Bulletin 150 — Solid-State Reduced Voltage Starters

The Allen-Bradley SMC™ Smart Motor Controller product line offers a broad range of products for starting and stopping standard 3-phase squirrel-cage induction motors and wye-delta motors.

						
	SMC™-50	SMC™ Flex	SMC™-3	SMC™ Dialog Plus	STC™	
Features	200…690V 90…xxx A♣	200…690V 1…1250 A	200…600V 1…480 A	200…600V 1…1000 A	100…240V 1Ø, 1…22 A	200…600V 3Ø, 1…22 A
Soft Start	S	S	S	S	S	S
Kickstart	S	S	S	S	—	—
Current Limit	S	S	S	S	—	—
Dual Ramp Start	S	S	—	S	—	—
Full Voltage	S	S	—	S	—	—
Energy Saver	S	—	—	S	—	—
Soft Stop	S	S	S	O	—	—
Pump Control	S	O	—	O	—	—
Preset Slow Speed	S	S	—	O	—	—
Linear Acceleration/Deceleration	S	S	—	—	—	—
Torque Control	S	—	—	—	—	—
SMB™ Smart Motor Braking	S	O	—	O	—	—
Accu-Stop™	S	O	—	O	—	—
Slow Speed with Braking	S	O	—	O	—	—
Integrated Bypass Contactor	NA⌘	S	S	NA⌘	—	—
Integrated Motor Overload Protection	S	S	S	S	—	—
Single-phase Operation	—	—	—	—	S	—
DPI Communication	S	S	—	—	—	—
Metering	S	S	—	S	—	—
Real Time Clock	S	—	—	—	—	—
Motor Winding Heater Function	S	❄	—	—	—	—
Diagnostic Faults and Alarms	S	S	—	—	—	—
Motor and Starter	S	—	—	—	—	—
Individual Bit Enable of Faults and Alarms	S	—	—	—	—	—
Automatic Tuning of Motor Parameters	S	—	—	—	—	—
Parameter Configuration/Programming	S✶	S	—	S	—	—
Human Interface Module (HIM)	O✶	O	—	—	—	—
Parameter Configuration Module	O✶	—	—	—	—	—
Configuration Software: Drives Explorer and Drives Executive	O✶	O	—	—	—	—
Digital I/O Expansion Module‡§	O	—	—	—	—	—
Ground Fault/CT/PTC Module‡	O	—	—	—	—	—
Network Communications	O	O	—	—	—	—
Inside Delta Connection	S	S	S	—	—	—
Standards Compliance: CE Marked per Low Voltage Directive 73/23/EEC, 93/68/EEC CSA Certified (File No. LR 1234) UL Listed (File No. E96956)	S	S	S	S	S	S
Product Selection	Page 4-115Web♣	Page 4-115	Page 4-138	Open Style: Page 4-162 Enclosed: Web❖	Web❖	

S = Standard Feature
O = Optional Feature

‡ With removable terminal block.
§ Starter ships with 2 DC inputs and 2 relay outputs as standard.
✶ Starter does not include a configuration device as standard.
❄ Option using a Bulletin 1410 motor winding heater.
⌘ The starter is fully solid-state (no integral bypass). An external bypass contactor can be added as an option.
❖ Note: Information for this product line is available on the Industrial Controls catalog web site: www.ab.com/catalogs.
♣ Note: Information for this product line is available in publication 150-SG010* or on the Industrial Controls catalog web site:

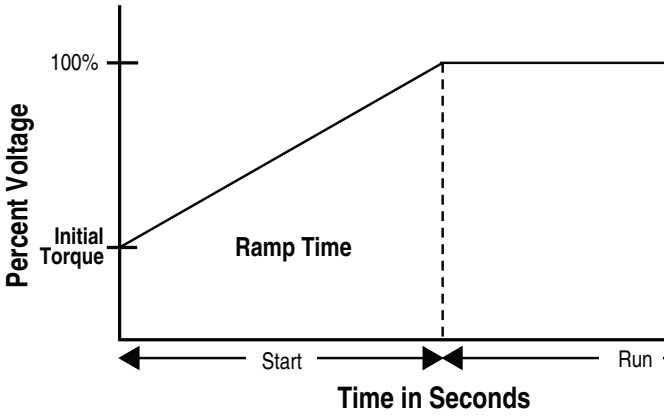
4

Modes of Operation

The SMC controllers provide the following modes of operation:

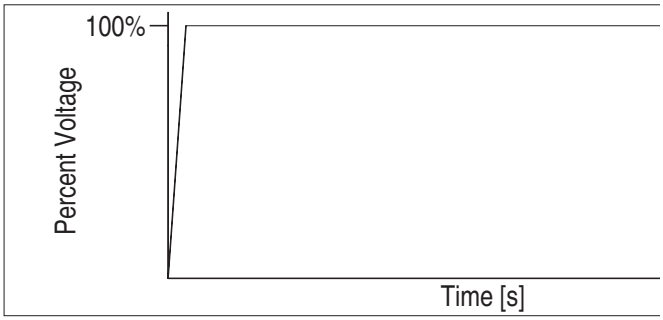
Soft Start

This method covers the most general applications. The motor is given an initial torque setting, which is user adjustable. From the initial torque level, the output voltage to the motor is steplessly increased during the acceleration ramp time, which is user adjustable.



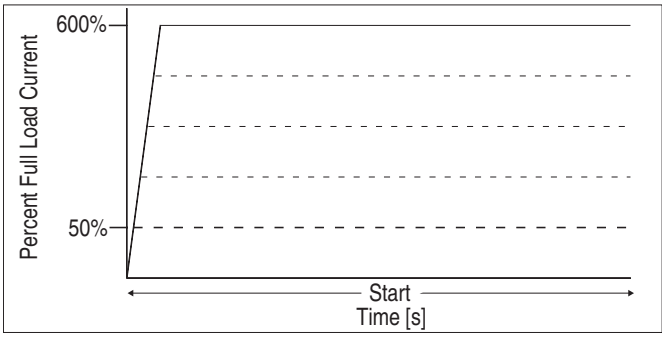
Full Voltage Start

This method is used in applications requiring across-the-line starting. The SMC controller performs like a solid-state contactor. Full inrush current and locked-rotor torque are realized. The SMC may be programmed to provide full voltage start in which the output voltage to the motor reaches full voltage.



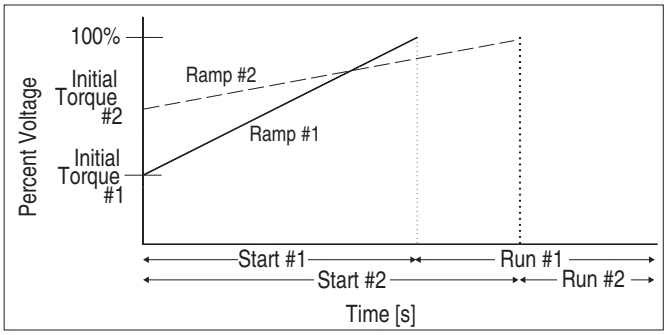
Current Limit Start

This method provides current limit start and is used when it is necessary to limit the maximum starting current. The starting current is user adjustable. The current limit stating time is user adjustable.



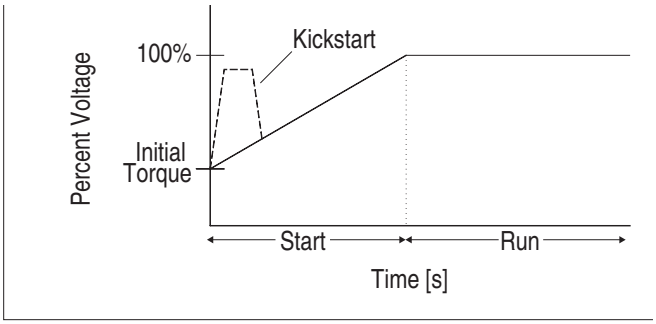
Dual Ramp Start

This starting method is useful on applications with varying loads, starting torque, and start time requirements. Dual Ramp Start offers the user the ability to select between two separate start profiles with separately adjustable ramp times and initial torque settings.



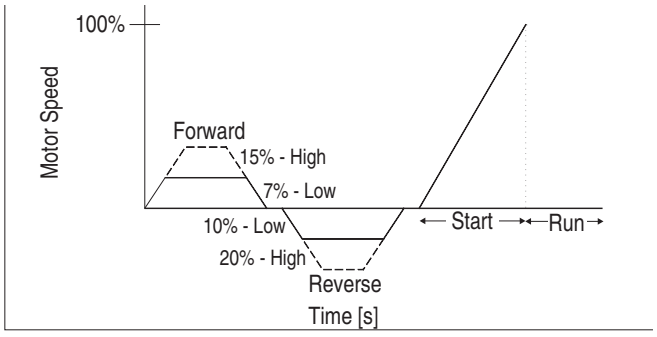
Selectable Kickstart

The kickstart feature provides a boost at startup to break away loads that may require a pulse of high torque to get started. It is intended to provide a current pulse, for a selected period of time.



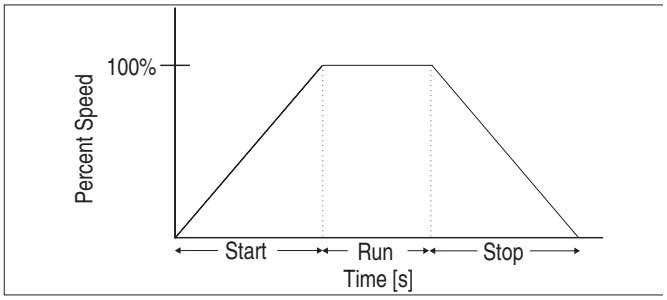
Preset Slow Speed

This method can be used on applications that require a slow speed for positioning material. The Preset Slow Speed can be set for either Low, 7% of base speed, or High, 15% of base speed. Reversing is also possible through programming. Speeds provided during reverse operation are Low, 10% of base speed, or High, 20% of base speed.



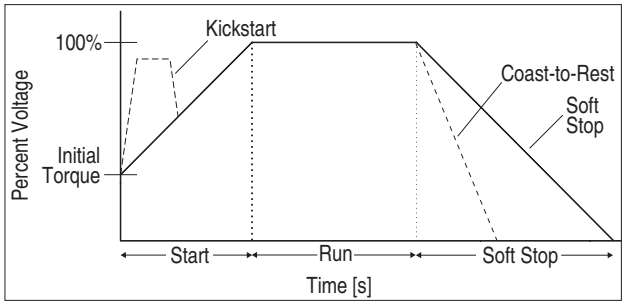
Linear Speed Acceleration

With this type of acceleration mode, a closed-loop feedback system maintains the motor acceleration at a constant rate. The required feedback signal is provided by a DC tachometer coupled to the motor (tachometer supplied by user 0…5V DC, 4.5V DC = 100% speed). Kickstart is available with this mode.



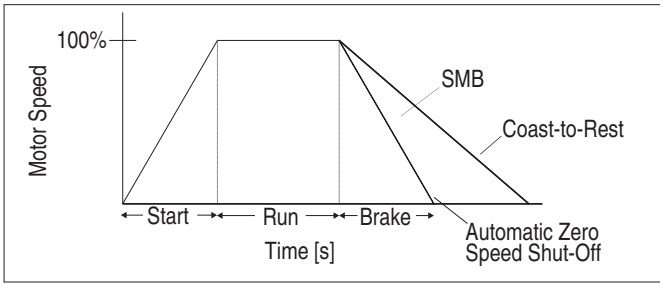
Soft Stop❄

The Soft Stop option can be used in applications requiring an extended coast-to-rest. The voltage ramp down time is user adjustable. The load will stop when the voltage drops to a point where the load torque is greater than the motor torque.



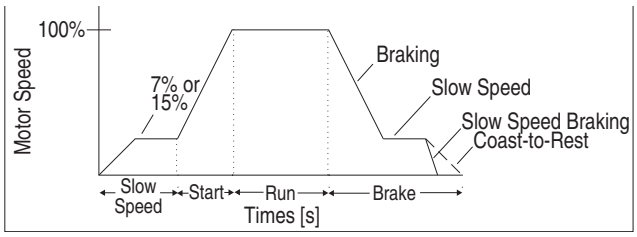
SMB Smart Motor Braking❄

This option provides motor braking for applications that require the motor to stop faster than a coast to rest. Braking control, with automatic zero speed shut off, is fully integrated into the compact design of the SMC controller. This design facilitates a clean, straight forward installation and eliminates the requirement for additional hardware such as braking contactors, resistors, timers, and speed sensors. The microprocessor based braking system applies braking current to a standard squirrel-cage induction motor. The strength of the braking current is user programmable.



Accu-Stop❄

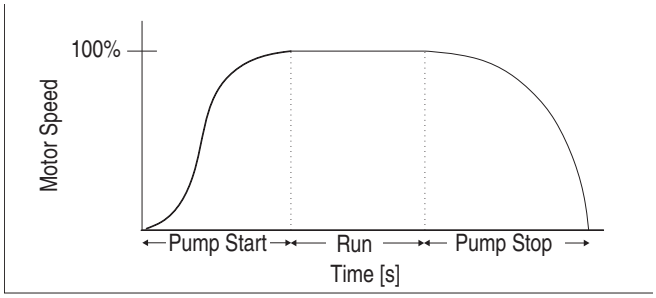
This option is used in applications requiring controlled position stopping. During stopping, braking torque is applied to the motor until it reaches preset slow speed (7% or 15% of rated speed) and holds the motor at this speed until a stop command is given. Braking torque is then applied until the motor reaches zero speed. Braking current and slow speed current are user programmable. Slow speed can be programmed for either 7% (low) or 15% (high).



Pump Control

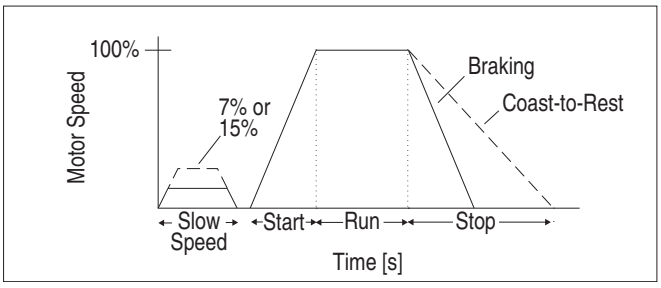
Start and Stop❄

This option is used to reduce surges during the starting and stopping of a centrifugal pump by smoothly accelerating and decelerating the motor. The microprocessor analyzes the motor variables and generates commands which control motor torque and reduce the possibility of surges occurring in the system.



Slow Speed with Braking❄

Slow Speed with Braking is used on applications that require slow speed (in the forward direction) for positioning or alignment and also require braking control to stop. Slow speed adjustments are 7% (low) or 15% (high) of rated speed. Slow speed acceleration current, slow speed running current, and braking current are all adjustable.



❄ Not intended to be used as an emergency stop. Refer to the applicable standards for emergency stop requirements.

Bulletin 150 — SMC™ Flex Smart Motor Controller

The SMC Flex controller provides microprocessor controlled starting for standard 3-phase squirrel-cage induction or Wye-Delta (6-lead) motors. Seven standard modes of operation are available within a single controller.

- 1…1250 A Range
- Seven Standard Start Modes
- Options Include Pump Control and Braking Control

Features

- Built in SCR Bypass/Run Contactor
- Built in Electronic Motor Overload Protection
- CT on each Phase
- Metering
- DPI Communication
- LCD Display
- Keypad Programming
- Four Programmable Auxiliary Contacts

The SMC Flex controller is available for motors rated 1…1250 A; 200…480V AC, 200…600V AC, or 230…690V AC, 50/60 Hz. In addition to motors, the SMC Flex controller can be used to control resistive loads.

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This catalog product information 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
CCC Certified

Modes of Operation

The SMC Flex controller provides the following modes of operation as standard:

- Soft Start
- Selectable Kickstart
- Current Limit Start
- Dual Ramp Start
- Full Voltage Start
- Linear Speed Acceleration
- Preset Slow Speed
- Soft Stop

Optional Modes of Operation

Pump Control

- Start and Stop

Braking Control

- SMB — Smart Motor Braking
- Accu-Stop
- Slow Speed with Braking

Note: For detailed information about the different modes of operation, see page 4-109.

Description of Features

Electronic Motor Overload Protection
The SMC Flex controller incorporates, as standard, electronic motor overload protection. This overload protection is accomplished electronically with an I^2t algorithm.
When coordinated with the proper short-circuit protection, overload protection is intended to protect the motor, motor controller, and power wiring against overheating caused by excessive overcurrent.
The SMC Flex controller meets applicable requirements as a motor overload protective device.
The controller's overload protection is programmable, providing the user with flexibility. The overload trip class consists of either OFF, 10, 15, 20, or 30 protection. The trip current is programmed by entering the motor full-load current rating, service factor, and selecting the trip class.
Thermal memory is included to accurately model motor operating temperature. Ambient temperature insensitivity is inherent in the electronic design of the overload.

