DATA SHEET

Manual motor starter magnetic only MO165

Manual motor starters magnetic only are electromechanical protection devices for the main circuit mainly used to switch motors manually ON/OFF and protect them fuseless against short-circuits. 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 and overload relays.

Description

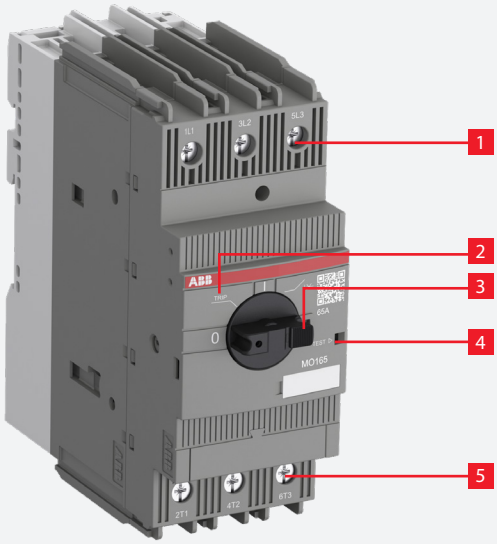
- Short-circuit protection
- Disconnect function
- Suitable for three- and single-phase applications
- Trip-free mechanism
- Clear switch position indication ON/OFF/TRIP
- Lockable handle

Order data

MO165 screw terminals

Rated operational current A	Rated operational power 400 V AC-3 kW	Type	Order code	Weight Pkg (1 pce) kg
16	7.5	MO165-16	1SAM461000R1011	0.95
20	7.5	MO165-20	1SAM461000R1012	0.95
25	11	MO165-25	1SAM461000R1013	0.96
32	15	MO165-32	1SAM461000R1014	0.97
42	22	MO165-42	1SAM461000R1015	0.97
54	22	MO165-54	1SAM461000R1016	0.97
65	30	MO165-65	1SAM461000R1017	0.98
73	37	MO165-73	1SAM461000R1018	0.98
80	45	MO165-80	1SAM461000R1019	0.98

Note: For overload protection of motors, an appropriate thermal or electronic overload relay must be used.



Functional description

1. Terminals 1L1, 3L2, 5L3
2. Switch position TRIP
3. Lockable handle
4. Test function
5. Terminals 2T1, 4T2, 6T3

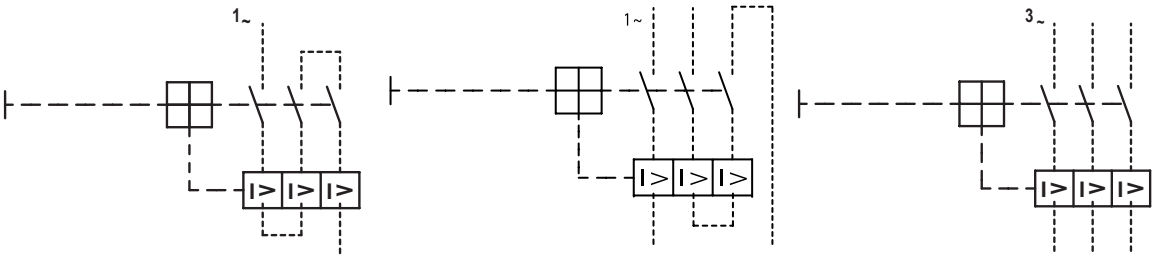
Application

Manual motor starters magnetic only protect loads and the installations against short-circuits. They are three pole protection devices with 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 the manual switching of loads.

For overload protection of motors, an appropriate thermal or electronic overload relay must be used.

