

Manual motor starter MS325



Manual motor starters (also known as motor protection circuit breakers or manual motor protectors) are electromechanical protection devices for the main circuit mainly used to switch motors manually ON/OFF and protect them fuseless against short-circuits, overloads and phase failures. Fuseless protection with a manual motor starter saves costs, space and ensures a quick reaction under short-circuit condition, by switching off the motor within milliseconds. Fuseless starter combinations are setup together with contactors.

Description

- Overload protection – trip class 10A
- Phase loss sensitivity
- Disconnect function
- Temperature compensation from -25 ... +50 °C
- Adjustable current setting for overload protection
- Suitable for three- and single-phase application
- Trip-free mechanism
- Clear switch position indication ON/OFF

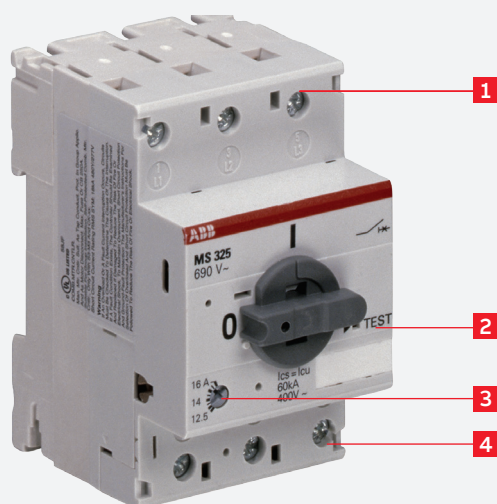


Order data

MS325 screw terminals

Setting range	Type	Order code	Weight Pkg (1 pce) kg
A			kg
0.10...0.16	MS325-0.16	1SAM150000R1001	0.310
0.16...0.25	MS325-0.25	1SAM150000R1002	0.310
0.25...0.40	MS325-0.4	1SAM150000R1003	0.310
0.40...0.63	MS325-0.63	1SAM150000R1004	0.310
0.63...1.00	MS325-1	1SAM150000R1005	0.340
1.00...1.60	MS325-1.6	1SAM150000R1006	0.370
1.60...2.50	MS325-2.5	1SAM150000R1007	0.370
2.50...4.00	MS325-4	1SAM150000R1008	0.370
4.00...6.30	MS325-6.3	1SAM150000R1009	0.370
6.30...9.0	MS325-9	1SAM150000R1010	0.370
9.00...12.5	MS325-12.5	1SAM150000R1011	0.370
12.5...16.0	MS325-16	1SAM150000R1012	0.370
16.0...20.0	MS325-20	1SAM150000R1013	0.370
20.0...25.0	MS325-25	1SAM150000R1014	0.370

Note: Manual motor starters should always be selected so that the actual motor current is within the setting range.



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

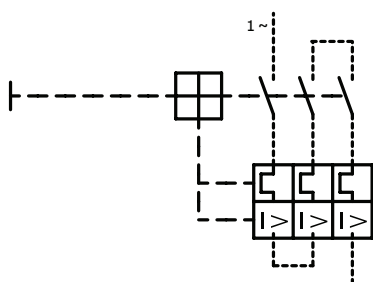
Application

Manual motor starters (also known as motor protection circuit breakers or manual motor protectors) protect the load and the installation against short-circuits and overloads. 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

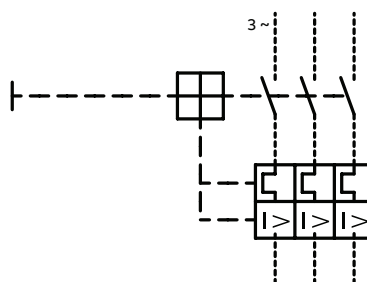
safe isolation of the installation and the supply, and they can be used for manual switching of loads. Manual motor starters have a setting scale in amperes, which allows direct adjusting of the device without any additional calculation.

In compliance with international and national standards, the setting current is the rated current of the motor and not the tripping current.

