

# Manual motor starter MS116












Manual motor starters are electro-mechanical devices for motor and circuit protection. These devices offer local motor disconnect means, manual ON/OFF control, and protection against short circuit, overload, and phase loss conditions. Manual motor protection saves cost, panel space, and ensures fast and reliable short-circuit protection by reacting within milliseconds. Close-coupling adaptors are available for combination with ABB contactors.



## Description

- Overload protection – trip class 10A
- Phase loss sensitivity
- Disconnect function
- Temperature compensation from -25 ... +55 °C
- Adjustable current setting for overload protection
- Suitable for three- and single-phase application
- Trip-free mechanism
- Clear switch position indication ON/OFF

## Approvals

-  cULus UL 508
-  CB scheme\*
-  CCC\*
-  GOST-R
-  GOST-F
-  ABS\*
-  Lloyd's Register\*
-  GL\*
-  DNV\*
-  RMRS\*
-  Bureau Veritas\*

## Marks

 CE

\* Note: the marked approvals are still pending for MS116-20...32

## Order data

MS116 screw terminal

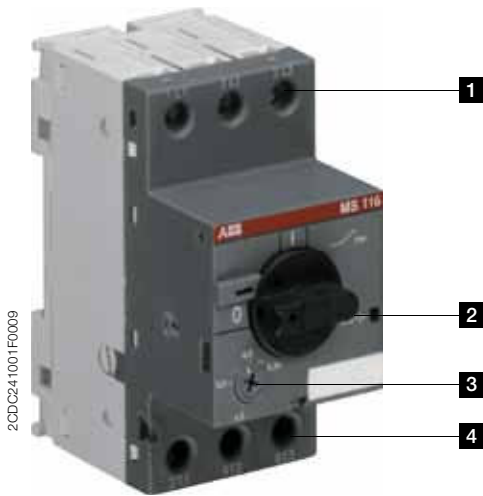


Setting range A	Catalog number	Trip class	Packing unit PCE	Weight per PCE kg
0.10...0.16	MS116-0.16	10A	1	0.225
0.16...0.25	MS116-0.25	10A	1	0.225
0.25...0.40	MS116-0.4	10A	1	0.225
0.40...0.63	MS116-0.63	10A	1	0.225
0.63...1.00	MS116-1.0	10A	1	0.225
1.00...1.60	MS116-1.6	10A	1	0.265
1.60...2.50	MS116-2.5	10A	1	0.265
2.50...4.00	MS116-4.0	10A	1	0.265
4.00...6.30	MS116-6.3	10A	1	0.265
6.30...10.0	MS116-10	10A	1	0.265
8.00...12.0	MS116-12	10A	1	0.265
10.0...16.0	MS116-16	10A	1	0.265
16.0...20.0	MS116-20	10A	1	0.310
20.0...25.0	MS116-25	10A	1	0.310
25.0...32.0	MS116-32	10A	1	0.310

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## Functional description



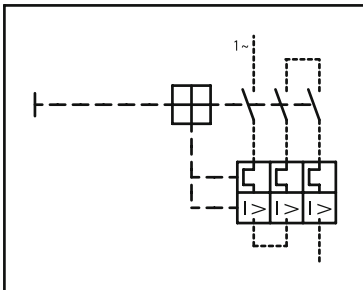
- 1** Terminals 1L1, 3L2, 5L3
- 2** Test function
- 3** Current setting range  
Adjustable current setting for overload protection
- 4** Terminals 2T1, 4T2, 6T3

## Application

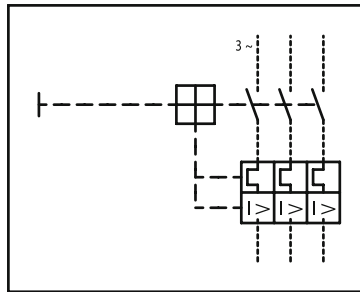
The manual motor starters protect the load and the installation against short-circuit and overload. They are three pole protection devices with thermal tripping elements for overload protection and electromagnetic tripping elements for short-circuit protection. Furthermore, they provide a disconnect function for safely isolation of the installation and the supply and can be used for the manual switching of loads.