Operation mode

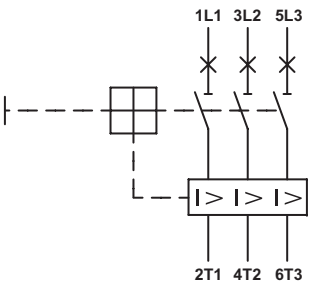


Single-phase operation

Single-phase operation

Three-phase operation

Wiring diagram

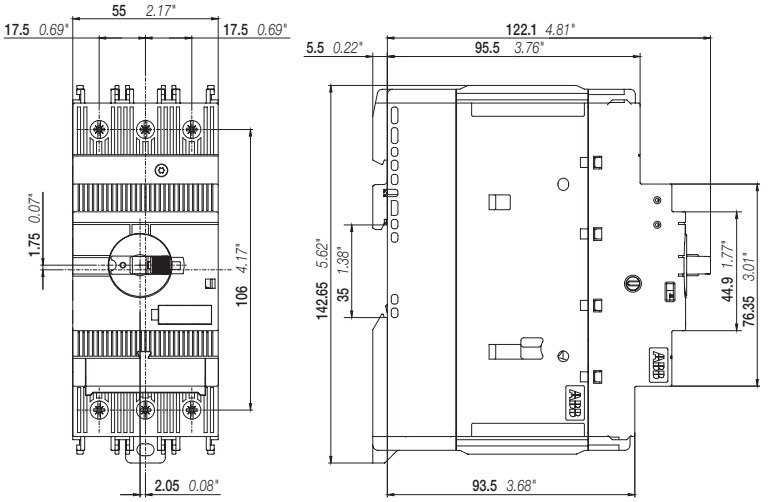


Power loss per pole

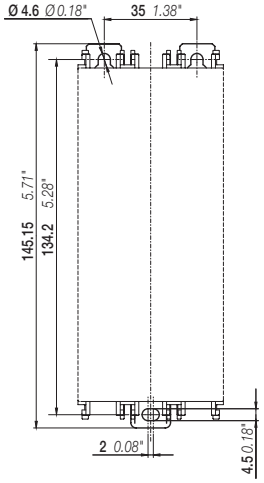
Type	Power loss per pole W
MO165-16	3.81
MO165-20	3.72
MO165-25	3.63
MO165-32	4.40
MO165-42	5.47
MO165-54	6.99
MO165-65	8.03
MO165-73	9.59
MO165-80	10.88

Main dimensions

in mm, inches



MO165



MO165 drilling plan

Technical data IEC/EN

Data at T_A = 40 °C and at rated values, if nothing else indicated

Main circuit

Terminal marking	1L1-3L2-5L3 2T1-4T2-6T3
Rated operational voltage Ue	690 V AC / 250 V DC (3 poles in series)
Rated operational current Ie	see table below
Rated operational current DC-5 Ie (250 V DC) 3 poles in series	see "Rated operational current Ie"
Rated instantaneous short-circuit current setting Ii	see table below
Rated service short-circuit breaking capacity Ics	see table "Short-circuit breaking capacity and back-up fuses" on page 6
Rated ultimate short-circuit breaking capacity Icu	
Rated service short-circuit breaking capacity DC Ics (250 V DC) 3 poles in series	100 kA
Rated frequency	DC, 50/60 Hz
Operating frequency	DC, 15 ... 415 Hz
Number of poles	3
Power loss per pole	see table "Power loss per pole" on page 3

Isolation data

Rated impulse withstand voltage Uimp	8 kV
Rated insulation voltage Ui	1000 V
Pollution degree	3

Electrical connection

	stranded	1/2 x 1 ... 50 mm²
	flexible with ferrule	1/2 x 1 ... 35 mm²
	flexible with ferrule insulated	1/2 x 1 ... 35 mm²
	flexible without ferrule	1/2 x 1 ... 35 mm²
Stripping length		16 mm
Tightening torque		4 Nm
Recommended screw driver		Pozidriv 2

Type	**Rated instantaneous short-circuit current setting Ii** A	**Rated operational current Ie** A
MO165-16	240	16
MO165-20	300	20
MO165-25	375	25
MO165-32	480	32
MO165-42	630	42
MO165-54	810	54
MO165-65	975	65
MO165-73	1022	73
MO165-80	1120	80

General data

Mechanical durability		50000
Electrical durability		25000 (1)
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 x In 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 on DIN rail		TH35-15 (35 x 15 mm Mounting Rail) acc. to IEC 60715 TH35-7.5 (35 x 7.5 mm Mounting Rail) acc. to IEC 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	housing / main circuit terminals	IP20 / IP10
Utilization category		A
Maximum operating altitude permissible		2000 m
Maximum operating frequency		50 cycles/h (2)
Recommended screw for mounting plate		M4
Screw torque for mounting plate		2 Nm

