



Miniature Cradle Relays

- World-wide compatibility
- mV/mA to 5A or 250V switching
- Bistable magnetic latching types
- Mounting options
- BT23 and 32 approved types
- Life tested to 100,000,000 mechanical operations
- Comprehensive technical service
- Broad custom capability

Keyswitch Varley VP Series miniature cradle relays offer contact, coil and mounting options to meet many applications. They are extremely reliable, proven through many years' manufacture and use, and are compatible with all similar products manufactured world-wide.

Our engineers can offer invaluable advice on the choice of relay best suited to your requirements.

SUMMARY OF TYPES

BASIC VP SERIES

Contacts – 2, 4, 6 and 8 pole contact arrangements are available, with a choice of contact materials to suit applications from low to heavy duty.

Coils – Nominal coil voltages range from 6 to 200V dc, with three types of coil to give the user a liberal choice of operating voltages.

AC Operation – For ac operation a range is available with built-in rectifiers. See also shaded pole (long coil) VPAC Series.

Sensitive Operation – Special adjustments can be made which provides increased sensitivity of operation, denoted by 'SEN' in the ordering code.

Mounting – Available as a plug-in relay (also suitable for direct wiring) or for printed circuit mounting with alternative pin layouts.

VPR SERIES

Bistable, polarised relays with either single or double wound coils, capable of being pulsed at a minimum of ten milliseconds.

VPL SERIES

Similar to the Basic VP Series but having longer coils offering an extended voltage range.

VPAC SERIES

This is a shaded pole version of the VPL (longer coil) series, suitable for ac operation on 50hz supplies (other frequencies to special order).

BRITISH TELECOM APPROVED RELAYS

These relays conform to British Telecom codes BT23 and BT32. For BT23 the contact material is always code 'G' whilst for BT32, code 'F' is used. Solderability of all relay terminals complies with BT specification.

SOCKET AND RETAINING CLIP

Relay sockets and retaining clips (ordered separately) are available to suit the different case sizes. Sockets are available with printed circuit pins or solder tags.

OMISSION OF EARTH SCREW/PIN

For applications where the earthing facility is not required, the earth screw or pin can be omitted, obviating the need to drill printed circuit boards or panels.

EARTH CLIP

Wiring sockets are supplied complete with an earth clip (loose piece) enabling the relay to be earthed via the fixing screw.

STANDARD CONTACT ARRANGEMENTS AND CASE SIZE – FIG. 1

| CONTACT TYPE NO. OF POLES | S | | | | TC | | | | 5A | | | | HD | | | |
|------------------------------|---|---|---|---|----|---|---|---|----|---|---|---|----|---|---|---|
| | 2 | 4 | 6 | 8 | 2 | 4 | 6 | 8 | 2 | 4 | 6 | 8 | 2 | 4 | 6 | 8 |
| BASIC M | | | 2 | 3 | | | 2 | 3 | | | 2 | 3 | | | | |
| VP B | | | 2 | 3 | | | 2 | 3 | | | 2 | 3 | | | | |
| SERIES C | 1 | 2 | 3 | | 1 | 2 | 3 | | 1 | 2 | 3 | | 2 | 3 | | |
| SEN M | | | 2 | 3 | | | | | | | | | | | | |
| OPTION B | | | 2 | 3 | | | | | | | | | | | | |
| C | 1 | 2 | 3 | | | | | | | | | | | | | |
| VPR M | | | 2 | | | | 2 | | | | 2 | | | | | |
| SERIES B | | | 2 | | | | 2 | | | | 2 | | | | | |
| C | 1 | 2 | | | 1 | 2 | | | 1 | 2 | | | 2 | | | |
| VPL M | | | 5 | | | | 5 | | | | 5 | | | | | |
| SERIES B | | | 5 | | | | 5 | | | | 5 | | | | | |
| C | 4 | 5 | | | 4 | 5 | | | 4 | 5 | | | 5 | | | |
| VPAC M | | | 5 | | | | | | | | | | | | 5 | |
| SERIES B | | | 5 | | | | | | | | | | | | 5 | |
| C | 4 | 5 | | | 4 | 5 | | | 4 | 5 | | | 5 | | | |

