



STSRail

(FORMERLY FIELD AND GRANT)

PO3000 RELAYS

FORMERLY MANUFACTURED BY TELERELAY AND KEYSWITCH

Relay Description

The PO3000 relays covered in this data sheet were originally designed for telephone circuit switching and whilst the telecommunications industry now uses solid state switching, these relays continue to be used in many other applications due to their proven reliability.

STSRail PO3000 Relay Features

- Compact modular design
- Changeover N/O and N/C contacts
- Single and double contact bank options
- Slugged and non-slugged versions available
- Singled and multi-wound coil options
- Proven reliability
- Low life cycle cost

Part Number Breakdown

Each part number is prefixed by the letter P and alphanumeric fields then define the relay configuration as follows:

- Frame type - 2 digits
- Coil - 2 digits
- Left hand contact assembly - 3 digits
- Right hand contact assembly - 3 digits
- Accessories - normally left blank or 2 digits
- Wiring - normally left blank or 2 digits

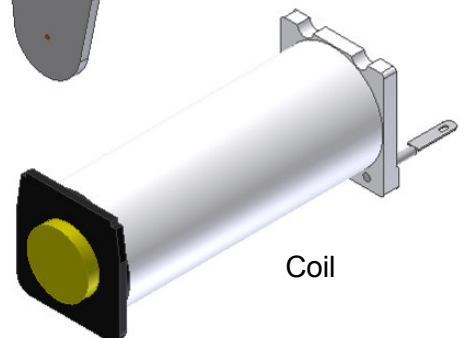
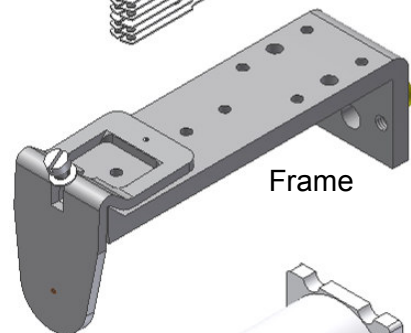
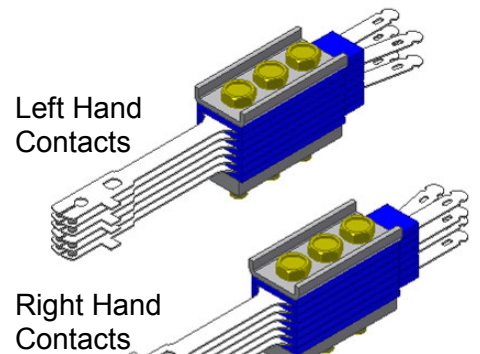
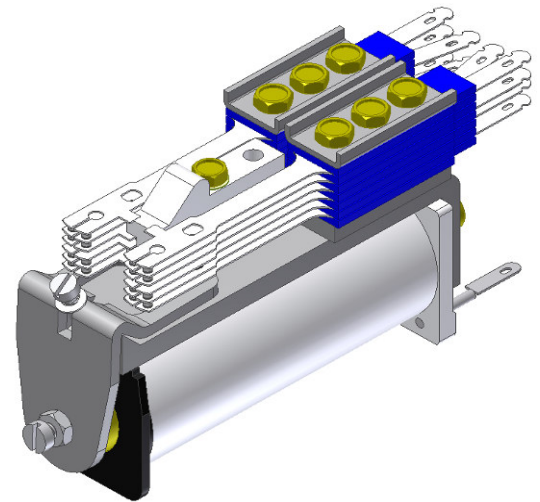
A typical part number is shown in the following table:

P	A1	E1	H50	H50	W4	Y1
PO3000	Frame type	Coil	Left hand contacts	Right hand contacts	Accessories	Wiring

In the part number example above, the relay has:

- A standard yoke and armature with sprung armature retaining screw and 0.004" fixed residual pin.
- A 100 Ohm, (typically 5 V) coil.
- One N/O and one N/C standard duty fine silver contact on each bank.
- A PW style housing with standard wiring.

