



Bulletin 150 — Smart Motor Controllers — SMC™-3 Smart Motor Controller

The SMC-3 is a compact, simple to use, solid-state motor controller designed to operate 3-phase motors. It features a built-in overload relay and a built-in SCR bypass contactor on all three phases, allowing a smaller footprint than other soft starters on the market. This product is designed for many applications, including compressors, chillers, pumps, conveyors, and crushers. Modes of operation for the controller are as follows:

- Soft Start
- Current Limit Start
- Soft Stop
- Kick Start

The controllers offer two voltage ranges: 200...480V AC and 200...600V AC. All voltage ranges will operate at either 50 or 60 Hz.

- 1...480 A Range
- Built-In Electronic Motor Overload Protection
- Built-In SCR/Run Bypass
- Delta Compatibility

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This catalog is based on the **minimum** information needed to select an SMC soft starter for applications with low starting torque requirements. For product selection involving loads with high starting torque requirements (large fan, rock crusher, chipper, etc.), use of the free tools available from the Rockwell Automation Website is recommended:

http://www.ab.com/industrialcontrols/products/solid-state_motor_control/software/

Standards Compliance

- UL 508
- CSA C22.2 No.14
- EN/IEC 60947-1
- EN/IEC 60947-4-2

Certifications

- cULus Listed (Open Type) (File No. E96956, Guides NMFT, NMFT7)
- CSA Certified (File No. LR 1234)
- CE Marked (Open Type) per EMC and Low Voltage Directive
- CCC Certified

Modes of Operation

- Soft Start
- Current Limit Start
- Selectable Kickstart
- Soft Stop

Note: For detailed information about the different modes of operation, see page 4

Description of Features

Electronic Motor Overload Protection

The SMC-3 controller incorporates, as standard, electronic motor overload protection. This motor overload protection is accomplished electronically with the use of current transformers on each of the three phases. The controller's overload protection is programmable, providing the user with flexibility. The overload trip class selection consists of either OFF, 10, 15, or 20. The trip current is easily selected by adjusting the rotary potentiometer to the motor full-load current rating. Trip reset is selectable to either automatic or manual mode.

Note: Trip rating is 120% of dial setting.

Over-temperature

The SMC-3 monitors the SCR temperature by means of internal thermistors. When the power poles maximum rated temperature is reached, the microcomputer switches off the SMC, a TEMP fault is indicated via LED, and the 97/98 fault contact closes.

Phase Reversal Protection

When enabled via a DIP switch, 3-phase input power will be verified before starting. If input power phasing is detected to be incorrect, the start will be aborted and a fault indicated.

Phase Loss/Open Load

The unit will not attempt a start if there is a single-phase condition on the line. This protects from motor burnout during single-phase starting.

Phase Imbalance

The unit monitors for imbalance between phase currents. To prevent motor damage, the unit will trip if the difference between the minimum phase current and the maximum phase current exceeds 65% for 3 s, and a fault will be indicated.

Shorted SCR

Prior to every start and during starting, the unit will check all SCRs for shorts and unit load connections to the motor. If there is a shorted SCR in the SMC-3 and/or open load, the start will be aborted and a shorted SCR or open load fault will be indicated. This prevents damage from phase imbalance.

Push to Test

The unit with control wiring can be tested for fault conditions by using the Push to Test function. Hold down the Reset button for 7 s to activate the fault Aux (97, 98) and shut down the SMC-3. To clear, either push the Reset button or cycle control power to the device.