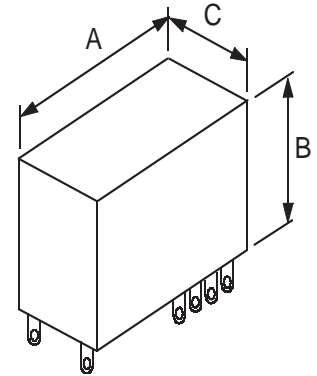
M=make, B=break, C=changeover, S=standard single contact (0.2 or 1amp), TC=twin contact (0.2 or 1amp)
5A=5amp single contact, HD=heavy duty 5amp (increased pin spacing)
Shaded area gives case size and availability (confirm with sales department)

VP SERIES

CASE SIZE, RETAINING CLIP & SOCKET CODING - FIG. 2

| Case Size | Dimensions (see drawing) | | | Printed Circuit Socket | Wiring Socket | Retaining Clip |
|-----------|--------------------------|------|------|------------------------|---------------|----------------|
| | A | B | C | Order Code | Order Code | Order Code |
| 1 | 24.4 | 30.1 | 18.5 | SVP10P01 | SVP10W01 | SVP10RC01 |
| 2 | 30.0 | 30.1 | 18.5 | SVP16P01 | SVP16W01 | SVP16RC01 |
| 3 | 36.0 | 30.1 | 18.5 | SVP22P01 | SVP22W01 | SVP22RC00 |
| 4 | 24.4 | 40.0 | 18.5 | SVP10P01 | SVP10W01 | SVP10RCL00 |
| 5 | 30.0 | 40.0 | 18.5 | SVP16P01 | SVP16W01 | SVP16RCL00 |

An earth clip is supplied with each Wiring Socket (loose part).



COIL DATA

BASIC VP SERIES - FIG 3

Short coils (case 1, 2 or 3, see Fig. 1 & 2). The tables below list the characteristics of all standard Basic VP Series relay coils. Note, against 'Minimum Volts' the sub-headings refer to the various options. i.e. S = low level or light duty single contacts. TC = twin contacts. 5A = 5 amp contacts. HD = heavy duty contacts. SEN = sensitive adjustment. The characters below these sub-headings refer to the number of poles and the contact action, i.e. M = make, B = break, C = changeover.

| COIL TYPE (Nominal voltage) Max. power at 2°C amb. = 2W | | | | | | 6 | 12 | 14 | 21 | 26 | 34 | 47 | 72 | 90 | 120 |
|---------------------------------------------------------|----------|----------|----------|----|----------|------|------|------|------|------|------|-------|-------|-------|--------|
| Resistance (ohm) ±10% (except *±15%) | | | | | | 52 | 185 | 280 | 430 | 700 | 1250 | 2500 | 5800 | *9000 | *15000 |
| Number of Turns | | | | | | 1750 | 3200 | 3800 | 4700 | 5900 | 7700 | 11000 | 16000 | 20000 | 24000 |
| MAXIMUM VOLTS (40°C ambient) | | | | | | 10 | 19 | 23 | 29 | 37 | 49 | 70 | 106 | 128 | 166 |
| MIN. VOLTS | S | TC | 5A | HD | SEN | | | | | | | | | | |
| | 2C | | | | | 2.6 | 5.0 | 6.5 | 8.0 | 11.0 | 15.0 | 21.0 | 33.0 | 42.0 | 58.0 |
| | 4C,6M,6B | | | 2C | | 4.0 | 8.0 | 10.0 | 11.0 | 16.0 | 22.0 | 31.0 | 50.0 | 62.0 | 86.0 |
| | | 2C | 2C | | | 3.4 | 6.8 | 7.7 | 10.2 | 13.2 | 19.0 | 27.0 | 41.0 | 50.0 | 70.0 |
| | | | | | 2C | 2.3 | 4.3 | 5.3 | 6.4 | 8.2 | 11.0 | 17.0 | 23.5 | 30.0 | 43.0 |
| | | 4C,6M,6B | 4C,6M,6B | 4C | | 4.8 | 9.6 | 11.4 | 14.6 | 19.0 | 27.0 | 38.4 | 58.0 | 72.0 | 100.0 |
| | | | | | 4C,6M,6B | 3.3 | 6.3 | 7.7 | 10.0 | 12.3 | 16.5 | 26.0 | 35.0 | 43.5 | 58.0 |

