

VP Series Miniature Cradle Relays

Keyswitch Varley VP Series miniature cradle relays - the widest and most comprehensive range manufactured in the United Kingdom - offer contact, coil and mounting options to meet every known application. They are extremely reliable, attested through many years' manufacture and use, and are fully compatible with all similar products manufactured worldwide.

Every Keyswitch Varley product is backed by in-depth technical

expertise second to none, enabling our engineers to offer invaluable advice on the choice of relay best suited to your requirements - either from the thousands of standard types represented in this brochure or, alternatively, from our complete custom capability.

Standard or custom, bring your cradle relay requirements to Keyswitch Varley.

How to Use this Brochure

New users are recommended first to familiarise themselves with the standard ranges available as described in the following 'Summary of Types'. It is then a relatively simple task to select the appropriate coils, contacts, mountings and other

requirements from the data on the following pages.

For further assistance do not hesitate to contact the Keyswitch Varley Sales Desk. We shall be pleased to advise you.

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 level to heavy duty.

Coils Nominal coil voltages range from 6 to 160V dc, with two types of coil to give the user a liberal choice of minimum operating voltages. For a wider range of operating voltages see (long coil) VPL Series.

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 provide increased sensitivity of operation, denoted by 'SEN' in the ordering code.

High Insulation For 250V ac or dc switching of both live and neutral lines a specially designed range is available with extended creepage paths, denoted by 'HI' in the ordering code.

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, i.e. up to 200V dc nominal.

VPAC SERIES

This is a shaded pole version of the VPL (longer coil) Series suitable for ac operation on 50Hz supplies. (60Hz to special order).

BRITISH TELECOM APPROVED RELAYS

These relays conform to British Telecom codes BT23 and BT32

Standard Contact Arrangements

CONTACT TYPE	RELAY TYPE	—	TC	5A	HD	HC	LL
		2 4 6 8	2 4 6 8	2 4 6 8	2 4 6 8	2 4 6 8	single contacts 2 4 6 8
Basic VP Series	M	**	**	**		*	**
	B	**	**	**		*	**
	C	***	***	***	**	**	***
	K	***	*				*
SEN option	M	**					
	B	**					
	C	***					
	K						
HI option	M			*			
	B			*			
	C						
	K						
VPR Series	M	*	*	*			*
	B	*	*	*			*
	C	**	**	**	*		**
	K						
VPL Series	M	**	**	**		*	**
	B	**	**	**		*	**
	C	***	***	***	**	**	***
	K	***	*				***
VPAC Series	M	*	*	*			*
	B	*	*	*			*
	C	**	**	**	*		**
	K						

M = make, B = break, C = changeover, K = make before break.

TC column applies equally to 0.2 amp, 1.0 amp and low level twin contacts.

Contact Codes:

— = Light duty (0.2 amp or 1.0 amp)
TC = Twin contact
5A = 5 amp

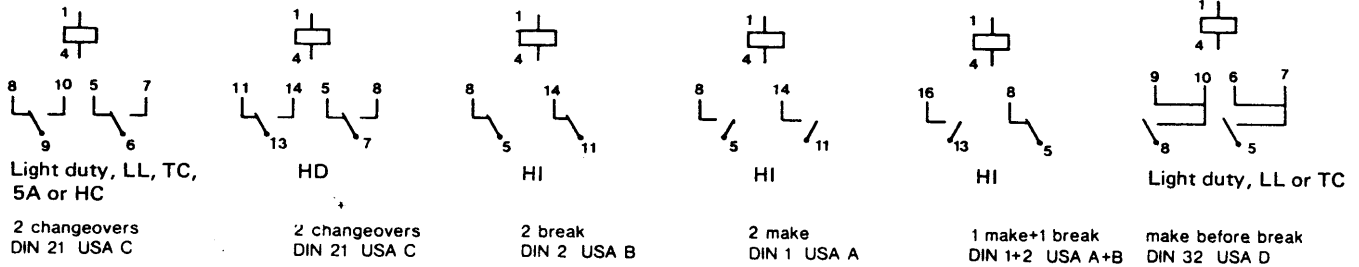
HD = Heavy duty 5 amp
HC = Heavy current 10 amp
LL = Low level

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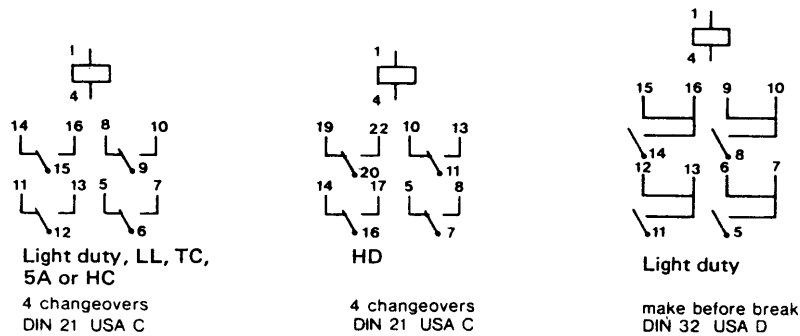
Schematic Diagrams

The arrangements shown are applicable to all Basic VP, and VPL Series relays. They are also applicable to the VPR and VPAC Series where relevant – see Standard Contact Arrangements on page opposite.

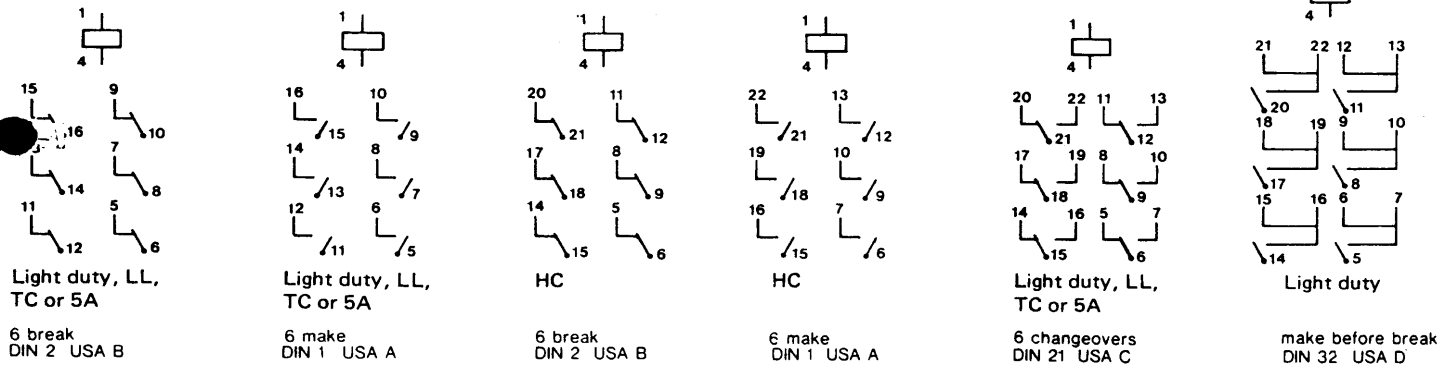
2 Pole



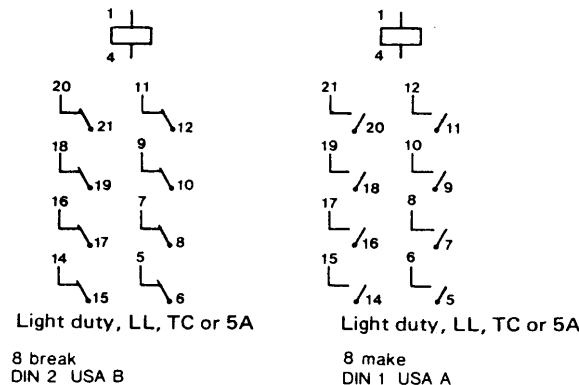
4 Pole



6 Pole



8 Pole



Coil Data

Basic VP Series

Short coils - see dimensions, pages 8-10.
The tables below list the characteristics of all standard Basic VP Series relay coils. Note, against 'Minimum Volts' and 'Minimum Amps' the sub-headings refer to the various options, i.e.