(1) for MO165-73 and MO165-80 20000 (400 V AC -3/AC-3e)
(2) for MO165-73 and MO165-80: 15 cycles/h

Environmental data

Ambient air temperature		
Operation	open	-25 ... +60 °C
Storage		-50 ... +80 °C
Resistance to vibrations acc. to IEC 60068-2-6		5g / 3 ... 150 Hz
Resistance to shock acc. to IEC 60068-2-27		25g / 11 ms pulse

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

Ics Rated service short-circuit breaking capacity
Icu 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		
	Ics kA	Icu kA	gG A	Ics kA	Icu kA	gG A	Ics kA	Icu kA	gG A	Ics kA	Icu kA	gG A
MO165-16	100	100	-	100	100	-	75	75	125*	40	40	125*
MO165-20	100	100	-	100	100	-	75	75	125*	40	40	125*
MO165-25	100	100	-	100	100	-	50	50	125*	30	30	125*
MO165-32	100	100	-	100	100	-	50	50	125*	30	30	125*
MO165-42	50	50	125*	50	50	125*	50	50	125*	30	30	125*
MO165-54	30	50	125*	30	50	125*	30	45	125*	20	20	125*
MO165-65	30	50	125*	30	50	125*	30	45	125*	20	20	125*
MO165-73	30	30		30	30		18	18		10	10	
MO165-80	30	30		30	30		18	18		10	10	

Type	690 V AC			250 V DC **		
	Ics kA	Icu kA	gG A	Ics kA	Icu kA	gG A
MO165-16	10	10	63*	100	100	-
MO165-20	10	10	63*	100	100	-
MO165-25	10	10	80*	100	100	-
MO165-32	10	10	100*	100	100	-
MO165-42	10	10	100*	100	100	-
MO165-54	6	8	100*	100	100	-
MO165-65	6	8	100*	100	100	-
MO165-73	6	8	160*	100	100	-
MO165-80	6	8	160*	100	100	-

*) Rated back-up fuse for short-circuit up to 100 kA
**) 3 poles in series

Technical data UL/CSA

Main circuit

Maximum operational voltage		600 V
Motor ratings	Horsepower	see table below
	Full Load Amps (FLA)	see table below
	Locked Rotor Amps (LRA)	see table below

Electrical connection

Type		**MO165**
Connecting capacity		
	stranded	1/2 x AWG 16 ... 0
	flexible without ferrule	1/2 x AWG 16 ... 0
Stripping length		16 mm
Tightening torque		35 lb-In
Recommended screw driver		Pozidriv 2
Recommended screw for mounting plate		M4
Screw torque for mounting plate		18 lb-In

Motor ratings, single-phase

Type	120 V AC			220 ... 240 V AC		
	hp	FLA	LRA	hp	FLA	LRA
MO165-16	1	16	96	2	12	72
MO165-20	1 1/2	20	120	3	17	102
MO165-25	2	24	144	3	17	102
MO165-32	2	24	144	5	28	168
MO165-42	3	34	204	7 1/2	40	240
MO165-54	3	34	204	10	50	300
MO165-65	5	56	336	10	50	300
MO165-73	5	73	435	15	73	435
MO165-80	5	80	435	15	80	435

Motor ratings, three-phase

Type	200 V AC			208 V AC			220 ... 240 V AC			440 ... 480 V AC			550 ... 600 V AC		
	hp	FLA	LRA	hp	FLA	LRA	hp	FLA	LRA	hp	FLA	LRA	hp	FLA	LRA
MO165-16	3	11	73.6	3	10.6	71	5	15.2	92	10	14	81	10	11	64.8
MO165-20	5	17.5	105.8	5	16.7	102	5	15.2	92	10	14	81	15	17	93
MO165-25	5	17.5	105.8	7 1/2	24.2	140	7 1/2	22	127	15	21	116	20	22	116
MO165-32	7 1/2	25.3	146	10	30.8	179	10	28	162	20	27	145	30	32	174
MO165-42	10	32.2	186.3	10	30.8	179	15	42	232	30	40	218	40	41	232
MO165-54	15	48.3	267	15	46.2	257	20	54	290	40	52	290	50	52	290
MO165-65	20	62.1	334	20	59.4	321	20	54	290	50	65	363	60	62	348
MO165-73	20	62.1	334	20	59.4	321	25	68	365	50	65	363	60	62	348
MO165-80	25	78.2	450	25	74.8	404	30	80	435	60	77	435	75	77	434