The manual motor starters have a setting scale in amperes, which allows for direct adjustment of the device without any additional calculation. In compliance with international and national standards, the setting current is the rated current of the motor and not the tripping current (i.e., no tripping at  $1.2 \times I$ ;  $I$  = setting current).

## Operation mode

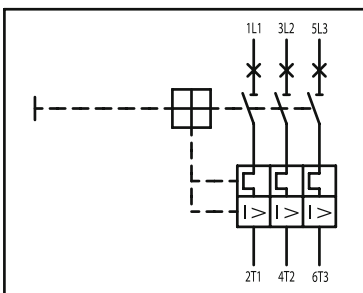


Single-phase operation



Three-phase operation

## Wiring diagram

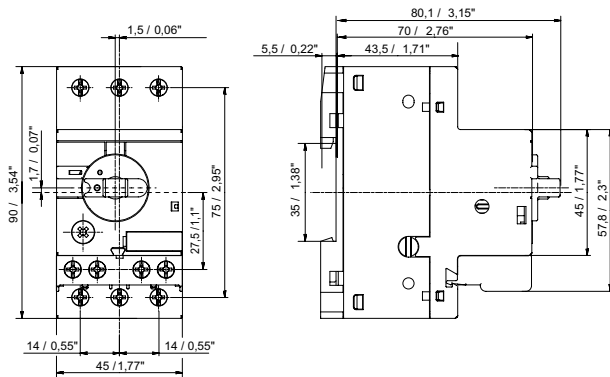


## Resistance and power loss per pole

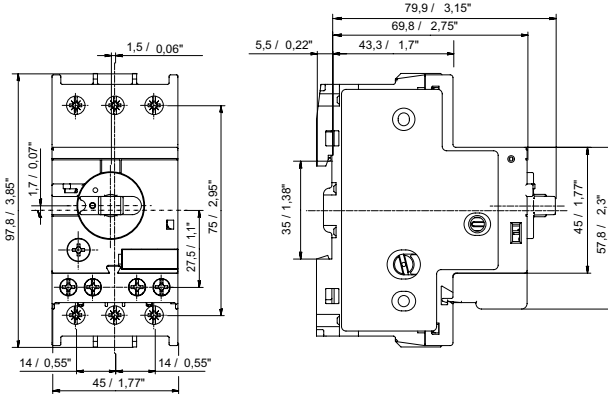
Type	Setting range		Resistance per pole $\Omega$	Power loss per pole	
	lower value A	upper value A		at lower value W	at upper value W
MS116-0.16	0.10	0.16	66.00	0.7	1.7
MS116-0.25	0.16	0.25	25.50	0.7	1.7
MS116-0.4	0.25	0.40	10.38	0.7	1.7
MS116-0.63	0.40	0.63	4.36	0.7	1.7
MS116-1.0	0.63	1.00	1.605	0.7	1.7
MS116-1.6	1.00	1.60	0.648	0.7	1.7
MS116-2.5	1.60	2.50	0.272	0.7	1.7
MS116-4.0	2.50	4.00	0.106	0.7	1.7
MS116-6.3	4.00	6.30	0.046	0.7	1.7
MS116-10	6.30	10.0	0.024	0.9	2.4
MS116-12	8.00	12.0	0.016	1.0	2.3
MS116-16	10.0	16.0	0.011	1.1	2.8
MS116-20	16.0	20.0	0.0057	1.5	2.3
MS116-25	20.0	25.0	0.0045	1.8	2.8
MS116-32	25.0	32.0	0.0030	1.9	3.1

