Live Line Indication

Live-Line Indication Applications

Matroc has long experience of the manufacture of ceramic capacitors for high voltage DC and power frequency applications. These products are used all over the world in onerous service conditions, and are backed by rigorous testing procedures to ensure the electrical integrity and long service life of such components. Over one million capacitors of the categories described here have been successfully used in Live-Line Indication applications. Morgan Electro Ceramic has decades of involvement in high voltage system practices and the design of capacitors for those environments.

The capacitors described in this section are used in circuitry indicating the presence of voltage on conductors. A capacitor voltage divider enables a small neon lamp to be illuminated or alternatively the low voltage signal may be used to feed a sensing circuit which monitors for supply failure and circuit condition.

UK Office
Morgan Electro Ceramics
Vauxhall Industrial Estate
Ruabon, Wrexham
LL14 6HY
Tel : +44 (0) 1978 810456
Fax : +44 (0) 1978 824303

Theory

In its simplest form the Live-Line Indication consists of a high voltage ac rated capacitor which is connected in series with the neon indicator between the phase and earth lines. (Fig.1)

The addition of higher value, low voltage rated capacitor in parallel with the neon is sometimes preferred. (Fig.2)

The object is two-fold - firstly toadvise the operator that the connections are live and secondly for operation of re-routing systems in the event of inadvertent disconnection.

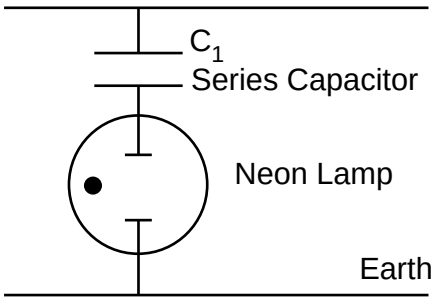


Fig. 1

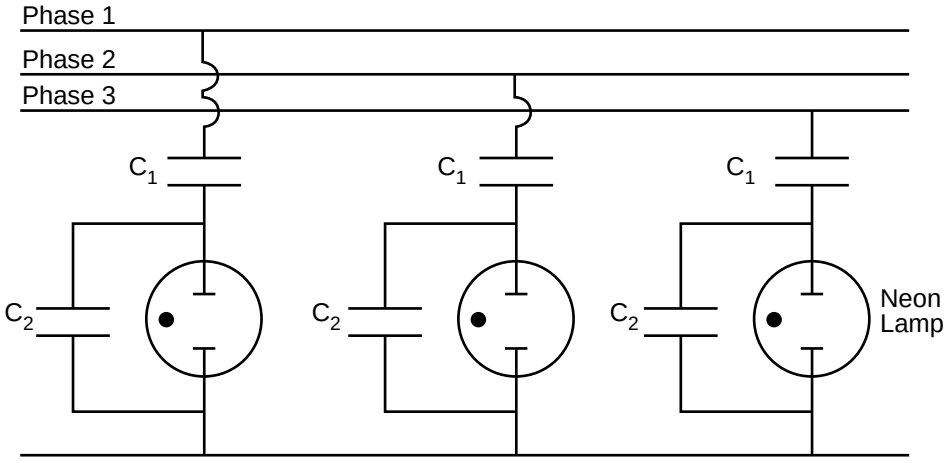


Fig. 2

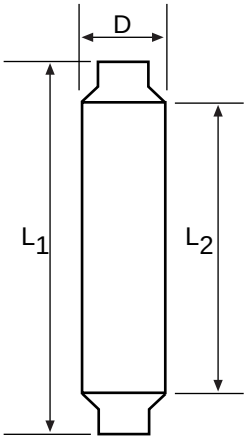
C_1 = High Voltage Series Capacitor
C_2 = low Voltage Shunt Capacitor

Material Characteristics

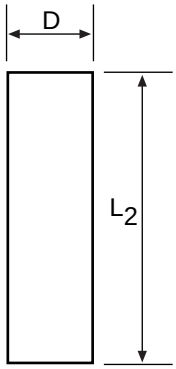
	Units	Dielectric K1500	K2100	K3500
EIA Category		Z5U	X7R	Y5U
Dielectric Constant Er @ 1kHz, 20°C LV		~1500	~2100	~4300
Dielectric Constant Er @ 50Hz, 0.35kV/mm20°C LV		~1650	~3000	~5200
Typical Dissipation Factor @ 1kHz 20°C LV	%	≤0.5	≤2.0	≤1.0
Insulation Resistance @ 500V, 20°C	Ω	$\geq 10^{10}$	$\geq 10^{10}$	$\geq 10^{10}$
Aging Rate per decade hour	%	-3	-2.5	-3.5

Capacitors for encapsulation by the user.