LED Description (Number of Flashes)

1. Overload
2. Overtemperature
3. Phase Reversal
4. Phase Loss/Open Load
5. Phase Imbalance
6. Shorted SCR
7. Test

Cat. No. Explanation
 Open and Non-Combination

150 – C 30 F B D – 8L
a b c d e f g

a

Bulletin Number	
Code	Description
150	Solid-State Controller

b

Controller Type	
Code	Description
C	SMC-3

c

Ampere Ratings	
Code	Description
3	3 A
9	9 A
16	16 A
19	19 A
25	25 A
30	30 A
37	37 A
43	43 A
60	60 A
85	85 A
108	108 A
135	135 A
201	201 A
251	251 A
317	317 A
361	361 A
480	480 A

d

Enclosure Type	
Code	Description
N	Open
F	NEMA 4/12 (IP65)

e

Input Line Voltage Open Type	
Code	Description
B	200...460V AC, 3-Phase, 50/60 Hz
C	200...600V AC, 3-Phase, 50/60 Hz
Non-Combination Enclosed Only	
H	200...208V AC, 3-Phase, 50/60 Hz
A	230V AC, 3-Phase, 50/60 Hz
B	400...460V AC, 3-Phase, 50/60 Hz
C	500...575V AC, 3-Phase, 50/60 Hz

f

Control Voltage	
Code	Description
D	100...240V AC
R	24V AC/DC (Open Type only)

g

Options (see page 42 for a full listing)	
Code	Description
8L	Line Mounted Protective Module (Enclosed Type only)

Load-side MOVs are not available when used with inside-the-delta connections. MOVs can be field installed for open type units.

Combination

152H – C 30 F BD 43 – 8L
a b c d e f g

a

Bulletin Number	
Code	Description
152H	Solid-State Controller with Fusible Disconnect
153H	Solid-State Controller with Circuit Breaker

b

Controller Type	
Code	Description
C	SMC-3

c

Ampere Ratings	
Code	Description
3	3 A
9	9 A
16	16 A
19	19 A
25	25 A
30	30 A
37	37 A
43	43 A
60	60 A
85	85 A
108	108 A
135	135 A
201	201 A
251	251 A
317	317 A
361	361 A
480	480 A

e

Input Line Voltage Open Type	
Code	Description
HD	200...208V AC, 3-Phase, 50/60 Hz
AD	230V AC, 3-Phase, 50/60 Hz
BD	400...460V AC, 3-Phase, 50/60 Hz
CD	500...575V AC, 3-Phase, 50/60 Hz

g

Options (see page 42 for a full listing)	
Code	Description
8L	Line Mounted Protective Module (Enclosed Type only)

Load-side MOVs are not available when used with inside-the-delta connections.

d

Enclosure Type	
Code	Description
F	NEMA Type 4/12 (IP65)
J	NEMA Type 12 (IP54)
X	NEMA Type 3R (IP44)

f

Horsepower									
Cat. No.	Hp Rating	Cat. No.	Hp Rating	Cat. No.	Hp Rating	Cat. No.	Hp Rating	Cat. No.	Hp Rating
33	0.5	39	5	46	40	52	150	60	450
34	0.75	40	7.5	47	50	54	200	61	500
35	1	41	10	48	60	56	250	62	600
36	1.5	42	15	49	75	57	300	63	700
37	2	43	20	50	100	58	350	65	800
38	3	44	25	51	125	59	400	67	1000
—	—	45	30	—	—	—	—	—	—

Open Type and Non-Combination Enclosed (IP65, NEMA 4/12) Controllers — For use with Line-Connected Motors

