

# MS/MD Series 60/70°C

RoHS  
Compliant

- Intermittent AC Motor Starting
- 6.3 mm Double amp tags (quick connect types)
- VDE approved to EN 60252-2

## APPLICATION

A range of aluminium electrolytic capacitors specifically designed for a.c. operation which help to start the motor by providing a leading current to the auxillary winding. The capacitor is not permanently connected to the winding of the motor and is switched off after starting, usually automatically.

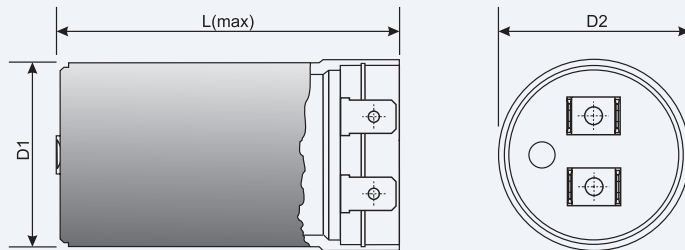
## BASIC DESIGN

Capacitors for this application are designed for intermittent duty only, and capable of withstanding the a.c. voltage applied to the motor during starting. The capacitor construction comprise either double anode

or O-style (double anode and floating cathode) windings and are housed in a moulded plastic case. The MD series is VDE approved to EN 60252-2 for the defined ratings.

## SPECIFICATION

<b>Standards</b>	DIN EN 60252-2:- AC Motor Capacitors - Part 2 : Motor Start Capacitors
<b>Capacitance range</b>	25 $\mu$ F to 750 $\mu$ F
<b>Capacitance tolerance</b>	$\pm 10\%$ or $-0\%$ +25%
<b>Rated voltage <math>U_R</math></b>	120V - 330Vac 50Hz
<b>Surge voltage <math>U_s</math></b>	$1.25 \times U_R$
<b>Endurance life time</b>	
<b>+70°C, <math>1.1U_R</math></b>	MD types 500 hrs (at specified duty cycle)
<b>+60°C, <math>1.1U_R</math></b>	MS types 500 hrs (at specified duty cycle)
<b>Shelf Life</b>	2 years
<b>Temperature range</b>	-20°C to +70°C MD types -20°C to +60°C MS types
	End of Life requirement: $\Delta C/C \leq \pm 10\%$ $\cos \varphi \leq 0.2$



## Dimensions mm

Case Code	D1 $\pm 0.5$	D2 $\pm 0.5$	Lmax
AA	38	39	75
AB	38	39	90
AC	38	39	116

## VDE Approvals to EN 60252-2

Rated Voltage	220V	260V
Capacitor type	MD	MD
Capacitance ( $\mu$ F)	(note 1)	(note 2)
30	AA	
40	AA AB	AB
50	AA AB	AB
60	AA AB	AB
70	AB	AB
80	AB AC	AB
90	AC	
100	AC	
120	AC	
125	AC	

### Note 1: Duty cycles approved;

220V @ SD=3 & ED=1.7%  
280V @ SD=1 & ED=0.55%  
300V @ SD=1 & ED=0.1%

### Note 2: Duty cycles approved;

260V @ SD=3 & ED=1.7%  
330V @ SD=1 & ED=0.55%

### General approval notes;

- valid for both  $\pm 10\%$  and  $-0$  +25% tolerance.
- valid for intermediate capacitance values in increments of 1 $\mu$ F between 30 $\mu$ F and 100 $\mu$ F and in increments of 5 $\mu$ F between 100 $\mu$ F and 125 $\mu$ F.

## 120Vac

Type number	Min. Cap. ( $\mu$ F)	Max. Cap. ( $\mu$ F)	Tolerance	Can Size (mm)	Duty Cycle	
					@ 120V rms	@ 150V rms
---MS12AAMA1STD	25	325	-0% +25%	38x75	1.67%	
---MS12AAMK1STD	25	360	$\pm$ 10%	38x75	1.67%	
---MS12ABMA1STD	85	460	-0% +25%	38x90	1.67%	
---MS12ABMK1STD	90	510	$\pm$ 10%	38x90	1.67%	
---MS12ACMA1STD	120	670	-0% +25%	38x116	1.67%	
---MS12ACMK1STD	130	750	$\pm$ 10%	38x116	1.67%	
---MD12AAMA1STD	25	325	-0% +25%	38x75	1.67%	0.55%
---MD12AAMK1STD	25	360	$\pm$ 10%	38x75	1.67%	0.55%
---MD12ABMA1STD	85	460	-0% +25%	38x90	1.67%	0.55%
---MD12ABMK1STD	90	510	$\pm$ 10%	38x90	1.67%	0.55%
---MD12ACMA1STD	120	670	-0% +25%	38x116	1.67%	0.55%
---MD12ACMK1STD	130	750	$\pm$ 10%	38x116	1.67%	0.55%

