component.

### Off-State Leakage Current

This current flows through the load terminals during the off state of the SSR.

### Load Current Range

The minimum and maximum continuous load current with appropriate cooling of the SSR.

### Surge Current

Maximum current for a defined duration of one sine half wave without destroying the semiconductor component. With the maximum surge current the chip reaches the maximum junction temperature in this time. In the technical data the maximum surge current (valid for one sine half wave at 50 Hz) for every SSR-type is listed.

### Maximum Load Integral $I^2t$

Value indicated the necessary semiconductor fuse for contact protection.

### On-State Voltage

Effective voltage drop over the load terminals with control voltage on and maximum load current.

### Off-State (static) $dv/dt$

The maximum allowable rate of voltage rise across the output terminals.

### Turn-On Time

The maximum time duration until the output is switched on.

### Turn-Off Time

The maximum time duration until the output is switched off.

## Gunther Solid State Relays

### SSR's for AC Loads (PCB Mounting)

#### WG A4.

This type offers high component density on the PCB with a maximum load current of 2 A.

#### WG A8.

This series is especially developed for PCB mounting with very small dimensions and load currents of 3 A or 5 A. There are SSR's with 600 V peak-off state voltage (load voltage max. 280 V AC) as well as types with 1200 V peak-off state voltage (load voltage max. 530 V AC) available. Moreover the WG A8 are available in zero cross switching (Z-types) for resistive and capacitive loads or in random switching (R-types) for inductive loads.

### SSR's for AC Loads and Chassis Mounting

#### WG A5. (Hockey Puck Housing)

This relay is especially suited to switch resistive loads as in heaters and lamps.

#### WG 280. (Hockey Puck Housing)

This relay is designed to switch inductive loads like electric motors and valves (R-type) as well as resistive loads like heaters and lamps (A-type). High current devices up to 90 A are available.

#### WG 480. (Hockey Puck Housing) WG 660 ...

For switching applications in three phase systems, the Gunther SSR series WG 480 offers excellent reliability due to high noise immunity (maximum peak-off state voltage 1600 V) and extremely good  $dv/dt$  characteristic. Some types have internal overvoltage protection (see data sheets). This relay is available in both Z- and R-types.

#### WG A3. (Maxi Puck Housing)

This series is able to switch three phase loads with one control signal up to rated line currents of 45 A and line voltages up to 480 V AC. The WG A3 has high noise immunity (maximum peak-off state voltage 1200 V) and internal overvoltage protection which becomes effective at approximately 1000 V.

#### WG A0. (Maxi Puck Housing)

This series is recommended for electronic motor reversing in three phase systems. Load voltages up to 480 V AC and load currents up to 45 A can be switched. A built-in interlocking circuit with a typical change over switching time of  $60 \pm 20$  ms prevents simultaneous switching-on of forward and reverse functions and prevents a short circuit between two phases. An LED indicated the forward and reverse function.

### SSR's for DC Loads (PCB Mounting)

#### WG F8.

The WG F8 are for PCB mounting and DC loads and have a MOSFET in the output. This series is suitable for resistive, capacitive and inductive loads. With inductive loads a protection circuit like a diode or a RC-snubber is recommended.

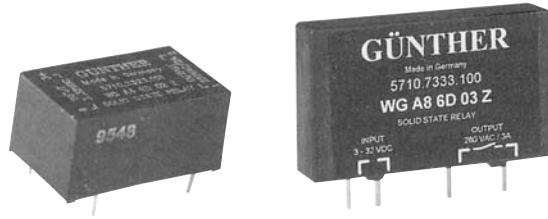
### SSR's for DC Loads and Chassis Mounting

#### WG F. (Hockey Puck Housing)

The WG F are for chassis mounting and DC loads and have a MOSFET in the output. The electrical data are the same for the WG F8, but with a higher load current.

# Solid State Relays

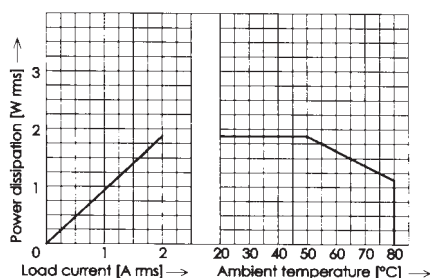
## 1-phase for AC loads and PCB mounting



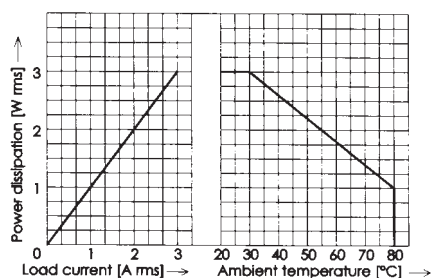
SSR type		WG A4 6D 02 Z	WG A8 6D 03 Z	WG A8 6D 03 R
Switching type		zero cross	zero cross	random
Approvals		none	UL	UL
Circuit diagrams, dimensions		page 19	page 19	page 19
Output		triac	triac	triac
Application Fields		Resistive loads Inductive Loads with $\cos\varphi > 0.85$	Resistive loads Inductive Loads with $\cos\varphi > 0.85$	Inductive Loads
<b>Input Circuit</b>				
Control Voltage Range	V	3 - 32 DC	3 - 32 DC	3 - 32 DC
Control Current Max.	mA	14	14	14
Turn-off voltage Min.	V DC	1	1	1
Input Resistance	$\Omega$	Constant Current	Constant Current	Constant Current
<b>Output Circuit</b>				
Load Voltage Range	V rms	24 - 280 AC	24 - 280 AC	24 - 280 AC
Peak-off-stage Voltage	V drn	600	600*	600*
Off-state Leakage Current	mA <sub>eff</sub> max.	2	5	5
Load Current Range	A rms	0.01 - 2	0.05 - 3	0.05 - 3
Surge Current. 1 half wave	A peak	100	100	100
I <sup>2</sup> t for Fusing	A <sup>2</sup> s	50	50	50
On-state Voltage	V peak	1.6	1.6	1.6
Off-state (static) dv/dt	V/ $\mu$ s	200	200	200
Snubber	$\Omega$ ; nF	100 ; 10	47 ; 22	47 ; 22
<b>General Data</b>				
Turn-on Time Max.	ms	11	11	0,1
Turn-off Time Max.	ms	11	11	11
Line Frequency Range	Hz	47 - 63	47 - 63	47 - 63
Isolation Volt. Between:				
- input / output	V rms	4.000	4.000	4.000
- input-output / base	V rms	-	-	-
Isolation Resistance	M $\Omega$	50	50	50
Operating Temperature		-20... +80	-20... +80	-20... +80
Recommended Varistor		S10V-S14 K230	S10V-S14 K230	S10V-S14 K230

NOTE: \* An 800V version is available as WG A8 8D Series

Derating diagram WG A4 6D 02 Z



Derating diagram WG A8 6D 03 Z/R



# Solid State Relays

## 1-phase for AC loads and PCB mounting

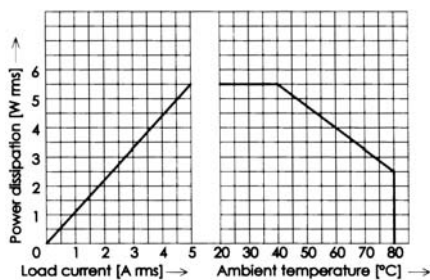


SSR type		WG A8 6D 05 Z	WG A8 6D 05 R	WG A8 12D 05 Z	WG A8 12D 05 R		WG A8 6 05 PC
Switching type		zero cross	random	zero cross	Random		phase control
Approvals		none	none	VDE	VDE		none
Circuit diagrams, dimensions		page 19	page 19	page 19	page 19		page 19
Output		triac	triac	alternistor	alternistor		triac
Application Fields		Resistive loads Inductive Loads with $\cos\varphi > 0.85$	Inductive Loads	Resistive loads Inductive Loads with $\cos\varphi > 0.85$	Inductive Loads		Softstart and phase control
<b>Input Circuit</b>							
Control Voltage Range	V	3 - 32 DC	3 - 32 DC	3 - 32 DC	3 - 32 DC	supply voltage	3 - 32 DC
Control Current Max.	mA	14	14	22	22	supply current	max. 1 mA
Turn-off voltage Min.	V DC	1	1	1	1	control voltage	0.6 - 40 VDC
Input Resistance	$\Omega$	Constant Current	Constant Current	Constant Current	Constant Current	control current	0 - 5 mA
<b>Output Circuit</b>							
Load Voltage Range	V rms	24 - 280 AC	48 - 280 AC	24 - 480 AC	48 - 480 AC		140 - 280 AC
Peak-off-stage Voltage	V drn	600*	600*	1.200 (1.000**)	1.200 (1.000**)		600
Off-state Leakage Current	mA <sub>eff</sub> max.	8	8	5	5		8
Load Current Range	A rms	0.1 - 5	0.1 - 5	0.1 - 5	0.1 - 5		0.1 - 5
Surge Current. 1 half wave	A peak	100	100	120	120		100
$I^2t$ for Fusing	A <sup>2</sup> s	50	50	72	72		50
On-state Voltage	V peak	1.6	1.6	1.6	1.6		1.6
Off-state (static) dv/dt	V/ $\mu$ s	200	200	200	200		200
Snubber	$\Omega$ ; nF	47 ; 47	47 ; 47	47 ; 10	47 ; 10		none
<b>General Data</b>							
Turn-on Time Max.	ms	11	0.1	11	0.1		controllable
Turn-off Time Max.	ms	11	11	11	11		11
Line Frequency Range	Hz	47 - 63	47 - 63	47 - 63	47 - 63		47 - 63
Isolation Volt. Between:							
- input / output	V rms	4.000	4.000	4.000	4.000		4.000
- input-output / base	V rms	-	-	-	-		-
Isolation Resistance	M $\Omega$	50	50	50	50		50
Operating Temperature		-20... +80	-20... +80	-20... +80	-20... +80		-20... +80
Recommended Varistor		SIOV-S14 K230	SIOV-S14 K230	SIOV-S14 K230	SIOV-S14 K230		SIOV-S14 K230

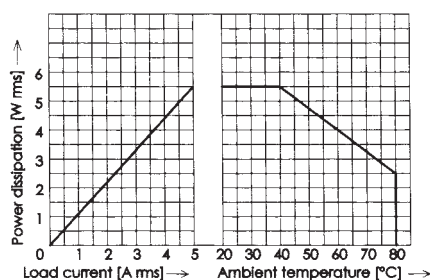
NOTE: \* An 800V version is available as WG A8 8D Series

\*\* integrated overvoltage protection effective above 1.000 V

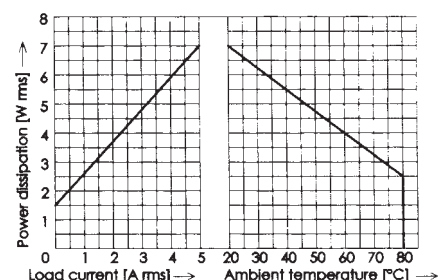
Derating diagram WG A8 6D 05 Z/R



Derating diagram WG A8 12D 05 Z/R



Derating diagram WG A8 6 05 PC





# Solid State Relays

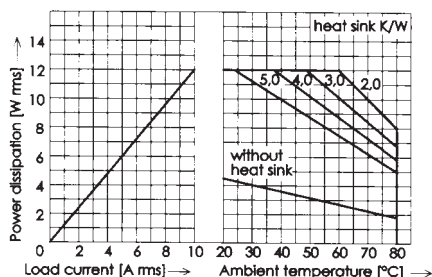
## 1-phase for AC loads and chassis mounting



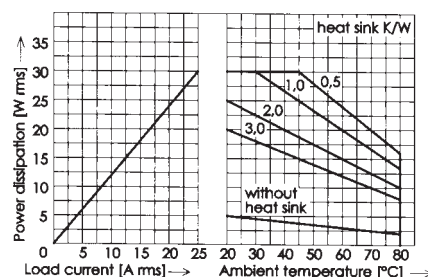
SSR type		WG A5 6A 10 Z	WG A5 6A 25 Z	WG A5 6A 40 Z	WG A5 6D 10 Z	WG A5 6D 25 Z	WG A5 6D 40 Z
Switching type		zero cross	zero cross	zero cross	zero cross	zero cross	zero cross
Approvals		UL, VDE	UL, VDE	UL, VDE	UL, VDE	UL, VDE	UL, VDE
Circuit diagrams, dimensions		page 19	page 19	page 19	page 19	page 19	page 19
Output		triac	triac	triac	triac	triac	triac
Application Fields		Resistive loads Inductive Loads with $\cos\phi > 0.85$	Resistive loads Inductive Loads with $\cos\phi > 0.85$	Resistive loads Inductive Loads with $\cos\phi > 0.85$	Resistive loads Inductive Loads with $\cos\phi > 0.85$	Resistive loads Inductive Loads with $\cos\phi > 0.85$	Resistive loads Inductive Loads with $\cos\phi > 0.85$
<b>Input Circuit</b>							
Control Voltage Range	V	90 - 280 AC	90 - 280 AC	90 - 280 AC	3 - 32 DC	3 - 32 DC	3 - 32 DC
Control Current Max.	mA	10	10	10	34	34	34
Turn-off voltage Min.	V DC	10 AC	10 AC	10 AC	1 DC	1 DC	1 DC
Input Resistance	$\Omega$	30.000	30.000	30.000	900	900	900
<b>Output Circuit</b>							
Load Voltage Range	V rms	24 - 280 AC	24 - 280 AC	24 - 280 AC	24 - 280 AC	24 - 280 AC	24 - 280 AC
Peak-off-stage Voltage	V drn	600	600	600	600	600	600
Off-state Leakage Current	mA <sub>off</sub> max.	6	12	12	6	12	12
Load Current Range	A rms	0.1 - 10	0.1 - 25	0.2 - 40	0.1 - 10	0.1 - 25	0.2 - 40
Surge Current. 1 half wave	A peak	110	230	315	110	230	315
t <sub>1</sub> for Fusing	A <sup>2</sup> s	60	260	500	60	260	500
On-state Voltage	V peak	1.85	1.85	1.85	1.85	1.85	1.85
Off-state (static) dv/dt	V/ $\mu$ s	200	200	200	200	200	200
Snubber	$\Omega$ ; nF	47 ; 47	47 ; 100	47 ; 100	47 ; 47	47 ; 100	47 ; 100
<b>General Data</b>							
Turn-on Time Max.	ms	33	33	33	11	11	11
Turn-off Time Max.	ms	33	33	33	11	11	11
Line Frequency Range	Hz	47 - 63	47 - 63	47 - 63	47 - 63	47 - 63	47 - 63
Isolation Volt. Between:							
- input / output	V rms	4.000	4.000	4.000	4.000	4.000	4.000
- input-output / base	V rms	2.500	2.500	2.500	2.500	2.500	2.500
Isolation Resistance	M $\Omega$	50	50	50	50	50	50
Operating Temperature		-20... +80	-20... +80	-20... +80	-20... +80	-20... +80	-20... +80
Recommended Varistor		S10V-S20 K230	S10V-S20 K230	S10V-S20 K230	S10V-S20 K230	S10V-S20 K230	S10V-S20 K230

UL recognised component: Suitable for a max. surrounding air temperature of 40°C. For use at other ambient temperatures, check the derating diagrams.

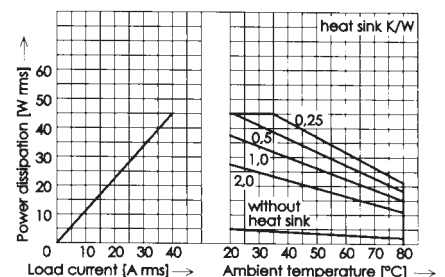
Derating diagram WG A5 6 10 Z



Derating diagram WG A5 6 25 Z

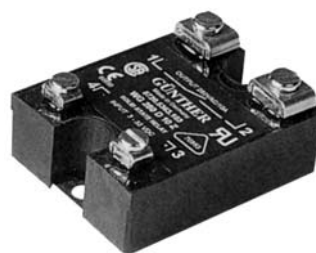


Derating diagram WG A5 6 40 Z



# Solid State Relays

## 1-phase for AC loads and chassis mounting

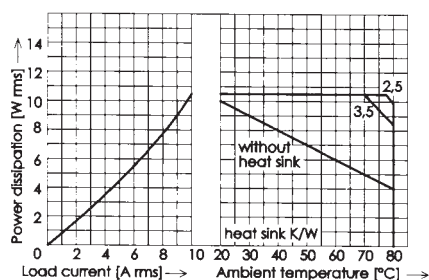


SSR type		WG 280 D 10 Z	WG 280 D 10 R	WG 280 D 25 Z	WG 280 D 25 R	WG 280 D 45 Z	WG 280 D 45 R
Switching type		zero cross	random	zero cross	random	zero cross	random
Approvals		UL, VDE	UL, VDE	UL, VDE	UL, VDE	UL, VDE	UL, VDE
Circuit diagrams, dimensions		page 19	page 19	page 19	page 19	page 19	page 19
Output		thyristor	thyristor	thyristor	thyristor	thyristor	thyristor
Application Fields		Resistive loads Inductive Loads with $\cos\varphi > 0.65$	Inductive loads	Resistive loads Inductive Loads with $\cos\varphi > 0.65$	Inductive loads	Resistive loads Inductive Loads with $\cos\varphi > 0.65$	Inductive loads
<b>Input Circuit</b>							
Control Voltage Range	V	3 - 32 DC	3 - 32 DC	3 - 32 DC	3 - 32 DC	3 - 32 DC	3 - 32 DC
Control Current Max.	mA	34	34	34	34	34	34
Turn-off voltage Min.	V DC	1	1	1	1	1	1
Input Resistance	$\Omega$	900	900	900	900	900	900
<b>Output Circuit</b>							
Load Voltage Range	V rms	24 - 280 AC	24 - 280 AC	24 - 280 AC	24 - 280 AC	24 - 280 AC	24 - 280 AC
Peak-off-stage Voltage	V drn	600	600	600	600	600	600
Off-state Leakage Current	mA <sub>eff</sub> max.	6	6	12	12	12	12
Load Current Range	A rms	0.1 - 10	0.1 - 10	0.2 - 25	0.2 - 25	0.4 - 45*	0.4 - 45*
Surge Current. 1 half wave	A peak	110	110	230	230	500	500
$I^2t$ for Fusing	A <sup>2</sup> s	60	60	260	260	1.250	1.250
On-state Voltage	V peak	1.6	1.6	1.6	1.6	1.6	1.6
Off-state (static) dv/dt	V/ $\mu$ s	200	200	200	200	200	200
Snubber	$\Omega$ ; nF	47 ; 47	47 ; 47	47 ; 100	47 ; 100	47 ; 100	47 ; 100
<b>General Data</b>							
Turn-on Time Max.	ms	11	0.1	11	0.1	11	0.1
Turn-off Time Max.	ms	11	11	11	11	11	11
Line Frequency Range	Hz	47 - 63	47 - 63	47 - 63	47 - 63	47 - 63	47 - 63
Isolation Volt. Between:							
- input / output	V rms	4.000	4.000	4.000	4.000	4.000	4.000
- input-output / base	V rms	2.500	2.500	2.500	2.500	2.500	2.500
Isolation Resistance	M $\Omega$	50	50	50	50	50	50
Operating Temperature		-20... +80	-20... +80	-20... +80	-20... +80	-20... +80	-20... +80
Recommended Varistor		SIOV-S20 K230	SIOV-S20 K230	SIOV-S20 K230	SIOV-S20 K230	SIOV-S20 K230	SIOV-S20 K230

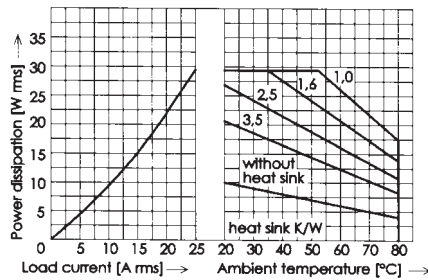
NOTE: \* A 50A version WG 280 D 50 Z/R is also available

UL recognised component: Suitable for a max. surrounding air temperature of 40°C. For use at other ambient temperatures, check the derating diagrams.

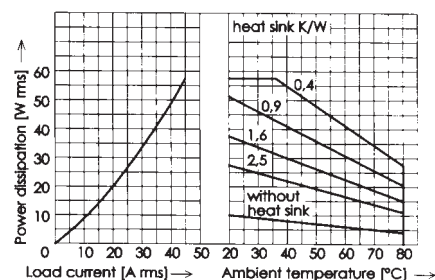
Derating diagram WG 280 D 10 Z/R



Derating diagram WG 280 D 25 Z/R



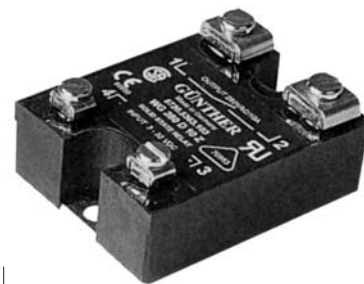
Derating diagram WG 280 D 45 Z/R





# Solid State Relays

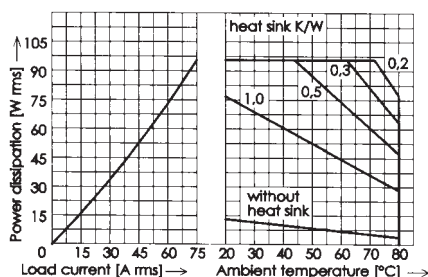
## 1-phase for AC loads and chassis mounting



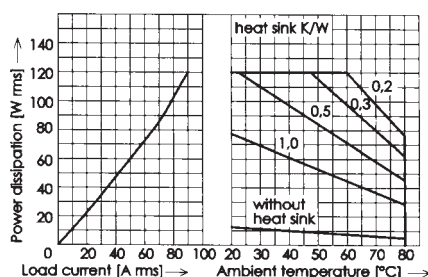
SSR type		WG 280 D 75 Z	WG 280 D 75 R	WG 280 D 90 Z	WG 280 D 90 R
Switching type		zero cross	random	zero cross	random
Approvals		UL, VDE	UL, VDE	UL, VDE	UL, VDE
Circuit diagrams, dimensions		page 19	page 19	page 19	page 19
Output		thyristor	thyristor	thyristor	thyristor
Application Fields		Resistive loads Inductive Loads with $\cos\varphi > 0.65$	Inductive loads	Resistive loads Inductive Loads with $\cos\varphi > 0.65$	Inductive loads
Input Circuit					
Control Voltage Range	V	3 - 32 DC	3 - 32 DC	3 - 32 DC	3 - 32 DC
Control Current Max.	mA	34	34	34	34
Turn-off voltage Min.	V DC	1	1	1	1
Input Resistance	$\Omega$	900	900	900	900
Output Circuit					
Load Voltage Range	V rms	24 - 280 AC	24 - 280 AC	24 - 280 AC	24 - 280 AC
Peak-off-stage Voltage	V drms	600	600	600	600
Off-state Leakage Current	mA <sub>eff</sub> max.	12	12	12	12
Load Current Range	A rms	0.4 - 75	0.4 - 75	0.4 - 90	0.4 - 90
Surge Current. 1 half wave	A peak	910	910	1.090	1.090
I <sup>2</sup> t for Fusing	A <sup>2</sup> s	4.150	4.150	5.980	5.980
On-state Voltage	V peak	1.6	1.6	1.6	1.6
Off-state (static) dv/dt	V/μs	200	200	200	200
Snubber	$\Omega$ ; nF	47 ; 100	47 ; 100	47 ; 100	47 ; 100
General Data					
Turn-on Time Max.	ms	11	0.1	11	0.1
Turn-off Time Max.	ms	11	11	11	11
Line Frequency Range	Hz	47 - 63	47 - 63	47 - 63	47 - 63
Isolation Volt. Between:					
- input / output	V rms	4.000	4.000	4.000	4.000
- input-output / base	V rms	2.500	2.500	2.500	2.500
Isolation Resistance	M $\Omega$	50	50	50	50
Operating Temperature		-20... +80	-20... +80	-20... +80	-20... +80
Recommended Varistor		S10V-S20 K230	S10V-S20 K230	S10V-S20 K230	S10V-S20 K230

UL recognised component: Suitable for a max. surrounding air temperature of 40°C. For use at other ambient temperatures, check the derating diagrams.

Derating diagram WG 280 D 75 Z/R

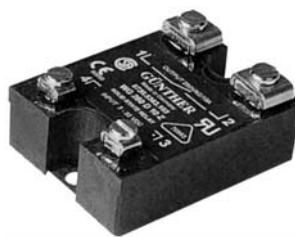


Derating diagram WG 280 D 90 Z/R



# Solid State Relays

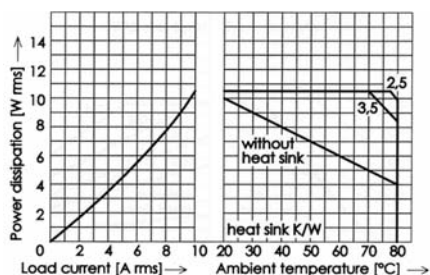
## 1-phase for AC loads and chassis mounting



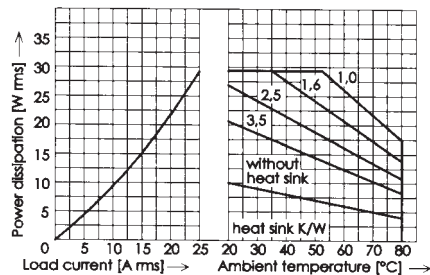
SSR type		WG 280 A 10 Z	WG 280 A 25 Z	WG 280 A 45 Z	WG 280 A 10 R	WG 280 A 25 R	WG 280 A 45 R
Switching type		zero cross	zero cross	zero cross	random	random	random
Approvals		UL, VDE	UL, VDE	UL, VDE	UL, VDE	UL, VDE	UL, VDE
Circuit diagrams, dimensions		page 19	page 19	page 19	page 19	page 19	page 19
Output		thyristor	thyristor	thyristor	thyristor	thyristor	thyristor
Application Fields		Resistive loads Inductive Loads with $\cos\varphi > 0.65$	Resistive loads Inductive Loads with $\cos\varphi > 0.65$	Resistive loads Inductive Loads with $\cos\varphi > 0.65$	Inductive Loads	Inductive Loads	Inductive Loads
<b>Input Circuit</b>							
Control Voltage Range	V	90 - 280 AC	90 - 280 AC	90 - 280 AC	90 - 280 AC	90 - 280 AC	90 - 280 AC
Control Current Max.	mA	10	10	10	12	12	12
Turn-off voltage Min.	V DC	10	10	10	10	10	10
Input Resistance	$\Omega$	30.000	30.000	30.000	30.000	30.000	30.000
<b>Output Circuit</b>							
Load Voltage Range	V rms	24 - 280 AC	24 - 280 AC	24 - 280 AC	24 - 280 AC	24 - 280 AC	24 - 280 AC
Peak-off-stage Voltage	V drn	600	600	600	600	600	600
Off-state Leakage Current	mA <sub>eff</sub> max.	6	12	12	6	12	12
Load Current Range	A rms	0.1 - 10	0.2 - 25	0.4 - 45	0.1 - 10	0.2 - 25	0.4 - 45
Surge Current. 1 half wave	A peak	110	230	500	110	230	500
$I^2t$ for Fusing	A <sup>2</sup> s	60	260	1.250	60	260	1250
On-state Voltage	V peak	1.6	1.6	1.6	1.6	1.6	1.6
Off-state (static) dv/dt	V/ $\mu$ s	200	200	200	200	200	200
Snubber	$\Omega$ ; nF	47 ; 47	47 ; 100	47 ; 100	47 ; 47	47 ; 100	47 ; 100
<b>General Data</b>							
Turn-on Time Max.	ms	33	33	33	0.1	0.1	0.1
Turn-off Time Max.	ms	33	33	33	33	33	33
Line Frequency Range	Hz	47 - 63	47 - 63	47 - 63	47 - 63	47 - 63	47 - 63
Isolation Volt. Between:							
- input / output	V rms	4.000	4.000	4.000	4.000	4.000	4.000
- input-output / base	V rms	2.500	2.500	2.500	2.500	2.500	2.500
Isolation Resistance	M $\Omega$	50	50	50	50	50	50
Operating Temperature		-20... +80	-20... +80	-20... +80	-20... +80	-20... +80	-20... +80
Recommended Varistor		SIOV-S20 K230	SIOV-S20 K230	SIOV-S20 K230	SIOV-S20 K230	SIOV-S20 K230	SIOV-S20 K230

UL recognised component: Suitable for a max. surrounding air temperature of 40°C. For use at other ambient temperatures, check the derating diagrams.

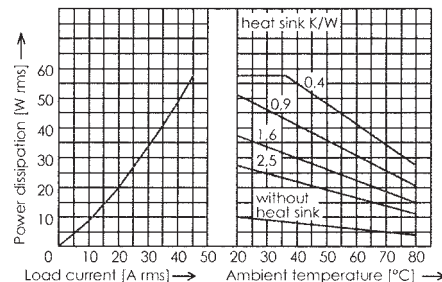
Derating diagram WG 280 A 10 Z/R



Derating diagram WG 280 A 25 Z/R

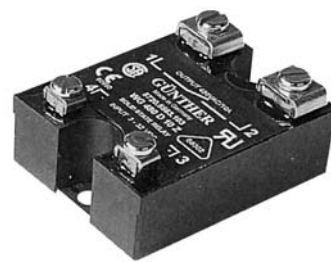


Derating diagram WG 280 A 45 Z/R



# Solid State Relays

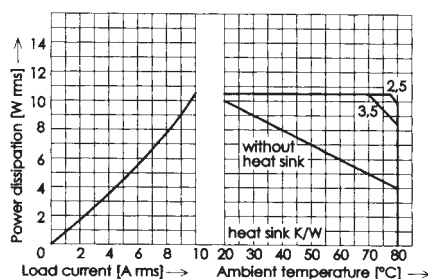
## 1-phase for AC loads and chassis mounting



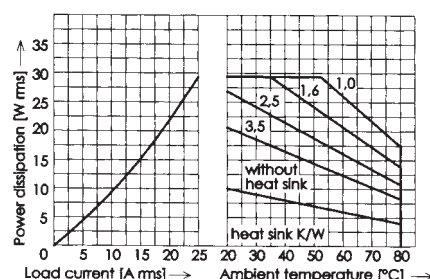
SSR type		WG 480 D 10 Z	WG 480 D 10 R	WG 480 D 25 Z	WG 480 D 25 R	WG 480 D 40 Z	WG 480 D 40 R
Switching type		zero cross	random	zero cross	random	zero cross	random
Approvals		UL, VDE	UL, VDE	UL, VDE	UL, VDE	UL, VDE	UL, VDE
Circuit diagrams, dimensions		page 19	page 19	page 19	page 19	page 19	page 19
Output		thyristor	thyristor	thyristor	thyristor	thyristor	thyristor
Application Fields		Resistive loads Inductive Loads with $\cos\varphi > 0.85$	Inductive loads	Resistive loads Inductive Loads with $\cos\varphi > 0.85$	Inductive loads	Resistive loads Inductive Loads with $\cos\varphi > 0.85$	Inductive loads
Input Circuit							
Control Voltage Range	V	3 - 32 DC	3 - 32 DC	3 - 32 DC	3 - 32 DC	3 - 32 DC	3 - 32 DC
Control Current Max.	mA	22	22	22	22	22	22
Turn-off voltage Min.	V DC	1	1	1	1	1	1
Input Resistance	$\Omega$	constant current	constant current	constant current	constant current	constant current	constant current
Output Circuit							
Load Voltage Range	V rms	24 - 530 AC	48 - 530 AC	24 - 530 AC	48 - 530 AC	24 - 530 AC	48 - 530 AC
Peak-off-stage Voltage	V drms	1.200 (1.000)*	1.200 (1.000)*	1.200 (1.000)*	1.200 (1.000)*	1.200 (1.000)*	1.200 (1.000)*
Off-state Leakage Current	mA <sub>off</sub> max.	10	10	10	10	10	10
Load Current Range	A rms	0.1 - 10	0.1 - 10	0.2 - 25	0.2 - 25	0.4 - 40	0.4 - 40
Surge Current. 1 half wave	A peak	110	110	230	230	500	500
I <sup>2</sup> t for Fusing	A <sup>2</sup> s	60	60	260	260	1.250	1.250
On-state Voltage	V peak	1.6	1.6	1.6	1.6	1.6	1.6
Off-state (static) dv/dt	V/ $\mu$ s	200	200	200	200	200	200
Snubber	$\Omega$ ; nF	47; 22	47; 22	47; 22	47; 22	47; 22	47; 22
General Data							
Turn-on Time Max.	ms	11	0.1	11	0.1	11	0.1
Turn-off Time Max.	ms	11	11	11	11	11	11
Line Frequency Range	Hz	47 - 63	47 - 63	47 - 63	47 - 63	47 - 63	47 - 63
Isolation Volt. Between:							
- input / output	V rms	4.000	4.000	4.000	4.000	4.000	4.000
- input-output / base	V rms	2.500	2.500	2.500	2.500	2.500	2.500
Isolation Resistance	M $\Omega$	50	50	50	50	50	50
Operating Temperature		-20... +80	-20... +80	-20... +80	-20... +80	-20... +80	-20... +80
Recommended Varistor		SIOV-S20 K420	SIOV-S20 K420	SIOV-S20 K420	SIOV-S20 K2420	SIOV-S20 K420	SIOV-S20 K420

UL recognised component: Suitable for a max. surrounding air temperature of 40°C. For use at other ambient temperatures, check the derating diagrams.

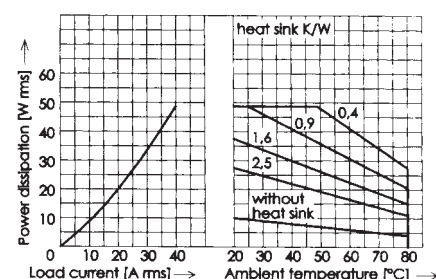
Derating diagram WG 480 D 10 Z/R



Derating diagram WG 480 D 25 Z/R

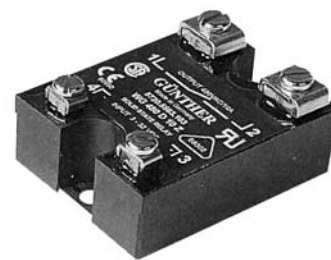


Derating diagram WG 480 D 40 Z/R



# Solid State Relays

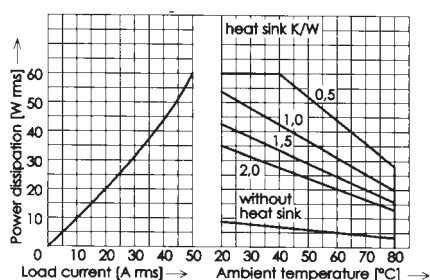
## 1-phase for AC loads and chassis mounting



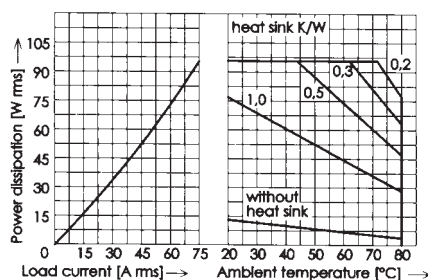
SSR type		WG 480 D 50 Z	WG 480 D 50 R	WG 480 D 75 Z	WG 480 D 75 R	WG 480 D 90 Z	WG 480 D 90 R
Switching type		zero cross	random	zero cross	random	zero cross	random
Approvals		UL, VDE	UL, VDE	UL, VDE	UL, VDE	UL, VDE	UL, VDE
Circuit diagrams, dimensions		page 19	page 19	page 19	page 19	page 19	page 19
Output		thyristor	thyristor	thyristor	thyristor	thyristor	thyristor
Application Fields		Resistive loads Inductive Loads with $\cos\varphi > 0.85$	Inductive loads	Resistive loads Inductive Loads with $\cos\varphi > 0.85$	Inductive loads	Resistive loads Inductive Loads with $\cos\varphi > 0.85$	Inductive loads
<b>Input Circuit</b>							
Control Voltage Range	V	3 - 32 DC	3 - 32 DC	3 - 32 DC	3 - 32 DC	3 - 32 DC	3 - 32 DC
Control Current Max.	mA	22	22	22	22	22	22
Turn-off voltage Min.	V DC	1	1	1	1	1	1
Input Resistance	$\Omega$	constant current	constant current	constant current	constant current	constant current	constant current
<b>Output Circuit</b>							
Load Voltage Range	V rms	24 - 530 AC	48 - 530 AC	24 - 530 AC	48 - 530 AC	24 - 530 AC	48 - 530 AC
Peak-off-stage Voltage	V drms	1.200	1.200	1.200	1.200	1.200	1.200
Off-state Leakage Current	mA <sub>eff</sub> max.	10	10	10	10	10	10
Load Current Range	A rms	0.4 - 50	0.4 - 50	0.4 - 75	0.4 - 75	0.4 - 90	0.4 - 90
Surge Current. 1 half wave	A peak	570	570	910	910	1.090	1.090
I <sup>2</sup> t for Fusing	A <sup>2</sup> s	1.620	1.620	4.150	4.150	5.980	5.980
On-state Voltage	V peak	1.6	1.6	1.6	1.6	1.6	1.6
Off-state (static) dv/dt	V/ $\mu$ s	200	200	200	200	200	200
Snubber	$\Omega$ ; nF	47 ; 22	47 ; 22	47 ; 22	47 ; 22	47 ; 22	47 ; 22
<b>General Data</b>							
Turn-on Time Max.	ms	11	0.1	11	0.1	11	0.1
Turn-off Time Max.	ms	11	11	11	11	11	11
Line Frequency Range	Hz	47 - 63	47 - 63	47 - 63	47 - 63	47 - 63	47 - 63
Isolation Volt. Between:							
- input / output	V rms	4.000	4.000	4.000	4.000	4.000	4.000
- input-output / base	V rms	2.500	2.500	2.500	2.500	2.500	2.500
Isolation Resistance	M $\Omega$	50	50	50	50	50	50
Operating Temperature		-20... +80	-20... +80	-20... +80	-20... +80	-20... +80	-20... +80
Recommended Varistor		SIOV-S20 K420	SIOV-S20 K420	SIOV-S20 K420	SIOV-S20 K2420	SIOV-S20 K420	SIOV-S20 K420

UL recognised component: Suitable for a max. surrounding air temperature of 40°C. For use at other ambient temperatures, check the derating diagrams.

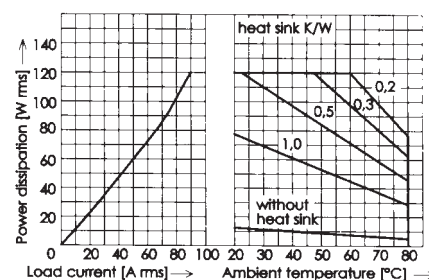
Derating diagram WG 480 D 50 Z/R



Derating diagram WG 480 D 75 Z/R

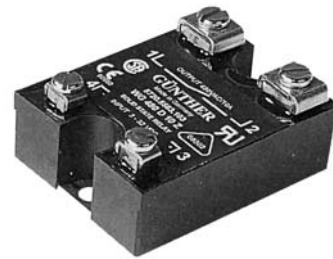


Derating diagram WG 480 D 90 Z/R



# Solid State Relays

## 1-phase for AC loads and chassis mounting

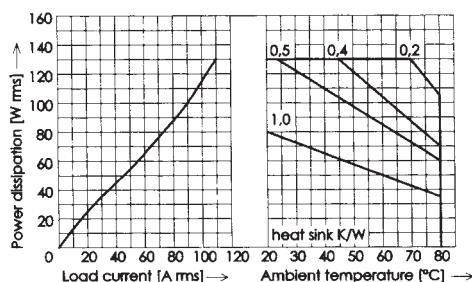


SSR type		WG 480 D 110 Z	WG 480 D 110 R	WG 480 D 125 Z	WG 480 D 125 R	WG 660 D ... Z	WG 660 D ... R
Switching type		zero cross	random	zero cross	random	zero cross	random
Approvals		UL, VDE	UL, VDE	UL, VDE	UL, VDE	UL on request	UL on request
Circuit diagrams, dimensions		page 19	page 19	page 19	page 19	page 19	page 19
Output		thyristor	thyristor	thyristor	thyristor	thyristor	thyristor
Application Fields		Resistive loads Inductive Loads with $\cos\varphi > 0.85$	Inductive loads	Resistive loads Inductive Loads with $\cos\varphi > 0.85$	Inductive loads	Resistive loads Inductive Loads with $\cos\varphi > 0.85$	Inductive Loads with $\cos\varphi > 0.65$
Input Circuit							
Control Voltage Range	V	3 - 32 DC	3 - 32 DC	3 - 32 DC	3 - 32 DC	3 - 32 DC	3 - 32 DC
Control Current Max.	mA	22	22	22	22	22	22
Turn-off voltage Min.	V DC	1	1	1	1	1	1
Input Resistance	$\Omega$	constant current	constant current	constant current	constant current	constant current	constant current
Output Circuit							
Load Voltage Range	V rms	24 - 530 AC	48 - 530 AC	24 - 530 AC	48 - 530 AC	24 - 660 AC	48 - 660 AC
Peak-off-stage Voltage	V drms	1.200	1.200	1.200	1.200	1600	1600
Off-state Leakage Current	mA <sub>eff</sub> max.	10	10	10	10	12	12
Load Current Range	A rms	0.4 - 110	0.4 - 110	0.4 - 125	0.4 - 125	0.4 - 10 ... 125	0.4 - 10 ... 125
Surge Current. 1 half wave	A peak	1.350	1.350	1.590	1.590	110...1590	110...1590
I <sup>2</sup> t for Fusing	A <sup>2</sup> s	9.100	9.100	12.650	12.650	60...12650	60...12650
On-state Voltage	V peak	1.6	1.6	1.6	1.6	1.6	1.6
Off-state (static) dv/dt	V/μs	200	200	200	200	200	200
Snubber	$\Omega$ ; nF	47 ; 22	47 ; 22	47 ; 22	47 ; 22	47 ; 22	47 ; 22
General Data							
Turn-on Time Max.	ms	11	0.1	11	0.1	11	0.1
Turn-off Time Max.	ms	11	11	11	11	11	11
Line Frequency Range	Hz	47 - 63	47 - 63	47 - 63	47 - 63	47 - 63	47 - 63
Isolation Volt. Between:							
- input / output	V rms	4.000	4.000	4.000	4.000	4.000	4.000
- input-output / base	V rms	2.500	2.500	2.500	2.500	2.500	2.500
Isolation Resistance	M $\Omega$	50	50	50	50	50	50
Operating Temperature		-20... +80	-20... +80	-20... +80	-20... +80	-20... +80	-20... +80
Recommended Varistor		SIOV-S20 K420	SIOV-S20 K420	SIOV-S20 K420	SIOV-S20 K2420	on request	on request

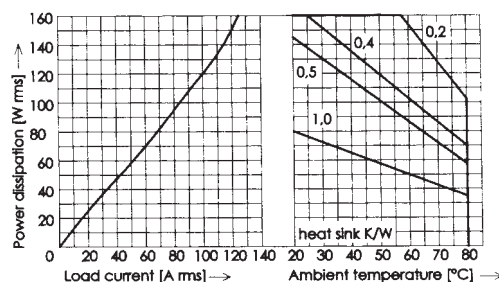
NOTE: For the derating diagrams of the WG660 Series, use the same diagrams as for the WG480 Series.

UL recognised component: Suitable for a max. surrounding air temperature of 40°C. For use at other ambient temperatures, check the derating diagrams.

