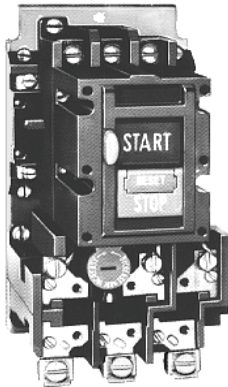


Single-Phase Starters



Single- and Three-Phase Starters



11.1 Single-Phase Starters

MS Series

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Application Description	V10-T11-2
Features	V10-T11-2
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11.2 Single- and Three-Phase Starters

Type B100

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Application Description	V10-T11-6
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Single-Phase Starters



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Single-Phase Starters

Product Selection **V10-T11-3**Accessories **V10-T11-4**Dimensions **V10-T11-5**

MS Series

Product Description

- Eaton's MS motor starter is a compact, versatile unit featuring heavy sliding contacts as well as "quick-make" and "quick-break" mechanism
- Standard with large pressure type terminals, straight-through wiring and a trip-free handle mechanism
- The "plug-in" heater element is keyed to ensure proper positioning and an adjustable knob allows a setting of plus or minus ten percent of the nominal heater rating

Application Description

The MS manual motor starter provides manual control and overload protection to single-phase motors. By utilizing the interchangeable heater elements, the starter can protect motors ranging from 0.40A up to 16.0A. Ideal for HVAC applications.

Features

- Compact size
- Trip-free handle mechanism
- Keyed heater elements to ensure proper installation
- Starters available with red pilot light
- The operating handle of the enclosed units can be locked in the OFF position
- Enclosures are offered in Type 1, 3, 4 and 5
- Hazardous locations cast aluminum enclosures are available rated for Type 7, Class I, Group D (vapors) and Type 9, Class II, Groups E, F and G (dust)

Instructional Leaflet

IL12987G

Standards and Certifications

Note: See **Tab 17** for additional information on standards and certifications that apply to all enclosed control products.

- UL File No. E1922, Category NLRV (for motor controller)
- CSA File No. LR39402-6, Class 3211-05
- ABS Type Approved
- OSHPD Certified (OSP-0015-10)



Product Selection**When Ordering Specify**

- Catalog number of manual motor starter
- Heater pack selection
- Any required accessories
- Heater coil selection according to the motor full load current requirements

MS Series Starters—Open Type

Number of Poles	Horsepower	Voltage	Catalog Number ^①
1	1	120/240V, 277 Vac	MST01
	1/4	120/240 Vdc	
	1/4	32 Vdc	
2	1	120/240V, 277 Vac	MST02
	1	120/240 Vdc	
	1/4	32 Vdc	

Switch and Pilot Light Mounted on Flush Plate**MS Series Starters—Flush Plate Type (No Enclosure Included)**

Number of Poles	Flush Plate Type	Description	Catalog Number ^①
1	General purpose	Switch only	MST01FN
		Switch with pilot light	MST01FN1P
2	General purpose	Switch only	MST02FN
		Switch with pilot light	MST02FN1P
1	Stainless steel	Switch only	MST01DN
		Switch with pilot light	MST01DN1P
2	Stainless steel	Switch only	MST02DN
		Switch with pilot light	MST02DN1P

Switch and Pilot Light Mounted in Type 1 Enclosure**MS Series Starters—Enclosed Type**

Number of Poles	Enclosure Type	Description	Catalog Number ^①
1	General purpose Type 1	Switch only	MST01SN
		Switch with pilot light	MST01SN1P
2	General purpose Type 1	Switch only	MST02SN
		Switch with pilot light	MST02SN1P

Waterproof Type 3, 4 and 5

1	Waterproof Type 3, 4 and 5	Through hub	MST01AH
2		Through hub	MST02AH

Hazardous Location Type 7D, 9E, 9F and 9G

1	Hazardous location ^② Types 7D, 9E, 9F and 9G	Through hub	MST01EH
2		Through hub	MST02EH

Notes

^① Does not include heater. Select heater from table on **Page V10-T11-4**.