Undervoltage Protection
The SMC Flex controller's undervoltage protection will halt motor operation if a drop in the incoming line voltage is detected.
The undervoltage trip level is adjustable as a percentage of the programmed line voltage, from 0…99%. To eliminate nuisance trips, a programmable undervoltage trip delay time of 0…99 seconds can also be programmed. The line voltage must remain below the undervoltage trip level during the programmed delay time.

Overvoltage Protection
If a rise in the incoming line voltage is detected, the SMC Flex controller's overvoltage protection will halt motor operation.
The overvoltage trip level is adjustable as a percentage of the programmed line voltage, from 0…199%. To eliminate nuisance trips, a programmable overvoltage trip delay time of 0…99 seconds can also be programmed. The line voltage must remain above the overvoltage trip level during the programmed delay time.

Stall Protection and Jam Detection
Motors can experience locked-rotor currents and develop high torque levels in the event of a stall or a jam. These conditions can result in winding insulation breakdown or mechanical damage to the connected load. The SMC Flex controller provides both stall protection and jam detection for enhanced motor and system protection. Stall protection allows the user to program a maximum stall protection delay time from 0…10 seconds. The stall protection delay time is in addition to the programmed start time and begins only after the start time has timed out. If the controller senses that the motor is stalled, it will shut down after the delay period has expired. Jam detection allows the user to determine the motor jam detection level as a percentage of the motor's full-load current rating. To prevent nuisance tripping, a jam detection delay time, from 0.0…99.0 seconds, can be programmed. This allows the user to select the time delay required before the SMC Flex controller will trip on a motor jam condition. The motor current must remain above the jam detection level during the delay time. Jam detection is active only after the motor has reached full speed.

Underload Protection
Utilizing the underload protection of the SMC Flex controller, motor operation can be halted if a drop in current is sensed.
The SMC Flex controller provides an adjustable underload trip setting from 0…99% of the programmed motor full-load current rating with an adjustable trip delay time of 0…99 seconds.

Voltage Unbalance Protection
Voltage unbalance is detected by monitoring the 3-phase supply voltage magnitudes in conjunction with the rotational relationship of the three phases. The controller will halt motor operation when the calculated voltage unbalance reaches the user-programmed trip level.
The voltage unbalance trip level is programmable from 0…25% unbalance.

Excessive Starts Per Hour
The SMC Flex controller allows the user to program the allowed number of starts per hour (up to 99). This helps eliminate motor stress caused by repeated starting during a short time period.

Metering
Power monitoring parameters include:

- 3-phase current
- 3-phase voltage
- Power in kW or mW
- Power usage in kWH or mWH
- Power Factor
- Motor thermal capacity usage
- Elapsed time

Note: The motor thermal capacity usage allows the user to monitor the amount of overload thermal capacity usage before the SMC Flex controller's built-in electronic overload trips.

Built-in DPI Communication Capabilities
A serial interface port is provided as standard, which allows connection to a Bulletin 20 Human Interface Module and a variety of Bulletin 20-COMM Communication Modules. This includes Allen-Bradley Remote I/O, DeviceNet, ControlNet, Ethernet, ProfiBUS, Interbus, and RS485-DF1.

LCD Display
The SMC Flex controller's three-line 16-character backlit LCD display provides parameter identification using clear, informative text. Controller set up can be performed quickly and easily without the use of a reference manual. Parameters are arranged in an organized four-level menu structure for ease of programming and fast access to parameters.

Network I/O
The SMC Flex can have up to two inputs and four outputs controlled via a communication network. The output contacts use the auxiliary contacts.

Keypad Programming
Programming of parameters is accomplished through a five-button keypad on the front of the SMC Flex controller. The five buttons include up and down arrows, an Enter button, a Select button, and an Escape button. The user needs only to enter the correct sequence of keystrokes for programming the SMC Flex controller.

Auxiliary Contacts
Four fully programmable hard contacts are furnished as standard with the SMC Flex controller:

Aux #1, Aux #2, Aux #3, Aux #4

- N.O./N.C.
- Normal/Up-to-Speed/External Bypass/Fault/Alarm/Network

Ground Fault Input
The SMC Flex can monitor for ground fault conditions. An external core balance current transformer is required for this function. See SMC Flex User Manual for additional information.

Tach Input
A motor tachometer is required for the Linear Speed Start mode. Please see the Specifications section on page 4-127 for tachometer characteristics.

PTC Input
A motor PTC input can be monitored by the SMC Flex. In the event of a fault, the SMC Flex will shut down and indicate a motor PTC fault.

Open and Non-Combination

150 – F135 F B D B – 8L
a b c d e f g

a

Bulletin Number	
Code	Description
150	Solid-State Controller
150B	Enclosed Solid-State Controller with Isolation Contactor

b

Controller Ratings	
Code	Description
F5	5 A, 3 Hp @ 460V AC
F25	25 A, 15 Hp @ 460V AC
F43	43 A, 30 Hp @ 460V AC
F60	60 A, 40 Hp @ 460V AC
F85	85 A, 60 Hp @ 460V AC
F108	108 A, 75 Hp @ 460V AC
F135	135 A, 100 Hp @ 460V AC
F201	201 A, 150 Hp @ 460V AC
F251	251 A, 200 Hp @ 460V AC
F317	317 A, 250 Hp @ 460V AC
F361	361 A, 300 Hp @ 460V AC
F480	480 A, 400 Hp @ 460V AC
F625	625 A, 500 Hp @ 460V AC
F780	780 A, 600 Hp @ 460V AC
F970	970 A, 800 Hp @ 460V AC
F1250	1250 A, 1000 Hp @ 460V AC

c

Enclosure Type	
Code	Description
F	NEMA Type 4/12 (IP65) (Non-Combination Only)
J	NEMA Type 12 (IP54)
N	Open

d

Input Line Voltage	
Open Type	
Code	Description
B	200…460V AC, 3-phase, 50 and 60 Hz
C	200…575V AC, 3-phase, 50 and 60 Hz
Z	230…690V AC, 3-phase, 50 and 60 Hz (Open Only, 108 A and above)
Non-Combination Enclosed Only	
H	200…208V AC, 3-phase, 50 and 60 Hz
A	230V AC, 3-phase, 50 and 60 Hz
B	400…460V AC, 3-phase, 50 and 60 Hz
C	500…575V AC, 3-phase, 50 and 60 Hz

e

Control Voltage	
Code	Description
D	100…240V AC (5…480 A units)
R	24V AC/DC (5…480 A units) (Open Only)
E	110/120V AC (625…1250 A units)
A	230/240V AC (625…1250 A units)

f

Options (Select Only One)	
Code	Description
Blank	Standard
B	Pump Control
D	Braking Control

g

Options (Non-Combination only) (see page 4-125 for a full listing)	
Code	Description
8L	Line-Mounted Protective Module (enclosed only)
8M	Load-Mounted Protective Module (enclosed only)
8B	Line- and Load-Mounted Protective Modules (enclosed only)
Load-side MOVs are not available with Pump and Braking options, or on delta-connected motors. MOVs can be field installed for open type units.	

Combination

152H – F480 F BD B – 59 – 8B
a b c d e f g

a

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

b

Controller Ratings	
Code	Description
F5	5 A, 3 Hp @ 460V AC
F25	25 A, 15 Hp @ 460V AC
F43	43 A, 30 Hp @ 460V AC
F60	60 A, 40 Hp @ 460V AC
F85	85 A, 60 Hp @ 460V AC
F108	108 A, 75 Hp @ 460V AC
F135	135 A, 100 Hp @ 460V AC
F201	201 A, 150 Hp @ 460V AC
F251	251 A, 200 Hp @ 460V AC
F317	317 A, 250 Hp @ 460V AC
F361	361 A, 300 Hp @ 460V AC
F480	480 A, 400 Hp @ 460V AC
F625	625 A, 500 Hp @ 460V AC
F780	780 A, 600 Hp @ 460V AC

c

Enclosure Type	
Code	Description
F	NEMA Type 4/12 (IP65)
J	NEMA Type 12 (IP54)

d

Line Voltage, 120V AC Control Voltage	
Code	Description
HD	200…208V AC, 3-phase, 50 and 60 Hz
AD	230V AC, 3-phase, 50 and 60 Hz
BD	400…460V AC, 3-phase, 50 and 60 Hz
CD	500…575V AC, 3-phase, 50 and 60 Hz

e

Control Options	
Code	Description
Blank	Standard
B	Pump Control
D	Braking Control

g

Options (see page 4-125 for a full listing)	
Code	Description
8L	Line-Mounted Protective Module
8M	Load-Mounted Protective Module
8B	Line- and Load-Mounted Protective Modules
Load-side MOVs are not available with Pump and Braking options, or when used with inside-the-delta connections.	

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, Type 4/12) Controllers — For use with Line-Connected Motors

Enclosures other than those listed are available; consult your local Rockwell Automation sales office or Allen-Bradley distributor.

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…5	—	1	100…240V AC, 50/60 Hz	**150-F5NBD**	150-F5FHD	
				24V AC/DC♣	**150-F5NBR**	—	
	5...25	—	5	100…240V AC, 50/60 Hz	**150-F25NBD**	150-F25FHD	
				24V AC/DC♣	**150-F25NBR**	—	
	8.6...43	—	10	100…240V AC, 50/60 Hz	**150-F43NBD**	150-F43FHD	
				24V AC/DC♣	**150-F43NBR**	—	
	12...60	—	15	100…240V AC, 50/60 Hz	**150-F60NBD**	150-F60FHD	
				24V AC/DC♣	**150-F60NBR**	—	
	17...85	—	25	100…240V AC, 50/60 Hz	**150-F85NBD**	150-F85FHD	
				24V AC/DC♣	**150-F85NBR**	—	
	27…108	—	30	100…240V AC, 50/60 Hz	**150-F108NBD**	150-F108FHD	
				24V AC/DC♣	**150-F108NBR**	—	
	34…135	—	40	100…240V AC, 50/60 Hz	**150-F135NBD**	150-F135FHD	
				24V AC/DC♣	**150-F135NBR**	—	
	67…201	—	60	100…240V AC, 50/60 Hz	**150-F201NBD**	150-F201FHD	
				24V AC/DC♣	**150-F201NBR**	—	
	84…251	—	75	100…240V AC, 50/60 Hz	**150-F251NBD**	150-F251FHD	
				24V AC/DC♣	**150-F251NBR**	—	
	106…317	—	100	100…240V AC, 50/60 Hz	**150-F317NBD**	150-F317FHD	
				24V AC/DC♣	**150-F317NBR**	—	
	120…361	—	125	100…240V AC, 50/60 Hz	**150-F361NBD**	150-F361FHD	
				24V AC/DC♣	**150-F361NBR**	—	
	160…480	—	150	100…240V AC, 50/60 Hz	**150-F480NBD**	150-F480FHD	
				24V AC/DC♣	**150-F480NBR**	—	
	208…625	—	200	110/120V AC, 50/60 Hz	**150-F625NBE**	⌘	150-F625JHE
				230/240V AC, 50/60 Hz	150-F625NBA	⌘	150-F625JHA
	260…780	—	250	110/120V AC, 50/60 Hz	150-F780NBE	⌘	150-F780JHE
				230/240V AC, 50/60 Hz	150-F780NBA	⌘	150-F780JHA
	323…970	—	350	110/120V AC, 50/60 Hz	150-F970NBE	—	
				230/240V AC, 50/60 Hz	150-F970NBA	—	
	416…1250	—	400	110/120V AC, 50/60 Hz	150-F1250NBE	—	
				230/240V AC, 50/60 Hz	150-F1250NBA	—	

✶ Controllers rated 108 A and greater are not equipped with line and load terminal lugs. See page 4-126 for terminal lug kits.

❄ Motor FLA rating should fall within specified current range for unit to operate properly. Special consideration should be given when using a motor with a potentially high starting current (greater than ten times motor FLA) with the SMC Flex in the "Full Voltage" starting mode. Contact Rockwell Automation technical support for further guidance.

§ 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 power supply is required for fan operation.

➢ Line and load termination are provided as standard.

⌘ Available in IP54 (Type 12) enclosure only.

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

Enclosures other than those listed are available; consult your local Rockwell Automation sales office or Allen-Bradley distributor.

Rated Voltage [V AC]	Motor Current [A]❄	Max. kW, 50 Hz	Max. Hp, 60 Hz	Control Power	Open Type — Line-Connected Motors✶ Cat. No.	IP65 (Type 4/12) Enclosed Non-Combination Controllers§➢ Cat. No.
230	1…5	1.1	1	100…240V AC, 50/60 Hz	**150-F5NBD**	150-F5FAD
				24V AC/DC♣	**150-F5NBR**	—
	5...25	5.5	7.5	100…240V AC, 50/60 Hz	**150-F25NBD**	150-F25FAD
				24V AC/DC♣	**150-F25NBR**	—
	8.6...43	11	15	100…240V AC, 50/60 Hz	**150-F43NBD**	150-F43FAD
				24V AC/DC♣	**150-F43NBR**	—
	12...60	15	20	100…240V AC, 50/60 Hz	**150-F60NBD**	150-F60FAD
				24V AC/DC♣	**150-F60NBR**	—
	17...85	22	30	100…240V AC, 50/60 Hz	**150-F85NBD**	150-F85FAD
				24V AC/DC♣	**150-F85NBR**	—
	27…108	30	40	100…240V AC, 50/60 Hz	**150-F108NBD**	150-F108FAD
				24V AC/DC♣	**150-F108NBR**	—
	34…135	37	50	100…240V AC, 50/60 Hz	**150-F135NBD**	150-F135FAD
				24V AC/DC♣	**150-F135NBR**	—
	67…201	55	75	100…240V AC, 50/60 Hz	**150-F201NBD**	150-F201FAD
				24V AC/DC♣	**150-F201NBR**	—
	84…251	75	100	100…240V AC, 50/60 Hz	**150-F251NBD**	150-F251FAD
				24V AC/DC♣	**150-F251NBR**	—
	106…317	90	125	100…240V AC, 50/60 Hz	**150-F317NBD**	150-F317FAD
				24V AC/DC♣	**150-F317NBR**	—
	120…361	110	150	100…240V AC, 50/60 Hz	**150-F361NBD**	150-F361FAD
				24V AC/DC♣	**150-F361NBR**	—
	160…480	132	200	100…240V AC, 50/60 Hz	**150-F480NBD**	150-F480FAD
				24V AC/DC♣	**150-F480NBR**	—
	208…625	200	250	110/120V AC, 50/60 Hz	**150-F625NBE**	⌘ 150-F625JAE
				230/240V AC, 50/60 Hz	150-F625NBA	⌘ 150-F625JAA
	260…780	250	300	110/120V AC, 50/60 Hz	150-F780NBE	⌘ 150-F780JAE
				230/240V AC, 50/60 Hz	150-F780NBA	⌘ 150-F780JAA
	323…970	315	400	110/120V AC, 50/60 Hz	150-F970NBE	—
				230/240V AC, 50/60 Hz	150-F970NBA	—
	416…1250	400	500	110/120V AC, 50/60 Hz	150-F1250NBE	—
				230/240V AC, 50/60 Hz	150-F1250NBA	—

✶ Controllers rated 108 A and greater are not equipped with line and load terminal lugs. See page 4-126 for terminal lug kits.

❄ Motor FLA rating should fall within specified current range for unit to operate properly. Special consideration should be given when using a motor with a potentially high starting current (greater than ten times motor FLA) with the SMC Flex in the "Full Voltage" starting mode. Contact Rockwell Automation technical support for further guidance.

§ 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 power supply is required for fan operation.

➢ Line and load termination are provided as standard.

⌘ Available in IP54 (Type 12) enclosure only.

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

Enclosures other than those listed are available; consult your local Rockwell Automation sales office or Allen-Bradley distributor.

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.	
400/415/460	1…5	2.2	3	100…240V AC, 50/60 Hz	**150-F5NBD**	150-F5FBD	
				24V AC/DC♣	**150-F5NBR**	—	
	5...25	11	15	100…240V AC, 50/60 Hz	**150-F25NBD**	150-F25FBD	
				24V AC/DC♣	**150-F25NBR**	—	
	8.6...43	22	30	100…240V AC, 50/60 Hz	**150-F43NBD**	150-F43FBD	
				24V AC/DC♣	**150-F43NBR**	—	
	12...60	30	40	100…240V AC, 50/60 Hz	**150-F60NBD**	150-F60FBD	
				24V AC/DC♣	**150-F60NBR**	—	
	17...85	45	60	100…240V AC, 50/60 Hz	**150-F85NBD**	150-F85FBD	
				24V AC/DC♣	**150-F85NBR**	—	
	27…108	55	75	100…240V AC, 50/60 Hz	**150-F108NBD**	150-F108FBD	
				24V AC/DC♣	**150-F108NBR**	—	
	34…135	75	100	100…240V AC, 50/60 Hz	**150-F135NBD**	150-F135FBD	
				24V AC/DC♣	**150-F135NBR**	—	
	67…201	110	150	100…240V AC, 50/60 Hz	**150-F201NBD**	150-F201FBD	
				24V AC/DC♣	**150-F201NBR**	—	
	84…251	132	200	100…240V AC, 50/60 Hz	**150-F251NBD**	150-F251FBD	
				24V AC/DC♣	**150-F251NBR**	—	
	106…317	160	250	100…240V AC, 50/60 Hz	**150-F317NBD**	150-F317FBD	
				24V AC/DC♣	**150-F317NBR**	—	
	120…361	200	300	100…240V AC, 50/60 Hz	**150-F361NBD**	150-F361FBD	
				24V AC/DC♣	**150-F361NBR**	—	
	160…480	250	400	100…240V AC, 50/60 Hz	**150-F480NBD**	150-F480FBD	
				24V AC/DC♣	**150-F480NBR**	—	
	208…625	355	500	110/120V AC, 50/60 Hz	**150-F625NBE**	⌘	150-F625JBE
				230/240V AC, 50/60 Hz	150-F625NBA	⌘	150-F625JBA
	260…780	450	600	110/120V AC, 50/60 Hz	150-F780NBE	⌘	150-F780JBE
				230/240V AC, 50/60 Hz	150-F780NBA	⌘	150-F780JBA
	323…970	560	800	110/120V AC, 50/60 Hz	150-F970NBE	—	
				230/240V AC, 50/60 Hz	150-F970NBA	—	
	416…1250	710	1000	110/120V AC, 50/60 Hz	150-F1250NBE	—	
				230/240V AC, 50/60 Hz	150-F1250NBA	—	

✶ Controllers rated 108 A and greater are not equipped with line and load terminal lugs. See page 4-126 for terminal lug kits.