Derating diagram WG 480 D 110 Z/R

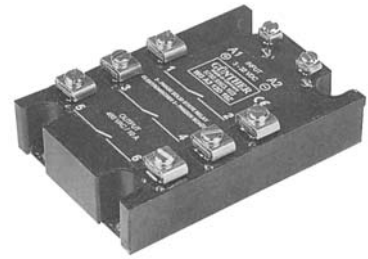


Derating diagram WG 480 D 125 Z/R



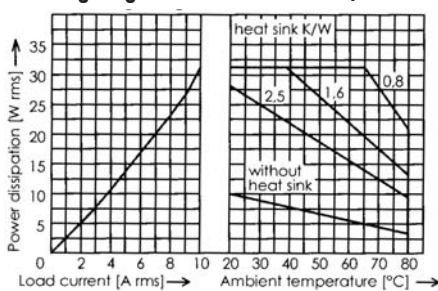
# Solid State Relays

## 3-phase for AC loads and chassis mounting

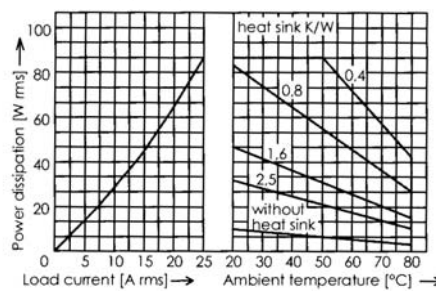


SSR type		WG A3 12D 10 Z	WG A3 12D 10 R	WG A3 12D 25 Z	WG A3 12D 25 R	WG A3 12D 45 Z	WG A3 12D 45 R
Switching type		zero cross	random	zero cross	random	zero cross	random
Approvals		none	none	none	none	none	none
Circuit diagrams, dimensions		page 19	page 19	page 19	page 19	page 19	page 19
Output		thyristor	thyristor	thyristor	thyristor	thyristor	thyristor
Application Fields		Resistive loads Inductive Loads with $\cos\varphi > 0.85$	Inductive loads	Resistive loads Inductive Loads with $\cos\varphi > 0.85$	Inductive loads	Resistive loads Inductive Loads with $\cos\varphi > 0.85$	Inductive loads
<b>Input Circuit</b>							
Control Voltage Range	V	3 - 32 DC	3 - 32 DC	3 - 32 DC	3 - 32 DC	3 - 32 DC	3 - 32 DC
Control Current Max.	mA	25	25	25	25	25	25
Turn-off voltage Min.	V DC	1	1	1	1	1	1
Input Resistance	$\Omega$	constant current	constant current	constant current	constant current	constant current	constant current
<b>Output Circuit</b>							
Load Voltage Range	V rms	24 - 530 AC	48 - 530 AC	24 - 530 AC	48 - 530 AC	24 - 530 AC	48 - 530 AC
Peak-off-stage Voltage	V drn	1.200 (1.000)*	1.200 (1.000)*	1.200 (1.000)*	1.200 (1.000)*	1.200 (1.000)*	1.200 (1.000)*
Off-state Leakage Current	mA <sub>eff</sub> max.	10	10	10	10	10	10
Load Current Range	A rms	0.1 - 10	0.1 - 10	0.2 - 25	0.2 - 25	0.4 - 45	0.4 - 45
Surge Current. 1 half wave	A peak	110	110	230	230	500	500
I <sup>2</sup> t for Fusing	A <sup>2</sup> s	60	60	260	260	1.250	1.250
On-state Voltage	V peak	1.6	1.6	1.6	1.6	1.6	1.6
Off-state (static) dv/dt	V/ $\mu$ s	200	200	200	200	200	200
Snubber	$\Omega$ ; nF	47; 10	47; 10	47; 10	47; 10	47; 10	47; 10
<b>General Data</b>		* integrated overvoltage protection effective above 1.000 V; SSR's with 1.600 V peak-off-state voltage also available					
Turn-on Time Max.	ms	11	0.1	11	0.1	11	0.1
Turn-off Time Max.	ms	11	11	11	11	11	11
Line Frequency Range	Hz	47 - 63	47 - 63	47 - 63	47 - 63	47 - 63	47 - 63
Isolation Volt. Between:							
- input / output	V rms	4.000	4.000	4.000	4.000	4.000	4.000
- input-output / base	V rms	2.500	2.500	2.500	2.500	2.500	2.500
Isolation Resistance	M $\Omega$	50	50	50	50	50	50
Operating Temperature		-20... +80	-20... +80	-20... +80	-20... +80	-20... +80	-20... +80
Recommended Varistor		SIOV-S20 K420	SIOV-S20 K420	SIOV-S20 K420	SIOV-S20 K2420	SIOV-S20 K420	SIOV-S20 K420

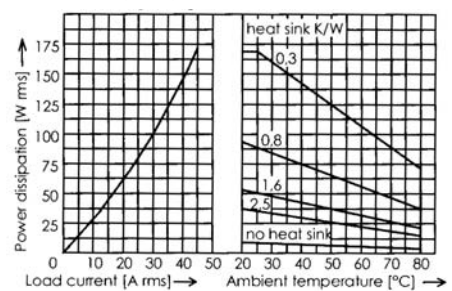
Derating diagram WG A3 12D 10 Z/R



Derating diagram WG A3 12D 25 Z/R



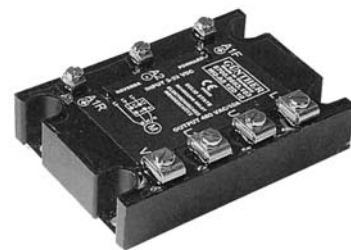
Derating diagram WG A3 12D 45 Z/R





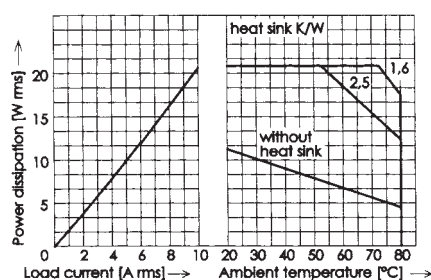
# Solid State Relays

## Solid State Reversing Relay for AC loads and chassis mounting

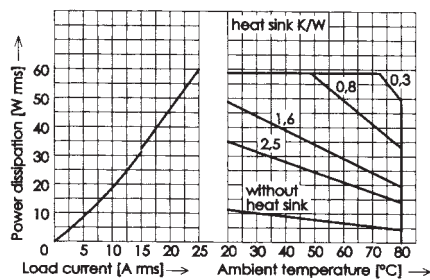


SSR type		WG A0 12D 10	WG A0 12D 25	WG A0 12D 45	
Switching type		random	random	random	
Approvals		none	none	none	
Circuit diagrams, dimensions		page 19	page 19	page 19	
Output		thyristor	thyristor	thyristor	
Application Fields		motor reversing	motor reversing	motor reversing	
<b>Input Circuit</b>					
Control Voltage Range	V	3 - 32 DC	3 - 32 DC	3 - 32 DC	
Control Current Max.	mA	30	30	30	
Turn-off voltage Min.	V DC	1	1	1	
Input Resistance	$\Omega$	constant current	constant current	constant current	
<b>Output Circuit</b>					
Load Voltage Range	V rms	48 - 480 AC	48 - 480 AC	48 - 480 AC	
Peak-off-stage Voltage	V drn	*1.200	*1.200	*1.200	
Off-state Leakage Current	mA <sub>eff</sub> max.	10	10	10	
Load Current Range	A rms	0.1 - 10	0.2 - 25	0.4 - 45	
Surge Current. 1 half wave	A peak	110	230	500	
t <sup>2</sup> for Fusing	A <sup>2</sup> s	60	260	1.250	
On-state Voltage	V peak	1.6	1.6	1.6	
Off-state (static) dv/dt	V/ $\mu$ s	500	500	500	
Snubber	$\Omega$ ; nF	47 ; 10	47 ; 10	47 ; 10	
<b>General Data</b>		* SSR's with 1.600 V peak-off-state voltage also available			
Turn-on Time Max.	ms	6	6	6	at 24 V DC control voltage
Turn-off Time Max.	ms	11	11	11	
Interlocking Time	ms	40 - 80	40 - 80	40 - 80	at 24 V DC control voltage
Line Frequency Range	Hz	47 - 63	47 - 63	47 - 63	
Isolation Volt. Between:					
- input / output	V rms	4.000	4.000	4.000	
- input-output / base	V rms	2.500	2.500	2.500	
Isolation Resistance	M $\Omega$	50	50	50	
Operating Temperature	°C	-20... +80	-20... +80	-20... +80	
Recommended Varistor		WG MOV 20 - 400	WG MOV 20 - 400	WG MOV 20 - 400	

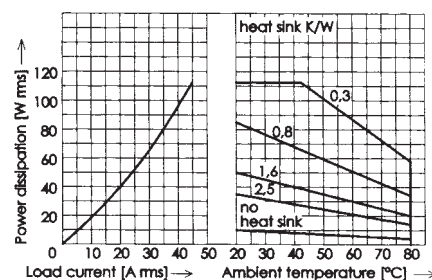
Derating diagram WG A0 12D 10



Derating diagram WG A0 12D 25



Derating diagram A0 12D 45



# Solid State Relays

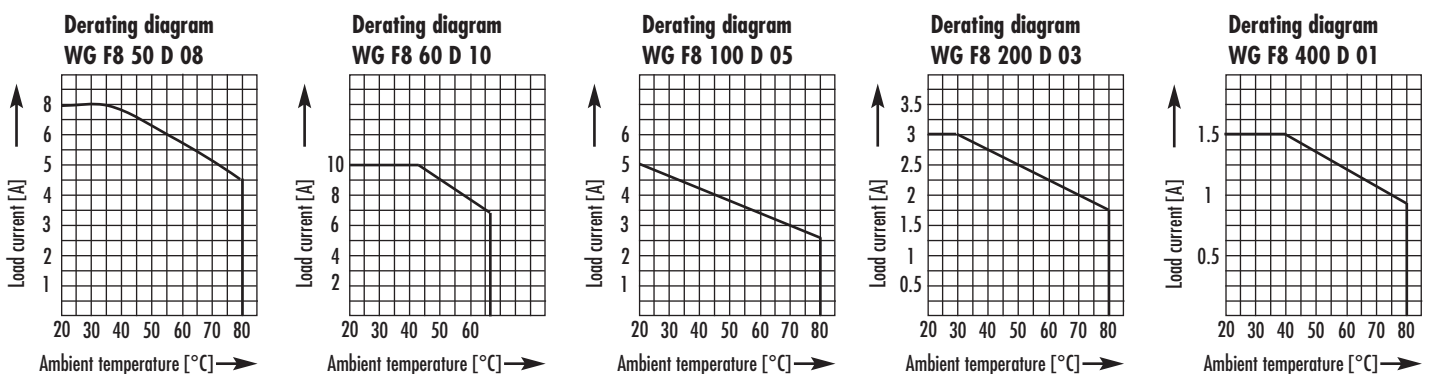
## 1-phase for DC loads and PCB mounting



SSR type		WG F8 50 D 08	WG F8 60 D 10	WG F8 100 D 05	WG F8 200 D 03	WG F8 400 D 01
Switching type		random	random	random	random	random
Approvals		none	none	none	none	none
Circuit diagrams, dimensions		page 19	page 19	page 19	page 19	page 19
Output		MOS-FET	MOS-FET	MOS-FET	MOS-FET	MOS-FET
Application Fields		resistive and inductive DC loads	resistive and inductive DC loads	resistive and inductive DC loads	resistive and inductive DC loads	resistive and inductive DC loads
<b>Input Circuit</b>						
Control Voltage Range		3 - 32 DC	3 - 32 DC	3 - 32 DC	3 - 32 DC	3 - 32 DC
Control Current Max.	V	25	25	25	25	25
Turn-off voltage Min.	mA	1	1	1	1	1
Input Resistance	V DC	constant current	constant current	constant current	constant current	constant current
<b>Output Circuit</b>						
Load Voltage Range	V	1 - 50 DC	1 - 60 DC	1 - 100 DC	1 - 200 DC	1 - 400 DC
Off-state Leakage Current	mA max.	0.1	0.1	0.1	0.1	0.1
Load Current Range	A	0 - 8	0 - 10	0 - 5	0 - 3	0 - 1.5
Surge Current. 2 ms Max.	A	80	100	50	35	15
On-state Resistance Max.	mΩ	36	25	150	360	1.100
<b>General Data</b>						
Turn-on Time Max.	ms	2	2	2	2	2
Turn-off Time Max.	ms	0.1	0.1	0.1	0.1	0.1
PWM frequency Max.	Hz	250	250	250	250	250
Isolation Volt. Between:						
- input / output	VDC	1.500	1.500	1.500	1.500	1.500
- input-output / base		-	-	-	-	-
Isolation Resistance	MΩ	50	50	50	50	50
Operating Temperature	°C	-20... +80	-20... +80	-20... +80	-20... +80	-20... +80

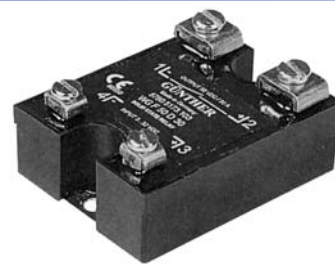
at max. chip temperature

We recommend external contact protection (diode, RC-snubber) for inductive loads



# Solid State Relays

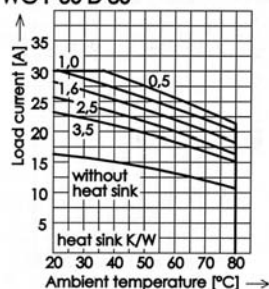
## 1-phase for DC loads and chassis mounting



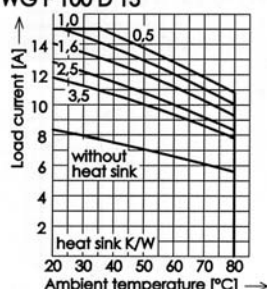
SSR type		WG F 50 D 30	WG F 100 D 15	WG F 200 D 10	WG F 400 D 05
Switching type		random	random	random	random
Approvals		none	none	none	none
Circuit diagrams, dimensions		page 19	page 19	page 19	page 19
Output		MOS-FET	MOS-FET	MOS-FET	MOS-FET
Application Fields		resistive and inductive DC loads	resistive and inductive DC loads	resistive and inductive DC loads	resistive and inductive DC loads
Input Circuit					
Control Voltage Range	V	3 - 32 DC	3 - 32 DC	3 - 32 DC	3 - 32 DC
Control Current Max.	mA	25	25	25	25
Turn-off voltage Min.	V DC	1	1	1	1
Input Resistance	V	constant current	constant current	constant current	constant current
Output Circuit					
Load Voltage Range	V	1 - 50 DC	1 - 100 DC	1 - 200 DC	1 - 400 DC
Peak-off-state voltage	V				
Off-state Leakage Current	A	0.1	0.1	0.1	0.1
Load Current Range	A	0 - 30	0 - 15	0 - 10	0 - 5
Surge Current. 2 ms Max.	A	0 - 30	50	35	15
On-state Resistance Max.	mΩ	80	150	360	1.100
General Data					at Max. chip temp.
Turn-on Time Max.	ms	2	2	2	2
Turn-off Time Max.	Hz	0.1	0.1	0.1	0.1
PWM frequency Max.		250	250	250	250
Isolation Volt. Between:	VDC				
- input / output	VDC	1.500	1.500	1.500	1.500
- input-output / base	MΩ	2.500	2.500	2.500	2.500
Isolation Resistance	°C	50	50	50	50
Operating Temperature		-20... +80	-20... +80	-20... +80	-20... +80

We recommend external contact protection (diode, RC-snubber) for inductive loads

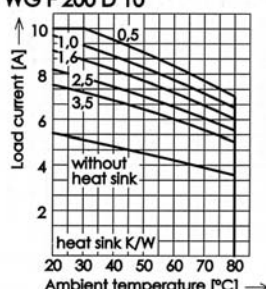
Derating diagram  
WG F 50 D 30



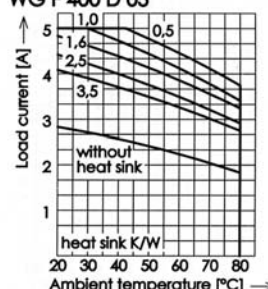
Derating diagram  
WG F 100 D 15



Derating diagram  
WG F 200 D 10

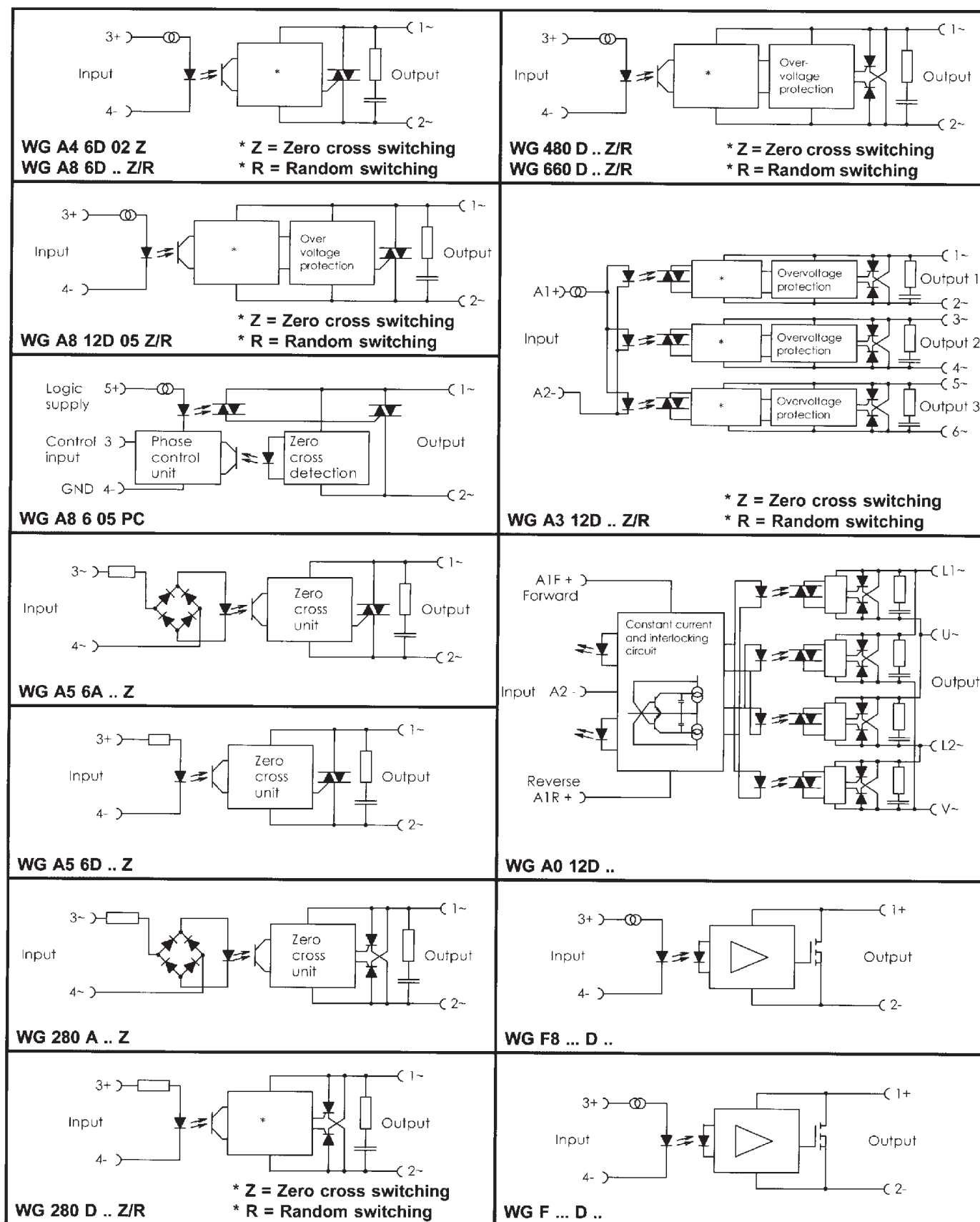


Derating diagram  
WG F 400 D 05



# Solid State Relays

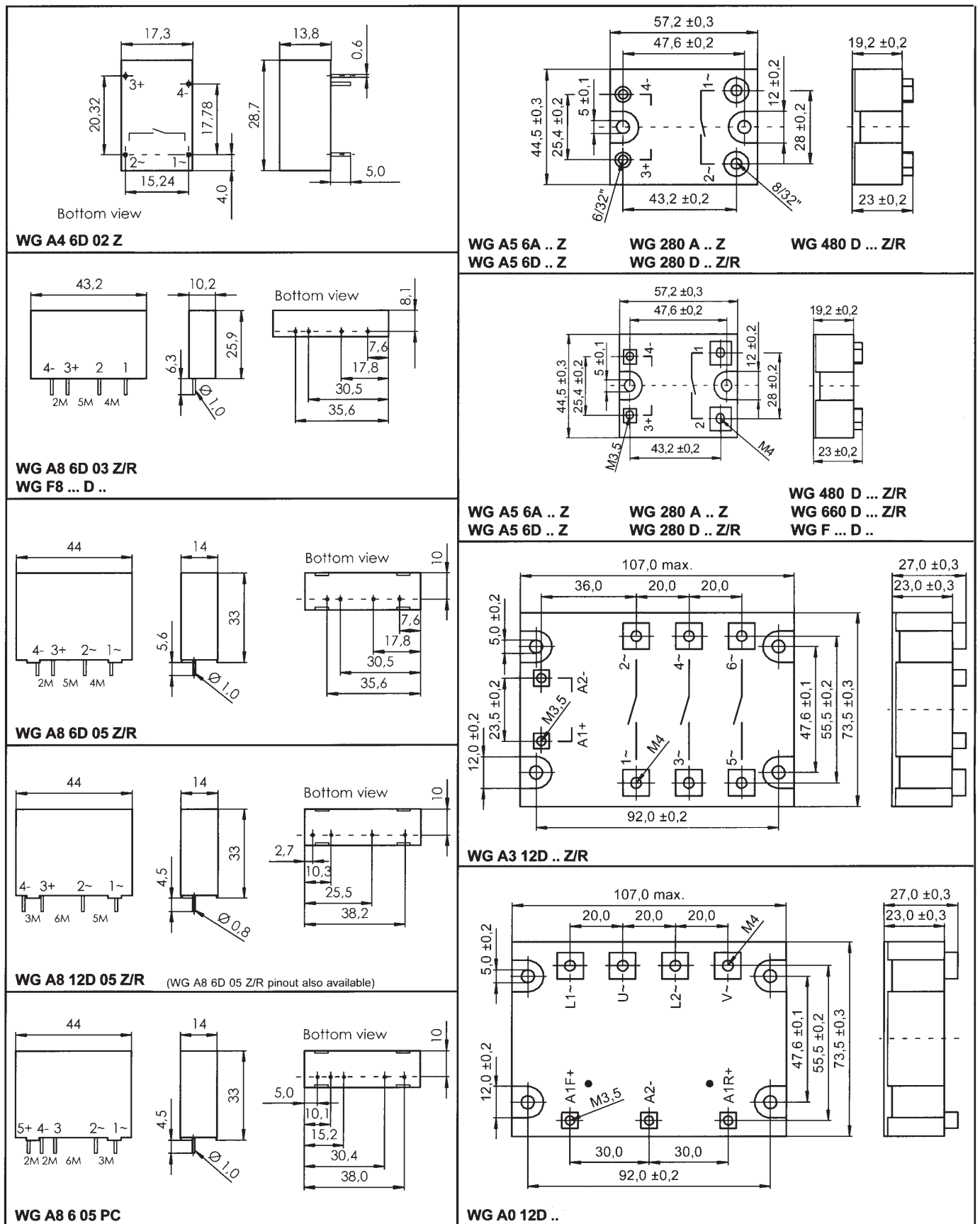
## Circuit Diagrams



# Solid State Relays

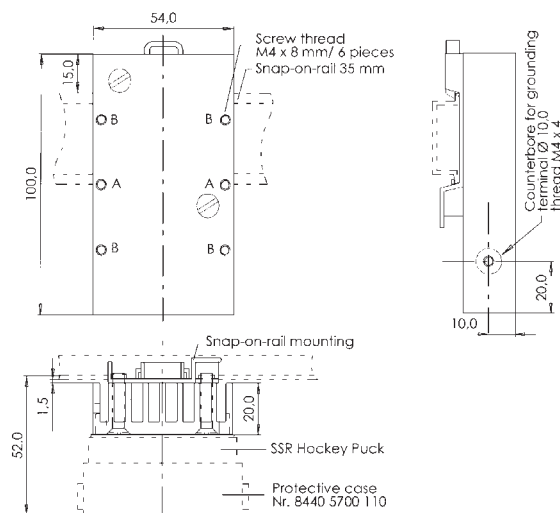
## Dimensions

### Dimensions in mm



# Solid State Relays - Heat Sinks

## Heat Sink WG - K1/100



Snap-on-rail mounting for 1 or 2 unit 1-phase Solid State Relays.

Thermal Resistance:

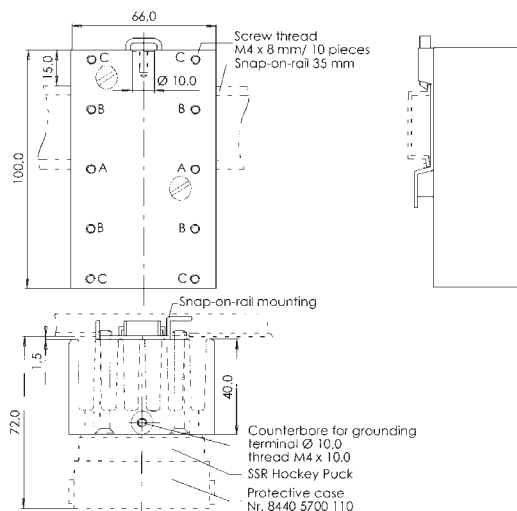
1 x 3.5 K/W for A (= 1 SSR)  
2 x 6.0 K/W for B (= 2 SSR's)

Dimensions in mm

Dimension tolerance:  $\pm 1.0$ mm

Weight: 170g

## Heat Sink WG - K2/100



Snap-on-rail mounting for 1 or 2 unit 1-phase Solid State Relays.  
or 1 unit Reversing Relay  
or 1 unit 3-phase Solid State Relay

Thermal Resistance:

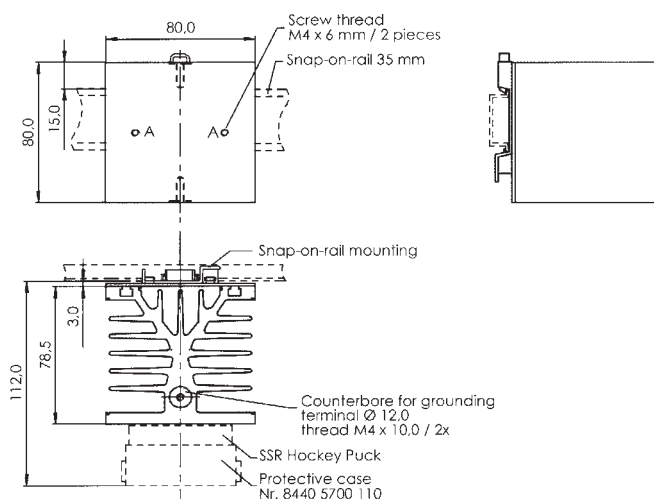
1 x 2.5 K/W for A (= 1 SSR)  
2 x 4.0 K/W for B (= 2 SSR's)  
1 x 2.5 K/W for C (= 1 Reversing Relay  
or 1 3-phase SSR)

Dimensions in mm

Dimension tolerance:  $\pm 1.0$ mm

Weight: 400g

## Heat Sink WG - K5/80



Snap-on-rail mounting for 1 unit 1-phase Solid State Relay.

Thermal Resistance:

1 x 1.6 K/W for A (= 1 SSR)

Dimensions in mm

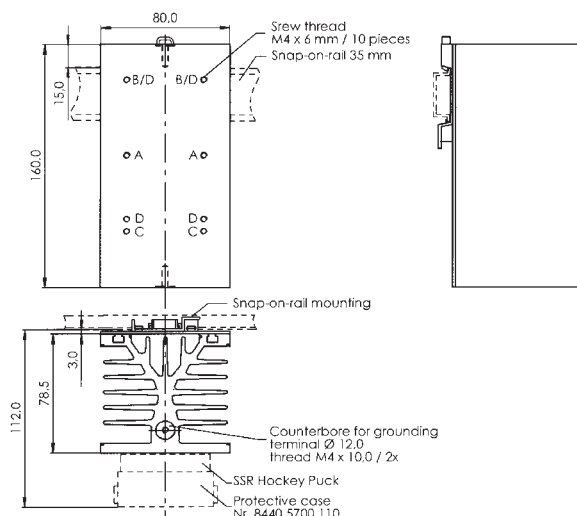
Dimension tolerance:  $\pm 1.0$ mm

Weight: 600g



# Solid State Relays - Heat Sinks

## Heat Sink WG - K3/160



With snap-on-rail mounting for 1, 2 or 3 unit  
1-phase Solid State Relays.  
Or 1 unit Reversing Relay or 1 unit 3-phase Solid State Relay

Thermal Resistance:

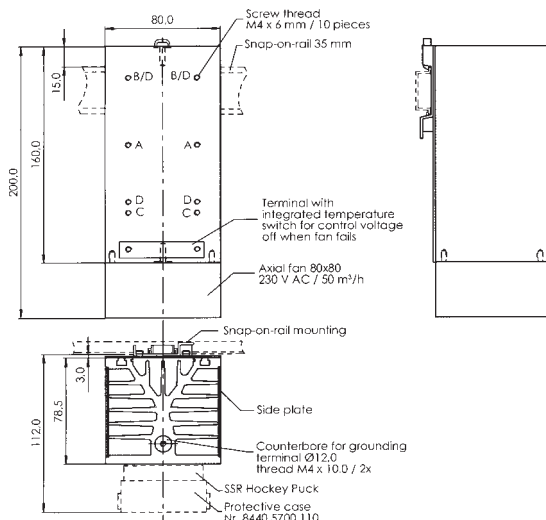
1 x 0.9 K/W for A (= 1 SSR)  
2 x 1.7 K/W for A + B (= 2 SSR's)  
3 x 2.5 KW for A + B + C (= 3 SSR's)  
1 x 0.8 K/W for D (= 1 reversing relay or  
1 3-phase SSR)

Dimensions in mm

Dimension tolerance:  $\pm 1.0$ mm

Weight: 1100g

## Heat Sink WG - K4/160L



With snap-on-rail mounting for 1, 2 or 3 unit 1-phase Solid  
State Relays.  
Or 1 unit Reversing Relay or 1 unit 3-phase Solid State Relay

Thermal Resistance:

1 x 0.30 K/W for A (= 1 SSR)  
2 x 0.55 K/W for A + B (= 2 SSR's)  
3 x 0.85 KW for A + B + C (= 3 SSR's)  
1 x 0.25 K/W for D (= 1 reversing relay or  
1 3-phase SSR)

Dimensions in mm

Dimension tolerance:  $\pm 1.0$ mm

Weight: 1500g

### Accessories:

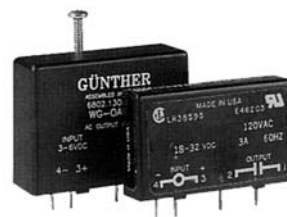
Description	Part Number	Purpose
Varistor protection WG MOV 20-400	5981 5900 080	for WG A0 overvoltage protection with 4 varistors assembled
Protective case small	8440 5700 110	for chassis mounting relays WG A5 WG 280 WG 480, WG 660, WG F
Protective case large	8440 5701 770	for chassis mounting relays WG A3, WG A0
Conducting paste	8406 0180 020	to use between Solid State Relays base plate and heat sink

**CE-approval:** All versions of the chassis mounting relays WG A5, WG 280, WG 480, WG 660, WG F, WG A3, WG A0 comply with the low voltage directive 73/23/EEC. Compliance with other directives is not implied. These products are components which may only be incorporated into a device which meets the requirements of relevant directives.

**EMC-directive:** To comply with the EMC directives it is necessary to know the exact load conditions of the application. To improve noise immunity special line saturation reactors or capacitors can be used. For determination of suitable component configurations do not hesitate to contact us for advice.

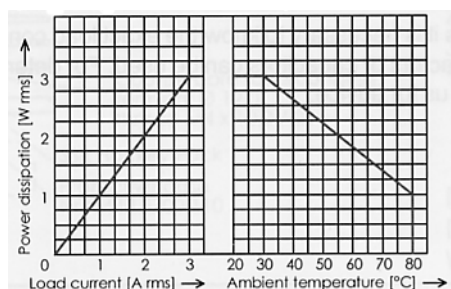
# Output Modules

for AC loads and PCB mounting



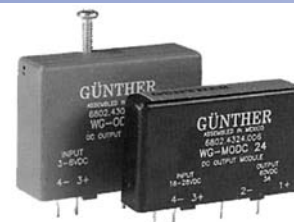
Output module type	Standard	WG 0AC5A	WG 0AC15A	WG 0AC24A
	Mini	WG MOAC5A	WG MOAC15A	WG MOAC24A
Switching type		zero cross	zero cross	zero cross
Approvals		on request	on request	on request
Circuit diagrams, dimensions		page 27	page 27	page 27
Output		triac	triac	triac
Application Fields		Resistive loads Inductive Loads with $\cos\varphi > 0.85$	Resistive loads Inductive Loads with $\cos\varphi > 0.85$	Resistive loads Inductive Loads with $\cos\varphi > 0.85$
<b>Input Circuit</b>				
Control Voltage Range	V	3 - 8 DC	9 - 18 DC	18 - 32 DC
Control Current Max.	mA	32	18	16
Turn-off voltage Min.	V DC	1	1	1
Input Resistance Min.	$\Omega$	250	1.000	2.000
<b>Output Circuit</b>				
Load Voltage Range	V rms	24 - 280 AC	24 - 280 AC	24 - 280 AC
Peak-off-state voltage	V drms	600	600	600
Off-state Leakage Current	mA <sub>eff max</sub>	5	5	5
Load Current Range	A rms	0,05 - 3	0,05 - 3	0,05 - 3
Surge Current. 1 half wave	A peak	100	100	100
$I^2t$ for fusing	A <sup>2</sup> s	50	50	50
On-state Voltage	V peak	1,6	1,6	1,6
Off-state (static) dv/dt	V/ $\mu$ s	200	200	200
Snubber	$\Omega$ nF	47 ; 22	47 ; 22	47 ; 22
<b>General Data</b>				
Turn-on Time Max.	ms	11	11	11
Turn-off Time Max.	ms	11	11	11
Line Frequency Range	Hz	47 - 63	47 - 63	47 - 63
Isolation Volt. Between:				
- input/output	V rms	4.000	4.000	4.000
Isolation Resistance	M $\Omega$	50	50	50
Operating Temperature	°C	-20... +80	-20... +80	-20... +80
Recommend Varistor	Siemens	S10V-S14 K230	S10V-S14 K230	S10V-S14 K230

Derating diagram WG 0AC .A / WG MOAC . A



# Output Modules

## for DC loads and PCB mounting



Output module type	Standard	WG ODC5	WG ODC5A	WG ODC15	WG ODC15A	WG ODC24	WG ODC24A	WG ODC5-18
	Mini	WG MODC5	WG MODC5A	WG MODC15	WG MODC15A	WG MODC24	WG MODC24A	WG MODC5-18
Switching type		random	random	random	random	random	random	random
Approvals		on request	on request	on request	on request	on request	on request	on request
Circuit diagrams, dimensions		page 27	page 27	page 27	page 27	page 27	page 27	page 27
Output		transistor	transistor	transistor	transistor	transistor	transistor	transistor
Application Fields		Resistive, Inductive, Capacitive Loads	Resistive, Inductive, Capacitive Loads	Resistive, Inductive, Capacitive Loads	Resistive, Inductive, Capacitive Loads	Resistive, Inductive, Capacitive Loads	Resistive, Inductive, Capacitive Loads	Resistive, Inductive, Capacitive Loads
<b>Input Circuit</b>								
Control Voltage Range	V	2,75 - 8DC	2,75 - 8DC	9 - 18DC	9 - 18DC	18 - 32DC	18 - 32DC	3 - 24DC
Control Current Max. 1)	mA	32	32	18	18	16	16	24
Turn-off voltage Min.	V DC	1	1	3	3	5	5	1
Input Resistance 3)	Ω	250	250	1.000	1.000	2.000	2.000	1.000
<b>Output Circuit 3)</b>								
Load Voltage Range	V rms	3 - 60 DC	3 - 60 DC	3 - 60 DC	5 - 200 DC	3 - 60 DC	5 - 200 DC	3 - 60 DC
Off-state Leakage Current	mA 4)	1,0	1,0	1,0	2,0	1,0	2,0	1,0
Load Current Range 5)	A	0,01 - 3,0	0,01 - 3,0	0,01 - 3,0	0,01 - 1,0	0,01 - 3,0	0,01 - 1,0	0,01 - 3,0
Surge Current. (1,0s)	A 6)	5,0	5,0	5,0	3,0	5,0	3,0	5,0
On-state Voltage Max.	V DC 7)	1,5	1,5	1,5	1,5	1,5	1,5	1,5
<b>General Data</b>								
Turn-on Time Max. 8)	ms	0,1	0,1	0,1	0,1	0,1	0,1	0,1
Turn-off Time Max. 8)	ms	0,1	0,1	0,1	0,1	0,1	0,1	0,1
PWM Frequency Max.	Hz	250	250	250	250	250	250	250
Isolation Volt. Between:								
- input/output	V	4.000	4.000	4.000	4.000	4.000	4.000	4.000
Isolation Resistance	MΩ	50	50	50	50	50	50	50
Operating Temperature	°C	-20... +80	-20... +80	-20... +80	-20... +80	-20... +80	-20... +80	-20... +80

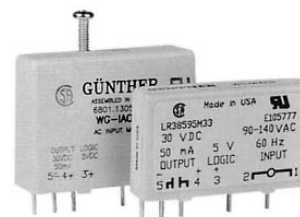
We recommend external contact protection (diode, RC-link) with inductive loads

### NOTES

- 1) At maximum input voltage
- 2) Does not include LED impedance (drop)
- 3) Specifications apply to T<sub>A</sub> (ambient temperature) -20 to +80 °C and are maximum values unless otherwise noted.
- 4) At T<sub>A</sub> of +80 °C and maximum line voltage.
- 5) For 60 volt versions: At T<sub>A</sub> of +20 °C, derate 38 mA/°C to +80 °C.  
For 200 volt versions: At T<sub>A</sub> of +45 °C, derate 18 mA/°C to +80 °C.
- 6) At T<sub>A</sub> of +25 °C, non-repetitive.
- 7) At T<sub>A</sub> of +25 °C and maximum on-state current.
- 8) At maximum voltage and current and nominal logic supply voltage.

# Input Modules

for AC loads and PCB mounting



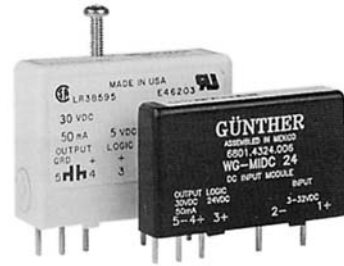
Input module type	Standard	WG IAC5	WG IAC5A	WG IAC15	WG IAC15A	WG IAC24	WG IAC24A
	Mini	WG MIAC5	WG MIAC5A	WG MIAC15	WG MIAC15A	WG MIAC24	WG MIAC24A
Approvals		UL on request	UL on request	UL on request	UL on request	UL on request	UL on request
Circuit diagrams, dimensions		page 27	page 27	page 27	page 27	page 27	page 27
Output		transistor	transistor	transistor	transistor	transistor	transistor
Application Fields		monitoring of electronic load circuits	monitoring of electronic load circuits	monitoring of electronic load circuits	monitoring of electronic load circuits	monitoring of electronic load circuits	monitoring of electronic load circuits
<b>Input Circuit 1)</b>	<b>PIN 1+2</b>						
Input Voltage Range 2)	V AC/DC	90 - 140	180 - 280	90 - 140	180 - 280	90 - 140	180 - 280
Allowable input voltage for output off-state	V AC/DC	40	40	40	40	40	40
Allowable input current for output off-state.	mA	3,0	2,0	3,0	2,0	3,0	2,0
Input current max. 3)	mA	10	10	10	10	10	10
Operating Frequency	Hz	47 - 63	47 - 63	47 - 63	47 - 63	47 - 63	47 - 63
<b>Output Circuit 1)</b>	<b>PIN 4+5 open collector</b>						
Output Voltage 4)	V DC	30	30	30	30	30	30
Output Current max.	mA	50	50	50	50	50	50
Output Voltage drop max.	mV DC	200	200	200	200	200	200
Leakage Current max.	µA	10	10	10	10	10	10
Turn-on Time max. 5)	ms	20	20	20	20	20	20
Turn-off Time max. 5)	ms	30	30	30	30	30	30
<b>Logic Supply 1)</b>	<b>PIN 3+5</b>						
Supply Voltage Range	V DC	2,75 - 6,0	2,75 - 6,0	9 - 18	9 - 18	20 - 30	2,75 - 6,0
Supply Current max 6)	mA	16	16	16	16	16	16
<b>General Data</b>							
Operating Temperature	°C	-20... +80	-20... +80	-20... +80	-20... +80	-20... +80	-20... +80
Isolation Voltage	V	4.000	4.000	4.000	4.000	4.000	4.000

## NOTES

- 1) Specifications apply to  $T_A$  (ambient temperature) -20 to +80 °C and are maximum values unless otherwise noted.
- 2) Günther input modules will operate on DC or AC input voltage.
- 3) At maximum input voltage.
- 4) Breakdown voltage of output transistor.
- 5) At nominal logic supply voltage, output voltage of logic circuit 30 VDC, output current of logic circuit 25 mA, input voltage 120 V AC and  $T_A = +25$  °C.
- 6) With external LED indicator on mounting boards, 18 mA **without** LED.

# Input Modules

## for DC loads and PCB mounting



Input module type	Standard	WG IDC5	WG IDC15	WG IDC24
	Mini	WG MIDC5	WG MIDC15	WG MIDC24
Approvals		UL on request	UL on request	UL on request
Circuit diagrams, dimensions		page 27	page 27	page 27
Output		transistor	transistor	transistor
Application Fields		monitoring of electronic load circuits	monitoring of electronic load circuits	monitoring of electronic load circuits
<b>Input Circuit 1)</b>		<b>PIN 1+2</b>		
Input Voltage Range 2)	V	<b>3,3 - 32 DC</b>	<b>3,3 - 32 DC</b>	<b>3,3 - 32 DC</b>
Allowable input voltage for output off-state	V DC	2	2	2
Allowable input current for output off-state.	mA	1	1	1
Input current max. 3)	mA	32	32	32
Input Resistance 4)	$\Omega$	1.000	1.000	1.000
<b>Output Circuit 1)</b>		<b>PIN 4+5</b>		
Output Voltage 5)	V DC	30	30	30
Output Current max.	mA	50	50	50
Output Voltage drop max.	mV DC	200	200	200
Leakage Current max.	$\mu$ A	10	10	10
Turn-on Time max. 6)	ms	1,0	1,0	1,0
Turn-off Time max. 6)	ms	1,0	1,0	1,0
<b>Logic Supply 1)</b>		<b>PIN 4+5 open collector</b>		
Supply Voltage Range	V DC	<b>2,75 - 6,0</b>	<b>9 - 18</b>	<b>20 - 30</b>
Supply Current max 7)	mA	16	16	16
Leakage Current max.	$\mu$ A	10	10	10
<b>General Data</b>				
Operating Temperature	$^{\circ}$ C	-20... +80	-20... +80	-20... +80
Isolation Voltage	V	4.000	4.000	4.000

### NOTES

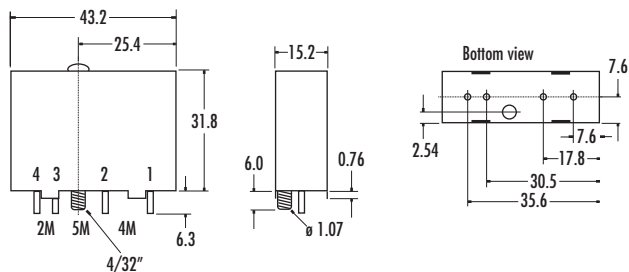
- 1) Specifications apply to  $T_A$  (ambient temperature) -20 to +80  $^{\circ}$ C and are maximum values unless otherwise noted.
- 2) Series switching with Günther output modules is permitted.
- 3) At 32 V DC input voltage.
- 4) Does not include LED impedance (drop).
- 5) Breakdown voltage of output transistor.
- 6) At nominal logic supply voltage, output voltage of logic circuit 30 V DC, output current of logic circuit 25 mA, input voltage 120 V AC and  $T_A = +25^{\circ}$ C.
- 6) With external LED indicator on mounting boards, 18 mA **without** LED.

# Input Modules

## Dimensions in mm

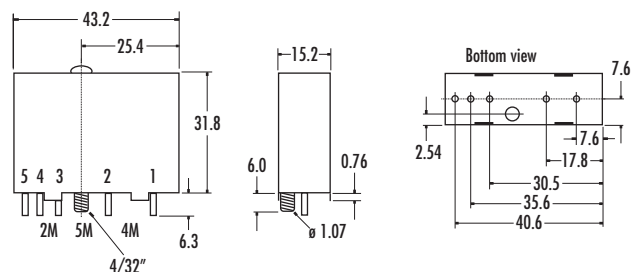
### Standard modules

#### OAC / ODC



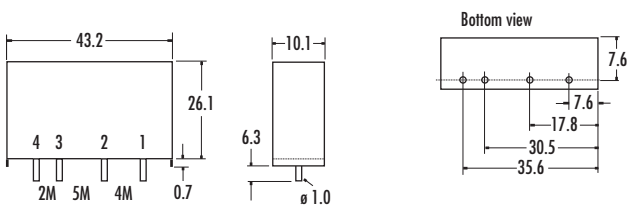
### Standard modules

#### IAC / IDC



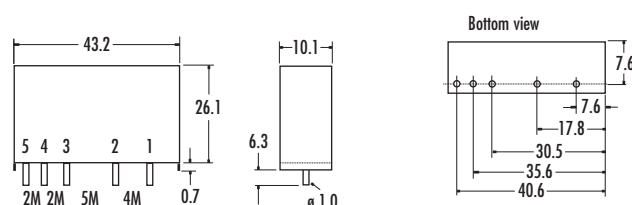
### Mini modules

#### MOAC / MODC



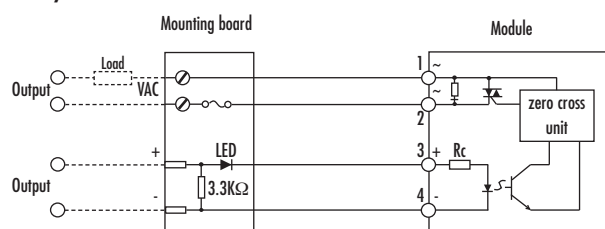
### Mini modules

#### MIAC / MIDC

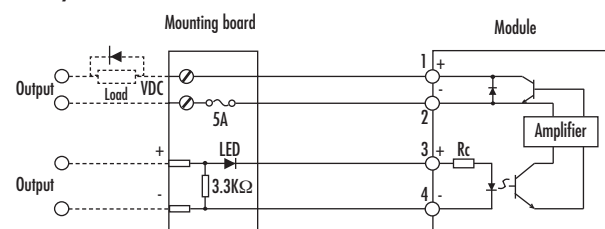


## Circuit diagrams

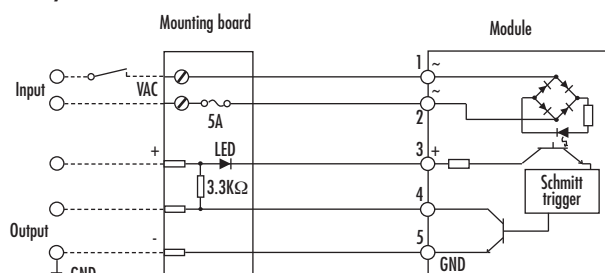
### OAC / MOAC



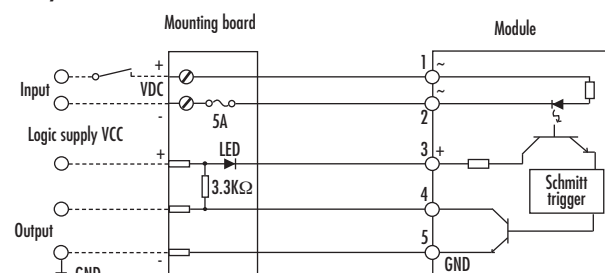
### ODC / MODC



### OAC / MOAC



### IDC / MIDC



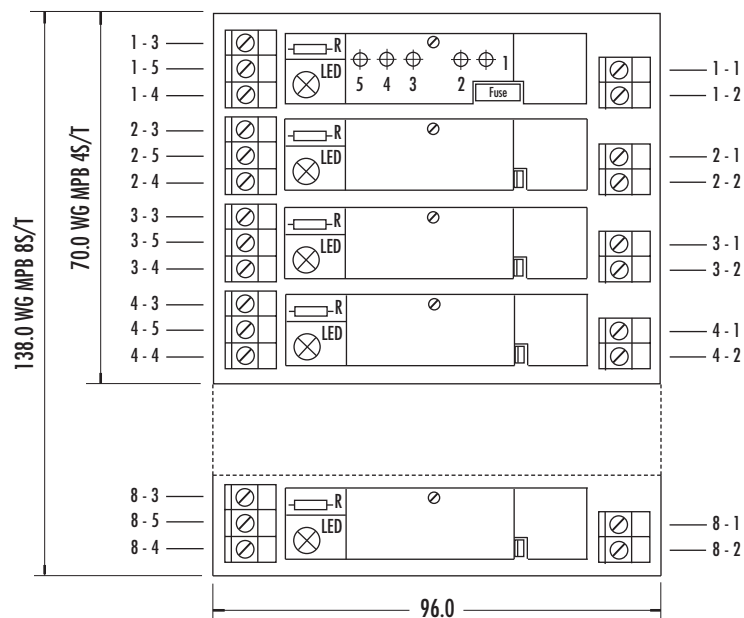


# Input / Output Modules

- Available with 4 or 8 positions
- Available with common ground (S version) or common supply and ground (T version)
- Screw terminals to both logic and field
- Optional overvoltage protection with metal oxide varistor
- Easy-to-change fuses
- LED status identification for each module
- Individual terminal identification available
- Suitable for both standard and mini modules
- Screwless mounting for mini modules
- With snap-on-rail mounting

## Dimensions in mm

### Mounting boards for 4 or 8 modules



## Module Positions

## Type

4

**WG MPB 4 S**  
**WG MPB 4T**

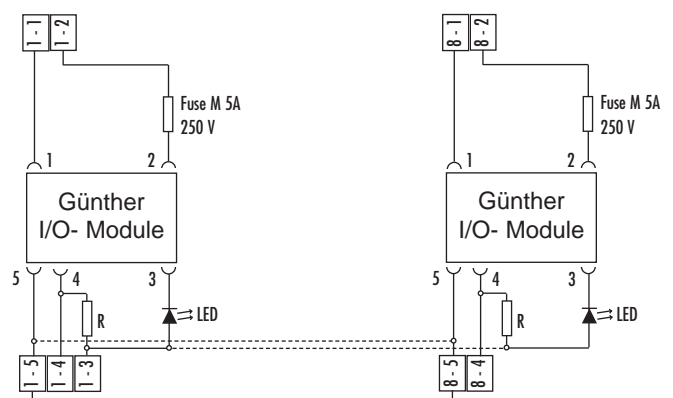
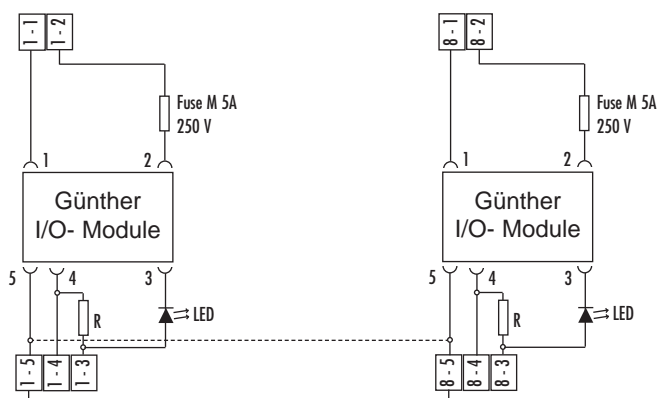
8

**WG MPB 8S**  
**WG MPB 8T**

## Circuit Diagrams

### S version

### T version



# Solid State Relays on Module Boards for 35mm Snap-on-Rail Mounting

## 1-, 2- and 3-phase and Reversing relay for AC loads

SSR type		WG MMPB 1Z	WG MMPB 1R	WG MMPB 2Z	WG MMPB 2R	WG MMPB 3Z	WG MMPB 3R	WG MPBW - 4
Phases		1-phase	1-phase	2-phase	2-phase	3-phase	3-phase	Reversing Relay
Switching type		zero cross	random	zero cross	random	zero cross	random	random
Approvals of the SSR's		VDE	VDE	VDE	VDE	VDE	VDE	VDE
Circuit diagrams, dimensions		page 30	page 30	page 30	page 30	page 30	page 30	page 30
Output		alternistor	alternistor	alternistor	alternistor	alternistor	alternistor	alternistor
Application Fields		Resistive loads Inductive Loads with $\cos\varphi > 0.85$	Resistive loads	Resistive loads Inductive Loads with $\cos\varphi > 0.85$	Resistive loads	Resistive loads Inductive Loads with $\cos\varphi > 0.85$	Resistive loads	motor reversing
<b>Input Circuit</b>								
Control Voltage Range	V	3 - 32 DC	3 - 32 DC	3 - 32 DC	3 - 32 DC	3 - 32 DC	3 - 32 DC	4.5 - 32 DC
Control Current Max.	mA	22	22	44	44	66	66	55
Turn-off voltage Min.	V DC	1	1	1	1	1	1	1
Input Resistance	$\Omega$	constant current	constant current	constant current	constant current	constant current	constant current	constant current
<b>Output Circuit 3)</b>								
Load Voltage Range	V rms	24 - 480 AC	48 - 480 AC	24 - 480 AC	48 - 480 AC	24 - 480 AC	48 - 480 AC	48 - 420 AC
Peak-off-state voltage	V drms	1.200 (1.000*)	1.200 (1.000*)	1.200 (1.000*)	1.200 (1.000*)	1.200 (1.000*)	1.200 (1.000*)	1.200 (1.000*)
Off-state-leak. current	mA <sub>eff</sub> max.	5	5	5	5	5	5	10
Load Current Range	A rms	0,1 - 5	0,1 - 5	0,1 - 4	0,1 - 4	0,1 - 3	0,1 - 3	0,1 - 4
Surge Current. 1 half wave	A peak	120	120	120	120	120	120	120
$I^2t$ for fusing	A <sup>2</sup> s	72	72	72	72	72	72	72
On-state Voltage	V peak	1,6	1,6	1,6	1,6	1,6	1,6	1,6
Off-state (static) dv/dt	V <sub>ps</sub>	200	200	200	200	200	200	500
Snubber	$\Omega$ ; nF	47 ; 10	47 ; 10	47 ; 10	47 ; 10	47 ; 10	47 ; 10	47 ; 10
<b>General Data</b>								
Turn-on Time Max.	ms	11	0,1	11	0,1	11	0,1	100
Turn-off Time Max.	ms	11	11	11	11	11	11	11
Interlocking time	ms	-	-	-	-	-	-	50 - 100
Line Frequency Range	Hz	47 - 63	47 - 63	47 - 63	47 - 63	47 - 63	47 - 63	47 - 63
Isolation Volt. Between:		-	-	-	-	-	-	-
- input/output	V rms	4.000	4.000	4.000	4.000	4.000	4.000	4.000
Isolation Resistance	M $\Omega$	50	50	50	50	50	50	50
Operating Temperature	°C	-20... +80	-20... +80	-20... +80	-20... +80	-20... +80	-20... +80	-20... +80

\*Integrated overvoltage protection effective above 1.000 V

**WG MMPB 1 Z/R, WG MMPB 2 Z/R, WG MMPB 3 Z/R:** 1-, 2- and 3-phase Solid State Relays on module board for 35 mm snap-on-rail mounting.