'—' = low level or light duty contacts
TC = twin contacts
5A = 5 amp contacts
HD = heavy duty contacts

COIL TYPE (Nominal Voltage)								6	7	10	12
Resistance $\Omega \pm 10\%$ (except $\pm 15\%$)								52	90	130	185
Number of turns								1750	2200	2600	3200
MAXIMUM VOLTS (40° ambient)								10	13	16	19
MINIMUM VOLTS	—	TC	5A	HD	HC	SEN	HI				
	2C							2.6	3.6	4.4	5.0
	4C, 6M, 6B			2C				4.0	5.5	6.5	8.0
		2C	2C			2C		3.4	4.5	5.6	6.8
						2C		2.3	3.0	3.6	4.3
		4C, 6M, 6B	4C, 6M, 6B	4C	4C, 6M, 6B		2M, 2B	4.8	6.5	8.0	9.6
	2K							3.6	5.0	6.0	7.0
	4K	2K						5.5	7.0	9.0	10.0
					4C, 6M, 6B		3.3	4.4	5.3	6.3	
MAXIMUM AMPS								0.200	0.154	0.125	0.105
MINIMUM AMPS	—	TC	5A	HD	HC	SEN	HI				
	2C							.050	.040	.034	.027
	4C, 6M, 6B			2C				.076	.061	.050	.043
		2C	2C			2C		.065	.050	.044	.037
						2C		.040	.030	.025	.021
		4C, 6M, 6B	4C, 6M, 6B	4C	4C, 6M, 6B		2M, 2B	.092	.072	.062	.052
	2K							.063	.050	.042	.035
	4K	2K						.092	.073	.061	.050
					4C, 6M, 6B		.058	.044	.037	.031	
INDUCTANCE at 50 Hz (Henries)											
armature open								0.25	0.45	0.6	0.8
armature closed (not energised)								0.35	1.0	1.6	2.0
armature closed (energised at nominal V)								0.07	0.12	0.16	0.2

NOTE: maximum watts at 20° C ambient = 2W

M Type Coils for relays with 6C, 8M or 8B contact actions; and for relays with 2C or 4C contact actions where, for a given nominal voltage, a lower minimum operating voltage

M TYPE COILS

COIL TYPE (Nominal Voltage)								6M	9M	12M	14M
Resistance $\Omega \pm 10\%$ (except $\pm 15\%$)								28	58	110	150
Number of turns								1350	1900	2700	3100
MAXIMUM VOLTS (40° C ambient)								7.4	10.6	14.6	17.2
MINIMUM VOLTS	—	TC	5A	HD	HC	SEN	HI				
	2C							1.9	2.8	3.9	4.4
	4C, 6M, 6B			2C				2.82	4.2	5.8	6.6
		2C	2C			2C		2.36	3.5	4.9	5.6
						2C		1.54	2.3	3.2	3.6
		4C, 6M, 6B	4C, 6M, 6B	4C	4C, 6M, 6B	6C, 8M, 8B	2M, 2B	3.3	4.9	6.9	7.8
	2K							2.6	3.7	5.1	5.9
	4K	2K						3.8	5.6	7.8	8.8
						4C, 6M, 6B		2.2	3.2	4.6	5.1
	6C, 8M, 8B							4.3	6.4	8.6	10.0
6K	6C, 8M, 8B	6C, 8M, 8B					6.0	8.0	11.0	13.0	
MAXIMUM AMPS								0.270	0.189	0.137	0.116
MINIMUM AMPS	—	TC	5A	HD	HC	SEN	HI				
	2C							.065	.046	.033	.028
	4C, 6M, 6B			2C				.099	.071	.048	.044
		2C	2C			2C		.084	.058	.042	.038
						2C		.052	.035	.024	.022
		4C, 6M, 6B	4C, 6M, 6B	4C	4C, 6M, 6B	6C, 8M, 8B	2M, 2B	.119	.083	.060	.054
	2K							.082	.058	.040	.036
	4K	2K						.119	.085	.059	.052
						4C, 6M, 6B		.075	.051	.036	.032
	6C, 8M, 8B							.120	.085	.060	.052
6K	6C, 8M, 8B	6C, 8M, 8B					.164	.106	.076	.066	
INDUCTANCE at 50 Hz (Henries)											
armature open								.150	.290	.650	.750
armature closed (not energised)								.210	.410	1.70	1.90
armature closed (energised at nominal V)								.042	.082	.170	.190

NOTE: maximum watts at 20° C ambient = 2W

HC - Heavy current contacts
 Sensitive adjustment
 High insulation

The characters below these sub-headings refer to the number of poles and the contact action, i.e. M = make, B = break, C = changeover, K = make before break.

13	14	21	26	34	47	72	90	120
230	280	430	700	1250	2500	5800	*9000	*15000
3300	3800	4700	5900	7700	11000	16000	20000	24000
21	23	29	37	49	70	106	128	166
6.0	6.5	8.0	11.0	15.0	21.0	33.0	42.0	58.0
9.0	10.0	11.0	16.0	22.0	31.0	50.0	62.0	86.0
7.5	7.7	10.2	13.2	19.0	27.0	41.0	50.0	70.0
4.8	5.3	6.4	8.2	11.0	17.0	23.5	30.0	43.0
11.0	11.4	14.6	19.0	27.0	38.4	58.0	72.0	100.0
8.5	9.0	11.0	14.5	20.0	28.0	44.0	55.0	76.0
12.0	13.0	16.0	21.0	29.0	42.0	63.0	79.0	110.0
7.0	7.7	10.0	12.3	16.5	26.0	35.0	43.5	58.0
0.095	0.087	0.069	0.054	0.041	0.028	0.019	0.015	0.012
.026	.023	.019	.016	.012	.0084	.0057	.0046	.0039
.039	.036	.025	.023	.018	.012	.0087	.0069	.0057
.033	.028	.024	.019	.015	.011	.007	.0056	.0047
.019	.017	.0135	.0106	.008	.0057	.0039	.003	.0026
.048	.041	.034	.027	.022	.016	.010	.008	.0067
.033	.029	.023	.019	.015	.010	.007	.006	.005
.048	.042	.034	.027	.021	.015	.010	.008	.007
.028	.025	.021	.016	.012	.0084	.0057	.0044	.0035
1.0	1.5	2.0	3.0	5.0	9.0	21.0	30.0	41.0
3.0	3.5	4.0	6.0	9.0	15.0	35.0	45.0	67.0
0.25	0.35	0.5	0.7	1.2	2.5	6.0	9.5	13.0

is required.
 Designated in the ordering code by 'M' immediately after the coil voltage.