Rated Voltage [V AC]	Motor Current [A]‡	Max. kW, 50 Hz	Max. Hp, 60 Hz	Control Power	Open Type — Line-Connected Motors	IP65 (Type 4/12) Enclosed Non-Combination Controllers*
					Cat. No.	Cat. No.
200/208	1...3	—	0.5	100...240V AC, 50/60 Hz	150-C3NBD	150-C3FHD
		—		24V AC/DC	150-C3NBR	—
	3...9	—	0.75...2	100...240V AC, 50/60 Hz	150-C9NBD	150-C9FHD
		—		24V AC/DC	150-C9NBR	—
	5.3...16	—	1.5...3	100...240V AC, 50/60 Hz	150-C16NBD	150-C16FHD
		—		24V AC/DC	150-C16NBR	—
	6.3...19	—	1.5...3	100...240V AC, 50/60 Hz	150-C19NBD	150-C25FHD
		—		24V AC/DC	150-C19NBR	—
	9.2...25	—	3...7.5	100...240V AC, 50/60 Hz	150-C25NBD	150-C25FHD
		—		24V AC/DC	150-C25NBR	—
	10...30	—	3...7.5	100...240V AC, 50/60 Hz	150-C30NBD	150-C30FHD
		—		24V AC/DC	150-C30NBR	—
	12.3...37	—	5...10	100...240V AC, 50/60 Hz	150-C37NBD	150-C37FHD
		—		24V AC/DC	150-C37NBR	—
	14.3...43	—	5...10	100...240V AC, 50/60 Hz	150-C43NBD	150-C43FHD
		—		24V AC/DC	150-C43NBR	—
	20...60	—	7.5...15	100...240V AC, 50/60 Hz	150-C60NBD	150-C60FHD
		—		24V AC/DC	150-C60NBR	—
	28.3...85	—	10...25	100...240V AC, 50/60 Hz	150-C85NBD	150-C85FHD
		—		24V AC/DC	150-C85NBR	—
27...108	—	20...30	100...240V AC, 50/60 Hz	150-C108NBD	150-C108FHD	
	—		24V AC/DC Δ	150-C108NBR	—	
34...135	—	25...40	100...240V AC, 50/60 Hz	150-C135NBD	150-C135FHD	
	—		24V AC/DC Δ	150-C135NBR	—	
67...201	—	40...60	100...240V AC, 50/60 Hz	150-C201NBD	150-C201FHD	
	—		24V AC/DC Δ	150-C201NBR	—	
84...251	—	50...75	100...240V AC, 50/60 Hz	150-C251NBD	150-C251FHD	
	—		24V AC/DC Δ	150-C251NBR	—	
106...317	—	60...100	100...240V AC, 50/60 Hz	150-C317NBD	150-C317FHD	
	—		24V AC/DC Δ	150-C317NBR	—	
120...361	—	75...125	100...240V AC, 50/60 Hz	150-C361NBD	150-C361FHD	
	—		24V AC/DC Δ	150-C361NBR	—	
160...480	—	100...150	100...240V AC, 50/60 Hz	150-C480NBD	150-C480FHD	
	—		24V AC/DC Δ	150-C480NBR	—	

‡ Motor FLA rating should fall within specified current range for unit to operate properly.

* These controllers require a separate 100...240V, 50/60 Hz single-phase control source. To add a control circuit transformer to the enclosure, add the appropriate option code to the catalog string.

Δ Separate 120V or 240V single phase is required for fan operation.

Open Type and Non-Combination Enclosed (IP65, NEMA 4/12) Controllers — For use with Line-Connected Motors, Continued

