ML SERIES

FEATURES: GENERAL PURPOSE LUG TERMINAL TYPE CAPACITORS RECOMMENDED FOR USE IN SWITCHED MODE POWER SUPPLIES, TELE-COMMNICATION & INDUSTRIAL SYSTEMS.

ENDURANCE: +85^{0}C, 2000 Hrs

REFERENCE STANDARDS: IS4317/ IEC 384-4

PRODUCT MARKING } PROVIDED WITH ORANGE COLOUR SLEEVE AND BLACK PRINT

1. SPECIFICATIONS

PARAMETERS.	PERFORMANCE CHARACTERISTICS
Operating Temperature	- 40^0 C to +85^{0}C for WV ≤ 250 Vdc & -25^{0}C to +85^{0}C for WV > 250 Vdc.
Working Voltage	16 Vdc to 450 Vdc
Capacitance Range	150µF to 47,000µF (at +27^0 C, 100 Hz)
Capacitance Tolerance	± 20%
Leakage Current (After 5mt charging through 1000 Ω resistor) IL in µA	IL ≤ 3 √ (CV) Where IL = Leakage current in µA C= Capacitance (µF), V= Working Voltage in Volt

Dissipation factor (Tan δ) Max

(at +27^{0}C, 100 Hz)

W V / Diameter	16	25	35	50	63	100-250	350-450
25	40	30	25	20	15	10	10
30	45	35	30	25	20	12	10
35	55	40	35	30	25	15	10
40					30	18	12
45						20	15

Life Tests

Tests	Endurance DC Life Test	Storage Shelf Life Test
Test Condition / Parameters	Capacitor at rated voltage And at +85^{0}C for 2000 Hrs Measurements after recovery to +27^{0}C	Capacitor under no voltage At +85^{0}C for 1000 Hrs Measurements after recovery to +27^{0}C
Δ Capacitance	Within ± 30% for WV 16V to 25V Within ± 25% for WV 35V to 100V Within ± 20% for WV 160V to 450V of initial measured value	Within ± 20% of initial measured Value
Tan ∂	Within 200% of initial limit	Within 150% of initial limit
D.C Leakage Current	Within initial limit	Within 150% of initial limit

(i). Endurance Test at High Temperature +85^{0}C at WV.

(ii). Storage Test at High Temperature +85^{0}C at 0V.

2. OTHER INFORMATION

Standard rating Size, Ripple current and Frequency multiplier	Refer page No. 2&3.
Capacitor Codification System	Refer page no.4
Dimensional Specification	Refer section 4 for details
Marking Specification	Refer Page no. 5
Type of Packing and Lead Configuration	Bulk Packing – In cardboard cartons with separator. Provided with general purpose lug terminal. For details of packing refer section 9

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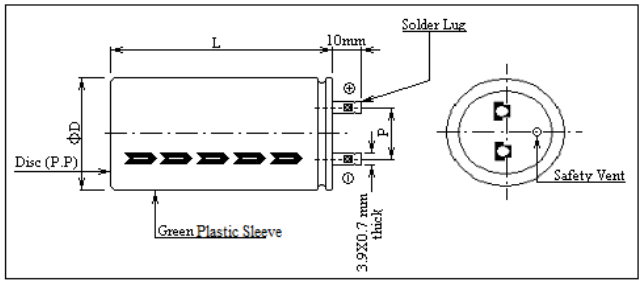
3. PHYSICAL OUTLINE – ML SERIES



All dimensions in mm

Note: Pressure Relief Vent may be Positioned Either in the Casing or in the Cover.

4. DIMENSIONS (All units in mm)

Case code	BC	BE	BF	CE	CG	DG	DK	DM	DQ	EK	EQ	FQ
Diameter Ø D ± 2 (mm)	25	25	25	30	30	35	35	35	35	40	40	45
Length L ± 3 (mm)	35	45	50	45	55	70	70	80	105	70	100	100
Pitch P ± 0.5 (mm)	10	10	10	12	12	14	14	14	14	16	16	18

5. STANDARD RATING TABLE

Provides detailed information regarding applicable case size and the appropriate ripple current handling capability of the defined case size.

WV / SV / Cap (µF)	16 / 19		25 / 30		35 / 41		50 / 58		63 / 73		100 / 115	
	CC	RC	CC	RC	CC	RC	CC	RC	CC	RC	CC	RC
2200											BE	3.20
3300									BC	2.80	CG	4.19
4700					BC	2.52	BC	3.11	BE	3.68	DG DK	5.24 5.59
6800					BC	2.91	BE	3.88	CE	4.66	DM	6.06
10000	BC	3.03	BC	3.15	BE	3.68	CE CG	5.04 5.36	DG	6.01	EQ	6.87
15000	BC	3.68	BC BE	3.85 4.08	CE	4.75	DG DH	6.52 6.76	DK	7.34	FQ	7.69
22000	BC	4.26	BF	5.04	DG	6.31	DM	7.81				
33000	BF	5.34	CG	6.70	DM	7.57						
47000	DG	7.28	DM	7.76								

Abbreviations used:

WV: Working voltage of the capacitor in Volts.
SV: Surge voltage in volts.
Cap: Capacitance in microfarad.
CC: Case Code
RC: Maximum Ripple current allowed in ampere at 100 Hz/ +85°c.

