

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♣	150-C108NBR	—	
34...135	—	25...40	100...240V AC, 50/60 Hz	150-C135NBD	150-C135FHD	
	—		24V AC/DC♣	150-C135NBR	—	
67...201	—	40...60	100...240V AC, 50/60 Hz	150-C201NBD	150-C201FHD	
	—		24V AC/DC♣	150-C201NBR	—	
84...251	—	50...75	100...240V AC, 50/60 Hz	150-C251NBD	150-C251FHD	
	—		24V AC/DC♣	150-C251NBR	—	
106...317	—	60...100	100...240V AC, 50/60 Hz	150-C317NBD	150-C317FHD	
	—		24V AC/DC♣	150-C317NBR	—	
120...361	—	75...125	100...240V AC, 50/60 Hz	150-C361NBD	150-C361FHD	
	—		24V AC/DC♣	150-C361NBR	—	
160...480	—	100...150	100...240V AC, 50/60 Hz	150-C480NBD	150-C480FHD	
	—		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.

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.

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 24V AC/DC	150-C3NBD 150-C3NBR	150-C3FBD —
	3...9	4	1.5...5	100...240V AC, 50/60 Hz 24V AC/DC	150-C9NBD 150-C9NBR	150-C9FBD —
	5.3...16	7.5	5...10	100...240V AC, 50/60 Hz 24V AC/DC	150-C16NBD 150-C16NBR	150-C16FBD —
	6.3...19	7.5	5...10	100...240V AC, 50/60 Hz 24V AC/DC	150-C19NBD 150-C19NBR	— 150-C19FBD
	9.2...25	11	7.5...15	100...240V AC, 50/60 Hz 24V AC/DC	150-C25NBD 150-C25NBR	150-C25FBD —
	10...30	15	7.5...20	100...240V AC, 50/60 Hz 24V AC/DC	150-C30NBD 150-C30NBR	150-C30FBD —
	12.3...37	18.5	10...25	100...240V AC, 50/60 Hz 24V AC/DC	150-C37NBD 150-C37NBR	150-C37FBD —
	14.3...43	22	10...30	100...240V AC, 50/60 Hz 24V AC/DC	150-C43NBD 150-C43NBR	150-C43FBD —
	20...60	30	15...40	100...240V AC, 50/60 Hz 24V AC/DC	150-C60NBD 150-C60NBR	150-C60FBD —
	28.3...85	45	25...60	100...240V AC, 50/60 Hz 24V AC/DC	150-C85NBD 150-C85NBR	150-C85FBD —
	27...108	55	50...75	100...240V AC, 50/60 Hz 24V AC/DC♣	150-C108NBD 150-C108NBR	150-C108FBD —
	34...135	75	60...100	100...240V AC, 50/60 Hz 24V AC/DC♣	150-C135NBD 150-C135NBR	150-C135FBD —
	67...201	95...110	75...150	100...240V AC, 50/60 Hz 24V AC/DC♣	150-C201NBD 150-C201NBR	150-C201FBD —
	84...251	95...132	100...200	100...240V AC, 50/60 Hz 24V AC/DC♣	150-C251NBD 150-C251NBR	150-C251FBD —
	106...317	95...160	125...250	100...240V AC, 50/60 Hz 24V AC/DC♣	150-C317NBD 150-C317NBR	150-C317FBD —
	120...361	110...200	250...300	100...240V AC, 50/60 Hz 24V AC/DC♣	150-C361NBD 150-C361NBR	150-C361FBD —
	160...480	160...250	300...400	100...240V AC, 50/60 Hz 24V AC/DC♣	150-C480NBD 150-C480NBR	150-C480FBD —

* 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.



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 24V AC/DC	150-C3NCD 150-C3NCR	150-C3FCD —
	3...9	5.5	3...7.5	100...240V AC, 50/60 Hz 24V AC/DC	150-C9NCD 150-C9NCR	150-C9FCD —
	5.3...16	7.5	5...10	100...240V AC, 50/60 Hz 24V AC/DC	150-C16NCD 150-C16NCR	150-C16FCD —
	6.3...19	11	7.5...15	100...240V AC, 50/60 Hz 24V AC/DC	150-C19NCD 150-C19NCR	150-C25FCD —
	9.2...25	15	7.5...20	100...240V AC, 50/60 Hz 24V AC/DC	150-C25NCD 150-C25NCR	150-C25FCD —
	10...30	18.5	10...25	100...240V AC, 50/60 Hz 24V AC/DC	150-C30NCD 150-C30NCR	150-C30FCD —
	12.3...37	22	15...30	100...240V AC, 50/60 Hz 24V AC/DC	150-C37NCD 150-C37NCR	150-C37FCD —
	14.3...43	22	15...40	100...240V AC, 50/60 Hz 24V AC/DC	150-C43NCD 150-C43NCR	150-C43FCD —
	20...60	37	20...50	100...240V AC, 50/60 Hz 24V AC/DC	150-C60NCD 150-C60NCR	150-C60FCD —
	28.3...85	55	30...75	100...240V AC, 50/60 Hz 24V AC/DC	150-C85NCD 150-C85NCR	150-C85FCD —
	27...108	75	60...100	100...240V AC, 50/60 Hz 24V AC/DC♣	150-C108NCD 150-C108NCR	150-C108FCD —
	34...135	90	75...125	100...240V AC, 50/60 Hz 24V AC/DC♣	150-C135NCD 150-C135NCR	150-C135FCD —
	67...201	75...132	100...200	100...240V AC, 50/60 Hz 24V AC/DC♣	150-C201NCD 150-C201NCR	150-C201FCD —
	84...251	90...160	125...250	100...240V AC, 50/60 Hz 24V AC/DC♣	150-C251NCD 150-C251NCR	150-C251FCD —
	106...317	100...200	200...300	100...240V AC, 50/60 Hz 24V AC/DC♣	150-C317NCD 150-C317NCR	150-C317FCD —
	120...361	132...250	200...350	100...240V AC, 50/60 Hz 24V AC/DC♣	150-C361NCD 150-C361NCR	150-C361FCD —
	160...480	200...315	250...500	100...240V AC, 50/60 Hz 24V AC/DC♣	150-C480NCD 150-C480NCR	150-C480FCD —

* 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.

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*	150-C108NBR	
59...234	—	20...75	100...240V AC, 50/60 Hz	150-C135NBD	
	—		24V AC/DC*	150-C135NBR	
116...348	—	75...100	100...240V AC, 50/60 Hz	150-C201NBD	
	—		24V AC/DC*	150-C201NBR	
145...435	—	100...150	100...240V AC, 50/60 Hz	150-C251NBD	
	—		24V AC/DC*	150-C251NBR	
183...549	—	100...200	100...240V AC, 50/60 Hz	150-C317NBD	
	—		24V AC/DC*	150-C317NBR	
208...625	—	125...200	100...240V AC, 50/60 Hz	150-C361NBD	
	—		24V AC/DC*	150-C361NBR	
277...831	—	200...300	100...240V AC, 50/60 Hz	150-C480NBD	
	—		24V AC/DC*	150-C480NBR	