Full details of the options available for each section of the part number can be found in the following pages.



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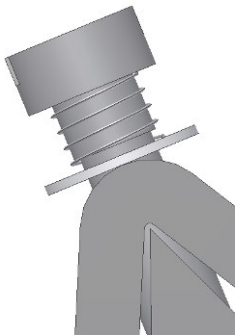
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Frame.

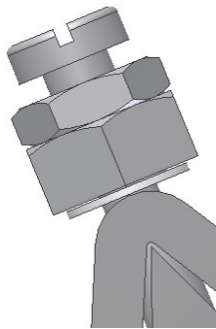
The frame of the relay defines the magnetic circuit of the relay less the coil. Variations will normally include residual pin height and type and armature retaining mechanism. A selection of the standard armature retaining screws and residual pin variations are shown below. All the variations shown below are built using a standard yoke and armature. If the frame is not listed STS Rail can supply the reference on request.

Reference	Frame Description
A1	Standard armature retaining screw with spring & 0.004" fixed residual pin
A2	Standard armature retaining screw with spring & 0.012" fixed residual pin
A3	Standard armature retaining screw with spring & 0.020" fixed residual pin
A4	Standard armature retaining screw with spring & adjustable residual pin
A5	Armature retaining screw with locknut & 0.004" fixed residual pin
A6	Armature retaining screw with locknut & 0.012" fixed residual pin
A7	Armature retaining screw with locknut & 0.020" fixed residual pin
A8	Armature retaining screw with locknut & adjustable residual pin

Armature Retaining Screw with Spring.



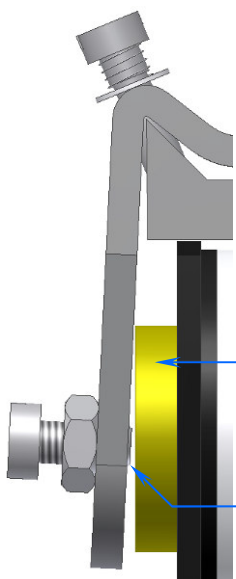
Armature Retaining Screw with Lock Nut.



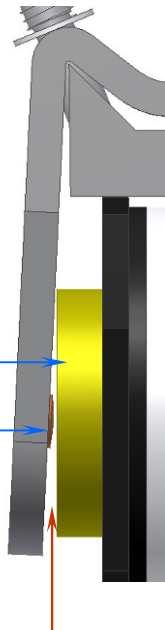
Armature Retaining Screw Arrangements.

There are two options for the armature retaining screw with a spring or with lock nuts (see illustrations left). Normally the sprung version is used with a standard coil and lock nuts are used with a tropicalised coil.

Adjustable Residual Pin.



Fixed Residual Pin.



Core
Residual Pin
Adjustable Residual Pin

Residual Pins.

Generally relays are supplied with a 0.012" fixed residual pin.

A 0.004" or 0.020" fixed pin can be fitted either to alter the operate and release voltages or currents of the relay or the time delay of a slugged relay.

An adjustable residual pin allows for some alteration of the relays characteristics by the Customer, however this is at the cost of changing the default characteristics and should only be used when skilled installation staff are available.

To measure the residual pin use a feeler gauge in the gap indicated by the red arrow (left) with the armature pressed down and the residual pin touching the top of the core.

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Coil.

The coil selected will depend upon the operating characteristics that are required. A selection of standard variations is shown below. If the coil is not listed STS Rail can supply the reference on request.

Nominal Voltage is a guide only, the actual rating will depend upon the operating characteristics, number of contacts and other relay design factors.