M TYPE COILS - FIG 4

M Type (short) coils for relays with 6C, 8M or 8B contact actions and for other actions where lower minimum operating voltage is required. Designated in the ordering code by 'M' immediately after the coil voltage.

| COIL TYPE (Nominal voltage) | | | | | | 6M | 12M | 17M | 21M | 26M | 34M | 47M | 65M | 100M | 120M |
|--------------------------------------|----------|----------|----------|----|----------|------|------|------|------|------|------|------|-------|-------|--------|
| Resistance (ohm) ±10% (except *±15%) | | | | | | 28 | 110 | 220 | 325 | 530 | 890 | 1700 | 3200 | 7600 | *11750 |
| Number of Turns | | | | | | 1350 | 2700 | 3700 | 4450 | 5800 | 7300 | 9900 | 13400 | 20700 | 24800 |
| MAXIMUM VOLTS (40°C ambient) | | | | | | 7.4 | 14.6 | 20.6 | 25 | 32 | 42 | 56 | 77 | 120 | 150 |
| MIN. VOLTS | S | TC | 5A | HD | SEN | | | | | | | | | | |
| | 2C | | | | | 1.9 | 3.9 | 5.4 | 6.5 | 8.3 | 11.0 | 15.5 | 21.5 | 33.0 | 43.0 |
| | 4C,6M,6B | | | 2C | | 2.82 | 5.8 | 8.2 | 10.1 | 12.4 | 17.0 | 23.8 | 32.0 | 51.0 | 65.0 |
| | | 2C | 2C | | | 2.36 | 4.9 | 6.9 | 8.5 | 10.6 | 14.3 | 20.4 | 29.0 | 46.0 | 59.0 |
| | | | | | 2C | 1.54 | 3.2 | 4.4 | 5.6 | 6.9 | 8.9 | 11.9 | 19.2 | 28.0 | 35.0 |
| | | 4C,6M,6B | 4C,6M,6B | 4C | 6C,8M,8B | 3.3 | 6.9 | 9.5 | 11.7 | 14.9 | 19.6 | 27.2 | 38.4 | 60.0 | 71.0 |
| | | | | | 4C,6M,6B | 2.2 | 4.6 | 6.2 | 7.8 | 9.6 | 12.5 | 18.7 | 25.0 | 39.0 | 50.0 |
| | 6C,8M,8B | | | | 4.3 | 8.6 | 12.4 | 15.3 | 19.0 | 25.0 | 36.0 | 50.0 | 76.0 | 98.0 | |
| | | 6C,8M,8B | 6C,8M,8B | | 6.0 | 11.0 | 17.0 | 20.0 | 25.0 | 33.0 | 45.0 | 60.0 | 90.0 | 115.0 | |

VPL SERIES - FIG 5

Long coils (case 4 or 5, see Fig. 1 & 2). The table below lists the characteristics of all standard VPL Series relay coils.

Note: against 'Min. Volts' the sub-headings refer to the various options. i.e. S = single light duty contacts, TC = twin contacts, 5A = 5 amp contacts, HD = heavy duty contacts, SEN = sensitive adjustment. The characters below these sub-headings refer to the number of poles and the contact action, i.e. M = make, B = break, C = changeover.