**WG MPBW - 4:** Reversing Relay on module board for 35 mm snap-on-rail mounting.

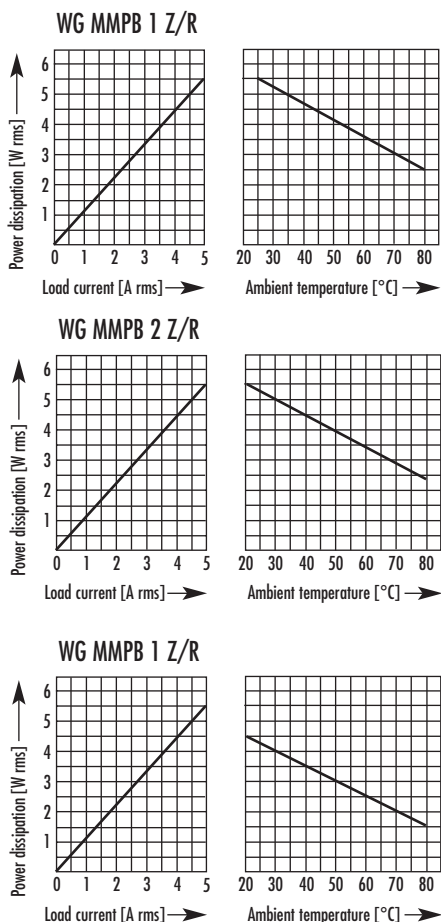
Basic relay of the module boards is the SSR WG A8 12D 05 Z/R.

Also available on request with ELR WG A8 6 D 05 Z/R, WG A8 6 D 03 Z/R or WG F8 50 D 08 ... 400 D 01.

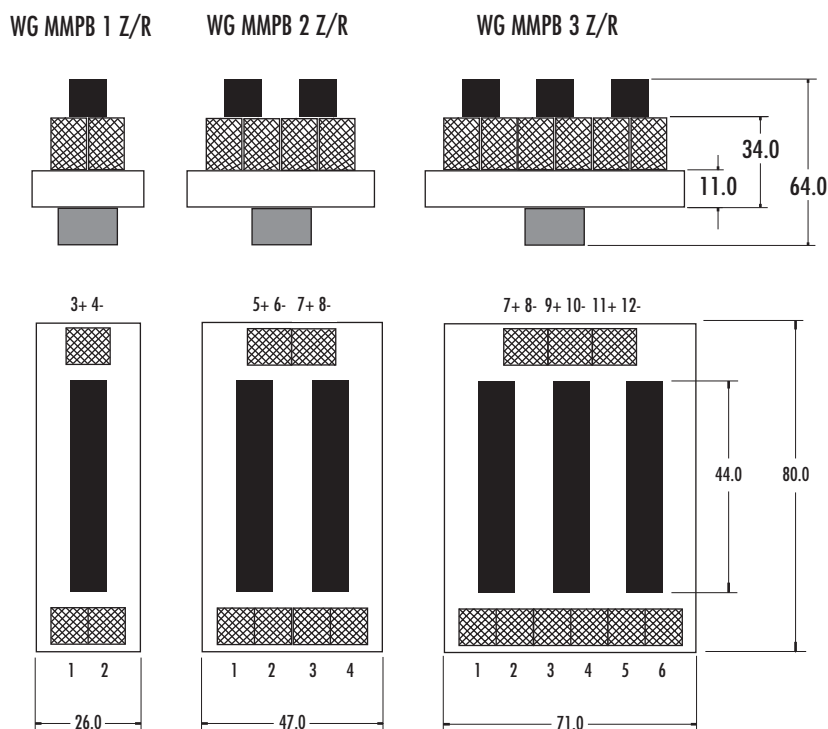
# Solid State Relays on Module Boards for 35mm Snap-on-Rail Mounting

1-, 2- and 3-phase and Reversing relay for AC loads and chassis mounting

## Derating Diagrams

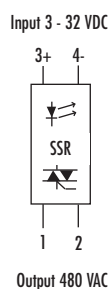


## Dimensions

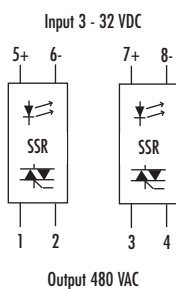


## Circuit Diagrams

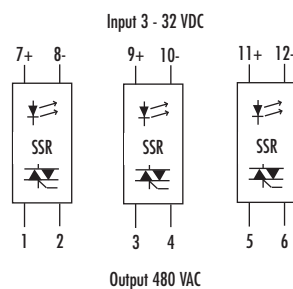
WG MMPB 1 Z/R



WG MMPB 1 Z/R



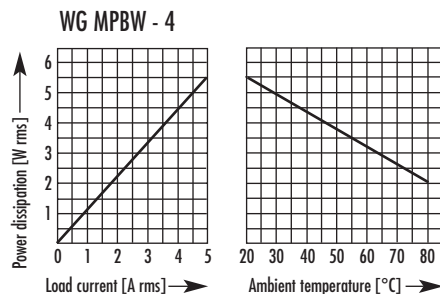
WG MMPB 3 Z/R



# Solid State Relays on Module Boards for 35mm Snap-on-Rail Mounting

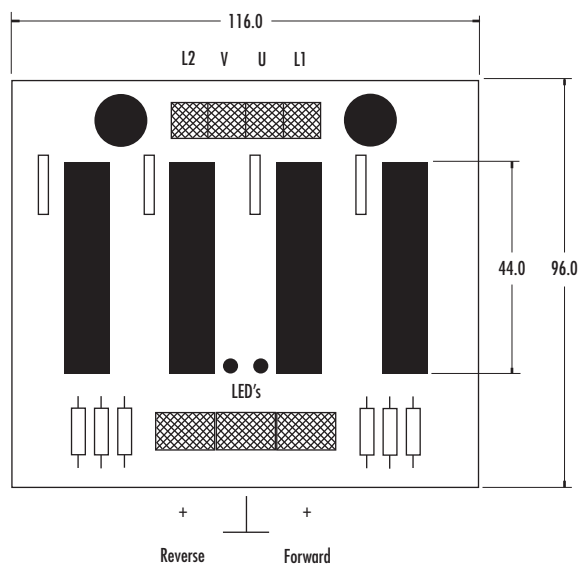
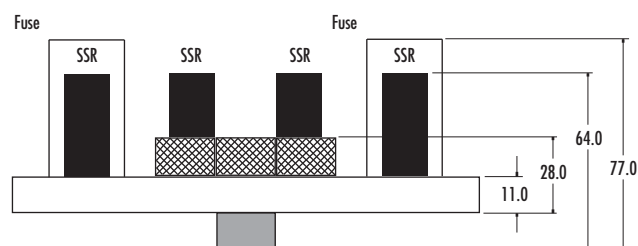
## 1-, 2- and 3-phase and Reversing relay for AC loads and chassis mounting

### Derating Diagrams



### Dimensions

WG MPBW - 4

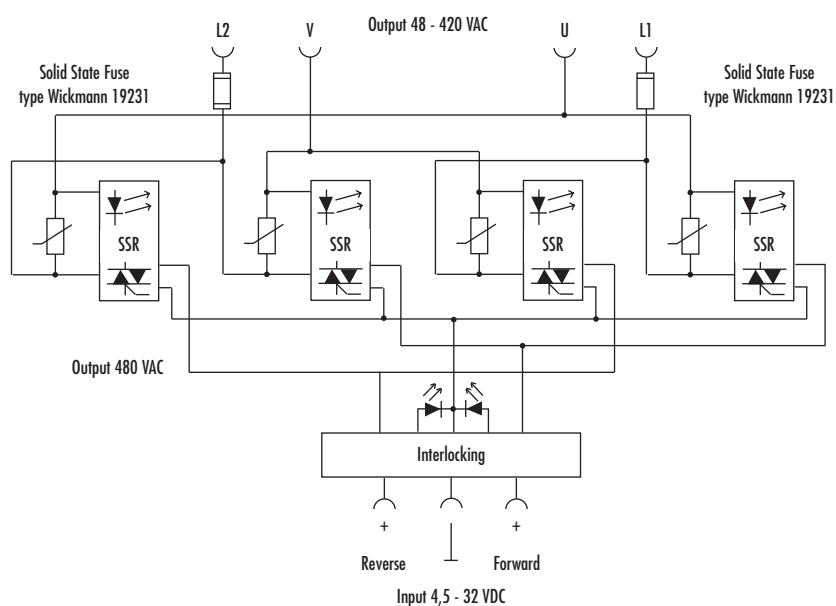


### Reversing Relay Features:

- 2 LED's for forward and reversing indication
- Overvoltage protection with varistors
- With semiconductor fuses
- 4 Solid State relays WG A8 12D 05 R-2

### Circuit Diagrams

WG MPBW - 4



# Reed Relays - DIL / SIL

## SPECIFICATIONS

### DESCRIPTION

Reed Relays consist of a reed switch and coil fitted into a housing, which could be plastic, metal or moulded. Compared with electro-mechanical relays, reed relays generally have a faster response time, lower coil consumption and are smaller in size. Furthermore, the switch is sealed in a dry, inert atmosphere preventing the ingress of contaminants.

### OPERATION

High Voltage Relays have outstanding performance in insulation and stand-off voltage. Energizing the coil operates a reed switch causing the contacts to open or close. It is important that the switch is not overloaded by applying loads in excess of the switch ratings. For details on switch loads refer to the reed relay specifications and the reed switch application page in this catalogue.

### Vibration and Shock Resistance

During the evaluation of vibration and shock resistance, the relays are driven with nominal voltage. The switches should not open longer than 10  $\mu$ sec.

	Normally Open	Change Over	Wetted
Vibration Resist.	20g / 5...2000 Hz	10g / 5...500 Hz	10g / 10...500 Hz
Shock Resistance	100g / 11ms Sine half wave	50g / 11ms Sine half wave	30g / 11ms Sine half wave

### Washability

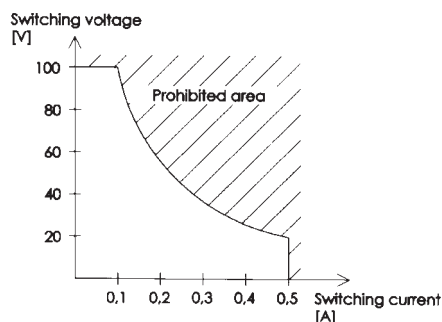
Resistant to Caltron, Freon, alcohol and distilled (pure) water. During the final rinsing phase only the purest substances should be used.

### Pull-in and Drop-out Voltage, Coil Resistance

The tolerances indicated are valid at  $25^{\circ}\text{C} \pm 3^{\circ}\text{C}$ . The temperature coefficient of the coil resistance is 0,4 % /  $^{\circ}\text{C}$ .

### Switching Voltage, Current and Capacity

The parameters as listed for switching voltage, current and capacity are maximum values. Exceeding any one of these values causes overload and reduces relay life expectancy.



### Contact Resistance

The contact resistance indicated is valid for new relays at nominal coil voltage. The four-point method at 2VDC / 100mA or 10 mA is applied. Custom solutions for special applications, especially for switching signals smaller than 1mV at 10 $\mu$ A (low-level-applications) or applications requiring dynamic contact resistance measurement can be produced for special switching needs.

### General Parameters

#### Life Expectancy

The life expectancy of a Reed Relay is at least  $10^5$ ... $10^6$  operations at nominal load. At minimum load the life expectancy can be up to  $5 \times 10^8$  operations. The mechanical life expectancy is  $10^9$  operations (minimum). Through the switching of higher loads, especially inductive or capacitive and lamp loads, life expectancy can be considerably reduced due to exceeding the permissible maximum current.

**Thermal Resistance** of the DIL-SIL-Reed Relays: 70 K/W.

### Thermoelectric Voltage

Between FeNi (Reed Switch) and Cu (PCB) a thermoelectric voltage  $U_{th} = k \times (T_1 - T_2)$  occurs with the constant  $k = 50 \mu\text{V}/^{\circ}\text{C}$  ( $T$ =temperature).

### Capacitance

The capacitance parameters are regarded as typical and are calculated for versions without shielding:

Capacitance, measured...	N.O.	N.O. wetted	Change Over
across open contact	0,8 pF	1,8 pF	2,5 pF
between open contact and coil	1,5 pF	3,6 pF	2,5 pF
between closed contact and coil	3,0 pF	7,0 pF	2,5 pF

### Solderability

All relays meet the DIN 8505 requirements.

Hole Diameter in PCB:  $\varnothing$  0.65mm

### Temperature Range

The operating temperature of the relay is the equivalent of the internal temperature. If the relays are used in ambient temperatures ( $J_a$ ) higher than  $20^{\circ}\text{C}$ , the maximum permissible operating voltage ( $U_T$ ) must be calculated according to the table indicated below, using the formula:

$$U_T = U_{\max} \times k_1$$

( $U_{\max}$  = max. permissible operating voltage)

$\vartheta_a$ ( $^{\circ}\text{C}$ )	20	30	40	50	60	70
$k_1$	1,00	0,96	0,92	0,88	0,84	0,80

### Switching Time

When using dry Reed Switches in relays, contact bounce may occur.

Pull-in time (incl. bounce time) typ. 0,5...1,8 ms

at nominal voltage and 20 Hz

Drop-out time (with diode) typ. 0,5...1,5 ms

at nominal voltage and 20 Hz

### Magnetic Shieldings

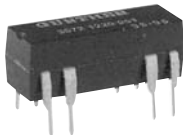
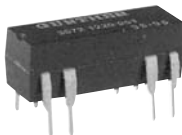
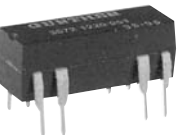
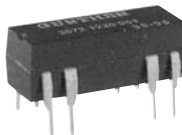
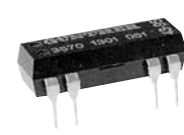
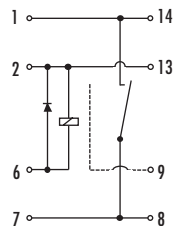
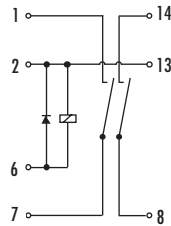
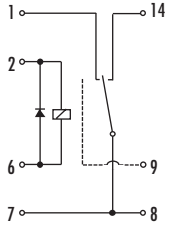
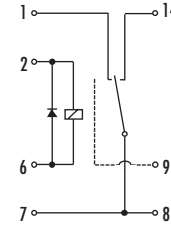
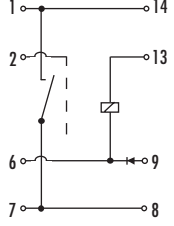
Magnetic shieldings for Reed Relays are also available:

- magnetic shieldings for SIL-Reed Relays:
  - top side and side by side
  - top side and front end
  - top side, side by side and front end
- magnetic shieldings for DIL-Reed Relays:
  - top side, side by side and front end suitable for the DIL-High profile

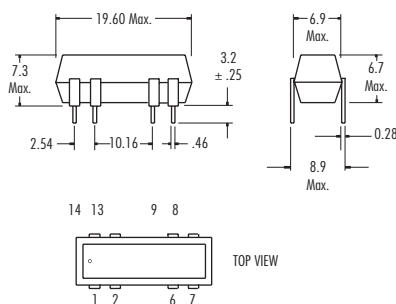
### Comment

Relay versions with 15 V nominal coil voltage are available for orders exceeding min. quantity of 1,000 pieces.

# Reed Relays - DIL / SIL - Dry Contact

															
Type	3570 1210 ...	3572 1220 ...	3563 1231 ...	3573 1231 ...	3570 1301 ...										
Style	DIL - High Profile	DIL - High Profile	DIL - High Profile	DIL - High Profile	DIL - Low Profile										
Contact Form	1 Form A	2 Form A	1 Form C	1 Form C	1 Form A										
Versions Available	1, 3 and 4	1 and 3	1, 3 and 4	1, 3 and 4	1, 3 and 4										
Coil Parameters															
Nominal Coil Voltage VDC	5	12	24	5	12	24	5	12	24	5	12	24			
Pull-in Voltage VDC Max.	3.8	9	18	3.8	9	18	3.8	9	18	3.5	8	16	3.8	9	18
Drop-out Voltage VDC Min.	0.8	1	2	0.8	1	2	1	2	4	1	2	4	0.8	1	2
Operating Voltage VDC Max.	20	30	40	10	20	40	10	18	35	10	18	35	15	20	30
Coil Resistance (±10%) Ω	500	1000	2150	140	500	2150	200	500	2150	200	500	2150	500	1000	2000
Contact Parameters															
Switching Capacity W/VA Max.	10			10			3			5			10		
Switching Voltage V Max.	100AC/DC			100AC/DC			70 AC /100 DC			100AC/DC			100AC/DC		
Switching Current A Max.	0.5			0.5			0.25			0.5			0.5		
Carrying Current A Max.	1.0			1.0			0.5			1.0			1.0		
Contact Resistance mΩ Max.	150			150			200			150			150		
Dielectric Strength VDC Min.	200			200			140			200			200		
Relay Parameters															
Dielectric Strength Coil/Contact VDC	1000			1000			1000			500			1000		
Insulation Resistance Coil/Contact Ω	10 <sup>10</sup>			10 <sup>10</sup>			10 <sup>10</sup>			10 <sup>10</sup>			10 <sup>10</sup>		
Storage Temperature Deg. °C	-40 +105			-40 +105			-40 +105			-40 +105			-40 +105		
Operating Temperature Deg. °C	-35 +80			-35 +80			-35 +80			-35 +80			-35 +80		
Pull-in Time incl. Bounce Time max. ms	0.5			0.5			2.0			1.2			0.5		
Drop-out Time with Diode ms	0.5			0.5			3.0			0.8			0.5		
Weight approx. g	2.3			2.3			2.3			2.3			1.8		
Pin Configuration (top view)															

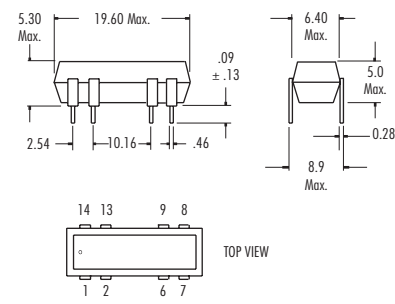
**DIL-High Profile**



## How to Order:

3570	1210	05	1
<b>Contact code</b>			
<b>Type Number</b>			
<b>Nominal coil voltage</b>			
05 = 5V			
12 = 12V			
24 = 24V			
<b>Version</b>			
1 = without diode			
3 = with diode			
4 = with electrostatic shielding and diode			

**DIL-Low Profile**



All dimensions are nominal, in millimetres unless otherwise stated.

As part of the groups policy of continued product improvement, specifications may change without notice. Our sales office will be pleased to help you with the latest information on our products.

# SWITCHES + SENSORS

A Comus International Group Company



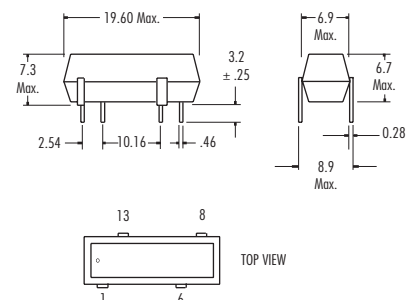
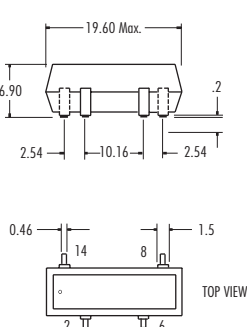
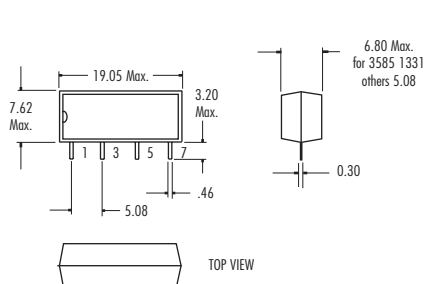
# Reed Relays - DIL / SIL - Dry - Wetted

Type Style Contact Form Versions Available	3570 1331... 1) SIL 1 Form A 1 and 3			3570 1511... Surface Mount 1 Form A 1 and 3			3582 7251 DIP 1 Form A 1 and 3			3585 7251 DIP 1 Form A 1 and 3			3570 1331... 1)
Nominal Voltage V.	5	12	24	5	12	24	5	12	24	5	12	24	
Coil Resistance (+10%) Ω	500	1.000	2.000	500	1.000	2.150	105	500	2150	140	500	2150	
Operate Voltage V.	3.8	9	18	3.8	9	18	3.75	9	18	3.75	9	18	
Release Voltage V.	0.8	1.5	2	0.8	1	2	0.5	1	2	0.5	1	2	
Nominal Input Power mW	-	-	-	-	-	-	238	288	268	179	288	268	
Max Voltage Max. V.	15	30	40	20	30	40	10	20	40	10	20	40	
Switch Parameters													
Switching Voltage Max. DC/Peak AC Resist	100V			100V			500V			500V			3570 1511...
Switching Current Max. DC/Peak AC Resist	0.5A			0.5A			2A			2A			
Carrying Current (24h) Max. DC/Peak AC Resist	1.0			1.0			3A			2A			
Contact Rating Max. DC/Peak AC Resist	10			10			50W Max.			50W Max.			
Life Expectancy Signal Level 1.0V, 10mA	-			-			1000 x 10 <sup>6</sup> Ops Min.			500 x 10 <sup>6</sup> Ops Min.			
Rated loads													
50V, 1A	-			-			2 x 10 <sup>6</sup> Ops Min.			1 x 10 <sup>6</sup> Ops Min.			
500V, 100mA	-			-			2 x 10 <sup>6</sup> Ops Min.			5 x 10 <sup>6</sup> Ops Min.			
Static Contact Resistance 50mV, 10mA	150 mΩ max.			150 mΩ max.			100 mΩ max.			100 mΩ max.			
Contact Material	Rh			Rh			Hg			Hg			
Hg Content	-			-			40 mg			16 mg			
Relay Parameters													
Insulation Resistance	10			10			10			10			
Between all insulated pins at 500V, 25°C, 40%RH	10 <sup>10</sup> (at 100V)			10 <sup>10</sup> (at 100V)			10 <sup>12</sup> (at 100V)			10 <sup>11</sup> (at 100V)			
Capacitance Across Open Contacts	1.3 pF Typ.			1.5 pF Typ.			0.7 pF Typ.			1.5 pF Typ.			
Open Contacts to Coil	3 pF Typ.			3 pF Typ.			1.2 pF Typ.			3 pF Typ.			
Closed Contact to Coil	-			-			3.2 pF Typ.			-			
Dielectric Strength Between Contacts	200 Vdc			200 Vdc			2000 Vdc/Peak AC			1500 Vdc/Peak AC			
Contacts to Coil	1000 Vac			4000 Vac			1000 Vac			1000 Vac			
Operating Time (Time incl. Bounce)	0.5			1.0			-			-			
At Nominal Coil Voltage 10Hz Sq. Wave, 50%DC	0.5ms Max.			0.1ms Max.			2.5ms Max.			1.75ms Max.			
Release Time Zener-Diode Suppression	0.5A ms Max.			1.0A ms Max.			2.5A ms Max.			1.5A ms Max.			
Storage Temperature Deg °C	-40 +105			-40 +105			-40 +105			-40 +105			
Operating Temperature At V nom. Deg. °C	-35 +80			-35 +80			-38 +75			-38 +75			
Soldering Temperature 10 sec maximum Deg. °C	+260			+260			+260			+260			
Vibration resistance (Survival) 10 Hz-500 Hz	10g			10g			10g			10g			
Shock Resistance (Survival) 11±1ms, 1/2 Sine Wave	30g			30g			30g			30g			
Weight	1.6			1.6			2.4g			2.4g			
Dimensions Length: mm Max.	19.05			19.6			19.6			19.6			
Width: mm Max.	6.8			6.9			6.9			6.9			
Height: mm Max.	7.62			6.9			7.33			7.33			






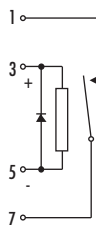
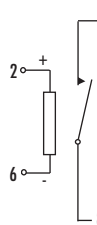
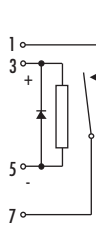
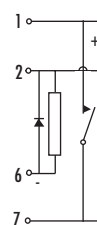
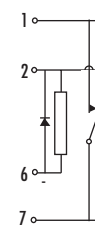
SIL

DIL-Surface Mount

DIL-High Profile








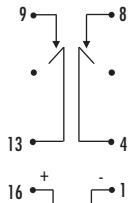
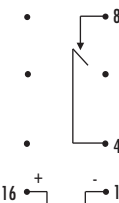
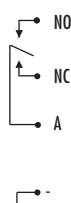
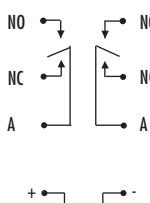
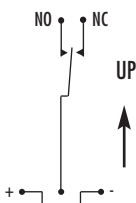
# Reed Relays - SIP / DIP - Wetted Contact

	Non Position Sensitive			Non Position Sensitive									Non Position Sensitive		
															
Type	3585 1331			3585 7511			3582 7331			3582 7210			3585 1210		
Style	SIP			DIP			SIP			DIP			DIP		
Contact Form	1 Form A			1 Form A			1 Form A			1 Form A			1 Form A		
Nominal Voltage V.	5	12	24	5	12	24	5	12	24	5	12	24	5	12	24
Coil Resistance (+10%) Ω	140	500	2150	140	500	2150	105	500	2150	105	500	2150	140	500	2150
Operate Voltage V.	3.75	9	18	3.75	9	18	3.75	9	18	3.75	9	18	3.75	9	18
Release Voltage V.	0.5	1	2	0.5	1	2	0.5	1	2	0.5	1	2	0.5	1	2
Nominal Input Power mW	179	288	268	179	288	268	238	288	268	238	288	268	179	288	268
Max Voltage Max. V.	10	20	40	10	20	40	10	20	40	10	20	40	10	20	40
Switch Parameters															
Switching Voltage Max. DC/Peak AC Resist	500V			500V			500V			500V			500V		
Switching Current Max. DC/Peak AC Resist	2A			2A			2A			2A			2A		
Carrying Current (24h) Max. DC/Peak AC Resist	2A			2A			3A			3A			2A		
Contact Rating Max. DC/Peak AC Resist	50W Max.			50W Max.			50W Max.			50W Max.			50W Max.		
Life Expectancy Signal Level 1.0V, 10mA	500 x 10 <sup>6</sup> Ops Min.			500 x 10 <sup>6</sup> Ops Min.			1000 x 10 <sup>6</sup> Ops Min.			1000 x 10 <sup>6</sup> Ops Min.			500 x 10 <sup>6</sup> Ops Min.		
Rated loads															
50V, 1A	1 x 10 <sup>6</sup> Ops Min.			1 x 10 <sup>6</sup> Ops Min.			2 x 10 <sup>6</sup> Ops Min.			2 x 10 <sup>6</sup> Ops Min.			1 x 10 <sup>6</sup> Ops Min.		
500V, 100mA	5 x 10 <sup>6</sup> Ops Min			5 x 10 <sup>6</sup> Ops Min			50 x 10 <sup>6</sup> Ops Min			50 x 10 <sup>6</sup> Ops Min			5 x 10 <sup>6</sup> Ops Min		
Static Contact Resistance 50mV, 10mA	100 mΩ Max.			100 mΩ Max.			100 mΩ Max.			100 mΩ Max.			100 mΩ Max.		
Contact Material	Hg			Hg			Hg			Hg			Hg		
Hg Content	16 mg			16 mg			40 mg			40 mg			16 mg		
Relay Parameters															
Insulation Resistance															
Between all insulated pins at 500V, 25°C,40%RH	10 <sup>11</sup> Ω Typ.			10 <sup>11</sup> Ω Typ.			10 <sup>12</sup> Ω Typ.			10 <sup>12</sup> Ω Typ.			10 <sup>11</sup> Ω Typ.		
Capacitance Across Open Contacts	1.3 pF Typ.			1.5 pF Typ.			0.8 pF Typ.			0.7 pF Typ.			1.5 pF Typ.		
Open Contacts to Coil	3 pF Typ.			3 pF Typ.			2.2 pF Typ.			1.2 pF Typ.			3 pF Typ.		
Closed Contact to Coil							3.3pF Typ.			3.2pF Typ.			-		
Dielectric Strength Between Contacts	2000 VDC/Peak AC			1500 VDC/Peak AC			2000 VDC/Peak AC			2000 VDC/Peak AC			1500 VDC/Peak AC		
Contacts to Coil	1000 Vac			4000 Vac			1000 Vac			1000 Vac			1000 Vac		
Operating Time															
At Nominal Coil Voltage 10Hz Sq. Wave, 50%DC	1.75 ms Max.			1.75 ms Max.			1.5 ms Max.			2.5 ms Max.			1.75 ms Max.		
Release Time Zena-Diode Suppression	1.5 ms Max.			1.5 ms Max.			1 ms Max.			2.5 ms Max.			1.5 ms Max.		
Storage Temperature Deg. °C	-40 +105			-40 +105			-40 +105			-40 +105			-40 +105		
Operating Temperature At V nom. Deg. °C	-38 +75			-38 +75			-38 +75			-38 +75			-38 +75		
Soldering Temperature 10 sec maximum Deg. °C	+260			+260			+260			+260			+260		
Vibration resistance (Survival) 10 Hz-500 Hz	10g			10g			10g			10g			10g		
Shock Resistance (Survival) 11±1ms, 1/2 Sine Wave	30g			30g			30g			30g			30g		
Weight	2.4g			2.3g			2.4g			2.4g			2.4g		
Dimensions Length: mm Max.	19.05			19.6			19.05			19.6			19.6		
Width: mm Max.	6.7			6.9			6.7			6.9			6.9		
Height: mm Max.	8.2			6.9			8.2			7.33			7.33		
<div>How to order wetted Reed Relays</div> <div>NOTE: Vertical mounting required (+30° from vertical)</div> <div>Type 3582 7331 Type 3582 1210</div> <div>3582 7331 XX X</div> <div>Nominal Coil Voltage</div> <div>05 = 5V</div> <div>12 = 12V</div> <div>24 = 24V</div> <div>Version</div> <div>1 = Standard</div> <div>3 = Diode</div>															
<div></div> <div>Non-Position Sensitive Wetted Relay</div> <div></div> <div>Non-Position Sensitive Wetted Relay for Surface Mounting</div> <div></div> <div>High performance Reability Wetted Relay</div> <div></div> <div>High performance Reability Wetted Relay</div> <div></div> <div>Non-Position Sensitive Wetted Relay</div>															
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# Reed Relays - SIP / DIP - Wetted Contact

																
Type	3885 7811				3885 7801				3880 7821	3880 7831	3880 7711					
Style	DIP				DIP				DIP	DIP	-					
Contact Form	2 Form A				1 Form A				1 Form C	2 Form C	1 Form C					
Nominal Voltage V.	5	12	24	48	5	12	24	48	5	15	24	40	5	12	24	48
Coil Resistance (+10%) $\Omega$	80	430	1750	6900	80	430	1750	6900	44	280	1050	4100	44	280	1050	4100
Operate Voltage V.	3.75	9	18	36	3.75	9	18	36	3.75	9	18	36	3.75	9	18	36
Release Voltage V.	0.5	1	2	4	0.5	1	2	4	0.5	1	2	4	0.5	1	2	4
Nominal Input Power mW	313	335	329	334	313	335	329	334	568	514	549	562	568	514	549	562
Max Voltage Max. V.	9	21	43	86	9	21	43	86	7	17	33	65	7	17	33	65
Switch Parameters																
Switching Voltage Max. DC/Peak AC Resist	500V				500V				500V	500V	500V					
Switching Current Max. DC/Peak AC Resist	2A				2A				2A	2A	2A					
Carrying Current (24h) Max. DC/Peak AC Resist	2A				2A				3A	3A	3A					
Contact Rating Max. DC/Peak AC Resist	50W Max.				50W Max.				50W Max.	50W Max.	50W Max.					
Life Expectancy Signal Level 1.0V, 10mA	500 x 10 <sup>6</sup> Ops Min.				500 x 10 <sup>6</sup> Ops Min.				1000 x 10 <sup>6</sup> Ops Min.	1000 x 10 <sup>6</sup> Ops Min.	1000 x 10 <sup>6</sup> Ops Min.					
Rated loads 48V, 10mA	1 x 10 <sup>6</sup> Ops Min.				1 x 10 <sup>6</sup> Ops Min.				200 x 10 <sup>6</sup> Ops Min.	200 x 10 <sup>6</sup> Ops Min.	200 x 10 <sup>6</sup> Ops Min.					
50V, 1A	5 x 10 <sup>6</sup> Ops Min				5 x 10 <sup>6</sup> Ops Min				2 x 10 <sup>6</sup> Ops Min.	2 x 10 <sup>6</sup> Ops Min.	2 x 10 <sup>6</sup> Ops Min.					
500V, 100mA	150 m $\Omega$ Max.				150 m $\Omega$ Max.				150 m $\Omega$ Max.	150 m $\Omega$ Max.	70 m $\Omega$ Max.					
Static Contact Resistance 50mV, 10mA	Hg				Hg				Hg	Hg	Hg					
Contact Material	16 mg				16 mg				72 mg	72 mg	72 mg					
Hg Content	Relay Parameters															
Insulation Resistance	10 <sup>11</sup> $\Omega$ Typ.				10 <sup>11</sup> $\Omega$ Typ.				10 <sup>11</sup> $\Omega$ Typ.	10 <sup>11</sup> $\Omega$ Typ.	10 <sup>11</sup> $\Omega$ Typ.					
Between all insulated pins at 500V, 25°C, 40%RH	0.9 pF Typ.				0.9 pF Typ.				1.5 pF Typ.	1.0 pF Typ.	1.2 pF Typ.					
Capacitance Across Open Contacts	1.8 pF Typ.				1.8 pF Typ.				1.2 pF Typ.	1.2 pF Typ.	1.7 pF Typ.					
Open Contacts to Coil									3.0pF Typ.	3.0 pF Typ.	3.2pF Typ.					
Closed Contact to Coil	1400 VDC/Peak AC				1400 VDC/Peak AC				1400 VDC/Peak AC	1400 VDC/Peak AC	1000 VDC/Peak AC					
Dielectric Strength Between Contacts	1000 Vac				1000 Vac				1000 Vac	1000 Vac	1000 Vac					
Contacts to Coil																
Operating Time	1.75 ms Max.				1.75 ms Max.				2.5 ms Max.	5 ms Max.	3.0 ms Max.					
At Nominal Coil Voltage 10Hz Sq. Wave, 50%DC	1.7 ms Max.				1.7 ms Max.				1.7 ms Max.	5 ms Max.	2.5 ms Max.					
Release Time Zena-Diode Suppression	-40 +105				-40 +105				-40 +105	-40 +105	-40 +105					
Storage Temperature Deg. °C	-38 +75				-38 +75				-38 +75	-38 +75	-38 +75					
Operating Temperature At V nom. Deg. °C	+260				+260				+260	+260	+260					
Soldering Temperature 10 se maximum Deg. °C	10g				10g				10g	10g	10g					
Vibration resistance (Survival) 10 Hz-500 Hz	30g				30g				30g	30g	30g					
Shock Resistance (Survival) 11±1ms, 1/2 Sine Wave	3.4g				3.2g				3.2g	3.4g	8g					
Weight	.795 (20.2)				.795 (20.2)				.795 (20.2)	.795 (20.2)	1.181 (30.0)					
Dimensions Length: mm Max.	.386 (9.8)				.386 (9.8)				.386 (9.8)	.386 (9.8)	.457 (11.6)					
Width: mm Max.	.425 (10.8)				.425 (10.8)				.425 (10.8)	.425 (10.8)	.425 (10.8)					
Height: mm Max.																
	Non-Position Sensitive Wetted Relay				Non-Position Sensitive Wetted Relay				High performance Reability Wetted Relay	Miniature wetted Changeover Relay	Hg Wetted Relay					

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## SWITCHES + SENSORS

# Reed Relays - High Voltage

## SPECIFICATIONS

### DESCRIPTION

Reed Relays consist of a reed switch and coil fitted into a housing, which could be plastic, metal or moulded. Compared with electro-mechanical relays, reed relays generally have a faster response time, lower coil consumption and are smaller in size. Furthermore, the switch is sealed in a dry, inert atmosphere preventing the ingress of contaminants.

### OPERATION

High Voltage Relays have outstanding performance in insulation and stand-off voltage. Energizing the coil operates a reed switch causing the contacts to open or close. It is important that the switch is not overloaded by applying loads in excess of the switch ratings. For details on switch loads refer to the reed relay specifications and the reed switch application page in this catalogue.

### General Parameters

All characteristics for pull-in voltage, drop-out voltage and coil resistance at  $20^{\circ}\text{C} \pm 3^{\circ}\text{C}$  ambient temperature. For other temperatures see diagram "operating temperature."

### Contact Resistance

Initial value at nominal voltage measured by the Kelvin test method at 20V/100mA.

### Soldering

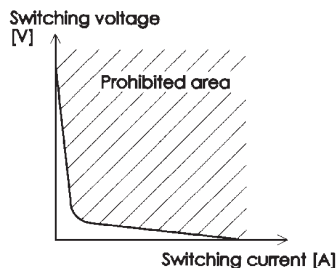
During soldering make sure no mechanical stress is applied to terminals because the thermoplastic moulding material might be damaged.

### Insulation Resistance

The insulation resistance is measured with a Tera Ohmmeter at 500V DC. The ambient climate is  $20^{\circ}\text{C} \pm 3^{\circ}\text{C}$  and 50% relative humidity.

### Switching Voltage, Switching Current and Power Rating

The listed values for switching voltage, switching current and power rating are absolute limits. If any of these values is exceeded, a reduction of life expectancy will result (see following power diagram).

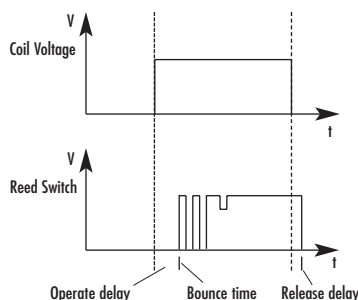


### Dielectric Strength

Tested in a radiation (eg. light, x-ray) free environment by applying a DC voltage across the open contacts, between adjacent contacts and between coil and contact. The test current is 100 mA. The unused contacts should not be connected during the test.

### Switching Time

Pull-in time including bounce time at nominal voltage and 20 Hz: 1.5 - 3.5 ms  
Release time (without diode) at nominal voltage and 20 Hz: 0.4 - 1.5 ms.



### Contact Capacitance (Typical Values)

Capacitance:	N.O
Across open contacts	0.8 - 1.2pF
Between open contact and coil	1.4 - 2.2 pF
Between closed contacts and coil	2.3 - 3.5 pF

### Shock and Vibration

During shock and vibration tests the relays must be energized with nominal voltage. The contact should not open or close longer than 10  $\mu\text{s}$ .

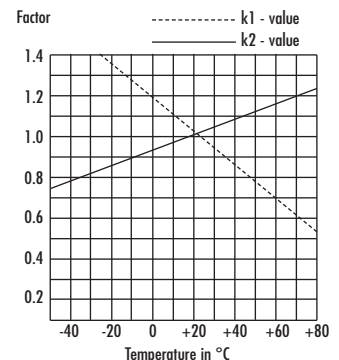
Vibration stability: 20 g/50 - 500 Hz. Shock stability: 35 g/11 ms half sine wave.

### Life Expectancy

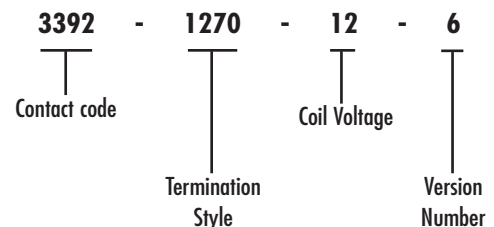
The life expectancy of a Reed Relay is at least  $10^5 - 10^6$  operations at nominal load. At minimum load the life expectancy can endure up to  $5 \times 10^8$  operations. The mechanical life expectancy is  $10^9$  operations (minimum). When switching higher loads, especially inductive or capacitive and lamp loads, life expectancy can be considerably reduced. Proper contact protection will reduce electromagnetic interference and rapid contact erosion.

### Operating Temperature

The operating temperature is the internal temperature of the relay (ambient temperature plus self heating). If relays are operating at higher ambient temperatures ( $J_0$ ) than  $+20^{\circ}\text{C}$ , the pull-in voltage and the maximum coil voltage must be calculated as follows: Pull-in voltage = Pull-in voltage at  $20^{\circ}\text{C} \times k1$ . Maximum coil voltage = Max. coil voltage at  $20^{\circ}\text{C} \times k2$ . When mounting relays side by side a gap of approximately half the relay-width is recommended to avoid mutual magnetic influence.



### How to order High Voltage Relays:



NOTE: All parts of the order code must be completed

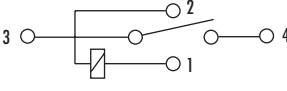
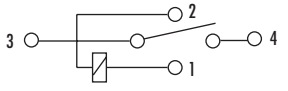
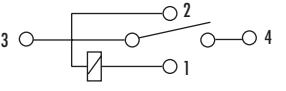
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# SWITCHES + SENSORS

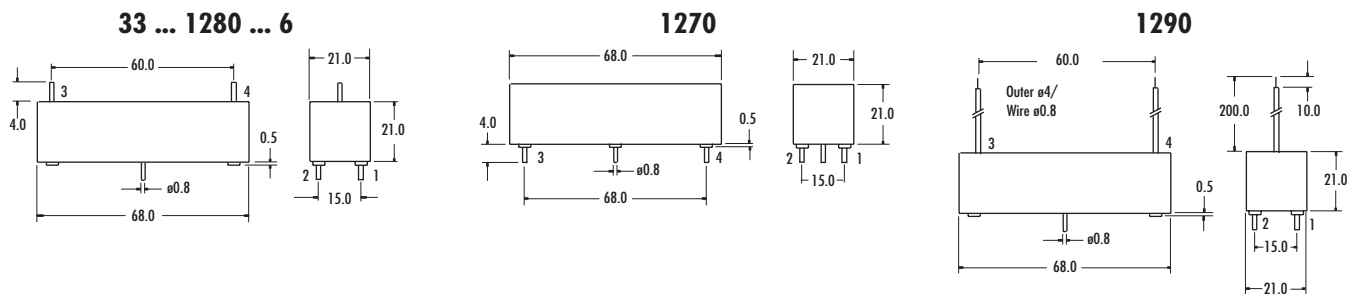
A Comus International Group Company

# Reed Relays - High Voltage

Version Number		6				6				6			
Contact Form		1 Normally Open (N/O)				1 Normally Open (N/O)				1 Normally Open (N/O)			
Contact Code		3316	3390	3391	3392	3316	3390	3391	3392	3316	3390	3391	3392
Termination Style		1270	1270	1270	1270	1280	1280	1280	1280	1290	1290	1290	1290
Contact Parameters													
Switching Voltage	max. VAC peak/VDC	1500	5000	7500	10000	1500	5000	7500	10000	1500	5000	7500	10000
Dielectric Strength	min. VDC	3000	7000	10000	14000	3000	7000	10000	14000	3000	7000	10000	14000
Switching Capacity	max. W	30	50	50	50	30	50	50	50	30	50	50	50
Switching Current	max. A	1	2	2	2	1	2	2	2	1	2	2	2
Carrying Current	max. A	2	3	3	3	2	3	3	3	2	3	3	3
Contact Resistance	max. mΩ	80	250	250	250	80	250	250	250	80	250	250	250
Coil Parameters													
Nominal Coil Voltage	VDC	5	12	24		5	12	24		5	12	24	
Pull-in Voltage	max. VDC	4	10	20		4	10	20		4	10	20	
Drop-out Voltage	min. VDC	1	2	4		1	2	4		1	2	4	
Operating Voltage	max. VDC	8	18	36		8	18	36		8	18	36	
Coil Resistance	±15% Ω	35	200	720		35	200	720		35	200	720	
Relay Parameters													
Dielectric Strength	coil/contact VDC	20000				20000				20000			
Dielectric Strength	contact/contact VDC	-				-				-			
Insulation Resistance	coil/contact Ω	1 x 10 <sup>9</sup>				1 x 10 <sup>9</sup>				1 x 10 <sup>9</sup>			
Storage Temperature	°C	-35 +90				-35 +90				-35 +90			
Operating Temperature	°C	-20 +70				-20 +70				-20 +70			
Pull-in Time incl. Bounce Time max.	ms	3.5				3.5				3.5			
Drop-out Time	ms	1.5				1.5				1.5			
Weight	approx.g	55				55				55			
Pin Configuration													

Relays with contact code 3390-91-92 have tungsten-plated switch contacts and should be used only for switching power above approx. 10 mW

## TERMINATION STYLES



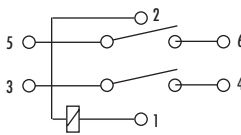
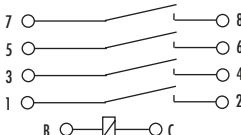
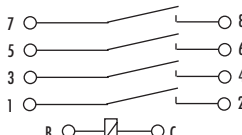
See page 37 for ordering information

All dimensions are nominal, in millimetres unless otherwise stated.