Reference	Coil Description	Normal Coil Nominal Voltage
E1	100 Ohm coil plastic cheek. 5100 Turns. 0.236 Wire.	5 V DC
E2	500 Ohm coil plastic cheek. 10730 Turns. 0.150 Wire.	12 V DC
E3	1000 Ohm coil plastic cheek. 15900 Turns. 0.132 Wire.	24 V DC
E4	1500 Ohm coil plastic cheek. 19500 Turns. 0.125 Wire.	35 V DC
E5	2000 Ohm coil plastic cheek. 22600 Turns. 0.112 Wire.	50 V DC
E6	4000 Ohm coil plastic cheek. 30150 Turns. 0.090 Wire.	70 V DC
E7	5000 Ohm coil plastic cheek. 31800 Turns. 0.080 Wire.	100 V DC
E8	6500 Ohm coil plastic cheek. 37080 Turns. 0.080 Wire.	125 V DC
E9	10000 Ohm coil plastic cheek. 47400 Turns. 0.071 Wire.	150 V DC
E0	20000 Ohm coil plastic cheek. 70000 Turns. 0.063 Wire.	240 V DC

Slugs.

To increase the operating time from about 8ms a slug can be added to either the heel or toe of the coil.

A heel slug will increase the operate delay and a toe slug will increase both the operate and release delay.

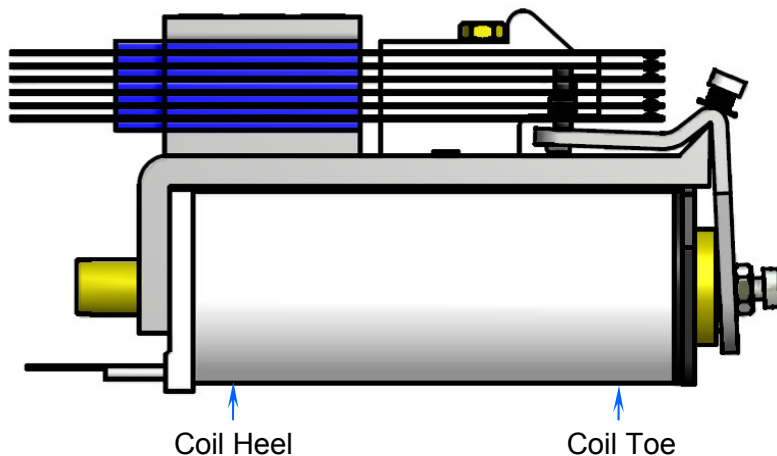
Three standard slug sizes of ½", 1" and 1½" are available .

The approximate time delays achieved by fitting these slugs are:

½" 50 ms.

1" 100 ms.

1½" 200 ms.



Coil Cheeks.

Plastic coil cheeks are fitted as standard, however other options are available. Copper cheeks smooth the relay operation where a noisy power supply is present.

For copper cheek variants of the standard coils above substitute an "F" for the "E".

Multi Wound Coils.

Double wound coils are available where one supply is required to operate the relay and the other to hold it in the operate position (usually consuming less power). Triple and quadruple wound coils are also available.

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Contacts.

Two banks of contacts are available on these relays, left hand and right hand. Whilst individual contacts within each bank can be manufactured from different materials, generally the contact material is the same throughout the bank. Mixed contact materials within the bank should be specified at time of order.

The tables opposite list the contact tip material options, the standard contact configurations and timing options available. Non-standard contact configuration and tip material mixes will have a code assigned by STS Rail as required.

Contacts are Normally Open (N/O) otherwise known as Make, Normally Closed (N/C) otherwise known as Break or Changeover (C/O).

Part Number Build-up.

Two contact numbers are required, one for the left hand bank of contacts and one for the right hand bank. Each number consists of three digits.

The first digit designates the contact material.

The second digit designates the contact arrangement.

The third digit designates the contact timing.

Contact Timing.