Rated Voltage [V AC]	Motor Current [A]‡	Max. kW, 50 Hz	Max. Hp, 60 Hz	Control Power	Open Type — Line-Connected Motors	IP65 (Type 4/12) Enclosed Non-Combination Controllers♣
					Cat. No.	Cat. No.
230	1...3	0.55	0.5	100...240V AC, 50/60 Hz	150-C3NBD	150-C3FAD
				24V AC/DC	150-C3NBR	—
	3...9	2.2	0.75...2	100...240V AC, 50/60 Hz	150-C9NBD	150-C9FAD
				24V AC/DC	150-C9NBR	—
	5.3...16	4	1.5...5	100...240V AC, 50/60 Hz	150-C16NBD	150-C16FAD
				24V AC/DC	150-C16NBR	—
	6.3...19	4	2...5	100...240V AC, 50/60 Hz	150-C19NBD	150-C25FAD
				24V AC/DC	150-C19NBR	—
	9.2...25	5.5	3...7.5	100...240V AC, 50/60 Hz	150-C25NBD	150-C25FAD
				24V AC/DC	150-C25NBR	—
	10...30	7.5	5...10	100...240V AC, 50/60 Hz	150-C30NBD	150-C30FAD
				24V AC/DC	150-C30NBR	—
	12.3...37	7.5	5...10	100...240V AC, 50/60 Hz	150-C37NBD	150-C37FAD
				24V AC/DC	150-C37NBR	—
	14.3...43	11	5...15	100...240V AC, 50/60 Hz	150-C43NBD	150-C43FAD
				24V AC/DC	150-C43NBR	—
	20...60	15	7.5...20	100...240V AC, 50/60 Hz	150-C60NBD	150-C60FAD
				24V AC/DC	150-C60NBR	—
	28.3...85	22	15...30	100...240V AC, 50/60 Hz	150-C85NBD	150-C85FAD
				24V AC/DC	150-C85NBR	—
27...108	30	20...40	100...240V AC, 50/60 Hz	150-C108NBD	150-C108FAD	
			24V AC/DC△	150-C108NBR	—	
34...135	37	25...50	100...240V AC, 50/60 Hz	150-C135NBD	150-C135FAD	
			24V AC/DC△	150-C135NBR	—	
67...201	55	40...75	100...240V AC, 50/60 Hz	150-C201NBD	150-C201FAD	
			24V AC/DC△	150-C201NBR	—	
84...251	75	50...100	100...240V AC, 50/60 Hz	150-C251NBD	150-C251FAD	
			24V AC/DC△	150-C251NBR	—	
106...317	90	60...125	100...240V AC, 50/60 Hz	150-C317NBD	150-C317FAD	
			24V AC/DC△	150-C317NBR	—	
120...361	110	75...150	100...240V AC, 50/60 Hz	150-C361NBD	150-C361FAD	
			24V AC/DC△	150-C361NBR	—	
160...480	132	100...200	100...240V AC, 50/60 Hz	150-C480NBD	150-C480FAD	
			24V AC/DC△	150-C480NBR	—	

‡ Motor FLA rating should fall within specified current range for unit to operate properly.

♣ These controllers require a separate 100...240V, 50/60 Hz single-phase control source. To add a control circuit transformer to the enclosure, add the appropriate option code to the catalog string.

△ Separate 120V or 240V single phase is required for fan operation.

SMC™-3 Smart Motor Controllers

Product Selection

Open Type and Non-Combination Enclosed (IP65, NEMA 4/12) Controllers — For use with Line-Connected Motors, Continued

Rated Voltage [V AC]	Motor Current [A]‡	Max. kW, 50 Hz	Max. Hp, 60 Hz	Control Power	Open Type — Line-Connected Motors	IP65 (Type 4/12) Enclosed Non-Combination Controllers♣
					Cat. No.	Cat. No.
380/400/ 415/460	1...3	1.1	0.5...1.5	100...240V AC, 50/60 Hz	150-C3NBD	150-C3FBD
				24V AC/DC	150-C3NBR	—
	3...9	4	1.5...5	100...240V AC, 50/60 Hz	150-C9NBD	150-C9FBD
				24V AC/DC	150-C9NBR	—
	5.3...16	7.5	5...10	100...240V AC, 50/60 Hz	150-C16NBD	150-C16FBD
				24V AC/DC	150-C16NBR	—
	6.3...19	7.5	5...10	100...240V AC, 50/60 Hz	150-C19NBD	150-C19NBR
				24V AC/DC	150-C19NBR	—
	9.2...25	11	7.5...15	100...240V AC, 50/60 Hz	150-C25NBD	150-C25NBR
				24V AC/DC	150-C25NBR	—
	10...30	15	7.5...20	100...240V AC, 50/60 Hz	150-C30NBD	150-C30FBD
				24V AC/DC	150-C30NBR	—
	12.3...37	18.5	10...25	100...240V AC, 50/60 Hz	150-C37NBD	150-C37FBD
				24V AC/DC	150-C37NBR	—
	14.3...43	22	10...30	100...240V AC, 50/60 Hz	150-C43NBD	150-C43FBD
				24V AC/DC	150-C43NBR	—
	20...60	30	15...40	100...240V AC, 50/60 Hz	150-C60NBD	150-C60FBD
				24V AC/DC	150-C60NBR	—
	28.3...85	45	25...60	100...240V AC, 50/60 Hz	150-C85NBD	150-C85FBD
				24V AC/DC	150-C85NBR	—
27...108	55	50...75	100...240V AC, 50/60 Hz	150-C108NBD	150-C108FBD	
			24V AC/DCΔ	150-C108NBR	—	
34...135	75	60...100	100...240V AC, 50/60 Hz	150-C135NBD	150-C135FBD	
			24V AC/DCΔ	150-C135NBR	—	
67...201	95...110	75...150	100...240V AC, 50/60 Hz	150-C201NBD	150-C201FBD	
			24V AC/DCΔ	150-C201NBR	—	
84...251	95...132	100...200	100...240V AC, 50/60 Hz	150-C251NBD	150-C251FBD	
			24V AC/DCΔ	150-C251NBR	—	
106...317	95...160	125...250	100...240V AC, 50/60 Hz	150-C317NBD	150-C317FBD	
			24V AC/DCΔ	150-C317NBR	—	
120...361	110...200	250...300	100...240V AC, 50/60 Hz	150-C361NBD	150-C361FBD	
			24V AC/DCΔ	150-C361NBR	—	
160...480	160...250	300...400	100...240V AC, 50/60 Hz	150-C480NBD	150-C480FBD	
			24V AC/DCΔ	150-C480NBR	—	