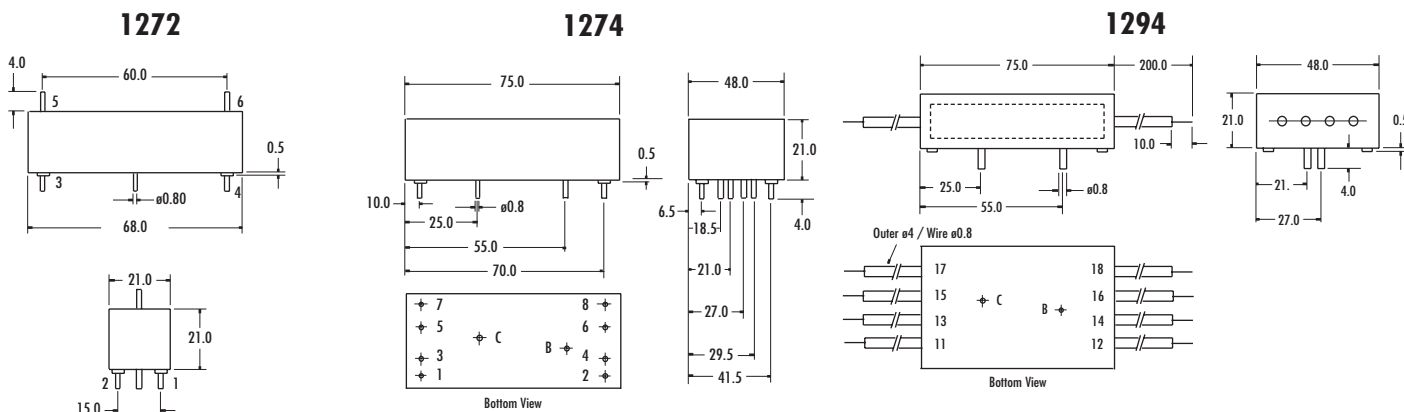
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**SWITCHES + SENSORS**

# Reed Relays - High Voltage

Version Number			6				6				6			
Contact Form														
Contact Code			3316	3390	3391	3392	3316	3390	3391	3392	3316	3390	3391	3392
Termination Style			1272	1272	1272	1272	1274	1274	1274	1274	1294	1294	1294	1294
Contact Parameters														
Switching Voltage	max.	VAC <sub>peak</sub> /VDC	1500	5000	7500	10000	1500	5000	7500	10000	1500	5000	7500	10000
Dielectric Strength	min.	VDC	3000	7000	10000	14000	3000	7000	10000	14000	3000	7000	10000	14000
Switching Capacity	max.	W	30	50	50	50	30	50	50	50	30	50	50	50
Switching Current	max.	A	1	2	2	2	1	2	2	2	1	2	2	2
Carrying Current	max.	A	2	3	3	3	2	3	3	3	2	3	3	3
Contact Resistance	max.	mΩ	80	250	250	250	80	250	250	250	80	250	250	250
Coil Parameters														
Nominal Coil Voltage		VDC	5	12	24		5	12	24		5	12	24	
Pull-in Voltage	max.	VDC	4	10	20		4	10	20		4	10	20	
Drop-out Voltage	min.	VDC	0.5	1.2	2.4		0.5	1	2		0.5	1	2	
Operating Voltage	max.	VDC	7	16	29		7.5	14.5	27		7.5	14.5	27	
Coil Resistance	±15%	Ω	15	85	275		12	42	175		12	42	175	
Relay Parameters														
Dielectric Strength	coil/contact	VDC	10000				10000				10000			
Dielectric Strength	contact/contact	VDC	10000				8000				8000			
Insulation Resistance	coil/contact	Ω	1 x 10 <sup>9</sup>				1 x 10 <sup>9</sup>				1 x 10 <sup>9</sup>			
Storage Temperature		°C	-35 +90				-35 +90				-35 +90			
Operating Temperature		°C	-20 +70				-20 +70				-20 +70			
Pull-in Time incl. Bounce Time max.		ms	3.5				3.5				3.5			
Drop-out Time		ms	1.5				1.5				1.5			
Weight		approx.g	55				130				130			
Pin Configuration														

Relays with contact code 3390-91-92 have tungsten-plated switch contacts and should be used only for switching power above approx. 10 mW



See page 37 for ordering information

All dimensions are nominal, in millimetres unless otherwise stated.

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**SWITCHES + SENSORS**

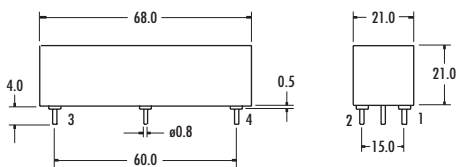
A Comus International Group Company

# Reed Relays - High Voltage

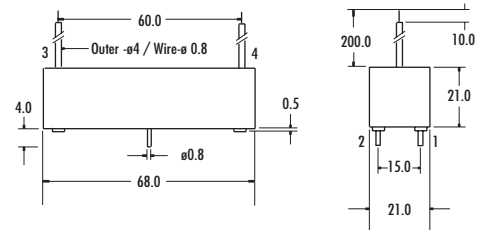
Version Number		6				6				6			
Contact Form		1 Normally Closed N/C				1 Normally Closed (N/C)				4 Normally Open (N/CO)			
Contact Code		3316	3390	3391	3392	3316	3390	3391	3392	3316	3390	3391	3392
Termination Style		4270	4270	4270	4270	4280	4280	4280	4280	4290	4290	4290	4290
Contact Parameters													
Switching Voltage	max. VAC peak/VDC	1500	5000	7500	10000	1500	5000	7500	10000	1500	5000	7500	10000
Dielectric Strength	min. VDC	3000	7000	10000	14000	3000	7000	10000	14000	3000	7000	10000	14000
Switching Capacity	max. W	30	50	50	50	30	50	50	50	30	50	50	50
Switching Current	max. A	1	2	2	3	1	2	2	2	1	2	2	2
Carrying Current	max. A	2	3	3	5	2	3	3	3	2	3	3	3
Contact Resistance	max. mΩ	80	250	250	250	80	250	250	250	80	250	250	250
Coil Parameters													
Nominal Coil Voltage	VDC	5	12	24		5	12	24		5	12	24	
Pull-in Voltage	max. VDC	4	10	20		4	10	20		4	10	20	
Drop-out Voltage	min. VDC	0.5	1	2		0.5	1	2		0.5	1	2	
Operating Voltage	max. VDC	6.5	14.5	27		6.5	14.5	27		6.5	14.5	27	
Coil Resistance	±15% Ω	50	400	675		50	400	675		50	400	675	
Relay Parameters													
Dielectric Strength	coil/contact VDC	20000				20000				20000			
Dielectric Strength	contact/contact VDC	-				-				-			
Insulation Resistance	coil/contact Ω	1 x 10 <sup>9</sup>				1 x 10 <sup>9</sup>				1 x 10 <sup>9</sup>			
Storage Temperature	°C	-35 +90				-35 +90				-35 +90			
Operating Temperature	°C	-20 +70				-20 +70				-20 +70			
Pull-in Time incl. Bounce Time max.	ms	3.5				3.5				3.5			
Drop-out Time	ms	1.5				1.5				1.5			
Weight	approx.g	55				55				55			
Pin Configuration													

Relays with contact code 3390-91-92 have tungsten-plated switch contacts and should be used only for switching power above approx. 10 mW

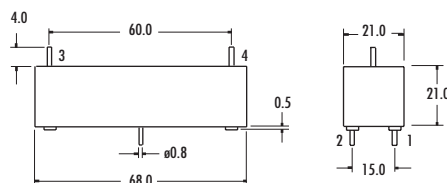
**4270**



**4290**



**4280**



See page 37 for  
ordering information

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**SWITCHES + SENSORS**



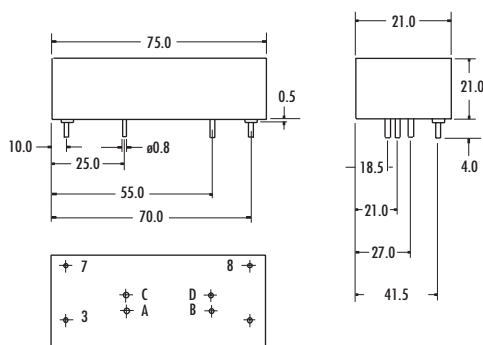
# Reed Relays - High Voltage

Version Number			6				6			
Contact Form			1 N/O + 1 N/C				1 Normally Open (N/O)			
Contact Code			3316	3390	3391	3392	3316	3390	3391	3392
Termination Style			5272	5272	5272	5272	5292	5292	5292	5292
Contact Parameters										
Switching Voltage	max.	VAC peak/VDC	1500	5000	7500	10000	1500	5000	7500	10000
Dielectric Strength	min.	VDC	3000	7000	10000	14000	3000	7000	10000	14000
Switching Capacity	max.	W	30	50	50	50	30	50	50	50
Switching Current	max.	A	1	2	2	2	1	2	2	2
Carrying Current	max.	A	2	3	3	3	2	3	3	3
Contact Resistance	max.	mΩ	80	250	250	250	80	250	250	250
Coil Parameters										
Nominal Coil Voltage		VDC	5	12	24		5	12	24	
Pull-in Voltage	max.	VDC	4	10	20		4	10	20	
Drop-out Voltage	min.	VDC	0.5	1	2		0.5	1	2	
Operating Voltage	max.	VDC	7.5	14.5	27		7.5	14.5	27	
Coil Resistance	±15%	Ω	27	135	345		27	135	345	
Relay Parameters										
Dielectric Strength	coil/contact	VDC	10000				10000			
Dielectric Strength	contact/contact	VDC	8000				8000			
Insulation Resistance	coil/contact	Ω	1 x 10 <sup>9</sup>				1 x 10 <sup>9</sup>			
Storage Temperature		°C	-35 +90				-35 +90			
Operating Temperature		°C	-20 +70				-20 +70			
Pull-in Time incl. Bounce Time max.		ms	3.5				3.5			
Drop-out Time		ms	1.5				1.5			
Weight	approx.g		130				130			
Pin Configuration										

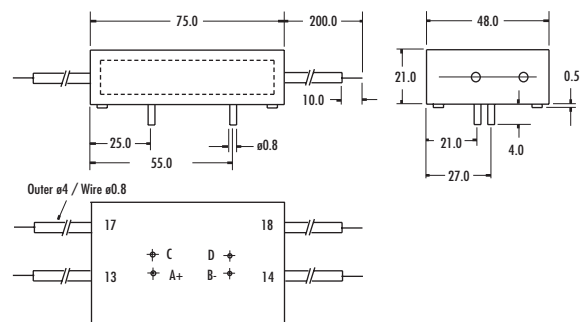
Relays with contact code 3390-91-92 have tungsten-plated switch contacts and should be used only for switching power above approx. 10 mW

## TERMINATION STYLES

### 5272



### 5292



See page 37 for ordering information

All dimensions are nominal, in millimetres unless otherwise stated.

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**SWITCHES + SENSORS**

A Comus International Group Company

# Reed Switches

## SPECIFICATIONS

### DESCRIPTION

Reed Switches consist of two or three ferromagnetic blades (or reeds) hermetically sealed inside a glass envelope. The construction ensures protection from the external environment. Two types are generally available: Form A (normally open) and Form C (changeover). Sensitivity of a reed switch is measured in ampere turns (A.T.) and it should be noted that lower switch (A.T.) ratings are more sensitive as they require less magnetic field strength to operate them. Various voltage and current switching levels are available and contact plating materials can be varied to accommodate specific types of load.

### OPERATION

Reed switches are operated by a magnetic field, this may be a magnet or a current carrying coil. When the field is removed the switch reverts to its previous state.

Operation by magnet can be achieved in a large variety of ways either moving the magnet toward and away from the reed either perpendicularly or parallel to the glass (see page 36).

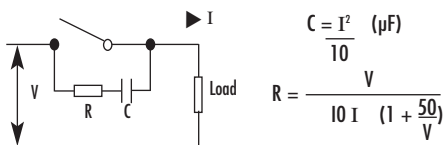
Reed switches are used in a variety of Asmetech products including Proximity switches Float Switches and Reed Relays. They are also available in moulded packages affording protection from damage and Surface Mount styles.

### CONTACT PROTECTION

#### Inductive Loads

A reverse voltage is generated by store energy in an inductive load when reed contacts open. This voltage can reach very high levels and is capable of damaging the contacts.

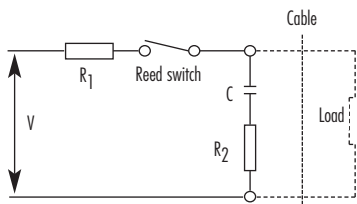
An RC network may be used as shown below to give protection.



#### Capacitive Loads

Unlike inductive loads, capacitive and lamp loads are prone to high inrush currents which can lead to faulty operation and even contact welding.

When switching charged capacitors (including cable capacitance) a sudden unloading can occur, the intensity of which is determined by the capacity and length of the connecting leads to the switch. This inrush peak can be reduced by a series of resistors. The value is dependent on the particular application but should be as high as possible to ensure that the inrush current is within the allowable limits.

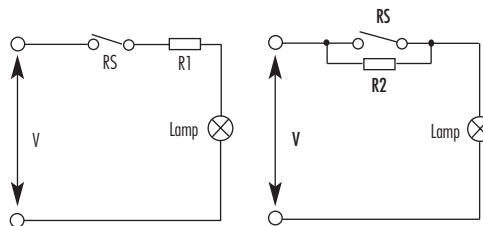


The above diagram illustrates a resistor/capacitor network for protecting a Reed Switch against high inrush currents. R<sub>1</sub> and/or R<sub>2</sub> are used depending upon circuit conditions.

#### Lamp Loads

With lamp load applications it is important to note that cold lamp filaments have a resistance 10 times smaller than already glowing filaments. This means that when being turned-on, the lamp filament experiences a current flow 10 times greater than when already glowing. This

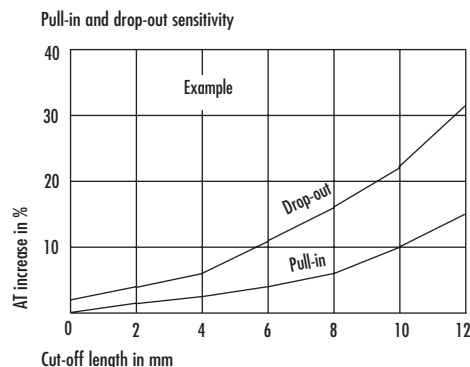
high inrush current can be reduced to an acceptable level through the use of a series of current-limiting resistors. Another possibility is the parallel switching of a resistor across the switch. This allows just enough current to flow to the filament to keep it warm, yet not enough to make it glow.



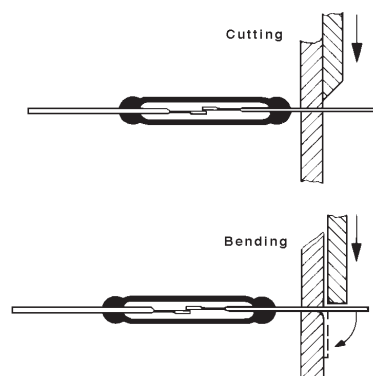
*Lamp load with parallel or current limiting resistor across the switch*

#### Cutting and Bending

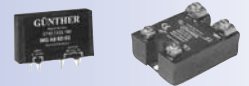
As the Reed Switch blades are part of the magnetic circuit of a Reed Switch shortening the leads results in increased pull-in and drop-out values.



When cutting or bending Reed Switches, it is important that the glass body should not be damaged. Therefore, the cutting or bending point should be no closer than 3mm (.118) to the glass body.



## SOLID STATE RELAYS



Page 4

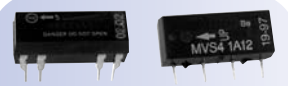
## SOLID STATE RELAYS - HEAT SINKS

Page 21

## INPUT / OUTPUT MODULES

Page 23

## REED RELAYS DIL / SIL



Page 32

## REED RELAYS

Page 37

## DRY CONTACT



Page 44

## MOULDED/SMD



Page 47

## REED SWITCHES HIGH VOLTAGE

Page 49

All dimensions are nominal, in millimetres unless otherwise stated.

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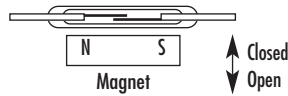
# Reed Switches

## SPECIFICATIONS

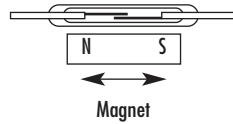
### Actuation of Reed Switches with a Permanent Magnet Examples of switching with the use of a moving magnet.

#### Direct Actuation:

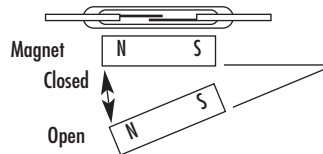
A magnet moved perpendicularly towards and away from a Reed Switch turns it off and on one time.



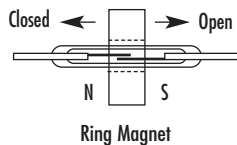
A magnet moved parallel to a Reed Switch operates it from one to three times.



A magnet swung towards and away from a Reed Switch operates it one time.



A ring magnet moved parallel to the Reed Switches axis operates it from one to three times.

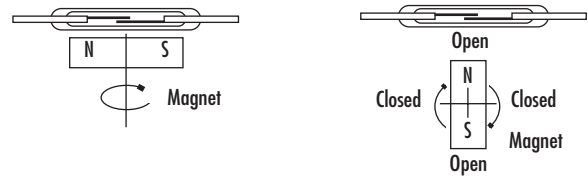


#### In General:

For all Reed Switches the standard pull-in sensitivity is given in the table. Other pull-in sensitivities are available on request.

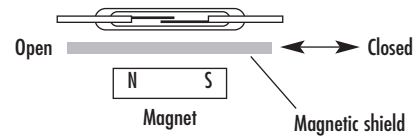
#### Rotation:

Examples of switching through rotational movement.



#### Indirect Actuation: Shielding

With the stationary arrangement of a Reed Switch and magnet, the contact Reeds are closed. Should the magnetic field be diverted away from the Reed Switch by a shield of ferro-magnetic material placed between the switch and the magnet, the contacts will open. When the shield is removed, the contact Reeds become magnetically actuated and close.



#### Pull-in Sensitivity:

The given pull-in sensitivity of the Reed Switch has a test equipment tolerance of  $\pm 2$  AT.

#### Life Expectancy:

The life expectancy of a reed switch is dependent upon the load being switched. At maximum rated loads life expectancy is approximately  $10^6$  switching cycles. Lower load ratings can increase the life expectancy up to  $5 \times 10^8$  operations. Switching inductive, capacitive or lamp loads. The mechanical life expectancy can reach at least  $10^9$  operations. Through the switching of inductive, capacitive and lamp loads, the life expectancy is considerably reduced due to exceeding the specified maximum current.

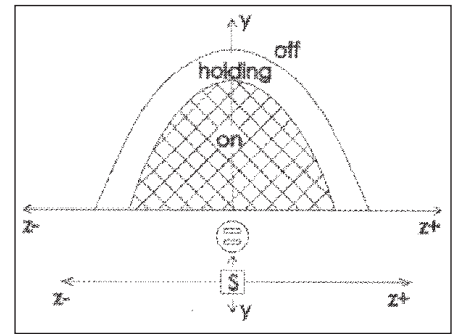
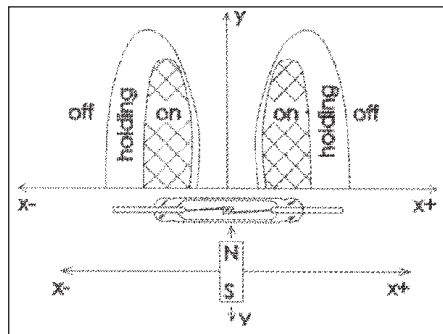
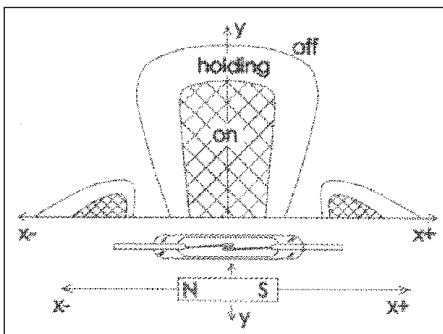
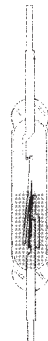
Contact Form A



Contact Form C



Contact  
Form A wetted



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**SWITCHES + SENSORS**

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# Reed Switches - Dry Contact

UL and CSA Approved			NORMALLY OPEN								
			OKI	OKI	Gunther	OKI	OKI	OKI	Gunther	Gunther	OKI
Supplier Type			0213	0211	2522	0219	0221	0228	2322	2314	2212
Contact Form			A	A	A	A	A	A	A	A	A
Contact Material			Rh	Rh	Rh	Rh	Rh	Rh	Rh	Rh	Rh
Switching Capacity	Max.	W/VA	1	1	6	10	10	10	10	10	70VA/50W
Switching Voltage	Max.	VAC/DC	24	24	140	100	100	100	150	400	150
Switching Current	Max.	A	0.1	0.1	0.5	0.5	0.3	0.5	0.5	0.5	0.7
Carry Current	Max.	A	0.3	0.3	0.8	1.0	1.0	1.0	1.0	1.0	2.5
Dielectric Strength	Min.	VDC	100	150	200	150	150	150	200	600	250
Contact Resistance	Max.	mΩ	200	150	150	100	100	150	150	150	100
Insulation Resistance	Min.	Ω	10 <sup>9</sup>	10 <sup>9</sup>	10 <sup>10</sup>	10 <sup>9</sup>	10 <sup>9</sup>	10 <sup>9</sup>	10 <sup>10</sup>	10 <sup>11</sup>	10 <sup>10</sup>
Pull-in Sensitivity		AT	10 - 40	10 - 30	10 - 40	10 - 30	10 - 30	10 - 45	10 - 35	10 - 35	15 - 60
Drop-out Sensitivity	Min.	AT	5	5	5	5	5	5	5	5	DO/PI≥7.0
Switching Time without Bounce	Max.	ms	0.3	0.3	1.0	0.4	0.4	1.1	1.8	1.8	1.1
Bounce Time	Max.	ms	0.3	0.3	0.3	0.3	0.5	0.3	0.2	0.2	0.5
Release Time	Max.	ms	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Resonant Frequency	Typ.	Hz	11000	7500	6000	5900	3000	5000	5000	5000	2500
Operating Frequency	Max.	Hz	500	500	400	500	500	500	200	200	500
Vibration (10-1000 Hz)		g	20	20	35	20	20	20	35	35	20
Shock (11ms)		g	30	30	50	30	35	30	50	50	30
Capacitance	Typ.	pF	0.4	0.2	0.5	0.3	0.3	0.3	0.7	0.7	0.5
Operating Temperature Range	Deg.	°C	-40 +125	-40 +125	-40 +125	-40 +125	-40 +125	-40 +125	-40 +125	-40 +125	-40 +125
Test Coil	Type		0211	0211	1035	0221	0221	0221	1035	1035	0221
Dimensions											
Total Length	A Max.	mm	36.0	36.0	55.0	44.5	44.5	45.0	55.0	55.0	56.0
Glass Length	B Max.	mm	7.0	10.0	11.0	12.0	13.5	14.0	14.1	14.1	21.0
Glass Diameter	C Max.	mm	1.8	2.0	2.1	2.0	2.3	2.2	2.3	2.3	2.75
Wire Diameter	D Max.	mm	0.3	0.4	0.4	0.5	0.33 x 0.6	0.5	0.5	0.5	0.35 x 0.6

## Reed Switch Ordering Information

PART NUMBER 0271 30 40

Type \_\_\_\_\_

Minimum (AT) Sensitivity \_\_\_\_\_

Maximum (AT) Sensitivity \_\_\_\_\_

Example: Type 2717. Pull-in sensitivity between 30-40 AT

All dimensions are nominal, in millimetres unless otherwise stated.

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# SWITCHES + SENSORS

# Reed Switches - Dry Contact

UL and CSA Approved			NORMALLY OPEN							
Supplier			Gunther	Gunther	Gunther	Gunther	OKI	Gunther	Gunther	Gunther
Type			2722	2717	3723	3717	0229	9210	3823	3817
Parameters			2722	2717	3723	3717	0229	9210	3823	3817
Contact Form			A	A	A	A	A	A	A	A
Contact Material			Rh	Rh	Rh	Rh	Rh	Rh	Rh	Rh
Switching Capacity	Max.	W/VA	12	10	40	40	70	100	60	60
Switching Voltage	Max.	VAC/DC	230	500	230	400	350	300	230	400
Switching Current	Max.	A	1.0	0.5	2.0	2.0	0.7	1.0	3.0	3.0
Carry Current	Max.	A	-2.0	1.0	3.0	3.0	2.5	2.5	4.0	4.0
Dielectric Strength	Min.	VDC	400	1000	400	1000	500	1000	400	1000
Contact Resistance	Max.	mΩ	100	100	80	80	100	100	80	80
Insulation Resistance	Min.	Ω	10 <sup>11</sup>	10 <sup>11</sup>	10 <sup>11</sup>	10 <sup>11</sup>	10 <sup>10</sup>	10 <sup>10</sup>	10 <sup>11</sup>	10 <sup>11</sup>
Pull-in Sensitivity	AT		20 - 50	20 - 50	30 - 50	30 - 50	20 - 60	20 - 40	30 - 70	30 - 70
Drop-out Sensitivity	Min.	AT	5	5	15	15	6	5	15	15
Switching Time without Bounce	Max.	ms	2.0	2.0	2.0	2.0	0.6	0.6	2.5	2.5
Bounce Time	Max.	ms	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Release Time	Max.	ms	0.10	0.10	0.10	0.10	0.05	0.05	0.10	0.10
Resonant Frequency	Typ.	Hz	2900	2900	4200	4200	2500	2500	2400	2400
Operating Frequency	Max.	Hz	200	200	300	300	500	500	200	200
Vibration (10-1000 Hz)	g		35	35	35	35	20	20	35	35
Shock (11ms)	g		50	50	50	50	35	30	50	50
Capacitance	Typ.	pF	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Operating Temperature Range	Deg.	°C	-40 +125	-40 +125	-40 +125	-40 +125	-40 +125	-40 +125	-40 +125	-40 +125
Test Coil	Type		1700	1700	1700	1700	0221	0221	1800	1800
Dimensions										
Total Length	A Max.	mm	55.0	55.0	55.0	55.6	56.0	56.0	55.0	55.0
Glass Length	B Max.	mm	19.0	19.0	19.0	19.0	21.0	21.0	24.5	24.5
Glass Diameter	C Max.	mm	2.6	2.6	2.6	2.6	2.75	2.75	3.8	3.8
Wire Diameter	D Max.	mm	0.55	0.55	0.7	0.7	0.6	0.6	.03	.03

## ADDITIONAL TYPES ON REQUEST

All dimensions are nominal, in millimetres unless otherwise stated.

As part of the groups policy of continued product improvement, specifications may change without notice. Our sales office will be pleased to help you with the latest information on our products.

# SWITCHES + SENSORS

A Comus International Group Company

## Reed Switches - Dry Contact

UL and CSA Approved			NORMALLY OPEN			CHANGEOVER					
			Gunther	Gunther	Gunther	Gunther	OKI	Gunther	Gunther	Gunther	Gunther
Parameters	Type		1517	1523	6517	3525	0551	3325	3336	1917	1625
Contact Form			A	A	A	C	C	C	C	C	C
Contact Material			Rh	Rh	W	Rh	Rh	Rh	Rh	Rh	Rh
Switching Capacity	Max.	W/VA	30	120	50	5	3	5	20	60	60
Switching Voltage	Max.	VAC/DC	1000	250	10000	100	30	100	150	400	230
Switching Current	Max.	A	1.0	3.0	3.0	0.5	0.2	0.5	1.0	1.0	1.0
Carry Current	Max.	A	2.0	5.0	5.0	1.0	0.5	1.0	2.0	2.0	2.0
Dielectric Strength	Min.	VDC	3000	800	14000	200	200	200	200	1000	400
Contact Resistance	Max.	mΩ	80	80	250	150	100	150	150	100	100
Insulation Resistance	Min.	Ω	10 <sup>11</sup>	10 <sup>11</sup>	10 <sup>11</sup>	10 <sup>9</sup>	10 <sup>9</sup>	10 <sup>9</sup>	10 <sup>9</sup>	10 <sup>9</sup>	10 <sup>9</sup>
Pull-in Sensitivity		AT	75 - 95	75 - 95	100 - 200	15 - 50	15 - 30	15 - 30	15 - 30	40 - 100	80 - 120
Drop-out Sensitivity	Min.	AT	25	30	40	8	5	5	5	20	20
Switching Time without Bounce	Max.	ms	3.5	3.5	3.6	1.5	1.0	2.0	2.0	4.0	4.0
Bounce Time	Max.	ms	0.5	0.5	0.5	.6	1.5	0.6	0.6	0.5	0.5
Release Time	Max.	ms	0.2	0.2	0.05	0.5	0.5	0.5	0.5	0.15	0.10
Resonant Frequency	Typ.	Hz	900	900	900	-	-	-	-	-	-
Operating Frequency	Max.	Hz	100	100	5	250	200	250	250	100	100
Vibration (10-1000 Hz)		g	35	35	35	35	20	20	20	35	35
Shock (11ms)		g	50	50	50	-	50	50	50	50	50
Capacitance	Typ.	pF	0.8	0.8	0.5	1.5	1.5	0.8	0.8	1.0	1.0
Operating Temperature Range	Deg.	°C	-40 +125	-40 +125	-40 +125	-40 +125	-40 +125	-40 +125	-40 +125	-40 +125	-40 +125
Test Coil	Type		1500	1500	6500	1035	0551	1035	1035	1500	1500
Dimensions											
Total Length	A Max.	mm	79.0	79.0	83.0	54.5	56.5	55.0	55.0	70.0	80.0
Glass Length	B Max.	mm	52.0	52.0	51.0	14.0	14.0	14.0	14.0	36.0	52.0
Glass Diameter	C Max.	mm	5.4	5.4	5.5	2.6	2.54	2.54	2.54	5.6	5.6
Wire Diameter	D Max.	mm	2.5 x 0.5	2.5 x 0.5	2.5	0.5	0.5	0.35 x .75	0.35 x .75	2.5 x 0.5	2.5 x 0.5

**PART NUMBER 0271 30 40**

Type \_\_\_\_\_

Minimum (AT) \_\_\_\_\_  
Sensitivity \_\_\_\_\_

Maximum (AT) \_\_\_\_\_  
Sensitivity \_\_\_\_\_

**Example: Type 2717. Pull-in sensitivity between 30-40 AT**

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# Reed Switches - SMD / Moulded

## MOULDED

A range of reed switches moulded in polypropylene is available. These are ideal for situations where a bare reed switch may be vulnerable to damage during or after assembly and also for ease of assembly where bending and forming facilities are limited or unavailable.

For Operation and Contact Protection details see page 42

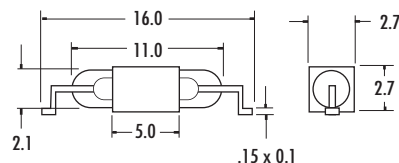
## SMD

A range of switches with formed and flattened leads to enable surface mounting onto PCB's. All are available loose or taped and reeled for presentation to high speed placement machines.



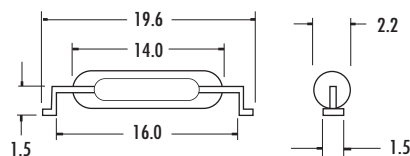
5522

Contact Form / Style	Normally Open	
Switching Voltage	Max. Vac	140
Switching Current	Max. A	0.5
Switching Capacity	Max. VA	6
Contact Resistance	Max. mΩ	150
Switching Distance	Dependent on magnet	
Operating Temperature	Deg. °C	-20° +235°
Storage Temperature	Deg. °C	-40° +125°
Case Material	-	
Features	Surface Mount	



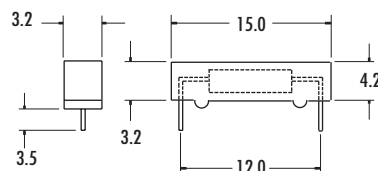
5228

Contact Form / Style	Normally Open	
Switching Voltage	Max. Vac	100
Switching Current	Max. A	0.5
Switching Capacity	Max. VA	10
Contact Resistance	Max. mΩ	150
Switching Distance	Dependent on magnet	
Operating Temperature	Deg. °C	-20° +235°
Storage Temperature	Deg. °C	-40° +125°
Case Material	-	
Features	Surface Mount	



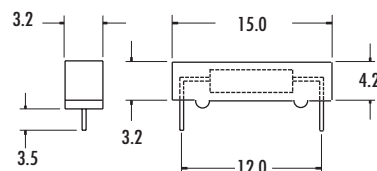
PPS24

Contact Form / Style	Normally Open	
Switching Voltage	Max. Vac	24
Switching Current	Max. A	0.1
Switching Capacity	Max. VA	1.0
Contact Resistance	Max. mΩ	200
Switching Distance	Dependent on magnet	
Operating Temperature	Deg. °C	-20° +110°
Storage Temperature	Deg. °C	-25° +110°
Case Material	Polypropylene	
Features	Compact	



PPS70

Contact Form / Style	Normally Open	
Switching Voltage	Max. Vac	70
Switching Current	Max. A	0.25
Switching Capacity	Max. VA	10.0
Contact Resistance	Max. mΩ	200
Switching Distance	Dependent on magnet	
Operating Temperature	Deg. °C	-20° +110°
Storage Temperature	Deg. °C	-25° +110°
Case Material	Polypropylene	
Features	Compact	



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## SWITCHES + SENSORS

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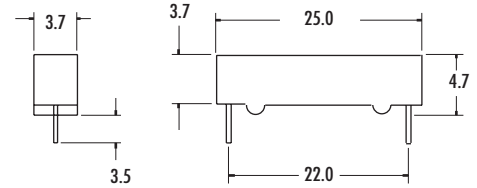


# Reed Switches - Moulded



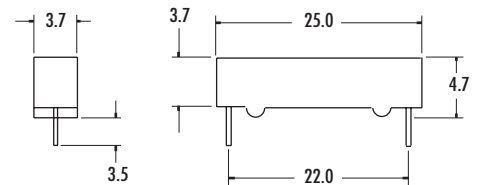
PPS470

Contact Form / Style		Normally Open
Switching Voltage	Max. Vac	470
Switching Current	Max. A	0.5
Switching Capacity	Max. VA	10.0
Contact Resistance	Max. mΩ	150
Switching Distance		Dependent on magnet
Operating Temperature	Deg. °C	-20° +110°
Storage Temperature	Deg. °C	-25° +110°
Case Material		Polypropylene
Features		High Voltage



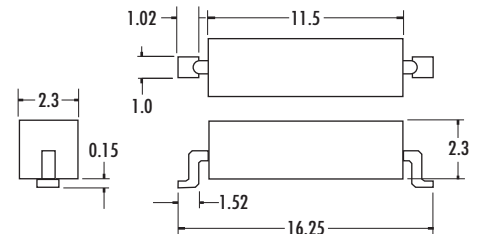
PPS175B

Contact Form / Style		Normally Closed
Switching Voltage	Max. Vac	175
Switching Current	Max. A	0.25
Switching Capacity	Max. VA	5
Contact Resistance	Max. mΩ	100
Switching Distance		Dependent on magnet
Operating Temperature	Deg. °C	-20° +110°
Storage Temperature	Deg. °C	-25° +110°
Case Material		Polypropylene
Features		Normally Closed Contact



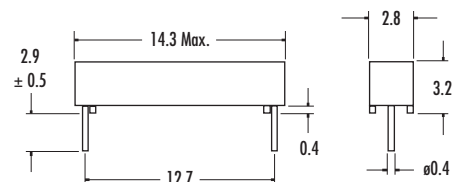
P3-1A16

Contact Form / Style		Normally Open
Switching Voltage	Max. Vac	24
Switching Current	Max. A	0.1
Carry Current	Max. A	0.3
Contact Rating	Max. VA	1.0
Contact Resistance (Initial)	Max. mΩ	150
Switching Distance		Dependent on magnet
Operating Temperature	Deg. °C	-40° +125°
Storage Temperature	Deg. °C	-25° +110°
Total Pull-in Sensitivity	AT	10 - 20



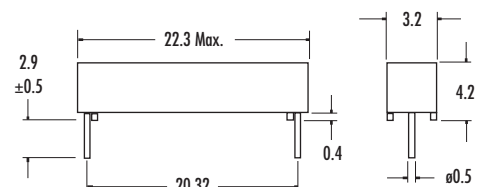
GC.0211.202 GC.0211.204  
10-15 (AT) 20-25 (AT)  
GC.0211.203 GC.0211.205  
15-20 (AT) 25-30 (AT)

Contact Form / Style		Normally Open
Switching Voltage	Max. Vac/dc	24
Switching Current	Max. A	0.1
Switching Capacity	Max. W/VAVA	1
Contact Resistance	Max. mOhm	150
Operating Temperature	Deg. °C	-40° +120°
Storage Temperature	Deg. °C	-25° +110°
Carry Current	Max. A	0.3
Dielectric Strength	Min. Vdc	150
Case Material		PA6.6



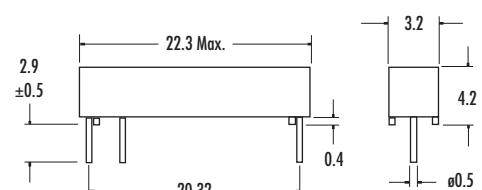
GC.2322.202 GC.2322.204  
10-15 (AT) 20-25 (AT)  
GC.2322.203 GC.2322.205  
15-20 (AT) 25-30 (AT)

Contact Form / Style		Normally Open
Switching Voltage	Max. Vac/dc	150
Switching Current	Max. A	0.5
Switching Capacity	Max. W/VAVA	10
Contact Resistance	Max. mOhm	150
Operating Temperature	Deg. °C	-40° +120°
Storage Temperature	Deg. °C	-25° +110°
Carry Current	Max. A	1.0
Dielectric Strength	Min. Vdc	250
Case Material		PA6.6



GC.3336.202 GC.3336.204  
10-15 (AT) 20-25 (AT)  
GC.3336.203 GC.3336.205  
15-20 (AT) 25-30 (AT)

Contact Form / Style		Changeover
Switching Voltage	Max. Vac/dc	150
Switching Current	Max. A	0.5
Switching Capacity	Max. W/VAVA	1.0
Contact Resistance	Max. mOhm	150
Operating Temperature	Deg. °C	-40° +120°
Storage Temperature	Deg. °C	-25° +110°
Carry Current	Max. A	2.0
Dielectric Strength	Min. Vdc	200
Case Material		PA6.6



# Reed Switches - High Voltage



## HBS - 7KVDC High Voltage Form A

Contact Rating	Conditions	Symbol	Min.	Typ.	Max.	Units
Switching Voltage	DC/Peak AC Resistive	$V_L$			5000	Volts
Switching Current	DC/Peak AC Resistive	$I_L$			3	Amps
Carry Current (24h)	DC/Peak AC Resistive	$I_C$			3	Amps
Contact Rating	DC/Peak AC Resistive				50	Watts
Operating Frequency		f			5	Hz
Life Expectancy	1.0VDC, 10mA		1000			$\times 10^6$ Ops
Max. Switching Voltage	50W		0.5			$\times 10^6$ Ops
Operate AT Range	See note 1		90		170	AT
Release AT Range	See note 1		40			AT
Insulation Resistance	100V, 25°C 40% RH		$10^{10}$			$\Omega$
Capacitance (typ)	Across Open Contacts				0.5	pF
Dielectric Strength	Between Contacts Leak Current		7000		22	VDC $\mu$ A
Operate Time (Bounce included)	1.5 times Operate at 60 Hz Sq. Wave 50% DC	$T_{OP}$			3.6	msec.
Release Time	Without Diode	$T_{rel}$			0.5	msec.
Static Contact Resistance		CR			100	m $\Omega$
<b>Environmental Ratings</b>						
Storage Temperature		$T_A$	-55		+125	°C
Operating Temperature		$T_O$	-55		+125	°C
Soldering Temperature	<10 sec at 260°C			+260		°C
Vibration Resistance (survival)	10 Hz - 500 Hz	G			35	g
Shock Resistance (survival)	11±1ms, 1/2 Sine Wave	S			40	g
Weight				2		grams

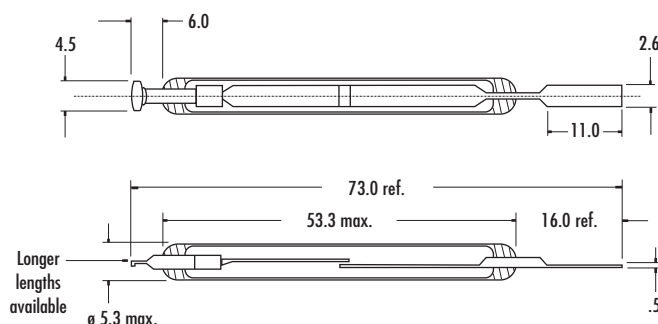
NOTE 1: Testcoil NARM RS-421-A:III or EN 119000 No 16.  
NOTE 2: All parameters are at 25°C unless otherwise stated.



## HBS - 10KVDC High Voltage Form A

Symb	Min.	Typ.	Max.	Units
$V_L$			7500	Volts
$I_L$			3	Amps
$I_C$			3	Amps
			50	Watts
f			5	Hz
	1000			$\times 10^6$ Ops
	0.5			$\times 10^6$ Ops
	90		200	AT
	40			AT
	$10^{10}$			$\Omega$
			0.5	pF
	10000		22	VDC $\mu$ A
$T_{OP}$			3.6	msec.
$T_{rel}$			0.5	msec.
CR			100	m $\Omega$
$T_A$	-55		+125	°C
$T_O$	-55		+125	°C
		+260		°C
G			35	g
S			40	g
		2		grams

NOTE 1: Testcoil NARM RS-421-A:III or EN 119000 No 16.  
NOTE 2: All parameters are at 25°C unless otherwise stated.



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# SWITCHES + SENSORS

A Comus International Group Company

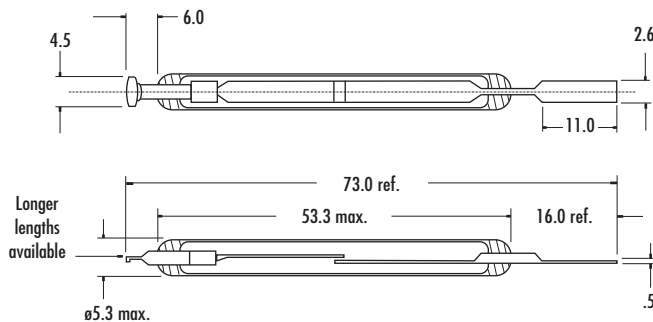


## HBS - 15KVDC High Voltage Form A

Contact Rating	Conditions	Symbol	Min.	Typ.	Max.	Units
Switching Voltage	DC/Peak AC Resistive	$V_L$		10000		Volts
Switching Current	DC/Peak AC Resistive	$I_L$		3		Amps
Carry Current (24h)	DC/Peak AC Resistive	$I_C$		3		Amps
Contact Rating	DC/Peak AC Resistive				50	Watts
Operating Frequency		$f$			5	Hz
Life Expectancy	1.0VDC, 10mA		1000			$\times 10^6$ Ops
Max. Switching Voltage	50W		0.5			$\times 10^6$ Ops
Operate AT Range	See note 1		130		200	AT
Release AT Range	See note 1		40			AT
Insulation Resistance	100V, 25°C 40% RH		$10^{10}$			$\Omega$
Capacitance (typ)	Across Open Contacts				0.5	pF
Dielectric Strength	Between Contacts Leak Current		15000		22	VDC $\mu$ A
Operate Time (Bounce included)	1.5 times Operate at 60 Hz Sq. Wave 50% DC	$T_{OP}$		3.6		msec.
Release Time	Without Diode	$T_{rel}$		0.5		msec.
Static Contact Resistance		CR		100		m $\Omega$
<b>Environmental Ratings</b>						
Storage Temperature		$T_A$	-55		+125	°C
Operating Temperature		$T_O$	-55		+125	°C
Soldering Temperature	<10 sec at 260°C			+260		°C
Vibration Resistance (survival)	10 Hz - 500 Hz	G		35		g
Shock Resistance (survival)	11 $\pm$ 1ms, 1/2 Sine Wave	S		40		g
Weight				2		grams

NOTE 1: Testcoil NARM RS-421-A:III or EN 119000 No 16.

NOTE 2: All parameters are at 25°C unless otherwise stated.



NOTE: Vertical mounting required  
 $\pm 30^\circ$  from vertical

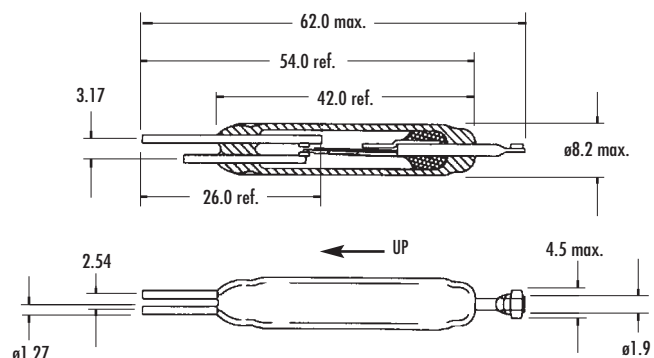


## HG.07.120.180 High Performance Form D

Contact Rating	Conditions	Symbol	Min.	Typ.	Max.	Units
Switching Voltage	DC/Peak AC Resistive	$V_L$		500		Volts
Switching Current	DC/Peak AC Resistive	$I_L$		5		Amps
Carry Current (24h)	DC/Peak AC Resistive	$I_C$		10		Amps
Contact Rating	DC/Peak AC Resistive				250	Watts
Operating Frequency		$f$			80	Hz
Life Expectancy	1.0V 10mA		1000			$\times 10^6$ Ops
	50V, 1A		5			$\times 10^6$ Ops
	500V, 100mA		50			$\times 10^6$ Ops
Operate AT Range	See note 1		120		180	AT
Release AT Range	See note 1		30			AT
Insulation Resistance	500V, 25°C 40% RH		$10^7$			$\Omega$
Capacitance (typ)	Across Open Contacts			2		pF
Dielectric Strength	Between Contacts	I/O	2500			VAC
Operate Time	1.5 times Operate at 20 Hz Sq. Wave 50% DC	$T_{OP}$		7		msec.
Release Time	Zener-Diode Suppression	$T_{rel}$		6		msec.
Bridging Time			150		900	$\mu$ sec.
Drain Time				15		sec
Static Contact Resistance	50mV, 10mA	CR		30		m $\Omega$
Contact Material				Hg		
Hg Content				3		g
Storage Temperature	Deg. °C	$T_A$	-40		+125	°C
Operating Temperature	Deg. °C	$T_O$	-38		+125	°C
Soldering Temperature	<10 sec at 260°C			+260		°C
Vibration Resistance (survival)	10 Hz - 500 Hz	G		10		g
Shock Resistance (survival)	11 $\pm$ 1ms, 1/2 Sine Wave	S		30		g
Weight				3.8		grams

Unless advised otherwise all specifications are maximum and measured at 25 Deg. C.

NOTE 1: Measured in testcoil NARM 1 or EN119000-03/ Gap position in coil 2mm below centre.  
Operate value has a  $\pm 2$  AT tolerance.



All dimensions are nominal, in millimetres unless otherwise stated.

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# Reed Switches - Wetted Contact

NOTE: Vertical mounting required  
±30° from vertical



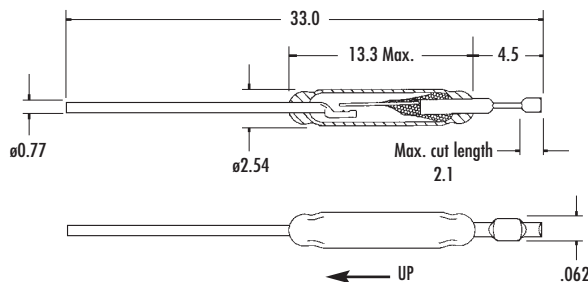
## MH4 High Performance Form A

Contact Rating	Conditions	Symbol	Min.	Typ.	Max.	Units
Switching Voltage	DC/Peak AC Resistive	$V_L$			500	Volts
Switching Current	DC/Peak AC Resistive	$I_L$			2	Amps
Carry Current (24h)	DC/Peak AC Resistive	$I_C$			3	Amps
Contact Rating	DC/Peak AC Resistive				50	Watts
Operating Frequency		$f$			200	Hz
Life Expectancy	1.0V 10mA		1000			$\times 10^6$ Ops
	50V, 1A		2			$\times 10^6$ Ops
	500V, 100mA		50			$\times 10^6$ Ops
	48V, 100mA					
Operate AT Range	See note 1		20		35	AT
Release AT Range	See note 1		8			AT
Insulation Resistance	500V, 25°C 40% RH		x			$\Omega$
Capacitance (typ)	Across Open Contacts			0.3		pF
Dielectric Strength	Between Contacts	I/O	1500			VAC
Operate Time	1.5 times Operate at 20 Hz Sq. Wave 50% DC	$T_{OP}$			2	msec.
Release Time	Zener-Diode Suppression	$T_{rel}$			1.5	msec.
Drain Time					5	sec.
Static Contact Resistance	50mV, 10mA	CR			30	m $\Omega$
Contact Material				Hg		
Hg Content				40		mg
Storage Temperature	Deg. °C	$T_A$	-40		+125	°C
Operating Temperature	Deg. °C	$T_O$	-38		+125	°C
Soldering Temperature	<10 sec at 260°C			+260		°C
Vibration Resistance (survival)	10 Hz - 500 Hz	G			10	g
Shock Resistance (survival)	11 ± 1ms, 1/2 Sine Wave	S			30	g
Weight				0.24		grams

NOTE 1: Measured in testcoil NARM 1 or EN119000-03/Gap position in coil: 2mm below centre in vertical position

The given Operate value has a tolerance of ±2 AT.

NOTE 2: All parameters are at 25°C unless otherwise stated.