❄ Motor FLA rating should fall within specified current range for unit to operate properly. Special consideration should be given when using a motor with a potentially high starting current (greater than ten times motor FLA) with the SMC Flex in the "Full Voltage" starting mode. Contact Rockwell Automation technical support for further guidance.

§ 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 power supply is required for fan operation.

➢ Line and load termination are provided as standard.

⌘ Available in IP54 (Type 12) enclosure only.

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

Enclosures other than those listed are available; consult your local Rockwell Automation sales office or Allen-Bradley distributor.

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...5	2.2	3	100…240V AC, 50/60 Hz	**150-F5NCD**	150-F5FCD
				24V AC/DC♣	**150-F5NCR**	—
	5...25	15	20	100…240V AC, 50/60 Hz	**150-F25NCD**	150-F25FCD
				24V AC/DC♣	150-F25NCR	—
	8.6...43	22	40	100…240V AC, 50/60 Hz	**150-F43NCD**	150-F43FCD
				24V AC/DC♣	**150-F43NCR**	—
	12...60	37	50	100…240V AC, 50/60 Hz	**150-F60NCD**	150-F60FCD
				24V AC/DC♣	**150-F60NCR**	—
	17...85	55	75	100…240V AC, 50/60 Hz	**150-F85NCD**	150-F85FCD
				24V AC/DC♣	**150-F85NCR**	—
	27…108	75	100	100…240V AC, 50/60 Hz	150-F108NCD	150-F108FCD
				24V AC/DC♣	**150-F108NCR**	—
	34…135	90	125	100…240V AC, 50/60 Hz	**150-F135NCD**	150-F135FCD
				24V AC/DC♣	**150-F135NCR**	—
	67…201	132	200	100…240V AC, 50/60 Hz	**150-F201NCD**	150-F201FCD
				24V AC/DC♣	**150-F201NCR**	—
	84…251	160	250	100…240V AC, 50/60 Hz	**150-F251NCD**	150-F251FCD
				24V AC/DC♣	**150-F251NCR**	—
	106…317	200	300	100…240V AC, 50/60 Hz	**150-F317NCD**	150-F317FCD
				24V AC/DC♣	**150-F317NCR**	—
	120…361	250	350	100…240V AC, 50/60 Hz	**150-F361NCD**	150-F361FCD
				24V AC/DC♣	**150-F361NCR**	—
	160…480	315	500	100…240V AC, 50/60 Hz	150-F480NCD	150-F480FCD
				24V AC/DC♣	**150-F480NCR**	—
	208…625	450	600	110/120V AC, 50/60 Hz	150-F625NCE	⌘ 150-F625JCE
				230/240V AC, 50/60 Hz	150-F625NCA	⌘ 150-F625JCA
	260…780	560	800	110/120V AC, 50/60 Hz	150-F780NCE	⌘ 150-F780JCE
				230/240V AC, 50/60 Hz	150-F780NCA	⌘ 150-F780JCA
	323…970	710	1000	110/120V AC, 50/60 Hz	150-F970NCE	—
				230/240V AC, 50/60 Hz	150-F970NCA	—
	416…1250	900	1300	110/120V AC, 50/60 Hz	150-F1250NCE	—
				230/240V AC, 50/60 Hz	150-F1250NCA	—

Rated Voltage [V AC]	Motor Current [A]❄	Max. kW, 50 Hz	Max. Hp, 60 Hz	Control Power	Open Type — Line-Connected Motors✶
					Cat. No.
690/Y‡	27…108	90	100	100…240V AC, 50/60 Hz	**150-F108NZD**
	34…135	132	175	100…240V AC, 50/60 Hz	**150-F135NZD**
	67…201	160	200	100…240V AC, 50/60 Hz	**150-F201NZD**
	84…251	200	250	100…240V AC, 50/60 Hz	**150-F251NZD**
	106…317	315	400	100…240V AC, 50/60 Hz	**150-F317NZD**
	120…361	355	450	100…240V AC, 50/60 Hz	**150-F361NZD**
	160…480	450	600	100…240V AC, 50/60 Hz	**150-F480NZD**
	208…625	630	800	110/120V AC, 50/60 Hz	150-F625NZE
				230/240V AC, 50/60 Hz	150-F625NZA
	260…780	800	1000	110/120V AC, 50/60 Hz	150-F780NZE
				230/240V AC, 50/60 Hz	150-F780NZA
	323…970	1000	1300	110/120V AC, 50/60 Hz	150-F970NZE
				230/240V AC, 50/60 Hz	150-F970NZA
	416…1250	1200	1600	110/120V AC, 50/60 Hz	150-F1250NZE
				230/240V AC, 50/60 Hz	150-F1250NZA

✶ Controllers rated 108 A and greater are not equipped with line and load terminal lugs. See page 4-126 for terminal lug kits.

❄ Motor FLA rating should fall within specified current range for unit to operate properly. Special consideration should be given when using a motor with a potentially high starting current (greater than ten times motor FLA) with the SMC Flex in the "Full Voltage" starting mode. Contact Rockwell Automation technical support for further guidance.

§ 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 power supply is required for fan operation.

➢ Line and load termination are provided as standard.

‡ To be used only in a Y-type system.

⌘ Available in IP54 (Type 12) enclosure only.

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…8.7	—	2	100…240V AC, 50/60 Hz	**150-F5NBD**
				24V AC/DC♣	**150-F5NBR**
	8.7…43	—	10	100…240V AC, 50/60 Hz	**150-F25NBD**
				24V AC/DC♣	**150-F25NBR**
	14.9…74	—	20	100…240V AC, 50/60 Hz	**150-F43NBD**
				24V AC/DC♣	**150-F43NBR**
	20.8…104	—	30	100…240V AC, 50/60 Hz	**150-F60NBD**
				24V AC/DC♣	**150-F60NBR**
	29.4…147	—	40	100…240V AC, 50/60 Hz	**150-F85NBD**
				24V AC/DC♣	**150-F85NBR**
	47…187	—	60	100…240V AC, 50/60 Hz	**150-F108NBD**
				24V AC/DC♣	**150-F108NBR**
	59…234	—	75	100…240V AC, 50/60 Hz	**150-F135NBD**
				24V AC/DC♣	**150-F135NBR**
	116…348	—	100	100…240V AC, 50/60 Hz	**150-F201NBD**
				24V AC/DC♣	**150-F201NBR**
	145…435	—	150	100…240V AC, 50/60 Hz	**150-F251NBD**
				24V AC/DC♣	**150-F251NBR**
	183…549	—	200	100…240V AC, 50/60 Hz	**150-F317NBD**
				24V AC/DC♣	**150-F317NBR**
	208…625	—	200	100…240V AC, 50/60 Hz	**150-F361NBD**
				24V AC/DC♣	**150-F361NBR**
	277…831	—	300	100…240V AC, 50/60 Hz	**150-F480NBD**
				24V AC/DC♣	**150-F480NBR**
	283…850	—	300	110/120V AC, 50/60 Hz	**150-F625NBE**
				230/240V AC, 50/60 Hz	150-F625NBA
	300…900	—	300	110/120V AC, 50/60 Hz	150-F780NBE
				230/240V AC, 50/60 Hz	150-F780NBA
	400…1200	—	400	110/120V AC, 50/60 Hz	150-F970NBE
				230/240V AC, 50/60 Hz	150-F970NBA
	533…1600	—	500	110/120V AC, 50/60 Hz	150-F1250NBE
				230/240V AC, 50/60 Hz	150-F1250NBA

✶ Controllers rated 108 A and greater are not equipped with line and load terminal lugs. See page 4-126 for terminal lug kits.

❄ Motor FLA rating should fall within specified current range for unit to operate properly. Special consideration should be given when using a motor with a potentially high starting current (greater than ten times motor FLA) with the SMC Flex in the "Full Voltage" starting mode. Contact Rockwell Automation technical support for further guidance.

♣ Separate 120V or 240V single-phase power supply 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…8.7	2.2	2	100…240V AC, 50/60 Hz	**150-F5NBD**
				24V AC/DC♣	**150-F5NBR**
	8.7…43	11	15	100…240V AC, 50/60 Hz	**150-F25NBD**
				24V AC/DC♣	**150-F25NBR**
	14.9…74	22	25	100…240V AC, 50/60 Hz	**150-F43NBD**
				24V AC/DC♣	**150-F43NBR**
	20.8…104	30	40	100…240V AC, 50/60 Hz	**150-F60NBD**
				24V AC/DC♣	**150-F60NBR**
	29.4…147	45	50	100…240V AC, 50/60 Hz	**150-F85NBD**
				24V AC/DC♣	**150-F85NBR**
	47…187	55	60	100…240V AC, 50/60 Hz	**150-F108NBD**
				24V AC/DC♣	**150-F108NBR**
	59…234	75	75	100…240V AC, 50/60 Hz	**150-F135NBD**
				24V AC/DC♣	**150-F135NBR**
	116…348	110	125	100…240V AC, 50/60 Hz	**150-F201NBD**
				24V AC/DC♣	**150-F201NBR**
	145…435	132	150	100…240V AC, 50/60 Hz	**150-F251NBD**
				24V AC/DC♣	**150-F251NBR**
	183…549	160	200	100…240V AC, 50/60 Hz	**150-F317NBD**
				24V AC/DC♣	**150-F317NBR**
	208…625	200	250	100…240V AC, 50/60 Hz	**150-F361NBD**
				24V AC/DC♣	**150-F361NBR**
	277…831	250	350	100…240V AC, 50/60 Hz	**150-F480NBD**
				24V AC/DC♣	**150-F480NBR**
	283…850	250	350	110/120V AC, 50/60 Hz	**150-F625NBE**
				230/240V AC, 50/60 Hz	150-F625NBA
	300…900	250	350	110/120V AC, 50/60 Hz	150-F780NBE
				230/240V AC, 50/60 Hz	150-F780NBA
	400…1200	400	400	110/120V AC, 50/60 Hz	150-F970NBE
				230/240V AC, 50/60 Hz	150-F970NBA
	533…1600	500	600	110/120V AC, 50/60 Hz	150-F1250NBE
				230/240V AC, 50/60 Hz	150-F1250NBA

✶ Controllers rated 108 A and greater are not equipped with line and load terminal lugs. See page 4-126 for terminal lug kits.

❄ Motor FLA rating should fall within specified current range for unit to operate properly. Special consideration should be given when using a motor with a potentially high starting current (greater than ten times motor FLA) with the SMC Flex in the "Full Voltage" starting mode. Contact Rockwell Automation technical support for further guidance.

♣ Separate 120V or 240V single-phase power supply 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.
400/415/460	1.7…8.7	4	5	100…240V AC, 50/60 Hz	**150-F5NBD**
				24V AC/DC♣	**150-F5NBR**
	8.7…43	22	30	100…240V AC, 50/60 Hz	**150-F25NBD**
				24V AC/DC♣	**150-F25NBR**
	14.9…74	37	50	100…240V AC, 50/60 Hz	**150-F43NBD**
				24V AC/DC♣	**150-F43NBR**
	20.8…104	55	75	100…240V AC, 50/60 Hz	**150-F60NBD**
				24V AC/DC♣	**150-F60NBR**
	29.4…147	75	100	100…240V AC, 50/60 Hz	**150-F85NBD**
				24V AC/DC♣	**150-F85NBR**
	47…187	90	150	100…240V AC, 50/60 Hz	**150-F108NBD**
				24V AC/DC♣	**150-F108NBR**
	59…234	132	150	100…240V AC, 50/60 Hz	**150-F135NBD**
				24V AC/DC♣	**150-F135NBR**
	116…348	160	250	100…240V AC, 50/60 Hz	**150-F201NBD**
				24V AC/DC♣	**150-F201NBR**
	145…435	250	350	100…240V AC, 50/60 Hz	**150-F251NBD**
				24V AC/DC♣	**150-F251NBR**
	183…549	315	450	100…240V AC, 50/60 Hz	**150-F317NBD**
				24V AC/DC♣	**150-F317NBR**
	208…625	355	500	100…240V AC, 50/60 Hz	**150-F361NBD**
				24V AC/DC♣	**150-F361NBR**
	277…831	450	700	100…240V AC, 50/60 Hz	**150-F480NBD**
				24V AC/DC♣	**150-F480NBR**
	283…850	500	700	110/120V AC, 50/60 Hz	**150-F625NBE**
				230/240V AC, 50/60 Hz	150-F625NBA
	300…900	500	700	110/120V AC, 50/60 Hz	150-F780NBE
				230/240V AC, 50/60 Hz	150-F780NBA
	400…1200	710	1000	110/120V AC, 50/60 Hz	150-F970NBE
				230/240V AC, 50/60 Hz	150-F970NBA
	533…1600	900	1400	110/120V AC, 50/60 Hz	150-F1250NBE
				230/240V AC, 50/60 Hz	150-F1250NBA

✶ Controllers rated 108 A and greater are not equipped with line and load terminal lugs. See page 4-126 for terminal lug kits.

❄ Motor FLA rating should fall within specified current range for unit to operate properly. Special consideration should be given when using a motor with a potentially high starting current (greater than ten times motor FLA) with the SMC Flex in the "Full Voltage" starting mode. Contact Rockwell Automation technical support for further guidance.

♣ Separate 120V or 240V single-phase power supply 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…8.7	5.5	7.5	100…240V AC, 50/60 Hz	**150-F5NCD**
				24V AC/DC♣	**150-F5NCR**
	8.7…43	15	40	100…240V AC, 50/60 Hz	**150-F25NCD**
				24V AC/DC♣	150-F25NCR
	14.9…74	45	60	100…240V AC, 50/60 Hz	**150-F43NCD**
				24V AC/DC♣	**150-F43NCR**
	20.8…104	55	100	100…240V AC, 50/60 Hz	**150-F60NCD**
				24V AC/DC♣	**150-F60NCR**
	29.4…147	90	150	100…240V AC, 50/60 Hz	**150-F85NCD**
				24V AC/DC♣	**150-F85NCR**
	47…187	132	150	100…240V AC, 50/60 Hz	150-F108NCD
				24V AC/DC♣	**150-F108NCR**
	59…234	160	200	100…240V AC, 50/60 Hz	**150-F135NCD**
				24V AC/DC♣	**150-F135NCR**
	116…348	250	300	100…240V AC, 50/60 Hz	**150-F201NCD**
				24V AC/DC♣	**150-F201NCR**
	145…435	315	400	100…240V AC, 50/60 Hz	**150-F251NCD**
				24V AC/DC♣	**150-F251NCR**
	183…549	400	500	100…240V AC, 50/60 Hz	**150-F317NCD**
				24V AC/DC♣	**150-F317NCR**
	208…625	450	600	100…240V AC, 50/60 Hz	**150-F361NCD**
				24V AC/DC♣	**150-F361NCR**
	277…831	560	900	100…240V AC, 50/60 Hz	150-F480NCD
				24V AC/DC♣	**150-F480NCR**
	283…850	560	900	110/120V AC, 50/60 Hz	150-F625NCE
				230/240V AC, 50/60 Hz	150-F625NCA
	300…900	630	900	110/120V AC, 50/60 Hz	150-F780NCE
				230/240V AC, 50/60 Hz	150-F780NCA
	400…1200	800	1300	110/120V AC, 50/60 Hz	150-F970NCE
				230/240V AC, 50/60 Hz	150-F970NCA
	533…1600	1100	1600	110/120V AC, 50/60 Hz	150-F1250NCE
				230/240V AC, 50/60 Hz	150-F1250NCA

✶ Controllers rated 108 A and greater are not equipped with line and load terminal lugs. See page 4-126 for terminal lug kits.