## Dimensions

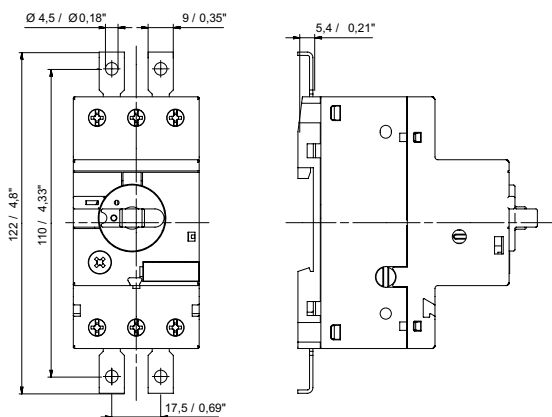
in mm / inches



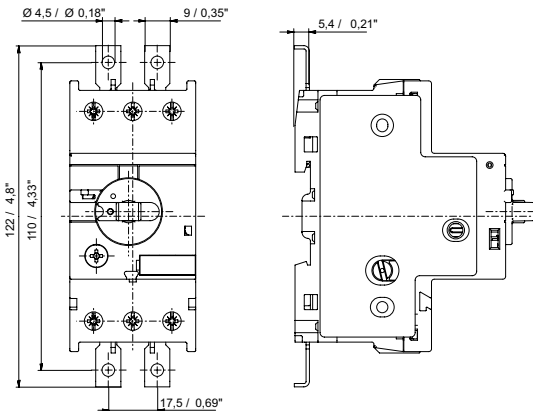
MS116 ≤ 16 A



MS116 ≥ 20 A



MS116 ≤ 16 A with screw fixing kit FS116 (accessory)



MS116 ≥ 20 A with screw fixing kit FS116 (accessory)

## Technical data IEC/EN

Data at  $T_A = 40\text{ °C}$  and at rated values, if nothing else indicated

### Main circuit

	<b>1L1-3L2-5L3</b> <b>2T1-4T2-6T3</b>
Rated operational voltage $U_e$	690 V a.c. - V d.c.
Setting range - thermal overload protection	see table "Order data" on page 1
Rated operational current $I_e$	see table below
Rated instantaneous short-circuit current setting $I_i$	see table below
Rated service short-circuit breaking capacity $I_{cs}$	see table "Short-circuit breaking capacity and back-up fuses" on page 6
Rated ultimate short-circuit breaking capacity $I_{cu}$	see table "Order data" on page 1
Trip class	50/60 Hz
Rated frequency	3
Number of poles	see table "Resistance and power loss per pole" on page 3
Resistance per pole	on page 3
Power loss per pole	

### Isolation data

Rated impulse withstand voltage $U_{imp}$	6 kV
Rated insulation voltage $U_i$	690 V
Pollution degree	3

### Electrical connection

		<b>MS116 ≤ 16 A</b>	<b>MS116 ≥ 20 A</b>
Connecting capacity	solid	1/2 x 1 ... 4 mm <sup>2</sup>	1/2 x 2.5 ... 6 mm <sup>2</sup>
	stranded	1/2 x 1 ... 4 mm <sup>2</sup>	1/2 x 2.5 ... 6 mm <sup>2</sup>
	flexible with ferrule	1/2 x 0.75 ... 2.5 mm <sup>2</sup>	1/2 x 1 ... 6 mm <sup>2</sup>
	flexible with ferrule insulated	1/2 x 0.75 ... 2.5 mm <sup>2</sup>	1/2 x 1 ... 6 mm <sup>2</sup>
	flexible without ferrule	1/2 x 0.75 ... 2.5 mm <sup>2</sup>	1/2 x 2.5 ... 6 mm <sup>2</sup>
Stripping length		9 mm	10 mm
Tightening torque		0.8 ... 1.2 Nm	2 Nm
Connection screw		M3.5 (Pozidrive 2 / 5.5 mm)	M4 (Pozidrive 2 / 6.5 mm)

Type	Rated instantaneous short-circuit current setting $I_i$ A	Rated operational current $I_e$ A
MS116-0.16	1.56	0.16
MS116-0.25	2.44	0.25
MS116-0.4	3.90	0.40
MS116-0.63	6.14	0.63
MS116-1.0	11.50	1.0
MS116-1.6	18.40	1.6
MS116-2.5	28.75	2.5
MS116-4.0	50.00	4.0
MS116-6.3	78.75	6.3
MS116-10	150	10
MS116-12	180	12
MS116-16	240	16
MS116-20	300	20
MS116-25	375	25
MS116-32	480	32