| COIL TYPE (Nominal voltage) | | 8 | 12 | 19 | 22 | 28 | 36 | 45 | 60 | 85 | 130 | 200 |
|--------------------------------------------------|----------|------|------|------|------|------|------|-------|-------|-------|-------|--------|
| Resistance (ohm) $\pm 10\%$ (except $\pm 15\%$) | | 42 | 90 | 220 | 310 | 450 | 750 | 1250 | 2200 | 4200 | *9700 | *27500 |
| Number of Turns | | 1950 | 2800 | 4400 | 5300 | 6300 | 8000 | 10100 | 13000 | 19000 | 28000 | 45000 |
| MAXIMUM VOLTS (40°C ambient) | | 10.5 | 15.5 | 24 | 29 | 35 | 45 | 58 | 77 | 106 | 161 | 265 |
| MIN. VOLTS | S | | | | | | | | | | | |
| | TC | | | | | | | | | | | |
| | 2C | 2.3 | 3.4 | 5.3 | 6.1 | 7.5 | 10.0 | 13.5 | 18.0 | 23.0 | 38.0 | 67.0 |
| | 4C,6M,6B | 3.2 | 4.6 | 7.2 | 8.4 | 10.3 | 13.5 | 18.0 | 24.5 | 32.0 | 52.0 | 92.0 |
| | | 2C | 2C | | | | | | | | | |
| | | 3.3 | 4.8 | 7.6 | 8.8 | 11.0 | 14.2 | 19.0 | 25.6 | 33.0 | 54.0 | 96.0 |
| | 4C,6M,6B | 4.6 | 6.7 | 10.6 | 12.2 | 15.0 | 19.4 | 26.0 | 36.6 | 46.0 | 76.0 | 134.0 |

VPAC SERIES (AC SHADED POLE) - FIG 6

| COIL TYPE (Nominal Voltage) | Turns | Resistance ohms $\pm 10\%$ | Voltage @ 50Hz | |
|--------------------------------|-------|-------------------------------|----------------|---------|
| | | | maximum | minimum |
| 6 | 760 | 7 | 7 | 4.8 |
| 12 | 1530 | 34 | 13.5 | 9.5 |
| 24 | 3050 | 120 | 27 | 19 |
| 42 | 5350 | 380 | 46 | 33 |
| 60 | 7650 | 750 | 66 | 48 |
| 110 | 14000 | 2500 | 121 | 88 |
| 220 | 28000 | 12500 $\pm 15\%$ | 242 | 176 |

Long coils (case 4 or 5, Fig. 1 & 2).
Coil power 2W max, 0.7W min.
Frequency 50Hz
Available contact combinations:
2C or 4C light duty contacts
2C, 4C, 6M or 6B twin contacts
2C, 4C, 6M or 6B 5amp contacts
2C heavy duty contacts (HD)

BASIC VP SERIES WITH BUILT-IN RECTIFIERS FOR AC OPERATION - FIG 7

| COIL TYPE (Nominal Voltage) | Resistance ohms $\pm 10\%$ | Voltage @ 50Hz | |
|--------------------------------|-------------------------------|----------------|---------|
| | | maximum | minimum |
| 6AC (double coil) | 26X2 | 6.6 | 4.8 |
| 12AC* | 52 | 13.5 | 9.5 |
| 24AC* | 185 | 27.0 | 19.0 |
| 42AC* | 700 | 46.0 | 33.0 |
| 60AC* | 890 | 55.0 | 45.0 |
| 110AC* | 1250 | 66.0 | 48.0 |
| 220AC* | 4700 | 121.0 | 88.0 |

Short coils (case 1, 2 or 3, see Fig. 1 & 2).

Coil power: 1.6VA max, 1.3W max.

Frequency range: 50-120Hz.

Designated in the ordering code by 'AC' immediately following the nominal voltage.

Available contact combinations:

2C & 4C light duty contacts

2C, 4C, 6M or 6B twin contacts

2C, 4C, 6M or 6B 5amp contacts

2C heavy duty contacts (HD)

*12AC to 110AC have a single coil with series/parallel diode arrangement

VPR SERIES BISTABLE POLARISED RELAYS - FIG 8

Short coils (case 1, 2 or 3, see Fig. 1 & 2).

These are bistable polarised relays having magnetic latching by means of a ceramic magnet. The relay can be pulsed at 10 milliseconds (min.) sine or square wave. The physical dimensions and base terminals are identical to those of the Basic VP Series, and they are available with single or double wound coils.

Data in the tables below apply to available contact arrangements i.e. 2 or 4 pole changeover, 6 pole make or break.

