



## 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)

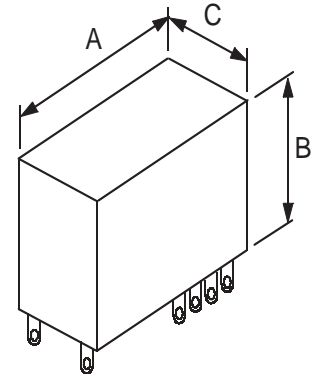
# VP SERIES



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.

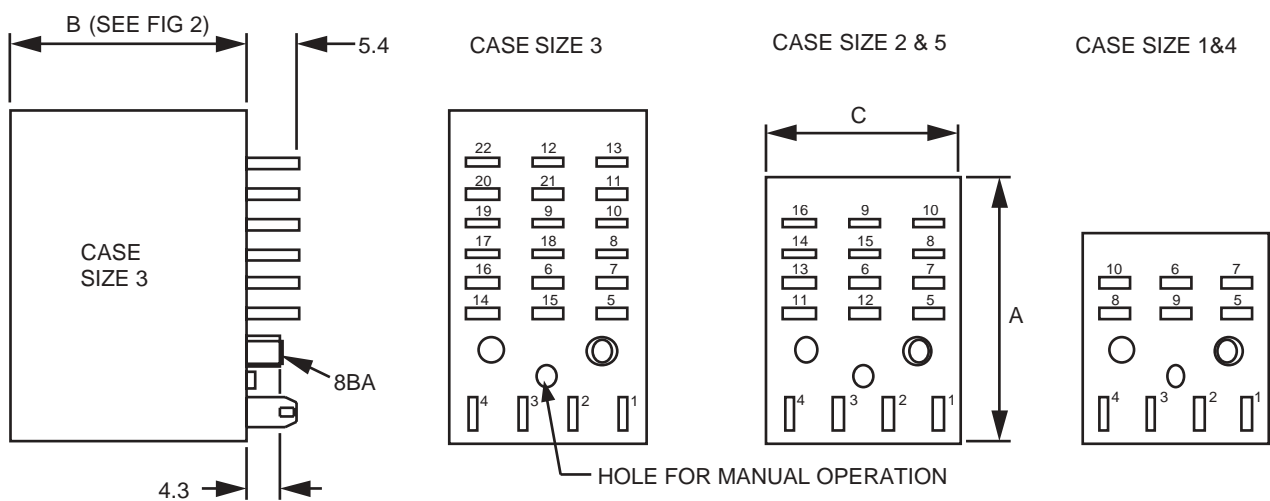
**Code F** – (BT type 32 Contact Material) 95% Gold, 5% Nickel – arc and weld resistant, hard wearing and the best material for low level applications.