‡ Motor FLA rating should fall within specified current range for unit to operate properly.

♣ These controllers require a separate 100...240V, 50/60 Hz single-phase control source. To add a control circuit transformer to the enclosure, add the appropriate option code to the catalog string.

Δ Separate 120V or 240V single phase is required for fan operation.

Open Type and Non-Combination Enclosed (IP65, NEMA 4/12) Controllers — For use with Line-Connected Motors, Continued

Rated Voltage [V AC]	Motor Current [A]‡	Max. kW, 50 Hz	Max. Hp, 60 Hz	Control Power	Open Type — Line-Connected Motors	IP65 (Type 4/12) Enclosed Non-Combination Controllers♣
					Cat. No.	Cat. No.
500/575	1...3	1.5	0.75...2	100...240V AC, 50/60 Hz	150-C3NCD	150-C3FCD
				24V AC/DC	150-C3NCR	—
	3...9	5.5	3...7.5	100...240V AC, 50/60 Hz	150-C9NCD	150-C9FCD
				24V AC/DC	150-C9NCR	—
	5.3...16	7.5	5...10	100...240V AC, 50/60 Hz	150-C16NCD	150-C16FCD
				24V AC/DC	150-C16NCR	—
	6.3...19	11	7.5...15	100...240V AC, 50/60 Hz	150-C19NCD	150-C25FCD
				24V AC/DC	150-C19NCR	—
	9.2...25	15	7.5...20	100...240V AC, 50/60 Hz	150-C25NCD	150-C25FCD
				24V AC/DC	150-C25NCR	—
	10...30	18.5	10...25	100...240V AC, 50/60 Hz	150-C30NCD	150-C30FCD
				24V AC/DC	150-C30NCR	—
	12.3...37	22	15...30	100...240V AC, 50/60 Hz	150-C37NCD	150-C37FCD
				24V AC/DC	150-C37NCR	—
	14.3...43	22	15...40	100...240V AC, 50/60 Hz	150-C43NCD	150-C43FCD
				24V AC/DC	150-C43NCR	—
	20...60	37	20...50	100...240V AC, 50/60 Hz	150-C60NCD	150-C60FCD
				24V AC/DC	150-C60NCR	—
	28.3...85	55	30...75	100...240V AC, 50/60 Hz	150-C85NCD	150-C85FCD
				24V AC/DC	150-C85NCR	—
27...108	75	60...100	100...240V AC, 50/60 Hz	150-C108NCD	150-C108FCD	
			24V AC/DCΔ	150-C108NCR	—	
34...135	90	75...125	100...240V AC, 50/60 Hz	150-C135NCD	150-C135FCD	
			24V AC/DCΔ	150-C135NCR	—	
67...201	75...132	100...200	100...240V AC, 50/60 Hz	150-C201NCD	150-C201FCD	
			24V AC/DCΔ	150-C201NCR	—	
84...251	90...160	125...250	100...240V AC, 50/60 Hz	150-C251NCD	150-C251FCD	
			24V AC/DCΔ	150-C251NCR	—	
106...317	100...200	200...300	100...240V AC, 50/60 Hz	150-C317NCD	150-C317FCD	
			24V AC/DCΔ	150-C317NCR	—	
120...361	132...250	200...350	100...240V AC, 50/60 Hz	150-C361NCD	150-C361FCD	
			24V AC/DCΔ	150-C361NCR	—	
160...480	200...315	250...500	100...240V AC, 50/60 Hz	150-C480NCD	150-C480FCD	
			24V AC/DCΔ	150-C480NCR	—	