All Dimensions in mm



Style A



Style B

Style 'A'

Type	Cap Value	Cap Tol	Dielectric	Voltage rating	System Voltage	Voltage Test 1 Min	Voltage Test Impulse	Discharge Free Test	øD	L1	L2	Thread Size Socket
	pF			kV rms	kV	kV 50Hz	kV pk	kV<5pC rms	mm	mm	mm	mm
07849	250	–20%	K3500	7	12	30	60	8	17	50.5	30.5	M4
07727	220	–20%	K3500	7	12	38	75	8	17	60	40	M4
07724	150	+20, -10%	K3500	15	24	55	140	26.4	17	81	61	M4
07723	50	–8pF	K1500	15	24	55	125	25.0	17	81	61	M4
07853	50	–10pF	K2100	15	24	55	125	26.4	12	81	61	M4
07897	20	–20%	K200	8	12	38	75	13.2	25	56	40	M4
07898	15	–20%	K200	15	24	50	125	26.4	25	82	62	M4

Style 'B'

Type	Cap Value	Cap Tol	Dielectric	Voltage rating	System Voltage	Voltage Test 1 Min	Voltage Test Impulse	Discharge Free Test	øD	L2
	pF			kV rms	kV	kV 50Hz	kV pk	kV<5pC rms	mm	mm
55530	150	+35, -15pF	K3500	14	24	55	140	15	17	61
55701	50	–10%	K1500	14	24	55	140	15	17	61
55559	50	–10%	K2100	14	24	55	140	15	12	61

Notes
1. Terminals are soldered to the ceramic parts with 220°C melting point solder
2. Capacitors of this type have been used in transformer oil and in SF6 gas. In these cases we would recommend a paint coating on the otherwise bare ceramic surfaces.
3. The usual end product is a resin cast capacitor stand-off for bus-bar or link support of appropriate height for the achievement of the system requirements of flashover and creepage distance etc.
4. Additional metal connectors can be attached to the above on request.

Capacitance Dividers

Many users prefer to have Morgan Electro Ceramic supply in the same moulding, not only the high voltage capacitor but also a lower voltage capacitor of larger value. This shunts the signalling circuit of the live-line indicator and prevents the incidence of high voltage at the tapping point should the indicating lamp loosen in the socket or become open circuit.

In the type of construction shown a heavily insulated HV lead is taken from the capacitor at the top. The construction is such that the lead contributes to a higher creepage distance such that this range is useful for certain distribution applications as well as for the requirements of mining switchgear.

The following descriptions apply to integral dividers primarily designed for mining switch gear applications. However, certain distribution switchgear requirements are met by virtue of their electrical withstand properties.

Type	Cap Value	Cap Tol	Dielectric	Voltage Rating	System Voltage (Distribution)	System Voltage (Mining)	Voltage Test 1 Min	Voltage Test Impulse	Discharge Free Test
	pF	%		kV max	kV	kV	kV 50Hz	kV 50Hz	kV<5pC rms
07529	375/5000	–10	K3500	4	3.6	7.2	20	40	5
07517	250/5000	–10	K3500	7	7.2	12	28	60	8
07590	250/5000	–10	K3500	7	12/17.5		38	95	8
07596	1000/5000	–10	K3500	4	3.6	7.2	10	40	5
07574	900/2500	–20	K3500	2		3.6	10	20	3

(Cap Value at 50Hz, +20°C)

Capacitors of Special Configuration

These are shapes produced to meet special space limitation factors and are often custom-made for the user.

Type	Cap Value	Cap Tol	Dielectric	Voltage Rating	System Voltage (Distribution)	System Voltage (Mining)	Voltage Test 1 Min	Voltage Test Impulse	Discharge Free Test
	pF	%		kV max	kV	kV	kV 50Hz	kV 50Hz	kV<5pC rms
07560	1000	–20	K3500	2		3.6	10	20	3
07573	250	–20	K3500	7	7.2		28	60	8
07576	375	–20	K3500	7	7.2	12	28	60	8
07580	1000	–20	K3500	7	7.2	12	28	60	8

(Cap Value at 50Hz, +20°C)

Live Line Indication

Vist the HV Capacitor Web-Site!
www.hvcaps.com

UK Office
Morgan Electro Ceramics
Vauxhall Industrial Estate
Ruabon, Wrexham
LL14 6HY
Tel : +44 (0) 1978 810456
Fax : +44 (0) 1978 824303