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

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



Open Type Controllers — For use with Delta-Connected Motors, Continued

Rated Voltage [V AC]	Motor Current [A]*	Max. kW, 50 Hz	Max. Hp, 60 Hz	Control Power	Open Type
					Cat. No.
230	1.7...5.1	0.25...1.1	1	100...240V AC, 50/60 Hz	150-C3NBD
				24V AC/DC	150-C3NBR
	5.1...16	1.1...4	1...5	100...240V AC, 50/60 Hz	150-C9NBD
				24V AC/DC	150-C9NBR
	9.1...27.6	2.2...7.5	3...7.5	100...240V AC, 50/60 Hz	150-C16NBD
				24V AC/DC	150-C16NBR
	10.9...32.8	2.2...7.5	3...10	100...240V AC, 50/60 Hz	150-C19NBD
				24V AC/DC	150-C19NBR
	14.3...43	4...11	3...15	100...240V AC, 50/60 Hz	150-C25NBD
				24V AC/DC	150-C25NBR
	17.3...52	4...15	5...15	100...240V AC, 50/60 Hz	150-C30NBD
				24V AC/DC	150-C30NBR
	21...64	5.5...18.5	7.5...20	100...240V AC, 50/60 Hz	150-C37NBD
				24V AC/DC	150-C37NBR
	25...74	5.5...22	7.5...25	100...240V AC, 50/60 Hz	150-C43NBD
				24V AC/DC	150-C43NBR
	34.6...104	7.5...30	15...40	100...240V AC, 50/60 Hz	150-C60NBD
				24V AC/DC	150-C60NBR
	50...147	15...45	20...50	100...240V AC, 50/60 Hz	150-C85NBD
				24V AC/DC	150-C85NBR
47...187	55	20...60	100...240V AC, 50/60 Hz	150-C108NBD	
			24V AC/DC*	150-C108NBR	
59...234	75	25...75	100...240V AC, 50/60 Hz	150-C135NBD	
			24V AC/DC*	150-C135NBR	
116...348	110	75...125	100...240V AC, 50/60 Hz	150-C201NBD	
			24V AC/DC*	150-C201NBR	
145...435	132	100...150	100...240V AC, 50/60 Hz	150-C251NBD	
			24V AC/DC*	150-C251NBR	
183...549	160	125...200	100...240V AC, 50/60 Hz	150-C317NBD	
			24V AC/DC*	150-C317NBR	
208...625	200	150...250	100...240V AC, 50/60 Hz	150-C361NBD	
			24V AC/DC*	150-C361NBR	
277...831	250	200...300	100...240V AC, 50/60 Hz	150-C480NBD	
			24V AC/DC*	150-C480NBR	

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

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

Open Type Controllers — For use with Delta-Connected Motors, Continued

Rated Voltage [V AC]	Motor Current [A]*	Max. kW, 50 Hz	Max. Hp, 60 Hz	Control Power	Open Type
					Cat. No.
380/400/415/460	1.7...5.1	0.55...2.2	0.5...2	100...240V AC, 50/60 Hz	150-C3NBD
				24V AC/DC	150-C3NBR
	5.1...16	2.2...7.5	2...7.5	100...240V AC, 50/60 Hz	150-C9NBD
				24V AC/DC	150-C9NBR
	9.1...27.6	4...11	5...15	100...240V AC, 50/60 Hz	150-C16NBD
				24V AC/DC	150-C16NBR
	10.9...32.8	4...15	5...15	100...240V AC, 50/60 Hz	150-C19NBD
				24V AC/DC	150-C19NBR
	14.3...43	5.5...22	7.5...20	100...240V AC, 50/60 Hz	150-C25NBD
				24V AC/DC	150-C25NBR
	17.3...52	7.5...22	7.5...30	100...240V AC, 50/60 Hz	150-C30NBD
				24V AC/DC	150-C30NBR
	21...64	7.5...30	10...40	100...240V AC, 50/60 Hz	150-C37NBD
				24V AC/DC	150-C37NBR
	25...74	11...37	10...50	100...240V AC, 50/60 Hz	150-C43NBD
				24V AC/DC	150-C43NBR
	34.6...104	15...55	20...75	100...240V AC, 50/60 Hz	150-C60NBD
				24V AC/DC	150-C60NBR
	50...147	22...75	25...100	100...240V AC, 50/60 Hz	150-C85NBD
				24V AC/DC	150-C85NBR
47...187	90	40...150	100...240V AC, 50/60 Hz	150-C108NBD	
			24V AC/DC*	150-C108NBR	
59...234	132	50...150	100...240V AC, 50/60 Hz	150-C135NBD	
			24V AC/DC*	150-C135NBR	
116...348	160	150...250	100...240V AC, 50/60 Hz	150-C201NBD	
			24V AC/DC*	150-C201NBR	
145...435	250	200...350	100...240V AC, 50/60 Hz	150-C251NBD	
			24V AC/DC*	150-C251NBR	
183...549	315	250...450	100...240V AC, 50/60 Hz	150-C317NBD	
			24V AC/DC*	150-C317NBR	
208...625	355	300...500	100...240V AC, 50/60 Hz	150-C361NBD	
			24V AC/DC*	150-C361NBR	
277...831	450	350...700	100...240V AC, 50/60 Hz	150-C480NBD	
			24V AC/DC*	150-C480NBR	

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

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

Open Type Controllers — For use with Delta-Connected Motors, Continued

Rated Voltage [V AC]	Motor Current [A]*	Max. kW, 50 Hz	Max. Hp, 60 Hz	Control Power	Open Type
					Cat. No.
500/575	1.7...5.1	0.75...3	1...3	100...240V AC, 50/60 Hz	150-C3NCD
				24V AC/DC	150-C3NCR
	5.1...16	3...7.5	3...10	100...240V AC, 50/60 Hz	150-C9NCD
				24V AC/DC	150-C9NCR
	9.1...27.6	5.5...15	7.5...20	100...240V AC, 50/60 Hz	150-C16NCD
				24V AC/DC	150-C16NCR
	10.9...32.8	5.5...22	7.5...30	100...240V AC, 50/60 Hz	150-C19NCD
				24V AC/DC	150-C19NCR
	14.3...43	7.5...22	10...40	100...240V AC, 50/60 Hz	150-C25NCD
				24V AC/DC	150-C25NCR
	17.3...52	11...30	15...50	100...240V AC, 50/60 Hz	150-C30NCD
				24V AC/DC	150-C30NCR
	21...64	11...37	15...60	100...240V AC, 50/60 Hz	150-C37NCD
				24V AC/DC	150-C37NCR
	25...74	15...45	20...60	100...240V AC, 50/60 Hz	150-C43NCD
				24V AC/DC	150-C43NCR
	34.6...104	22...55	30...100	100...240V AC, 50/60 Hz	150-C60NCD
				24V AC/DC	150-C60NCR
	50...147	30...90	40...150	100...240V AC, 50/60 Hz	150-C85NCD
				24V AC/DC	150-C85NCR
47...187	132	50...150	100...240V AC, 50/60 Hz	150-C108NCD	
			24V AC/DC*	150-C108NCR	
59...234	160	60...200	100...240V AC, 50/60 Hz	150-C135NCD	
			24V AC/DC*	150-C135NCR	
116...348	250	250...300	100...240V AC, 50/60 Hz	150-C201NCD	
			24V AC/DC*	150-C201NCR	
145...435	315	250...400	100...240V AC, 50/60 Hz	150-C251NCD	
			24V AC/DC*	150-C251NCR	
183...549	400	300...500	100...240V AC, 50/60 Hz	150-C317NCD	
			24V AC/DC*	150-C317NCR	
208...625	450	350...600	100...240V AC, 50/60 Hz	150-C361NCD	
			24V AC/DC*	150-C361NCR	
277...831	560	400...900	100...240V AC, 50/60 Hz	150-C480NCD	
			24V AC/DC*	150-C480NCR	