❄ Motor FLA rating should fall within specified current range for unit to operate properly. Special consideration should be given when using a motor with a potentially high starting current (greater than ten times motor FLA) with the SMC Flex in the "Full Voltage" starting mode. Contact Rockwell Automation technical support for further guidance.

♣ Separate 120V or 240V single-phase power supply is required for fan operation.

Combination Line-Connected Controllers — IP65 (Type 4/12) Enclosed with Fusible Disconnect or Circuit Breaker

Rated Voltage [V AC]	kW, 50 Hz	Hp, 60 Hz	Controller Current Rating [A] ❄	IP65 (Type 4/12) Enclosed Combination Controllers with Fusible Disconnect✶	IP65 (Type 4/12) Enclosed Combination Controllers with Circuit Breaker✶
				Cat. No.§	Cat. No.
200	—	0.5	5	152H-F5FHD-33	153H-F5FHD-33
	—	0.75	5	152H-F5FHD-34	153H-F5FHD-34
	—	1	5	152H-F5FHD-35	153H-F5FHD-35
	—	1.5	25	152H-F25FHD-36	153H-F25FHD-36
	—	2	25	152H-F25FHD-37	153H-F25FHD-37
	—	3	25	152H-F25FHD-38	153H-F25FHD-38
	—	5	25	152H-F25FHD-39	153H-F25FHD-39
	—	5	25	152H-F25FHD-40	153H-F25FHD-40
	—	10	43	152H-F43FHD-41	153H-F43FHD-41
	—	15	60	152H-F60FHD-42	153H-F60FHD-42
	—	20	85	152H-F85FHD-43	153H-F85FHD-43
	—	25	85	152H-F85FHD-44	153H-F85FHD-44
	—	30	108	152H-F108FHD-45	153H-F108FHD-45
	—	40	135	152H-F135FHD-46	153H-F135FHD-46
	—	50	201	152H-F201FHD-47	153H-F201FHD-47
	—	60	201	152H-F201FHD-48	153H-F201FHD-48
	—	75	251	152H-F251FHD-49	153H-F251FHD-49
	—	100	317	152H-F317FHD-50	153H-F317FHD-50
	—	125	361	152H-F361FHD-51	153H-F361FHD-51
	—	150	480	152H-F480FHD-52	153H-F480FHD-52
	—	200	625	♣ 152H-F625JHD-54	♣ 153H-F625JHD-54
	—	250	780	♣ 152H-F780JHD-56	♣ 153H-F780JHD-56
230	0.37	0.5	5	152H-F5FAD-33	153H-F5FAD-33
	0.55	0.75	5	152H-F5FAD-34	153H-F5FAD-34
	0.75	1	5	152H-F5FAD-35	153H-F5FAD-35
	1.1	1.5	25	152H-F25FAD-36	153H-F25FAD-36
	1.5	2	25	152H-F25FAD-37	153H-F25FAD-37
	2.2	3	25	152H-F25FAD-38	153H-F25FAD-38
	3.7	5	25	152H-F25FAD-39	153H-F25FAD-39
	5.5	7.5	25	152H-F25FAD-40	153H-F25FAD-40
	7.5	10	43	152H-F43FAD-41	153H-F43FAD-41
	11	15	43	152H-F43FAD-42	153H-F43FAD-42
	15	20	60	152H-F60FAD-43	153H-F60FAD-43
	18.5	25	85	152H-F85FAD-44	153H-F85FAD-44
	22	30	85	152H-F85FAD-45	153H-F85FAD-45
	30	40	108	152H-F108FAD-46	153H-F108FAD-46
	37	50	135	152H-F135FAD-47	153H-F135FAD-47
	45	60	201	152H-F201FAD-48	153H-F201FAD-48
	55	75	201	152H-F201FAD-49	153H-F201FAD-49
	75	100	251	152H-F251FAD-50	153H-F251FAD-50
	90	125	317	152H-F317FAD-51	153H-F317FAD-51
	110	150	361	152H-F361FAD-52	153H-F361FAD-52
	132	200	480	♣ 152H-F480JAD-54	153H-F480FAD-54
	185	250	625	♣ 152H-F625JAD-56	♣ 153H-F625JAD-56
	220	300	780	♣ 152H-F780JAD-57	♣ 153H-F780JAD-57

✶ 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.

❄ The nominal current rating for the combination package may differ from the controller, based on the horsepower. Consult your local Rockwell Automation sales office or Allen-Bradley distributor.

§ Provided with Class J or L fuse clips as standard.

♣ Available in IP54 (Type 12) enclosure only.

Combination Line-Connected Controllers — IP65 (Type 4/12) Enclosed with Fusible Disconnect or Circuit Breaker, Cont.

These controllers include line and load terminations. Enclosures other than those listed are available; consult your local Rockwell Automation sales office or Allen-Bradley distributor. All Bulletin 153 catalog numbers are supplied with thermal magnetic circuit breakers.

The fusible disconnects do not come with fuses.

Rated Voltage [V AC]	kW, 50 Hz	Hp, 60 Hz	Controller Current Rating [A] ❄	IP65 (Type 4/12) Enclosed Combination Controllers with Fusible Disconnect✶ Cat. No.§	IP65 (Type 4/12) Enclosed Combination Controllers with Circuit Breaker✶ Cat. No.
400/460	0.37	0.5	5	152H-F5FBD-33	153H-F5FBD-33
	0.55	0.75	5	152H-F5FBD-34	153H-F5FBD-34
	0.75	1	5	152H-F5FBD-35	153H-F5FBD-35
	1.1	1.5	5	152H-F5FBD-36	153H-F5FBD-36
	1.5	2	5	152H-F5FBD-37	153H-F5FBD-37
	2.2	3	5	152H-F5FBD-38	153H-F5FBD-38
	3.7	5	25	152H-F25FBD-39	153H-F25FBD-39
	5.5	7.5	25	152H-F25FBD-40	153H-F25FBD-40
	7.5	10	25	152H-F25FBD-41	153H-F25FBD-41
	11	15	25	152H-F25FBD-42	153H-F25FBD-42
	15	20	43	152H-F43FBD-43	153H-F25FBD-43
	18.5	25	43	152H-F43FBD-44	153H-F43FBD-44
	22	30	43	152H-F43FBD-45	153H-F43FBD-45
	30	40	60	152H-F60FBD-46	153H-F60FBD-46
	37	50	85	152H-F85FBD-47	153H-F85FBD-47
	45	60	85	152H-F85FBD-48	153H-F85FBD-48
	55	75	108	152H-F108FBD-49	153H-F108FBD-49
	75	100	135	152H-F135FBD-50	153H-F135FBD-50
	90	125	201	152H-F201FBD-51	153H-F201FBD-51
	110	150	201	152H-F201FBD-52	153H-F201FBD-52
	132	200	251	152H-F251FBD-54	153H-F251FBD-54
	160	250	317	152H-F317FBD-56	153H-F317FBD-56
	200	300	361	152H-F361FBD-57	153H-F361FBD-57
	250	350	480	152H-F480FBD-58	153H-F480FBD-58
	250	400	480	♣ 152H-F480JBD-59	153H-F480FBD-59
	355	500	625	♣ 152H-F625JBD-61	♣ 153H-F625JBD-61
	450	600	780	♣ 152H-F780JBD-62	♣ 153H-F780JBD-62
500/575	0.55	0.75	5	152H-F5FCD-34	153H-F5FCD-34
	0.75	1	5	152H-F5FCD-35	153H-F5FCD-35
	1.1	1.5	5	152H-F5FCD-36	153H-F5FCD-36
	1.5	2	5	152H-F5FCD-37	153H-F5FCD-37
	2.2	3	5	152H-F5FCD-38	153H-F5FCD-38
	3.7	5	25	152H-F25FCD-39	153H-F25FCD-39
	5.5	7.5	25	152H-F25FCD-40	153H-F25FCD-40
	7.5	10	25	152H-F25FCD-41	153H-F25FCD-41
	11	15	25	152H-F25FCD-42	153H-F25FCD-42
	15	20	43	152H-F43FCD-43	153H-F43FCD-43
	18.5	25	43	152H-F43FCD-44	153H-F43FCD-44
	22	30	43	152H-F43FCD-45	153H-F43FCD-45
	22	40	43	152H-F43FCD-46	153H-F43FCD-46
	37	50	60	152H-F60FCD-47	153H-F60FCD-47
	45	60	85	152H-F85FCD-48	153H-F85FCD-48
	55	75	85	152H-F85FCD-49	153H-F85FCD-49
	75	100	108	152H-F108FCD-50	153H-F108FCD-50
	90	125	135	152H-F135FCD-51	153H-F135FCD-51
	110	150	201	152H-F201FCD-52	153H-F201FCD-52
	132	200	201	152H-F201FCD-54	153H-F201FCD-54
	160	250	251	152H-F251FCD-56	153H-F251FCD-56
	200	300	317	152H-F317FCD-57	153H-F317FCD-57
	250	350	361	152H-F361FCD-58	153H-F361FCD-58
	295	400	480	♣ 152H-F480JCD-59	153H-F480FCD-59
	315	450	480	♣ 152H-F480JCD-60	153H-F480FCD-60
	315	500	480	♣ 152H-F480JCD-61	153H-F480FCD-61
	450	600	625	♣ 152H-F625JCD-62	♣ 153H-F625JCD-62
	560	800	780	♣ 152H-F780JCD-65	♣ 153H-F780JCD-65

✶ 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.

❄ The nominal current rating for the combination package may differ from the controller, based on the horsepower. Consult your local Rockwell Automation sales office or Allen-Bradley distributor.

§ Provided with Class J or L fuse clips as standard.

♣ Available in IP54 (Type 12) enclosure only.

Control Options (open and enclosed)

Option	Description	Cat. No. Modification
Pump Control	Provides smooth motor acceleration and deceleration, reducing surges caused by the starting and stopping of centrifugal pumps. Starting time is adjustable from 0…30 s, and stopping time is adjustable from 0…120 s.	B✶
Braking Control	Provides Smart Motor Braking (SMB), Accu-Stop, and Slow Speed with Braking.	D✶

Enclosed Options

Option	Description	Cat. No. Modification
Push Buttons	Start-Stop Push Button	-1
	Start-Stop Push Button with H-O-A Selector Switch	-1F
	Soft Stop Push Button❄	1XA
	Pump Stop Push Button❄	1XB
	Slow Speed Push Button❄	1XC
	Brake Push Button❄	1XD
	Accu-Stop/Slow Speed Push Button❄	1XE
Selector Switch	Hand-Off-Auto Selector Switch	-3
	SMC-Off-Bypass Selector Switch	-3B ✦
Pilot Lights	Transformer Pilot Light - Green Power On Indicator	-4G
	Transformer Pilot Light - Red Run Indicator	-4R
	Push-to-Test Pilot Light - Red Run Indicator	-5R
Control Circuit Transformer	Control Circuit Transformer (fused primary and secondary)	-6P
	Additional 100VA Control Circuit Transformer (fused primary and secondary)	-6PX
	1000VA Control Circuit Transformer (fused primary and secondary)	-6PK
	1600VA Control Circuit Transformer (fused primary and secondary)	-6PL
	2000VA Control Circuit Transformer (fused primary and secondary)	-6PM
Protective Modules	480V Line Side Protective Module	-8L
	600V Line Side Protective Module	
	480V Load Side Protective Module	-8M
	600V Load Side Protective Module	
	480V Both Line and Load Side Protective Modules	-8B
	600V Both Line and Load Side Protective Modules	
Human Interface Module	Door-mounted, Full Numeric (Type 4/12)	-HC3
Communication Module	RS-485	-20S
	DeviceNet	-20D
	Ethernet/IP	-20E
	Control Net	-20C
	ProfiBUS	-20P
Disconnect Auxiliary	N.O. disconnect auxiliary mounted on operating mechanism	-98
	N.C. disconnect auxiliary mounted on operating mechanism	-99
Circuit Breaker Auxiliary	Internal N.O. circuit breaker auxiliary	-98X
	Internal N.C. circuit breaker auxiliary	-99X
Service Entrance Label	Service Entrance Label	-SEL
Oil Pump Starter	Bulletin 509 NEMA Size 1starter and Bulletin 592 solid-state overload	-OPS

✶ Add the designated letter to the end of the cat. no. Example: To add the Pump Control option: **Cat. No. 150-F361NBDB** or **Cat. No. 152H-F361FBDB-57**.
❄ Option push buttons are available only when the corresponding option module is selected. Example: **Cat. No. 150-F108FBDB-1XB**.
✦ Bypass contactor and overload are not included with this option. A **-NB** or **-BP** needs to be added to the catalog string to add these devices.

Enclosed Options, Continued

Option	Description	Cat. No. Modification
NEMA Bypass Contactor and Overload Relay	5…43 A	-NB
	60…85 A	
	108…135 A	
	201…251 A	
	317…361 A	
	480 A	
NEMA Isolation Contactor	5…43 A	-NI
	60…85 A	
	108…135 A	
	201…251 A	
	317…361 A	
	480 A	
MCS Bypass Contactor and Overload Relay	5…43 A	-BP
	60…85 A	
	108…135 A	
	201…251 A	
	317…361 A	
	480 A	

Accessories

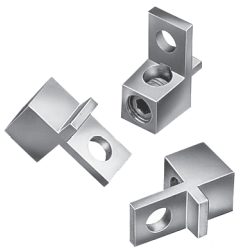
Protective Modules∗

Protective modules must not be placed on the load side of a device when using an inside-the-delta connection or with Pump, Braking, or Linerar Speed control.

Current Rating [A]	Description	Field Modification Cat. No.
5…85	480V Protective Module	**150-F84**
108…1250		**150-F84L**
5…85	600V Protective Module	**150-F86**
108…1250		150-F86L

∗ The same protective module mounts on the line or load side of the SMC Flex. For applications requiring both line and load side protection, two protective modules must be ordered.

Terminal Lug Kits (108…1250 A)



Current Rating [A] ❄	Wire Size	Total No. of Line Controller Terminal Lugs Possible Each Side		Pkg. Qty.	Cat. No.
		Line Side	Load Side		
108…135♣	#6…250 MCM AWG 16 mm²…120 mm²	3	3	3	**199-LF1**
201…251♣		6	6		
317…480♣	#4…500 MCM AWG 25 mm²…240 mm²	6	6		**199-LG1**
625…780	2/0…500 MCM AWG	6	6		**100-DL630**
970	4/0…500 MCM AWG	3	3		100-DL860
1250§	2/0…500 MCM AWG	3	3		**100-DL630**
	4/0…500 MCM AWG	3	3		100-DL860

Line and Load terminals are provided as standard on enclosed SMCs.

❄ 5…85 A units have box lugs standard. No additional lugs are required.

§ The 1250 A device requires (1) 100-DL630 and (1) 100-DL860 per connection.

♣ When a multi-conductor lug is required, refer to the User Manual for appropriate lug catalog number.

IEC Terminal Covers

Description‡	Package Quantity	Field Modification Cat. No.
IEC line or load terminal covers for 108 and 135 A devices. Dead front protection	1	**150-TC1**
IEC line or load terminal covers for 201…251 A devices. Dead front protection	1	**150-TC2**
IEC line or load terminal covers for 317…480 A devices. Dead front protection	1	**150-TC3**

‡ 5…85 A units have terminal guards standard. No additional terminal guards are required.

Human Interface and Communication Modules

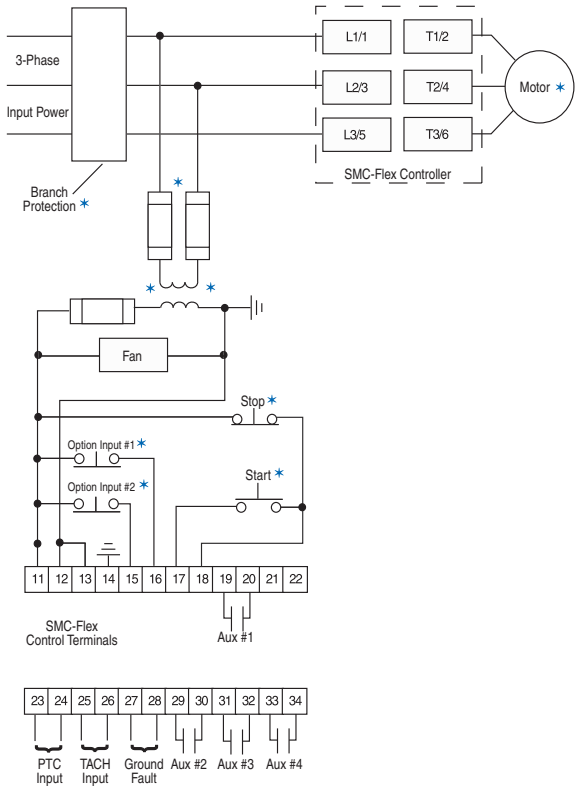
		Description		Cat. No.
	Hand-Held Human Interface Modules	LCD Display, Full Numeric Keypad∗		**20-HIM-A3**
		LCD Display, Programmer Only∗		20-HIM-A5
	Door-Mounted Human Interface Modules	Remote (Panel Mount) LCD Display, Full Numeric Keypad		**20-HIM-C3S**
		LCD Display, Programmer Only HIM (includes 3 m cable)		**20-HIM-C5S**
	Human Interface Module Interface Cables	PowerFlex HIM Interface Cable, 1 m (39 in)		20-HIM-H10
		Cable Kit (Male-Female) 0.33 m (1.1 ft)		1202-H03
		Cable Kit (Male-Female) 1 m (3.3 ft)		**1202-H10**
		Cable Kit (Male-Female) 3 m (9.8 ft)		**1202-H30**
		Cable Kit (Male-Female) 9 m (29.5 ft)		**1202-H90**
		DPI/SCANport™ One to Two Port Splitter Cable		**1203-S03**
		Description (IP30/Type 1)	**For Use With**	
	Communication Modules	RS485 DF1 Communication Adapter	Bulletin 150 SMC-Flex	20-COMM-S
		PROFIBUS™ DP Communication Adapter		**20-COMM-P**
		ControlNet™ Communication Adapter (Coax)		20-COMM-C
		Interbus™ Communication Adapter		20-COMM-I
		Modbus/TCP Communication Adapter		**20-COMM-M**
		DeviceNet™ Communication Adapter		**20-COMM-D**
		EtherNet/IP™ Communication Adapter		20-COMM-E
		HVAC Communication Adapter		20-COMM-H
		ControlNet™ Communication Adapter (Fiber)		20-COMM-Q
	DriveTools™	Programming Software	WIN NT/2000/XP	**9303-4DTE01ENE**
	DriveTools™ Sp	Programming Software	WIN NT/2000/XP	**9303-4DTS01ENE**
	AnaCANda™ RS-232 to DPI	PC Interface	Serial	**1203-SSS**
	DPI to USB	PC Interface	USB	**1203-USB**

∗ Requires a 20-HIM-H10 cable to connect to the SMC Flex.