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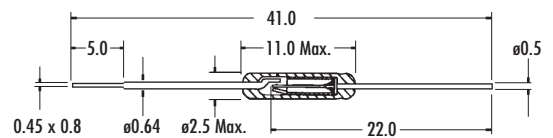
## MH5 High Performance Form A Non-position sensitive

Symbol	Min.	Typ.	Max.	Units
$V_L$			500	Volts
$I_L$			2	Amps
$I_C$			2	Amps
			50	Watts
$f$			300	Hz
	500			$\times 10^6$ Ops
	1			$\times 10^6$ Ops
	5			$\times 10^6$ Ops
	50			$\times 10^6$ Ops
	25		65	AT
	15			AT
	x			$\Omega$
		0.3		pF
I/O	1500			VAC
$T_{OP}$		0.85	1.2	msec.
$T_{rel}$		0.8	1	msec.
			5	sec.
CR			30	m $\Omega$
		Hg		
		10		mg
$T_A$	-40		+125	°C
$T_O$	-38		+125	°C
		+260		°C
G			20	g
S			50	g
		0.2		grams

NOTE 1: Measured in testcoil EN119000-09.

The given Operate value has a tolerance of ±2 AT.

NOTE 2: All parameters are at 25°C unless otherwise stated.

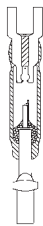


### HOW TO ORDER WETTED REED SWITCHES

Switch Type	MH4	XX	XX	XX	Max. operate value
Insulation resistance					Min. operate value
08:	10 <sup>8</sup> $\Omega$ min - HGZ				
10:	10 <sup>10</sup> $\Omega$ min - MH4 - MH5				
12:	10 <sup>12</sup> $\Omega$ min - MH4 - MH5				

For example: MH4 12 25 35 (MH4 switch) Insulation resistance 10<sup>12</sup>  $\Omega$  min. Operate value is between 25 and 35 AT For HG07 order by type number

# Reed Switches - Wetted Contact



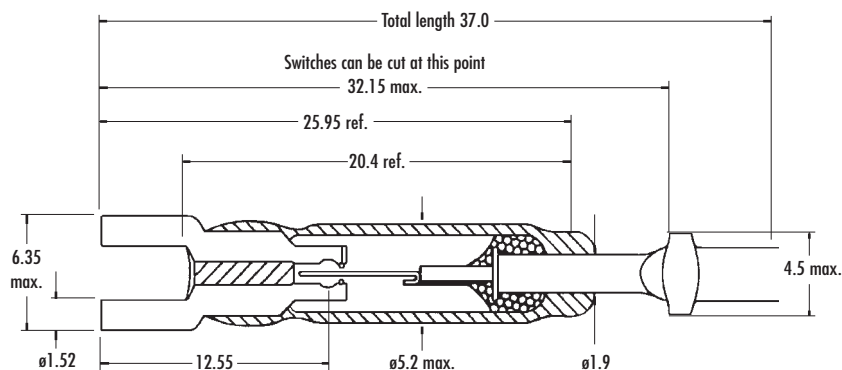
NOTE: Vertical mounting required  
±30° from vertical



## HGW 08 30 60 High Performance 1 Form C

Contact Rating	Conditions	Symbol	Min.	Typ.	Max.	Units
Switching Voltage	DC/Peak AC Resistive	$V_L$			500	Volts
Switching Current	DC/Peak AC Resistive	$I_L$			2	Amps
Carry Current (24h)	DC/Peak AC Resistive	$I_C$			5	Amps
Contact Rating	DC/Peak AC Resistive				100	Watts
Operating Frequency		f			200	Hz
Life Expectancy	1.0V 10mA		1000			$\times 10^6$ Ops
	50V, 1A		3			$\times 10^6$ Ops
	500V, 100mA		50			$\times 10^6$ Ops
Delta	See note 1		30		60	AT
Insulation Resistance	500V, 25°C 40% RH		10 <sup>8</sup>			$\Omega$
Capacitance (typ)	Across Open Contacts			0.7		pF
Dielectric Strength	Between Contacts	I/O	2000			VAC
Operate Time	2 times Operate at	$T_{OP}$			1.5	msec.
	20 Hz Sq. Wave 50% DC					
Release Time	Zener-Diode Suppression	$T_{rel}$			1.5	msec.
Transfer Time		$\alpha$	50		300	$\mu$ sec.
Drain Time		$\alpha$			5	sec.
Static Contact Resistance	50mV, 10mA	CR			30	m $\Omega$
Contact Material				Hg		
Hg Content				0.32		g
Storage Temperature		$T_A$	-40		+125	°C
Operating Temperature		$T_O$	-38		+125	°C
Soldering Temperature	<10 sec at 260°C			+260		°C
Vibration Resistance (survival)	10 Hz - 500 Hz	G			10	g
Shock Resistance (survival)	11 ± 1ms, 1/2 Sine Wave	S			30	g
Weight				1.16		grams

NOTE 1: Measured in testcoil EN119000-15, test system 2. The given Operate Value has a tolerance of ± 2 AT.  
NOTE 2: All parameters are at 25°C unless otherwise stated.



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NOTE: Vertical mounting required  
±30° from vertical



## HGZ

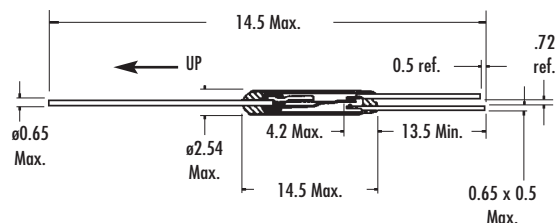
### Miniature High Performance 1 Form C

Symbol	Min.	Typ.	Max.	Units
$V_L$			500	Volts
$I_L$			2	Amps
$I_C$			3	Amps
			50	Watts
f			100	Hz
	1000			$\times 10^6$ Ops
	2			$\times 10^6$ Ops
	50			$\times 10^6$ Ops
	40		70	AT
	15			AT
	x			$\Omega$
		0.5		pF
I/O	1000			VAC
$T_{OP}$			3	msec.
$T_{rel}$			2	msec.
			5	sec.
CR			25	m $\Omega$
		Hg		
		72		mg
$T_A$	-40		+125	°C
$T_O$	-38		+125	°C
		+260		°C
G			10	g
S			30	g
			0.28	grams

NOTE 1: Measured in testcoil EN119000-09./Gap position in coil: 3.5mm in vertical position above centre.

The given Operate value has a tolerance of ±3 AT.

NOTE 2: All parameters are at 25°C unless otherwise stated.



# Proximity Switches

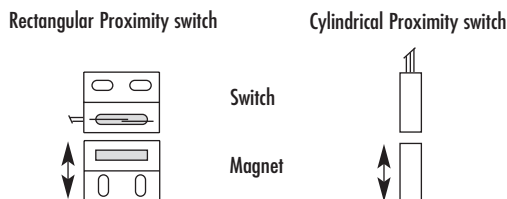
## REED SWITCH

Reed Proximity Switches are operated by a moving magnet and can be used to detect many directions of movement. When the magnet reaches the operate distance from the reed switch, the reed switch contacts will operate (open or close). Moving the magnet away will cause the reed switch contacts to switch back to their original position.

### OPERATION

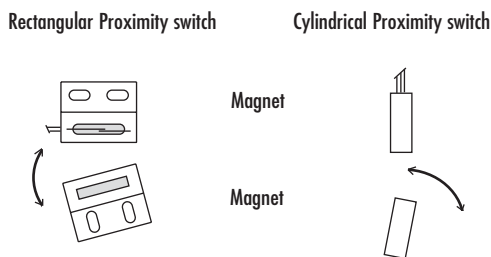
#### PERPENDICULAR

A magnet moved perpendicularly towards and away from a switch operates the switch off and on once.



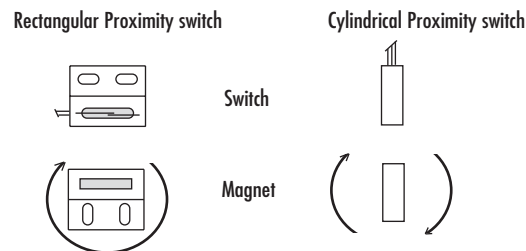
#### SWUNG

A magnet swung towards and away from the switch operates the switch contacts off and on once.



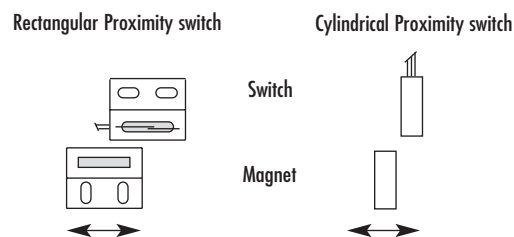
#### ROTATION

A magnet rotated through 360° will operate the switch contacts at least twice in one cycle..



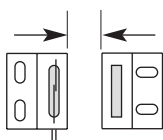
#### PARALLEL

A magnet moving parallel to the switch will operate the switch contacts off and on, one to three times.

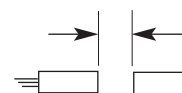


### SWITCHING OR OPERATING DISTANCE

Rectangular Switch Housings



Cylindrical Switch Housings



The switching distances shown in this catalogue are typical using the suggested magnets. The distance can be changed by using a different magnet. Contact Sales Office for further details.

#### Contact Protection

Further information on contact protection and the effects of Inductive and Capacitive loads is detailed in the reed switch section.

#### Electrical Loads

Switch ratings are normally specified for AC resistive loads. Inductive and fast switch cycles will affect the life of the switch. The electrical life expectancy of a reed switch is typically at least 1 million operations at nominal load. Mechanical life is 100 million operations. See reed switch section for more information.

## HALL EFFECT

### FEATURES

Hall Effect Proximity Sensors give bounce free, solid state switching when the magnetic actuator comes within range of the sensor.

The range of Hall Effect Proximity Switches comes in 3 case styles and 3 output types.

The PSS case is plastic. PTS case is threaded nickel plated brass. PSSM is aluminium. All are fully encapsulated to IP65. Output styles range between standard, digital and high power switching.

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# SWITCHES + SENSORS

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# Proximity - Reed Switch - Plastic

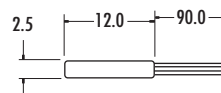
## MINIATURE



*PRA 30/10*

Contact Form / Style		Normally Open
Switching Voltage	Max. Vac	30
Switching Current	Max. A	0.01
Switching Capacity	Max. VA	0.25
Contact Resistance	Max. mΩ	500
Switching Distance	Min. mm	3.0
Operating Temperature		
Continuous	Deg. °C	-20° +70°
Intermittent	Deg. °C	-25° +70°
Storage Temperature		
Case Material		
Polypropylene		
Cable		
2 x 0.28 AWG PVC insulated		
Suggested Magnet		
PRLM		
see magnet section for details		See page 46

See table for cable details



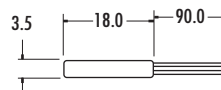
## MINIATURE



*S1372*

Contact Form / Style		Normally Open
Switching Voltage	Max. Vac	140
Switching Current	Max. A	0.5
Switching Capacity	Max. VA	10
Contact Resistance	Max. mΩ	115
Switching Distance	Min. mm	5
Operating Temperature		
Continuous	Deg. °C	-20° +85°
Intermittent	Deg. °C	-20° +105°
Storage Temperature		
Case Material		
Nylon		
Cable		
2 x 0.28 AWG PVC		
Suggested Magnet		
PRLM		
see magnet section for details		See page 46

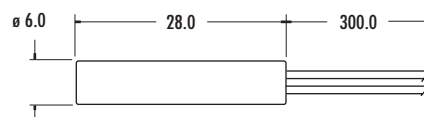
See table for cable details



*PRA 100/30*

Contact Form / Style		Normally Open
Switching Voltage	Max. Vac	100
Switching Current	Max. A	0.25
Switching Capacity	Max. VA	5.0
Contact Resistance	Max. mΩ	200
Switching Distance	Min. mm	5
Operating Temperature		
Continuous	Deg. °C	-20° +85°
Intermittent	Deg. °C	-20° +105°
Storage Temperature		
Case Material		
Nylon		
Cable		
2 x 0.14" PVC insulated		
Suggested Magnet		
PRM		
see magnet section for details		See page 46

See table for cable details



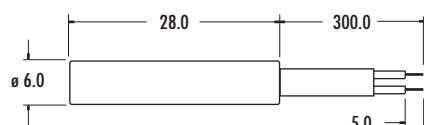
## 240V SWITCHING



*PRA 240/30*

Contact Form / Style		Normally Open
Switching Voltage	Max. Vac	240
Switching Current	Max. A	0.50
Switching Capacity	Max. VA	10.0
Contact Resistance	Max. mΩ	150
Switching Distance	Min. mm	5
Operating Temperature		
Continuous	Deg. °C	-20° +85°
Intermittent	Deg. °C	-20° +105°
Storage Temperature		
Case Material		
Nylon		
Cable		
2 x 0.14" PVC insulated		
Suggested Magnet		
PRM		
see magnet section for details		See page 46

See table for cable details



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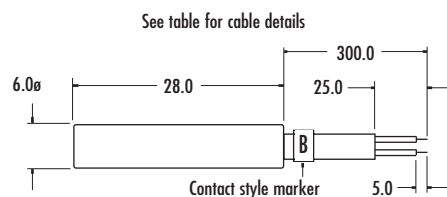
# Proximity - Reed Switch - Plastic

## NORMALLY CLOSED



*PRB 130/30*

Contact Form / Style		B/Normally Closed
Switching Voltage	Max. Vac	130
Switching Current	Max. A	0.25
Switching Capacity	Max. VA	3
Contact Resistance	Max. mΩ	200
Switching Distance	Min. mm	3
Operating Temperature		
Continuous	Deg. °C	-20° +85°
Intermittent	Deg. °C	-20° +105°
Storage Temperature		-25° +90°
Case Material		Polypropylene
Cable		2 x 0.14 <sup>2</sup> PVC insulated
Suggested Magnet		PRM
see magnet section for details		See page 46

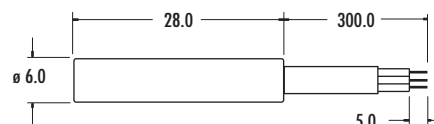


## CHANGEOVER CONTACTS



*PRC 175/30*

Contact Form / Style		Changeover
Switching Voltage	Max. Vac	175
Switching Current	Max. A	0.25
Switching Capacity	Max. VA	3
Contact Resistance	Max. mΩ	150
Switching Distance	Min. mm	3
Operating Temperature		
Continuous	Deg. °C	-20° +85°
Intermittent	Deg. °C	-20° +105°
Storage Temperature	Deg. °C	-20° +90°
Case Material		Polystyrene
Cable		3 x core 0.14 <sup>2</sup> PVC insulated
		White: Common
		Green: N/O
		Brown: N/C
Suggested Magnet		PRM
see magnet section for details		See page 46

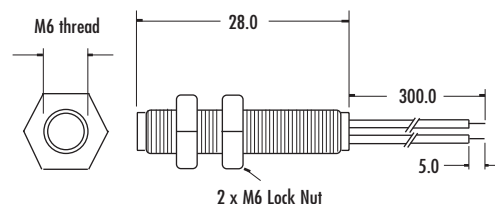


## 400V SWITCHING



*PTAP 470/30*

Contact Form / Style		Normally Open
Switching Voltage	Max. Vac	400
Switching Current	Max. A	0.5
Switching Capacity	Max. VA	10
Contact Resistance	Max. mΩ	150
Switching Distance	Min. mm	5
Operating Temperature		
Continuous	Deg. °C	-20° +85°
Intermittent	Deg. °C	-20° +105°
Storage Temperature		-20° +90°
Case Material		Acetal
Cable		2 x 0.22 <sup>2</sup> PVC insulated
Suggested Magnet		PRM
see magnet section for details		See page 46

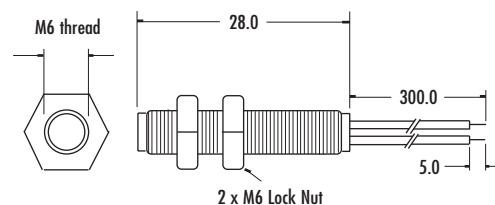


## NORMALLY CLOSED CONTACTS



*PTBP 130/30*

Contact Form / Style		Normally Closed
Switching Voltage	Max. Vac	130
Switching Current	Max. A	0.25
Switching Capacity	Max. VA	3.0
Contact Resistance	Max. mΩ	150
Switching Distance	Min. mm	3
Operating Temperature		
Continuous	Deg. °C	-20° +85°
Intermittent	Deg. °C	-20° +105°
Storage Temperature	Deg. °C	-20° +90°
Case Material		Acetal
Cable		2 x 0.22 <sup>2</sup> PVC insulated
Suggested Magnet		PRM
see magnet section for details		See page 46



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# SWITCHES + SENSORS

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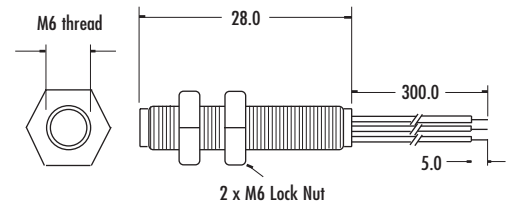
# Proximity - Reed Switch - Plastic

## CHANGEOVER CONTACTS



PTCP 130/30

Contact Form / Style		Changeover
Switching Voltage	Max. Vac	130
Switching Current	Max. A	0.25
Switching Capacity	Max. VA	3
Contact Resistance	Max. mΩ	150
Switching Distance	Min. mm	3
Operating Temperature		
Continuous	Deg. °C	-20° +85°
Intermittent	Deg. °C	-20° +105°
Storage Temperature	Deg. °C	-20° +90°
Case Material		Acetal
Cable		3 x 0.22 <sup>2</sup> PVC insulated
Suggested Magnet		PRM
see magnet section for details		See page 46

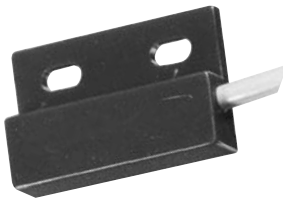
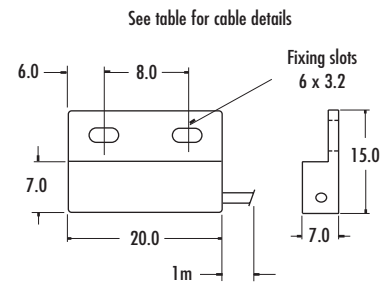


## MINIATURE



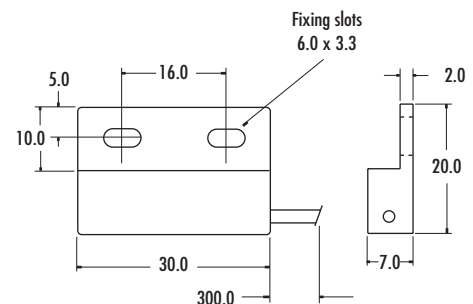
MPS 4452S

Contact Form / Style		Normally Open
Switching Voltage	Max. Vac	100
Switching Current	Max. A	0.5
Switching Capacity	Max. VA	6
Contact Resistance	Max. mΩ	150
Switching Distance	Min. mm	5
Operating Temperature		
Continuous	Deg. °C	-5° +70°
Storage Temperature	Deg. °C	-35° +85°
Case Material		ABS
Cable		2 x 0.14 <sup>2</sup> PVC insulated
Suggested Magnet		4452M
see magnet section for details		See page 46

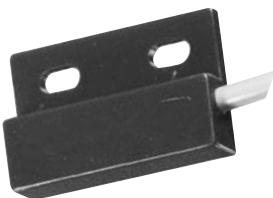


PSA 100/30

Contact Form / Style		Normally Open
Switching Voltage	Max. Vac	100
Switching Current	Max. A	0.25
Switching Capacity	Max. VA	5
Contact Resistance	Max. mΩ	200
Switching Distance	Min. mm	5
Operating Temperature		
Continuous	Deg. °C	-20° +85°
Intermittent	Deg. °C	-20° +105°
Storage Temperature	Deg. °C	-25° +90°
Case Material		Nylon 66
Cable		2 x 0.14 <sup>2</sup> PVC covered
Suggested Magnet		PSM
see magnet section for details		See page 46

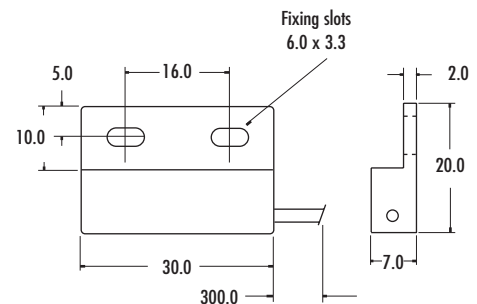


## 240V SWITCHING



PSA 240/30

Contact Form / Style		Normally Open
Switching Voltage	Max. Vac	240
Switching Current	Max. A	0.50
Switching Capacity	Max. VA	10
Contact Resistance	Max. mΩ	200
Switching Distance	Min. mm	5
Operating Temperature		
Continuous	Deg. °C	-20° +85°
Intermittent	Deg. °C	-20° +105°
Storage Temperature	Deg. °C	-25° +90°
Case Material		Nylon 66
Cable		2 x 0.14 <sup>2</sup> PVC covered
Suggested Magnet		PSM
see magnet section for details		See page 46

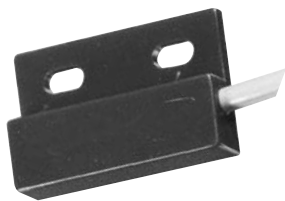


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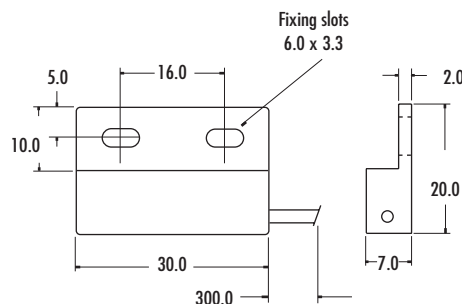
# Proximity - Reed Switch - Plastic

## CHANGEOVER CONTACTS

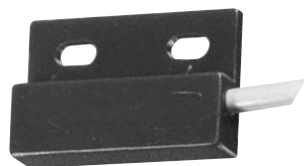


PSC 175/30

Contact Form / Style		Changeover
Switching Voltage	Max. Vac	175
Switching Current	Max. A	0.5
Switching Capacity	Max. VA	5
Contact Resistance	Max. mΩ	150
Switching Distance	Min. mm	5.0
Operating Temperature		
Continuous	Deg. °C	-20° +85°
Intermittent	Deg. °C	-20° +105°
Storage Temperature	Deg. °C	-25° +90°
Case Material		Nylon 66
Cable		3 x 0.14 <sup>2</sup> PVC covered
		White: Common
		Green: Normally Open
		Brown: Normally Closed
Suggested Magnet		PSM
see magnet section for details		See page 46

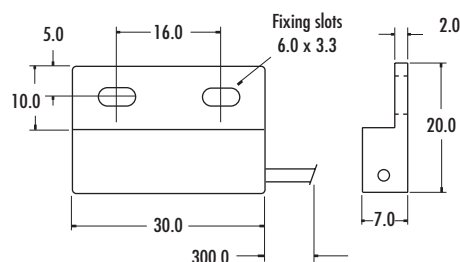


## NORMALLY CLOSED CONTACTS



PSB 175/30

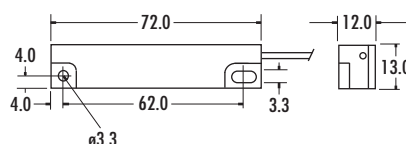
Contact Form / Style		Normally Closed
Switching Voltage	Max. Vac	175
Switching Current	Max. A	0.5
Switching Capacity	Max. VA	5
Contact Resistance	Max. mΩ	150
Switching Distance	Min. mm	5
Operating Temperature		
Continuous	Deg. °C	-20° +85°
Intermittent	Deg. °C	-20° +105°
Storage Temperature	Deg. °C	-25° +90°
Case Material		Polypropylene
Cable		2 x 0.22 <sup>2</sup> PVC covered
Suggested Magnet		PSM
see magnet section for details		See page 46



MPS 4428SN

Contact Form / Style		Normally Open
Switching Voltage	Max. Vac	250
Switching Current	Max. A	1.3
Switching Capacity	Max. VA	80
Contact Resistance	Max. mΩ	100
Switching Distance	Min. mm	10
Operating Temperature		
Continuous	Deg. °C	-5° +70°
Storage Temperature	Deg. °C	-30° +85°
Case Material		ABS
Cable		2 x 0.14 <sup>2</sup> PVC insulated
Suggested Magnet		4428M
see magnet section for details		See page 46

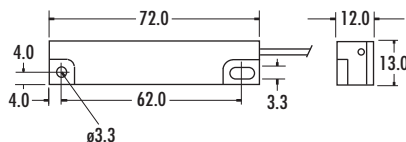
See table for cable details



MPS 4428U

Contact Form / Style		Changeover
Switching Voltage	Max. Vac	230
Switching Current	Max. A	1.0
Switching Capacity	Max. VA	60
Contact Resistance	Max. mΩ	100
Switching Distance	Min. mm	10
Operating Temperature		
Continuous	Deg. °C	-5° +70°
Storage Temperature	Deg. °C	-30° +85°
Case Material		ABS
Cable		3 x 0.14 <sup>2</sup> PVC insulated
Suggested Magnet		4428M
see magnet section for details		See page 46

See table for cable details



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## SWITCHES + SENSORS

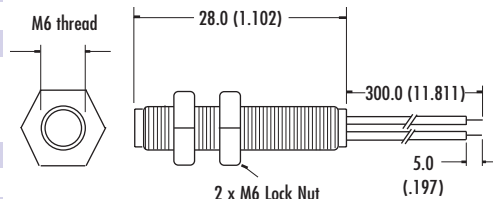
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# Proximity - Reed Switch - Metal



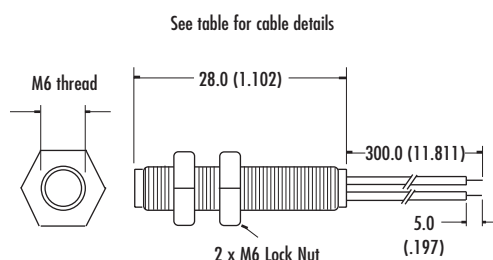
PTA 470/30

Contact Form / Style		Normally Open
Switching Voltage	Max. Vac	470
Switching Current	Max. A	0.5
Switching Capacity	Max. VA	10
Contact Resistance	Max. mΩ	150
Switching Distance	Min. mm	3
Operating Temperature		
Continuous	Deg. °C	-20° +85°
Intermittent	Deg. °C	-20° +105°
Storage Temperature	Deg. °C	-20° +90°
Case Material	Brass / Nickel Plated	
Cable	2 x 0.22 <sup>2</sup> PVC insulated	
Suggested Magnet	PRM	
see magnet section for details		See page 46



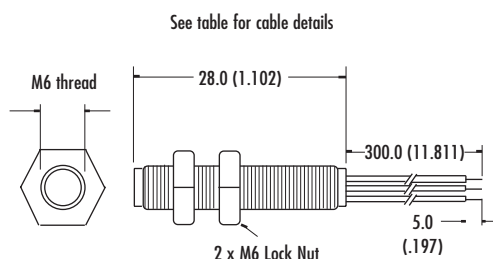
PTB 130/30

Contact Form / Style		Normally Closed
Switching Voltage	Max. Vac	130
Switching Current	Max. A	0.25
Switching Capacity	Max. VA	3.0
Contact Resistance	Max. mΩ	150
Switching Distance	Min. mm	3
Operating Temperature		
Continuous	Deg. °C	-20° +85°
Intermittent	Deg. °C	-20° +105°
Storage Temperature	Deg. °C	-20° +90°
Case Material	Brass / Nickel Plated	
Cable	2 x 0.22 <sup>2</sup> PVC insulated	
Suggested Magnet	PRM	
see magnet section for details		see page 46



PTC 130/30

Contact Form / Style		Changeover
Switching Voltage	Max. Vac	130
Switching Current	Max. A	0.25
Switching Capacity	Max. VA	3.0
Contact Resistance	Max. mΩ	150
Switching Distance	Min. mm	3
Operating Temperature		
Continuous	Deg. °C	-20° +85°
Intermittent	Deg. °C	-20° +105°
Storage Temperature	Deg. °C	-20° +90°
Case Material	Brass / Nickel Plated	
Cable	3 x 0.22 <sup>2</sup> PVC insulated	
		White: Common
		Green: Normally Open
		Brown: Normally Closed
Suggested Magnet see magnet section for details		PRM



## DESIGN AND ASSEMBLY SERVICE

*We can modify many of our products to your design requirements. This includes adding cable, connectors and terminals.*

*Switches can also be encapsulated, assembled to PCB's or fitted into housings.*

All dimensions are nominal, in millimetres unless otherwise stated.

As part of the groups policy of continued product improvement, specifications may change without notice. Our sales office will be pleased to help you with the latest information on our products.

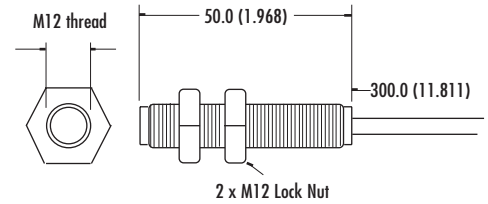
# SWITCHES + SENSORS

# Proximity - Reed Switch - Metal



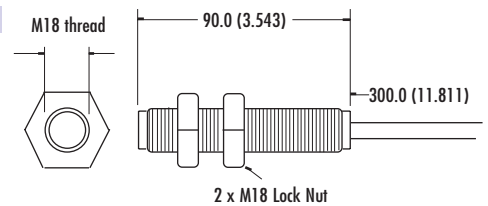
PTA 230/30

Contact Form / Style		Normally Open
Switching Voltage	Max. Vac	230
Switching Current	Max. A	3.0
Switching Capacity	Max. VA	60
Contact Resistance	Max. mΩ	80
Switching Distance	Min. mm	8
Operating Temperature		
Continuous	Deg. °C	-20° +85°
Intermittent	Deg. °C	-20° +105°
Storage Temperature	Deg. °C	-20° +90°
Case Material	Brass / Nickel Plated	
Cable	2 x 0.5² PVC insulated	
Suggested Magnet	PTM12	
see magnet section for details		



PTA 1500/30

Contact Form / Style		Normally Open
Switching Voltage	Max. Vac	1500
Switching Current	Max. A	3.0
Switching Capacity	Max. VA	120
Contact Resistance	Max. mΩ	80
Switching Distance	Min. mm	15
Operating Temperature		
Continuous	Deg. °C	-20° +85°
Intermittent	Deg. °C	-20° +105°
Storage Temperature	Deg. °C	-20 +90°
Case Material	Brass / Nickel Plated	
Cable	2 x 0.5² PVC covered	
Suggested Magnet	PTM18	
see magnet section for details		

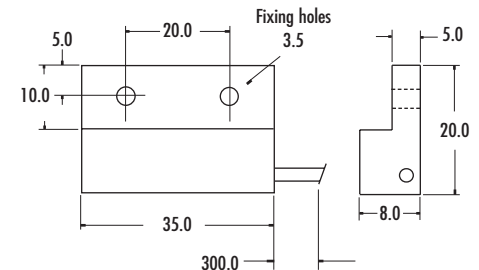


## RUGGED CONSTRUCTION 240V SWITCHING



PSAM 240/30

Contact Form / Style		Normally Open
Switching Voltage	Max. Vac	240
Switching Current	Max. A	0.5
Switching Capacity	Max. VA	10
Contact Resistance	Max. mΩ	100
Switching Distance	Min. mm	8
Operating Temperature		
Continuous	Deg. °C	-20° +85°
Intermittent	Deg. °C	-20° +105°
Storage Temperature	Deg. °C	-25° +90°
Case Material	Aluminium	
Cable	2 core 0.14² PVC insulated	
Suggested Magnet	PSRM	
see magnet section for details		See page 46

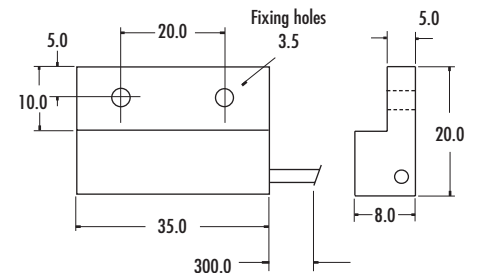


## RUGGED CONSTRUCTION NORMALLY CLOSED CONTACTS



PSBM 130/30

Contact Form / Style		Normally Closed
Switching Voltage	Max. Vac	130
Switching Current	Max. A	0.25
Switching Capacity	Max. VA	3
Contact Resistance	Max. mΩ	150
Switching Distance	Min. mm	8.0
Operating Temperature		
Continuous	Deg. °C	-20° +85°
Intermittent	Deg. °C	-20° +105°
Storage Temperature	Deg. °C	-25° +90°
Case Material	Aluminium	
Cable	2 core 0.14² PVC insulated	
Suggested Magnet	PSRM	
see magnet section for details		See page 41



All dimensions are nominal, in millimetres unless otherwise stated.

As part of the groups policy of continued product improvement, specifications may change without notice. Our sales office will be pleased to help you with the latest information on our products.

# SWITCHES + SENSORS

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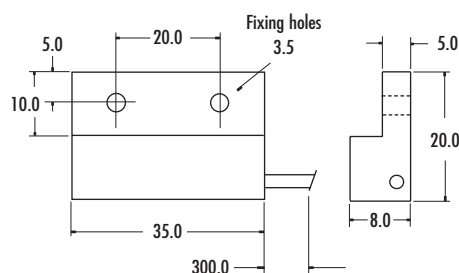
# Proximity - Reed Switch - Metal

## RUGGED CONSTRUCTION CHANGEOVER CONTACTS



*PSCM 130/30*

Contact Form / Style		Changeover
Switching Voltage	Max. Vac	130
Switching Current	Max. A	0.25
Switching Capacity	Max. VA	3
Contact Resistance	Max. mΩ	150
Switching Distance	Min. mm	8
Operating Temperature		
Continuous	Deg. °C	-20° +85°
Intermittent	Deg. °C	-20° +105°
Storage Temperature	Deg. °C	-25° +90°
Case Material		Aluminium
Cable		3 core 0.14 <sup>2</sup> PVC insulated
		White: Common
		Green: Normally Open
		Brown: Normally Closed
Suggested Magnet		PSRM
see magnet section for details		See page 46



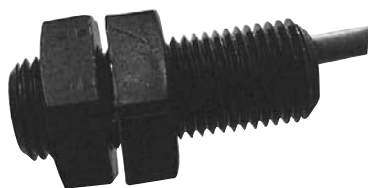
All dimensions are nominal, in millimetres unless otherwise stated.

As part of the groups policy of continued product improvement, specifications may change without notice. Our sales office will be pleased to help you with the latest information on our products.

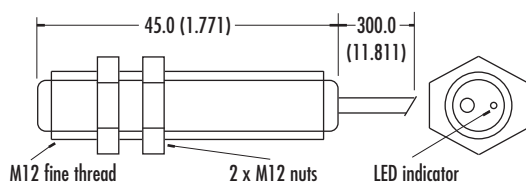
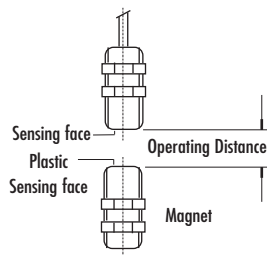
# SWITCHES + SENSORS

# Proximity - Hall Effect - Plastic

## DIGITAL OUTPUT

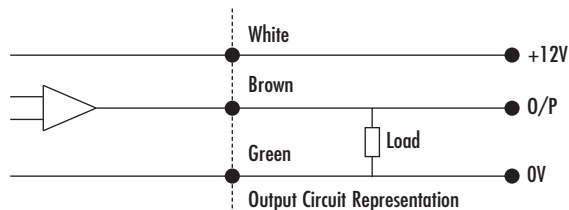


## OPERATION

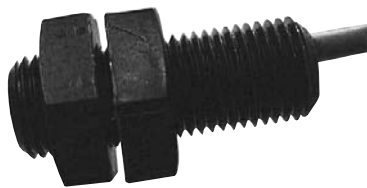


*PTSP25D/30*

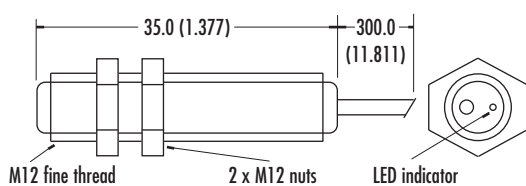
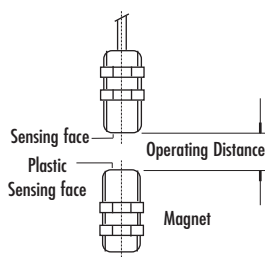
Supply Voltage	Vdc	10 Min. 15 Max.
Quiescent Current	Max. mA	25
Sensing Distance	Typical mm	8
Output Type	5V	Logic gate (Pull Down)
Output Loading		4K7
Operating Temperature		
Continuous	Deg. °C	-20° +85°
Intermittent	Deg. °C	-20° +105°
Storage Temperature	Deg. °C	-25° +90°
Case Material		Acetal
Magnet		PTPM
Cable/Termination		3 x 7/0.2 PVC insulated



## PNP + NPN OUTPUT



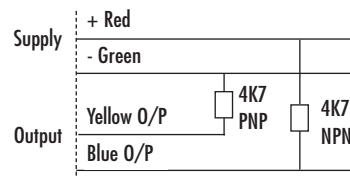
## OPERATION



*PTSP25S/30*

Supply Voltage	Max. Vdc	10 Min. 20 Max.
On Current	Max. mA	25
Output Type		Open Collector
Output Current	max. mA	250
Output Loading	Ohms	4.7K
Proximity Operation		See below
Sensing Distance	Min. mm	10
Operating Temperature		
Continuous	Deg. °C	-20° +85°
Intermittent	Deg. °C	-20° +105°
Storage Temperature	Deg. °C	-25° +90°
Case Material		Acetal
Magnet		PTPM
Cable/Termination		4 x 7/0.2 screened PVC insulated

- PNP + NPN Output
  - Normally Open Contact
  - Magnet Activated Bounce Free Operation
  - LED indication
- Red = +V,  
Green = 0V  
Blue = NPN Output (4.7k ohms to +V)  
Yellow = PNP Output (4.7k ohms to 0V)



NOTE: When power is applied the red indication LED will glow dimly to indicate power is at the device. When a magnet is present ie on target the LED will illuminate at full brightness.

All dimensions are nominal, in millimetres unless otherwise stated.

As part of the groups policy of continued product improvement, specifications may change without notice. Our sales office will be pleased to help you with the latest information on our products.

# SWITCHES + SENSORS

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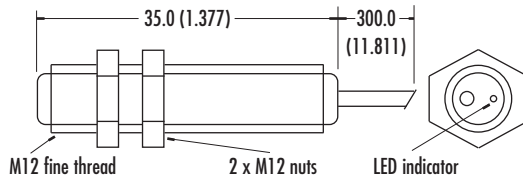
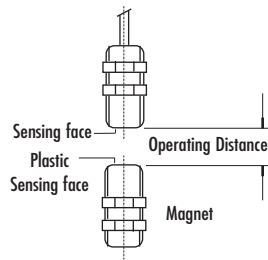


# Proximity - Hall Effect - Plastic

## 0.5A SWITCHING



## OPERATION



**PTSP12S/30**

Supply Voltage	Vdc	10 Min. 15 Max.
Quiescent Current	Max. mA	25
Sensing Distance	Typical mm	8
Output Type	5V	Logic gate (Pull Down)
Output Loading		4K7
Operating Temperature		
Continuous	Deg. °C	-20° +85°
Intermittent	Deg. °C	-20° +105°
Storage Temperature	Deg. °C	-25° +90°
Case Material		
Magnet		PTPM
Cable/Termination		3 x 7/0.2 PVC insulated

### Connection Details

White = +12Vdc

Green = 0V

Brown = 0/P (Ref. to 12v)

This device is a high current hall effect proximity sensor, designed for frequent switching applications requiring 1/2Amp or more capacity for loads such as resistive, inductive and incandescent lamps. Characteristically the device has a bounce free operation.

NOTE 1: Output is current limited to 800mA and junction temperature limited if current in excess of 800mA is attempted.

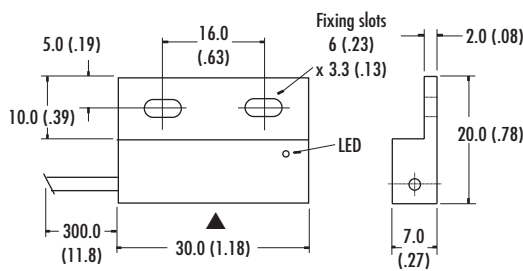
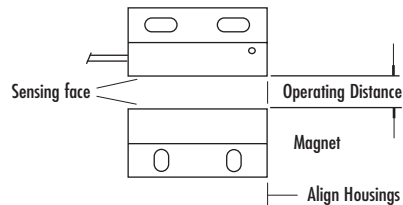
LED indicator to aid installation and diagnostic requirements.

*High Power Switching*

## PNP + NPN OUTPUT



## OPERATION



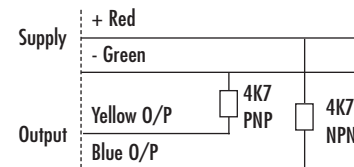
▲ Sensing face

**PSS25S/30**

Supply Voltage	Max. Vdc	10 Min. 20 Max.
On Current	Max. mA	25
Output Type		Open Collector
Output Current	max. mA	250
Output Loading	Ohms	4.7K
Proximity Operation		
Sensing Distance	Min. mm	8
Operating Temperature		
Continuous	Deg. °C	-20° +85°
Intermittent	Deg. °C	-20° +105°
Storage Temperature	Deg. °C	-25° +90°
Case Material		
Magnet		PSSM
Cable/Termination		4 x 7/0.2 screened PVC insulated

- PNP + NPN Output
- Normally Open Contact
- Magnet Activated Bounce Free Operation
- LED indication

Red = +v,  
Green = 0V  
Blue = NPN Output (4.7k ohms to +V)  
Yellow = PNP Output (4.7k ohms to 0V)



NOTE: When power is applied the red indication LED will glow dimly to indicate power is at the device. When a magnet is present ie on target the LED will illuminate at full brightness.

*Standard output*

All dimensions are nominal, in millimetres unless otherwise stated.

As part of the groups policy of continued product improvement, specifications may change without notice. Our sales office will be pleased to help you with the latest information on our products.

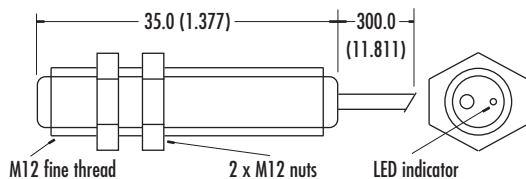
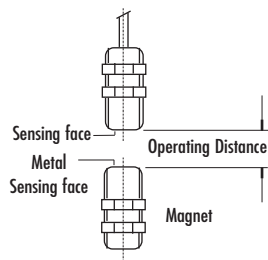
**SWITCHES + SENSORS**

# Proximity - Hall Effect - Metal

## PNP + NPN OUTPUT RUGGED CONSTRUCTION



### OPERATION

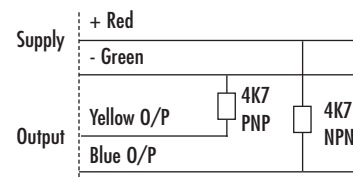


PTS25S/30

Supply Voltage	Max. Vdc	10 Min. 20 Max.
On Current	Max. mA	25
Output Type		Open Collector
Output Current	max. mA	250
Output Loading	Ohms	4.7K
Proximity Operation		See below
Sensing Distance	Min. mm	10
Operating Temperature		
Continuous	Deg. °C	-20° +85°
Intermittent	Deg. °C	-20° +105°
Storage Temperature	Deg. °C	-25° +90°
Case Material		Brass-Nickel plated
Magnet		PTSM
Cable/Termination		4 x 7/0.2 Screened PVC insulated

- PNP + NPN Output
- Normally Open Contact
- Magnet Activated Bounce Free Operation
- LED indication

Red = +V,  
Green = 0V  
Blue = NPN Output (4.7k ohms to +V)  
Yellow = PNP Output (4.7k ohms to 0V)

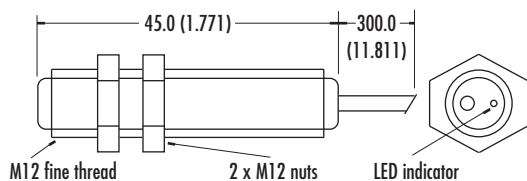
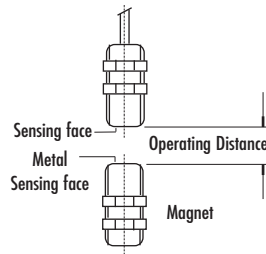


NOTE: When power is applied the red indication LED will glow dimly to indicate power is at the device. When a magnet is present ie on target the LED will illuminate at full brightness.

## DIGITAL OUTPUT RUGGED CONSTRUCTION

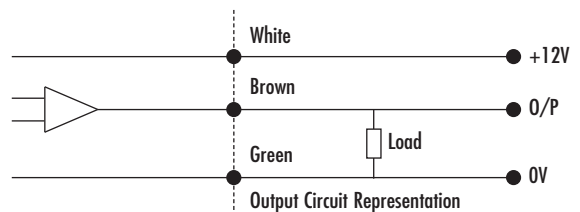


### OPERATION



PTS25D/30

Supply Voltage	Vdc	10 Min. 15 Max.
Quiescent Current	Max. mA	25
Sensing Distance	Typical mm	8
Output Type	5V	Logic gate (Pull Down)
Output Loading		4K7
Operating Temperature		
Continuous	Deg. °C	-20° +85°
Intermittent	Deg. °C	-20° +105°
Storage Temperature	Deg. °C	-25° +90°
Case Material		Brass-Nickel plated
Magnet		PTSM
Cable/Termination		3 x 7/0.2 PVC insulated



NOTE: This device consists of a hall effect sensing element coupled to digital circuits to provide a digital output. The output sense is active low. The LED indicator will illuminate when the magnet is in the sensing range. Protection is provided against supply reversal.

All dimensions are nominal, in millimetres unless otherwise stated.

As part of the groups policy of continued product improvement, specifications may change without notice. Our sales office will be pleased to help you with the latest information on our products.

# SWITCHES + SENSORS

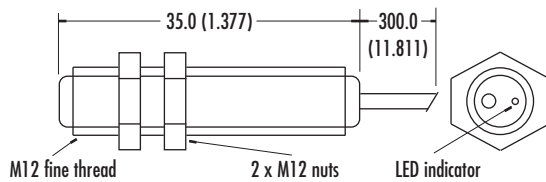
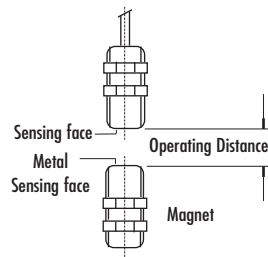
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# Proximity - Hall Effect - Metal

## 0.5A SWITCHING RUGGED CONSTRUCTION



### OPERATION



**PTS12S/30**

Supply Voltage	Vdc	10 Min. 15 Max.
Quiescent Current	Max. mA	25
Sensing Distance	Typical mm	8
Output Type	5V	Logic gate (Pull Down)
Output Loading		4K7
Operating Temperature		
Continuous	Deg. °C	-20° +85°
Intermittent	Deg. °C	-20° +105°
Storage Temperature	Deg. °C	-25° +90°
Case Material		Acetal
Magnet		PTPM
Cable/Termination		3 x 7/0.2 PVC insulated

Connection Details  
White = +12Vdc  
Green = 0V  
Brown = 0/P (Ref. to 12V)

This device is a high current hall effect proximity sensor, designed for frequent applications requiring 1/2Amp or more capacity for loads such as resistive, inductive and incandescent lamps. Characteristically the device has a bounce free operation.

NOTE 1: Output is current limited to 800mA and junction temperature limited if current in excess of 800mA is attempted.

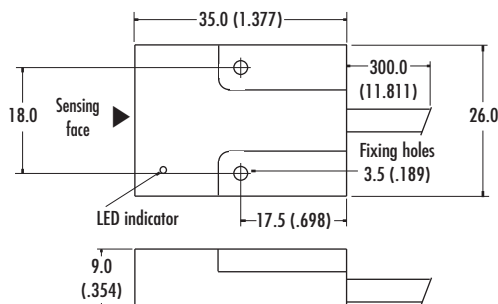
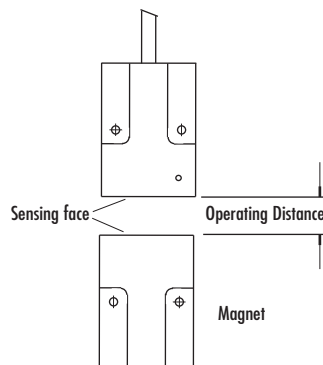
LED indicator to aid installation and diagnostic requirements.