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

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



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

Table of Contents

Cat. No. Explanation	4-137
Product Selection.....	4-138
Typical Wiring Diags.	4-150
Specifications.....	4-152
Approx. Dimensions .	4-156
Enclosed Options.....	4-148
Accessories.....	4-148

4

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 4-109

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

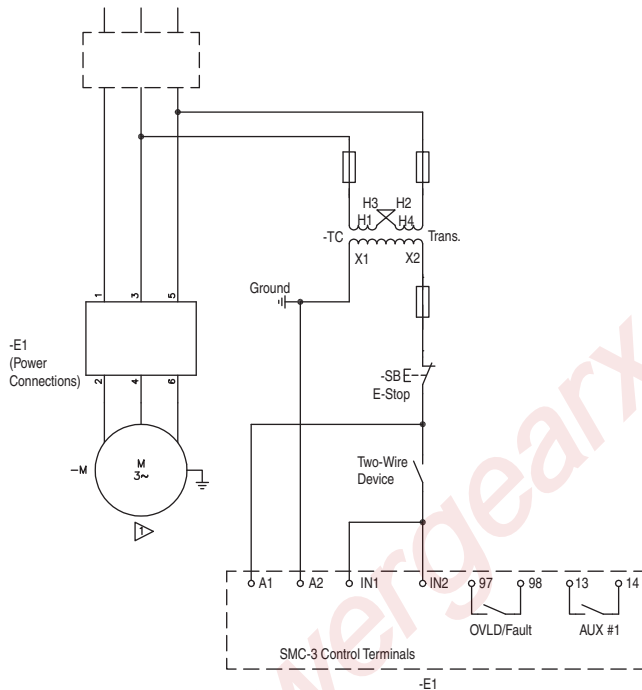
The unit with control wiring can be tested for fault conditions by using the Push to Test function. Hold down the Reset button for 7 s to activate the fault Aux (97, 98) and shut down the SMC-3. To clear, either push the Reset button or cycle control power to the device.

LED Description (Number of Flashes)

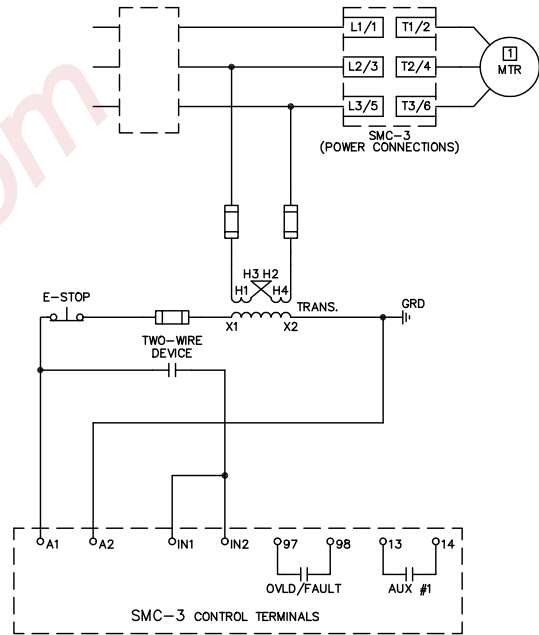
1. Overload
2. Overtemperature
3. Phase Reversal
4. Phase Loss/Open Load
5. Phase Imbalance
6. Shorted SCR
7. Test