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STANDARD RATING TABLE (Contd.)

WV / SV / Cap (µF)	160 / 184		200 / 230		250 / 285		350 / 385		400 / 440		450 / 500	
	CC	RC	CC	RC	CC	RC	CC	RC	CC	RC	CC	RC
150							BC	1.44	BE	1.39	BE	1.35
220							BE	1.82	BF	1.78	CE	1.78
330			BC	1.93	BE	1.92	CE	2.42	CG	2.22	DG	2.31
470	BC	2.02	BE	2.49	BF	2.42	DG	3.07	DG	2.89	DG	2.77
680	BE	2.60	CE	3.08	DG	3.00	DK	3.81	DM	3.75	EK	3.66
1000	CE	3.37	DG	3.84	DG DK	3.81 4.20	EQ	4.62	EQ	4.82	FQ	4.96
1500	DG	4.52	DK	4.90	DM	4.81	EQ	5.96				
2200	DK	6.06	EK	6.06	EQ	6.23						
3300	EK	7.50	EQ	7.31								

Abbreviations used:

WV: Working voltage of the capacitor in Volts. SV: Surge voltage in volts.

Cap: Capacitance in microfarad. CC: Case Code

RC: Maximum Ripple current allowed in ampere at 100 Hz/ +85°c.

Frequency Multiplier for Ripple Current

Freq / Voltage	50	100	120	300	1K	10K or more
16-100	0.88	1	1.03	1.11	1.18	1.18
160-250	0.85	1	1.04	1.12	1.19	1.24

6. PACKING QUANTITY

MB Series capacitors are generally packed in PRIMARY cardboard cartons by employing suitable separators to avoid damage during transit. The primary cartons are then inserted into MOTHER cardboard cartons before shipment.

Case Code	BC	BE	BF	CE	CG	DG	DK	DM	DQ	EK	EQ	FQ
Nos / Carton	288	288	288	200	200	162	81	81	81	64	64	49

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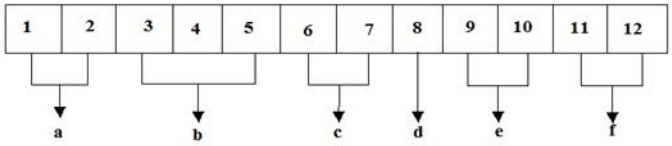
7.CAPACITOR ORDERING INFORMATION FOR ML SERIES CAPACITORS

Capacitors are identified with the help of a 12-digit code. Expansions of Part Nos are identified below.



a	b
Series Code	**Capacitance Value Code**
ML – Large can lug terminal type	Indicates Cap. Value in microfarad Eg (i) 47µF is coded as 470 (ii) 470 µF is coded as 471 (iii) 4700µF is coded as 472

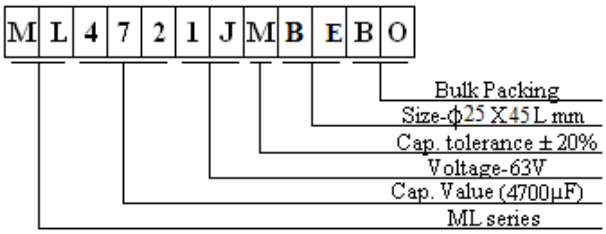
C

Voltage Code

Working Voltage (V)	16	25	35	50	63	100	160	200	250	350	400	420	450
Code	1C	1E	1V	1H	1J	2A	2C	2D	2E	2V	2G	2U	2W

d	e	f
Capacitance Tolerance Code	**Size Code**	**Packing Code**
A - Special tolerance	BC – FQ for ML Capacitor For details refer to the corres-ponding dimension section.	BO – Bulk Packing
M - ± 20%		
K - ± 10%		
N - ± 30%		

Example (ii) ML Series 4700µF/63V
Lug terminal type



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8.MARKING ON THE CAPACITOR FOR ML SERIES CAPACITORS

Product information is printed on the Plastic sleeve.ML capacitors are provided with green colour sleeve. The following information are marked on the capacitor.

a) Manufacturer's name & logo

KELTRON®

b) Capacitor series and upper category temperature

c) Nominal capacitance value in µF

d) Capacitance tolerance in %

e) Rated working voltage in V

f) Date code (Year - Month)

g) Negative terminals are indicated in the sleeve.

9.Date Code for ML series capacitors:

Date code is provided on the capacitor sleeve in Year – Month format. The details are as given below.

Year code

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Letter Code	M	N	P	R	S	T	U	V	W	X

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Letter Code	A	B	C	D	E	F	H	J	K	L

Year codes repeats after each cycle of 20 years.

Month code

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug	Sep.	Oct.	Nov	Dec.
Code	1	2	3	4	5	6	7	8	9	O	N	D