*High Power Switching*

## RUGGED CONSTRUCTION DIGITAL OUTPUT

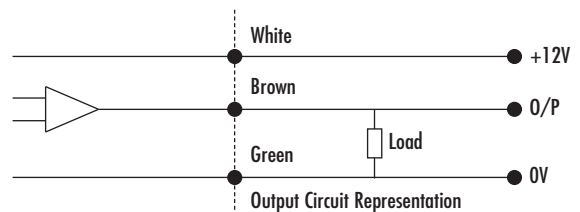


### OPERATION



**PSSM25D/30**

Supply Voltage	Vdc	10 Min. 15 Max.
Quiescent Current	Max. mA	25
Sensing Distance	Typical mm	8
Output Type	5V	Logic gate (Pull Down)
Output Loading		4K7
Operating Temperature		
Continuous	Deg. °C	-20° +85°
Intermittent	Deg. °C	-20° +105°
Storage Temperature	Deg. °C	-25° +90°
Case Material		Aluminium
Magnet		PSMM
Cable/Termination		3 x 7/0.2 PVC insulated



NOTE: This device consists of a hall effect sensing element coupled to digital circuits to provide a digital output. The output sense is active low. The LED indicator will illuminate when the magnet is in the sensing range. Protection is provided against supply reversal.

All dimensions are nominal, in millimetres unless otherwise stated.

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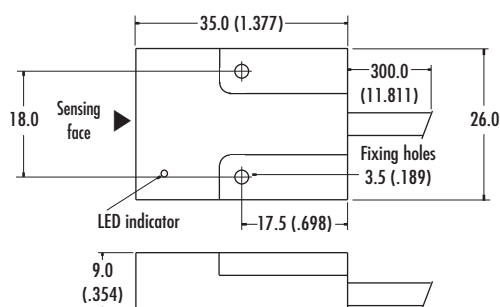
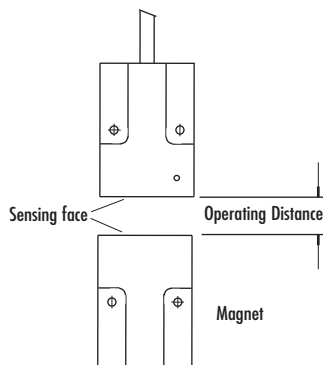
**SWITCHES + SENSORS**

# Proximity - Hall Effect - Metal

## PNP - NPN OUTPUT RUGGED CONSTRUCTION



### OPERATION

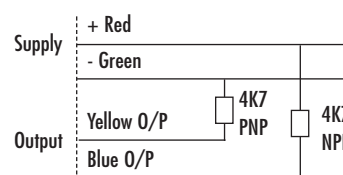


PSSM25S/30

Supply Voltage	Max. Vdc	10 Min. 20 Max.
On Current	Max. mA	25
Output Type		Open Collector
Output Current	max. mA	250
Output Loading	Ohms	4.7K
Proximity Operation		See below
Sensing Distance	Min. mm	8
Operating Temperature		
Continuous	Deg. °C	-20° +85°
Intermittent	Deg. °C	-20° +105°
Storage Temperature	Deg. °C	-25° +90°
Case Material		Aluminium
Magnet		PSMM
Cable/Termination		4 x 7/0.2 <sup>2</sup> screened PVC insulated

- PNP + NPN Output
- Normally Open Contact
- Magnet Activated Bounce Free Operation
- LED indication

Red = +V,  
Green = 0V  
Blue = NPN Output (4.7k ohms to +V)  
Yellow = PNP Output (4.7k ohms to 0V)



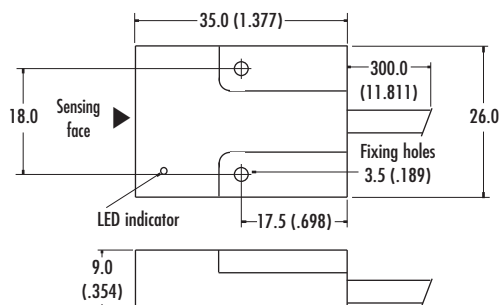
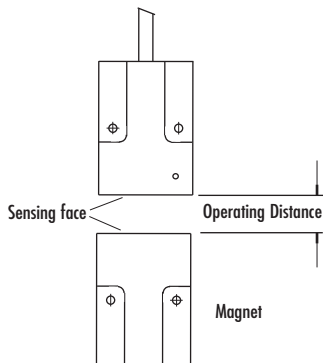
NOTE: When power is applied the red indication LED will glow dimly to indicate power is at the device. When a magnet is present ie on target the LED will illuminate at full brightness.

### Standard Output

## 0.5A SWITCHING RUGGED CONSTRUCTION



### OPERATION



PSSM12S/30

Supply Voltage	Vdc	5Min. 15 Max.
Quiescent Current	Max. mA	8
Sensing Distance	Typical mm	8
Output Type	5V	Darlington open collector
Output current continuously switching		0.5Amp duty cycle 3S on 8S off
Output current has thermal limiting*		800mA Peak
Short circuit & reverse polarity protected		
Operating Temperature		
Continuous	Deg. °C	-20° +85°
Intermittent	Deg. °C	-20° +105°
Storage Temperature	Deg. °C	-25° +90°
Case Material		Aluminium
Magnet		PSMM
Cable/Termination		3 x 0.14 <sup>2</sup> PVC insulated
		White: +12Vdc
		Green: 0V
		Brown: O/P (Ref. to 12V)

This is a high current hall effect proximity sensor, designed for frequent applications requiring 1/2Amp or more capacity for loads such as resistive, inductive and incandescent lamps. Characteristically the device has a bounce free operation with high noise immunity.

NOTE 1\*: Output is current limited to 800mA and junction temperature limited if current in excess of 800mA is attempted.

LED indicator to aid installation and diagnostic requirements.

### High Power Switching

All dimensions are nominal, in millimetres unless otherwise stated.

As part of the groups policy of continued product improvement, specifications may change without notice. Our sales office will be pleased to help you with the latest information on our products.

# SWITCHES + SENSORS

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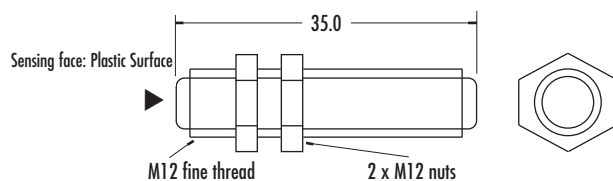
# Proximity - Hall Effect - Magnets



## FEATURES

- Acetal bodied magnet
- Selected to match sensor
- Easy Alignment

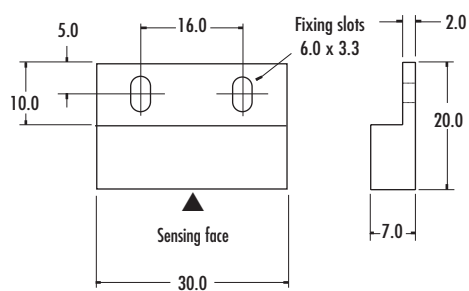
*PTPM*



## FEATURES

- Polypropylene Cased Magnet
- Selected to match sensor
- Easy Alignment

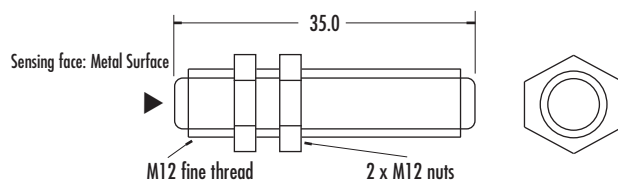
*PSSM*



## FEATURES

- Brass-Nickel Plated bodied magnet
- Selected to match sensor
- Easy Alignment

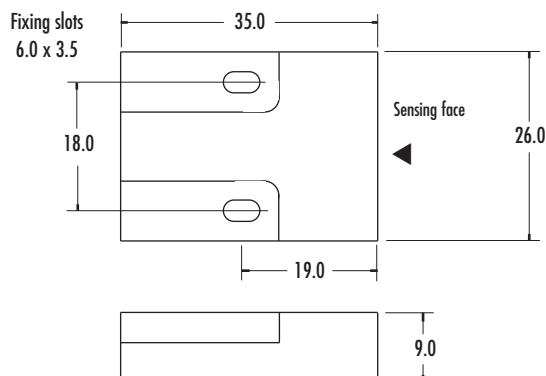
*PTSM*



## FEATURES

- Aluminium bodied magnet
- Selected to match sensor
- Easy Alignment

*PSMM*



All dimensions are nominal, in millimetres unless otherwise stated.

As part of the groups policy of continued product improvement, specifications may change without notice. Our sales office will be pleased to help you with the latest information on our products.

# SWITCHES + SENSORS

# Magnets - Bare - Cased

## BARE

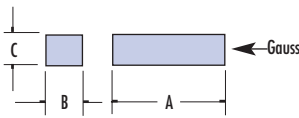
### MAGNETS

Magnets can be supplied as a separate product or part of a proximity switch set consisting of switch and magnet.



Below are shown our standard range of magnets. we can supply magnets in a wide variety of materials and styles.

### RECTANGULAR MAGNETS



Part Number	Material	Dimension A	Dimension B	Dimension C	Gauss at 3mm
RSH-01	Alcomax	12.7	3.18	1.59	140
RSH-33		19.05	3.18	3.18	250
RSH-34		25.4	6.35	6.35	690
RSH-32		27.9	4.75	4.75	550

### ALCOMAX

A good general purpose material that can be machined or cast to the required shape prior to being magnetised. It has a maximum working temperature of 550°C and good corrosion resistance.

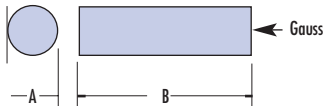
### FERRITE

Anisotropic sintered ferrite is a cost effective material which has high resistance to de-magnetisation. It has a maximum working temperature of 250°C and excellent corrosion resistance.

### NEODYMIUM IRON BORON

This is a high energy material with exceptional resistance to demagnetisation. It has a maximum working temperature of 120°C and is nickel plated to give good corrosion resistance together with excellent appearance.

### CYLINDRICAL MAGNETS



Part Number	Material	Dimension A	Dimension B	Plated	Surface Gauss
PRLM	Alcomax	3.0	15.0		900
PRM	Alcomax	6.0	18.0		1000
PRMM	Alcomax	10.0	30.0		1000
PRNM	Alcomax	12.5	40.0		1100
M1219-1	NdFeB	3.0	1.0	Nickel Plated	1500
M1219-2	NdFeB	3.0	2.0	Nickel Plated	2500
M1219-3	NdFeB	4.0	3.0	Nickel Plated	3200
M1219-4	NdFeB	6.0	2.0	Nickel Plated	2500
M1219-5	NdFeB	10.0	5.0	Nickel Plated	3500
M1219-8	NdFeB	6.0	4.0	Nickel Plated	3900
M1219-10	NdFeB	22.0	2.0	Nickel Plated	850
M1219-11	NdFeB	9.0	5.0	Nickel Plated	3500

For full list of magnet range please see our web site

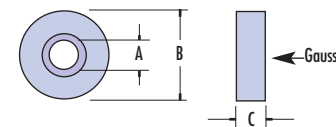
## CASED

### MAGNETS

Cased magnets can be supplied as a separate product where you can select a magnet to suit your operation or as part of a proximity switch set consisting of matching switch and magnet.

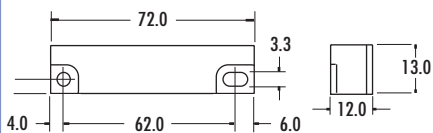


### RING MAGNETS

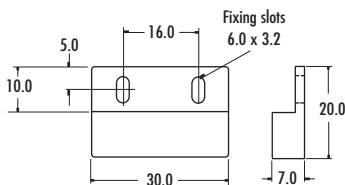


Part Number	Material	Dimension A	Dimension B	Dimension C	Surface Gauss
M1218	Ferrite	3.2	15.0	6.0	1000

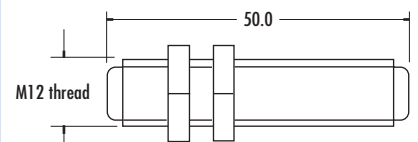
Gauss figures will change rapidly with distance and are given as a general guide only.



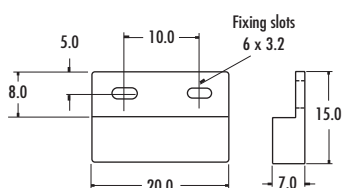
Case Material ABS  
4428M



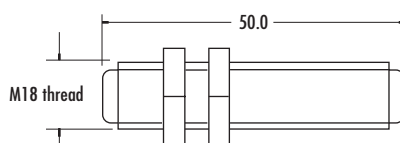
Case Material Moulded Nylon 66  
PSM



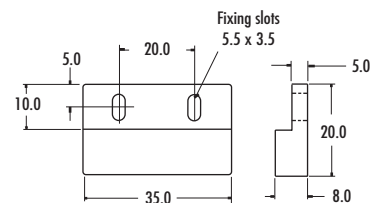
Case Material Brass Nickel Plated  
PTM12



Case Material ABS  
4452M



Case Material Brass Nickel Plated  
PTM18



Case Material Aluminium  
PSRM

# SWITCHES + SENSORS

A Comus International Group Company



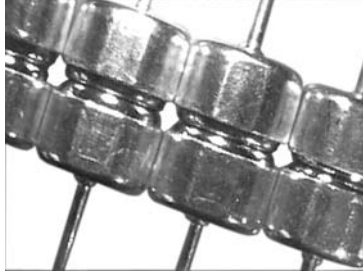
# Magnets - Cased

## Magtrix Miniature Magnetic Electrical Connectors

Made from the strongest permanent magnet material

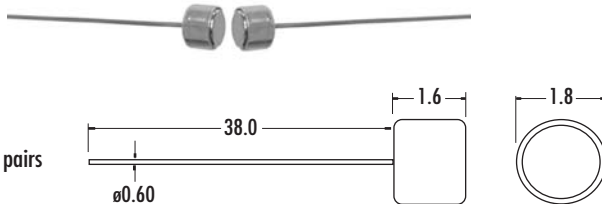
Magtrix Connectors are versatile miniature Neodymium-iron-boron nickel plated magnets with copper-tin plated flexible leads.

Primarily designed for use as battery connectors, they are also ideal for proximity sensor and reed switch triggering, connecting PCBs, test equipment connections and prototyping where connections need to be made quickly. These connectors are ideal for use where space is at a premium or whenever magnetic muscle is required to replace traditional methods of connection, electrical or mechanical.

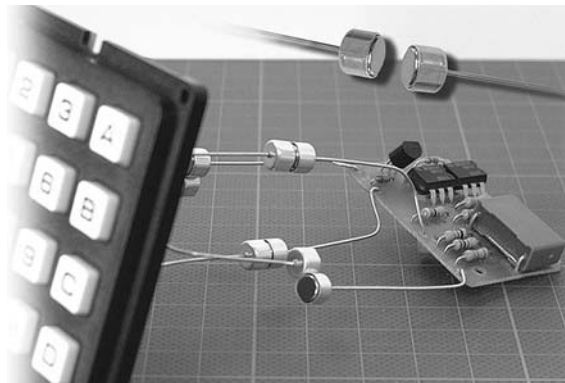


### MC/15GNS

Supplied in matching pairs

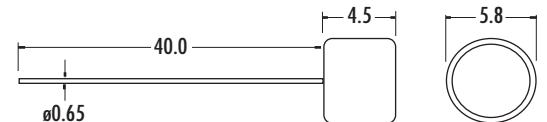


Magnet Material:	NdFeb (Neodymium-Iron-Boron) Grade: N35H
Surface Gauss:	1000
Finish:	Copper-tin plated
Housing:	Brass-silver plated
Connecting Wire:	Copper-tin plated
Operating Temperature: Deg. °C	120



### MC/53GNS

Supplied in matching pairs

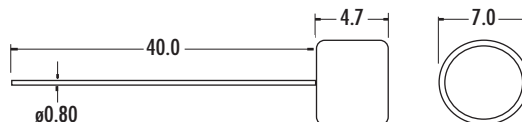


Magnet Material:	NdFeb (Neodymium-Iron-Boron) Grade: N35H
Surface Gauss:	3000
Finish:	Copper-tin plated
Housing:	Brass-silver plated
Connecting Wire:	Copper-tin plated
Rating:	8A with full face contact
Operating Temperature: Deg. °C	120

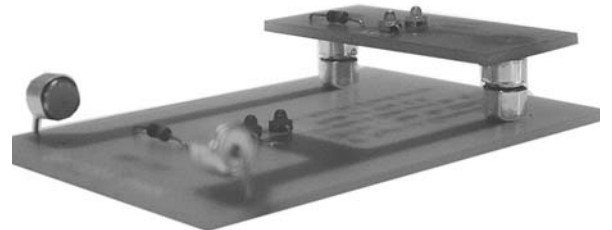
One connector has the power to lift and hold circa 300g / 10 oz.

### MC/64GNS

Supplied in matching pairs



Magnet Material:	NdFeb (Neodymium-Iron-Boron) Grade: N35H
Surface Gauss:	3000
Finish:	Copper-tin plated
Housing:	Brass-silver plated
Connecting Wire:	Copper-tin plated
Rating:	8A with full face contact
Operating Temperature: Deg. °C	120



**For more details on these and products and others  
due for release please contact our Sales Office**



# Movement Sensing

## DESCRIPTION

The products included in this section are all designed to detect motion or movement. Forms of movement are: Tilt, Rotation, Vibration, Shock or Acceleration. Many of these can be supplied for surface mount applications.

**Acceleration and Shock.** These switches have a normally open contact which closes when the switch reaches the acceleration activation level.

**Angle Sensors.** The output gives a change in resistance which varies in proportion to the angle rotated. The sensor operates in one plane and has a maximum working range of 140 degrees.

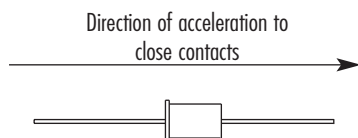
**Movement and Vibration.** When correctly positioned the switch contacts will react by giving a fleeting change of state when subjected to movement or vibration.

**Tilt Switches.** These operate when tilted from the horizontal position. The switch movement required to cause contact change is called the differential angle.

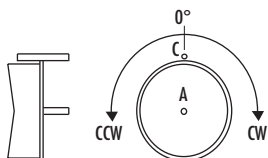
**Tip-Over Switches.** These operate when the switch is tilted from the vertical position. The angle through which the switch has to move before operating is called the operating angle. Many of these switches are omni-directional.

## OPERATION

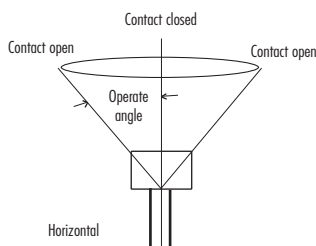
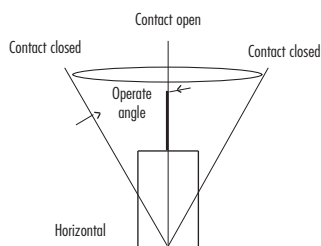
### Acceleration and Shock



### Angle Sensors

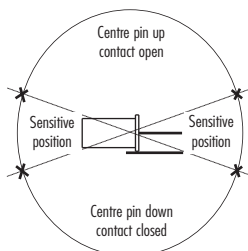


### Tip-over switch

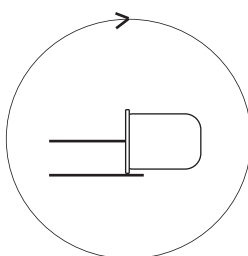


### Movement and Vibration

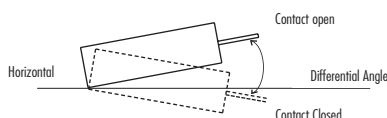
#### - Position Sensitive



#### - Non Position Sensitive



### Tilt Switch

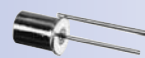


## SURFACE MOUNT



Page 70

## ACCELERATION SHOCK



Page 71

## ANGLE



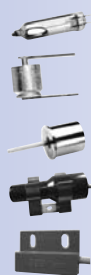
Page 72

## MOVEMENT VIBRATION



Page 73

## TILT



Page 77

## TIP-OVER



Page 90

# Surface Mount Switches and Sensors

We can now supply surface mount termination for a wide range of our products.

Gold plated contacts give good solderability and are designed to provide stability during assembly.

The following products can be supplied for SMD either loose or taped and reeled.

Contact the Sales Office for details



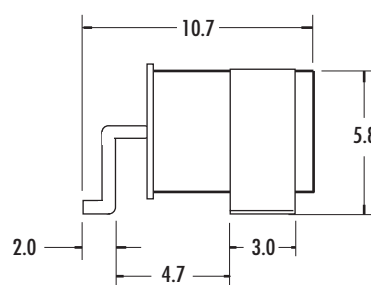
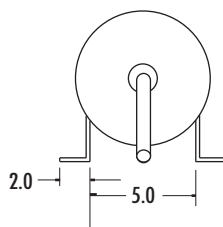
## Acceleration Switches See page 71 for switch specifications

ASLS - 2 - PP

ASLS - 5 - PP

ASLS - 10 - PP

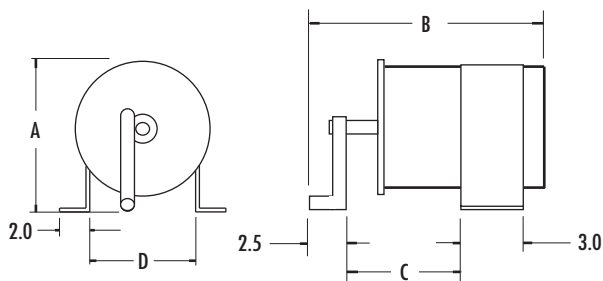
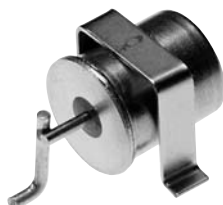
ASLS - 15 - PP



## Movement/Vibration Switches See page 73 for switch specifications

MS24 - PP

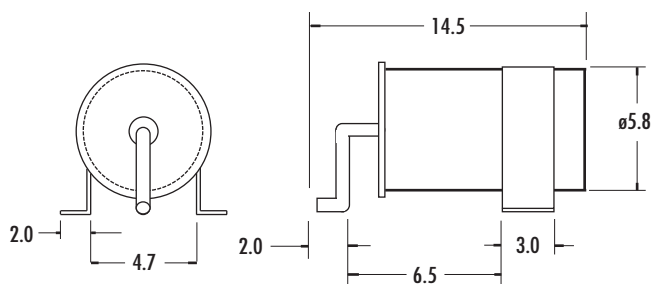
MS24M - PP



	MS24	MS24M
A	10.0	6.6
B	15.5	9.0
C	7.0	3.0
D	9.0	5.0

## Tilt Switches See page 77 for switch specifications

CW1300 - PP



All dimensions are nominal, in millimetres unless otherwise stated.

As part of the groups policy of continued product improvement, specifications may change without notice. Our sales office will be pleased to help you with the latest information on our products.

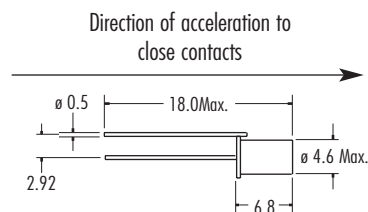
# SWITCHES + SENSORS

# Acceleration and Shock



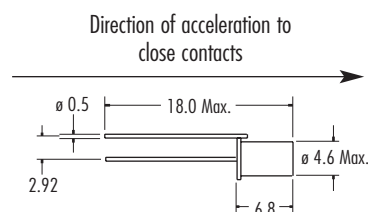
ASLS-2

Contact Form/Style	Normally Open	
Switching Voltage	Max. Vdc	24
Switching Current	Max. A	0.25
Switching Capacity	Max. VA	5
Contact Resistance	Max. $\Omega$	10
Operating Temperature	Deg. °C	-20° +85°
Storage Temperature		-25° +90°
Activation Level	G	2 - 4.9
Case Material	Steel - gold plated	



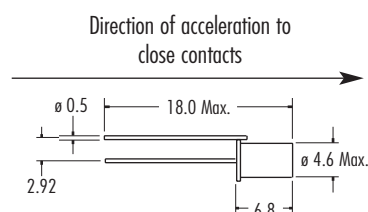
ASLS - 5

Contact Form/Style	Normally Open	
Switching Voltage	Max. Vdc	24
Switching Current	Max. A	0.25
Switching Capacity	Max. VA	5
Contact Resistance	Max. $\Omega$	10
Operating Temperature	Deg. °C	-20° +85°
Storage Temperature		-25° +90°
Activation Level	G	5.0 - 9.9
Case Material	Steel - gold plated	



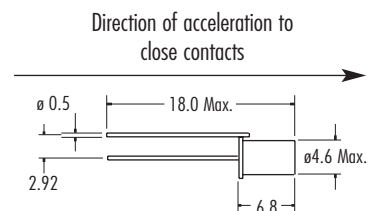
ASLS - 10

Contact Form/Style	Normally Open	
Switching Voltage	Max. Vdc	24
Switching Current	Max. A	0.25
Switching Capacity	Max. VA	5
Contact Resistance	Max. $\Omega$	10
Operating Temperature	Deg. °C	-20° +85°
Storage Temperature		-25° +90°
Activation Level	G	10.0 - 14.9
Case Material	Steel - gold plated	



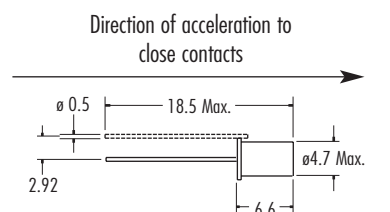
ASLS - 15

Contact Form/Style	Normally Open	
Switching Voltage	Max. Vdc	24
Switching Current	Max. A	0.25
Switching Capacity	Max. VA	5
Contact Resistance	Max. $\Omega$	10
Operating Temperature	Deg. °C	-20° +85°
Storage Temperature		-25° +90°
Activation Level	G	15.0 - 19.9
Case Material	Steel - gold plated	



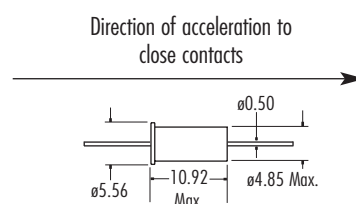
AS1303-0 (1 electrode)  
AS1303-1 (2 electrodes)

Contact Form/Style	Normally Open	
Switching Voltage	Max. Vdc	24
Switching Current	Max. A	0.25
Switching Capacity	Max. VA	3
Contact Resistance	Max. $\Omega$	20 at 2g overdrive
Operating Temperature	Deg. °C	-35° +100°
Storage Temperature		-40° +125°
Activation Level	G	3.0 - 9
Case Material	Tin plated	



ASS - 25 (25.0 ± 2.0)  
ASS - 45 (45.0 ± 3.0)

Contact Form/Style	Normally Open	
Switching Voltage	Max. Vdc	24
Switching Current	Max. A	0.25
Switching Capacity	Max. VA	5
Contact Resistance	Max. $\Omega$	10
Operating Temperature	Deg. °C	-20° +85°
Storage Temperature		-25° +90°
Activation Level	G	45.0 ± 3.0
Case Material	Steel - tin plated	



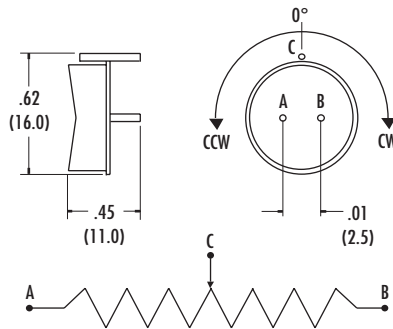
# Potentiometer - Mercury Contacts



**VRS 67**

(3 electrodes)

Clockwise rotation (CW) increases resistance between A and C



Combines the features of a hermetically sealed tilt switch with the versatility of a Potentiometer. Rotating the sensor will vary the resistance in proportion to the angle rotated.

## SPECIFICATIONS

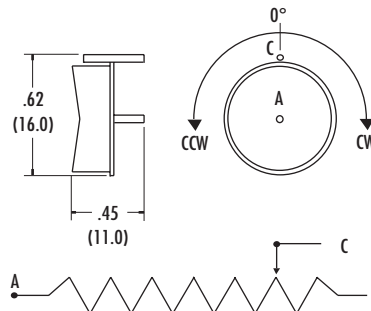
Temperature Range	-38°C +75°C
Maximum Working Voltage	200 V
Power Rating	0.1W at 40°C
Working Range	-70° +70° (total 140° total)
Typical Linearity	3% from -70° +70°
Contact Type	Mercury

**VRS 57 and VRS 37**

(2 electrodes)

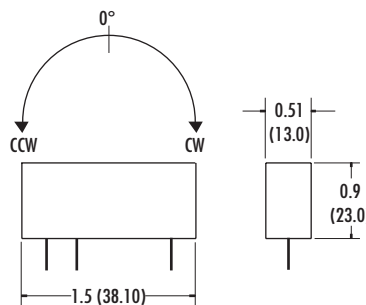
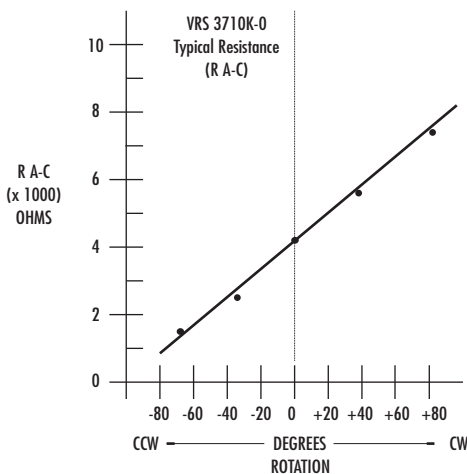
VRS 57 - Counter clockwise rotation (CCW) increases resistance

VRS 37 - Clockwise rotation (CW) increases resistance



**VRS37** - 2 Electrodes - CW rotation increases resistance  
**VRS57** - 2 Electrodes - CCW rotation increases resistance  
**VRS67** - 3 Electrodes - CW rotation increases resistance AC  
 With the outer electrode at the top position (0°) output resistance is approximate mid-point of the total range.

Resistance	PART No.	Resistance	PART No.
250	VRS - - 300-0	40K	VRS - - 50K-0
800	VRS - - 01K-0	80K	VRS - - 100K-0
1.6K	VRS - - 02K-0	160K	VRS - - 200K-0
4K	VRS - - 05K-0	400K	VRS - - 500K-0
8K	VRS - - 10K-0	800K	VRS - - 01M-0
17K	VRS - - 20K-0	1.6 MEG	VRS - - 02M-0

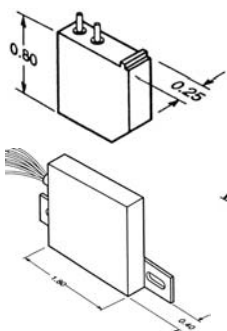


**PD 3052**

Epoxy sealed housing for mounting on a horizontal pcb

Designed for customers having a need for multiple switch operations as their equipment performs its functions.

## Custom Assemblies



A convenient and inexpensive solution to the problem of adjusting several tilt switches is to use an assembly having the switches factory set for correct operation.

These assemblies provide a single package that operates as you require, at a cost below that of buying switches and doing the assembly "in house." The epoxy sealed housing provides excellent protection against damage by dropping or mishandling during installation.

To obtain a quotation, contact our sales department and furnish a sketch with your package size and operating specifications.

**SWITCHES + SENSORS**

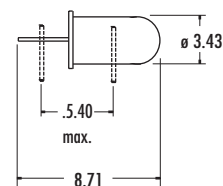
# Movement/Vibration - Non Mercury



CW1600-0  
CW1600-3

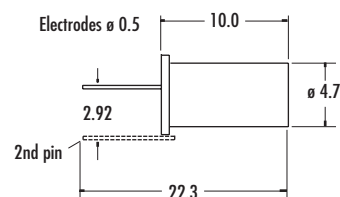
Contact Form/Style	Position Sensitive see p69	
Switching Voltage	Max. Vac	60
Switching Current	Max. A	0.1
Switching Capacity	Max. VA	3
Operating Angle	Max. Deg.	15
Contact Resistance	Max. $\Omega$	30
Operating Temperature	Deg. °C	-37° +100°
Storage Temperature	Deg. °C	-40° +125°
Case Material	Steel - tin plated	
Cable / Termination	Electrode	
Features	Compact Mercury Free CW1600-0 (1 electrode) CW1600-3 (2 electrodes)	

Electrodes  $\varnothing$  0.5



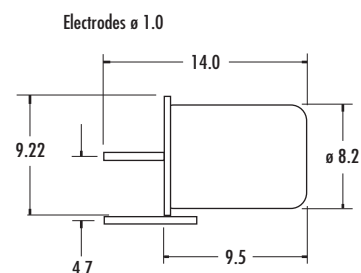
CW1300-0  
CW1300-1

Contact Form/Style	Position Sensitive see p69	
Switching Voltage	Max. Vac	60
Switching Current	Max. A	0.25
Switching Capacity	Max. VA	5
Operating Angle	Max. Deg.	N/A
Contact Resistance	Max. $\Omega$	30
Operating Temperature	Deg. °C	-37° +100°
Storage Temperature	Deg. °C	-40° +125°
Case Material	Nickel - Tin Plated	
Cable / Termination	Electrode	
Features	Mercury Free Patented Design CW1300-0 (1 electrode) CW1300-1 (2 electrodes)	



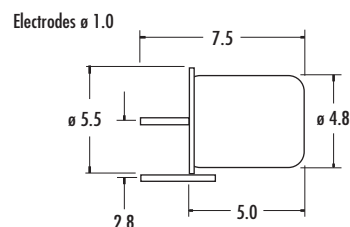
MS24

Contact Form/Style	Non-position Sensitive see p69	
Switching Voltage	Max. Vac	24
Switching Current	Max. A	0.25
Switching Capacity	Max. VA	5
Operating Angle	Max. Deg.	N/A
Contact Resistance	Max. $\Omega$	5
Operating Temperature	Deg. °C	-37° +100°
Storage Temperature	Deg. °C	-40° +125°
Case Material	Steel - Gold plated	
Cable / Termination	Electrode	
Features	Gold Plated Contacts Non-Mercury contacts Omni-Directional patent Applied for	



MS24M

Contact Form/Style	Non-position sensitive see p69	
Switching Voltage	Max. Vac	24
Switching Current	Max. A	0.20
Switching Capacity	Max. VA	5
Operating Angle	Max. Deg.	N/A
Contact Resistance	Max. $\Omega$	Less than 10
Operating Temperature	Deg. °C	-37° +100°
Storage Temperature	Deg. °C	-40° +125°
Case Material	Steel - Gold plated	
Cable / Termination	Electrode	
Features	Non-mercury contacts Omni-Directional Gold plated contacts	



All dimensions are nominal, in millimetres unless otherwise stated.

As part of the groups policy of continued product improvement, specifications may change without notice. Our sales office will be pleased to help you with the latest information on our products.

## SWITCHES + SENSORS

A Comus International Group Company

# Movement/Vibration - Non Mercury

## GENERAL INFORMATION

Due to the unique features of these modules and the wide range of motion and vibration they may be subjected to, we suggest actual testing to determine the suitability of the module for each operation.

### MS24P/10

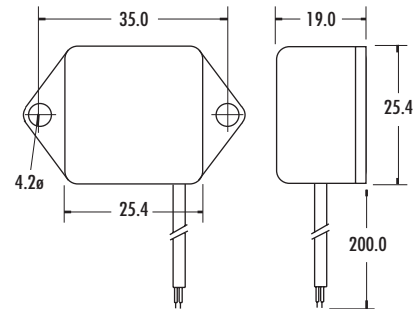


#### FEATURES

- MS24 switch in a plastic housing
- Omni-directional
- Fully encapsulated and sealed

Supply Voltage	Max. Vdc	N/A
Supply Current	Max. mA	N/A
Operating Voltage	Max. Vdc	24Vdc
Operating Current	Max. mA	25
Output		N/A
Operating Temperature	Deg. °C	-20° +70°
Storage Temperature	Deg. °C	-20° +75°
Case Material		ABS
Cable / Termination		2 x round 0.22" PVC covered and insulated

Patent applied for



This non-mercury sensor has been designed to detect movement or vibration. The sensor will react when disturbed by giving a fleeting change of state (ie n/o to n/c or vice versa). The time taken to settle depends on the amount of energy absorbed by the sensor; the settled state will normally be closed. The sensors contacts, when undisturbed, are normally closed, however it is possible to mount the switch with contacts open therefore we recommend that applications look for change of state not contact open or closed.

### MS24A/30



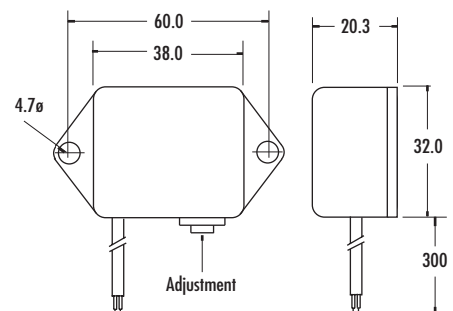
#### FEATURES

- MS24 switch in a plastic housing
- Omni-directional
- Fully encapsulated and sealed
- Sensitivity adjustment

Supply Voltage	Max. Vdc	5
Supply Current	Max. mA	40
Operating Voltage	Max. Vdc	N/A
Operating Current	Max. mA	N/A
Output		24mA at 5Vdc
Operating Temperature	Deg. °C	-10° +70°
Storage Temperature	Deg. °C	-10° +75°
Case Material		ABS
Cable / Termination		3 x round 0.14" PVC covered and insulated

Brown: +5V  
Green: 0V  
White: Output

Patent applied for



This non-mercury sensor has been designed to detect movement or vibration. The sensor will react when disturbed by giving a fleeting change of state (ie n/o to n/c or vice versa). The time taken to settle depends on the amount of energy absorbed by the sensor; the settled state will normally be closed. The sensors contacts, when undisturbed, are normally closed, however it is possible to mount the switch with contacts open therefore we recommend that applications look for change of state not contact open or closed. This product offers additional sensitivity adjustment via an internal potentiometer. The output is referenced to 0V and can drive a transistor or similar device.

All dimensions are nominal, in millimetres unless otherwise stated.

As part of the groups policy of continued product improvement, specifications may change without notice. Our sales office will be pleased to help you with the latest information on our products.

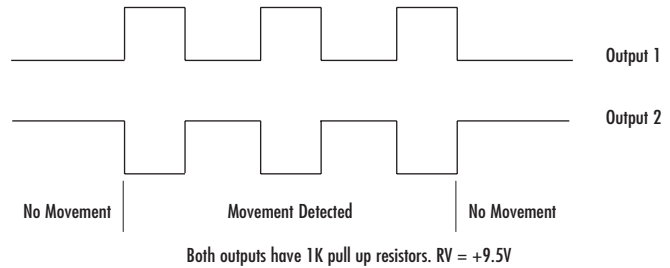
## SWITCHES + SENSORS

# Movement/Vibration - Non Mercury

## MS24D/30

The MS24D/30 requires a 10V supply and has two LED's for output monitoring and setting up. When operating there are two digital outputs which change state when movement is detected. When no movement is present one output will be logic high, the second will be logic low. When movement is detected the output states will change until the unit settles again.

The unit operates in all positions and is fully encapsulated.

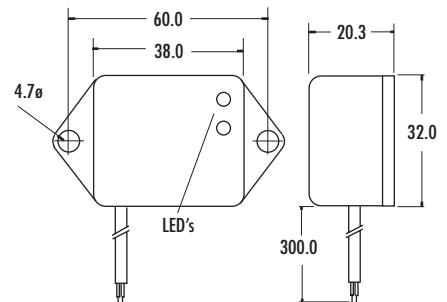


### FEATURES

- MS24 switch in a plastic housing
- Omni-directional
- Fully encapsulated and sealed
- Digital output with status indication

## MS24D/30

Supply Voltage	Max. Vdc	10
Supply Current	Max. mA	50
Operating Voltage	Max. Vdc	N/A
Operating Current	Max. mA	N/A
Output		Digital
Operating Temperature	Deg. °C	-10° +70°
Storage Temperature	Deg. °C	-10° +75°
Case Material		ABS
Cable / Termination		4 x round 0.22" PVC covered and insulated Red: + 10Vdc Green: 0V Blue: O/P 1 Yellow: O/P 2



Patent applied for

This non-mercury sensor has been designed to detect movement or vibration. The sensor will react when disturbed by giving a fleeting change of state (i.e., n/o to n/c or vice versa). The time taken to settle depends on the amount of energy absorbed by the sensor; the settled state will normally be closed. The sensor contacts, when undisturbed, are normally closed, however it is possible to mount the switch with contacts open therefore we recommend that applications look for change of state not contact open or closed.

This product has a digital output with status indication. The unit requires a 10V supply and has two LED's for output monitoring and setting up. There are two digital outputs which change state when movement or vibration is detected. In the undisturbed position one output will be logic high, the second will be logic low. When disturbed the output state will change.

## DESIGN AND ASSEMBLY SERVICE

*We can modify many of our products to your design requirements. This includes adding cable, connectors and terminals.*

*Switches can also be encapsulated, assembled to PCB's or fitted into housings.*

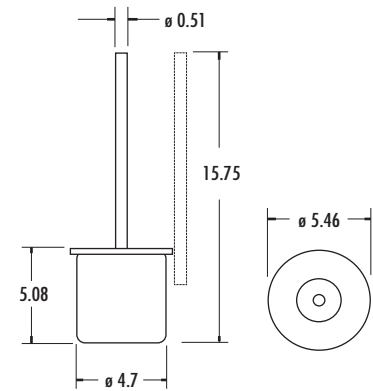


# Movement/Vibration - Mercury Contacts



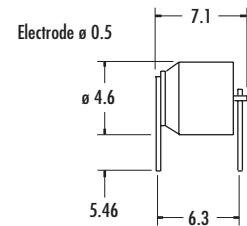
CM1344-0  
CM1344-1

Contact Form/Style	Normally Open	
Switching Voltage	Max. Vac	60
Switching Current	Max. A	0.1
Switching Capacity	Max. VA	-
Operating Angle	Max. Deg.	N/A
Contact Resistance	Max. $\Omega$	-
Operating Temperature	Deg. °C	-37° +100
Storage Temperature	Deg. °C	-40° +125
Case Material	Steel Tin Plated	
Cable / Termination	Electrode	
Features	Non position sensitive CM1344-0 (1 Electrode) CM1344-1 (2 Electrodes)	



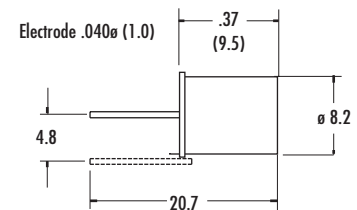
CM1800-1

Contact Form/Style	Position sensitive see p69	
Switching Voltage	Max. Vac	120
Switching Current	Max. A	0.1
Switching Capacity	Max. VA	3
Operating Angle	Max. Deg.	-
Contact Resistance	Max. $\Omega$	5
Operating Temperature	Deg. °C	-37° +100°
Storage Temperature	Deg. °C	-40° +125°
Case Material	Steel - tin plated	
Cable / Termination	Electrode	
Features	Compact. 2 electrodes	



CM4400-0  
CM4400-1

Contact Form/Style	Non-position sensitive	
Switching Voltage	Max. Vac	240
Switching Current	Max. A	1
Switching Capacity	Max. VA	100
Operating Angle	Max. Deg.	N/A
Contact Resistance	Max. $\Omega$	5
Operating Temperature	Deg. °C	-37° +100°
Storage Temperature	Deg. °C	-40° +125°
Case Material	Steel - tin plated	
Cable / Termination	Electrode	
Features	Standard Non position sensitive CM4400-0 (1 Electrode) CM4400-1 (2 Electrodes)	



**We can now supply surface mount termination for a wide range of our products.**

**Gold plated contacts give good solderability and are designed to provide stability during assembly.**

**Products can be supplied for SMD either loose or taped and reeled.**

**Contact the Sales Office for details**



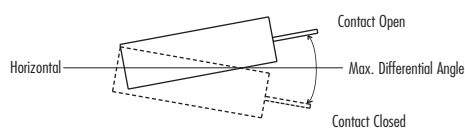
All dimensions are nominal, in millimetres unless otherwise stated.

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## SWITCHES + SENSORS

# Tilt Switches - Non Mercury Contacts

## SWITCH OPERATION



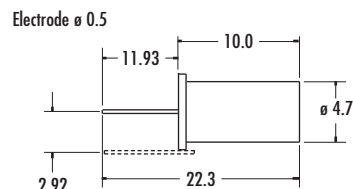
Tilt switches operate when tilted from the horizontal position. The switch movement required to cause contact change (example off to on) is called the differential angle. It is very important when designing a tilt switch to allow for the differential angle and understand that when in the horizontal position the switch contact may be open or closed.

We can supply these switches in glass, metal or sealed plastic housings.