Operation mode

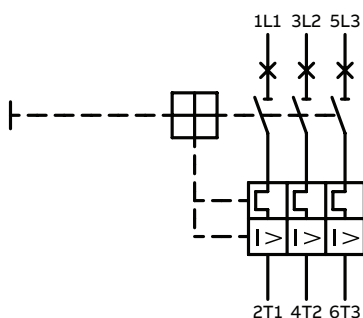


Single-phase operation



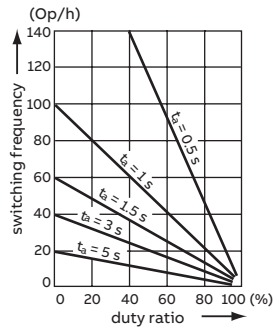
Three-phase operation

Wiring diagram



Resistance and power loss per pole

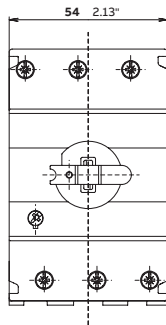
Type	Setting range		Resistance per pole	Power loss per pole	
	lower value	upper value		at lower value	at upper value
	A	A	mΩ	W	W
MS325-0.16	0.10	0.16	71.10	0.7	1.8
MS325-0.25	0.16	0.25	27.10	0.7	1.7
MS325-0.4	0.25	0.40	12.30	0.8	2.0
MS325-0.63	0.40	0.63	5.17	0.8	2.1
MS325-1	0.63	1.00	2.090	0.8	2.1
MS325-1.6	1.00	1.60	0.805	0.8	2.1
MS325-2.5	1.60	2.50	0.340	0.9	2.1
MS325-4	2.50	4.00	0.141	0.9	2.3
MS325-6.3	4.00	6.30	0.051	0.8	2.0
MS325-9	6.30	9.0	0.022	0.9	1.8
MS325-12.5	9.00	12.5	0.012	1.0	1.8
MS325-16	12.5	16.0	0.007	1.0	1.7
MS325-20	16.0	20.0	0.004	1.0	1.6
MS325-25	20.0	25.0	0.003	1.1	1.7



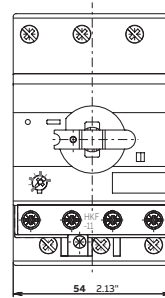
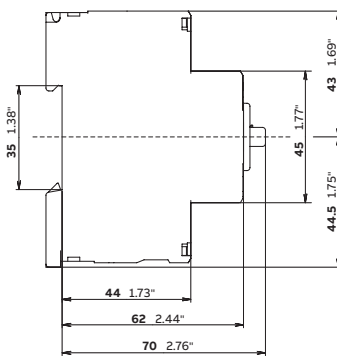
Intermittent periodic duty, ta: Motor starting time

Main dimensions

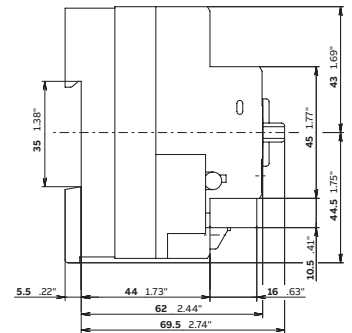
in mm / inches



MS325



MS325 with HK-F11



Technical data IEC/EN

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





Main circuit

Terminal marking	1L1-3L2-5L3 2T1-4T2-6T3
Rated operational voltage U_e	690 V AC
	440 V DC
Setting range - thermal overload protection	see table "Order data" on page 1
Rated operational current I_e	see table below
Rated operational current DC-5 I_e 3 conducting paths in series up to 250 V	see "Rated operational current I_e "
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}	
Rated service short-circuit breaking capacity DC I_{cs} 3 conducting paths in series up to 250 V	on request
Trip class	see table "Order data" on page 1
Rated frequency	DC, 50/60 Hz
Number of poles	3
Resistance per pole	see table "Resistance and power loss 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

Type		MS325
 solid		$1/2 \times 1 \dots 6 \text{ mm}^2 / 1 \times 10 \text{ mm}^2$
 flexible with ferrule		$1/2 \times 0.75 \dots 4 \text{ mm}^2 / 1 \times 6 \text{ mm}^2$
 flexible with ferrule insulated		$1/2 \times 0.75 \dots 4 \text{ mm}^2 / 1 \times 6 \text{ mm}^2$
 flexible without ferrule		$1/2 \times 1 \dots 6 \text{ mm}^2$
Stripping length		10 mm
Tightening torque		1.4 Nm
Recommended screw driver		Pozidriv 2