**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.

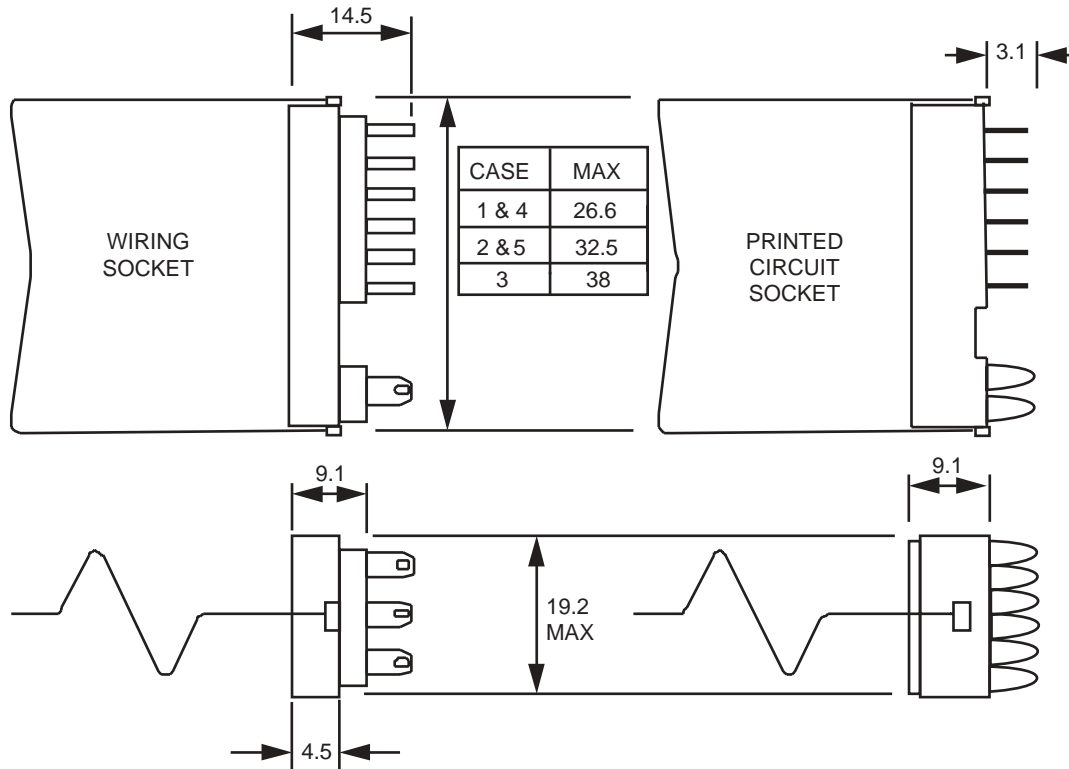
## CONTACT RATINGS – FIG 9

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

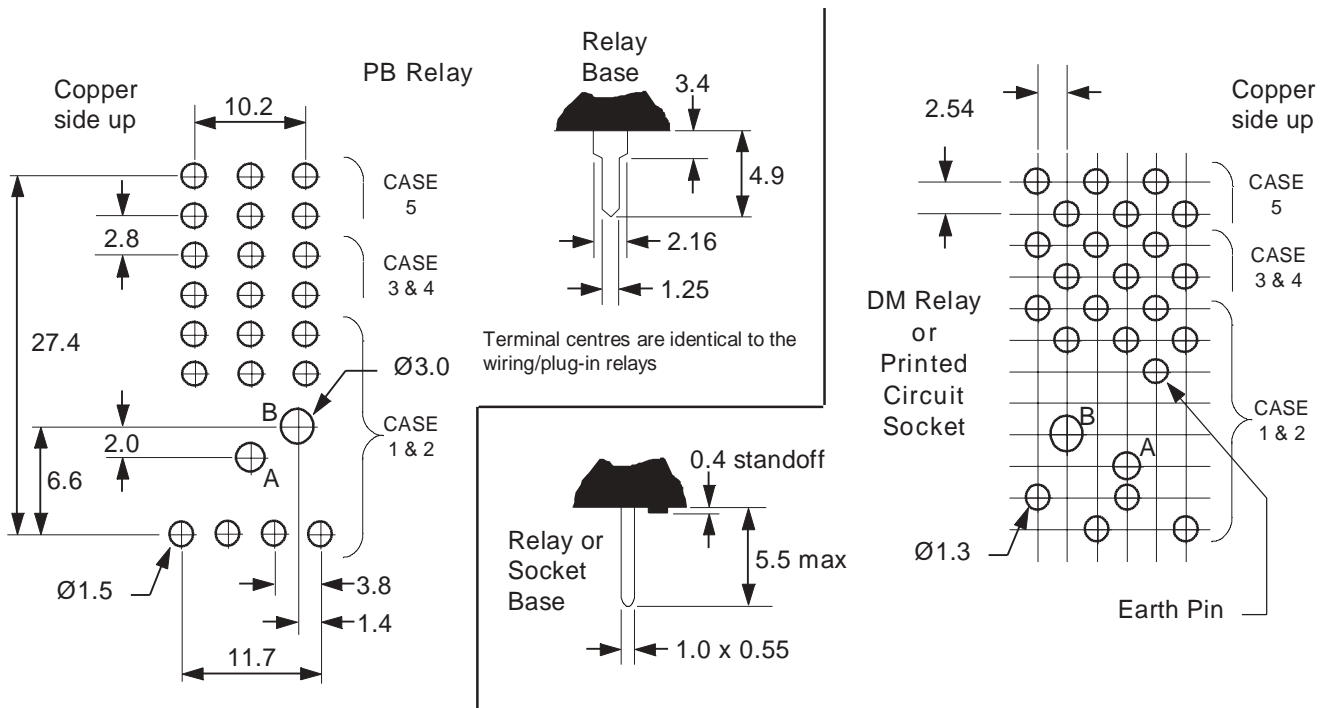
## PLUG IN / WIRING TYPE RELAY – FIG 10



## 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.