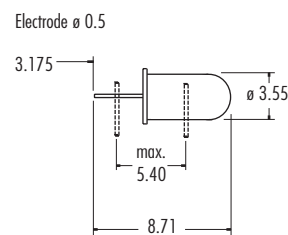
CW1300-0  
CW1300-1

Contact Form / Style	See operation details	
Switching Voltage	Max. Vac	60Vac/dc
Switching Current	Max. A	0.25
Switching Capacity	Max. VA	3
Differential Angle	Max. Deg°	15
Contact Resistance	Max. Ω	30
Operating Temperature	Deg. °C	-37° +100°
Storage Temperature	Deg. °C	-40° +125°
Case Material	Steel tin plated	
Mounting Clips	1A	
Features	CW1300-0 (1 electrode) CW1300-1 (2 electrodes)	



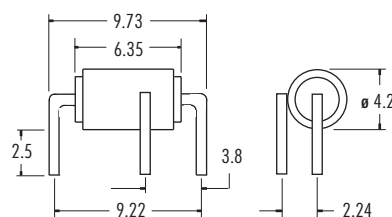
CW1600-0  
CW1600-3

Contact Form / Style	See operation details	
Switching Voltage	Max. Vac RMS	60Vac/dc
Switching Current	Max. A	0.10
Switching Capacity	Max. VA	3
Differential Angle	Max. Deg°	15
Contact Resistance	Max. Ω	100
Operating Temperature	Deg. °C	-37° +100°
Storage Temperature	Deg. °C	-40° +125°
Case Material	Steel tin plated	
Mounting Clips	-	
Features	CW1600-0 (1 electrode) CW1600-3 (2 electrodes)	



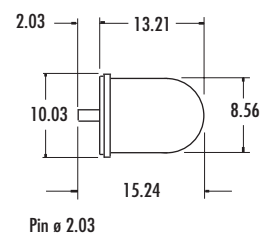
CW1620-3

Contact Form / Style	Changeover	
Switching Voltage	Max. Vac	60
Switching Current	Max. A	0.1
Switching Capacity	Max. VA	0.3
Differential Angle	Max. Deg°	-
Contact Resistance	Max. Ω	100
Operating Temperature	Deg. °C	-37° +100°
Storage Temperature	Deg. °C	-40° +125°
Case Material	Steel tin plated	
Mounting Clips	-	
Features	PCB mounting 3 electrodes	



AG3010-0  
AG3011-0

Contact Form / Style	See operation details	
Switching Voltage	Max. Vdc	24
Switching Current	Max. A	1A at 6 - 24Vdc
Switching Capacity	Max. VA	25
Differential Angle	Max. Deg°	15
Contact Resistance	Max. Ω	3
Operating Temperature	Deg. °C	-37° +100°
Storage Temperature	Deg. °C	-40° +125°
Case Material	Steel tin plated	
Mounting Clips	-	
Features	Automotive Lamp Switch	



AG3010-0 Electrode length: 2.03  
AG3011-0 Electrode length: 6.1

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## SWITCHES + SENSORS

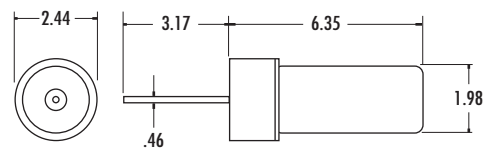
A Comus International Group Company

# Tilt Switches - Non Mercury Contacts



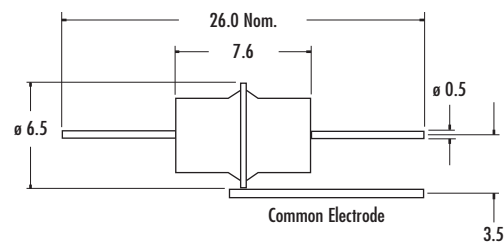
AU2100-0

Contact Form / Style	See Switch Operation	
Switching Voltage	Max. Vac	50
Switching Current	Max. A	0.15
Switching Capacity	Max. VA	2.0
Differential Angle	Max. Deg°	15
Contact Resistance	Max. $\Omega$	30
Operating Temperature	Deg. °C	-37 +100
Storage Temperature	Deg. °C	-40 +125
Case Material	Steel Gold Plated	
Features	Hermetically sealed and inert gas filled	



S1234

Contact Form / Style	Changeover	
Switching Voltage	Max. Vac	60
Switching Current	Max. A	0.2
Switching Capacity	Max. VA	3.0
Switching Angle	Max. Deg°	35
Contact Resistance	Max. $\Omega$	10
Operating Temperature	Deg. °C	-37 +100
Storage Temperature	Deg. °C	-40 +125
Case Material	Steel Gold Plated	
Features	Hermetically sealed and inert gas filled	



## DESIGN AND ASSEMBLY SERVICE

*We can modify many of our products to your design requirements. This includes adding cable, connectors and terminals.*

*Switches can also be encapsulated, assembled to PCB's or fitted into housings.*

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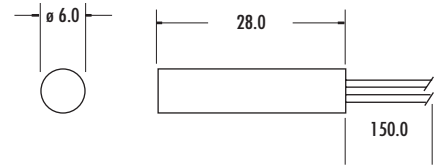
# SWITCHES + SENSORS

# Tilt Switches - Non Mercury Contacts



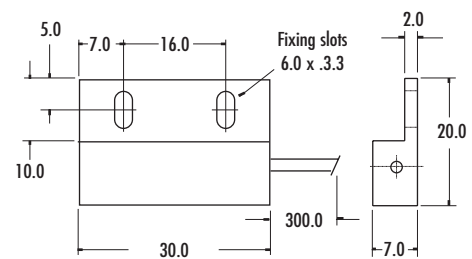
CW60S/15

Contact Form / Style		See switch operation
Switching Voltage	Max. Vac	60Vac/dc
Switching Current	Max. A	0.1
Switching Capacity	Max. VA	3
Differential Angle	Max. Deg°	15
Contact Resistance	Max. $\Omega$	100
Operating Temperature	Deg. °C	-20° +85°
Storage Temperature	Deg. °C	-20° +105°
Case Material	Polypropylene	
Cable/Termination	2 x 0.22" PVC	
Features	Low cost compact size	



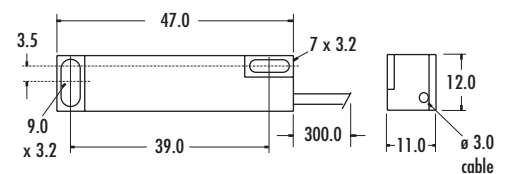
TSW30/60

Contact Form / Style		See switch operation
Switching Voltage	Max. Vac	60Vac
Switching Current	Max. A	0.25
Switching Capacity	Max. VA	3
Differential Angle	Max. Deg°	16
Contact Resistance	Max. $\Omega$	10
Operating Temperature	Deg. °C	-20° +85°
Storage Temperature	Deg. °C	-20° +105°
Case Material	Polypropylene	
Cable/Termination	2 x 0.14" PVC insulated	
Features	Low cost easy fitting	



S1039CW

Contact Form / Style		See switch operation
Switching Voltage	Max. Vac	60Vac/dc
Switching Current	Max. A	0.25
Switching Capacity	Max. VA	3
Differential Angle	Max. Deg°	15
Contact Resistance	Max. $\Omega$	30
Operating Temperature	Deg. °C	-20° +70°
Storage Temperature	Deg. °C	-25° +70°
Case Material	ABS	
Cable/Termination	2 x 0.14" PVC insulated	
Features	Easy fitting	

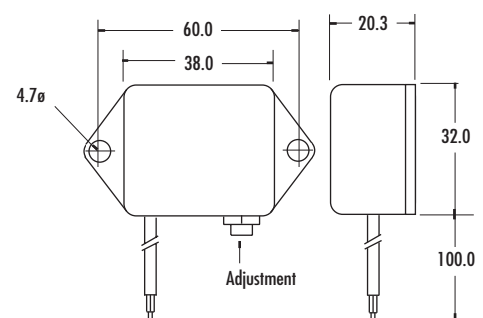


CW60A/30

Contact Form / Style		-
Switching Voltage	Max. Vac	60
Switching Current	Max. A	0.25
Switching Capacity	Max. VA	3
Differential Angle	Max. Deg°	15
Contact Resistance	Max. $\Omega$	10
Operating Temperature	Deg. °C	-20° +70°
Storage Temperature	Deg. °C	-25° +70°
Case Material	ABS	
Cable/Termination	3 x 0.14" PVC insulated	

Features

Brown: 5V  
Green: 0V  
White: Output  
With adjustment to minimise contact bounce



This sealed tilt sensor has a differential angle of 15° Degrees. The output signals are logic levels with a degree of de-bouncing applied. The amount of debounce is adjustable via a potentiometer. The output signal can be used to drive a transistor if required.

All dimensions are nominal, in millimetres unless otherwise stated.

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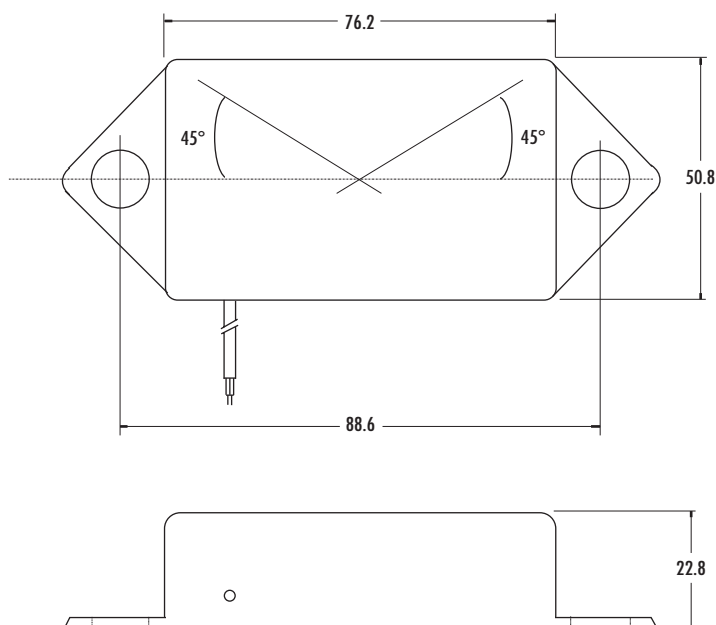
## SWITCHES + SENSORS

A Comus International Group Company

# Tilt Switches - Electronic Module



ETS 90XA



## Angle, Acceleration and G Force Sensing

The ETS90 range incorporates a microprocessor controlled angle sensing unit which gives a linear voltage output over the range of  $\pm 30$  degrees with an accuracy of  $\pm 1$  degree. The output will, however, continue to change up to the full angle range of  $\pm 45$  degrees. The sensor is housed in a fully sealed rugged ABS case which meets the requirements of IP65.

### Operation

The sensor provides a DC voltage output proportional to the tilt angle of the package relative to the horizontal. The voltage output is bi-directional in that the output is positive or negative in relation to  $\pm$  tilt.

- Linear voltage output over  $\pm 30$  degree range.
- Voltage output is also proportional to acceleration and g force.
- Programmable
- Easily modified for specific customer applications

### Applications include:

- Positioning medical and engineering equipment
- Vehicle leveling

Angular Range	°Deg.	90 (0 $\pm$ 45)
Resolution	°Deg.	1
Output Voltage	mV / Deg.	10
Response Time	mSec	100
Supply Voltage	Vdc	8 - 18
Operating Temperature	C °Deg.	-40 +70
Storage Temperature	C °Deg.	-40 +80
Case material		ABS
Cable length	mm	1000
Connectors to customers requirements		

- Closed loop control systems enabling equipment to be kept in a constant level state.
- Alarm control systems that require an output at specific tilt angle or g forces.

### Options available

Dual axis sensor providing a linear voltage output for the X and the Y axis.

Logic level or voltage free contacts that changes/operates at a custom set angle.

LED indication for up to 5 custom set angles.

Output calibrated for acceleration sensing.

RS232 interface.

The ETS90 is an intelligent microprocessor controlled sensor which enables it to be rapidly customised for specific applications. If you have an angle or acceleration application that falls outside of our standard range then please contact our office for technical assistance.

All dimensions are nominal, in millimetres unless otherwise stated.

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**SWITCHES + SENSORS**

# Tilt Switches - Glass - Mercury Contacts

## SWITCHING VOLTAGE

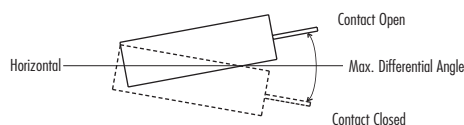
Unless specified switches can be used on AC and DC loads. For DC voltages reduce AC rating to 70 %.

## CONTACT FORM/STYLE

When in horizontal position switch contact can be either open or closed. We have an extensive range of glass switches for custom applications. Available in encapsulated plastic housings for easy mounting. These switches contain toxic material.

External leads "SO" are solder tinned.

## SWITCH OPERATION

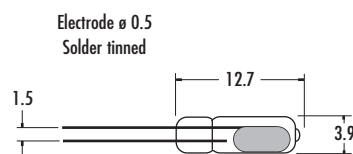


Tilt switches operate when tilted from the horizontal position. The switch movement required to cause contact change (example off to on) is called the differential angle. It is very important when designing a tilt switch to allow for the differential angle and understand that when in the horizontal position the switch contact may be open or closed.



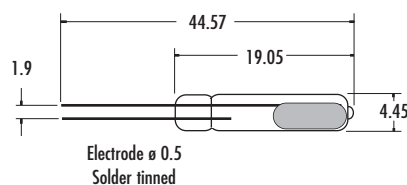
CA20-S0

Contact Form / Style	See switch operation	
Switching Voltage	Max. Vac	240
Switching Current	Max. A	0.05
Switching Capacity	Max. VA	12
Differential Angle	Max. Deg°	10
Contact Resistance	Max. mΩ	100
Operating Temperature	Deg. °C	-37° +125°
Storage Temperature	Deg. °C	-41° +150°
Mounting Clips	1A	
Features	Miniature switch	



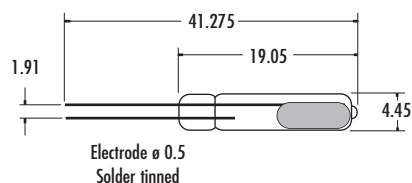
CA22-1-S0

Contact Form / Style	See switch operation	
Switching Voltage	Max. Vac	240
Switching Current	Max. A	0.05
Switching Capacity	Max. VA	12
Differential Angle	Max. Deg°	1
Contact Resistance	Max. mΩ	100
Operating Temperature	Deg. °C	-37° +125°
Storage Temperature	Deg. °C	-41° +150°
Mounting Clips	1A	
Features	Precision 1 Deg.°	



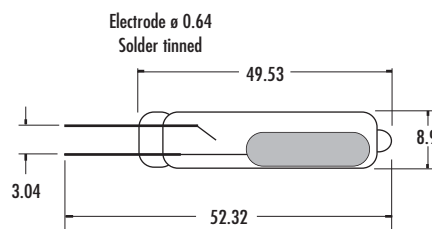
CA22-S0

Contact Form / Style	See switch operation	
Switching Voltage	Max. Vac	240
Switching Current	Max. A	0.05
Switching Capacity	Max. VA	12
Differential Angle	Max. Deg°	5
Contact Resistance	Max. mΩ	100
Operating Temperature	Deg. °C	+37° +125°
Storage Temperature	Deg. °C	-41° +150°
Mounting Clips	1A	
Features	Standard	



CH02-S0

Contact Form / Style	See switch operation	
Switching Voltage	Max. Vac	240
Switching Current	Max. A	0.10
Switching Capacity	Max. VA	12
Differential Angle	Max. Deg°	0.5
Contact Resistance	Max. mΩ	100
Operating Temperature	Deg. °C	-37° +125°
Storage Temperature	Deg. °C	-41° +150°
Mounting Clips	3BH	
Features	High Precision 0.5 Deg.°	



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# SWITCHES + SENSORS

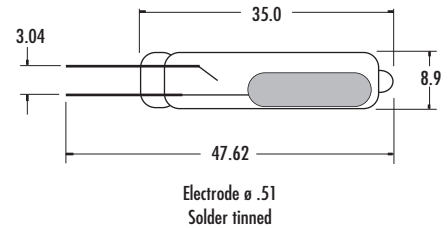
A Comus International Group Company

# Tilt Switches - Glass - Mercury Contacts



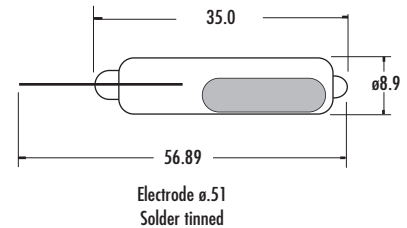
CH03-SO

Contact Form / Style		See switch operation
Switching Voltage	Max. Vac	240
Switching Current	Max. A	0.10
Switching Capacity	Max. VA	12
Differential Angle	Max. Deg°	1.4
Contact Resistance	Max. mΩ	100
Operating Temperature	Deg. °C	-37° +125°
Storage Temperature	Deg. °C	-41° +150°
Mounting Clips		3BH
Features		Low cost thermostat switch



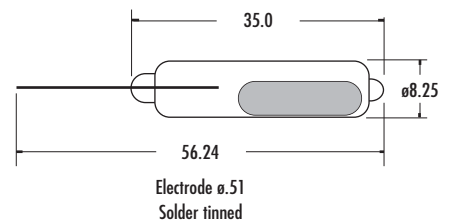
CB11-SO

Contact Form / Style		See switch operation
Switching Voltage	Max. Vac	240
Switching Current	Max. A	0.5
Switching Capacity	Max. VA	120
Differential Angle	Max. Deg°	5
Contact Resistance	Max. mΩ	30
Operating Temperature	Deg. °C	-37° +125°
Storage Temperature	Deg. °C	-40° +150°
Mounting Clips		3BH
Features		Wetted contact



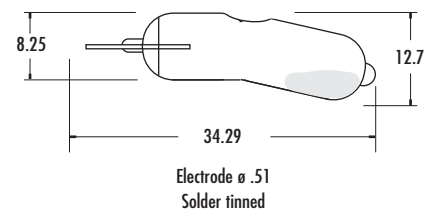
CB17-SO

Contact Form / Style		See switch operation
Switching Voltage	Max. Vac	240
Switching Current	Max. A	2.0
Switching Capacity	Max. VA	480
Differential Angle	Max. Deg°	10
Contact Resistance	Max. mΩ	50
Operating Temperature	Deg. °C	+37° +125°
Storage Temperature	Deg. °C	-40° +150°
Mounting Clips		3BH
Features		Standard



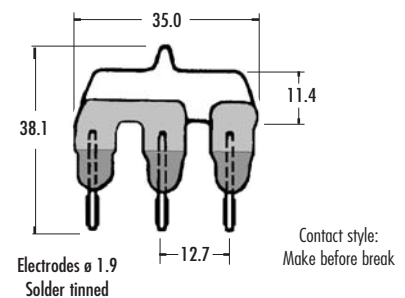
CK12-SO

Contact Form / Style		See switch operation
Switching Voltage	Max. Vac	240
Switching Current	Max. A	1.0
Switching Capacity	Max. VA	240
Differential Angle	Max. Deg°	30
Contact Resistance	Max. mΩ	50
Operating Temperature	Deg. °C	-37° +125°
Storage Temperature	Deg. °C	-40° +150°
Mounting Clips		3BH
Features		Pump application



CF52-SO

Contact Form / Style		SPDT
Switching Voltage	Max. Vac	240
Switching Current	Max. A	10.0
Switching Capacity	Max. VA	2000
Differential Angle	Max. Deg°	12 ± 3
Contact Resistance	Max. mΩ	50
Operating Temperature	Deg. °C	-37° +125°
Storage Temperature	Deg. °C	-40° +150°
Mounting Clips		-
Features		Heavy Duty



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## SWITCHES + SENSORS

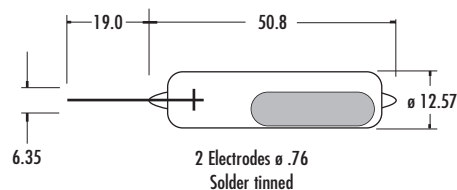


# Tilt Switches - Glass - Mercury Contacts



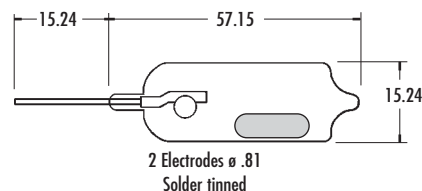
CL34-SO

Contact Form / Style		See switch operation
Switching Voltage	Max. Vac	240
Switching Current	Max. A	2
Switching Capacity	Max. VA	-
Differential Angle	Max. Deg°	10
Contact Resistance	Max. $\Omega$	1
Operating Temperature	Deg. °C	-37° +125°
Storage Temperature	Deg. °C	-40° +150°
Mounting Clips		6L
Features		



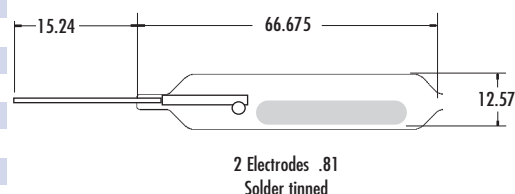
CL64-SO

Contact Form / Style		See switch operation
Switching Voltage	Max. Vac	240
Switching Current	Max. A	5.0
Switching Capacity	Max. VA	120
Differential Angle	Max. Deg°	5
Contact Resistance	Max. m $\Omega$	-
Operating Temperature	Deg. °C	-37° +125°
Storage Temperature	Deg. °C	-40° +150°
Mounting Clips		9L
Features		-



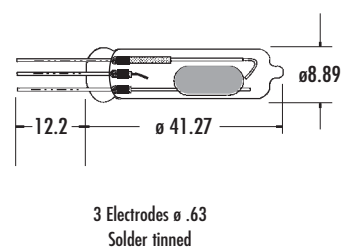
CL62-SO

Contact Form / Style		See switch operation
Switching Voltage	Max. Vac	240
Switching Current	Max. A	5.0
Switching Capacity	Max. VA	120
Differential Angle	Max. Deg°	3.0
Contact Resistance	Max. m $\Omega$	-
Operating Temperature	Deg. °C	-37° +125°
Storage Temperature	Deg. °C	-40° +150°
Mounting Clips		9L
Features		-



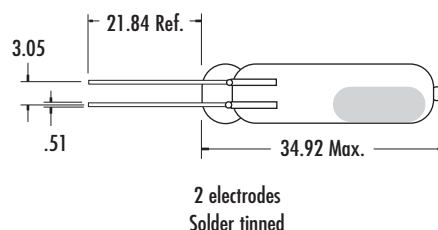
CH04-SO

Contact Form / Style		SPDT
Switching Voltage	Max. Vac	240
Switching Current	Max. A	0.1
Switching Capacity	Max. VA	24
Differential Angle	Max. Deg°	2.0
Contact Resistance	Max. m $\Omega$	0.1
Operating Temperature	Deg. °C	-37° +125°
Storage Temperature	Deg. °C	-40° +150°
Mounting Clips		3BH
Features		Wetted contact



CB18-SO

Contact Resistance	100 m $\Omega$ Max.
Contact Rating (Resistive Load)	2.0 A at 240 VAC
Differential Angle	10° Deg. Max.
Operating Temperature	-37° Deg C +125° Deg. C



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## SWITCHES + SENSORS

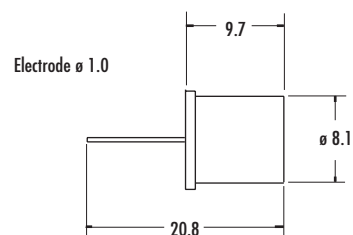
A Comus International Group Company

# Tilt Switches - Metal - Mercury Contacts



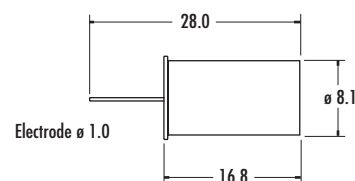
CM100-0

Contact Form / Style	See switch operation	
Switching Voltage	Max. Vac	240
Switching Current	Max. A	.75 at 240 Vac
		1.0 at 120 Vac
Switching Capacity	Max. VA	120
Differential Angle	Max. Deg°	10
Contact Resistance	Max. mΩ	3
Operating Temperature	Deg. °C	-37° +100°
Storage Temperature	Deg. °C	-40° +125°
Case Material	Steel tin plated	
Mounting Clips	3BH	
Features	1 electrode Compact 1 Amp	



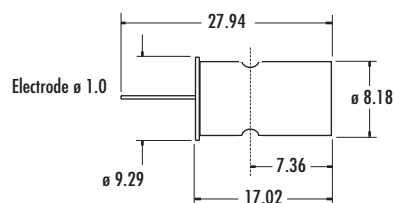
CM200-0

Contact Form / Style	See switch operation	
Switching Voltage	Max. Vac	240
Switching Current	Max. A	1.5 at 240 Vac
		2.0 at 120 Vac
Switching Capacity	Max. VA	240
Differential Angle	Max. Deg°	10
Contact Resistance	Max. Ω	3
Operating Temperature	Deg. °C	-37° +100°
Storage Temperature	Deg. °C	-40° +125°
Case Material	Steel tin plated	
Mounting Clips	3BH	
Features	1 electrode High Power	



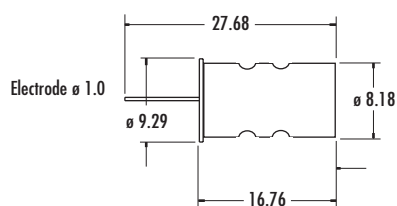
CM225-0

Contact Form / Style	See switch operation	
Switching Voltage	Max. Vac	240
Switching Current	Max. A	1.5 at 240 Vac
		2.0 at 120 Vac
Switching Capacity	Max. VA	240
Differential Angle	Max. Deg°	25
Contact Resistance	Max. Ω	3
Operating Temperature	Deg. °C	-37° +100°
Storage Temperature	Deg. °C	-40° +125°
Case Material	Steel tin plated	
Mounting Clips	3BH	
Features	1 electrode High Power	



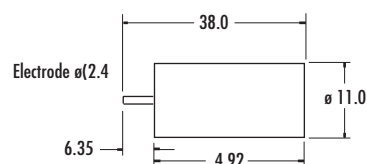
CM265-0

Contact Form / Style	See switch operation	
Switching Voltage	Max. Vac	240
Switching Current	Max. A	1.5 at 240Vac
		2.0 at 120Vac
Switching Capacity	Max. VA	240
Differential Angle	Max. Deg°	65
Contact Resistance	Max. Ω	3
Operating Temperature	Deg. °C	-37° +100°
Storage Temperature	Deg. °C	-40° +125°
Case Material	Steel tin plated	
Mounting Clips	3BH	
Features	1 electrode High Power	



CM1000-0

Contact Form / Style	See switch operation	
Switching Voltage	Max. Vac	240
Switching Current	Max. A	5.0 at 240Vac
		10 at 120Vac
Switching Capacity	Max. VA	1200
Differential Angle	Max. Deg°	10
Contact Resistance	Max. Ω	3.0
Operating Temperature	Deg. °C	-37° +100°
Storage Temperature	Deg. °C	-40° +125°
Case Material	Steel tin plated	
Mounting Clips	3BH	
Features	1 electrode High Power	

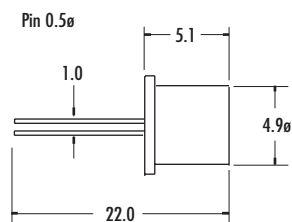


# Tilt Switches - Metal - Mercury Contacts



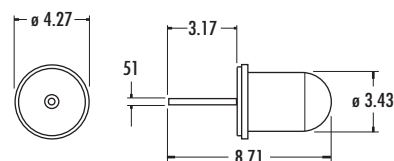
CM1360-0

Contact Form / Style	See switch operation	
Switching Voltage	Max. Vac RMS	120
Switching Current	Max. A	0.25 at 120 Vac 0.25 at 24 Vac
Switching Capacity	Max. VA	30
Differential Angle	Max. Deg°	30
Contact Resistance	Max. mΩ	10
Operating Temperature	Deg. °C	-37° +100°
Storage Temperature	Deg. °C	-40° +125°
Case Material	Steel tin plated	
Mounting Clips	1A	
Features	2 electrode Short Body	



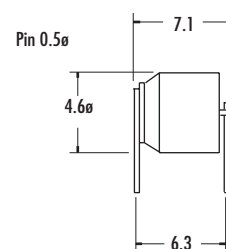
CM1600-0

Contact Form / Style	See switch operation	
Switching Voltage	Max. Vac	240
Switching Current	Max. A	0.15
Switching Capacity	Max. VA	5
Differential Angle	Max. Deg°	2
Contact Resistance	Max. Ω	5
Operating Temperature	Deg. °C	-37° +100°
Storage Temperature	Deg. °C	-40° +125°
Case Material	Steel tin plated	
Mounting Clips	1A	
Features	1 electrode. Miniature	



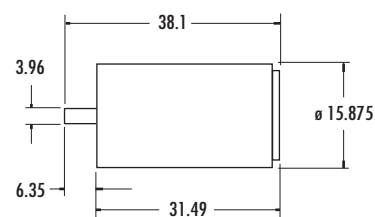
CM1800-1

Contact Form / Style	See switch operation	
Switching Voltage	Max. Vac RMS	120
Switching Current	Max. A	0.1
Switching Capacity	Max. VA	5
Differential Angle	Max. Deg°	2
Contact Resistance	Max. mΩ	5
Operating Temperature	Deg. °C	-37° +100°
Storage Temperature	Deg. °C	-40° +125°
Case Material	Steel tin plated	
Mounting Clips	1A	
Features	2 electrode Movement Sensitive	



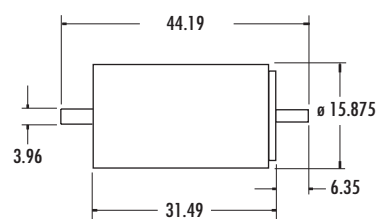
CM2000-0

Contact Form / Style	See switch operation	
Switching Voltage	Max. Vac	240
Switching Current	Max. A	10 at 240Vac
Switching Capacity	Max. VA	2400
Differential Angle	Max. Deg°	10
Contact Resistance	Max. Ω	3
Operating Temperature	Deg. °C	-37° +100°
Storage Temperature	Deg. °C	-40° +125°
Case Material	Steel tin plated	
Mounting Clips		
Features	1 electrode High Power	



CM2050-0

Contact Form / Style	Changeover/SPDT	
Switching Voltage	Max. Vac	240
Switching Current	Max. A	10 at 240Vac
Switching Capacity	Max. VA	2400
Differential Angle	Max. Deg°	10
Contact Resistance	Max. Ω	3.0
Operating Temperature	Deg. °C	-37° +100°
Storage Temperature	Deg. °C	-40° +125°
Case Material	Steel tin plated	
Mounting Clips	9L	
Features	High power Make before break	

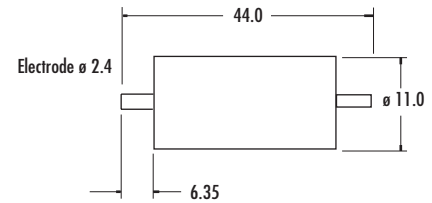


# Tilt Switches - Metal - Mercury Contacts



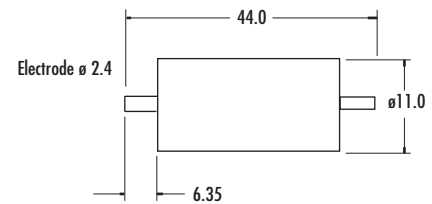
CM1020-0

Contact Form / Style		Changeover/SPDT
Switching Voltage	Max. Vac	240
Switching Current	Max. A	5 at 240Vac
Switching Capacity	Max. VA	1200
Differential Angle	Max. Deg°	10
Contact Resistance	Max. $\Omega$	3.0
Operating Temperature	Deg. °C	-37° +100°
Storage Temperature	Deg. °C	-40° +125°
Case Material	Steel tin plated	
Mounting Clips	9L	
Features	2 electrodes. High power Break before Make	



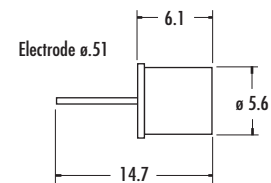
CM1050-0

Contact Form / Style		Changeover/SPDT
Switching Voltage	Max. Vac	240
Switching Current	Max. A	5 at 240Vac
Switching Capacity	Max. VA	1200
Differential Angle	Max. Deg°	10
Contact Resistance	Max. $\Omega$	3.0
Operating Temperature	Deg. °C	-37° +100°
Storage Temperature	Deg. °C	-40° +125°
Case Material	Steel tin plated	
Mounting Clips	9L	
Features	2 electrodes. High power Make before break	



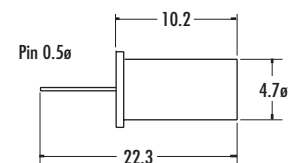
CM1230-0

Contact Form / Style		See switch operation
Switching Voltage	Max. Vac	240
Switching Current	Max. A	0.3 at 240Vac 0.5 at 120 Vac
Switching Capacity	Max. VA	30
Differential Angle	Max. Deg°	14
Contact Resistance	Max. $\Omega$	3.0
Operating Temperature	Deg. °C	-37° +100°
Storage Temperature	Deg. °C	-40° +125°
Case Material	Steel tin plated	
Mounting Clips	1A	
Features	1 electrode. Short body	



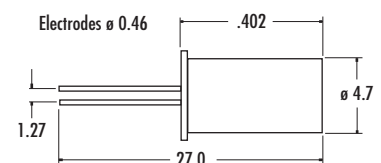
CM1300-0

Contact Form / Style		See switch operation
Switching Voltage	Max. Vac RMS	240
Switching Current	Max. A	0.3 at 240 Vac 0.5 at 120 Vac
Switching Capacity	Max. VA	50
Differential Angle	Max. Deg°	10
Contact Resistance	Max. m $\Omega$	3
Operating Temperature	Deg. °C	-37° +100°
Storage Temperature	Deg. °C	-40° +125°
Case Material	Steel tin plated	
Mounting Clips	1A	
Features	1 electrode General Purpose	

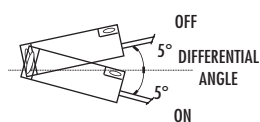


CM1320-0

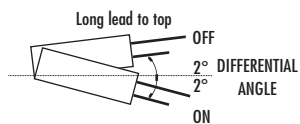
Contact Form / Style		See switch operation
Switching Voltage	Max. Vac	240
Switching Current	Max. A	0.2 at 240Vac 0.25 at 120 Vac
Switching Capacity	Max. VA	30
Differential Angle	Max. Deg°	10
Contact Resistance	Max. $\Omega$	1.0
Operating Temperature	Deg. °C	-37° +100°
Storage Temperature	Deg. °C	-40° +125°
Case Material	Steel tin plated	
Mounting Clips	1A	
Features	2 electrodes. General Purpose	



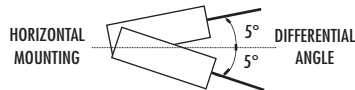
# Tilt Modules - Mercury Contacts



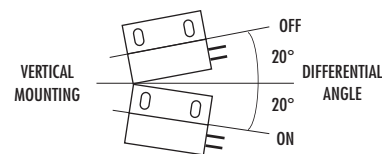
S1039



TSM4/240



TSM40/110

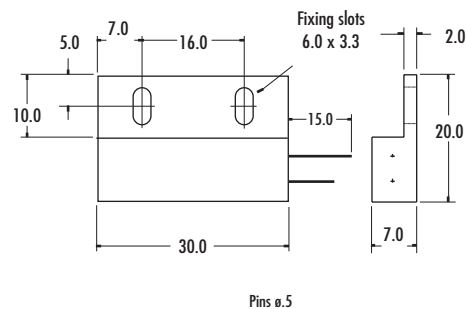


Tilt switches operate when tilted from the horizontal position. The switch movement required to cause contact change (example off to on) is called the differential angle. It is very important when designing a tilt switch to allow for the differential angle and understand that when in the horizontal position the switch contact may be open or closed.



TSM4/240

Contact Form / Style	See switch operation	
Switching Voltage	Max. Vac	240
Switching Current	Max. A	0.55
Switching Capacity	Max. VA	10
Differential Angle	Max. Deg°	4
Contact Resistance	Max. $\Omega$	0.25
Operating Temperature	Deg. °C	-20° +70°
Storage Temperature	Deg. °C	-25° +70°
Case Material	Clear Polystyrene	
Cable/Termination		
Features	Clear housing	

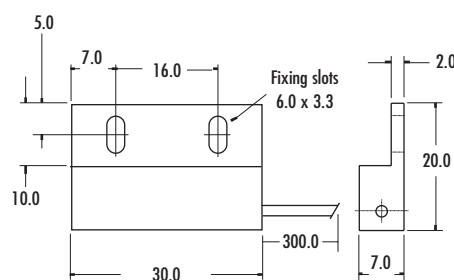


Pins  $\phi$ .5



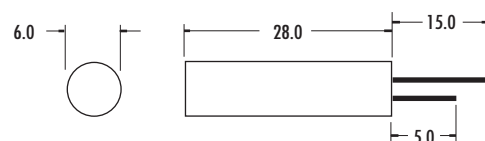
TSM10/240

Contact Form / Style	See switch operation	
Switching Voltage	Max. Vac	240
Switching Current	Max. A	0.5
Switching Capacity	Max. VA	50
Differential Angle	Max. Deg°	10
Contact Resistance	Max. $\Omega$	0.25
Operating Temperature		
Continuous	Deg. °C	-20° +85°
Intermittent	Deg. °C	-20° +105°
Storage Temperature	Deg. °C	-20° +90°
Case Material	Nylon 66	
Cable/Termination	2 wire PVC ins. with outer jacket	
Features	Robust Construction	



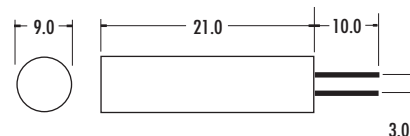
TRM4/240

Contact Form / Style	See switch operation	
Switching Voltage	Max. Vac	240
Switching Current	Max. A	0.25
Switching Capacity	Max. VA	10
Differential Angle	Max. Deg°	4
Contact Resistance	Max. $\Omega$	0.25
Operating Temperature	Deg. °C	-20° +70°
Storage Temperature	Deg. °C	-25° +70°
Case Material	Blue Polystyrene	
Cable/Termination	2 pin Long pin to top	
Features	Low cost. Close Diff.	



S1245

Contact Form / Style	See switch operation	
Switching Voltage	Max. Vac	120
Switching Current	Max. A	0.5
Switching Capacity	Max. VA	20
Differential Angle	Max. Deg°	15
Contact Resistance	Max. $\Omega$	0.2
Operating Temperature	Deg. °C	-20° +70°
Storage Temperature	Deg. °C	-25° +70°
Case Material	-	
Cable/Termination	2 pins	
Features	Clear Housing	

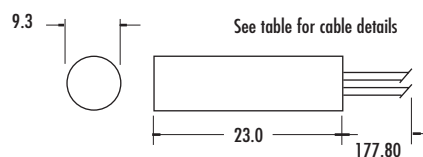


# Tilt Modules - Mercury Contacts



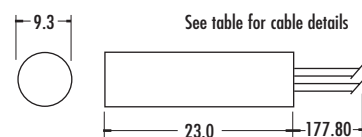
CM1320-70

Contact Form / Style		See switch operation
Switching Voltage	Max. Vac	120
Switching Current	Max. A	0.25 at 120Vac
Switching Capacity	Max. VA	30
Differential Angle	Max. Deg°	10
Contact Resistance	Max. $\Omega$	1.0
Operating Temperature	Deg. °C	-20° +70°
Storage Temperature	Deg. °C	-25° +70°
Case Material		ABS
Cable/Termination		26 AWG wire insulated
Features		Robust Construction



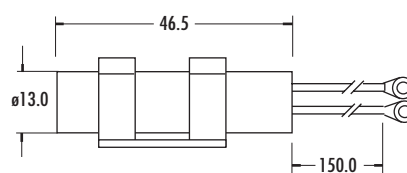
CM200-70

Contact Form / Style		See switch operation
Switching Voltage	Max. Vac	240
Switching Current	Max. A	1.5 at 240Vac
Switching Capacity	Max. VA	100
Differential Angle	Max. Deg°	10
Contact Resistance	Max. $\Omega$	3.0
Operating Temperature	Deg. °C	-20° +70°
Storage Temperature	Deg. °C	-25° +70°
Case Material		-
Cable/Termination		18 AWG wire insulated
Features		Robust Construction



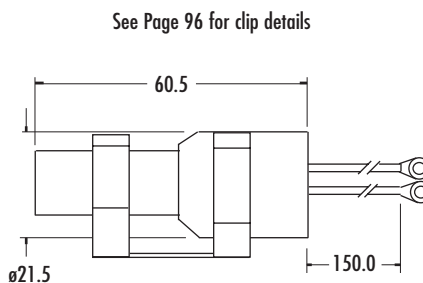
S1016

Contact Form / Style		See switch operation
Switching Voltage	Max. Vac	240
Switching Current	Max. A	10 at 240Vac 14 at 120VAC
Switching Capacity	Max. VA	2400
Differential Angle	Max. Deg°	15
Contact Resistance	Max. $\Omega$	0.3
Operating Temperature	Deg. °C	-20° +70°
Storage Temperature	Deg. °C	-25° +70°
Case Material		ABS
Cable/Termination		2x0.5" round silicone rubber insulated
Features		Robust Construction



S1017

Contact Form / Style		See switch operation
Switching Voltage	Max. Vac	240
Switching Current	Max. A	15 at 240Vac 19 at 120Vac
Switching Capacity	Max. VA	3600
Differential Angle	Max. Deg°	15
Contact Resistance	Max. $\Omega$	0.3
Operating Temperature	Deg. °C	-20° +70°
Storage Temperature	Deg. °C	-25° +70°
Case Material		ABS
Cable/Termination		2x17 AWG round silicone rubber insulated. Tag hole 5.1ø (.20)
Features		Rugged Construction/ Includes clip



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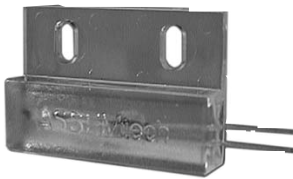
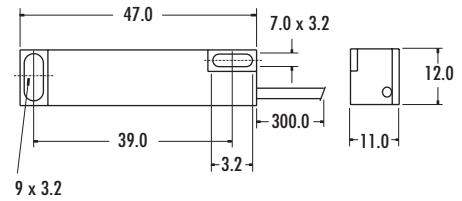
## SWITCHES + SENSORS

# Tilt Modules - Mercury Contacts



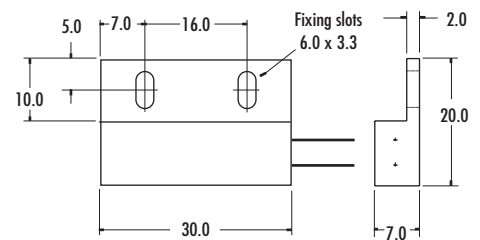
*S1039*

Contact Form / Style	See switch operation	
Switching Voltage	Max. Vac RMS	240
Switching Current	Max. A	1 at 240 Vac
		1.8 at 120 Vac
Switching Capacity	Max. VA	100
Differential Angle	Max. Deg°	10
Contact Resistance	Max. $\Omega$	0.3
Operating Temperature	Deg. °C	-20° +70°
Storage Temperature	Deg. °C	-25° +70°
Case Material	ABS	
Cable/Termination	2 x 0.22" PVC	
Features	Robust Construction	



*TSM40/110*

Contact Form / Style	See switch operation	
Switching Voltage	Max. Vac RMS	110
Switching Current	Max. A	0.5
Switching Capacity	Max. VA	10
Differential Angle	Max. Deg°	See operation above
Contact Resistance	Max. m $\Omega$	0.25
Operating Temperature	Deg. °C	-20° +70°
Storage Temperature	Deg. °C	-25° +70°
Case Material	Clear Polystyrene	
Cable/Termination	2 electrodes 25.0mm long	
Features	Clear housing	



## DESIGN AND ASSEMBLY SERVICE

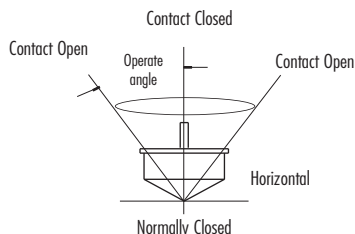
*We can modify many of our products to your design requirements. This includes adding cable, connectors and terminals.*

*Switches can also be encapsulated, assembled to PCB's or fitted into housings.*

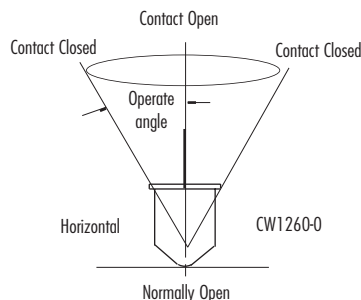


# Tip-Over Switches - Non Mercury Contacts

## SWITCH OPERATION



CW1725-1  
CW1740-1



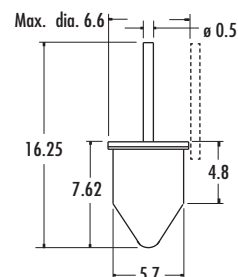
CW1260-0

Tip-over switches are designed to switch on/off when tilted from the vertical position.



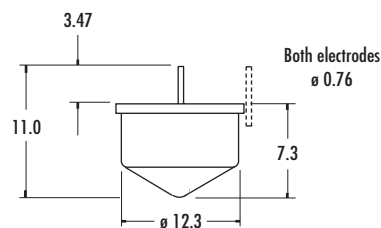
CW1260-0  
CW1260-1

Contact Form / Style	Normally Open	
Switching Voltage	Max. Vac	60
Switching Current	Max. A	0.25
Switching Capacity	Max. VA	3
Operating Angle	Deg°	60° ± 10°
Contact Resistance	Max. Ω	5Ω at 5Vdc
Operating Temperature	Deg. °C	-37° +100°
Storage Temperature	Deg. °C	-40° +125°
Case Material	Steel Tin Plated	
Cable/Termination	1 Electrode	
Features	Compact	



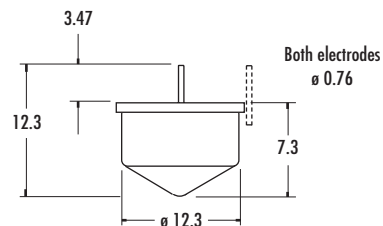
CW1725-0  
CW1725-1

Contact Form / Style	Normally Closed	
Switching Voltage	Max. Vac	60
Switching Current	Max. A	0.25
Switching Capacity	Max. VA	3
Operating Angle	Deg°	25° ± 15°
Contact Resistance	Max. Ω	30
Operating Temperature	Deg. °C	-37° +100°
Storage Temperature	Deg. °C	-40° +125°
Case Material	Steel Tin Plated	
Cable/Termination	1 or 2 Electrodes	
Features	Standard Omni-directional CW1725-0 (1 electrode) CW1725-1 (2 electrodes)	



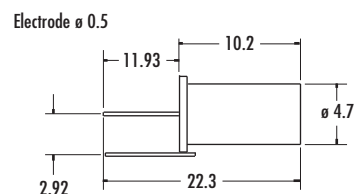
CW1740-0  
CW1740-1

Contact Form / Style	Normally Closed	
Switching Voltage	Max. Vac RMS	60
Switching Current	Max. A	0.25
Switching Capacity	Max. VA	3
Operating Angle	Deg°	5° ± 15°
Contact Resistance	Max. Ω	30
Operating Temperature	Deg. °C	-37° +100°
Storage Temperature	Deg. °C	-40° +125°
Case Material	Steel Tin Plated	
Cable/Termination	1 or 2 electrodes	
Features	Standard Omni-Directional CW1740-0 (1 electrode) CW1740-1 (2 electrodes)	



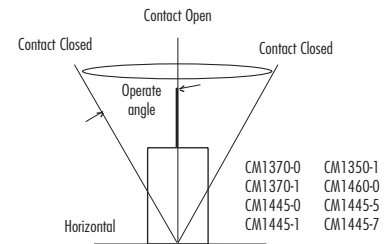
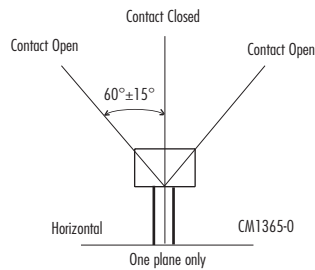
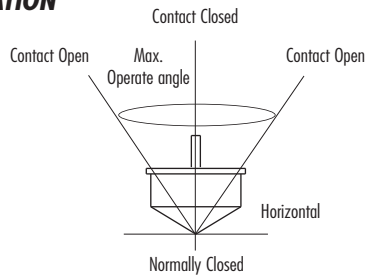
S1261

Contact Form / Style	See operation details	
Switching Voltage	Max. Vac	60Vac/dc
Switching Current	Max. A	0.25
Switching Capacity	Max. VA	3
Differential Angle	Max. Deg°	-
Contact Resistance	Max. Ω	30
Operating Temperature	Deg. °C	-37° +100°
Storage Temperature	Deg. °C	-40° +125°
Case Material	Steel tin plated	
Mounting Clips	1A	
Features	Compact Tipover Switch	



# Tip-Over Switches - Metal - Mercury Contacts

## SWITCH OPERATION

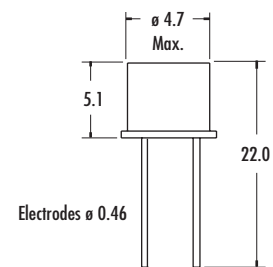


Tip-over switches are designed to switch on/off when tilted from the vertical position.