^② Type 7D = Type 7, Class I, Group D; Type 9E, 9F and 9G = Type 9, Class II, Groups E, F and G.

Typical Heater



Heater Element Installation



Heater Selection for MS Starters

Motor Full Load Current	Catalog Number	Motor Full Load Current	Catalog Number
0.4–0.43	MSH-5A	2.72–2.95	MSH3-4A
0.44–0.48	MSH-55A	2.96–3.27	MSH3-7A
0.49–0.53	MSH-61A	3.28–3.59	MSH4-1A
0.54–0.58	MSH-67A	3.60–3.99	MSH4-5A
0.59–0.64	MSH-74A	4.00–4.39	MSH5-0A
0.65–0.71	MSH-81A	4.40–4.79	MSH5-5A
0.72–0.78	MSH-89A	4.80–5.26	MSH6-0A
0.79–0.87	MSH-98A	5.27–5.83	MSH6-6A
0.88–0.95	MSH1-1A	5.84–6.39	MSH7-3A
0.96–1.03	MSH1-2A	6.40–7.03	MSH8-0A
1.04–1.15	MSH1-3A	7.04–7.74	MSH8-8A
1.16–1.27	MSH1-45A	7.75–8.46	MSH9-7A
1.28–1.35	MSH1-6A	8.47–9.35	MSH10-6A
1.36–1.51	MSH1-7A	9.36–10.30	MSH11-7A
1.52–1.67	MSH1-9A	10.31–11.35	MSH12-9A
1.68–1.83	MSH2-1A	11.36–12.47	MSH14-2A
1.84–1.99	MSH2-3A	12.48–13.67	MSH15-6A
2.00–2.23	MSH2-5A	13.68–15.12	MSH17-1A
2.24–2.47	MSH2-8A	15.13–16.00	MSH18-6A
2.48–2.71	MSH3-1A		