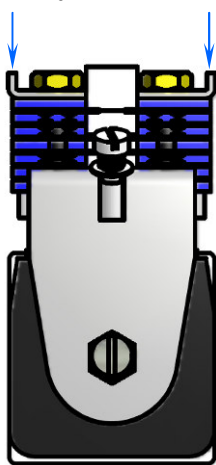
Changeover contacts are break before make as standard.

Changeover contacts can be manufactured as make before break as an option. Normally open and normally closed contacts can be made standard, early or late break or make.

Contact Stack to Ironwork Insulation.

Standard Relays have an insulation resistance of 500 V between the contact stack and the ironwork. Special Versions can be ordered with 1000 V, 2000 V or 3000 V ratings. Contact blade to contact blade insulation remains unchanged.

Left Hand Contact Assembly Right Hand Contact Assembly



AC Rating.

All contact tip types are rated at 250 V AC non-inductive.

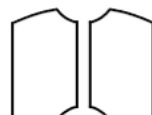
Twin Contact Spring Identification.

When using twin contacts contact materials can be identified by the form of the contact end of the spring. These are shown below:

Silver Twin



Palladium Twin



Platinum twin



Other Contact Spring Identification.

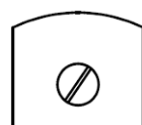
The punch used to rivet the fine silver contact leaves a cross on the back of the tip. This is the case for both heavy duty with a single $\text{Ø}^{3/16}$ contact and standard duty with a single $\text{Ø}^{1/8}$.

The punch which rivets Silver Cadmium Oxide tips has a line across the back of the tip.

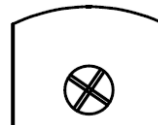
Elkonite contacts have neither a cross or a line across the back.

Tungsten contacts are spun to the blade, not riveted.

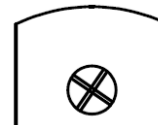
Silver Cadmium



Fine Silver



Fine Silver



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Contact Stack Digit #1				Contact Stack Digit #2	
Reference	Contact Stack to Ironwork Insulation	Contact Material	Contact Rating (Non-inductive)	Reference	Contact Arrangement
A	500 V (Standard)	Silver. Twin contact.	300 mA. 100 V DC	1	1 N/O
B		Elkonite D56.	8 A. 250 V DC	2	1 N/C
C		Palladium. Twin contact.	2 A. 100 V DC	3	1 C/O
D		Platinum. Twin contact.	1 A. 100 V DC	4	2 N/O
E		Fine silver (heavy duty)	3 A. 150 V DC	5	1 N/O & 1N/C
F		Silver cadmium oxide.	8 A. 250 V DC	6	1 N/O & 1 C/O
G		Tungsten.	8 A. 250 V DC	7	2 N/C
H		Fine silver (standard duty).	3A	8	1 N/C & 1 C/O
J	1000V	Silver. Twin contact.	300 mA. 100 V DC	9	2 C/O
K		Elkonite D56.	8 A. 250 V DC	0	3 N/O
L		Palladium. Twin contact.	2 A. 100 V DC	A	2 N/O & 1N/C
M		Platinum. Twin contact.	1 A. 100 V DC	B	2 N/O & 1 C/O
N		Fine silver (heavy duty)	3 A. 150 V DC	C	1 N/O & 2 N/C
P		Silver cadmium oxide.	8 A. 250 V DC	D	1 N/O, 1 N/C & 1 C/O
R		Tungsten.	8 A. 250 V DC	E	1 N/O & 2 C/O
S		Fine silver (standard duty).	3A	F	3 N/C
T	2000V	Silver. Twin contact.	300 mA. 100 V DC	G	2 N/C & 1 C/O
U		Elkonite D56.	8 A. 250 V DC	H	1 N/C & 2 C/O
V		Palladium. Twin contact.	2 A. 100 V DC	J	3 C/O
W		Platinum. Twin contact.	1 A. 100 V DC	K	4 N/O
X		Fine silver (heavy duty)	3 A. 150 V DC	L	3 N/O & 1 N/C
Y		Silver cadmium oxide.	8 A. 250 V DC	M	3 N/O & 1 C/O
Z		Tungsten.	8 A. 250 V DC	N	2 N/O & 2 N/C
1		Fine silver (standard duty).	3A	P	2 N/O, 1 N/C & 1 C/O
2	3000V	Silver. Twin contact.	300 mA. 100 V DC	R	1 N/O & 3 N/C
3		Elkonite D56.	8 A. 250 V DC	S	1 N/O, 2 N/C & 1 C/O
4		Palladium. Twin contact.	2 A. 100 V DC	T	4 N/C
5		Platinum. Twin contact.	1 A. 100 V DC	U	3 N/C & 1C/O
6		Fine silver (heavy duty)	3 A. 150 V DC	V	4 C/O
7		Silver cadmium oxide.	8 A. 250 V DC		
8		Tungsten.	8 A. 250 V DC		
9		Fine silver (standard duty).	3A		