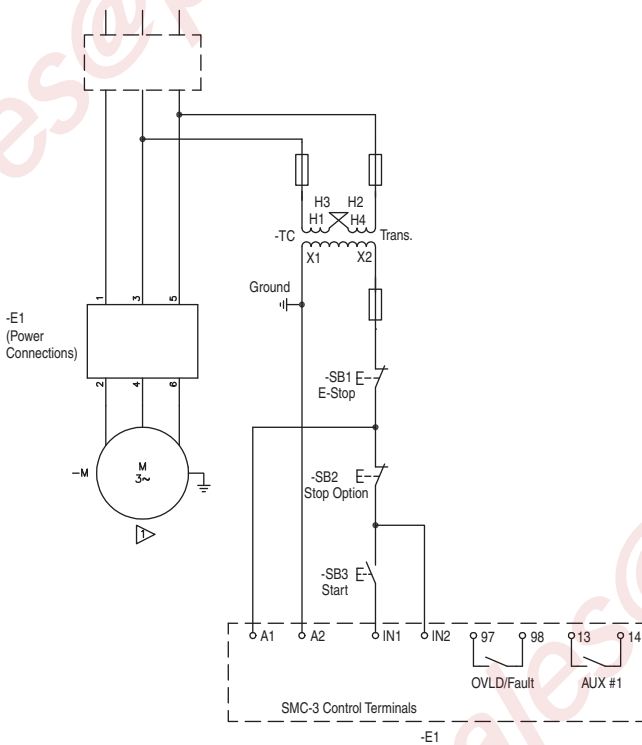
Two-Wire Configuration
 IEC



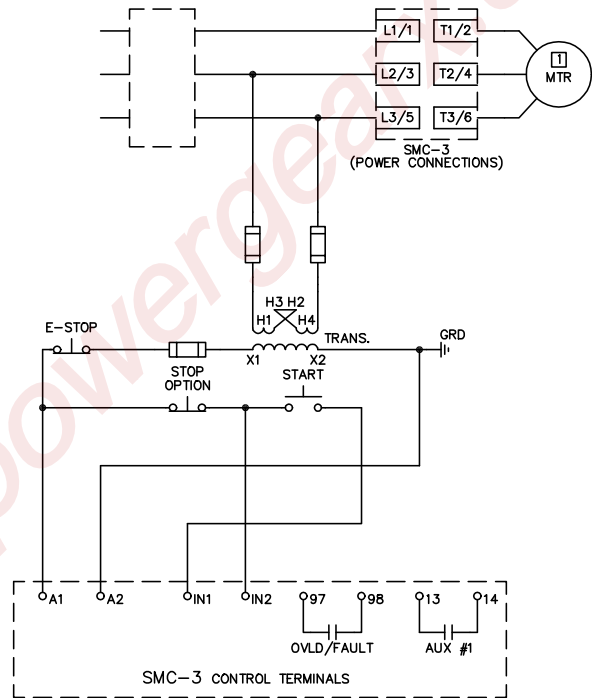
NEMA



Three-Wire Configuration
 IEC

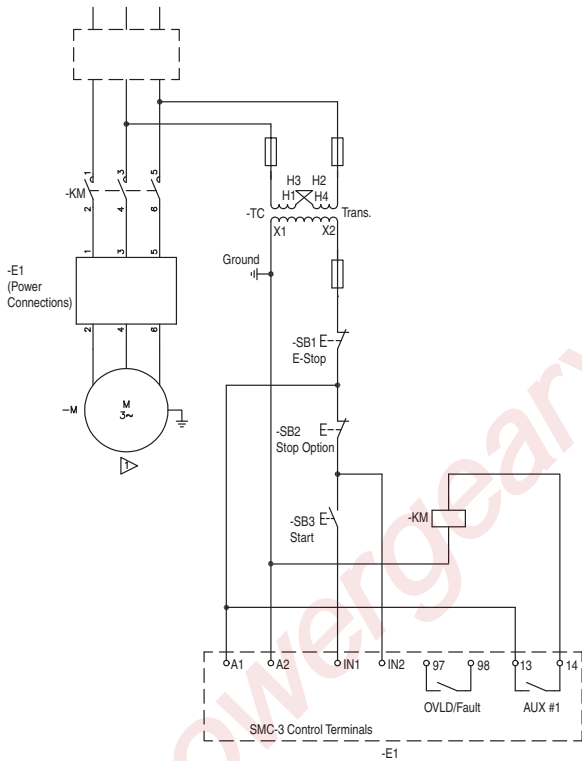


NEMA

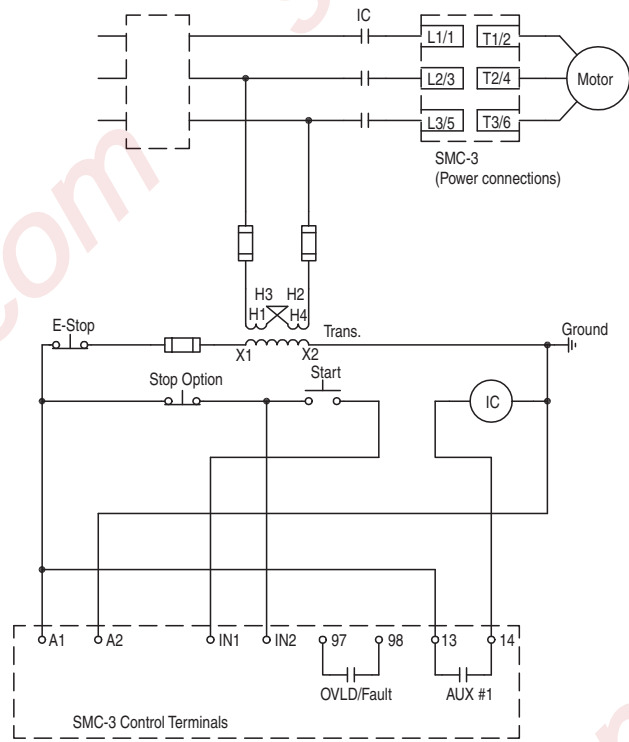


Isolation Contactor Configuration

IEC



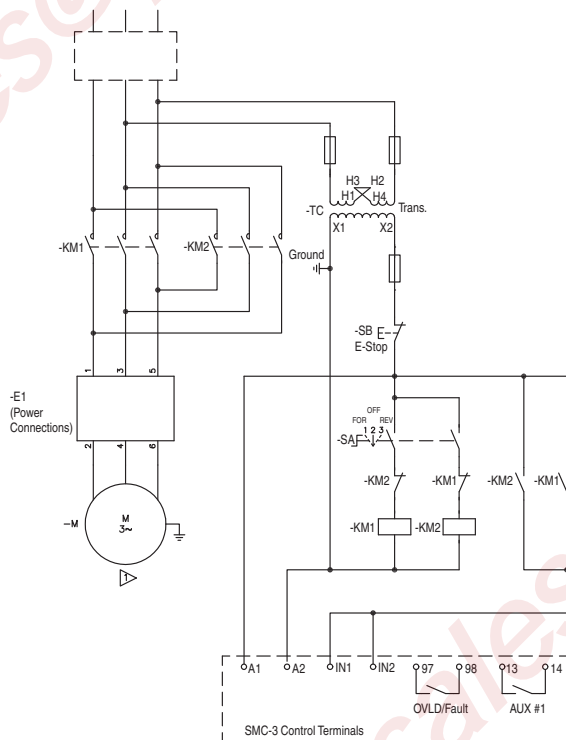
NEMA



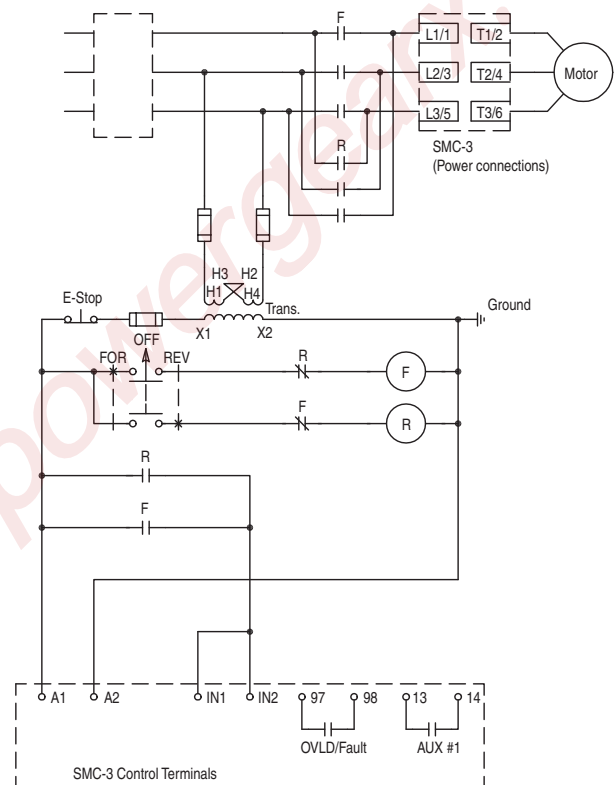
Reversing Configuration

Note: Minimum Off time equals 1.0 s.