## 220Vac

Type number	Min. Cap. ( $\mu$ F)	Max. Cap. ( $\mu$ F)	Tolerance	Can Size (mm)	Duty Cycle	
					@ 220V rms	@ 280V rms
---MS22AAMA1STD	30	65	-0% +25%	38x75	1.67%	
---MS22AAMK1STD	30	70	$\pm$ 10%	38x75	1.67%	
---MS22ABMA1STD	40	90	-0% +25%	38x90	1.67%	
---MS22ABMK1STD	40	100	$\pm$ 10%	38x90	1.67%	
---MS22ACMA1STD	55	130	-0% +25%	38x116	1.67%	
---MS22ACMK1STD	65	150	$\pm$ 10%	38x116	1.67%	
---MD22AAMA1STD	30	65	-0% +25%	38x75	1.67%	0.55%
---MD22AAMK1STD	30	70	$\pm$ 10%	38x75	1.67%	0.55%
---MD22ABMA1STD	40	90	-0% +25%	38x90	1.67%	0.55%
---MD22ABMK1STD	40	100	$\pm$ 10%	38x90	1.67%	0.55%
---MD22ACMA1STD	55	130	-0% +25%	38x116	1.67%	0.55%
---MD22ACMK1STD	65	150	$\pm$ 10%	38x116	1.67%	0.55%

## 260Vac

Type number	Min. Cap. ( $\mu$ F)	Max. Cap. ( $\mu$ F)	Tolerance	Can Size (mm)	Duty Cycle	
					@ 260V rms	@ 330V rms
---MS26AAMA1STD	25	55	-0% +25%	38x75	1.67%	
---MS26AAMK1STD	25	60	$\pm$ 10%	38x75	1.67%	
---MS26ABMA1STD	35	75	-0% +25%	38x90	1.67%	
---MS26ABMK1STD	35	85	$\pm$ 10%	38x90	1.67%	
---MS26ACMA1STD	50	110	-0% +25%	38x116	1.67%	
---MS26ACMK1STD	55	125	$\pm$ 10%	38x116	1.67%	
---MD26AAMA1STD	25	50	-0% +25%	38x75	1.67%	0.55%
---MD26AAMK1STD	25	55	$\pm$ 10%	38x75	1.67%	0.55%
---MD26ABMA1STD	30	70	-0% +25%	38x90	1.67%	0.55%
---MD26ABMK1STD	35	80	$\pm$ 10%	38x90	1.67%	0.55%
---MD26ACMA1STD	45	100	-0% +25%	38x116	1.67%	0.55%
---MD26ACMK1STD	50	115	$\pm$ 10%	38x116	1.67%	0.55%

\* **Capacitance code**  
e.g. 030=30 $\mu$ F, 120=120 $\mu$ F

## TECHNICAL DATA

**Dual Voltage Rating**

The MD range of capacitors is designed with a dual voltage rating. The lower voltage rating relates to a duty cycle of 1.67% and the upper voltage rating relates to a duty cycle of 0.55%.

**Power Factor**

The tangent of the loss angle for motor start capacitors shall not exceed 0.1 and shall be calculated as follows:

$$\tan \delta = \frac{W}{V \times I} = \frac{\text{true watts}}{\text{apparent watts}}$$

**Duty Cycle**

The standard rating is 1.67% or 1/60th full time and corresponds to a maximum duty of 20 starts, each of three seconds duration per hour. It is expressed as 3/1.67 (a 3 minute cycle with 1.67% duration during which the capacitor may be energised). If the same capacitor is to be used for a duty cycle of 60 starts per hour the cycle duration will be 1 minute. The operation time per cycle will then have to be reduced to 1.67% of 1 minute (i.e. 1 second). Alternative duty cycles are available on request.

**Presence of Run Capacitor**

When the motor is fitted with both starting and run capacitors, consideration should be given to fitting of the appropriate discharge resistor to the starting capacitor. This is to protect the run capacitor from damage through discharge of the starting capacitor.

**Container Form**

Cylindrical mouldings, meeting creepage and clearance distances, according to IEC 60335-1 and flammability ratings according to UL94-V1.

TECHNICAL DATA

**Discharge Resistors**

A discharge resistor may be fitted to a motor start capacitor to prevent electrical overstress of the capacitor and or for safety reasons. In accordance with BS5267 and IEC 60252, the resistor value should be such that it reduces the voltage on the capacitor, from the line voltage to less than 50V within 60 secs.

The resistor value may be approximated as follows:

$$R \text{ (k}\Omega\text{) max.} = \frac{T}{\text{Rated capacitance } \mu\text{F}}$$

Rated Voltage (d.c.)	T
120	50000
220	32000
260	30000
280	28000
330	26000

Value (kOhms)	Wattage
5.6	2W
15	2W
33	0.5W
56	1W
82	2W
100	1W

PART NUMBERING

Pos 1-15

0 8 0 M S 2 2 A B M A 1 S T D  
 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

