

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

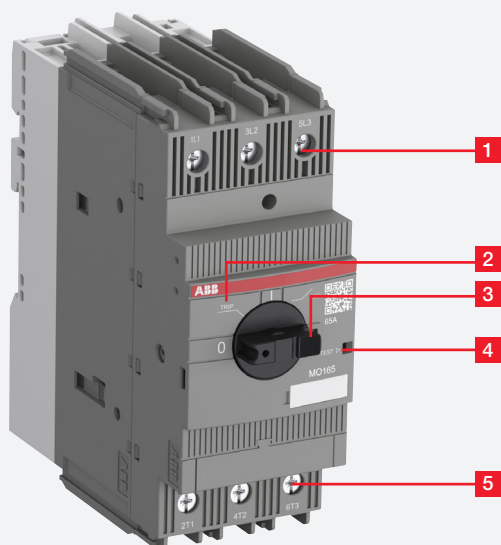


Order data

MO165 screw terminals

Rated operational current	Rated operational power 400 V AC-3 kW	Type	Order code	Weight Pkg (1 pce) kg
A				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

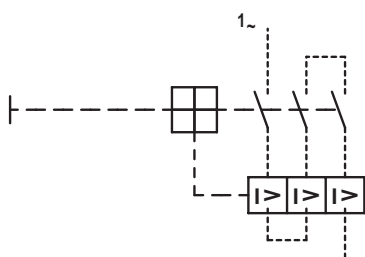
Application

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.

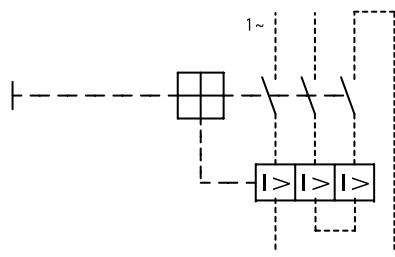
Furthermore, they provide a disconnect function for safe isolation of the installation and the supply and they can be used for the manual switching of loads.

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

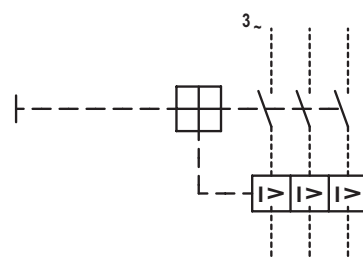
Operation mode



Single-phase operation

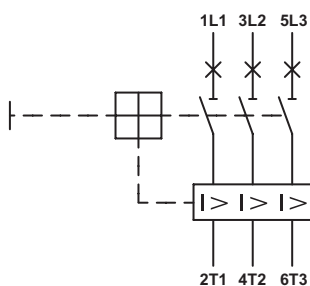


Single-phase operation



Three-phase operation

Wiring diagram

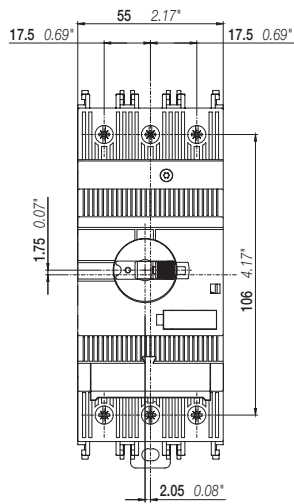


Power loss per pole

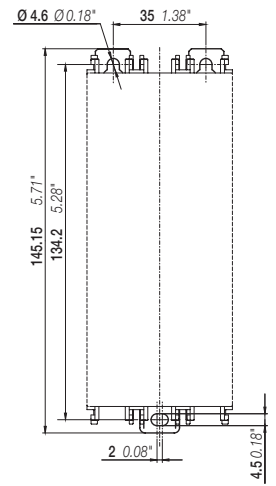
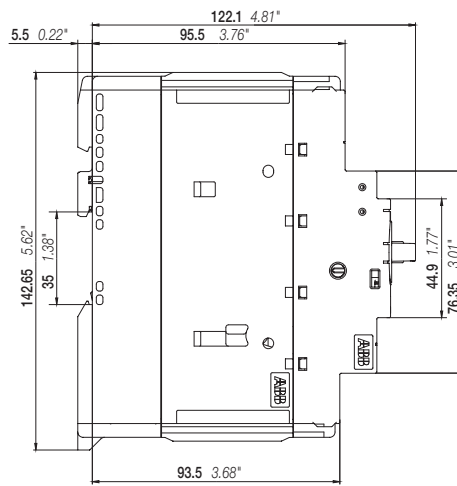
Type	Power loss per pole W
MO165-16	3.81
MO165-20	3.72
MO165-25	3.63
MO165-32	4.40
MO165-42	5.47
MO165-54	6.99
MO165-65	8.03
MO165-73	9.59
MO165-80	10.88

Main dimensions

in mm, inches



MO165



MO165 drilling plan





Technical data IEC/ENData 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 U _e	690 V AC / 250 V DC (3 poles in series)
Rated operational current I _e	see table below
Rated operational current DC-5 I _e (250 V DC) 3 poles in series	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"
Rated ultimate short-circuit breaking capacity I _{cu}	on page 6
Rated service short-circuit breaking capacity DC I _{cs} (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 U _{imp}	8 kV
Rated insulation voltage U _i	1000 V
Pollution degree	3

Electrical connection

Type	MO165		
Connecting capacity			
 Rigid stranded	1 or 2 x	1 ... 50 mm ²	
 Flexible with ferrule	1 or 2 x	1 ... 35 mm ²	
 Flexible with insulated ferrule	1 or 2 x	1 ... 35 mm ²	
 Flexible	1 or 2 x	1 ... 35 mm ²	
Stripping length		16 mm	
Tightening torque		4.0 Nm / 35 lb.in	
Recommended screw driver		Pozidriv 2	