17M	21M	26M	34M	47M	65M	100M	120M	160M
220	325	530	890	1700	3200	7600	*11750	*20900
3700	4450	5800	7300	9900	13400	20700	24800	32700
20.6	25	32	42	56	77	120	150	196
5.4	6.5	8.3	11.0	15.5	21.5	33.0	43.0	59.0
8.2	10.1	12.4	17.0	23.8	32.0	51.0	65.0	88.0
6.9	8.5	10.6	14.3	20.4	29.0	46.0	59.0	74.0
4.4	5.6	6.9	8.9	11.9	19.2	28.0	35.0	49.0
9.5	11.7	14.9	19.6	27.2	38.4	60.0	71.0	103.0
7.1	8.8	11.2	14.3	20.4	28.5	45.0	57.0	78.0
10.8	13.0	16.5	22.3	30.6	42.0	67.0	86.0	115.0
6.2	7.8	9.6	12.5	18.7	25.0	39.0	50.0	67.0
12.4	15.3	19.0	25.0	36.0	50.0	76.0	98.0	134.0
17.0	20.0	25.0	33.0	45.0	60.0	90.0	115.0	160.0
0.097	0.080	0.062	0.047	0.036	0.026	0.017	0.013	0.010
.0232	.0196	.0154	.0128	.0094	.007	.0044	.0037	.0029
.035	.031	.0203	.0186	.014	.0098	.0067	.0055	.0042
.0293	.024	.0195	.0154	.0115	.0082	.0054	.0045	.0035
.017	.0145	.011	.0086	.0062	.0047	.0038	.0024	.0019
.043	.035	.0275	.022	.017	.013	.0077	.0065	.0049
.0295	.025	.0186	.0154	.0117	.0084	.0054	.0049	.003
.043	.036	.0275	.022	.0164	.0124	.0077	.0065	.0043
.0245	.0213	.017	.013	.0094	.0069	.0046	.0036	.0026
.043	.036	.028	.022	.016	.012	.008	.007	.005
.059	.047	.036	.029	.020	.015	.010	.008	.006
1.50	1.80	2.90	4.50	7.30	15.0	32.0	43.0	77.0
3.30	3.60	5.80	8.10	12.0	25.0	48.0	70.0	125.0
.330	.450	.670	1.10	2.0	4.2	10.0	13.0	25.0

Coil Data

Long coils - see dimensions, pages 8-10

The table below lists the characteristics of all standard VPL Series relay coils. Note, against 'Minimum Volts' and 'Minimum Amps' the sub-headings refer to the various options, i.e.

'-' = low level or light duty contacts
TC = twin contacts

VPL Series

COIL TYPE (Nominal Voltage)							8	12	15	16
Resistance $\Omega \pm 10\%$ (except * $\pm 15\%$)							42	90	120	155
Number of turns							1950	2800	3200	3750
MAXIMUM VOLTS (40°C ambient)							10.5	15.5	18	20
MINIMUM VOLTS	—	TC	5A	HD	HC	SEN				
	2C						2.3	3.4	4.0	4.4
	4C, 6M, 6B			2C			3.2	4.6	5.4	6.0
		2C	2C		2C	6C, 8M, 8B	3.3	4.8	5.6	6.2
		4C, 6M, 6B	4C	4C	4C, 6M, 6B		4.6	6.7	8.0	8.7
	2K						3.4	5.0	6.0	6.5
	4K	2K					4.6	6.7	7.8	8.7
	6C, 8M, 8B						4.1	6.1	7.2	8.0
	6K	6C, 8M, 8B	6C, 8M, 8B				5.8	8.6	10.0	11.0
	MAXIMUM AMPS							0.280	0.192	0.166
MINIMUM AMPS	—	TC	5A	HD	HC	SEN				
	2C						.046	.032	.028	.024
	4C, 6M, 6B			2C			.067	.046	.040	.035
		2C	2C		2C	6C, 8M, 8B	.070	.048	.042	.036
		4C, 6M, 6B	4C	4C	4C, 6M, 6B		.097	.068	.060	.050
	2K						.072	.050	.044	.0375
	4K	2K					.093	.065	.056	.048
	6C, 8M, 8B						.087	.060	.053	.045
	6K	6C, 8M, 8B	6C, 8M, 8B				.126	.087	.077	.065
	INDUCTANCE <u>armature open</u>							2.0	3.0	3.5
at 50 Hz <u>armature closed (not energised)</u>							3.5	5.0	5.5	7.0
(Henries) <u>armature closed (energised at nominal V)</u>							0.5	0.71	0.9	1.0

VPAC Series (ac shaded pole)

Long coils - see dimensions, pages 8-10
Coil power: 2W max, 0.7W min.
Frequency 50Hz

Available contact combinations:

2C or 4C light duty or low level contacts
2C, 4C, 6M or 6B twin contacts
2C, 4C, 6M or 6B 5amp contacts
2C heavy duty contacts (HD)

COIL TYPE (Nominal Voltage)	Turns	Resistance $\Omega \pm 10\%$	Voltage 50Hz		nominal V	Amperes @	
			maximum	minimum		maximum V	minimum V
6	760	7	7	4.8	0.230	0.315	0.140
12	1530	34	13.5	9.5	0.125	0.160	0.075
24	3050	120	27	19	0.065	0.086	0.043
42	5350	380	46	33	0.037	0.046	0.026
60	7650	750	66	48	0.026	0.032	0.017
110	14000	2500	121	88	0.014	0.017	0.010
220	28000	*12500	242	176	0.0075	0.009	0.005

±15%

Basic VP Series with built-in rectifiers for ac operation

Short coils-see dimensions, pages 8-10

Coil power: 1.6VA max, 1.3W max. Frequency range: 50-120Hz Designated in the ordering code by 'AC' under 'Special Requirements' page 11

COIL TYPE (Nominal Voltage)	Resistance $\Omega \pm 10\%$	Voltage		Current @ max V
		maximum	minimum	
6 AC (double coil)	26x2	6.6	4.8	0.245A
12 AC *	52	13.5	9.5	0.120A
24 AC *	185	27.0	19.0	0.060A
42 AC *	700	46.0	33.0	0.035A
50 AC *	890	55.0	45.0	0.029A
60 AC *	1250	66.0	48.0	0.025A
110 AC *	4700	121.0	88.0	0.0135A

Available contact combinations:

2C, 2K, & 4C light duty or low level contacts
2C, 2K, 4C, 6M or 6B twin contacts
2C, 4C, 6M or 6B 5 amp contacts
2C heavy duty contacts (HD)

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

5A = 5 amp contacts
 HD = Heavy duty contacts
 C = Heavy current 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, K = make before break