4

Functional Design Specifications			
Standard Features	Installation	Power Wiring	Standard squirrel-cage induction motor or a Wye-Delta, six-lead motor.
		Control Wiring	2- and 3-wire control for a wide variety of applications.
	Setup	Keypad	Front keypad and backlit LCD display.
		Software	Parameter values can be downloaded to the SMC-Flex Controller with DriveTools programming software and the Cat. No. 20-COMM… DPI communication module.
	Communications		One DPI provided for connection to optional human interface and communication modules.
	Starting and Stopping Modes		Soft Start Current Limit Start Dual Ramp Full Voltage Linear Speed Acceleration Preset Slow Speed Soft Stop
	Protection and Diagnostics		Power loss, line fault, voltage unbalance, excessive starts/hour, phase reversal, undervoltage, overvoltage, controller temp, stall, jam, open gate, overload, underload, communication fault.
	Metering		Amps, volts, kW, kWH, MW, MWH, elapsed time, power factor, motor thermal capacity usage.
	Alarm Contact		Overload, underload, undervoltage, overvoltage, unbalance, jam, stall, and ground fault
	Status Indication		Stopped, starting, stopping, at speed, alarm, and fault.
	Auxiliary Contacts		Four fully programmable contacts as normal/up-to-speed/fault/alarm/network (N.O./N.C.), or external bypass (N.O. only).
Optional Features	Pump Control		Helps reduce fluid surges in centrifugal pumping systems during starting and stopping period. Starting time is adjustable from 0…30 s. Stopping time is adjustable from 0…120 s.
	Braking Control	SMB Smart Motor Braking	Provides motor braking without additional equipment for applications that require the motor to stop quickly. Braking current is adjustable from 0…400% of the motor's full-load current rating.
		Accu-Stop	Provides controlled position stopping. During stopping, braking torque is applied to the motor until it reaches preset slow speed (7% or 15% of rated speed) and holds the motor at this speed until a stop command is given. Braking torque is then applied until the motor reaches zero speed. Braking current is programmable from 0…450% of full-load current.
		Slow Speed with Braking	Used on applications that require slow speed (in the forward direction) for positioning or alignment and also require braking control to stop.

Wiring Diagram — Line Controller



* Customer supplied.

Electrical Ratings				
		Device Rating	UL/CSA/NEMA	IEC
Power Circuit	Rated Operation Voltage	480V	200…480V AC (–15%, +10%)	200…415V
		600V	200…600V AC (–15%, +10%)	200…500V
		690V	230…600V AC (–15%, +10%)	230…690V/Y (–15%, +10%)
	Rated Insulation Voltage	480V	N/A	500V
		600V		500V
		690V		690V
	Rated Impulse Voltage	480V	N/A	6000V
		600V		
		690V		
	Dielectric Withstand	480V	2200V AC	2500V
		600V		
		690V		
	Repetitive Peak Inverse Voltage Rating	480V	1400V	1400V
		600V	1600V	1600V
		690V	1800V	1800V
	Operating Frequency	All	50/60 Hz	
	Utilization Category	5…480 A	MG 1	AC-53B:3.0-50:1750
		625…1250 A	MG 1	AC-53B:3.0-50:3550
	Protection Against Electrical Shock	5…85 A	N/A	IP20
		108…480 A		IP2X (with terminal covers)
		625…1250 A		IP00 (open device)
	DV/DT Protection	480V & 600V	RC Snubber Network	
		690V	None	
	Transient Protection	480V & 600V	Metal Oxide Varistors: 220 Joules	
		690V	None	
Control Circuit	Rated Operational Voltage§	5…480 A	100…240V AC or 24V AC/DC	
		625…1250 A	110/120V AC and 230/240V AC	
	Rated Insulation Voltage	All	N/A	240V
	Rated Impulse Voltage	All	N/A	3000V
	Dielectric Withstand	All	1600V AC	2000V
	Operating Frequency	All	50/60 Hz	
	Input onstate voltage minimum		85V AC, 19.2V DC / 20.4V AC	
	Input onstate current		20 mA @120V AC / 40 mA @ 240V AC, 7.6 mA @ 24V AC/DC	
	Input offstate voltage maximum		50V AC, 10V DC / 12V AC	
	Input offstate current @ input offstate voltage		<10 mA AC, <3 mA DC	

§ 690V power is only available with 100…240V control.

Electrical Ratings								
Short-Circuit Protection	SCPD Performance 200…600V		Type 1§♣					
	SCCR List✶		Max. Standard Available Fault	Max. Standard Fuse [A]❄	Max. Standard Available Fault	Max. Circuit Breaker [A]	Max. High Fault	Max. Fuse [A] ‡
	Line Device Operational Current Rating [A]	5	5 kA	20	5 kA	20	70 kA	10
		25	5 kA	100	5 kA	100	70 kA	50
		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	225
		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
		625	42 kA	1600	42 kA	1600	74 kA	1600
		780	42 kA	1600	42 kA	2000	74 kA	1600
		970	85 kA	2500	85 kA	2500	85 kA	2500
		1250	85 kA	3000	85 kA	3200	85 kA	3000
	Delta Device Operational Current Rating [A]	8.7	5 kA	35	5 kA	35	70 kA	17.5
		43	5 kA	150	5 kA	150	70 kA	90
		74	10 kA	300	10 kA	300	70 kA	150
		104	10 kA	400	10 kA	400	70 kA	200
		147	10 kA	400	10 kA	400	70 kA	200
		187	10 kA	600	10 kA	500	70 kA	300
		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	70 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
		850	42 kA	1600	42 kA	2000	74 kA	1600
		900	42 kA	1600	42 kA	2000	74 kA	1600
		1200	85 kA	3000	85 kA	3200	85 kA	3000
		1600	85 kA	3000	85 kA	3200	85 kA	3000
	SCPD Performance 690V		Type 1§					
	SCCR List✶	Device Rating	Max. Standard Available Fault		Max. Ampere Tested — North American Style		Max. Ampere Tested — European Style	
	Maximum FLC	108	70 kA		A070URD33xxx500		6,9 gRB 73xxx400 6,6URD33xxx500	
		135	70 kA		A070URD33xxx500		6,9 gRB 73xxx400 6,6URD33xxx500	
		201	70 kA		A070URD33xxx700		6,9 gRB 73xxx630 6,6URD33xxx700	
		251	70 kA		A070URD33xxx700		6,9 gRB 73xxx630 6,6URD33xxx700	
		317	70 kA		A070URD33xxx900		6,9 gRB 73xxx800 6,6URD33xxx900	
		361	70 kA		A070URD33xxx900		6,9 gRB 73xxx800 6,6URD33xxx900	
		480	70 kA		A070D33xxx1250 A100URD73xxx1250		9 URD 73xxx1250 6,6URD33xxx1250	
		625	70 kA		A070URD33xxx1400		6,6URD33xxx1400	
		780	70 kA		A070URD33xxx1400		6,6URD33xxx1400	
		970	85 kA		Two fuses in parallel A070URD33xxx1250		Two fuses in parallel 6,6URD33xxx1250	
		1250	85 kA		Two fuses in parallel A070URD33xxx1250		Two fuses in parallel 6,6URD33xxx1250	

✶ Consult local codes for proper sizing of short circuit protection.

❄ Non-time delay fuses (K5 — 5…480V (8.7…831 A) devices; Class L — 625…1250V (850…1600 A) devices).

‡ High capacity fault rating when used with time delay class CC, J, or L fuses.

§ 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.

♣ For short-circuit current rating (SCCR) for enclosed panel with external bypass or isolation contactor, see the Industrial Controls catalog website: www.ab.com/catalogs.

Electrical Ratings					
Power Requirements	Control Module	1…480 A	120…240V AC	Transformer	75 VA
			24V AC	Transformer	130 VA
			24V DC	Inrush Current	5 A
				Inrush Time	250 ms
				Transient Watts	60 W
				Transient Time	500 ms
				Steady State Watts	24 W
				Minimum Allen-Bradley Power Supply	1606-XLP50E
		625…1250 A	751 VA (recommended 800 VA)		
	Heatsink Fan(s)♣		5…135 A, 20 VA		
			201…251 A, 40 VA		
			317…480 A, 60 VA		
			625…1250 A, 150 VA		
Steady State Heat Dissipation with Control and Fan Power (Watts)	Controller Rating [A]	5	70		
		25	70		
		43	81		
		60	97		
		85	129		
		108	91		
		135	104		
		201	180		
		251	198		
		317	225		
		361	245		
		480	290		
		625	446		
		780	590		
		970	812		
		1250	1222		
Auxiliary Contacts 19/20 (Aux #1) 29/30 (Aux #2) 31/32 (Aux #3) 33/34 (Aux #4)	Type of Control Circuit		Electromagnetic relay		
	Number of Contacts		1		
	Type of Contacts		programmable N.O./N.C.		
	Type of Current		AC		
	Rated Operational Current		3 A @ 120V AC, 1.5 A @ 240V AC		
	Conventional Thermal Current I_{th} AC/DC		5 A		
	Make/Break VA		3600/360		
	Utilization Category		AC-15/DC		
PTC Input Ratings	Response Resistance		3400 Ω ±150 Ω		
	Reset Resistance		1600 Ω ±100 Ω		
	Short-Circuit Trip Resistance		25 Ω ±10 Ω		
	Max. Voltage at PTC Terminals (R_{PTC} = 4 kΩ)		< 7.5V		
	Max. Voltage at PTC Terminals (R_{PTC} = open)		30V		
	Max. No. of Sensors.		6		
	Max. Cold Resistance of PTC Sensor Chain		1500 Ω		
	Response Time		800 ms		
Tach Input			0…5V DC, 4.5V DC = 100% Speed		

♣ Heatsink fans can be powered by either 110/120V AC or 220/240V AC.

Environmental	
Operating Temperature Range	-5…+50 °C (23…+122 °F) (open) -5…+40 °C (23…+104 °F) (enclosed)
Storage and Transportation Temperature Range	-20…+75 °C (-4…167 °F)
Altitude	2000 m (6560 ft)
Humidity	5…95% (non-condensing)
Pollution Degree	2

Mechanical			
Resistance to Vibration	Operational	All	1.0 G Peak, 0.15 mm (0.006 in.) displacement
	Non-Operational	5…480 A	2.5 G Peak, 0.38 mm (0.015 in.) displacement
		625…1250 A	1.0 G Peak, 0.15 mm (0.006 in.) displacement
Resistance to Shock	Operational	5…85 A	15 G
		108…480 A	5.5 G
		625…1250 A	4 G
	Non-Operational	5…85 A	30 G
		108…480 A	25 G
		625…1250 A	12 G
Construction	Power Poles	5…85 A	Heatsink thyristor modular design
	Power Poles	108…1250 A	Heatsink hockey puck thyristor modular design
	Control Modules		Thermoset and Thermoplastic Moldings
	Metal Parts		Plated Brass, Copper, or Painted Steel
Terminals	Power Terminals	5…85 A	Cable size — Line Upper — 2.5…95 mm² (14…3/0 AWG) Line Lower — 0.8…2.5 mm² (18…14 AWG) Load Upper — 2.5…50 mm² (14…1 AWG) Load Lower — 0.8…2.5 mm² (18…14 AWG) Tightening torque — 14.7 N•m (130 lb.-in.) Wire strip length — 18…20 mm (0.22…0.34 in.)
		108…135 A	One M10 x 1.5 diameter hole per power pole
		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
		625…1250 A	Two 13.5 mm (0.53 in.) diameter holes per power pole
	Power Terminal Markings		NEMA, CENELEC EN50 012
	Control Terminals	M3 screw clamp	Clamping yoke connection

Other				
EMC Emission Levels	Conducted Radio Frequency Emissions Radiated Emissions		Class A Class A	
EMC Immunity Levels	Electrostatic Discharge Radio Frequency Electromagnetic Field Fast Transient Surge Transient		8 kV Air Discharge Per EN/IEC 60947-4-2 Per EN/IEC 60947-4-2 Per EN/IEC 60947-4-2	
Overload Characteristics	Current Range [A]		Line	Delta
		5	1...5	1.7…9
		25	5...25	8.6…43
		43	8.6...43	14.8…75
		60	12...60	20.8…104
		85	17...85	29.4…147
		108	27…108	47…187
		135	34…135	59…234
		201	67…201	116…348
		251	84…251	145…435
		317	106…317	183…549
		361	120…361	208…625
		480	160…480	277…831
		625	208…625	283…850
		780	260…780	300…900
		970	323…970	400…1200
		1250	416…1250	533…1600
	Trip Classes Trip Current Rating Number of Poles		10, 15, 20, and 30 117% of Motor FLC 3	
Certifications	Open-Type Controllers		CE Marked Per Low Voltage Directive 73/23/EEC, 93/68/EEC UL Listed (File No. E96956)	

Dimensions are in millimeters (inches). Dimensions are not intended for manufacturing purposes.

Approximate Dimensions and Shipping Weights

Open Type Controllers

Rating [A]	Height	Width	Depth	Weight
5…85	321 (12.6)	150 (5.9)	203 (8.0)	5.7 kg (12.6 lbs)
108…135	443.7 (17.47)	196.4 (7.74)	205.2 (8.08)	15.0 kg (33 lbs).
201…251	560 (22.05)	225 (8.86)	253.8 (9.99)	30.4 kg (67 lbs).
317…480	600 (23.62)	290 (11.42)	276.5 (10.89)	45.8 kg (101 lbs)
625…780	1041.1 (41.0)	596.9 (23.5)	346.2 (13.63)	179 kg (395 lbs)
970…1250	1041.1 (41.0)	596.9 (23.5)	346.2 (13.63)	224 kg (495 lbs)

Enclosed-Type Line-Connected Controllers

Factory-installed options may affect enclosure size requirements.
Exact dimensions can be obtained after order entry. Please consult your local Rockwell Automation sales office or Allen-Bradley distributor.