hp Horsepower
FLA Full Load Amps
LRA Locked Rotor Amps

Maximum short-circuit current ratings

Type	Manual Motor Controllers Branch circuit protection, max. size per NEC/CEC (1)		for motor disconnect		for group installations		for tap conductor protection in group installations	
	Fuses	Circuit breaker	480 V	600 V	480 V	600 V	480Y / 277 V	600Y / 347 V
	A	A	kA	kA	kA	kA	kA	kA
MO165-16	Any listed fuses. Size per NEC/CEC	Any listed UL489 / CSA C22.2 No.5 circuit breaker. Size per NEC /CEC	65	30	65	30	65	30
MO165-20			65	30	65	30	65	30
MO165-25			65	30	65	30	65	30
MO165-32			65	30	65	30	65	30
MO165-42			65	30	65	30	65	30
MO165-54			65	30	65	30	65	30
MO165-65			65	30	65	30	65	30
MO165-73			50	10	50	10	50	10
MO165-80			50	10	50	10	50	10

(1) NEC: NFPA®70 National Electrical Code®; CEC: CSA C22.1 Canadian Electrical Code.

Type	Combination Motor Controller (Type F) Coordination type 1					
	480Y / 277 V	OL Relay	Contactor	600Y / 347 V	OL Relay	Contactor
	kA			kA		
MO165-16	65	EF19-18.9	AF09 ... AF38	50	EF19-18.9	AF09 ... AF38
MO165-20	65	EF45-30	AF26 ... AF38	50	EF45-30	AF26 ... AF38
MO165-25	65	EF45-30	AF26 ... AF38	50	EF45-30	AF26 ... AF38
MO165-32	65	EF45-45	AF26 ... AF38	50	EF45-45	AF26 ... AF38
MO165-42	65	EF65	AF40 ... AF65	30	EF65	AF40 ... AF65
MO165-54	65	EF65	AF40 ... AF65	30	EF65	AF40 ... AF65
MO165-65	65	EF65	AF40 ... AF65	30	EF65	AF40 ... AF65
MO165-73	50	EF96	AF80 ... AF96	–	–	–
MO165-80	50	EF96	AF80 ... AF96	–	–	–

Type	Combination Motor Controller (Type F) Coordination type 1					
	480Y / 277 V	OL Relay	Contactor	600Y / 347 V	OL Relay	Contactor
	kA			kA		
MO165-16	65	TF42	AF09 ... AF38	30	TF42	AF09 ... AF38
MO165-20	65	TF42	AF26 ... AF38	30	TF42	AF09 ... AF38
MO165-25	65	TF42	AF26 ... AF38	50	TF42	AF26 ... AF38
MO165-32	65	TF42	AF26 ... AF38	50	TF42	AF26 ... AF38
MO165-42	65	TF65	AF40 ... AF65	30	TF65	AF40 ... AF65
MO165-54	65	TF65	AF40 ... AF65	30	TF65	AF40 ... AF65
MO165-65	65	TF65	AF40 ... AF65	30	TF65	AF40 ... AF65
MO165-73	50	TF96	AF80 ... AF96	–	–	–
MO165-80	50	TF96	AF80 ... AF96	–	–	–

Type	Combination Motor Controller (Type F) Coordination Type 2					
	480Y / 277 V kA	**OL Relay**	**Contactor**	**600Y / 347 V** kA	**OL Relay**	**Contactor**
MO165-73	50	EF96	AF80 … AF96	–	–	–
MO165-80	50	EF96	AF80 … AF96	–	–	–

Type	Combination Motor Controller (Type F) Coordination Type 2					
	480Y / 277 V kA	**OL Relay**	**Contactor**	**600Y / 347 V** kA	**OL Relay**	**Contactor**
MO165-73	50	TF96	AF80 … AF96	–	–	–
MO165-80	50	TF96	AF80 … AF96	–	–	–

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