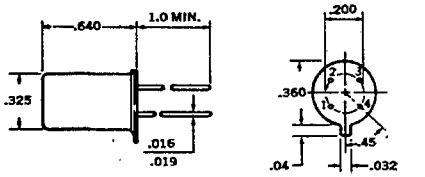
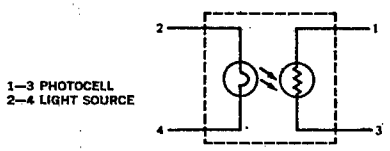
VACTEC HERMETIC SEALED VACTROL®





1—3 PHOTOCELL
2—4 LIGHT SOURCE

Bulletin VTL-1

These Vactrols combine incandescent or neon lamps with a photoresistor in a TO-5 based, hermetically sealed enclosure. The unit may be mounted perpendicular to the board or parallel as shown. All leads are isolated from the case.

These units may be operated in the ON-OFF mode or in proportional control circuits with a wide range of control. Neon units are intended primarily for ON-OFF operation, although a 10:1 variation in lamp current is usually workable.

Applications include photochoppers, isolators, noiseless switching, automatic gain control, SCR and Triac firing, audio effects, etc.

MAXIMUM RATINGS

Cell voltage	125 vrms or 150 vdc
Cell power	100mW — derate 2mW/°C above 25°C case temperature
Case temperature (4)	−55°C to +70°C operating and storage
Thermal resistance — case to ambient	90°C/W
Isolation voltage	500 v peak

SPECIFICATIONS
at 25°C

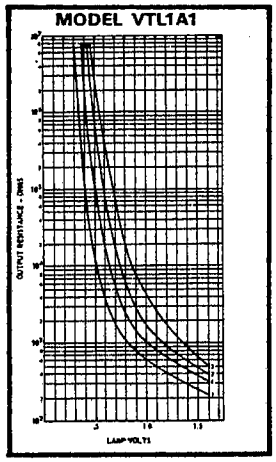
Part Number	LAMP (1) Volts	LAMP (1) mA	PHOTOCELL RESISTANCE — Ohms (2) ON Dark Adapted (typ.)	PHOTOCELL RESISTANCE — Ohms (2) ON Light Adapted (max.)	PHOTOCELL RESISTANCE — Ohms (2) OFF (min.)	RESPONSE — mS (3) Ascent (typ.)	RESPONSE — mS (3) Decay to 100K (max.)
INCANDESCENT LAMPS							
VTL1A1	1.5	50	300	500	10^7	65	350
VTL1A2	6.0	40	150	250	10^7	50	400
VTL1A3	10	14	350	800	10^7	50	150
VTL1A4	12	25	150	250	10^7	75	500
NEON LAMPS—EXTERNAL SERIES RESISTOR REQUIRED							
VTL1B5	150	1.5	400	1000	10^7	3	60
VTL1B6	90	.3	2000	5000	10^7	5	60

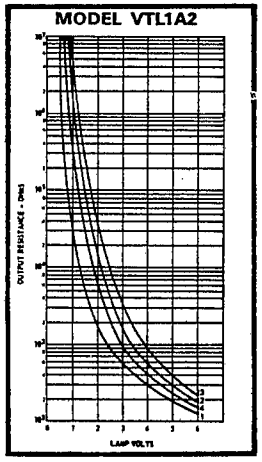
(1) **Incandescent Lamps:** The specified voltage is the maximum value which may be applied for 50,000 hour life. Lamps may be operated at any lower voltage.
Neon Lamps: The specified voltage is the minimum required to assure breakdown of the lamp. Since the lamp must operate in total darkness, a small amount of radioactive material is contained within the lamp to assure breakdown. The initial time to ignition after dark storage depends upon the ratio of applied voltage to breakdown voltage. At the minimum specified voltage, this time may be over 100 ms. Relonization time depends upon the rate of application of voltage and is negligible at 60 Hz. Careful consideration should be given to these factors before specifying this series using neon lamps.
A small amount of light on the lamp however minimizes the initial ionization problem. The VTL9 series Vactrols have cases with a small hole which permits some light to be applied to the neon lamp and should be considered for critical applications.
An external resistor, in series with the lamp, is required to limit the current to the value indicated. The approximate value of this resistance is given by the following formula:

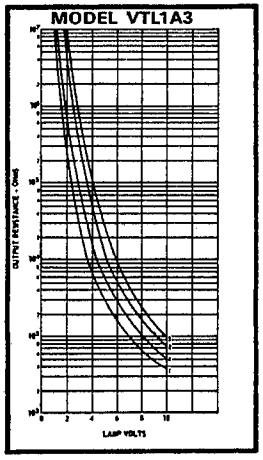
$$R = \frac{V_s - V_m}{I} \text{ Kohms}$$

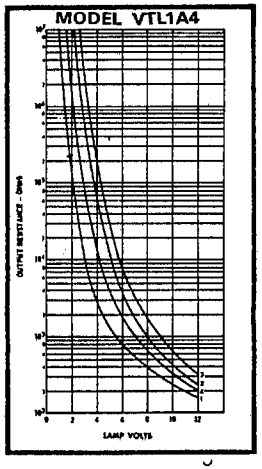
where V_s = supply voltage, DC or RMS
V_m = maintaining voltage, 70V for VTL1B5, 60 Volts for VTL1B6
I = Lamp current, mA

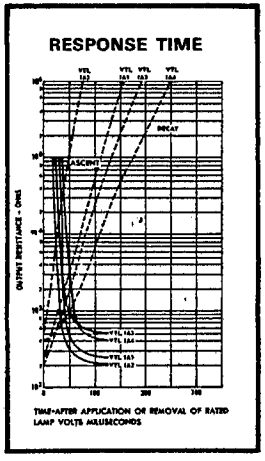
For reliable operation on AC, the minimum voltage should be 105 VRMS on the VTL1B5 and 65VRMS for the VTL1B6, The specified resistance is measured with direct current through the lamp. Typical maximum values with 120VAC are
VTL 1B5 39 Kohm series 2000 ohms
VTL 1B6 220 Kohm series 6000 ohms
Life at rated lamp current is 10,000 hours minimum. For more information on glow lamps, see the General Electric Glow Lamp Manual, 2nd Ed.
(2) Dark adapted ON resistance measured after 24 or more hours of no input. Light adapted ON resistance measure after 24 or more hours with rated input voltage. See figures 1 through 4 for typical resistance at other input conditions. Since neon lamp units are intended for on-off operation, no transfer data is given. OFF resistance is the minimum value at rated cell voltage. At lower voltages, the value is typically greater than 1000 megohms.
(3) Ascent time is the time for the cell conductance to rise to 63% of the final value measured from the application of rated lamp input. Response time is measured from the light adapted state with a cell test voltage of 1.35V. Initial ionization time is not included in neon-ascent time. At reduced input voltage, ascent time is increased and decay time to a specified value is decreased.
(4) Lamp power requirements must be included in case temperature determinations.











Notes:
1. All curves are typical.
2. Where guaranteed transfer characteristics are required over a range of input conditions, please consult the factory.
3. Figures 1-4 show input voltage vs. output resistance after the following adapt conditions:
   (1) 25°C — 24 hour no input
   (2) 25°C — 24 hour at rated input
   (3) 50°C — 24 hour at rated input
   (4) −20°C — 24 hour at rated input
4. Ascent times are reduced approximately 25-30 mS for rapid re-application of lamp voltage.

ORDERING INFORMATION

Order by indicated part number. Inquiries for special characteristics are invited.