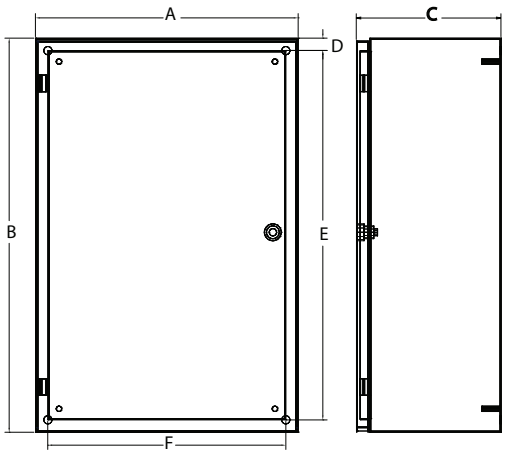


Figure 1 — Wall-Mount

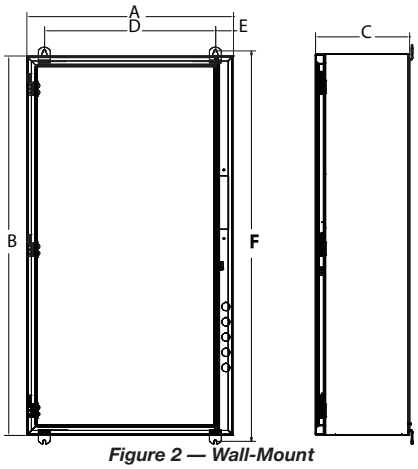


Figure 2 — Wall-Mount

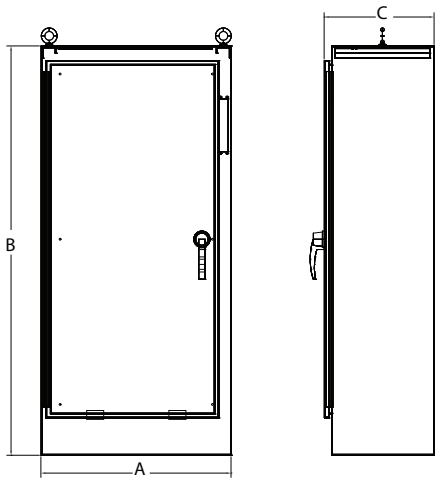


Figure 3 — Floor-Mount

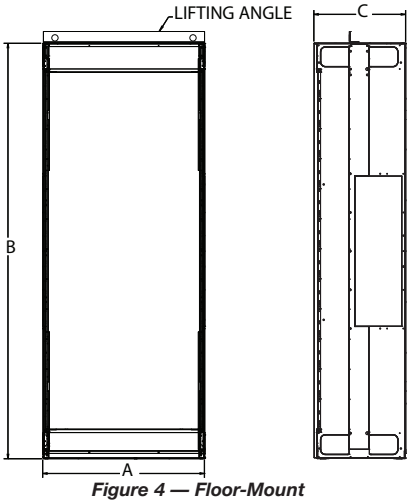


Figure 4 — Floor-Mount

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-Flex Combination Controller									
5…25	152H,153H,152B,153B	—	1	16 (406)	24 (610)	10 (254)	0.75 (19)	22.5 (572)	14.5 (368)
		BP,NB,NI,6_		24 (610)	30 (762)	12 (305)		28.5 (724)	22.5 (572)
43	152H,153H,152B,153B	—	1	16 (406)	24 (610)	10 (254)	0.75 (19)	22.5 (572)	14.5 (368)
		BP, 6_		24 (610)	30 (762)	12 (305)		28.5 (724)	22.5 (572)
		NI, NB		30 (762)	38 (965)	14 (356)		36.5 (927)	28.5 (724)
60	153H, 153B	—	1	16 (406)	24 (610)	10 (254)	0.75 (19)	22.5 (572)	14.5 (368)
	152H, 153H,153B	6_		24 (610)	30 (762)	12 (305)		28.5 (724)	22.5 (572)
	152H,152B	—		24 (610)	30 (762)	12 (305)		28.5 (724)	22.5 (572)
	152H,152B, 153B,153H	NI, NB		30 (762)	38 (965)	14 (356)		36.5 (927)	28.5 (724)
85	153B, 153H	—	1	16 (406)	24 (610)	10 (254)	0.75 (19)	22.5 (572)	14.5 (368)
	152B,152H	—		24 (610)	30 (762)	12 (305)		28.5 (724)	22.5 (572)
	152H, 153H,153B	6_		24 (610)	30 (762)	12 (305)		28.5 (724)	22.5 (572)
	153H	BP		24 (610)	30 (762)	12 (305)		28.5 (724)	22.5 (572)
		BP , 6_		30 (762)	38 (965)	14 (356)		36.5 (927)	28.5 (724)
	152B, 152H,153B	BP,NB,NI		30 (762)	38 (965)	14 (356)		36.5 (927)	28.5 (724)
108	152H,153H	—	1	30 (762)	38 (965)	14 (356)	0.75 (19)	36.5 (927)	28.5 (724)
		6_		30 (762)	38 (965)	14 (356)		36.5 (927)	28.5 (724)
	153H,153B,152H,152B	BP, NB,NI		36 (914)	51 (1295)	14 (356)		49.5 (1257)	34.5 (876)
135	152H,153H	—	1	30 (762)	38 (965)	14 (356)	0.75 (19)	36.5 (927)	28.5 (724)
		6_		30 (762)	38 (965)	14 (356)		36.5 (927)	28.5 (724)
	152H,152B,153H,153B	BP, NB,NI		36 (914)	51 (1295)	14 (356)		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)
		6_		30 (762)	38 (965)	14 (356)		36.5 (927)	28.5 (724)
	152B,153B,153H,152H	BP, NB,NI		36 (914)	51 (1295)	14 (356)		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)
		6_		30 (762)	38 (965)	14 (356)		36.5 (927)	28.5 (724)
	152B,153B,153H,152H	BP, NB,NI		36 (914)	51 (1295)	14 (356)		49.5 (1257)	34.5 (876)
317	153H	—	1	36 (914)	51 (1295)	14 (356)	0.75 (19)	49.5 (1257)	34.5 (876)
		6_		36 (914)	51 (1295)	14 (356)		49.5 (1257)	34.5 (876)
		BP,NB		36 (914)	60 (1524)	14 (356)		58.5 (1486)	34.5 (876)
	153B	—		36 (914)	60 (1524)	14 (356)		58.5 (1486)	34.5 (876)
	152H,152B	—	2	38 (965)	60 (1524)	17 (431)	33.88 (861)	1.75 (45)	61.69 (1567)
		6_		38 (965)	60 (1524)	17 (431)		1.75 (45)	61.69 (1567)
	152B,153B,152H	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)
		6_		36 (914)	51 (1295)	14 (356)		49.5 (1257)	34.5 (876)
		BP		36 (914)	60 (1524)	14 (356)		58.5 (1486)	34.5 (876)
	153B	—		36 (914)	60 (1524)	14 (356)		58.5 (1486)	34.5 (876)
	152H, 152B	—	2	38 (965)	60 (1524)	17 (431)	33.88 (861)	1.75 (45)	61.69 (1567)
	152H	6_		38 (965)	60 (1524)	17 (431)		1.75 (45)	61.69 (1567)
	153H,152B,153B,152H	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)
		6_		36 (914)	51 (1295)	14 (356)		49.5 (1257)	34.5 (876)
	153H,153B	BP,NI	1❄	36 (914)	60 (1524)	14 (356)		58.5 (1486)	34.5 (876)
	152H	—	2∗‡	38 (965)	60 (1524)	17 (431)	33.88 (861)	1.75 (45)	61.69 (1567)
		BP		38 (965)	60 (1524)	17 (431)		1.75 (45)	61.69 (1567)
		NB	3∗‡	40 (1016)	84 (2134)	18 (457)	—	—	—
		—	4∗§	20 (508)	91.5 (2324)	20 (508)	—	—	—
	153H.153B	BP,NB,NI	3∗§	40 (1016)	84 (2134)	18 (457)	—	—	—
	152B	BP,NB,NI,6_	3∗	40 (1016)	84 (2134)	18 (457)			
	152H,152B	BP,NB,NI	4	35 (889)	91.5 (2324)	20 (508)			
625	152B	—	4	70 (1778)	91.5 (2324)	20 (508)	—	—	—
	152B,152H,153B,153H	NB		105 (2664)	91.5 (2324)	20 (508)			
	152H	—		55 (1397)	91.5 (2324)	20 (508)			
		BP		70 (1778)	91.5 (2324)	20 (508)			
	153B,153H	—		65 (1651)	91.5 (2324)	20 (508)			
780	152B	—	4	55 (1397)	91.5 (2324)	20 (508)	—	—	—
	152B,152H	BP,NI		70 (1778)	91.5 (2324)	20 (508)			
	152B,152H,153B,153H	NB		105 (2664)	91.5 (2324)	20 (508)			
	153B,153H	—		65 (1651)	91.5 (2324)	20 (508)			

∗ Assumed line voltage to be 480V AC. Different voltage may necessitate a bigger enclosure size. Consult your local Rockwell Automation sales office or Allen-Bradley distributor.
❄ 350 Hp max.
‡ 150 Hp @ 208V AC, 350 Hp @480V, 400…4500 Hp @ 600V
§ 200 Hp @ 240V AC, 400 Hp @480V, 5000 Hp @ 600V

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.)
Non-Combination Controller									
5…43	150	—	1	16 (406)	24 (610)	10 (254)	0.75 (19)	22.5 (572)	14.5 (368)
		6_	1✶	16 (406)	24 (610)	10 (254)		22.5 (572)	14.5 (368)
		BP	1	24 (610)	30 (762)	12 (305)		28.5 (724)	22.5 (572)
	150, 150B	NB,NI	1	24 (610)	30 (762)	305(12)		28.5 (724)	22.5 (572)
	150	NB,6P_	1❄	30 (762)	38 (965)	14 (356)		36.5 (927)	28.5 (724)
60	150	—	1	16 (406)	24 (610)	10 (254)	0.75 (19)	22.5 (572)	14.5 (368)
	150B	—		24 (610)	30 (762)	12 (305)		28.5 (724)	22.5 (572)
		BP		24 (610)	30 (762)	12 (305)		28.5 (724)	22.5 (572)
	150	6_	1❄	24 (610)	30 (762)	12 (305)		28.5 (724)	22.5 (572)
		NB	1	24 (610)	30 (762)	12 (305)		28.5 (724)	22.5 (572)
	150, 150B	NI		30 (762)	38 (965)	14 (356)		36.5 (927)	28.5 (724)
85	150	—	1	16 (406)	24 (610)	10 (254)	0.75 (19)	22.5 (572)	14.5 (368)
	150B	—		24 (610)	30 (762)	12 (305)		28.5 (724)	22.5 (572)
		BP		24 (610)	30 (762)	12 (305)		28.5 (724)	22.5 (572)
	150	NB		24 (610)	30 (762)	12 (305)		28.5 (724)	22.5 (572)
		6_	1❄	24 (610)	30 (762)	12 (305)		28.5 (724)	22.5 (572)
	150, 150B	NB,NI,6P_	1❄	30 (762)	38 (965)	14 (356)		36.5 (927)	28.5 (724)
108	150	—	1	24 (610)	30 (762)	12 (305)	0.75 (19)	28.5 (724)	22.5 (572)
		BP		30 (762)	38 (965)	14 (356)		36.5 (927)	28.5 (724)
		NB		30 (762)	38 (965)	14 (356)		36.5 (927)	28.5 (724)
	150B	—		30 (762)	38 (965)	14 (356)		36.5 (927)	28.5 (724)
		NB,NI		36 (914)	51 (1295)	14 (356)		49.5 (1257)	34.5 (876)
135	150	—	1	24 (610)	30 (762)	12 (305)	0.75 (19)	28.5 (724)	22.5 (572)
		BP		30 (762)	38 (965)	14 (356)		36.5 (927)	28.5 (724)
	150B	—		30 (762)	38 (965)	14 (356)		36.5 (927)	28.5 (724)
	150	NB		30 (762)	38 (965)	14 (356)		36.5 (927)	28.5 (724)
	150B	NB,NI		36 (914)	51 (1295)	14 (356)		49.5 (1257)	34.5 (876)
201	150	—	1	30 (762)	38 (965)	14 (356)	0.75 (19)	36.5 (927)	28.5 (724)
	150,150B	NB,NI,BP,6_		36 (914)	51 (1295)	14 (356)		49.5 (1257)	34.5 (876)
251	150	—	1	30 (762)	38 (965)	14 (356)	0.75 (19)	36.5 (927)	28.5 (724)
	150,150B	NB,NI,BP,6_		36 (914)	51 (1295)	14 (356)		49.5 (1257)	34.5 (876)
317	150	NB,NI,BP,6_	1	36 (914)	51 (1295)	14 (356)	0.75 (19)	49.5 (1257)	34.5 (876)
	150B	NB,NI,BP,6_		36 (914)	60 (1524)	14 (356)		58.5 (1486)	34.5 (876)
361	150	NB,NI,BP,6_	1	36 (914)	51 (1295)	14 (356)	0.75 (19)	49.5 (1257)	34.5 (876)
	150B	NB,NI,BP,6_		36 (914)	60 (1524)	14 (356)		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		36 (914)	60 (1524)	14 (356)		58.5 (1486)	34.5 (876)
625	150	—	4	35 (889)	91.5 (2324)	20 (508)	—	—	—
		BP,NB		60 (1524)	91.5 (2324)	20 (508)			
	150B	—		60 (1524)	91.5 (2324)	20 (508)			
		NB		90 (2286)	91.5 (2324)	20 (508)			
780	150	—	4	35 (889)	91.5 (2324)	20 (508)	—	—	—
		BP,NB		60 (1524)	91.5 (2324)	20 (508)			
	150B	—		60 (1524)	91.5 (2324)	20 (508)			
		NB		90 (2286)	91.5 (2324)	20 (508)			

✶ Extra capacity transformer may require a larger enclosure; consult your local Rockwell Automation sales office or Allen-Bradley distributor.

❄ 1 kVA control transformers or larger extra capacity transformers may require a larger enclosure; consult your local Rockwell Automation sales office or Allen-Bradley distributor.

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

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 4-148 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

d

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

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

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	—	—	—	—	—	—

g

Options (see page 4-148 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.	

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	**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/DC♣	**150-C108NBR**	—
	34…135	75	60…100	100…240V AC, 50/60 Hz	**150-C135NBD**	150-C135FBD
				24V AC/DC♣	**150-C135NBR**	—
	67…201	95…110	75…150	100…240V AC, 50/60 Hz	**150-C201NBD**	150-C201FBD
				24V AC/DC♣	**150-C201NBR**	—
	84…251	95…132	100…200	100…240V AC, 50/60 Hz	**150-C251NBD**	150-C251FBD
				24V AC/DC♣	**150-C251NBR**	—
	106…317	95…160	125…250	100…240V AC, 50/60 Hz	**150-C317NBD**	150-C317FBD
				24V AC/DC♣	**150-C317NBR**	—
	120…361	110…200	250…300	100…240V AC, 50/60 Hz	**150-C361NBD**	150-C361FBD
				24V AC/DC♣	**150-C361NBR**	—
	160…480	160…250	300…400	100…240V AC, 50/60 Hz	**150-C480NBD**	150-C480FBD
				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.
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/DC♣	**150-C108NCR**	—
	34…135	90	75…125	100…240V AC, 50/60 Hz	**150-C135NCD**	150-C135FCD
				24V AC/DC♣	**150-C135NCR**	—
	67…201	75…132	100…200	100…240V AC, 50/60 Hz	**150-C201NCD**	150-C201FCD
				24V AC/DC♣	**150-C201NCR**	—
	84…251	90…160	125…250	100…240V AC, 50/60 Hz	**150-C251NCD**	150-C251FCD
				24V AC/DC♣	**150-C251NCR**	—
	106…317	100…200	200…300	100…240V AC, 50/60 Hz	**150-C317NCD**	150-C317FCD
				24V AC/DC♣	**150-C317NCR**	—
	120…361	132…250	200…350	100…240V AC, 50/60 Hz	**150-C361NCD**	150-C361FCD
				24V AC/DC♣	**150-C361NCR**	—
	160…480	200…315	250…500	100…240V AC, 50/60 Hz	**150-C480NCD**	150-C480FCD
				24V AC/DC♣	**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.

♣ 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.

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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.

Combination Enclosed (IP65, NEMA 4/12) Controllers with Fusible Disconnect or Circuit Breaker

Rated Voltage [V AC]	Current Rating [A]	kW	Hp	IP65 (Type 4/12) Enclosed Combination Controllers with Fusible Disconnect ❄ Cat. No.	IP65 (Type 4/12) Enclosed Combination Controllers with Circuit Breaker ❄ Cat. No.
200/208	3	—	0.5	152H-C3FHD-33	153H-C3FHD-33
	9	—	0.75	152H-C9FHD-34	153H-C9FHD-34
	9	—	1	152H-C9FHD-35	153H-C9FHD-35
	9	—	1.5	152H-C9FHD-36	153H-C9FHD-36
	16	—	2	152H-C16FHD-37	153H-C16FHD-37
	16	—	3	152H-C16FHD-38	153H-C16FHD-38
	25	—	5	152H-C25FHD-39	153H-C25FHD-39
	37	—	7.5	152H-C37FHD-40	153H-C37FHD-40
	43	—	10	152H-C43FHD-41	153H-C43FHD-41
	60	—	15	152H-C60FHD-42	153H-C60FHD-42
	85	—	20	152H-C85FHD-43	153H-C85FHD-43
	85	—	25	152H-C85FHD-44	153H-C85FHD-44
	108	—	30	152H-C108FHD-45	153H-C108FHD-45
	135	—	40	152H-C135FHD-46	153H-C135FHD-46
	201	—	60	152H-C201FHD-48	153H-C201FHD-48
	251	—	75	152H-C251FHD-49	153H-C251FHD-49
	317	—	100	152H-C317FHD-50	153H-C317FHD-50
	361	—	125	152H-C361FHD-51	153H-C361FHD-51
	480	—	150	152H-C480FHD-52	153H-C480FHD-52
230	3	0.37	0.5	152H-C3FAD-33	153H-C3FAD-33
	9	0.55	0.75	152H-C9FAD-34	153H-C9FAD-34
	9	0.75	1	152H-C9FAD-35	153H-C9FAD-35
	9	1.1	1.5	152H-C9FAD-36	153H-C9FAD-36
	9	1.5	2	152H-C9FAD-37	153H-C9FAD-37
	16	2.2	3	152H-C16FAD-38	153H-C16FAD-38
	25	3.7	5	152H-C25FAD-39	153H-C25FAD-39
	30	5.5	7.5	152H-C30FAD-40	153H-C30FAD-40
	37	7.5	10	152H-C37FAD-41	153H-C37FAD-41
	43	11	15	152H-C43FAD-42	153H-C43FAD-42
	60	15	20	152H-C60FAD-43	153H-C60FAD-43
	85	18.5	25	152H-C85FAD-44	153H-C85FAD-44
	85	22	30	152H-C85FAD-45	153H-C85FAD-45
	108	30	40	152H-C108FAD-46	153H-C108FAD-46
	135	37	50	152H-C135FAD-47	153H-C135FAD-47
	201	55	75	152H-C201FAD-49	153H-C201FAD-49
	251	75	100	152H-C251FAD-50	153H-C251FAD-50
	317	90	125	152H-C317FAD-51	153H-C317FAD-51
	361	110	150	152H-C361FAD-52	153H-C361FAD-52
	480	147	200	§ 152H-C480JAD-54	153H-C480FAD-54

❄ 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.
§ Available in IP54 (Type 12) enclosure only.