19	22	28	36	45	60	85	130	200
220 4400	310 5300	450 6300	750 8000	1250 10100	2200 13000	4200 19000	*9700 28000	*27500 45000
24	29	35	45	58	77	106	161	265
5.3	6.1	7.5	10.0	13.5	18.0	23.0	38.0	67.0
7.2	8.4	10.3	13.5	18.0	24.5	32.0	52.0	92.0
7.6	8.8	11.0	14.2	19.0	25.6	33.0	54.0	96.0
10.6	12.2	15.0	19.4	26.0	36.6	46.0	76.0	134.0
8.0	9.2	11.2	14.6	20.0	27.0	35.0	57.0	100.0
10.6	12.2	15.0	19.4	26.0	36.6	46.0	76.0	134.0
9.5	11.1	13.6	18.0	23.7	33.0	42.0	68.0	120.0
13.5	15.6	19.2	25.0	33.5	45.5	59.0	97.0	170.0
0.107	0.104	0.086	0.067	0.052	0.039	0.028	0.018	0.011
.021	.017	.0145	.0112	.009	.007	.0047	.0032	.002
.030	.0245	.021	.0162	.013	.010	.007	.0046	.0029
.029	.0255	.0215	.017	.0135	.0104	.0071	.0049	.003
.043	.036	.030	.024	.019	.0145	.010	.007	.0042
.032	.0265	.022	.0175	.014	.010	.0075	.005	.0031
.041	.034	.0285	.0225	.018	.014	.0095	.0065	.004
.039	.032	.027	.0215	.017	.013	.009	.006	.0038
.056	.046	.039	.031	.0245	.019	.013	.0087	.0055
5.5	6.0	7.0	11.0	17.0	31.0	70.0	100.0	190.0
8.0	10.0	12.0	20.0	34.0	63.0	100.0	150.0	400.0
1.4	1.5	1.75	2.7	4.2	7.7	17.0	25.0	47.0

VPR Series bistable polarised relays

Short coils-see dimensions, pages 8-10

These are bistable polarised relays having magnetic latching by means of a ceramic magnet. They 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.

The data in the tables below are correct for all available contact arrangements i.e. 2 or 4 pole changeover, 6 pole make or break.

Single Wound Coils at 20°C (terminals 1 & 4)

Polarity (NC closed)

To change state - apply positive to terminal 1.

To return to NC closed apply negative to terminal 1.

Coil type	3	5	6	12	24	34	47	72	120
Resistance ± 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

*±15%

Double Wound Coils at 20°C (terminals 1 & 4 and 2 & 3)

Each coil may be used separately as above.

To change state using both coils:

a) apply positive to either terminal 1 or terminal 2.

b) to return to original position apply negative to either terminal 1 or terminal 2.

Coil type	2.5	4	6	12	24	36	47	60	100
Resistance ±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

*±15%

Coil Data

Typical ampere turns

This table shows the approximate number of turns necessary to secure the various minimum conditions of excitation. It represents results obtained from numerous tests and is intended only as a guide in calculating requirements.

Relay type	to operate	to hold	to release
VP2(C)	73	40	15
VP2HI(M&B) VP4HD(C)	140	100	30
VP4HC(C) VP6HC (M&B)	110	70	30
VP2HD(C) VP4(C) VP6(M)	148	100	45
VP6(C)	148	70	15
VP6(B)	148	85	30
VP8(M)	176	85	20
VP8(B)	94	70	20
VP2TC(C) VP25A(C)	138	105	30
VP4TC(C) VP45A(C)	220	110	50
VP6TC(C) VP65A(C)	148	85	25
VP6TC(M) VP65A(M)	182	70	25
VP6TC(B) VP65A(B)	187	100	35
VP8TC(M) VP85A(M)	220	85	30
VP8TC(B) VP85A(B)	94	65	20
VP2(K) VP2HC(C)	138	75	35
VP4(K)	220	110	50
VP6(K)	145	70	30
VP2TC(K)	65	35	10
VP4SEN(C) VP6SEN(M&B)	90	50	20
VP6SEN(C) VP8SEN(M&B)	134	60	35

NOTE: to calculate typical ampere turns for long coil types, add 10% to the figures for the appropriate VP type, i.e. VPL2 (C) = 80.3 to operate etc.

OPERATING TEMPERATURE RANGE

-40°C to +100°C including any temperature rise due to the coil dissipation.

TROPICAL FINISH

All coils are available with a tropicalised finish. Add 'T' to ordering code under 'Special Requirements'.

Double Wound Coils

Overlaid and two section
 inner winding terminals 2&3
 outer winding terminals 1&4

NOTE: when ordering state both coil voltages, first figure for terminals 2 and 3, second figure for terminals 1 & 4. Separate the figures by a hyphen for two section coils (i. e. 6-12) and by the letter 'W' for overlaid coils (i. e. 6W12).

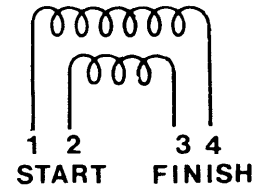
Always state the application eg: relay must operate when both coils are energised, relay must NOT operate when either coil alone is energised, relay must operate on one coil and 'hold' on the other (generally overlaid coils).

Bifilar windings

Bobbins are wound simultaneously with two strands of a specially selected synthetic enamelled wire, thus the two windings are identical in turns and the resistance is within standard wire tolerances.

Terminal numbering — overlaid, two-section and bifilar coils

RELAY COIL (S)



POWER INPUT

Basic coil (VP): total of 2 watts per relay (each winding continuously rated 1 watt at 40°C); long coil (VPL): total of 3 watts per relay (each winding continuously rated 1.5 watts at 40°C).

PEAK VOLTAGE

The potential difference between the windings should not exceed 250 volts peak.

COIL SPECIFICATION

The following tables show number of turns and resistance of available windings.

BASIC COILS (VP)

(both windings identical)

Resistance Ω	Turns	Resistance Ω	Turns
52 ± 10%	1250	42 ± 10%	1250
90 ± 10%	1550	90 ± 10%	1850
130 ± 10%	1850	120 ± 10%	2125
185 ± 10%	2200	155 ± 10%	2500
230 ± 10%	2600	220 ± 10%	2900
280 ± 10%	2800	310 ± 10%	3375
430 ± 10%	3600	450 ± 10%	4100
700 ± 10%	4400	750 ± 10%	5200
1250 ± 10%	5700	1250 ± 10%	6650
2500 ± 10%	7650	2200 ± 10%	9000
5800 ± 15%	12000	4200 ± 10%	11750
9000 ± 15%	13500	9700 ± 15%	17100

LONG COILS (VPL)

(both windings identical)

Resistance Ω	Turns	Resistance Ω	Turns
52 ± 10%	1250	42 ± 10%	1250
90 ± 10%	1550	90 ± 10%	1850
130 ± 10%	1850	120 ± 10%	2125
185 ± 10%	2200	155 ± 10%	2500
230 ± 10%	2600	220 ± 10%	2900
280 ± 10%	2800	310 ± 10%	3375
430 ± 10%	3600	450 ± 10%	4100
700 ± 10%	4400	750 ± 10%	5200
1250 ± 10%	5700	1250 ± 10%	6650
2500 ± 10%	7650	2200 ± 10%	9000
5800 ± 15%	12000	4200 ± 10%	11750
9000 ± 15%	13500	9700 ± 15%	17100

NOTE: when ordering bifilar windings, omit the voltage from the part numbering code and include the resistance plus the letter 'B' eg VP2 CAB/52 Ω B.