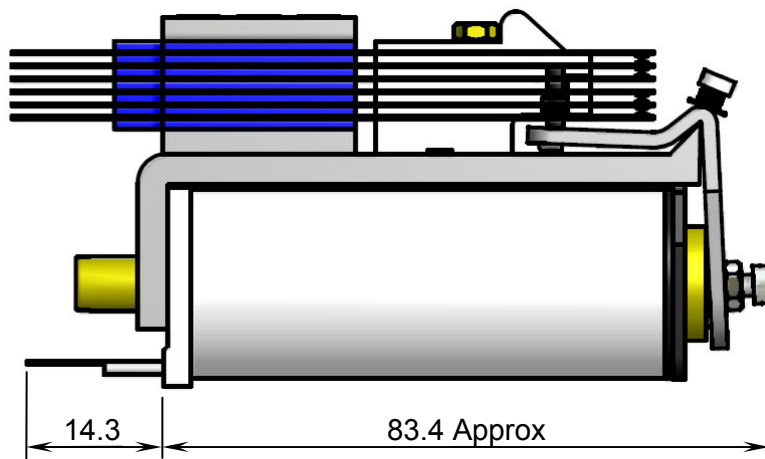
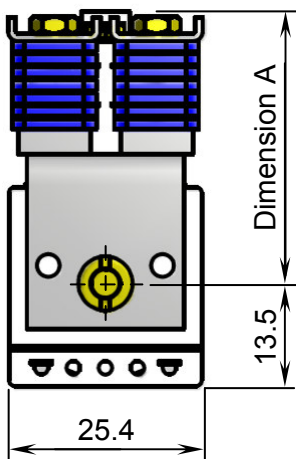
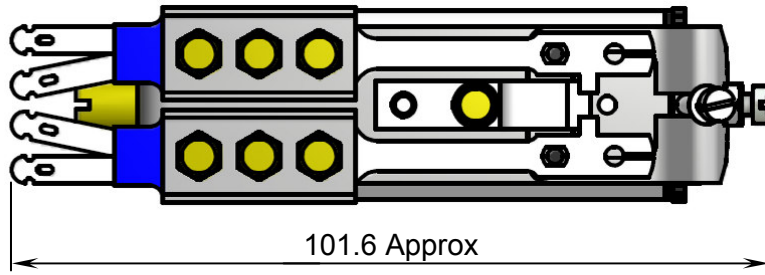
As standard, where multiple contact types are used the order of contacts starting from the frame is N/O, then N/C, then C/O

Contact Stack Digit #3	
Reference	Contact Timing and Ironwork to Contact Stack Insulation
0	All Contacts Standard Timing
X	All Changeover Contacts Make Before Break.