Combination Enclosed (IP65, NEMA 4/12) Controllers with Fusible Disconnect or Circuit Breaker, Continued

Rated Voltage [V AC]	Current Rating [A]	kW	Hp	IP65 (Type 4/12) Enclosed Combination Controllers with Fusible Disconnect ❄ Cat. No.	IP65 (Type 4/12) Enclosed Combination Controllers with Circuit Breaker ❄ Cat. No.
460	3	0.37	0.5	152H-C3FBD-33	153H-C3FBD-33
	3	0.55	0.75	152H-C3FBD-34	153H-C3FBD-34
	3	0.75	1	152H-C3FBD-35	153H-C3FBD-35
	9	1.1	1.5	152H-C9FBD-36	153H-C9FBD-36
	9	1.5	2	152H-C9FBD-37	153H-C9FBD-37
	9	2.2	3	152H-C9FBD-38	153H-C9FBD-38
	16	3.7	5	152H-C16FBD-39	153H-C16FBD-39
	16	5.5	7.5	152H-C16FBD-40	153H-C16FBD-40
	25	7.5	10	152H-C25FBD-41	153H-C25FBD-41
	30	11	15	152H-C30FBD-42	153H-C30FBD-42
	37	15	20	152H-C37FBD-43	153H-C37FBD-43
	43	18.5	25	152H-C43FBD-44	153H-C43FBD-44
	43	22	30	152H-C43FBD-45	153H-C43FBD-45
	60	30	40	152H-C60FBD-46	153H-C60FBD-46
	85	37	50	152H-C85FBD-47	153H-C85FBD-47
	85	45	60	152H-C85FBD-48	153H-C85FBD-48
	108	55	75	152H-C108FBD-49	153H-C108FBD-49
	135	75	100	152H-C135FBD-50	153H-C135FBD-50
	201	110	150	152H-C201FBD-52	153H-C201FBD-52
	251	132	200	152H-C251FBD-54	153H-C251FBD-54
	317	160	250	152H-C317FBD-56	153H-C317FBD-56
	361	200	300	152H-C361FBD-57	153H-C361FBD-57
	480	250	400	§ 152H-C480JBD-59	153H-C480FBD-59
500/575	3	0.55	0.75	152H-C3FCD-34	153H-C3FCD-34
	3	0.75	1	152H-C3FCD-35	153H-C3FCD-35
	9	1.1	1.5	152H-C9FCD-36	153H-C9FCD-36
	9	1.5	2	152H-C9FCD-37	153H-C9FCD-37
	9	2.2	3	152H-C9FCD-38	153H-C9FCD-38
	9	3.7	5	152H-C9FCD-39	153H-C9FCD-39
	16	5.5	7.5	152H-C16FCD-40	153H-C16FCD-40
	16	7.5	10	152H-C16FCD-41	153H-C16FCD-41
	25	11	15	152H-C25FCD-42	153H-C25FCD-42
	30	15	20	152H-C30FCD-43	153H-C30FCD-43
	37	18.5	25	152H-C37FCD-44	153H-C37FCD-44
	43	22	30	152H-C43FCD-45	153H-C43FCD-45
	43	30	40	152H-C43FCD-46	153H-C43FCD-46
	60	37	50	152H-C60FCD-47	153H-C60FCD-47
	85	45	60	152H-C85FCD-48	153H-C85FCD-48
	85	55	75	152H-C85FCD-49	153H-C85FCD-49
	108	75	100	152H-C108FCD-50	153H-C108FCD-50
	135	90	125	152H-C135FCD-51	153H-C135FCD-51
	201	132	200	152H-C201FCD-54	153H-C201FCD-54
	251	160	250	152H-C251FCD-56	153H-C251FCD-56
	317	200	300	152H-C317FCD-57	153H-C317FCD-57
	361	250	350	152H-C361FCD-58	153H-C361FCD-58
	480	315	500	§ 152H-C480JCD-61	153H-C480FCD-61

❄ 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.

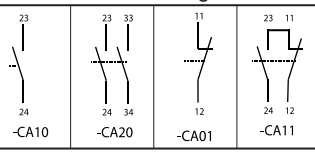
§ Available in IP54 (Type 12) enclosure only.

Enclosed Options

Option	Description		Cat. No. Modification
Push Buttons	Start-Stop Push Button		-1
Selector Switch	Hand-Off-Auto Selector Switch		-3
Pilot Light	Transformer Pilot Light - Red Run Indicator		-4R
Control Circuit Transformer	Control Circuit Transformer (fused primary and secondary)		-6P
Protective Module	480V Line Side Protective Module	3…480 A	-8L
	600V Line Side Protective Module	3…480 A	
	480V Load Side Protective Module	43…480 A	-8M
	600V Load Side Protective Module	43…480 A	
	480V Both Line and Load Side Protective Module	43…480 A	-8B
	600V Both Line and Load Side Protective Module	43…480 A	
Auxiliary Contacts	1 N.O. auxiliary contact	for 3…480 A units	-90
	2 N.O. auxiliary contacts	for 3…480 A units	-900
	1 N.O. and 1 N.C. auxiliary contacts	for 3…480 A units	-901
Disconnect Auxiliary	N.O. disconnect auxiliary mounted on the operating mechanism		-98
	N.C. disconnect auxiliary mounted on the operating mechanism		-99
NEMA Bypass Contactor and Overload Relay	5…43 A		-NB
	60…85 A		
	108…135 A		
	201…251 A		
	317…361 A		
	480 A		
MCS Bypass Contactor and Overload Relay	5…43 A		-BP
	60…85 A		
	108…135 A		
	201…251 A		
	317…361 A		
	480 A		

Accessories

Auxiliary Contact Blocks

Description	N.O.	N.C.	Connection Diagram	Cat. No.
 **Auxiliary Contact Blocks for side mounting with sequence terminal designations** 1- and 2-pole Quick and easy mounting without tools One block per device only	1	0	 -CA10	**150-CA10**
	2	0	-CA20	**150-CA20**
	0	1	-CA01	150-CA01
	1	1	-CA11	**150-CA11** (Form C)

Fans

Description		For Use With	Pkg. Qty.	Cat. No.
 **Fan** Field installed	Optional	150-C3…37	1	**150-CF64**
	Replacement	150-C43…85		**150-CF147**
		150-C108, 150-C135		**41391-801-03**
		150-C201, 150-C251		**41391-801-01**
		150-C317…C480		**41391-801-02**

Connecting Modules

Description	For Use With	Pkg. Qty.	Cat. No.
 **Connecting modules to 140-M** Electrical interconnection between SMC-3 and 140-M. Motor protector and SMC must be mounted separately.	Connects 140-M-C to 150-C3…25	1	**150-CC25**
	Connects 140-M-D to 150-C3…25	1	**150-CD25**
	Connects 140-M-F to 150-C3…37	1	150-CF45
 **Connecting modules to 100-C** Electrical interconnection between SMC-3 and 100-C. Contactor and SMC must be mounted separately.	Connects 100-C09…23 to 150-C3…19	1	150-CI23
	Connects 100-C30…37 to 150-C3…37	1	150-CI37

Protective Modules

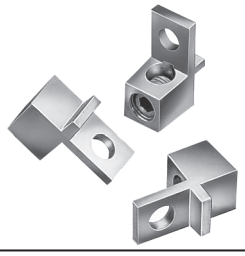
Protective modules must not be placed on the load side of a device when using an inside-the-delta connection.

Description		For Use With	Pkg. Qty.	Cat. No.
	**480V Protective Module**	150-C3…37NB	1	**150-C84**
		150-C43…85NB (line and/or load)	1	**150-C84P**
		150-C108…480NB (line and/or load)	1	**150-F84L**
	600V Protective Module	150-C3…37NC	1	150-C86
		150-C43…85NC (line and/or load)	1	150-C86P
		150-C108…480NC (line and/or load)	1	150-F86L

IEC Terminal Covers

Description		For Use With	Pkg. Qty.	Cat. No.
	**Terminal Cover** IEC line or load terminal covers for 108…480 A devices. Dead front protection	150-C108…-C135	1	**150-TC1**
		150-C201…-C251	1	**150-TC2**
		150-C317…-C480	1	**150-TC3**

Terminal Lug Kits (108…480 A)



Current Rating [A] ❄	Wire Size	Total No. of Line Controller Terminal Lugs Possible Each Side		Pkg. Qty.	Cat. No.
		Line Side	Load Side		
108…135♣	#6…250 MCM AWG 16 mm²…120 mm²	3	3	3	**199-LF1**
201…251♣		6	6		
317…480♣	#4…500 MCM AWG 25 mm²…240 mm²	6	6		**199-LG1**

Line and Load terminals are provided as standard on enclosed SMCs.

❄ 1…85 A units have box lugs standard. No additional lugs are required.

♣ When a multi-conductor lug is required, refer to the Instruction Sheet for appropriate lug catalog number.

Marking Tags and Covers

Description		For Use With	Pkg. Qty.	Cat. No.
	**Marking Tag Sheet** 160 perforated paper labels each, 6 x 17 mm, to be used with a transparent cover	150-C, 150-D	10	**100-FMP**
	Transparent Cover To be used with marking tag sheets	150-C, 150-D	100	**100-FMC**

Remote Reset Solenoid

Description		For Use With	Pkg. Qty.	Cat. No.
	**Remote Reset Solenoid** for remote reset of electronic overload	193-T all, 150-C	1	193-ER1⊗

⊗ Voltage Suffix Code

Voltage	24	48	110	115	120	220	240
50 Hz	J	—	D	—	—	A	—
60 Hz	J	—	—	—	D	—	A
DC	Z24	Z48	—	Z01	—	—	—

Surcharge for special voltages up to 20 pcs. (no surcharge for quantities greater than 20 pcs.)

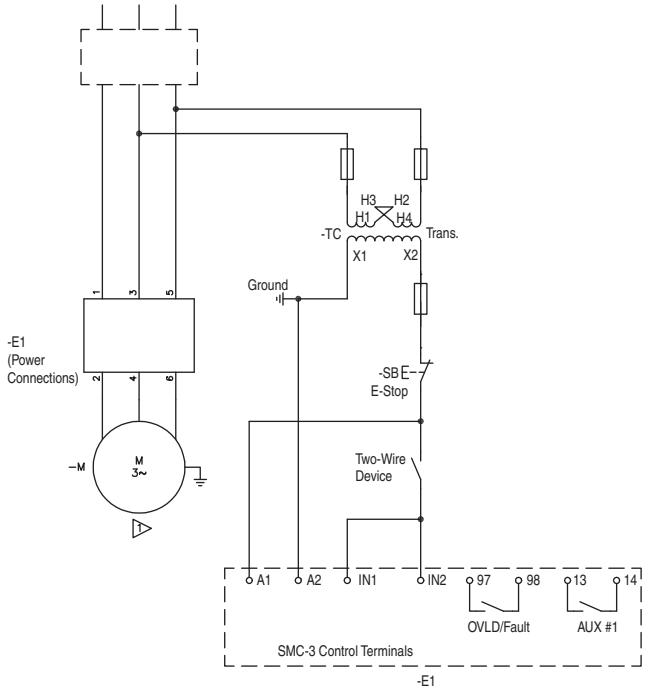
Available Coil Voltages 12…600V 50 Hz/12…600V 60 Hz