IEC



NEMA



Bulletin 150
SMC™-3 Smart Motor Controllers
 Specifications

Standard Features								
Selectable Start Times	2, 5, 10, 15, 20, 25, or 30 s							
Selectable Initial Torque	0%, 25%, 35%, and 65% of locked rotor torque							
Selectable Current Limit	150%, 250%, 350%, and 450% of full load current							
Selectable Kick Start — 450% FLA	0, 0.5, 1.0, or 1.5 s							
Selectable Soft Stop	Off, 100%, 200%, or 300% of the start time setting when wired							
Electrical Ratings								
Power Circuit	UL/CSA/NEMA			IEC				
	Rated Operation Voltage	200...480V AC 200...600V AC		200...480V~ — 400V~ 500V~ — 500V~				
	Rated Insulation Voltage	600V AC		500V~				
	Dielectric Withstand	2200V AC		2500V~				
	Repetitive Peak	200...480V AC: 1400V 200...600V AC: 1600V		200...480V~: 1400V 500V~: 1600V				
	Operating Frequency	50/60 Hz		50/60 Hz				
	Utilization Category	1...37 A	—		AC-53b: 3.5-15:3585			
		43...60 A	—		AC-53b: 4.5-30:1770			
		85 A	—		AC-53b: 4.5-30:3570			
		108 A	—		AC-53b: 4.5-30:1770			
		135 A	—		AC-53b: 3.5-30: 1770			
		201...251 A	—		AC-53b: 3.5-30: 1770			
	317...480 A	—		AC-53b: 3.5-30: 1770				
	Number of Poles	Equipment designed for 3-phase only						
Rated Impulse Voltage	6 kV							
DV/DT Protection	1000V/μs							
Overvoltage Category	III							
SCPD Performance	Type 1§							
		Non-Time Delay		Thermal Magnetic Circuit Breaker		High Capacity Time Delay Class CC/J/L		
SCPD List†		Max. Standard Available Fault	Max. Standard Fuse [A]*	Max. Standard Available Fault	Max. Circuit Breaker [A]	Max. Standard Available Fault	Max. Fuse [A]	
Line Device Operational Current Rating [A]	3	5 kA	12	5 kA	15	70 kA	6	
	9	5 kA	30	5 kA	30	70 kA	15	
	16	5 kA	60	5 kA	60	70 kA	30	
	19	5 kA	70	5 kA	70	70 kA	40	
	25	5 kA	100	5 kA	100	70 kA	50	
	30	10 kA	110	10 kA	110	70 kA	60	
	37	10 kA	125	10 kA	125	70 kA	60	
	43	10 kA	150	10 kA	150	70 kA	90	
	60	10 kA	225	10 kA	225	70 kA	125	
	85	10 kA	300	10 kA	300	70 kA	175	
	108	10 kA	400	10 kA	300	70 kA	200	
	135	10 kA	500	10 kA	400	70 kA	250	
	201	18 kA	600	18 kA	600	70 kA	350	
	251	18 kA	700	18 kA	700	70 kA	400	
	317	30 kA	800	30 kA	800	69 kA	500	
	361	30 kA	1000	30 kA	1000	69 kA	600	
	480	42 kA	1200	42 kA	1200	69 kA	800	
Delta Device Operational Current Rating [A]	5.1	5 kA	15	5 kA	15	70 kA	10	
	16	5 kA	60	5 kA	60	70 kA	30	
	27.6	5 kA	70	5 kA	70	70 kA	60	
	32.8	5 kA	125	5 kA	125	70 kA	70	
	43	5 kA	150	5 kA	150	70 kA	90	
	52	10 kA	200	10 kA	200	70 kA	100	
	64	10 kA	250	10 kA	250	70 kA	100	
	74	10 kA	250	10 kA	250	70 kA	150	
	104	10 kA	400	10 kA	300	70 kA	225	
	147	10 kA	400	10 kA	400	70 kA	300	
	187	10 kA	600	10 kA	500	70 kA	400	
	234	10 kA	700	10 kA	700	70 kA	400	
	348	18 kA	1000	18 kA	1000	70 kA	600	
	435	18 kA	1200	18 kA	1200	69 kA	800	
	549	30 kA	1600	30 kA	1600	69 kA	1000	
	625	30 kA	1600	30 kA	1600	69 kA	1200	
	831	42 kA	1600	30 kA	1600	69 kA	1600	
831	42 kA	1600	42 kA	1200	69 kA	1600		

* Non-time delay fuses (K5).

† Consult local codes for proper sizing of short-circuit protection.

§ Type 1 performance/protection indicates that, under a short-circuit condition, the fused or circuit breaker-protected starter shall cause no danger to persons or installation but may not be suitable for further service without repair or replacement.



Electrical Ratings				
		UL/CSA/NEMA	IEC	
Control Circuit	Rated Operational Voltage (+10%, -15%)	100...240V AC, 24V AC/DC		
	Rated Insulation Voltage	250V		
	Rated Impulse Voltage	2.5 kV		
	Dielectric Withstand	1500V AC		
	Overvoltage Category	II		
	Operating Frequency	50/60 Hz		
	Input onstate voltage minimum, during start (IN1, IN2)	85V AC, 19.2V DC / 19.2V AC		
	Input onstate current (IN1, IN2)	9.8 mA @ 120V AC/19.6 mA @ 240V AC, 7.3 mA @ 24V AC/DC		
	Input offstate voltage maximum (IN1, IN2)	40V AC, 17V DC / 12V AC		
	Input offstate current @ input offstate voltage (IN1, IN2)	<10 mA, <12 mA		
	Control Power with Fan, during start	3...37 A	215 mA @ 120V AC / 180 mA @ 240V AC, 800 mA @ 24V DC / 660 mA @ 24V AC	
		43...85 A	200 mA @ 120V AC / 100 mA @ 240V AC, 700 mA @ 24V AC/DC	
		Fan Power	Control Power	
108...135 A		20VA	200 mA @ 120V AC / 120 mA @ 240V AC, 600 mA @ 24V AC/DC	
201...251 A		40VA		
317...480 A		60VA		
Control Power without Fan, during start	3...37 A	205 mA @ 120V AC / 145 mA @ 240V AC, 705 mA @ 24V DC / 580 mA @ 24V AC		
Steady State Heat Dissipation and Overload Current Range	Controller Rating [A]	Steady State Heat Dissipation [W]	Overload Current Range [A]	
	3	11	1...3	
	9	12	3...9	
	16	14	5.3...16	
	19	15	6.3...19	
	25	17	9.2...27.7	
	30	19	10...30	
	37	24	12.3...37	
	43	34	14.3...43	
	60	50	20...60	
	85	82	28.3...85	
	108	62	27...108	
	135	75	34...135	
	201	129	67...201	
	251	147	84...251	
	317	174	106...317	
361	194	120...361		
480	239	160...480		

Auxiliary Contacts			
		UL/CSA/NEMA	IEC
Rated Operational Voltage		250V AC/30V DC	250V~/30V DC
Rated Insulation Voltage		250V	250V~
Rated Impulse Voltage		2.5 kV	4 kV
Dielectric Withstand		1500V AC	2000V~
Overvoltage Category		II	III*
Operating Frequency		50/60 Hz	50/60 Hz
Utilization Category		D300/D300	AC-15/DC
TB-97, -98 (OVL/D/Fault)	Type of Control Circuit	Electromagnetic relay	
	Number of Contacts	1	
	Type of Contacts	Normally Open (N.O.)	
	Type of Current	AC/DC	
	Rated Operational Current (max.)	0.6 A @ 120V~ and 0.3 A @ 240V~	
	Conventional Thermal Current I_{th}	1 A	
	Make/Break VA	432/72	
TB-13, -14 Aux 1 (Normal/Up-to-Speed)	Type of Control Circuit	Electromagnetic relay	
	Number of Contacts	1	
	Type of Contacts	Normally Open (N.O.)	
	Type of Current	AC/DC	
	Rated Operational Current (max.)	0.6 A @ 120V~ and 0.3 A @ 240V~	
	Conventional Thermal Current I_{th}	1 A	
	Make/Break VA	432/72	

* Overvoltage category II, when either control or auxiliary circuit is wired to a SELV or PELV circuit.

Bulletin 150
SMC™-3 Smart Motor Controllers
 Specifications

Electrical Ratings		
Side-Mount Auxiliary Contacts		
	UL/CSA/NEMA	IEC
Rated Operational Voltage	250V AC/30V DC	250V AC/30V DC
Rated Insulation Voltage	250V	250V AC
Rated Impulse Voltage	2.5 kV	4 kV
Dielectric Withstand	1500V AC	2000V AC
Overvoltage Category	II	III*
Operating Frequency	50/60 Hz	50/60 Hz
	C300/R150	AC-15/DC-13
TB-23, -24 (Normal/Up-to-Speed) TB-33, -34 (Normal/Up-to-Speed)	Utilization Category	Electromagnetic relay
	Type of Control Circuit	1
	Number of Contacts	Normally Open (N.O.)
	Type of Contacts	AC/DC
	Type of Current	1.5 A @ 120V AC, 0.75A @ 240V AC, 1.17 A @ 24V DC
	Rated Operational Current (max.)	2.5 A
	Conventional Thermal Current I_{th}	1800/180V AC, 28V DC (resistive)
TB-11, -12 (Normal/Up-to-Speed)	Make/Break VA	B300/R300
	Type of Control Circuit	AC-15/DC-13
	Type of Control Circuit	Electromagnetic relay
	Number of Contacts	1
	Type of Contacts	Normally Closed (N.C.)
	Type of Current	AC/DC
	Rated Operational Current (max.)	3 A @ 120V AC, 1.5A @ 240V AC, 1.17 A @ 24V DC
Conventional Thermal Current I_{th}	5 A	
Make/Break VA	3600/360VA, 28VA (DC resistive)	

* Overvoltage category II, when either control or auxiliary circuit is wired to a SELV or PELV circuit.