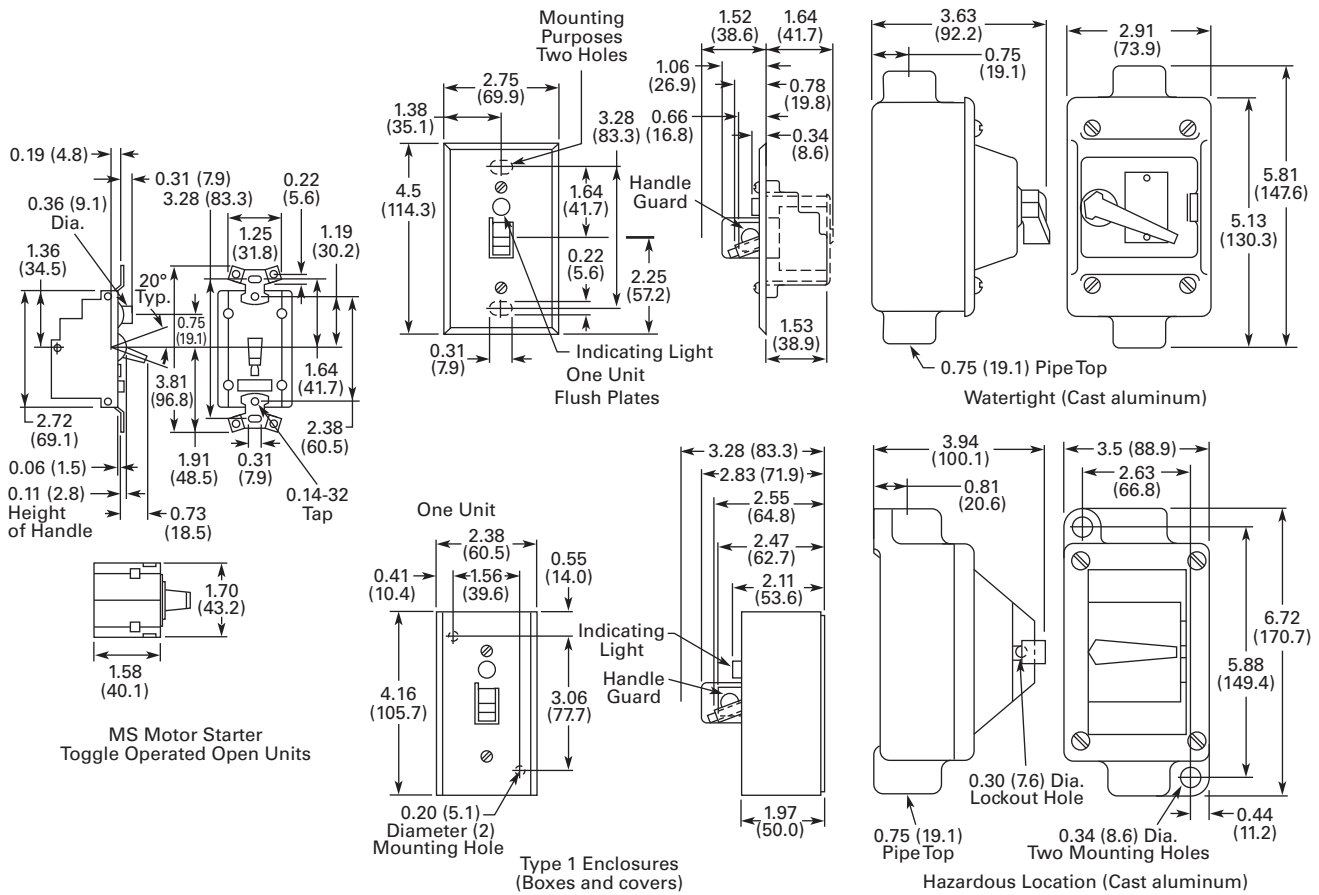
Accessories

MS Series Accessories

Description	Catalog Number
Pilot light kit (NEMA 1 enclosure and flush plates)	MSPT
Box, 1 unit (NEMA 1 enclosure)	MS1BN
Cover, 1 unit (NEMA 1 enclosure)	MS1CN
Flush plate, 1 unit (steel)	MS1FN
Flush plate, 1 unit (stainless steel)	MS1DN
Handle guard (padlockable for NEMA 1 enclosure and flush plates)	MSLG

Dimensions

Approximate Dimensions in Inches (mm)

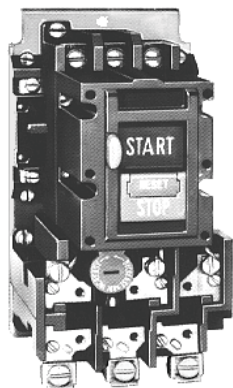
MS Series Single-Phase Starters

11.2

Manual Motor Control

Single- and Three-Phase Starters

Single- and Three-Phase Starters



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11

Type B100

Product Description

Eaton's B100 manual motor starters can be used in single-phase applications rated 3 hp at 240 Vac or 2 hp at 230 Vdc. The starter can also be rated for three-phase applications up to 10 hp at 600 Vac.

There are two methods of operation for the B100 manual starter. It can be ordered with a toggle switch operator or a START/STOP pushbutton operator.

Application Description

The B100 family of manual motor starters provides manual control, as well as overload protection, to both single-phase and three-phase motors. The starter protects motors up to 38.9A single-phase and 26.8A three-phase with the appropriate heater selection.

Features

- Includes three-pole bimetallic overload relay
- Straight-through wiring
- Field mounted auxiliary contacts
- Available in Type 1, 4, 7, 9 and 12 enclosures with toggle operation (Type 1 enclosure for pushbutton operator)
- Standard with a lockout device to lock motor in the OFF position

Instructional Leaflet

IL14890

Standards and Certifications

Note: See **Tab 17** for additional information on standards and certifications that apply to all enclosed control products.