Contact Data

Ratings

TYPE	AMP	VOLT	WATT	VA†	MATERIALS
Light duty	0.2	100	10	20	B, F
Light duty	1.0	100	30	60	A, C, E, G, P
5 Amp	5.0	250	100	200	A, I
Heavy duty	5.0	250	100	200	A, I
Heavy current	10.0	250	200	400	A, I
Low level	-	-	-	-	A*, B**

Switching level order of: * mV, μ A; ** μ V, pA. †Resistive load

LIFE

Electrical (resistive load)	
Low level and light duty	10^7 operations
5 amp and heavy duty	10^6 operations
Heavy current	5×10^4 operations
Mechanical	10^8 operations

TWIN CONTACTS

For increased reliability, twin contacts are optionally available on all low level types and on the majority of light duty types.

LOW LEVEL SWITCHING (Code LL)

For switching low level signals, special gold plated silver contacts with gold flashed tags are used. Twin contacts are recommended for increased reliability and should be specified when ordering. Where signals are of extremely low level value, specially treated gold alloy twin contacts with gold flashed contact springs and tags should be specified. The use of low thermal solder is recommended.

OPERATE TIMES

These figures are typical for relays operating at nominal voltages and are intended for general guidance only.

Total Times (ms)	VP2C VP2SEN C	VP2HD C VP4C VP4SEN C VP6M&B VP6SEN M&B	VP2 5A C VP2TC C	VP4 TC C VP6C	VP6TC M	VP4 5A C	VPL4	VP6TC C VP8TCM&B	All VPAC types	All Polarised types
Operate	3.5 - 6	4.5 - 7.5	4 - 7	7 - 10	6 - 9	9 - 13	5 - 8	10 - 13	3 - 12*	4 - 6
Release	4 - 5	1 - 3.5	3 - 4	2 - 3	1 - 2	2 - 3	3 - 5	1 - 3	3 - 20*	2 - 3

VPAC operate times are influenced by the instant of switching and thus are not closely banded.

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 the contacts rapidly breaks down the film. The gold flash inhibits the formation of sulphide during storage.

CODE B

Gold alloy 625R - one of the most reliable gold alloys for all-round use and where complete freedom from tarnishing at room temperature is required at a modest cost. It is a hard material, long wearing and arc resistant.

CODE C

Palladium (not alloyed) - has many of the properties of platinum but is less costly. It is softer than platinum and is liable to slight polymer formation.

CODE E

30% palladium, 70% silver - gives an improved resistance to tarnish and wear when compared with unalloyed silver, but it is more expensive.

HEAVY DUTY CONTACTS

When heavy duty (HD) contacts are specified, double spacers are inserted between the springs so that the spring set is larger than that of the normal duty 5 amp (5A) contacts. Consequently the case sizes and terminal numbering are different from the 5A types.

SUPPRESSION

When switching inductive loads, consideration should be given to suppression, which can increase the life of the contacts considerably. For guidance purposes a chart showing typical R + C contact protection is printed on the inside back cover of this publication. Alternatively, diodes or non-linear resistors etc. can be used.

PROTECTIVE FINISH

1 amp silver contacts are gold flashed for storage protection. All relay tags are nickel/tin plated with the exception of low level (LL) types which are gold flashed.

ANTI-RESIDUAL STUD (Code RSD)

For controlled release on dc operated relays an anti-residual stud is available as an optional extra. When the stud is incorporated, due allowance must be made when referring to the operating characteristics.

INSULATION TEST

1000V rms 50Hz - contact to contact, contacts to frame and coil to frame. For sensitive types, contact to contact is limited to 500V rms 50Hz; for dual windings, coil to coil is 500V rms 50Hz and for bifilar types, coil to coil is 350V dc.

A plastic end-plate rivet is now used in place of a metal tubular rivet on the majority of VP relay types, offering even greater reliability.

CODE F

5% nickel, 95% gold - arc and weld resistant, hard wearing and a good substitute for platinum where there is a risk of polymer formation.

CODE G

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.

CODE I

Silver cadmium oxide - a hard sintered alloy ideally suited for heavy duty applications with inductive loads. It is less prone to material transfer than silver on dc circuits, but it is not suitable for low voltage low current applications.

CODE P

Platinum (not alloyed) - remains free from tarnish films, requires only very light pressure, is ideally arc resistant and will operate in chemically contaminated atmospheres.

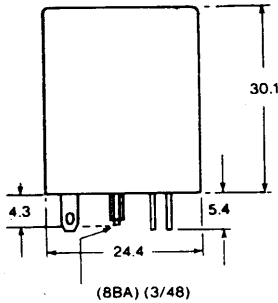
Dimensions

Dimensions are in mm

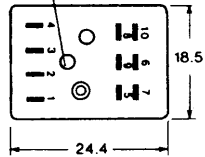
PLUG-IN/WIRING TYPES

Case Size 1

Short coil types:
VP2(C)
VP2(K)
VP2-HC(C)

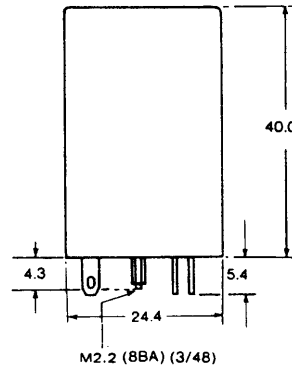


hole for manual operation



Case Size 2

Long coil types:
VPL2(C)
VPL2(K)
VPAC2(C)
VPL2HC(C)



Omission of earth screw/pin

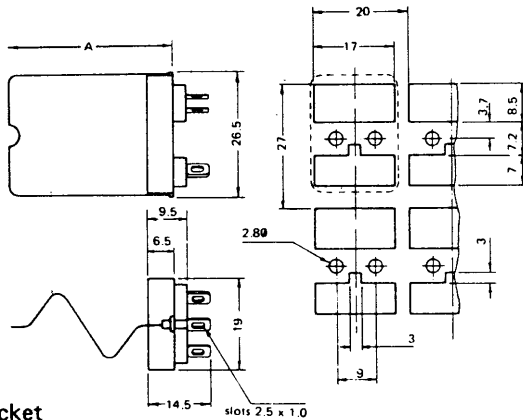
For applications where the earthing facility is not required, the earth screw or pin can be omitted, obviating the need to drill circuit boards or panels. See ordering information (page 11)

Retaining clip

Relay sockets are supplied complete with retaining clips, the length of the clips being appropriate to the case size of the relays being ordered. When sockets are ordered separately the shorter clips are supplied as standard unless otherwise requested.

Wiring socket

Part No: 1351 - 01
Terminal numbering as on relay base

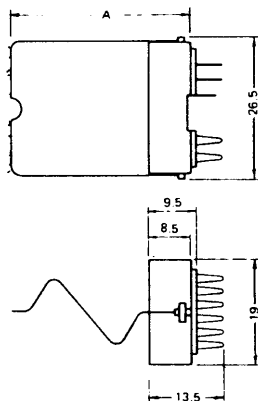


Earth clip

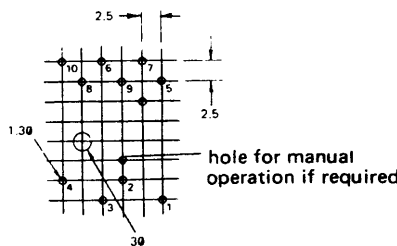
An earth clip, Part No. 398, enabling the relay to be earthed via the wiring socket fixing screw, should be ordered separately when required.