Type	Rated instantaneous short-circuit current setting I_i	Rated operational current I_e
	A	A
MS325-0.16	1.56	0.16
MS325-0.25	2.44	0.25
MS325-0.4	3.90	0.40
MS325-0.63	6.14	0.63
MS325-1	11.50	1.00
MS325-1.6	18.40	1.60
MS325-2.5	28.75	2.50
MS325-4	50.00	4.00
MS325-6.3	78.75	6.30
MS325-9	135.5	9.00
MS325-12.5	180	12.5
MS325-16	240	16.0
MS325-20	300	20.0
MS325-25	375	25.0

General data

Mechanical durability		100 000
Electrical durability		50 000
Duty time		100 %
Operating frequency without early tripping		up to 15 operations/h or 60 operations/h with 40 % duty ratio, if the motor breaking current $6 \times I_n$ and the motor starting time does not exceed 1 s
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	100 mm
Minimum distance to electrical conductive board	horizontal, up to 400 V	> 1.5 mm
	horizontal, up to 690 V	> 1.5 mm
	vertical	75 mm
Degree of protection	housing / main circuit terminals	IP20
Utilization category		A
Maximum operating altitude		2000 m
Maximum operating frequency		170 cycles/h

Environmental data

Ambient air temperature		
Operation	open - compensated	-25 ... +50 °C
	open	-25 ... +50 °C
Storage		-50 ... +80 °C
Ambient air temperature compensation		acc. to IEC/EN 60947-4-1
Vibration (sinusoidal) acc. to IEC/EN 60068-2-6 (Fc)		5g / 10 ... 150 Hz
Shock (half-sine) acc. to IEC/EN 60068-2-27 (Ea)		15g / 11 ms

Standards / directives

Standards	IEC/EN 60947-1 IEC/EN 60947-2 IEC/EN 60947-4-1 UL 60947-1 UL 60947-4-1 CSA-C22.2 No. 60947-1 CSA-C22.2 No. 60947-4-1
Low Voltage Directive	2014/35/EU
RoHS Directive	2011/65/EU

Short-circuit breaking capacity and back-up fuses

I_{cs} Rated service short-circuit breaking capacity

I_{cu} Rated ultimate short-circuit breaking capacity

- No back-up fuse required, because short-circuit proof up to 100 kA



Type	230 V AC			400 V AC			440 V AC			500 V AC			690 V AC		
	I_{cs} kA	I_{cu} kA	gG A	I_{cs} kA	I_{cu} kA	gG A	I_{cs} kA	I_{cu} kA	gG A	I_{cs} kA	I_{cu} kA	gG A	I_{cs} kA	I_{cu} kA	gG A
MS325-0.16	100	100	-	100	100	-	100	100	-	100	100	-	100	100	-
MS325-0.25	100	100	-	100	100	-	100	100	-	100	100	-	100	100	-
MS325-0.4	100	100	-	100	100	-	100	100	-	100	100	-	100	100	-
MS325-0.63	100	100	-	100	100	-	100	100	-	100	100	-	100	100	-
MS325-1	100	100	-	100	100	-	100	100	-	100	100	-	100	100	-
MS325-1.6	100	100	-	100	100	-	100	100	-	100	100	-	100	100	-
MS325-2.5	100	100	-	100	100	-	100	100	-	100	100	-	40	40	25
MS325-4	100	100	-	100	100	-	100	100	-	60	60	40	10	10	40
MS325-6.3	100	100	-	100	100	-	70	70	50	40	40	50	7	7	40
MS325-9	100	100	-	100	100	-	50	50	80	30	30	80	5	5	50
MS325-12.5	100	100	-	75	75	80	45	45	80	27	27	80	4.5	4.5	50
MS325-16	100	100	-	60	60	100	40	40	100	25	25	100	4	4	50
MS325-20	100	100	-	55	55	100	35	35	100	22	22	100	3.5	3.5	50
MS325-25	100	100	-	50	50	125	30	30	125	20	20	125	3	3	50

Technical data UL/CSA

Main circuit

Maximum operational voltage	600 V
Manual motor controller ratings	see table below
Motor ratings	
Horse power	see table below
Full load amps (FLA)	see table below
Locked rotor amps (LRA)	see table below

Electrical connection

Type	MS325
 stranded	1/2 x AWG 14 ... 8
 flexible without ferrule	1/2 x AWG 14 ... 8
Stripping length	10 mm
Tightening torque	14 lb-in
Recommended screw driver	Pozidriv 2