Environmental	
Operating Temperature Range	-5...+50 °C (23...122 °F) (open) -5...+40 °C (23...104 °F) (enclosed)
Storage and Transportation Temperature Range	-25...+85 °C (-13...+185 °F)
Altitude	2000 m (6560 ft)
Humidity	5...95% (non-condensing)
Pollution Degree	2
Type of Protection	IP2X

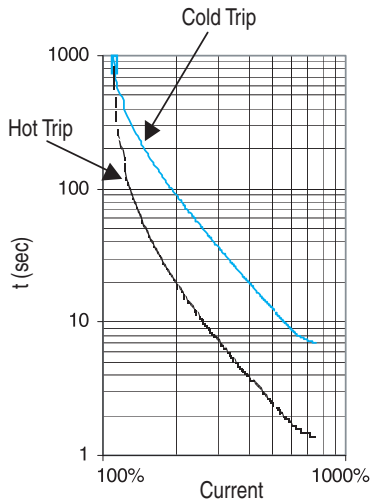
Mechanical Ratings		
Resistance to Vibration	Operational	1.0 G Peak, 0.15 mm (0.006 in.) displacement
	Non-Operational	2.5 G Peak, 0.38 mm (0.015 in.) displacement
Resistance to Shock	Operational	15 G
	Non-Operational	30 G
Line Power Terminals	Cable Size Tightening Torque	3...37 A 2.5...25 mm ² (14...4 AWG) 2.3...2.8 N•m (20...25 in•lbs)
		43...85 A 2.5...95 mm ² (14...3/0 AWG) 11.3...12.4 N•m (100...110 in•lbs)
		108...135 A 23 N•m (200 in•lbs)
		201...251 A Two M10 x 1.5 diameter holes per power pole
		317...480 A Two M12 x 1.75 diameter holes per power pole
Load Power Terminals	Cable Size Tightening Torque	3...37 A 2.5...16 mm ² (14...6 AWG) 2.3...2.5 N•m (20...22.5 in•lbs)
		43...85 A 2.5...50 mm ² (14...1 AWG) 11.3...12.4 N•m (100...110 in•lbs)
		108...135 A 23 N•m (200 in•lbs)
		201...251 A Two M10 x 1.5 diameter holes per power pole
		317...480 A Two M12 x 1.75 diameter holes per power pole
Control Terminals	Cable Size Tightening Torque	All 0.2...2.5 mm ² (24...14 AWG) 0.5...0.9 N•m (4.4...8.0 in•lbs)

Other		
	UL/CSA/NEMA	IEC
EMC Emission Levels	Conducted Radio Frequency Emissions	—
	Radiated Emissions	Class A
EMC Immunity Levels	Electrostatic Discharge	4 kV Contact and 8 kV Air Discharge
	Radio Frequency Electromagnetic Field	8 kV Air Discharge
	Fast Transient	Per EN/IEC 60947-4-2
	Surge Transient	Per EN/IEC 60947-4-2

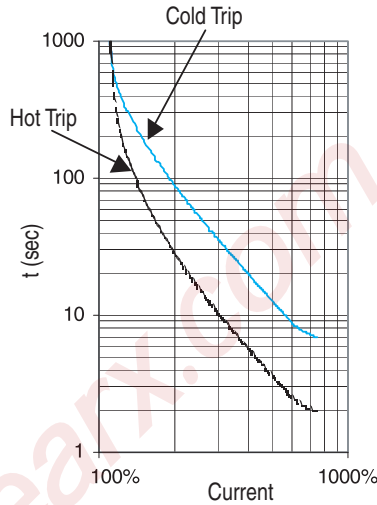


SMC-3 Overload Trip Curves

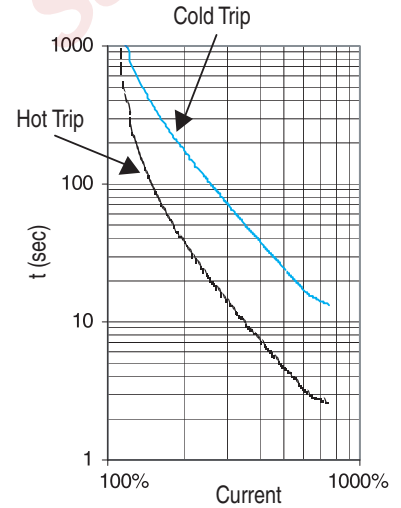
Trip Class 10



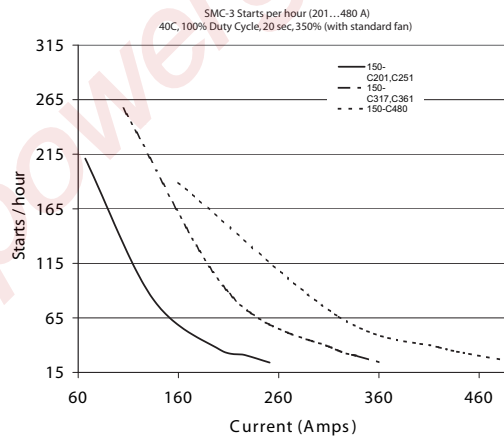
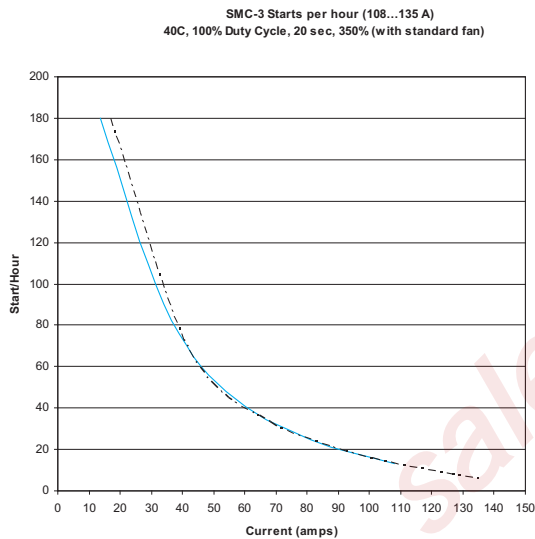
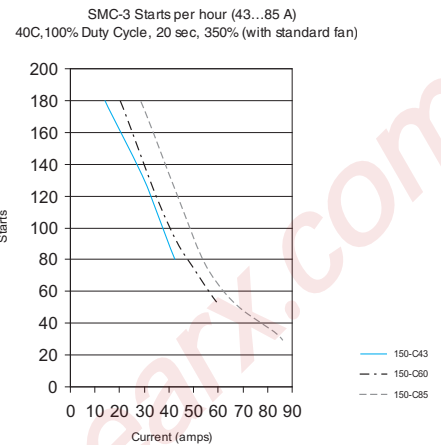
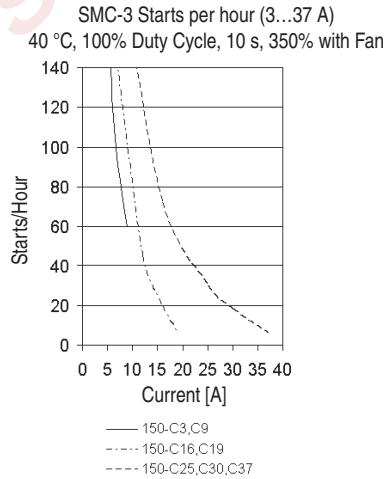
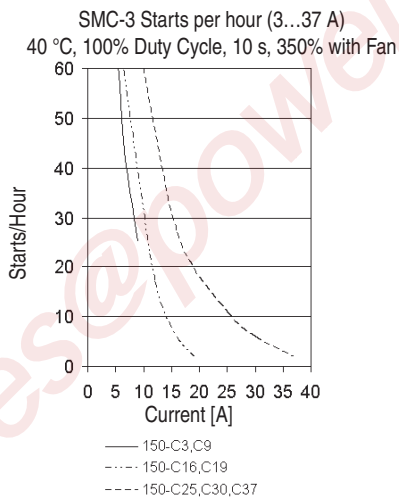
Trip Class 15