Printed Circuit Socket

Part No: 1352 - 01
Supplied with earth contact



pcb socket grid
copper side up



Solderability

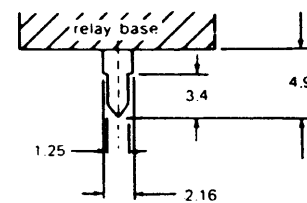
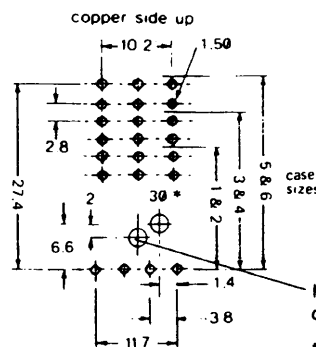
Solderability of all relay terminals complies with BT specification. Finish: low level types, gold flashed; all other types, nickel / tin dipped.

Case size	Dim A
1	35
2	47

PRINTED CIRCUIT TYPES

In addition to the plug-in/wiring versions, all VP Series relays are available with pcb terminations.

PB Series Terminal centres and numbering identical to the wiring/ plug-in types.



hole for manual operation if required

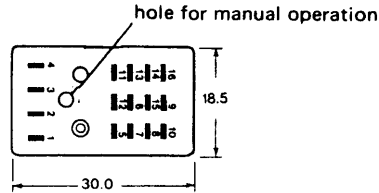
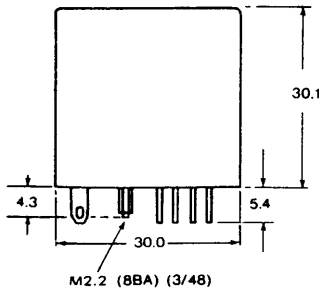
*hole for earth screw if fitted

Dimensions

Case Size 3

Short coil

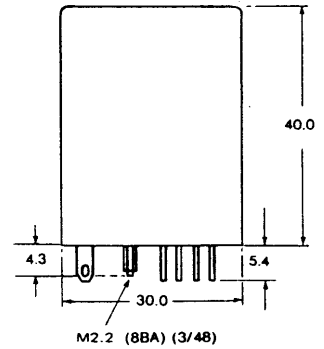
- types:
 VP2 - HD(C)
 VP2 - HI(M&B)
 VP4 (C)
 VP4 (K)
 VP4 - HC(C)
 VP6 (M&B)



Case Size 4

Long coil

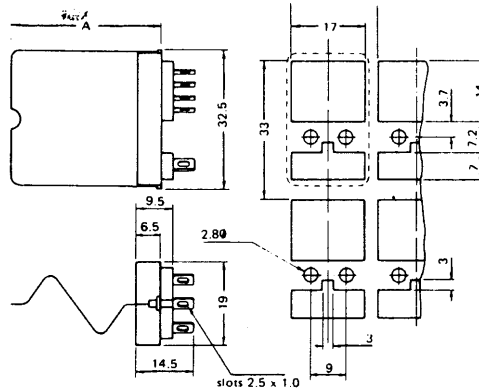
- types:
 VPL2 - HD (C) VPL4 (K)
 VPAC2 - HD (C) VPL6 (M&B)
 VPL4 (C) VPAC6 (M&B)
 VPAC4 (C)



Wiring Socket

Part No: 1351-02

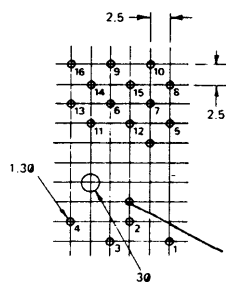
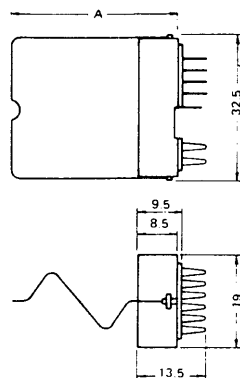
Terminal numbering as on relay base



Printed Circuit Socket

Part No: 1352-02

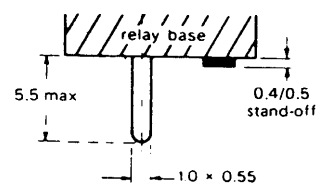
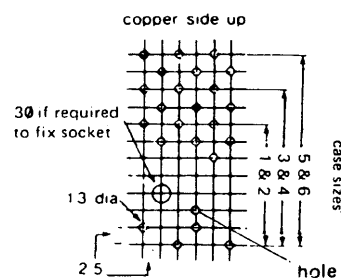
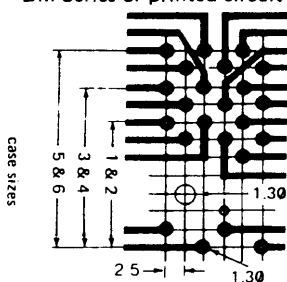
Supplied with earth contact



Case size	Dim A
3	35
4	47

DM Series Suitable for mounting on printed circuit boards with 2.5mm (0.1 in) spacings. Terminal numbering identical to printed circuit sockets.

Suggested track layout for DM Series or printed circuit sockets

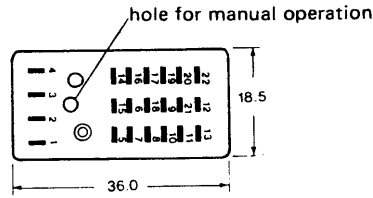
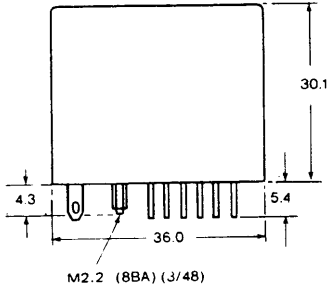


Dimensions Dimensions are in mm

PLUG-IN/WIRING TYPES

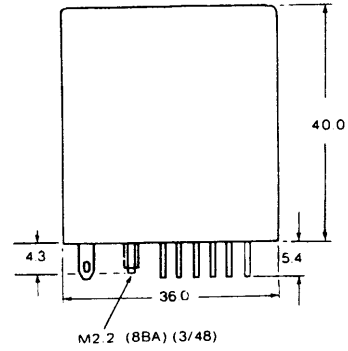
Case Size 5

Short coil
types:
VP4 - HD (C)
VP6 (C)
VP6 (K)
VP6 - HC (M&B)
VP8 (M&B)