- UL File No. E19222, Category NLRV (for motor controller)
- CSA File No. LR39402-6, Class 3211-05 (open starters)
- CSA File No. LR54517-1, Class 3211-05 (closed starters)
- ABS Type Approved
- OSHPD Certified (OSP-0015-10)



Product Selection

When Ordering Specify

- Catalog number of starter with application modifications
- Heater pack selection—a three-phase starter requires three heaters, and a single-phase starter requires two heaters
- Any required accessories

Toggle Operated



Type 1 Enclosure



Toggle and Pushbutton Operated Starters

NEMA Size	Enclosed				
	Open Type Toggle Handle Catalog Number ^①	Type 1 General Purpose Catalog Number ^①	Type 4 Watertight, Stainless Steel ^② Catalog Number ^①	Type 7D, 9E, 9F and 9G for Hazardous Locations ^{③④} Catalog Number ^①	Type 12 Dust-Tight Catalog Number ^①
Type B100 Non-Reversing Two-Pole (For Single-Phase Motors and DC)					
M-0	B100M0B	B100S0B	B100W0B	B100U0B	B100J0B
M-1	B100M1B	B100S1B	B100W1B	B100U1B	B100J1B
Type B100 Non-Reversing Three-Pole (For Polyphase Motors) ^④					
M-0	B100M0C	B100S0C	B100W0C	B100U0C	B100J0C
M-1	B100M1C	B100S1C	B100W1C	B100U1C	B100J1C

Notes

- ^① Does not include heaters. Select catalog numbers of heaters from table on **Page V10-T11-8**.
- ^② One 1-inch chrome hub supplied on each end.
- ^③ Type 7D = Type 7, Class I, Group D. Type 9E, 9F and 9G = Type 9, Class II, Groups E, F and G.
- ^④ Tapped for 1-inch conduit on each end.

Heater Selection

Motor Full Load Current	Maximum Fuse Amps	Catalog Number	Motor Full Load Current	Maximum Fuse Amps	Catalog Number	Motor Full Load Current	Maximum Fuse Amps	Catalog Number
Single-Phase Enclosed Starters ①								
0.28–0.29	1	FH03	1.90–2.10	7	FH22	9.59–10.40	35	FH40
0.30–0.33	1	FH04	2.11–2.32	8	FH23	10.41–11.30	35	FH41
0.34–0.36	1	FH05	2.33–2.54	8	FH24	11.40–12.20	40	FH42
0.37–0.40	1	FH06	2.55–2.79	9	FH25	12.30–13.50	45	FH43
0.41–0.45	1	FH07	2.80–3.07	10	FH26	13.60–14.90	50	FH44
0.46–0.50	1	FH08	3.08–3.36	10	FH27	15.00–16.00	50	FH45
0.51–0.56	1	FH09	3.37–3.68	10	FH28	16.10–17.10	60	FH46
0.57–0.63	2	FH10	3.69–4.03	10	FH29	17.20–18.30	60	FH47
0.64–0.70	2	FH11	4.04–4.40	15	FH30	18.40–19.70	70	FH48
0.71–0.78	2	FH12	4.41–4.81	15	FH31	19.80–21.20	70	FH49
0.79–0.86	2	FH13	4.82–5.26	15	FH32	21.30–22.80	80	FH50
0.87–0.95	3	FH14	5.27–5.74	15	FH33	22.90–24.50	88	FH51
0.96–1.04	3	FH15	5.75–6.26	20	FH34	24.60–26.40	90	FH52
1.05–1.14	3	FH16	6.27–6.83	20	FH35	26.50–28.50	90	FH53
1.15–1.25	4	FH17	6.84–7.45	25	FH36	28.60–30.80	100	FH54
1.26–1.39	4	FH18	7.46–8.11	25	FH37	30.90–33.30	110	FH55
1.40–1.54	5	FH19	8.12–8.81	30	FH38	33.40–36.00	125	FH56
1.55–1.71	5	FH20	8.82–9.58	30	FH39	36.10–38.90	125	FH57
1.72–1.89	6	FH21						
Three-Phase Enclosed Starters ②								
0.25–0.26	1	FH03	1.51–1.66	5	FH21	7.12–7.73	25	FH38
0.27–0.29	1	FH04	1.67–1.84	5	FH22	7.74–8.40	25	FH39
0.30–0.32	1	FH05	1.85–2.03	7	FH23	8.41–9.12	30	FH40
0.33–0.35	1	FH06	2.04–2.23	7	FH24	9.13–9.89	35	FH41
0.36–0.39	1	FH07	2.24–2.45	8	FH25	9.90–10.70	35	FH42
0.40–0.44	1	FH08	2.46–2.69	9	FH26	10.80–11.80	40	FH43
0.45–0.49	1	FH09	2.70–2.95	10	FH27	11.90–13.00	45	FH44
0.50–0.55	1	FH10	2.96–3.23	10	FH28	13.10–14.00	50	FH45
0.56–0.61	2	FH11	3.24–3.53	10	FH29	14.10–15.00	50	FH46
0.62–0.68	2	FH12	3.54–3.85	10	FH30	15.10–16.10	50	FH47
0.69–0.75	2	FH13	3.86–4.22	10	FH31	16.20–17.30	60	FH48
0.78–0.83	2	FH14	4.23–4.61	15	FH32	17.40–18.60	60	FH49
0.84–0.91	3	FH15	4.62–5.03	15	FH33	18.70–20.00	70	FH50
0.92–1.00	3	FH16	5.04–5.49	15	FH34	20.10–21.50	70	FH51
1.01–1.10	3	FH17	5.50–5.99	20	FH35	21.60–23.20	80	FH52
1.11–1.22	4	FH18	6.00–6.53	20	FH36	23.30–25.00	80	FH53
1.23–1.35	4	FH19	6.54–7.11	25	FH37	25.10–26.80	90	FH54
1.36–1.50	5	FH20						