Trip Class 20



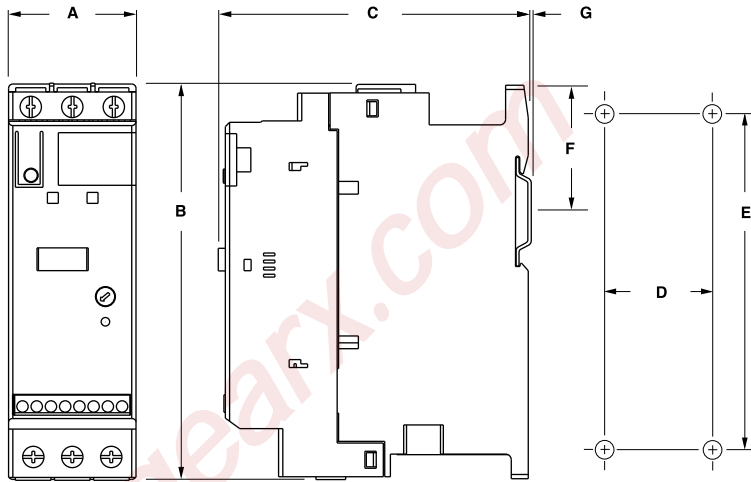
Starts per Hour Curves



Bulletin 150
SMC™-3 Smart Motor Controllers
 Approximate Dimensions

Dimensions in millimeters (inches). Dimensions are not intended to be used for manufacturing purposes. All dimensions are subject to change.

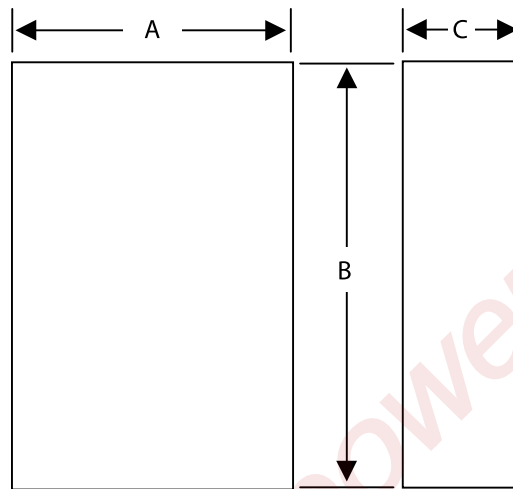
Open Type



4

Controller Rating [A]	A	B	C	D	E	F	G	Mounting Hole Size	Weight kg (lbs)
1...37	44.8 (1-49/64)	139.7 (5-1/2)	100 (4-21/64)	35 (1-3/8)	132 (5-13/64)	46.4 (1.81)	2 (1/16)	4.6 (0.18)	0.86 (1.9)
43...85	72 (2.83)	206 (8.11)	130 (5.12)	55 (2.17)	198 (7.8)	102 (4.02)	2 (1/16)	5.3 (0.21)	2.25 (5.0)
108...135	196.4 (7.74)	443.7 (17.47)	205.2 (8.08)	166.6 (6.56)	367 (14.45)	—	—	7.5 (0.295)	15 (33)
201...251	225 (8.86)	560 (22.05)	265.3 (10.45)	150 (5.91)	504.1 (19.85)	—	—	11.5 (0.45)	30.4 (67)
317...480	290 (11.42)	600 (23.62)	298 (11.73)	200 (7.87)	539.2 (21.23)	—	—	11.5 (0.45)	45.8 (101)

Minimum Enclosure Size



Controller Rating [A]	B Height	A Width	C Depth	Fan Requirements
1...37 A	305 (12)	224 (9)	152 (6)	none
43...85 A	406 (16)	305 (12)	203 (8)	none
108...135 A	762 (30)	610 (24)	305 (12)	none
201...251 A	965 (38)	762 (30)	356 (14)	none
317...480 A	1295 (51)	914 (36)	356 (14)	none

Enclosed Type Line-Connected Controllers

Dimensions in millimeters (inches). Dimensions are not intended to be used for manufacturing purposes. All dimensions are subject to change.