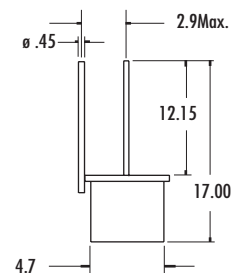
CM1365-0

Contact Form / Style		Normally Closed
Switching Voltage	Max. Vac	120
Switching Current	Max. A	.10A at 240 Vac
		.25A at 120 Vac
Switching Capacity	Max. VA	-
Operating Angle	Deg°	60° ± 15° from vertical
Contact Resistance	Max. Ω	3
Operating Temperature	Deg. °C	-37° +100°
Storage Temperature	Deg. °C	-40° +125°
Case Material		Steel Tin Plated
Cable/Termination		Electrode
Features		Sub Miniature
		2 electrodes



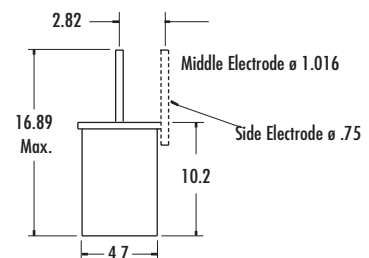
CM1350-1

Contact Form / Style		Normally Open
Switching Voltage	Max. Vac	240
Switching Current	Max. A	.10A at 240 Vac
		.5A at 120 Vac
Switching Capacity	Max. VA	50
Operating Angle	Deg°	50° ± 10° from vertical
Contact Resistance	Max. Ω	3
Operating Temperature	Deg. °C	-37° +100°
Storage Temperature	Deg. °C	-40° +125°
Case Material		Steel Tin Plated
Cable/Termination		Electrode
Features		Omnidirectional
		2 electrodes for pcb mounting



CM1370-0  
CM1370-1

Contact Form / Style		Normally Open
Switching Voltage	Max. Vac	240
Switching Current	Max. A	.10A at 240 Vac
		.25A at 120 Vac
Switching Capacity	Max. VA	60
Operating Angle	Deg°	60° ± 10° from vertical
Contact Resistance	Max. Ω	3
Operating Temperature	Deg. °C	-37° +100°
Storage Temperature	Deg. °C	-40° +125°
Case Material		Steel Tin Plated
Cable/Termination		Electrode
Features		Omnidirectional
		CM1370-0 (1 electrode) CM1370-1 (2 electrodes)



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## SWITCHES + SENSORS

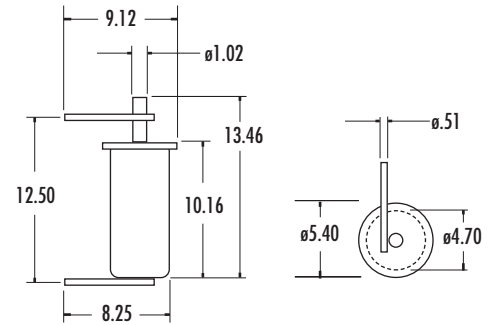
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# Tip-Over Switches - Metal - Mercury Contacts



CM1370-12

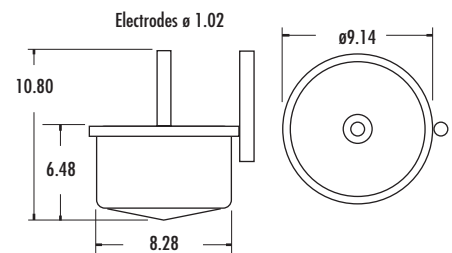
Contact Form / Style	Normally Open at vertical	
Switching Voltage	Max. Vac RMS	120
Switching Current	Max. A	0.25
Switching Capacity	Max. VA	60
Operating Angle	Deg°	60 ± 10
Contact Resistance	Max. Ω	3
Operating Temperature	Deg. °C	-37° +100°
Storage Temperature	Deg. °C	-40° +125°
Case Material	Steel Tin plated	
Cable/Termination	2 Electrodes	
Features		



CM1415-1

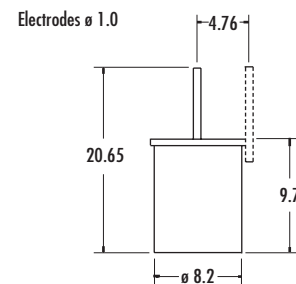
Contact Form / Style	Normally Open	
Switching Voltage	Max. Vac	240
Switching Current	Max. A	1 A at 120Vac
Switching Capacity	Max. VA	100
Operating Angle	Deg°	15° ± 3°
Contact Resistance	Max. Ω	3
Operating Temperature	Deg. °C	-37° +100°
Storage Temperature	Deg. °C	-40° +125°
Case Material	Steel Tin Plated	
Cable/Termination	2 Electrodes	
Features	Standard	

Other angles available



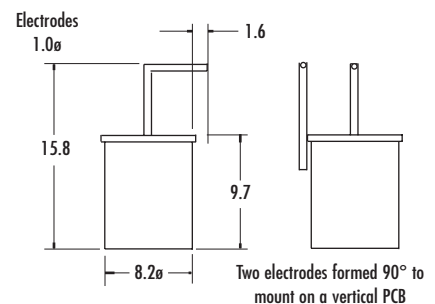
CM1445-0  
CM1445-1

Contact Form / Style	Normally Open	
Switching Voltage	Max. Vac	240
Switching Current	Max. A	0.4A at 240 Vac 1.0A at 120 Vac
Switching Capacity	Max. VA	100
Operating Angle	Deg°	45° ± 10°
Contact Resistance	Max. Ω	3
Operating Temperature	Deg. °C	-37° +100°
Storage Temperature	Deg. °C	-40° +125°
Case Material	Steel Tin Plated	
Cable/Termination	Electrode	
Features	Omnidirectional	
	CM1445-0 (1 Electrode)	
	CM1445-1 (2 Electrodes)	



CM1445-5

Contact Form / Style	Normally Open	
Switching Voltage	Max. Vac	240
Switching Current	Max. A	0.4A at 240 Vac 1.0A at 120 Vac
Switching Capacity	Max. VA	100
Operating Angle	Deg°	45° ± 10°
Contact Resistance	Max. Ω	3
Operating Temperature	Deg. °C	-37° +100°
Storage Temperature	Deg. °C	-40° +125°
Case Material	Steel Tin Plated	
Cable/Termination	Pin	
Features	90° Degree Pins Omnidirectional	



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## SWITCHES + SENSORS

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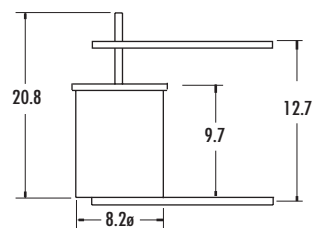
# Tip-Over Switches - Metal - Mercury Contacts



CM1445-7

Contact Form / Style		Normally Open
Switching Voltage	Max. Vac	240
Switching Current	Max. A	0.4A at 240 Vac
		1.0A at 120 Vac
Switching Capacity	Max. VA	100
Operating Angle	Deg°	45° ± 10°
Contact Resistance	Max. Ω	3
Operating Temperature	Deg. °C	-37° +100°
Storage Temperature	Deg. °C	-40° +125°
Case Material	Steel Tin Plated	
Cable/Termination	Pin	
Features	90° Degree welded pins Omnidirectional	

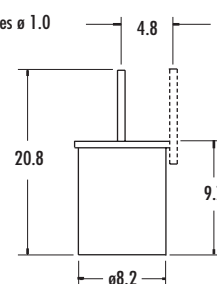
Electrodes  
1.0ø



CM1460-0  
CM1460-1

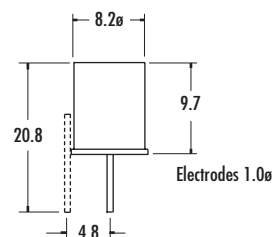
Contact Form / Style		Normally Open
Switching Voltage	Max. Vac	240
Switching Current	Max. A	0.4A at 240 Vac
		1.0A at 120 Vac
Switching Capacity	Max. VA	100
Operating Angle	Deg°	60° ± 10°
Contact Resistance	Max. Ω	3
Operating Temperature	Deg. °C	-37° +100°
Storage Temperature	Deg. °C	-40° +125°
Case Material	Steel Tin Plated	
Cable/Termination	Electrode	
Features	Standard Omnidirectional CM1460-0 (1 Electrode) CM1460-1 (2 Electrodes)	

Electrodes ø 1.0



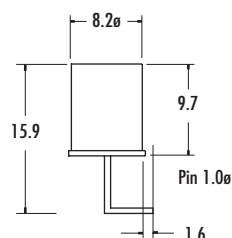
CM1490-0  
CM1490-1

Contact Form / Style		Normally Closed
Switching Voltage	Max. Vac	240
Switching Current	Max. A	0.4A at 240Vac
		1.0A at 120Vac
Switching Capacity	Max. VA	100
Operating Angle	Deg°	45° ± 15°
Contact Resistance	Max. Ω	3
Operating Temperature	Deg. °C	-37° + 100°
Storage Temperature	Deg. °C	-40° +125°
Case Material	Steel Tin Plated	
Cable/Termination	Pin	
Features	Standard Switching CM1490-0 1 electrode CM1490-1 2 electrodes	



CM1490-5

Contact Form / Style		Normally Closed
Switching Voltage	Max. Vac	240
Switching Current	Max. A	0.4A at 240 Vac
		1.0A at 120 Vac
Switching Capacity	Max. VA	100
Operating Angle	Deg°	45° ± 15°
Contact Resistance	Max. Ω	3
Operating Temperature	Deg. °C	-37° +100°
Storage Temperature	Deg. °C	-40° +125°
Case Material	Steel Tin Plated	
Cable/Termination	Pin	
Features	Standard Two electrodes formed 90° to mount onto a vertical PCB	



All dimensions are nominal, in millimetres unless otherwise stated.

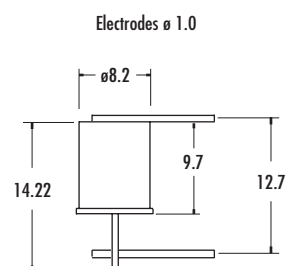
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# Tip-Over Switches - Metal - Mercury Contacts



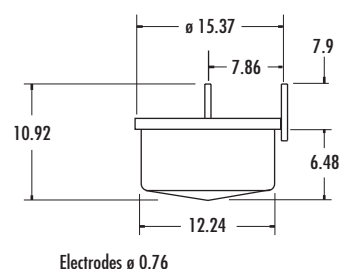
CM1490-7

Contact Form / Style	Normally Closed	
Switching Voltage	Max. Vac	240
Switching Current	Max. A	0.4A at 240 Vac
		1.0A at 120 Vac
Switching Capacity	Max. VA	100
Operating Angle	Deg°	45° ± 15°
Contact Resistance	Max. Ω	3
Operating Temperature	Deg. °C	-37° +100°
Storage Temperature	Deg. °C	-40° +125°
Case Material	Steel Tin Plated	
Cable/Termination	Electrode	
Features	Standard 90° Deg. 2 Electrodes	



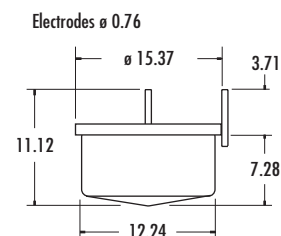
CM1702-1

Contact Form / Style	Normally Closed	
Switching Voltage	Max. Vac	240
Switching Current	Max. A	0.8A at 240 Vac
		1.5A at 120 Vac
Switching Capacity	Max. VA	200
Operating Angle	Deg°	2° ± .5°
	Remake angle 1.5° from vertical	
Contact Resistance	Max. Ω	5
Operating Temperature	Deg. °C	-37° +100°
Storage Temperature	Deg. °C	-40° +125°
Case Material	Steel Tin Plated	
Cable/Termination	Electrode	
Features	2 electrodes	



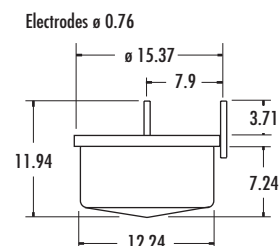
CM1706-1

Contact Form / Style	Normally Closed	
Switching Voltage	Max. Vac	240
Switching Current	Max. A	0.8A at 240 Vac
		.25A at 60 Vac
Switching Capacity	Max. VA	200
Operating Angle	Deg°	6° ± 2°
Contact Resistance	Max. Ω	5
Operating Temperature	Deg. °C	-37° +100°
Storage Temperature	Deg. °C	-40° +125°
Case Material	Steel Tin Plated	
Cable/Termination	Electrode	
Features	2 electrodes	



CM1715-1

Contact Form / Style	Normally Closed	
Switching Voltage	Max. Vac	240
Switching Current	Max. A	0.8A at 240Vac
		1.5A at 120Vac
Switching Capacity	Max. VA	200
Operating Angle	Deg°	15° ± 3°
Contact Resistance	Max. Ω	5
Operating Temperature	Deg. °C	-37° + 100°
Storage Temperature	Deg. °C	-40° +125°
Case Material	Steel Tin Plated	
Cable/Termination	Electrode	
Features	2 electrodes	



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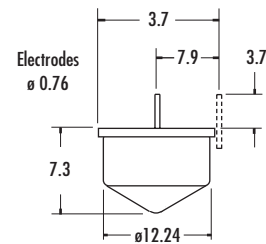
## SWITCHES + SENSORS

# Tip-Over Switches - Metal - Mercury Contacts



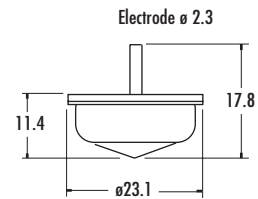
CM1725-0  
CM1725-1

Contact Form / Style	Normally Closed	
Switching Voltage	Max. Vac	240
Switching Current	Max. A	0.8A at 240 Vac 1.5A at 120 Vac
Switching Capacity	Max. VA	100
Operating Angle	Deg°	25° ± 10°
Contact Resistance	Max. Ω	5
Operating Temperature	Deg. °C	-37° +100°
Storage Temperature	Deg. °C	-40° +125°
Case Material	Steel Tin Plated	
Cable/Termination	Electrode	
Features	CM1725-0 (1 Electrode) CM1725-1 (2 Electrodes)	



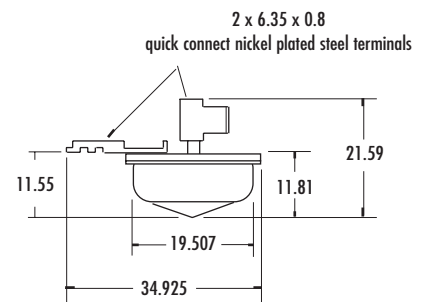
CM1500-0

Contact Form / Style	Normally Closed	
Switching Voltage	Max. Vac	240
Switching Current	Max. A	7.0A at 240 Vac 12.5A at 120 Vac
Switching Capacity	Max. VA	1500
Operating Angle	Deg°	35° ± 10°
Contact Resistance	Max. Ω	5
Operating Temperature	Deg. °C	-37° +100°
Storage Temperature	Deg. °C	-40° +125°
Case Material	Steel Nickel Plated	
Cable/Termination	Electrode	
Features	Heavy Duty Switching Safety switch for portable devices	



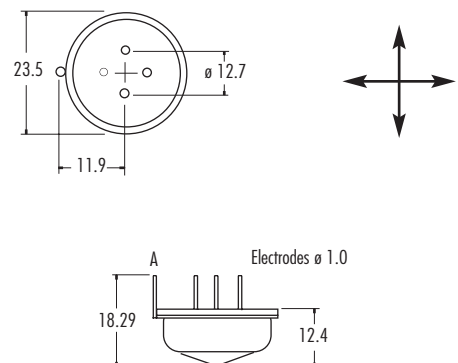
CM1535-5

Contact Form / Style	Normally Closed	
Switching Voltage	Max. Vac	240
Switching Current	Max. A	7.0A at 240Vac 12.5A at 120Vac
Switching Capacity	Max. VA	1500
Operating Angle	Deg°	35° ± 10°
Contact Resistance	Max. Ω	5
Operating Temperature	Deg. °C	-37° +100°
Storage Temperature	Deg. °C	-40° +125°
Case Material	Steel Nickel Plated	
Cable/Termination	Electrode	
Features	Heavy Duty Switching safety switch for portable devices	



CM4150-1

Contact Form / Style	Normally Open	
Switching Voltage	Max. Vac	120
Switching Current	Max. A	1.0
Switching Capacity	Max. VA	150
Operating Angle	Deg°	4° ± 1°
Contact Resistance	Max. Ω	3
Operating Temperature	Deg. °C	-37° +100°
Storage Temperature	Deg. °C	-40° +125°
Case Material	Steel Tin Plated	
Cable/Termination	Electrode	
Features	Joystick Control 4 contacts to sense 4 different planes	



Also available with the following operating angles:  
CM4151-0 = 1°, CM4154-0 = 2°, CM4153-0 = 16°

All dimensions are nominal, in millimetres unless otherwise stated.

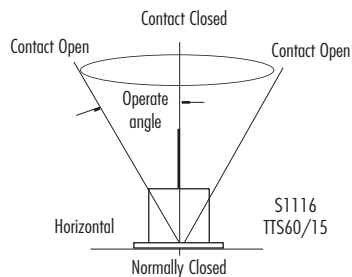
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## SWITCHES + SENSORS

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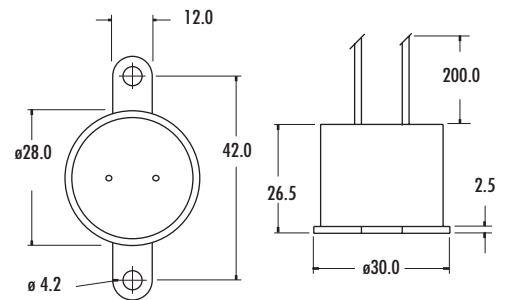
# Tip-Over Modules - Mercury Contacts

## SWITCH OPERATION



S1116

Contact Form / Style		Normally Closed
Switching Voltage	Max. Vac RMS	240
Switching Current	Max. A	12.5A at 120 Vac
Switching Capacity	Max. VA	1500W
Operating Angle	Deg°	35° ± 10°
Contact Resistance	Max. Ω	5
Operating Temperature	Deg. °C	-20° +105°
Storage Temperature	Deg. °C	-25° +115°
Case Material		Polypropylene
Cable/Termination		2 x 17 AWG silicone rubber insulated
Features		Heavy Duty Switching

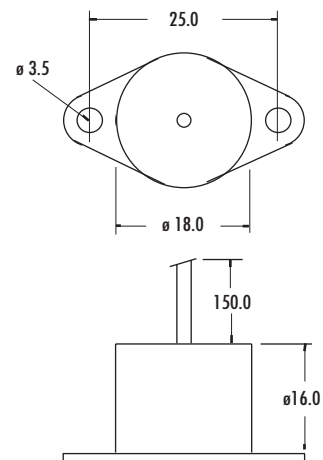


# Tip-Over Modules - Non Mercury Contact



TTS60/15

Contact Form / Style		Normally Closed
Switching Voltage	Max. Vac RMS	60
Switching Current	Max. A	0.25
Switching Capacity	Max. VA	3
Operating Angle	Deg°	40° ± 15°
Contact Resistance	Max. Ω	6
Operating Temperature	Deg. °C	-20° +85°
Storage Temperature	Deg. °C	-25° +105°
Case Material		Polypropylene
Cable/Termination		2 x 0.14" PVC insulated
Features		Compact. Easy Fitting



## DESIGN AND ASSEMBLY SERVICE

*We can modify many of our products to your design requirements. This includes adding cable, connectors and terminals. Switches can also be encapsulated, assembled to PCB's or fitted into housings.*

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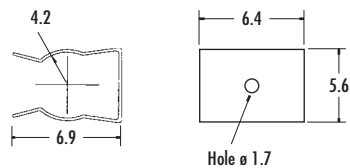
# SWITCHES + SENSORS



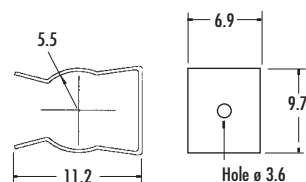
# Clips



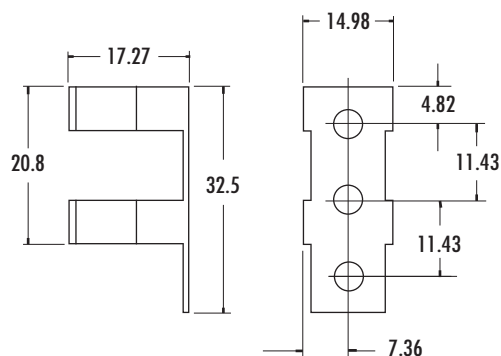
1A



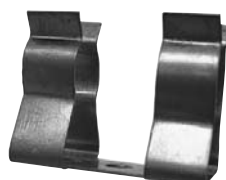
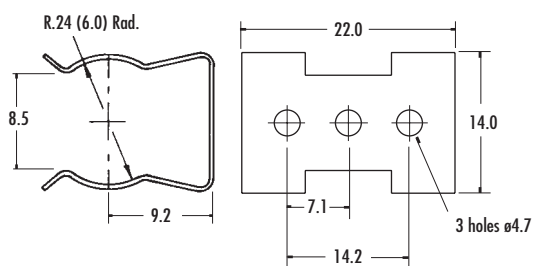
3BH



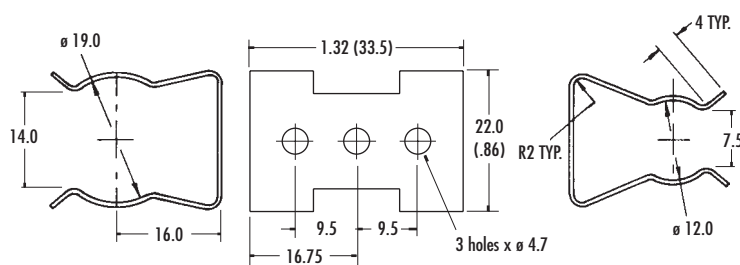
5DL-2



S1016-2



S1017-2



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## SWITCHES + SENSORS

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# Float Switches

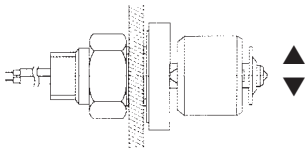
## DESCRIPTION

Reed Float Switches are operated by a magnet fitted into the float assembly. When the float moves past the reed switch fitted inside the float switch body, the reed switch contacts will operate (open or close). When the float moves back to its original position the reed switch contacts will switch back to their original position.

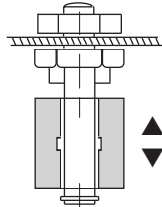
The Cable Tether type float switches use either mercury or a mercury free contact.

## OPERATION

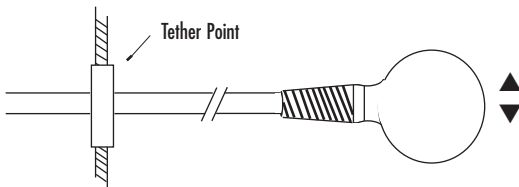
### SIDE MOUNTING



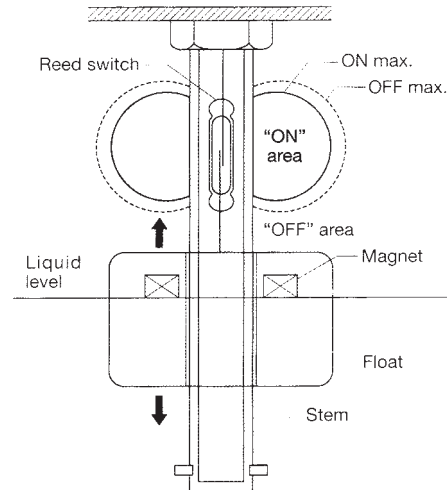
### VERTICAL MOUNTING



### CABLE TETHER



## OPERATING PRINCIPLE



The level sensor consists of a vertical stem and a free moving float containing a magnet. The vertical stem contains a reed which is activated by the proximity of the float.

## GENERAL SPECIFICATION

### Contact Form

Most switch actions can be changed from normally open to normally Closed by reversing the float on its stem. See specifications for details.

### Switch Ratings

The load switching capacity of most float switches can be significantly increased with the addition of the Relay Units on page 93.

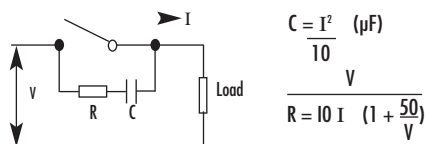
### Switching Capacity

This is specified as maximum for resistive loads. For capacitive and inductive loads, some switch protection may be required.

## CONTACT PROTECTION

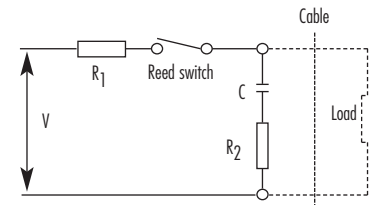
### Inductive Loads

A reverse voltage is generated by store energy in an inductive load when reed contacts open. This voltage can reach very high levels and is capable of damaging the contacts. An RC network may be used as shown below to give protection.



### Capacitive Loads

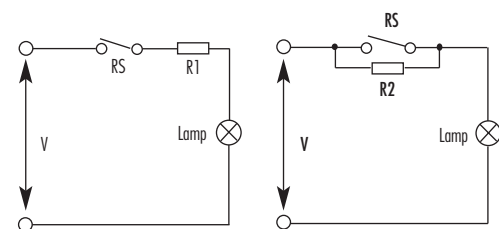
Unlike inductive loads, capacitive and lamp loads are prone to high inrush currents which can lead to faulty operation and even contact welding. When switching charged capacitors (including cable capacitance) a sudden unloading can occur, the intensity of which is determined by the capacity and length of the connecting leads to the switch. This inrush peak can be reduced by a series of resistors. The value is dependent on the particular application but should be as high as possible to ensure that the inrush current is within the allowable limits.



The above diagram illustrates a resistor/capacitor network for protecting a Reed Switch against high inrush currents.  $R_1$  and/or  $R_2$  are used depending upon circuit conditions.

### Lamp Loads

With lamp load applications it is important to note that cold lamp filaments have a resistance 10 times smaller than already glowing filaments. This means that when being turned-on, the lamp filament experiences a current flow 10 times greater than when already glowing. This high inrush current can be reduced to an acceptable level through the use of a series of current-limiting resistors. Another possibility is the parallel switching of a resistor across the switch. This allows just enough current to flow to the filament to keep it warm, yet not enough to make it glow.



Lamp load with parallel or current limiting resistor across the switch

# Float - Plastic

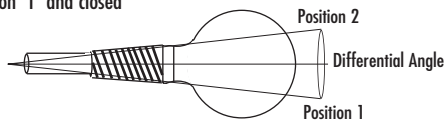
## Mercury and Non-mercury Types

- Nylon Strain Relief
- Hermetically sealed contacts
- N.O. and N.C. versions
- Choice of operating angles

### ALL RANGES

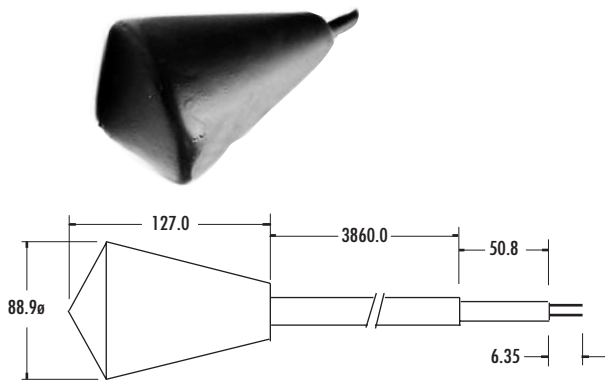
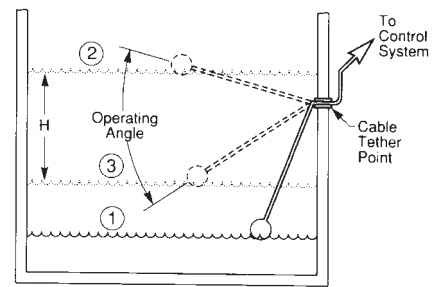
Part numbers with letter "A" have normally open contacts at position '1' and closed contacts at position '2'.

To reverse contact order 'B' in place of 'A' in part number



## FIXING INSTRUCTIONS

For normally open float  
Level 1 = Contact Open  
Level 2 = Contact Closes as level rises  
Level 3 = Contact opens as level falls  
Distance H will depend on the operating angle and cable length from float to tether point.



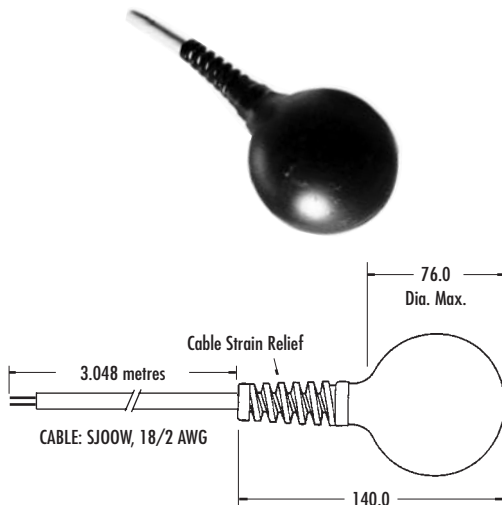
## FP10 FP210-13

Contact Form/Style		FP210 - 13 2 Contacts
		FP10 - 1 Contact
Switching Voltage	Max. Vac/dc	240Vac
Switching Capacity	Max. VA	10A 120Vac
		5A 120Vdc
		5A 240Vac
		3A 240Vdc
Switch Resistance	Max. $\Omega$	3.0
Operating Temperature	Max. Deg. $^{\circ}\text{C}$	70 $^{\circ}\text{C}$
Differential Angle	(TYP) Deg. $^{\circ}\text{C}$	10 $^{\circ}$
Material		Urethane rigid moulded foam with PVC coating

**FP210-13:** 16/4 Type SJ00W Cable. Outer sleeve extends 25.4 Min. inside float housing.

**FP10:** 16/2 Type SJ00W Cable. Outer sleeve extends 25.4 Min. inside float housing.

## BF32 Types - see below WBF Types - see below



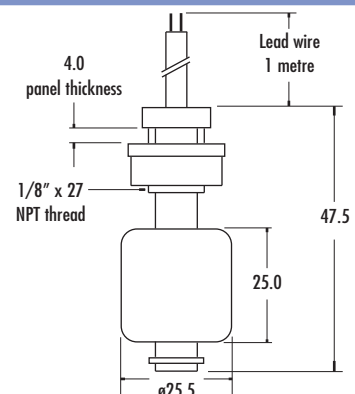
Contact Form/Style		BF32 Type	WBF31A-0
		1 Contact	1 Contact Mercury Free
Switching Voltage	Max. Vac/dc	240Vac	1.5 - 50Vdc
Switching Capacity	Max. VA	BF32 = 2A 120Vac	0.120A 12Vac
		1.0A 240Vdc	0.15A 120Vdc
		BF310A-0 = 10A 120Vac	25W lamp load at 120Vac
		5A 240Vdc	
Switch Resistance	Max. $\Omega$	3.0	3.0
Operating Temperature	Max. Deg. $^{\circ}\text{C}$	70 $^{\circ}\text{C}$	70 $^{\circ}\text{C}$
Differential Angle	(TYP) Deg. $^{\circ}\text{C}$	BF32A-0 8 $^{\circ}$ BF32A25-0 25 $^{\circ}$ BF32A65-0 65 $^{\circ}$ BF310A-0 8 $^{\circ}$	15 $^{\circ}$ Deg. Max.
Material		Polypropylene housing with PVC coating	Polypropylene housing with PVC coating



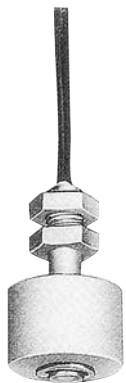
P219

Contact Form/Style		Reversible Float
Switching Voltage	Max. V	400 Vac/dc
Switching Current	Max. A	2.0
carry Current	Max. A	3.0
Switching Capacity	Max. VA	40
Contact Resistance	max. m $\Omega$	80
Lead Wire		PVC 0.5mm <sup>2</sup>
Reversible Switch Action		Yes
Operating Pressure	Max. Kg/cm <sup>2</sup>	1.0
Operating Temperature	Deg. $^{\circ}\text{C}$	-20 $^{\circ}$ +80 $^{\circ}$
Material		Polypropylene
Suitable Specific Gravity		0.75
Mounting Hole Dia.	mm.	10.5

Reed switch is UL approved

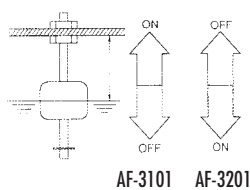


# Float - Plastic

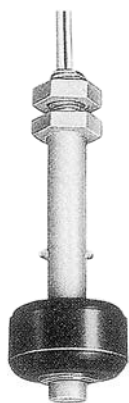
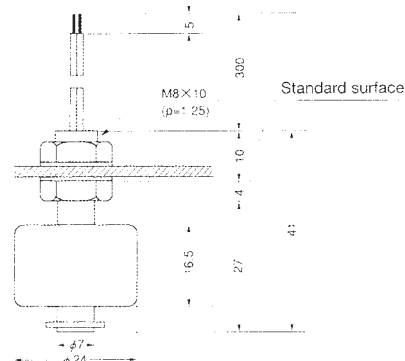


Suitable Specific Gravity (Float)	1.0
Material: Case	PP resin
Float	PP resin
Switching Power	Max. W 50
Switching Voltage	Max. V 200
Switching Current	Max. A 0.6
Contact Withstand Voltage	Max. V 250
Contact Resistance	Max. $\Omega$ 0.3
Operating Temperature	Deg. $^{\circ}\text{C}$ -10 ~ +60

*AF - 3101*  
*AF - 3201*

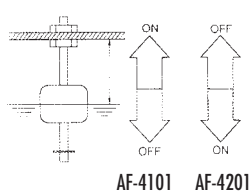


	AF-3101	AF-3201
ON	10.5 min.	17.5 max.
OFF	17.5 max.	10.5 min.

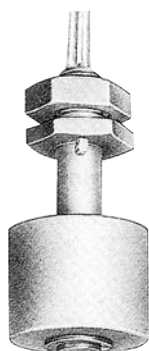
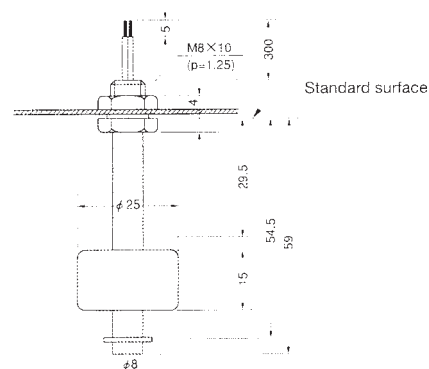


Suitable Specific Gravity (Float)	0.79
Material: Case	Nylon 6
Float	NBR (polyfoam)
Switching Power	Max. W 50/10
Switching Voltage	Max. V 200
Switching Current	Max. A 0.6
Contact Withstand Voltage	Max. V 250
Contact Resistance	Max. $\Omega$ 0.3
Operating Temperature	Deg. $^{\circ}\text{C}$ -20 ~ +80

*AF - 4101*  
*AF - 4201*

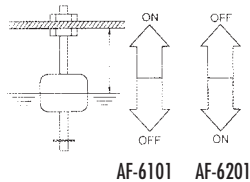


	AF-4101	AF-4201
ON	34.0 min.	44.0 max.
OFF	41.0 max.	35.0 min.

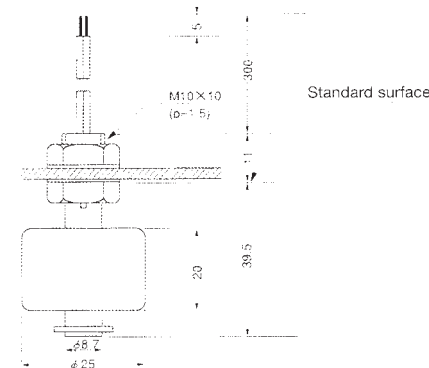


Suitable Specific Gravity (Float)	1.0
Material: Case	PP Resin
Float	PP Resin
Switching Power	Max. W 50
Switching Voltage	Max. V 200
Switching Current	Max. A 0.6
Contact Withstand Voltage	Max. V 250
Contact Resistance	Max. $\Omega$ 0.3
Operating Temperature	Deg. $^{\circ}\text{C}$ -10 ~ +60

*AF - 6101*  
*AF - 6201*

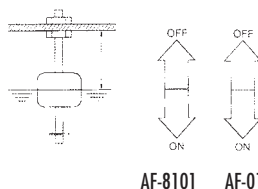


	AF-6101	AF-6201
ON	9.0 min.	21.0 max.
OFF	19.5 max.	14.0 min.

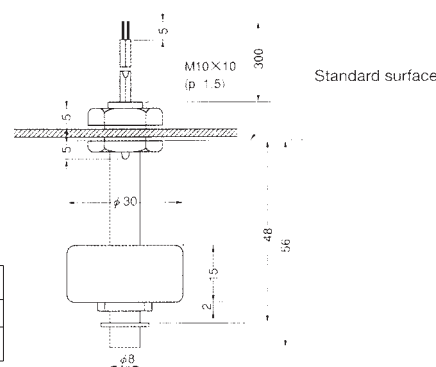


Suitable Specific Gravity (Float)	0.79
Material: Case	Nylon 6
Float	NBR (polyfoam)
Switching Power	Max. W 10
Switching Voltage	Max. V 200
Switching Current	Max. A 0.5
Contact Withstand Voltage	Max. V 300
Contact Resistance	Max. $\Omega$ 0.2
Operating Temperature	Deg. $^{\circ}\text{C}$ -20 ~ +80

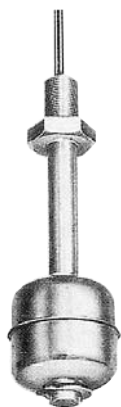
*AF - 8101*  
*AF - 01*



	AF-8101	AF - 01
ON	39.5 min.	35 $\pm$ 2
OFF	32.5 max.	5.5 $\pm$ 2

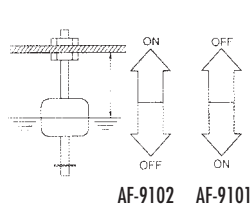


# Float - Plastic / Metal



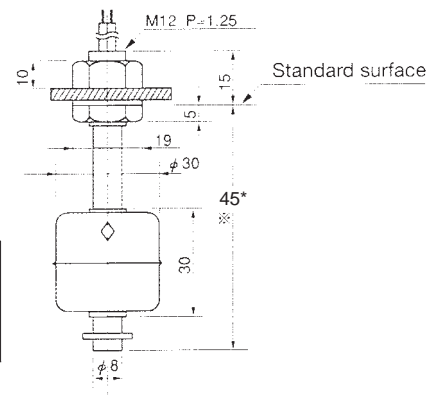
Suitable Specific Gravity (Float)	1.0
Material: Case	Stainless steel 304
Float	Stainless steel 304
Switching Power	Max. W 10
Switching Voltage	Max. V 200
Switching Current	Max. A 0.25
Contact Withstand Voltage	Max. V 250
Contact Resistance	Max. $\Omega$ 0.3
Operating Temperature	Deg. °C -20 ~ +90

AF - 9101  
AF - 9102



	AF-9101 (4.5mm typ)	AF-9201 (4.5mm typ)
ON	9.0 min.	21.0 max.
OFF	19.5 max.	14.0 min.

\* Also available: 100mm and 150mm

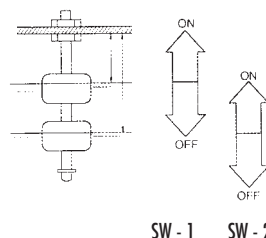


**A full custom design service is available for many of our range of float switches including multi float sensing.  
Please contact our sales office for more information.**



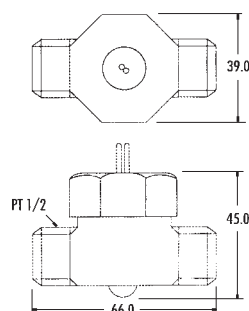
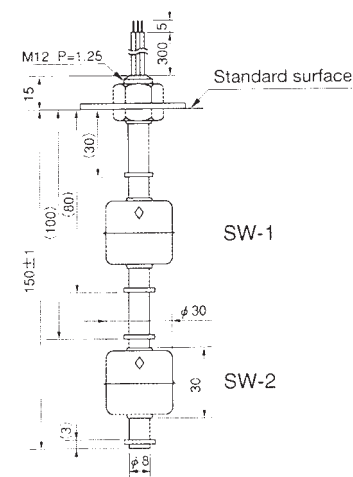
Suitable Specific Gravity (Float)	0.79
Material: Case	Stainless steel 304
Float	Stainless steel 304
Switching Power	Max. W 10
Switching Voltage	Max. V 200
Switching Current	Max. A 0.25
Contact Withstand Voltage	Max. V 250
Contact Resistance	Max. $\Omega$ 0.3
Operating Temperature	Deg. °C -20 ~ +90

AF - 9521



	SW - 1	SW - 2
ON	40.0 min.	110.0 max.
OFF	60.0 max.	130.0 min.

**For further information on these and many other types of float and flow switches and sensors, please contact the sales office or go to our web site which will be continually updated to give you full details of all our products.  
[www.assemtech.co.uk](http://www.assemtech.co.uk)**



## Flow Sensor - SS Series

The SS Series flow sensor is characterised by its small, light and low cost design using a plastic case and reed switch sensor. The use of a reed switch ensure long operation life in various conditions. It supplies a stable flow sensing output for years of continuous operation.

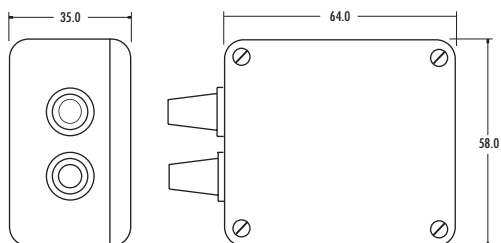
The SS Series also has the option of a built in thermistor which enable simultaneous detection of temperature and flow. Suitable for use in food hygiene related applications.

	SS-11-1.0	SS-11-2.0	SS-11-3.5	SS-11-5.0
Operating Characteristics (Water)	On 1.0 ± 0.3 litre/min. Off 0.7 ± 0.3 litre/min.	On 2.0 ± 0.4 litre/min. Off 1.5 ± 0.4 litre/min.	On 3.5 ± 0.5 litre/min. Off 2.7 ± 0.5 litre/min.	On 5.0 ± 0.5 litre/min. Off 4.2 ± 0.5 litre/min.
Withstanding Pressure	8kgf / cm <sup>2</sup>			
Pressure Dissipation	below 0.2 cm <sup>2</sup> (when in 10 litre/min.)			
Max. Switching Power	5W			
Max. Switching Voltage	100V			
Max. Switching Current	0.25A			
Contact Withstand Voltage	250V			
Contact Resistance	0.2 $\Omega$ max.			
Operating Temperature	-10 ~ +80°C			
Applicable Fluid	Water, propylene glycol, ethylene glycol, oil*			
Material	Case: PP, Nylon 6. Spring: SUS. Float: PP, Nylon 6.			
Sensing Flow	Filling Plastic: epoxy, Sensing Switch: Reed switch			

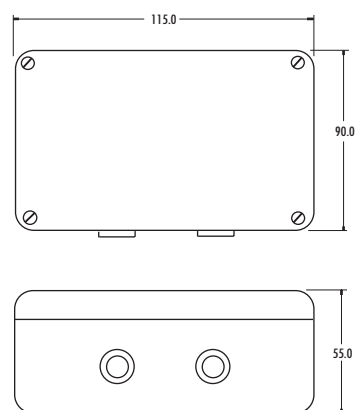
# High Power Switch Modules



These switch modules contain relays that are capable of switching 5 or 10 amps. They are intended to be used with any of our products such as tilt switches, proximity switches and float switches. They enable standard switches to handle all load requirements including resistive, capacitive and inductive.



**PART NUMBER S1384**



**PART NUMBER S1386**

PART NUMBER		S1384	S1386
SUPPLY VOLTAGE	Max. V	12Vdc	240Vac
SWITCHING CURRENT	Max. A	5	10
SWITCHING CAPACITY	Max. Vac	240	240
OPERATING TEMPERATURE	Deg. °C	-10° + 70°	-10° + 70°
STORAGE TEMPERATURE	Deg. °C	-25° + 70°	-25° + 70°
CASE MATERIAL		ABS	ABS
RELAY COIL DIODE PROTECTED		Yes	Yes
OUTPUT CONTACTS PROTECTED		Yes	Yes
IP65 SEALED CASE (subject to cable exit)		Yes	Yes

Connection via an internal 6-way terminal block

Full wiring instructions supplied with each unit.

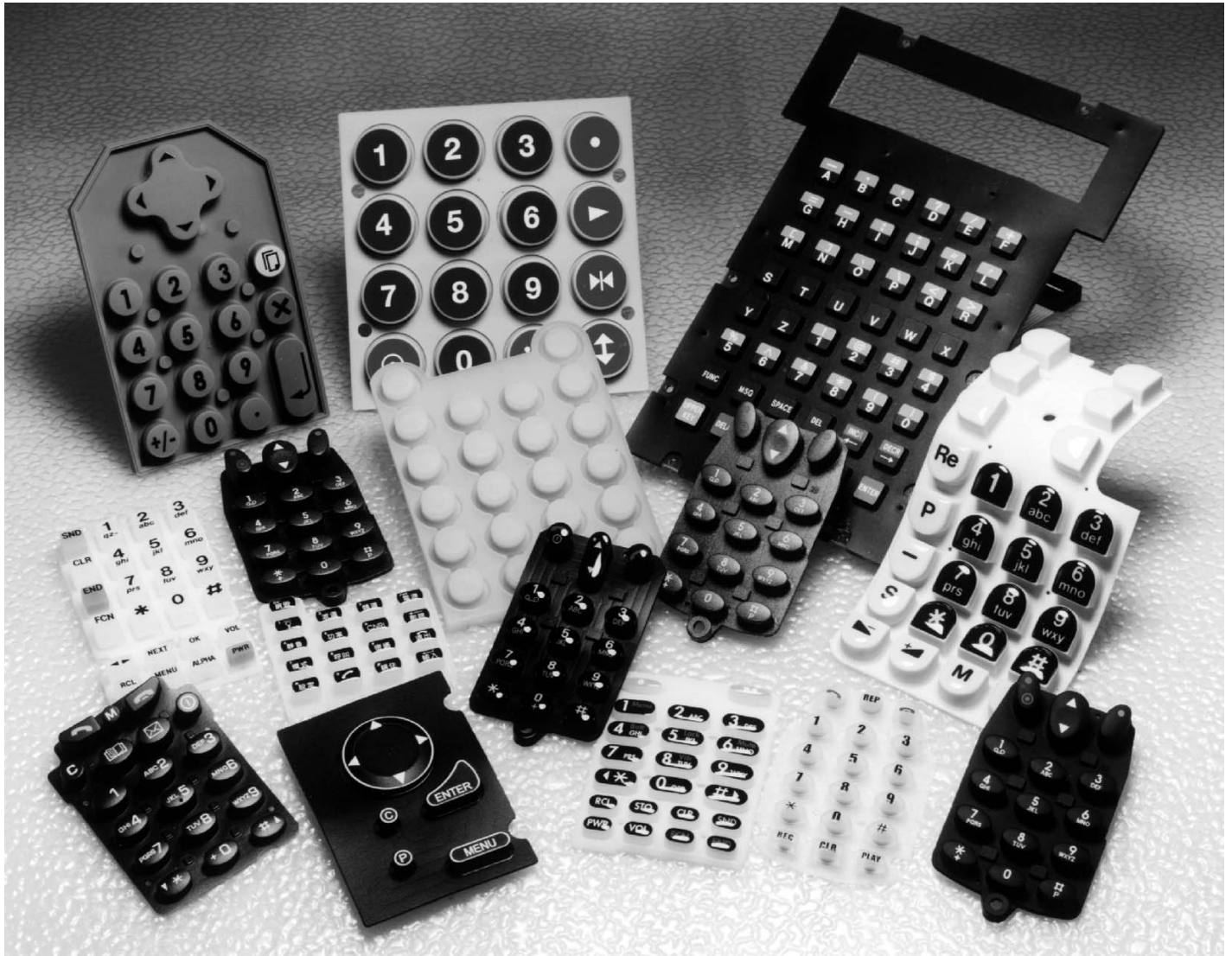
All dimensions are nominal, in millimetres unless otherwise stated.

As part of the groups policy of continued product improvement, specifications may change without notice. Our sales office will be pleased to help you with the latest information on our products.

## SWITCHES + SENSORS



# Elastomeric Keypads - Silicone Rubber



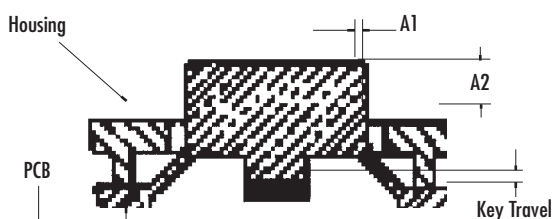
As part of the Comus International group of Companies Assemtech has many years experience in supplying elastomeric products. A special agreement between Assemtech and General Silicones enables us to offer custom designed, high quality products at very competitive prices.

Assemtech can provide technical engineering support from initial enquiry to delivery of completed product.

## BASIC KEYPADS

Moulded in solid colour or translucent rubber. Keytops can be printed or moulded in different colours. Translucent rubber is ideal for basic back lighting. Keytops can be permanently printed in full or reverse.

All keypads are moulded to individual requirements and can incorporate seals, PCB locations and other structural features



## CONSTRUCTION

A flexible insulator with bonded contact elements offers tactile feedback with or without snap effect. The actuation force and the snap effect can be adjusted to a definite and satisfactory requirement. Contact resistance when measured with two flat circuits space 0.7mm and pressed with a force of 100g has a value of 100 ohm max. (Dependent on pcb contact quality).

### Mechanical considerations when using a keypad frame.

- A1. Key opening in frame should have 0.25mm clearance on each side to allow at least 0.50mm clearance between size of key and frame hole.
- A2. When fully depressed the key should be at least 0.50mm above frame top surface to prevent key catching under frame.

# SWITCHES + SENSORS



# Elastomeric Keypads - Silicone Rubber

Rubber keypads are widely used in the "push-button" facilities regularly seen in our daily life, such as personal computer keyboards, calculators, remote controllers, cellular phone/mobile phones, multi-functional telephones, CB radios, car stereos, cameras and answering machines.

## Material

The hardness of silicone rubber can be blended between 30 to 70 shore A. Suggested hardness for silicone rubber keypads is 40 to 60 shore A, depending on customers' requirements of actuation force.

## Contact Resistance

Silicone rubber keypads can be co-moulded with carbon impregnated silicone pills (carbon pills), gold plated pills or metal pills according to customers' requirements.



## Rubber keypad printing, spray painting and coating

### Spray Printing for Back-lighted Legends

After moulding, the keypads are spray painted with black and white ink on the front side. A laser is then used to etch out the legends onto the keytop to give a back lighted effect.

### Silk-screen Printing

Keypads can be silk-screen printed enabling individual keytops to be printed in different colours as required.

### Epoxy Coating

Keypads can be dipped with an epoxy resin to form a hard or medium hard keytop with a smooth touch.

### Rubber Colours

Any colour can be blended according to customer request. It can also be blended with phosphorescent material to glow in the dark.

### PU Coating and Hard Coating

Silicone rubber keypads can also be spray coated with PU resin to provide excellent abrasion resistance.

#### Hard Coating

A screen-print or spray-paint process is used to coat an additional protective clear silicone ink over the keytops. This increases the abrasion life of the legend