SINGLE WOUND COILS AT 20°C (TERMINALS 1 & 4)

| Coil Type (nom.volts) | 3 | 5 | 6 | 12 | 24 | 34 | 47 | 72 | 120 |
|----------------------------|-----|------|------|------|------|------|------|-------|--------|
| Resistance ohms $\pm 10\%$ | 9.6 | 23 | 49 | 200 | 560 | 1080 | 2040 | 4800 | *13300 |
| Number of Turns | 660 | 1020 | 1430 | 3000 | 5000 | 6800 | 9350 | 14000 | 24000 |
| Nominal volts | 3 | 5 | 6 | 12 | 24 | 34 | 47 | 72 | 120 |
| Minimum volts | 1.9 | 3.0 | 4.5 | 8.9 | 15.4 | 22 | 30 | 47 | 87 |
| Max.volts(cont) | 4.2 | 6.5 | 9.4 | 19 | 33 | 44 | 60 | 93 | 150 |
| Max.pulse volts. | 6.5 | 10 | 16 | 30 | 51 | 72 | 98 | 154 | 280 |

* $\pm 15\%$

Polarity (NC closed)

To change state – apply positive to terminal 1.

To return to NC closed, apply negative to terminal 1.

VP SERIES

DOUBLE WOUND COILS AT 20°C (TERMINALS 1 & 4 AND 2 & 3)

| Coil Type (nom.volts) | 2.5 | 4 | 6 | 12 | 24 | 36 | 47 | 60 | 100 |
|------------------------------------|-----|------|------|------|------|------|------|-------|-------|
| Resistance ohms $\pm 10\%$ (1 & 4) | 4.8 | 11.5 | 24.5 | 100 | 340 | 1020 | 1400 | *2400 | *6650 |
| (2&3) | 4.8 | 11.5 | 24.5 | 100 | 400 | 1020 | 1400 | *2400 | *6650 |
| Number of Turns (1 & 4) | 310 | 490 | 730 | 1450 | 2600 | 4600 | 5100 | 6700 | 10900 |
| (2&3) | 310 | 490 | 700 | 1450 | 3020 | 4220 | 5650 | 6700 | 10600 |
| Minimum volts | 2.0 | 3.2 | 4.8 | 9.4 | 19.5 | 33 | 38 | 51.5 | 92 |
| Max.volts (cont) | 3.0 | 4.6 | 6.7 | 13.4 | 26.5 | 42.5 | 50 | 65 | 108 |
| Max.pulse volts | 7.0 | 10.5 | 15.5 | 31 | 65 | 100 | 120 | 160 | 280 |

* $\pm 15\%$

Each coil may be used separately as above.
 To change state using both coils apply positive to either terminal 1 or terminal 2.
 To return to original position apply negative to either terminal 1 or terminal 2.

Contact Materials

Code A – Fine silver (gold flashed) – the most effective material for general purposes and has the highest conductivity of all metals. The bare metal is prone to tarnishing in sulphurous atmospheres, but in all but the very lightest of settings the wiping action of all the contacts rapidly breaks down the film.

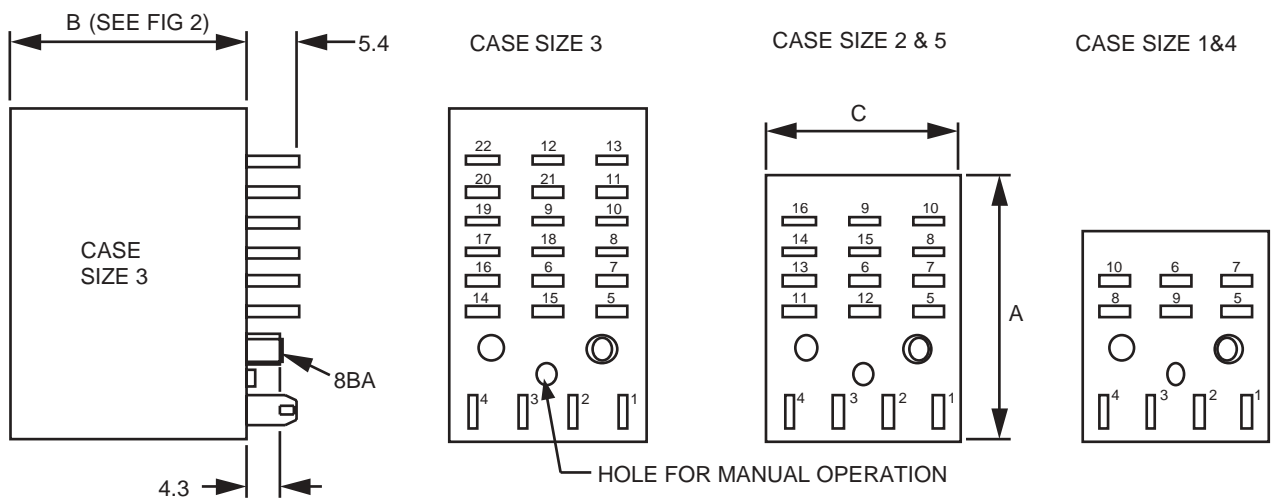
Code F – (BT type 32 Contact Material) 95% Gold, 5% Nickel – arc and weld resistant, hard wearing and the best material for low level applications.