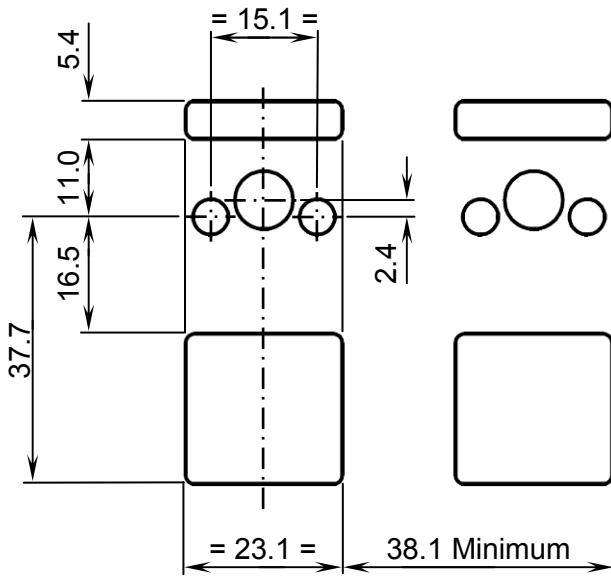
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Dimensions.

The general dimensions for a standard relay with no accessories is shown below.



Mounting Dimensions.



Contact Arrangement Reference	No. of Buffer Block Steps	Dimension 'A'
1-3	1	30.3
4-9	2	35.9
0-U	3	41.4
V	4	47.0

Single (Heavy Duty) Changeover Contacts.

Single contact changeover contacts require more depth than twin contacts so 'Dimension A' will increase by one step for this arrangement.

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Accessories.

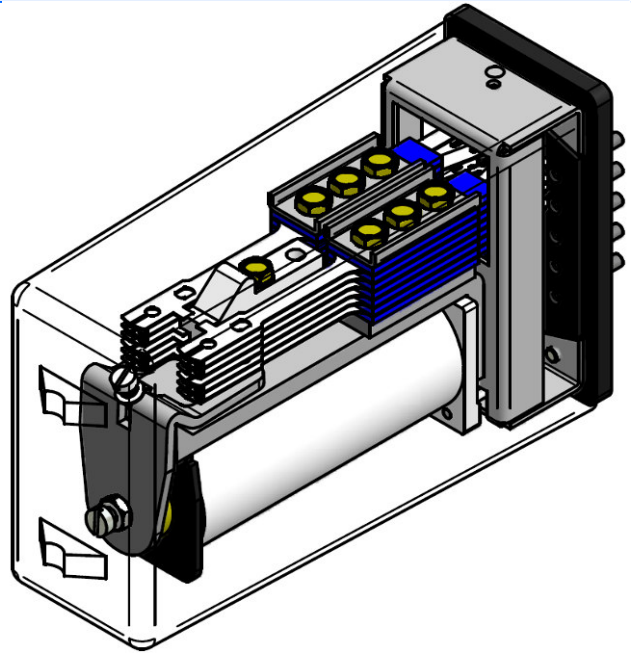
Accessories include enclosures with plug-in bases in various styles and tropicalisation of the coils by means of resin impregnation to reduce the ingress of moisture .

Enclosed relays can only be manufactured with contact stack to ironwork insulation of 500 V or 1000 V.

Keyswitch style enclosures have "KEYSWITCH" moulded in to the front and have a flat front with 2 tabs which the retaining clip locks in to (see right).

PW style enclosure (manufactured by B&R) has a dome shaped front.

Relays in Keyswitch style enclosures generally have a standard wiring arrangement but other enclosure styles have traditionally been wired to suit customer requirements.