Type	Rated instantaneous short-circuit current setting I _i	Rated operational current I _e
	A	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 $6 \times I_n$ 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 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	mounted on DIN-rail	4g / 3...150Hz
	mounted on mounting plate	5g / 3...150Hz
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	No. 2011/65/EU incl. 2015/863/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

Short-circuit breaking capacity and back-up fuses – MO165

Type	230 V AC			400 V AC			415 V AC			440 V AC			500 V AC			690 V AC			250 V DC (2)		
	Ics kA	Icu kA	gG A	Ics kA	Icu kA	gG A	Ics kA	Icu kA	gG A	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	-	100	100	-	75	75	125 (1)	40	40	125 (1)	10	10	63 (1)	100	100	-
MO165-20	100	100	-	100	100	-	100	100	-	75	75	125 (1)	40	40	125 (1)	10	10	63 (1)	100	100	-
MO165-25	100	100	-	100	100	-	100	100	-	50	50	125 (1)	30	30	125 (1)	10	10	80 (1)	100	100	-
MO165-32	100	100	-	100	100	-	100	100	-	50	50	125 (1)	30	30	125 (1)	10	10	100 (1)	100	100	-
MO165-42	50	50	125 (1)	50	50	125 (1)	50	50	125	50	50	125 (1)	30	30	125 (1)	10	10	100 (1)	100	100	-
MO165-54	30	50	125 (1)	30	50	125 (1)	30	45	125	30	45	125 (1)	20	20	125 (1)	6	8	100 (1)	100	100	-
MO165-65	30	50	125 (1)	30	50	125 (1)	30	45	125	30	45	125 (1)	20	20	125 (1)	6	8	100 (1)	100	100	-
MO165-73	30	30	200 (1)	30	30	200 (1)	18	18	200 (1)	18	18	200 (1)	10	10	200 (1)	6	8	160 (1)	100	100	-
MO165-80	30	30	200 (1)	30	30	200 (1)	18	18	200 (1)	18	18	200 (1)	10	10	200 (1)	6	8	160 (1)	100	100	-

(1) Maximum rated current of the back-up fuse for short circuit up to 100kA if Icc > Ics



(2) 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 or 2 x AWG 16 ... 0
 flexible without ferrule	1 or 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

Note: For UL listed, use 75°C stranded Cu wire only.

UL/CSA Motor ratings, single phase

Type	110-120 VAC			200 VAC			208 VAC			220-240 VAC		
	hp	FLA	LRA	hp	FLA	LRA	hp	FLA	LRA	hp	FLA	LRA
MO165-16	1	16	96	2	16	96	2	16	96	2	16	96
MO165-20	1 1/2	20	120	3	20	120	3	20	120	3	20	120
MO165-25	2	25	150	3	25	150	3	25	150	3	25	150
MO165-32	2	32	192	3	32	192	5	32	192	5	32	192
MO165-42	3	42	252	5	42	252	5	42	252	7 1/2	42	252
MO165-54	3	54	324	7 1/2	54	324	7 1/2	54	324	10	54	324
MO165-65	5	65	348	10	65	348	10	65	348	10	65	348
MO165-73	5	73	435	10	73	435	10	73	435	15	73	435
MO165-80	5	80	435	10	80	435	10	80	435	15	80	435

UL/CSA Motor ratings, three phase

Type	110-120 VAC			200 VAC			208 VAC			220-240 VAC			440-480 VAC			550-600 VAC		
	hp	FLA	LRA	hp	FLA	LRA	hp	FLA	LRA	hp	FLA	LRA	hp	FLA	LRA	hp	FLA	LRA
MO165-16	2	16	96	3	16	96	3	16	96	5	16	96	10	16	96	10	16	96
MO165-20	3	20	120	5	20	120	5	20	120	5	20	120	10	20	120	15	20	120
MO165-25	3	25	150	5	25	150	7 1/2	25	150	7 1/2	25	150	15	25	150	20	25	150
MO165-32	5	32	192	7 1/2	32	192	10	32	192	10	32	192	20	32	192	30	32	192
MO165-42	5	42	252	10	42	252	10	42	252	15	42	252	30	42	252	40	42	252
MO165-54	7 1/2	54	324	15	54	324	15	54	324	20	54	324	40	54	324	50	54	324
MO165-65	10	65	348	20	65	348	20	65	348	20	65	348	50	65	348	60	65	348
MO165-73	10	73	435	20	73	435	20	73	435	25	73	435	50	73	435	60	73	435
MO165-80	10	80	435	25	80	435	25	80	435	30	80	435	60	80	435	75	80	435

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 A	Circuit breaker A	480 V kA	600 V kA	480 V kA	600 V kA	480Y / 277 V kA	600Y / 347 V 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.

Maximum short-circuit current ratings – MO165 with AF contactors and electronic overload relays

Type	Combination Motor Controllers (Type F) Coordination type 1					
	480Y / 277 V kA	OL Relay	Contactor	600Y / 347 V kA	OL Relay	Contactor
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	-	-	-

Maximum short-circuit current ratings – MO165 with AF contactors and thermal overload relays

Type	Combination Motor Controllers (Type F) Coordination type 1					
	480Y / 277 V kA	OL Relay	Contactor	600Y / 347 V kA	OL Relay	Contactor
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	-	-	-

More coordination tables are available in our SOC (selected optimized coordination) tool:
<https://applications.it.abb.com/SOC/Motor>.



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