Code G – (BT type 23 Contact Material) 60% palladium, 40% silver – the least costly of the tarnish-free alloys at normal temperatures. It is arc resistant and is one of the hardest and most durable of the silver-palladium alloys. Ideal for load applications to 1A, 50Vdc.

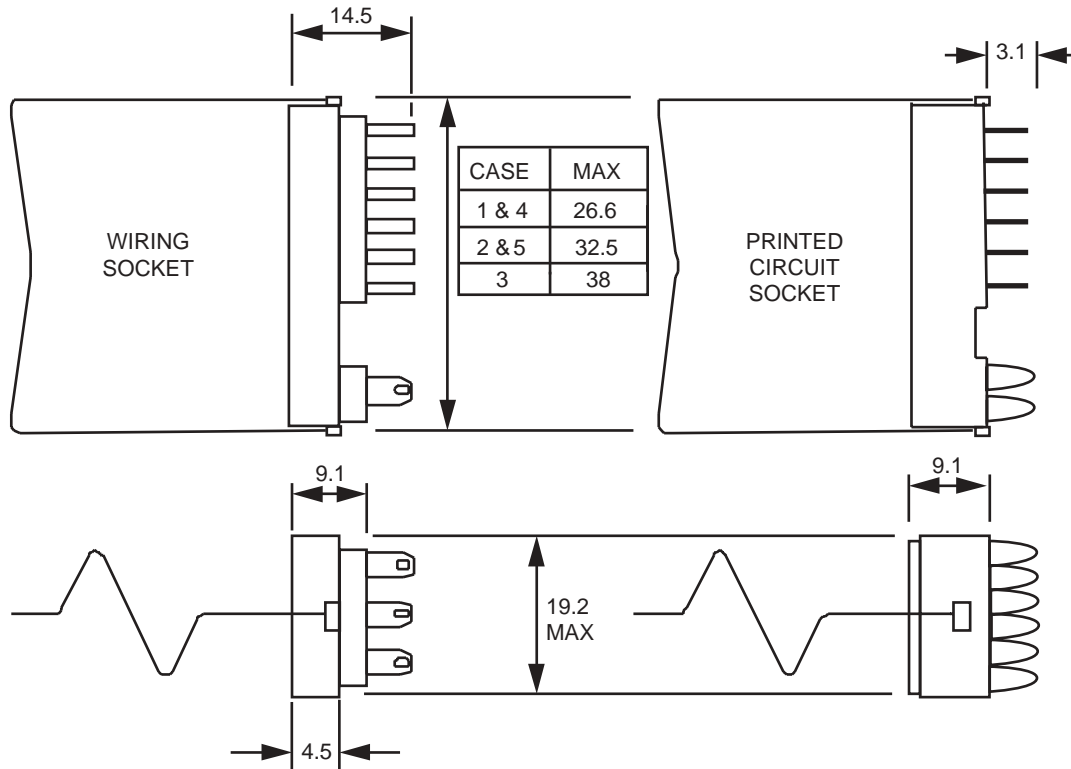
CONTACT RATINGS – FIG 9

| TYPE | Max. Amps | Max. Volts | Max. Watts | Max. VA | Materials |
|------------|-----------|------------|------------|---------|-----------|
| S & TC | 0.2 | 100 | 10 | 20 | F |
| | 1.0 | 100 | 30 | 60 | A or G |
| 5 amp & HD | 5.0 | 250 | 100 | 200 | A |