Accessory Code	
Reference	Description
No Code	No accessories.
W1	Tropicalised coil.
W2	Keyswitch style enclosure.
W3	Keyswitch style enclosure, plug-in base and retaining clip.
W4	PW style enclosure.
W5	PW style enclosure, plug-in base and retaining clip.
W6	Modified PW style enclosure.
W7	Modified PW style enclosure, plug-in base and retaining clip.
W8	Enclosure with an octal plug.
W9	Enclosure with 11 pin octal style plug.
W0	Keyswitch style enclosure and tropicalised coil.
WA	Keyswitch style enclosure, plug-in base, retaining clip and tropicalised coil.
WB	PW style enclosure and tropicalised coil.
WC	PW style enclosure, plug-in base, retaining clip and tropicalised coil.
WD	Modified PW style enclosure and tropicalised coil.
WE	Modified PW style enclosure, plug-in base, retaining clip and tropicalised coil.
WF	Enclosure with an octal plug and tropicalised coil.
WG	Enclosure with 11 pin octal style plug and tropicalised coil.
WH	Cropped contact springs and separators for enclosed variant
WJ	Cropped contact springs and separators for enclosed variant and tropicalised coil
Wiring Code	
Reference	Description
No Code	No wiring.
Y1	Standard wiring.

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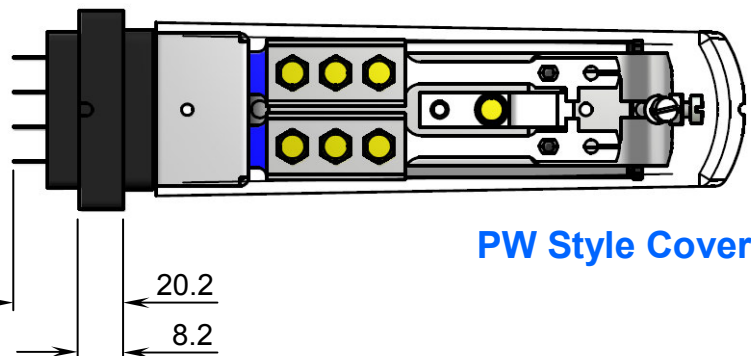
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Dimensions.

The general dimensions for enclosed relays are shown below.

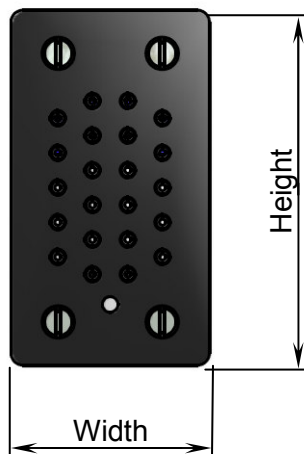
Dimension	Dimensions (mm)		
	Depth	Width	Height
Keyswitch	116.5	36.4	65.7
Standard PW	122.6	29.3	59.5
Modified PW	116.5	29.3	59.5

Height and Width Dimensions are relay base dimensions, not relay and Plugboard dimensions.

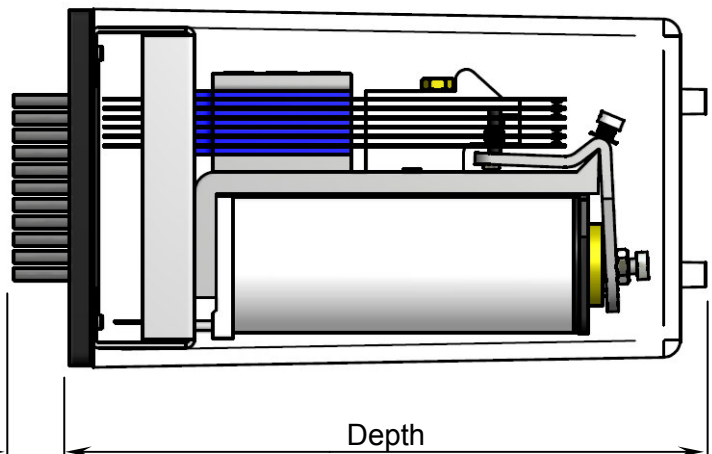


PW Style Cover

Keyswitch Style Cover



10.5



Wiring.

Standard Keyswitch wiring is shown below. All contacts are wired for a changeover contact. Where a break contact is required the make contact is left out and where a make contact is required the break contact is left out.