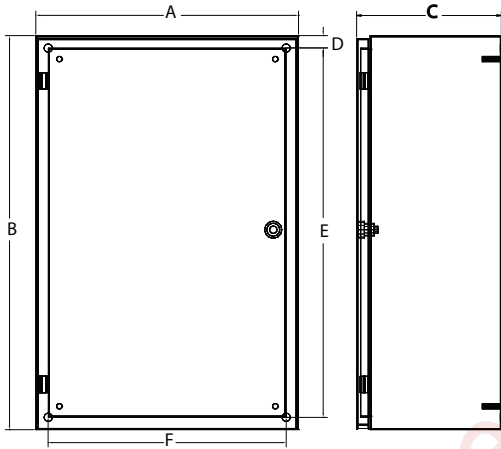


Figure 1 — Wall-Mount

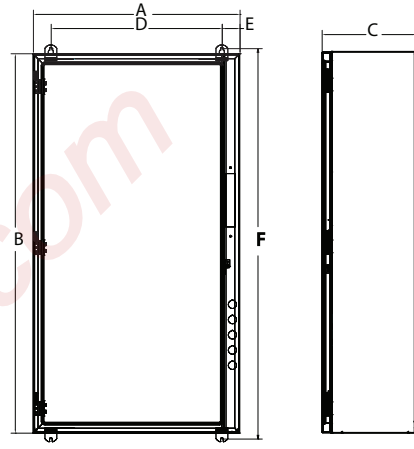


Figure 2 — Wall-Mount

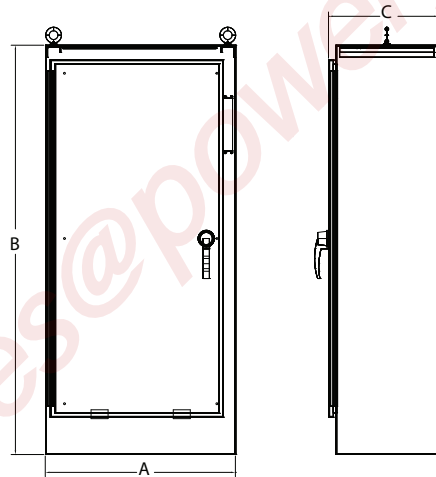


Figure 3 — Floor-Mount

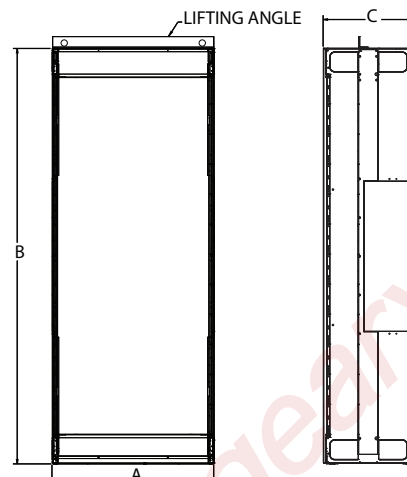


Figure 4 — Floor-Mount

Controller Rating [A]	Bulletin	With Option	Dimension Figure No.	Dimensions in inches (mm)					
				A (Width)	B (Height)	C (Depth)	D (Mtg. Dim.)	E (Mtg. Dim.)	F (Mtg. Dim.)
SMC-3 Non-Combination Controller									
3...37	150	—	1	8 (203)	12 (305)	6 (152)	2.44 (62)	10.43 (265)	3.0 (76)
		6P		12 (305)	12 (305)	6 (152)	2.41 (61)	10.43 (265)	7.0 (178)
43...85	150	—	1	8 (203)	14 (356)	8 (203)	2.44 (62)	12.40 (315)	3.0 (76)
				16 (406)	14 (356)	8 (203)	4.38 (111)	12.40 (315)	7.0 (178)
108...135	150	Any	1	24 (610)	30 (762)	12 (305)	0.75 (19)	28.5 (724)	22.5 (572)
201...251	150	—	1	30 (762)	38 (965)	14 (356)	0.75 (19)	36.5 (927)	28.5 (724)
	150, 150B	BP,NB,NI,6P		36 (914)	51 (1295)	14 (356)	0.75 (19)	49.5 (1257)	34.5 (876)
317...361	150	Any	1	36 (914)	51 (1295)	14 (356)	0.75 (19)	49.5 (1257)	34.5 (876)
	150B	—		36 (914)	51 (1295)	14 (356)	0.75 (19)	49.5 (1257)	34.5 (876)
		NI, 6P		36 (914)	51 (1295)	14 (356)	0.75 (19)	49.5 (1257)	34.5 (876)
		BP,NI, 6P		36 (914)	60 (1524)	14 (356)	0.75 (19)	58.5 (1486)	34.5 (876)
480	150	—	1	36 (914)	51 (1295)	14 (356)	0.75 (19)	49.5 (1257)	34.5 (876)
	150, 150B	BP,NB,NI,6P		36 (914)	60 (1524)	14 (356)	0.75 (19)	58.5 (1486)	34.5 (876)

Controller Rating [A]	Bulletin	With Option	Dimension Figure No.	Dimensions in inches (mm)					
				A (Width)	B (Height)	C (Depth)	D (Mtg. Dim.)	E (Mtg. Dim.)	F (Mtg. Dim.)
SMC-3 Combination Controller									
3...37	152H,153H	Any	1	16 (406)	14 (356)	8 (203)	4.38 (111)	12.40 (315)	7.0 (178)
43	152H	Any	1	16 (406)	14 (356)	8 (203)	4.38 (111)	12.40 (315)	7.0 (178)
	153H	Any	1	16 (406)	24 (610)	10 (254)	0.75 (19)	22.5 (572)	14.5 (368)
60	152H, 153H	Any	1	16 (406)	24 (610)	9 (229)	0.75 (19)	22.5 (572)	14.5 (368)
	152H	Any	1	24 (610)	30 (762)	12 (305)	0.75 (19)	28.5 (724)	22.5 (572)
85	152H	Any	1*	16 (406)	24 (610)	9 (229)	0.75 (19)	22.5 (572)	14.5 (368)
		Any	1§	24 (610)	30 (762)	12 (305)	0.75 (19)	28.5 (724)	22.5 (572)
	153H	Any	1	16 (406)	24 (610)	9 (229)	0.75 (19)	22.5 (572)	14.5 (368)
108	152H,153H	Any	1	30 (762)	38 (965)	14 (356)	0.75 (19)	36.5 (927)	28.5 (724)
	152B,153B	Any	1	36 (914)	51 (1295)	14 (356)	0.75 (19)	49.5 (1257)	34.5 (876)
135	152H,153H	Any	1	30 (762)	38 (965)	14 (356)	0.75 (19)	36.5 (927)	28.5 (724)
	152B,153B	Any	1	36 (914)	51 (1295)	14 (356)	0.75 (19)	49.5 (1257)	34.5 (876)
201	152H,153H	—	1	30 (762)	38 (965)	14 (356)	0.75 (19)	36.5 (927)	28.5 (724)
	152B,153B, 152H,153H	Any	1	36 (914)	51 (1295)	14 (356)	0.75 (19)	49.5 (1257)	34.5 (876)
251	152H,153H	—	1	30 (762)	38 (965)	14 (356)	0.75 (19)	36.5 (927)	28.5 (724)
	152B,153B, 152H,153H	Any	1	36 (914)	51 (1295)	14 (356)	0.75 (19)	49.5 (1257)	34.5 (876)
317	153H	—	1	36 (914)	51 (1295)	14 (356)	0.75 (19)	49.5 (1257)	34.5 (876)
		BP,NB	1	36 (914)	60 (1524)	14 (356)	0.75 (19)	58.5 (1486)	34.5 (876)
	153B	—	1	36 (914)	60 (1524)	14 (356)	0.75 (19)	58.5 (1486)	34.5 (876)
	152B,152H	—	2	38 (965)	60 (1524)	17 (431)	33.88 (861)	1.75 (45)	61.69 (1567)
	152H	BP	2	38 (965)	60 (1524)	17 (431)	33.88 (861)	1.75 (45)	61.69 (1567)
	152B,152H,153B,153H	NB,NI	3	40 (1016)	84 (2134)	18 (457)	—	—	—
361	153H	—	1	36 (914)	51 (1295)	14 (356)	0.75 (19)	49.5 (1257)	34.5 (876)
		BP,NB	1	36 (914)	60 (1524)	14 (356)	0.75 (19)	58.5 (1486)	34.5 (876)
	153B	—	1	36 (914)	60 (1524)	14 (356)	0.75 (19)	58.5 (1486)	34.5 (876)
	152B,152H	—	2	38 (965)	60 (1524)	17 (431)	33.88 (861)	1.75 (45)	61.69 (1567)
	152H	BP	2	38 (965)	60 (1524)	17 (431)	33.88 (861)	1.75 (45)	61.69 (1567)
	152B,152H,153B,153H	NB,NI	3	40 (1016)	84 (2134)	18 (457)	—	—	—
480	153H	—	1	36 (914)	51 (1295)	14 (356)	0.75 (19)	49.5 (1257)	34.5 (876)
		BP	3§	40 (1016)	84 (2134)	18 (457)	—	—	—
	152H,153B	Any	3	40 (1016)	84 (2134)	18 (457)	—	—	—
	152H	—	4§	20 (508)	91.5 (2324)	20 (508)	—	—	—
	152B, 152H	BP,NB	4§	35 (889)	91.5 (2324)	20 (508)	—	—	—

* Rating 20 Hp @208V, 25 Hp @240V, 50 Hp @ 480V, 60 Hp @ 600V

§ Rating 25 Hp @208V, 30 Hp @240V, 60 Hp @ 480V, 75 Hp @ 600V

§ 200 Hp @ 240V AC, 400 Hp @480V, 500 Hp @ 600V