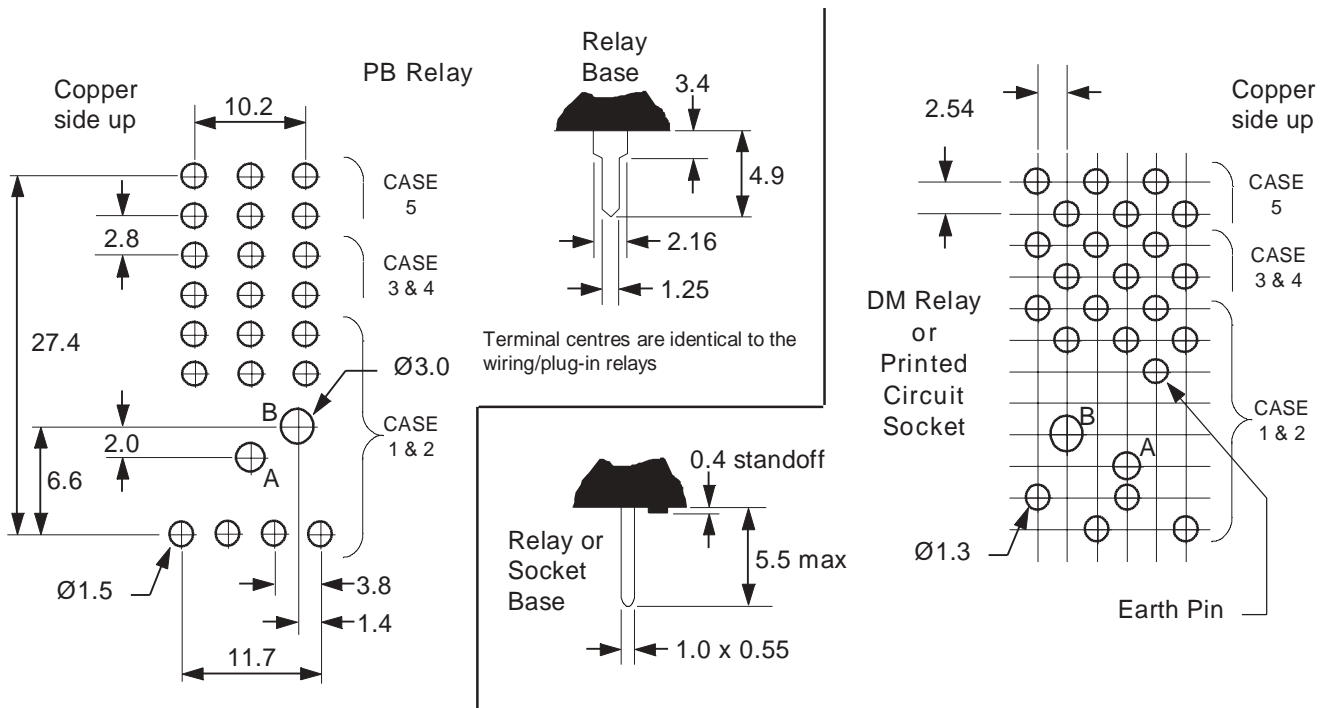
PLUG IN / WIRING TYPE RELAY – FIG 10



SOCKET OUTLINE DRAWING - FIG 11



PRINTED CIRCUIT BOARD LAYOUTS - FIG 12



Terminal numbering is identical to plug-in. Wiring relays, but with 'staggered' pin layout on DM & PC Socket as shown.

A – hole for manual relay operation if required.

B – hole required for PB relay with standard 8BA earth/mounting stud. Not required for DM Relay, PC Socket or PB Relay with LES in its code.