Motor ratings, single phase

hp Horse power

FLA Full load amps

LRA Locked rotor amps

Type	110 ... 120 V AC			220 ... 240 V AC		
	hp	FLA	LRA	hp	FLA	LRA
MS325-0.16	-			-	0.16	0.96
MS325-0.25	-			-	0.25	1.5
MS325-0.4	-			-	0.4	2.4
MS325-0.63	-			-	0.63	3.78
MS325-1	-			-	1	6
MS325-1.6	-			1/10	1.5	
MS325-2.5	-			1/6	2.2	
MS325-4	1/8	3.8		1/3	3.6	
MS325-6.3	1/4	5.8		1/2	4.9	
MS325-9	1/3	7.2		1	8	
MS325-12.5	1/2	9.8		2	12	
MS325-16	1	16		2-1/2		
MS325-20	1-1/2	20		3	17.0	
MS325-25	2	24		3	17.0	

Motor rating, three phase

Type	220 ... 240 V AC			440 ... 480 V AC			550 ... 600 V AC		
	hp	FLA	LRA	hp	FLA	LRA	hp	FLA	LRA
MS325-0.16	-	0.16	0.96	-	0.16	0.96	-	0.16	0.96
MS325-0.25	-	0.25	1.5	-	0.25	1.5	-	0.25	1.5
MS325-0.4	-	0.4	2.4	-	0.4	2.4	-	0.4	2.4
MS325-0.63	-	0.63	3.78	-	0.63	3.78	-	0.63	3.78
MS325-1	-	1	6	1/2	1.1	10	1/2	0.9	8
MS325-1.6	-	1.6	9.6	3/4	1.6	12.5	3/4	1.3	10
MS325-2.5	1/2	2.2	20	1	2.1	15	1-1/2	2.4	16
MS325-4	1	4.2	30	2	3.4	25	3	3.9	25.6
MS325-6.3	1-1/2	6	40	3	4.8	32	5	6.1	36.8
MS325-9	2-1/2			5	7.6	46	7-1/2	9.0	50.8
MS325-12.5	3	9.6	64	7-1/2	11.0	63.5	10	11.0	64.8
MS325-16	5	15.2	92	10	14.0	81	10	11.0	64.8
MS325-20	5	15.2	92	10	14.0	81	15	27.0	93
MS325-25	7-1/2	22.0	127	15	21.0	116	20	35.0	116

Manual motor controller for motor disconnect / group installation

Type	Maximum circuit breaker per UL/NEC 480 V	Maximum fuse type (class ...) per UL/NEC 480 V A	Maximum short-circuit current 480 V kA	Maximum circuit breaker per UL/NEC 600 V	Maximum fuse type K5 or RK5 per UL/NEC 600 V A	Maximum short-circuit current 600 V kA
MS325-0.16	-	1600 (class L)	85	S7H1200	1200	50
MS325-0.25	-	1600 (class L)	85	S7H1200	1200	50
MS325-0.4	-	1600 (class L)	85	S7H1200	1200	50
MS325-0.63	-	1600 (class L)	85	S7H1200	1200	50
MS325-1	-	1600 (class L)	85	S7H1200	1200	50
MS325-1.6	-	1600 (class L)	85	S7H1200	1200	50
MS325-2.5	-	1600 (class L)	85	S7H1200	1200	50
MS325-4	-	1600 (class L)	85	S7H1200	1200	50
MS325-6.3	S7H1200	600 (class K5)	50	S7H1200	1200	50
MS325-9	S7H1200	600 (class K5)	50	S4H250	250	50
MS325-12.5	S4H250	400 (class K5)	50	S7H1200	1200	30
MS325-16	S4H250	400 (class K5)	50	S7H1200	1200	30
MS325-20	S4H250	400 (class K5)	50	S4H250	250	30
MS325-25	S4H250	400 (class K5)	50	S4H250	250	30

Self-Protected (Type E) Combination Motor Controller and Tap Conductor Protection

Type	Self-Protected Combination Motor Controller (Type E) Maximum short-circuit current 480 Y / 277 V kA	for Tap Conductor Protection Maximum short-circuit current 480 Y / 277 V kA
MS325-0.16	18	18
MS325-0.25	18	18
MS325-0.4	18	18
MS325-0.63	18	18
MS325-1	18	18
MS325-1.6	18	18
MS325-2.5	18	18
MS325-4	18	18
MS325-6.3	18	18
MS325-9	18	18
MS325-12.5	18	18
MS325-16	18	18
MS325-20	18	18
MS325-25	18	18



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