## General data

Mechanical durability		10 <sup>5</sup>
Electrical durability		10 x 10 <sup>4</sup>
Duty time		100 %
Dimensions (W x H x D)		see drawing "Dimensions" on page 3
Weight		see table "Order data" on page 1
Mounting		DIN-rail (EN 60715)
Mounting position		position 1-6 (optional for single mounting)
Group Mounting		on request
Minimum distance to other units same type	horizontal	0 mm
	vertical	150 mm
Minimum distance to electrical conductive board	horizontal, up to 400 V	0 mm
	horizontal, up to 690 V	> 1.5 mm
	vertical	75 mm
Degree of protection	enclosure / terminals	IP20
Utilization category		A
Altitude		up to 2000 m
Maximum operating frequency		170 cycles/h

## Electromagnetic compatibility

Electromagnetic compatibility		not applicable
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## Environmental data

Ambient air temperature		
Operation	open - compensated without derating	-25 ... +55 °C
	open	-25 ... +70 °C
Storage		-50 ... +80 °C
Temperature compensation		continuous
Vibration (sinusoidal) acc. to IEC/EN 60068-2-6 (Fc)		5g / 3 ... 150 Hz
Shock (half-sine) acc. to IEC/EN 60068-2-27 (Ea)		25g / 11 ms

## Standards / directives

Product standard		IEC/EN 60947-2
		IEC/EN 60947-4-1
		IEC/EN 60947-1
		UL 508, CSA 22.2 No. 14
Low Voltage Directive		2006/95/EC
EMC Directive		2004/108/EC
RoHS Directive		2002/95/EC

## Short-circuit breaking capacity and back-up fuses

$I_{cs}$  Rated service short-circuit breaking capacity

$I_{cu}$  Rated ultimate short-circuit breaking capacity (in case of MS116:  $I_{cu} = I_{cs}$ )

$I_{cc}$  Prospective short-circuit current at installation location

Note: Maximum rated current of the back-up fuses if  $I_{cc} > I_{cs}$

Type	230 V AC			400 V AC			440 V AC			500 V AC			690 V AC		
	$I_{cs}$ kA	$I_{cu}$ kA	gG, aM A	$I_{cs}$ kA	$I_{cu}$ kA	gG, aM A	$I_{cs}$ kA	$I_{cu}$ kA	gG, aM A	$I_{cs}$ kA	$I_{cu}$ kA	gG, aM A	$I_{cs}$ kA	$I_{cu}$ kA	gG, aM A
MS116-0.16	No back-up fuse required up to $I_{cc} = 50$ kA						No back-up fuse required up to $I_{cc} = 30$ kA								
MS116-0.25															
MS116-0.4															
MS116-0.63															
MS116-1.0															
MS116-1.6															
MS116-2.5															
MS116-4.0	6	6	25	6	6	25	2	2	25						
MS116-6.3	6	6	63	6	6	63	2	2	40						
MS116-10	6	6	63	6	6	63	2	2	50						
MS116-12	25	25	80	25	25	80	6	6	63	6	6	63	2	2	50
MS116-16	16	16	80	16	16	80	6	6	63	4	4	63	2	2	63
MS116-20	10	15	-	10	15	-	3	6	-	3	4	-	2	3	-
MS116-25	10	15	-	10	15	-	3	6	-	3	4	-	2	3	-
MS116-32	10	10	-	10	10	-	3	6	-	3	4	-	2	3	-

## Technical data UL/CSA

### Main circuit

Maximum operational voltage	600 V	
Manual Motor Controller ratings	see table "UL 508 – Manual Motor Controller" on page 8	
Motor ratings	Horse power	see table below
	Full load amps (FLA)	see table below
	Locked rotor amps (LRA)	see table below

Electrical connection		MS116 ≤ 16 A	MS116 ≥ 20 A
Connecting capacity	stranded	1/2 x AWG 16 ... 12	1/2 x AWG 12 ... 8
	flexible without ferrule	1/2 x AWG 16 ... 12	1/2 x AWG 12 ... 8
Stripping length		9 mm	10 mm
Tightening torque		10 ... 12 lb-In	18 lb-In
Connection screw		M3.5 (Pozidrive 2)	M4 (Pozidrive 2)