Case Size 6

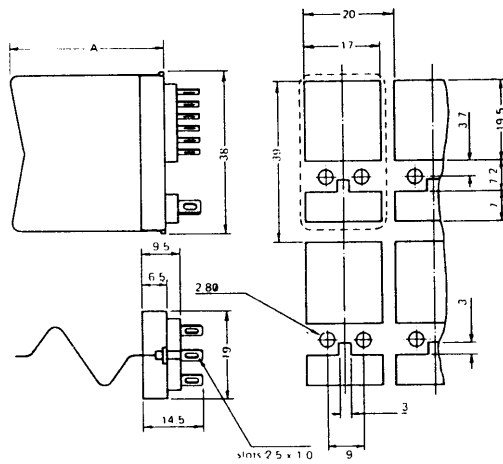
Long coil
types:
VPL4 - HD (C)
VPL6 (C)
VPL6 (K)
VPL6 - HC (M&B)
VPL8 (M&B)



Wiring Socket

Part No: 1351-03

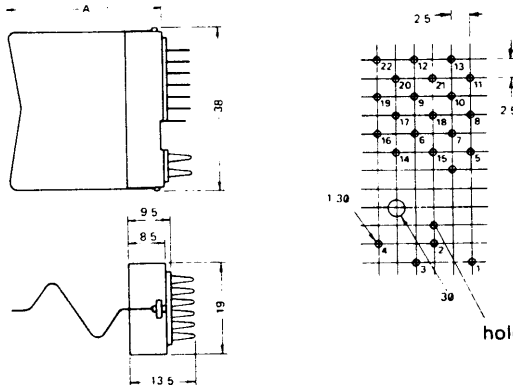
Terminal numbering as on relay base



Printed Circuit Socket

Part No: 1352-03

Supplied with earth contact



Case size	Dim A
5	35
6	47

Ordering information

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/High insulation

SEN = sensitive operation
HI = high insulation

Mounting style

— = plug-in/ solder
PB = printed circuit - grid as plug-in/wiring types
DM = printed circuit - 2.54mm (0.10") grid

Type of contacts

= standard light duty
HD = heavy duty
= heavy current
5A = 5 amp capacity
TC = twin contacts

Contact function

M = make
B = break
C = changeover
K = make before break

Contact material

A = fine silver
B = gold alloy 625R
C = palladium (not alloyed)
E = 30% palladium, 70% silver
F = 5% nickel, 95% gold
G = 60% palladium, 40% silver
I = silver cadmium oxide
P = platinum (not alloyed)

Terminal material

B = steel or brass, nickel/tin plated

Coil identification

Coil voltage required
For bifilar windings insert resistance in lieu of voltage; for M type coils insert M after coil voltage)

Special requirements

T = tropicalised coil LL = for low level switching RSD = anti-residual stud AC = built-in rectifiers
B = bifilar windings M2 3 = M2.3 (3-48NC) earth screw in lieu of standard M2.2 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 Pages 8 - 10

Typical examples

VP4/PB/CAB/26/RSD/T/LES

Basic 4 pole changeover action with 2.8 mm pitch PC terminals, 1 amp silver contacts, 26 volt dc coil, anti-residual stud, tropicalised, less earth screw.

VP6/DM/SEN/CBB/26M/LEP

Basic 6 pole changeover action with 2.54mm pitch pc terminals, extra sensitive adjustment, 0.2 amp 625R gold alloy contacts, 26 volt dc coil, less earth pin.

VP2/TC/KAB/26 /LL

Basic 2 pole make before break action with low level silver contacts, 26 volt dc coil.

VPAC6/MAB/220

Plug coil 6 pole make action with 1 amp silver contacts, 220 volt ac coil.

DM/5A/CIB/28

Plug coil 4 pole changeover action with 2.54mm pitch pc terminals, 5 amp silver cadmium oxide contacts, 28 volt dc coil.

VP4/CAB/24AC

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

VPR2/5A/CAB/12W12

Bistable polarised 2-pole changeover action with 5 amp silver contacts, double wound coil (12 volt inner, 12 volt outer windings)

VP6/BFB/26W26 (Pull and Hold)

Basic 6 pole break action with 0.2 amp nickel gold contacts, overlaid coils (26 volt inner 'pull', 26 volt outer 'hold').

VP2/HD/CAB/430 Ω B

Basic 2-pole changeover action with heavy duty silver contacts, 430 ohm bifilar coil windings.

VP2/HI/5A/MIB/26

Basic 2-pole make action with high insulation 5 amp silver cadmium oxide contacts, 26 volt dc coil.

British Telecom Approved Relays

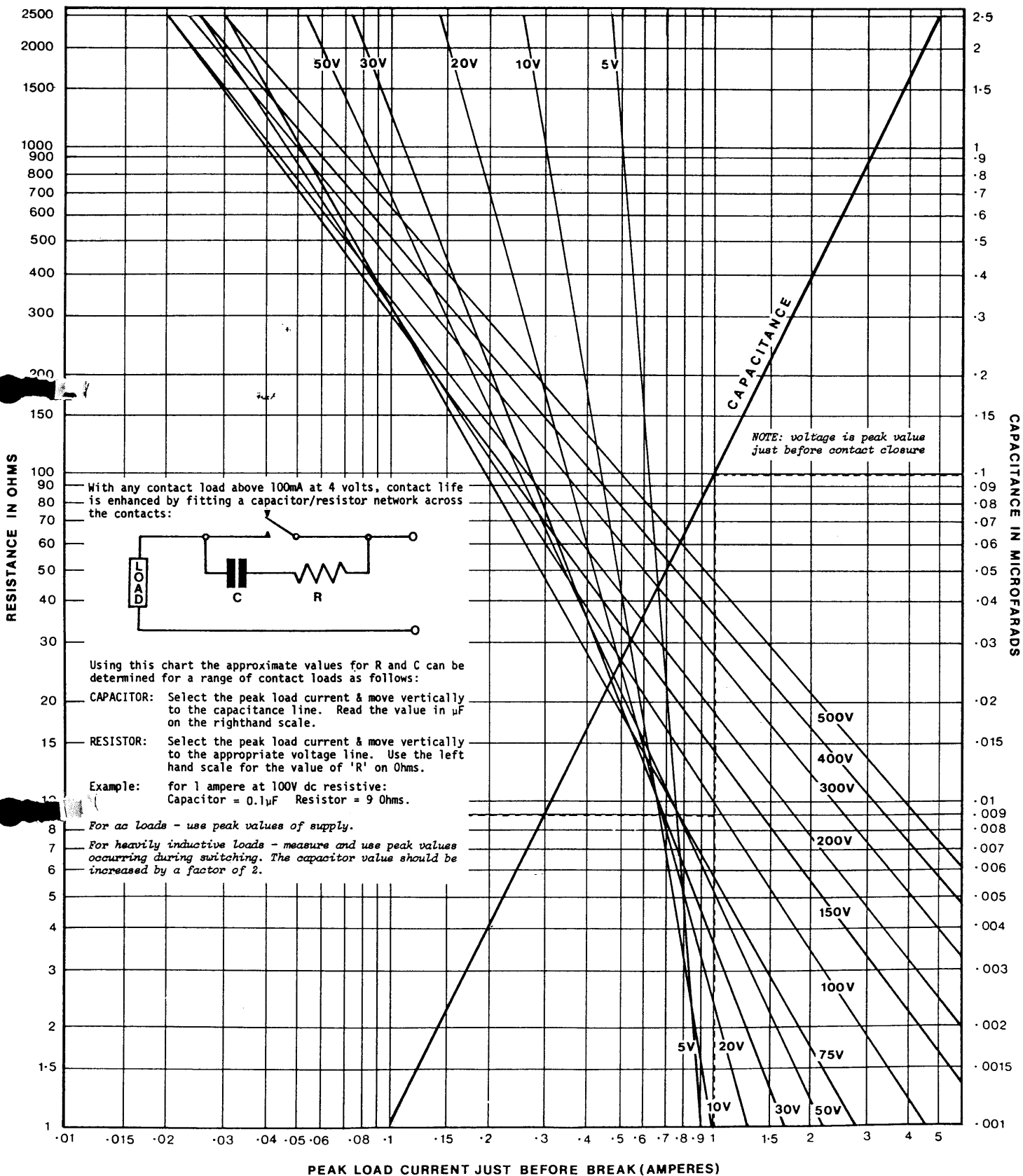
These relays conform to British Telecom codes BT23 or BT32