VP SERIES

CONTACT NUMBERING – FIG 13

(SEE FIGS 10 AND 12 FOR PIN POSITIONS FOR EACH CASE SIZE)

RELAYS WITH CHANGEOVER CONTACTS

| TYPE | 2 - POLE | | | | 4 - POLE | | | | | | | | 6 - POLE | | | | | |
|-----------|-----------|----|-------|----|-----------|----|----|----|----|----|----|----|-----------|----|----|----|----|----|
| | S,TC & 5A | | HD | | S,TC & 5A | | | | HD | | | | S,TC & 5A | | | | | |
| CASE SIZE | 1 & 4 | | 2 & 5 | | 2 & 5 | | | | 3 | | | | 3 | | | | | |
| NO | 7 | 10 | 8 | 14 | 7 | 10 | 13 | 16 | 8 | 13 | 17 | 22 | 7 | 10 | 13 | 16 | 19 | 22 |
| COM | 6 | 9 | 7 | 13 | 6 | 9 | 12 | 15 | 7 | 11 | 16 | 20 | 6 | 9 | 12 | 15 | 18 | 21 |
| NC | 5 | 8 | 5 | 11 | 5 | 8 | 11 | 14 | 5 | 10 | 14 | 19 | 5 | 8 | 11 | 14 | 17 | 20 |

RELAYS WITH MAKE OR BREAK CONTACTS

| | 6-POLE MAKE OR BREAK CONTACTS (CASE SIZE 2 or 5) | | | | | | 8-POLE MAKE OR BREAK CONTACTS (CASE SIZE 3) | | | | | | | |
|---------|--------------------------------------------------|---|----|----|----|----|---------------------------------------------|---|----|----|----|----|----|----|
| CONTACT | 5 | 7 | 9 | 11 | 13 | 15 | 5 | 7 | 9 | 11 | 14 | 16 | 18 | 20 |
| PAIRS | 6 | 8 | 10 | 12 | 14 | 16 | 6 | 8 | 10 | 12 | 15 | 17 | 19 | 21 |

ORDERING INFORMATION – FIG 14

Typical Relay Part No: VP 4/ SEN/ PB/ 5A/ C A B/ 26 T

Relay series _____
 VP VPR VPL VPAC

Number of poles in contacts _____
 2,4,6 or 8

Sensitive operation _____
 SEN = sensitive operation

Mounting style _____
 blank = plug-in/solder
 PB = printed circuit - grid as plug-in/wiring types
 DM = printed circuit -2.54mm (0.1") grid

Type of contacts _____
 blank = standard light duty
 HD = heavy duty
 5A = 5amp capacity
 TC = twin contacts

Contact function _____
 M = make
 B = break
 C = changeover

Contact material _____
 A = fine silver
 F = 95% gold, 5% nickel
 G = 60% palladium, 40% silver

Terminal material _____
 B = steel, nickel plated

Coil Identification _____
 State nominal voltage required
 (for bifilar windings insert resistance in lieu of voltage and for M type coils insert M after coil voltage).

Special requirements _____
 T = tropicalised coil, RSD = anti-residual stud, AC = built-in rectifiers, B = bifilar windings, LES = less earth screw (plug-in and pcb types),
 LEP = less earth pin (direct mounting (DM) types).

Sockets and Retaining Clips
 Order by part number, see Fig. 2.

Typical examples

VP4/PB/CAB/26/RSD/T/LES – Basic 4 pole changeover action with 2.8mm pitch PC terminals, 1 amp silver contacts, 26 volt dc coil, anti-residual stud, tropicalised, less earth screw.

VP6/DM/TC/MGB/530ohm BT type 23 PW Relay – 6 pole make action, twin palladium silver contacts, 530 ohm coil, current adjusted to operate at 23.7mA. 2.54 mm pitch PC terminals, including earth pin.

VP4/CAB/24AC – Basic 4 pole changeover action with 1 amp silver contacts, 24 volt coil with built-in rectifier for ac operation.

VP6/BFB/26W26 (Pull and Hold) Basic 6 pole break action with 0.2 amp gold nickel contacts, overlaid coils (26 volt inner 'pull', 26 volt outer 'hold').

VP2/HD/CAB/430ohmB – Basic 2 pole changeover action with heavy duty silver contacts, 430 ohm bifilar coil windings.

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