### Motor rating, single phase

hp Horse power; FLA Full load amps; LRA Locked rotor amps

Type	220-240 VAC			440-480 VAC		
	hp	FLA	LRA	hp	FLA	LRA
MS116-0.16	-	0.16	0.96	-	0.16	0.96
MS116-0.25	-	0.25	1.5	-	0.25	1.5
MS116-0.4	-	0.4	2.4	-	0.4	2.4
MS116-0.63	-	0.63	3.78	-	0.63	3.78
MS116-1.0	-	1.0	6.0	-	1.0	6.0
MS116-1.6	1/10	1.5	-	-	1.6	9.6
MS116-2.5	1/6	2.2	-	1/2	2.5	-
MS116-4.0	1/3	3.6	-	1/2	2.5	-
MS116-6.3	1/2	4.9	-	1	4	-
MS116-10	1-1/2	10	-	2	6	-
MS116-12	2	12	-	3	8.5	-
MS116-16	2	12	-	5	14	-
MS116-20	3	17	92	5	14	81
MS116-25	3	17	127	7-1/2	21	116
MS116-32	5	28	162	10	26	145

### Motor rating, three phase

hp Horse power; FLA Full load amps; LRA Locked rotor amps

Type	110-120 VAC			220-240 VAC			440-480 VAC			500-600 VAC		
	hp	FLA	LRA	hp	FLA	LRA	hp	FLA	LRA	hp	FLA	LRA
MS116-0.16	-	0.16	0.96	-	0.16	0.96	-	0.16	0.96	-	0.16	0.96
MS116-0.25	-	0.25	1.5	-	0.25	1.5	-	0.25	1.5	-	0.25	1.5
MS116-0.4	-	0.4	2.4	-	0.4	2.4	-	0.4	2.4	-	0.4	2.4
MS116-0.63	-	0.63	3.78	-	0.63	3.78	-	0.63	3.78	-	0.63	3.78
MS116-1.0	-	1.0	6.0	-	1.0	6.0	-	1.0	6.0	1/2	0.9	8
MS116-1.6	-	1.6	9.6	-	1.6	9.6	3/4	1.6	12.5	3/4	1.3	10
MS116-2.5	-	2.5	15.0	1/2	2.2	20	1	2.1	15	1-1/2	2.4	16
MS116-4.0	-	4.0	16.0	1	4.2	30	2	3.4	25	3	3.9	25.6
MS116-6.3	1/2	4.4	40	1-1/2	6.4	40	3	4.8	32	5	6.1	36.8
MS116-10	1	8.4	60	3	9.6	64	5	7.6	46	7-1/2	9	50.8
MS116-12	1-1/2	12	80	3	9.6	64	7-1/2	11	63.5	10	11	64.8
MS116-16	2	13.6	100	5	15.2	92	10	20	81	10	11	64.8
MS116-20	3	19.2	128	5	15.2	92	10	14	81	15	17	93
MS116-25	3	19.2	128	7-1/2	22	127	15	21	116	20	22	116
MS116-32	5	30.4	184	10	28	162	20	27	145	25	27	146

Type	Maximum fuse type K5 o. RK5 per UL/NEC 480 V / 600 V A	Maximum short-circuit current			
		for motor disconnect <sup>1)</sup>		for group installation	
		480 V	600 V	480 V	600 V
		kA	kA	kA	kA
MS116-0.16	100	30	5	18	5
MS116-0.25	100	30	5	18	5
MS116-0.4	100	30	5	18	5
MS116-0.63	100	30	5	18	5
MS116-1.0	100	30	5	18	5
MS116-1.6	100	30	5	18	5
MS116-2.5	100	30	5	18	5
MS116-4.0	100	18	5	18	5
MS116-6.3	100	18	5	18	5
MS116-10	100	18	5	18	5
MS116-12	100	18	5	18	5
MS116-16	100	18	5	18	5
MS116-20	100	18	5	18	5
MS116-25	100	18	5	18	5
MS116-32	100	18	5	18	5

<sup>1)</sup> Suitable as motor disconnect only when provided with padlock SA1 or SA3...

**ABB Inc.**

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