BT Code No.	Contacts	Coil	KV item	Keyswitch Varley code number
23/1	2C	3300	2598	VP2/TC/CGB/3300ohms
23/1PW	2C	3300	DM90	VP2/DM/TC/CGB/3300ohms
23/2	4C	1800	2568	VP4/TC/CGB/1800ohms
23/2PW	4C	1800	DM69	VP4/DM/TC/CGB/1800ohms
23/3	6M	1800	2593	VP6/TC/MGB/1800ohms
23/3PW	6M	1800	DM283	VP6/DM/TC/MGB/1800ohms
23/4	4C	890	2978	VP4/TC/CGB/890ohms
23/4PW	4C	890	DM143	VP4/DM/TC/CGB/890ohms
23/5	6M	890	3061	VP6/TC/MGB/890ohms
23/5PW	6M	890	DM 453	VP6/DM/TC/MGB/890ohms
23/6	2C 2K	1800	2592	VP4/TC/KCGB/1800ohms
23/6PW	2C 2K	1800	DM282	VP4/DM/TC/KCGB/1800ohms
23/7	2C	890	2960	VP2/TC/CGB/890ohms
23/7PW	2C	890	DM118	VP2/DM/TC/CGB/890ohms
23/8	2C 2K	150	2591	VP4/TC/KCGB/150ohms
23/8PW	2C 2K	150	DM179	VP4/DM/TC/KCGB/150ohms
23/9	2C	530	2961	VP2/TC/CGB/530ohms
23/9PW	2C	530	DM89	VP2/DM/TC/CGB/530ohms
23/10	4C	530	3188	VP4/TC/CGB/530ohms
23/10PW	4C	530	DM101	VP4/DM/TC/CGB/530ohms
23/11	2K	890	2977	VP2/TC/KGB/890ohms
23/11PW	2K	890	DM7	VP2/DM/TC/KGB/890ohms
23/12	2C	220	3403	VP2/TC/CGB/220ohms
23/12PW	2C	220	DM58	VP2/DM/TC/CGB/220ohms
23/13	2C 2K	28	2979	VP4/TC/KCGB/28ohms
23/13PW	2C 2K	28	DM661	VP4/DM/TC/KCGB/28ohms
23/14	6M	2200	3098	VP6/TC/MGB/2200ohms
23/14PW	6M	2200	DM34	VP6/DM/TC/MGB/2200ohms
23/15	6B	2200	3185	VP6/TC/BGB/2200ohms
23/15PW	6B	2200	DM75	VP6/DM/TC/BGB/2200ohms
23/16	4C	2200	3186	VP4/TC/CGB/2200ohms
23/16PW	4C	2200	DM112	VP4/DM/TC/CGB/2200ohms
23/17	6M	530	3187	VP6/TC/MGB/530ohms
23/17PW	6M	530	DM141	VP6/DM/TC/MGB/530ohms
23/18	2C	325	3754	VP2/TC/CGB/325ohms
23/18PW	2C	325	DM172	VP2/DM/TC/CGB/325ohms
23/19	4C	150	3755	VP4/TC/CGB/150ohms
23/19PW	4C	150	DM102	VP4/DM/TC/CGB/150ohms
23/20	2C	2200	3721	VP2/TC/CGB/2200ohms
23/20PW	2C	2200	DM134	VP2/DM/TC/CGB/2200ohms
23/21	2C 2K	2200	3723	VP4/TC/KCGB/2200ohms
23/21PW	2C 2K	2200	DM225	VP4/DM/TC/KCGB/2200ohms
23/22	2C	7600	4011	VP2/TC/CGB/7600ohms
23/22PW	2C	7600	DM97	VP2/DM/TC/CGB/7600ohms
23/23	2K	3300	3766	VP2/TC/KGB/3300ohms
23/23PW	2K	3300	DM226	VP2/DM/TC/KGB/3300ohms
23/24	4C	220	3837	VP4/TC/CGB/220ohms
23/24PW	4C	220	DM136	VP4/DM/TC/CGB/220ohms
23/25	2C	110	4409	VP2/TC/CGB/110ohms
23/25PW	2C	110	DM133	VP2/DM/TC/CGB/110ohms
23/26	2C 2K	220	3855	VP4/TC/KCGB/220ohms
23/26PW	2C 2K	220	DM335	VP4/DM/TC/KCGB/220ohms
23/27	6M	220		VP6/TC/MGB/220ohms
23/27PW	6M	220	DM178	VP6/DM/TC/MGB/220ohms
23/28	2C	58	4642	VP2/TC/CGB/58ohms
23/28PW	2C	58	DM265	VP2/DM/TC/CGB/58ohms
23/29	6M	150		VP6/TC/MGB/150ohms
23/29PW	6M	150	DM223	VP6/DM/TC/MGB/150ohms
23/30	2K	220	5526	VP2/TC/KGB/220ohms
23/30PW	2K	220	DM276	VP2/DM/TC/KGB/220ohms
23/31	2C	1800		VP2/TC/CGB/1800 ohms
23/31PW	2C	1800	DM646	VP2DM/TC/CGB/1800 ohms
32/1	2C	3300	4721	VP2/TC/CFB/3300ohms
32/1PW	2C	3300	DM227	VP2/DM/TC/CFB/3300ohms
32/2	6M	890		VP6/TC/MFB/890ohms
32/2PW	6M	890	DM228	VP6/DM/TC/MFB/890ohms
32/3	2C	890		VP2/TC/CFB/890ohms
32/3PW	2C	890		VP2/DM/TC/CFB/890ohms
32/4	4C	2200	4974	VP4/TC/CFB/2200ohms
32/4PW	4C	2200	DM229	VP4/DM/TC/CFB/2200ohms
349A*	3MBC	150	4392	VP5/TC/MBCGB/150ohms/RSD

Notes: * A special relay with hold and release functions

All DM versions can be supplied without earth pin by adding LEP to KV item no. eg. DM90/LEP

R+C Contact Protection (see Suppression - page 7)



IMPORTANT

The materials contained in these products are not harmful provided the rated ratings are not exceeded. Normal electrical safety precautions should be observed at all times.

Every effort has been made in the preparation of this publication to ensure the accuracy of information given and no responsibility will be accepted for errors or changes in information following our programme of constant improvement.