‡ Motor FLA rating should fall within specified current range for unit to operate properly.

♣ These controllers require a separate 100...240V, 50/60 Hz single-phase control source. To add a control circuit transformer to the enclosure, add the appropriate option code to the catalog string.

Δ Separate 120V or 240V single phase is required for fan operation.

Bulletin 150
SMC™-3 Smart Motor Controllers
 Product Selection

Open Type Controllers — For use with Delta-Connected Motors

Rated Voltage [V AC]	Motor Current [A]‡	Max. kW, 50 Hz	Max. Hp, 60 Hz	Control Power	Open Type
					Cat. No.
200/208	1.7...5.1	—	1	100...240V AC, 50/60 Hz	150-C3NBD
		—		24V AC/DC	150-C3NBR
	5.1...16	—	1.5...3	100...240V AC, 50/60 Hz	150-C9NBD
		—		24V AC/DC	150-C9NBR
	9.1...27.6	—	3...7.5	100...240V AC, 50/60 Hz	150-C16NBD
		—		24V AC/DC	150-C16NBR
	10.9...32.8	—	3...10	100...240V AC, 50/60 Hz	150-C19NBD
		—		24V AC/DC	150-C19NBR
	14.3...43	—	3...10	100...240V AC, 50/60 Hz	150-C25NBD
		—		24V AC/DC	150-C25NBR
	17.3...52	—	5...10	100...240V AC, 50/60 Hz	150-C30NBD
		—		24V AC/DC	150-C30NBR
	21...64	—	7.5...20	100...240V AC, 50/60 Hz	150-C37NBD
		—		24V AC/DC	150-C37NBR
	25...74	—	7.5...20	100...240V AC, 50/60 Hz	150-C43NBD
		—		24V AC/DC	150-C43NBR
	34.6...104	—	15...30	100...240V AC, 50/60 Hz	150-C60NBD
		—		24V AC/DC	150-C60NBR
	50...147	—	15...40	100...240V AC, 50/60 Hz	150-C85NBD
		—		24V AC/DC	150-C85NBR
47...187	—	20...60	100...240V AC, 50/60 Hz	150-C108NBD	
	—		24V AC/DC ^Δ	150-C108NBR	
59...234	—	20...75	100...240V AC, 50/60 Hz	150-C135NBD	
	—		24V AC/DC ^Δ	150-C135NBR	
116...348	—	75...100	100...240V AC, 50/60 Hz	150-C201NBD	
	—		24V AC/DC ^Δ	150-C201NBR	
145...435	—	100...150	100...240V AC, 50/60 Hz	150-C251NBD	
	—		24V AC/DC ^Δ	150-C251NBR	
183...549	—	100...200	100...240V AC, 50/60 Hz	150-C317NBD	
	—		24V AC/DC ^Δ	150-C317NBR	
208...625	—	125...200	100...240V AC, 50/60 Hz	150-C361NBD	
	—		24V AC/DC ^Δ	150-C361NBR	
277...831	—	200...300	100...240V AC, 50/60 Hz	150-C480NBD	
	—		24V AC/DC ^Δ	150-C480NBR	

‡ Motor FLA rating should fall within specified current range for unit to operate properly.

Δ Separate 120V or 240V single phase is required for fan operation.