Notes

① Single-phase starters require two overload heaters.

② Three-phase starters require three overload heaters.

FH series heaters are for type B100 manual motor starters. Heater element selection is based on motor nameplate's listed full load amperes.

Trip rating of this series of elements is 125% of minimum motor full load amperes listed for the element.

When motor and overload relay are in the same ambient and the service factor of the motor is 1.15 to 1.25, select heaters from the heater selection table.

If the service factor is 1.0 or less (including zero), or a maximum of 115% protection is desired, select a heater one size smaller than indicated for the amperage range required.

Accessories**Accessories**

Description	Catalog Number
Field Mounting Kits	
Auxiliary contact	
1NO	B1A
1NC	B1B
Red pilot light	
120/60 (Type 1 enclosed only)	LK-21
208-240/6 (Type 1 enclosed only)	LK-22
480-600/60 (Type 1 enclosed only)	LK-26
For Type 4 and 12 Enclosures Only	
Red pilot light	
120V	LK-41
240V	LK-42

Options**Factory Modifications**

Description	Catalog Number ^① Suffix
Pushbutton operator (open and Type 1 only)	A
Without lockoff (open only)	X

Technical Data**Specifications**

NEMA Size	Maximum hp for AC Ratings ^②			Maximum hp for DC Ratings	
	120 Vac	208–240 Vac	480–600 Vac	115 Vdc	230 Vdc
Two-Pole, Single-Phase					
M-0	1	2	—	1	1-1/2
M-1	2	3	—	1-1/2	2
Three-Pole, Three-Phase					
M-0	2	3	5	—	—
M-1	3	7-1/2	10	—	—

Notes

^① Add suffix letter to starter catalog number. Example: B100MOCA.

^② Ratings up to 3 hp, three-phase are suitable for group fusing.

11.2 Manual Motor Control

Single- and Three-Phase Starters

Dimensions

Approximate Dimensions in Inches (mm)

Type B100 Single- and Three-Phase Starters