Standard Coil Voltages

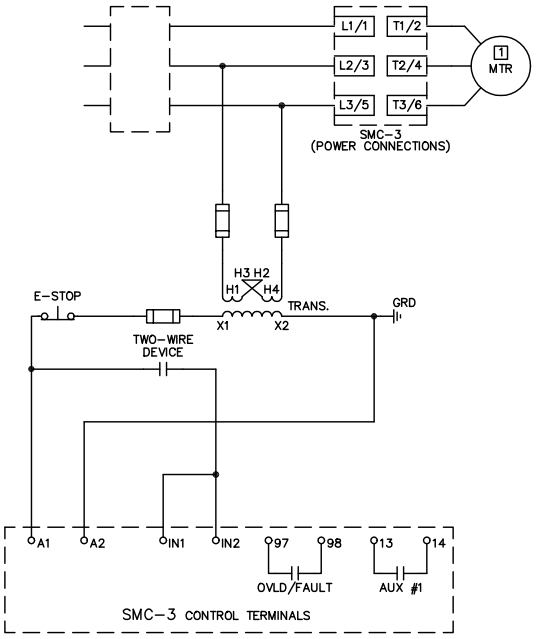
4

Two-Wire Configuration

IEC

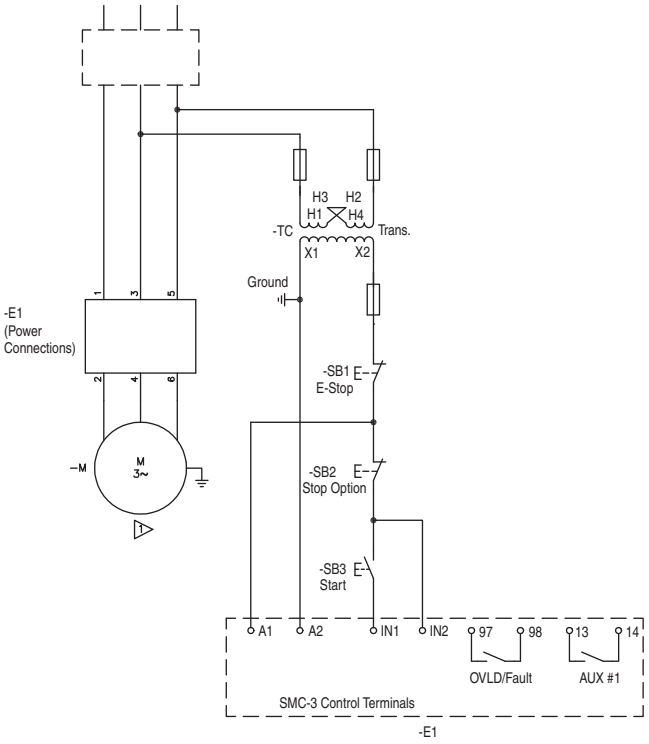


NEMA

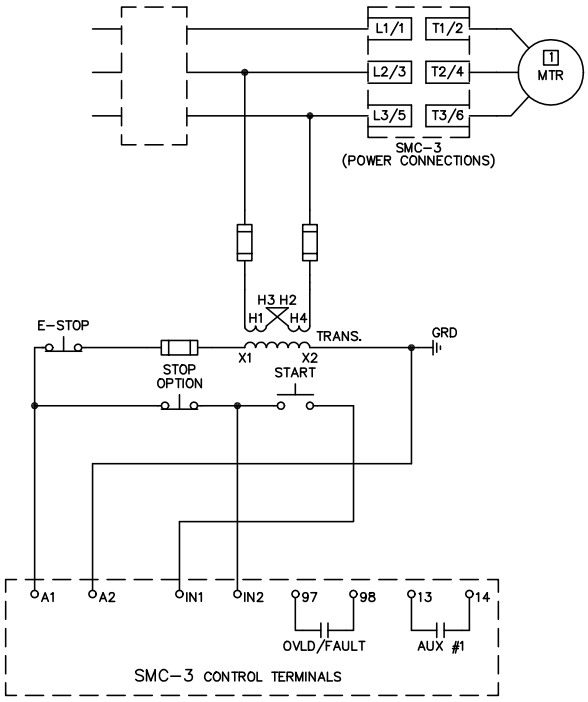


Three-Wire Configuration

IEC

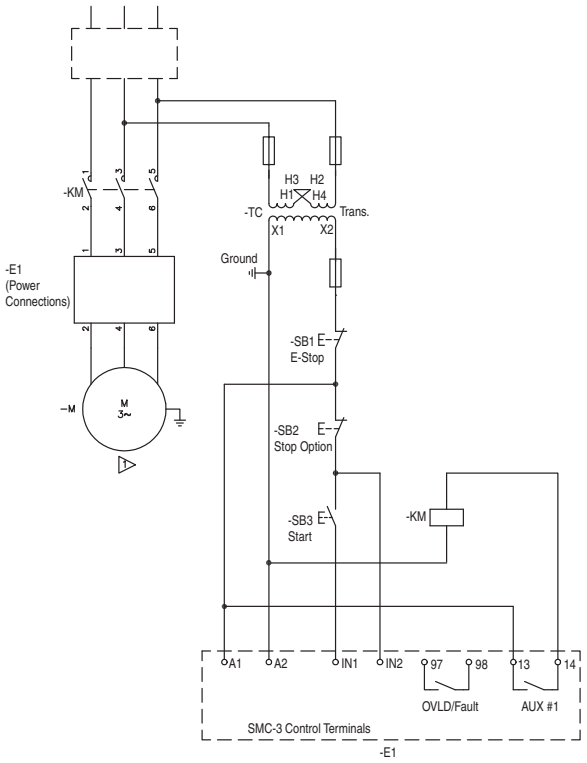


NEMA

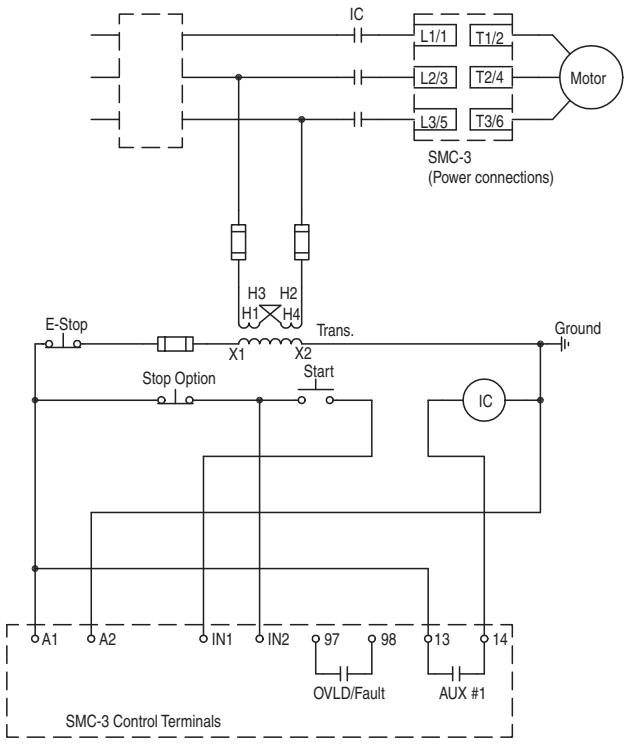


Isolation Contactor Configuration

IEC



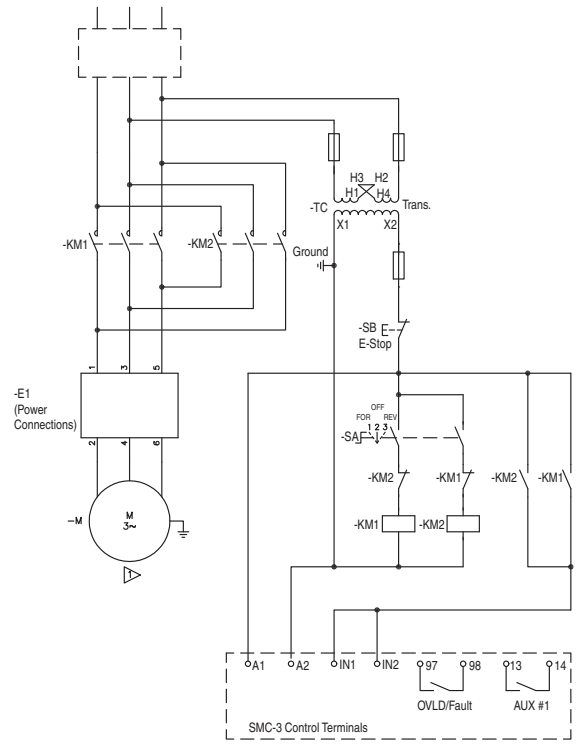
NEMA



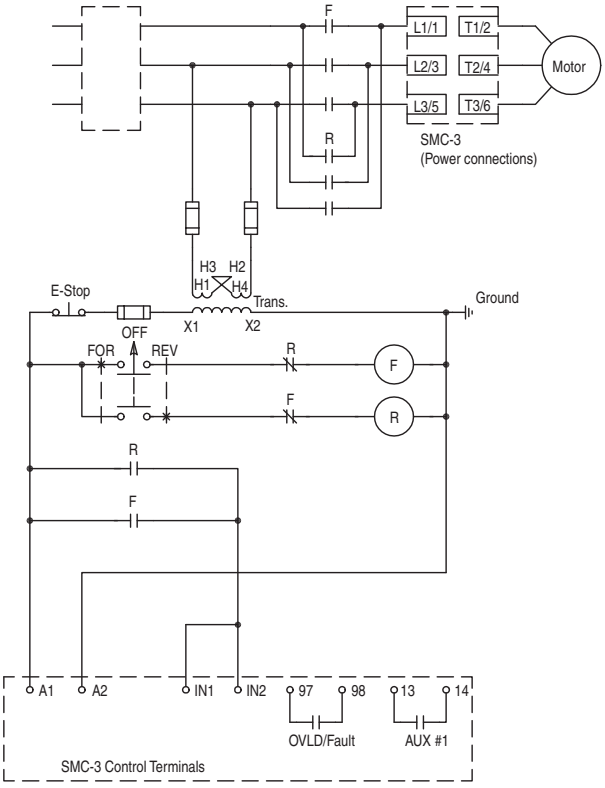
Reversing Configuration

Note: Minimum Off time equals 1.0 s.

IEC



NEMA



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							
			UL/CSA/NEMA		**IEC**		
Power Circuit	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				
Short Circuit Protection	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	100…240V~, 24V AC/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
	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 (OVLD/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.

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
TB-23, -24 (Normal/Up-to-Speed) TB-33, -34 (Normal/Up-to-Speed)	Utilization Category	C300/R150	AC-15/DC-13
	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.)	1.5 A @ 120V AC, 0.75A @ 240V AC, 1.17 A @ 24V DC	
	Conventional Thermal Current I_{th}	2.5 A	
	Make/Break VA	1800/180V AC, 28V DC (resistive)	
TB-11, -12 (Normal/Up-to-Speed)	Type of Control Circuit	B300/R300	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.

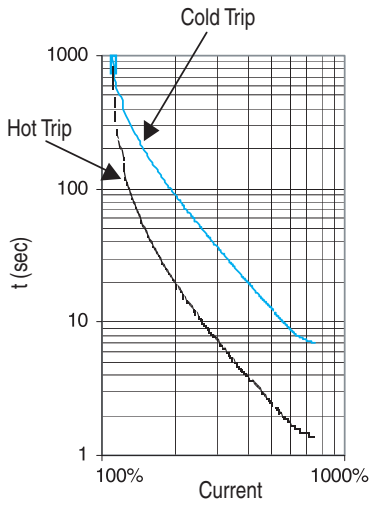
Environmental	
Operating Temperature Range	-5…+50 °C (23…122 °F) (open) -5…+40 °C (23…104 °F) (enclosed)
Storage and Transportation Temperature Range	-25…+85 °C (-13…+185 °F)
Altitude	2000 m (6560 ft)
Humidity	5…95% (non-condensing)
Pollution Degree	2
Type of Protection	IP2X

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 mm2 (14…4 AWG) 2.3…2.8 N•m (20…25 in•lbs)
		43…85 A	2.5…95 mm2 (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 mm2 (14…6 AWG) 2.3…2.5 N•m (20…22.5 in•lbs)
		43…85 A	2.5…50 mm2 (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 mm2 (24…14 AWG) 0.5…0.9 N•m (4.4…8.0 in•lbs)

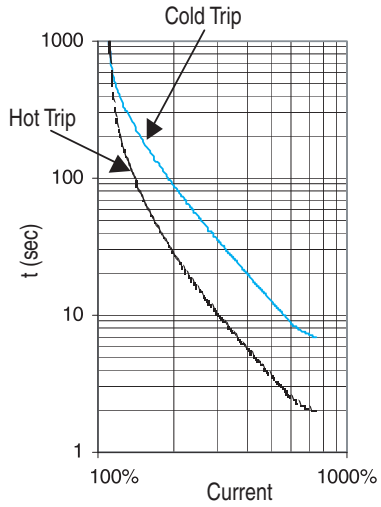
Other			
		UL/CSA/NEMA	IEC
EMC Emission Levels	Conducted Radio Frequency Emissions	—	Class A
	Radiated Emissions	—	Class A
EMC Immunity Levels	Electrostatic Discharge	4 kV Contact and 8 kV Air Discharge	8 kV Air Discharge
	Radio Frequency Electromagnetic Field	—	Per EN/IEC 60947-4-2
	Fast Transient	—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

SMC-3 Overload Trip Curves

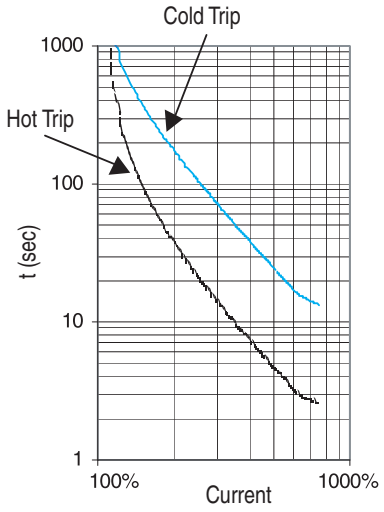
Trip Class 10



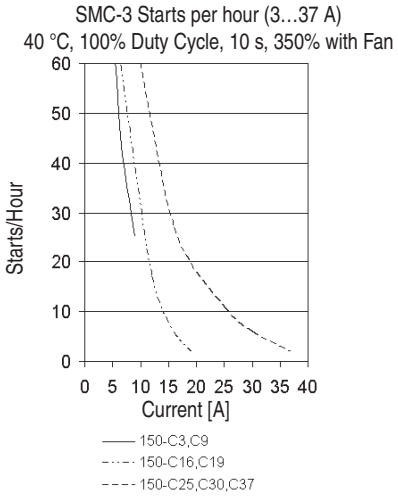
Trip Class 15

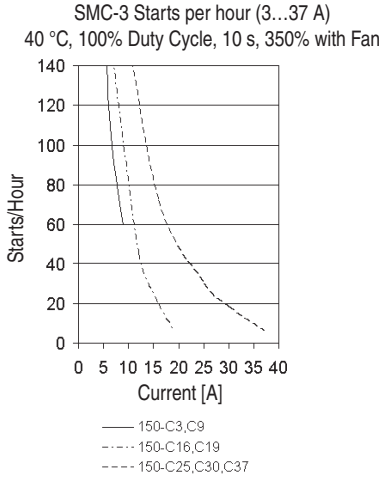


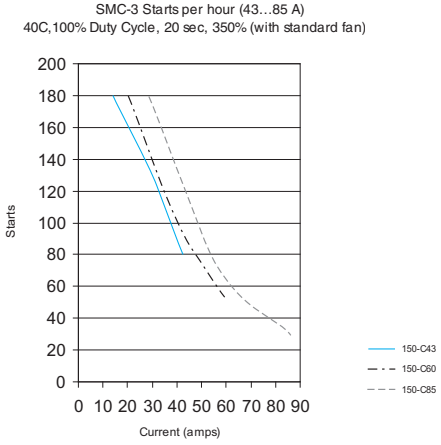
Trip Class 20

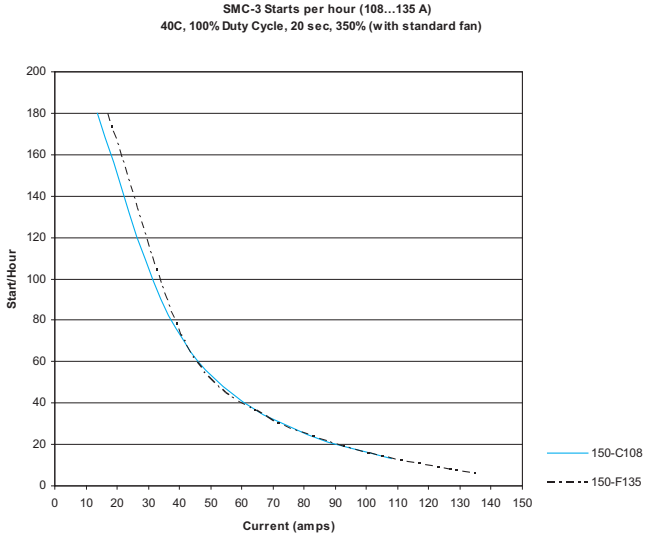


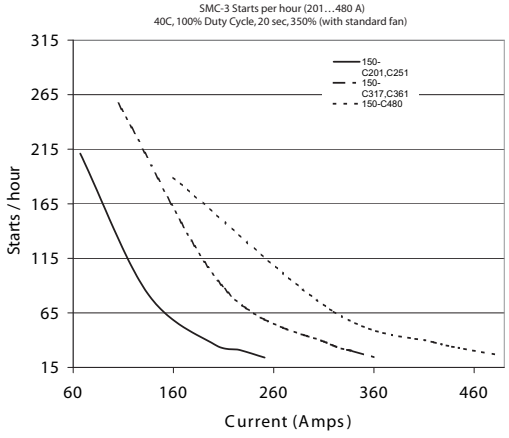
Starts per Hour Curves





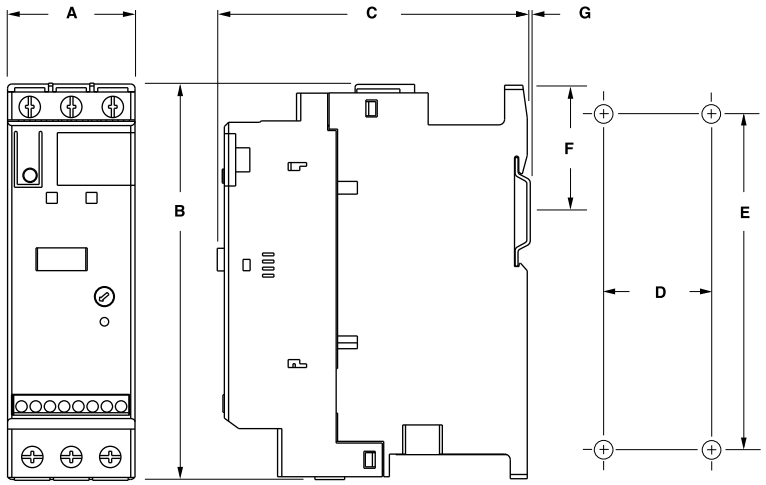






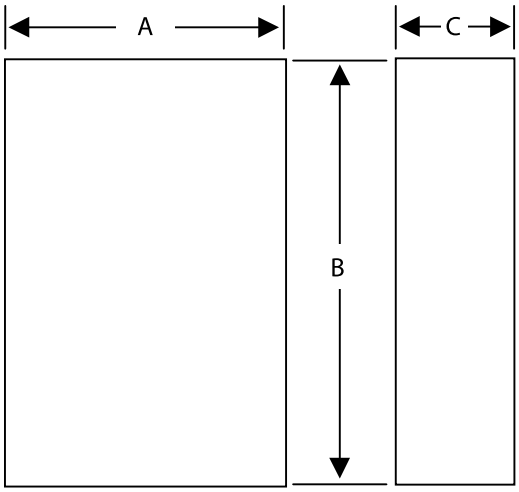
Dimensions in millimeters (inches). Dimensions are not intended to be used for manufacturing purposes. All dimensions are subject to change.

Open Type



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.

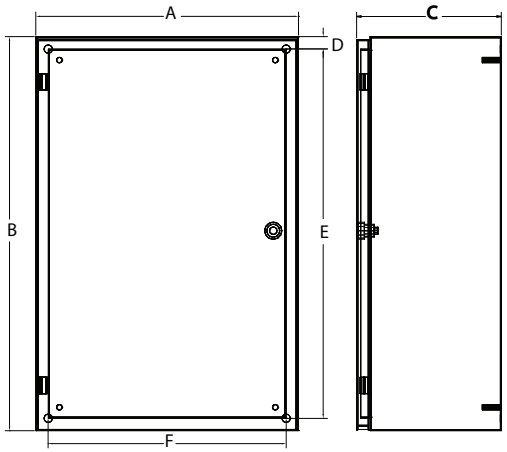


Figure 1 — Wall-Mount

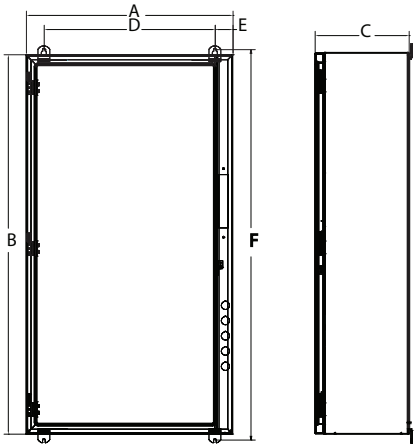


Figure 2 — Wall-Mount

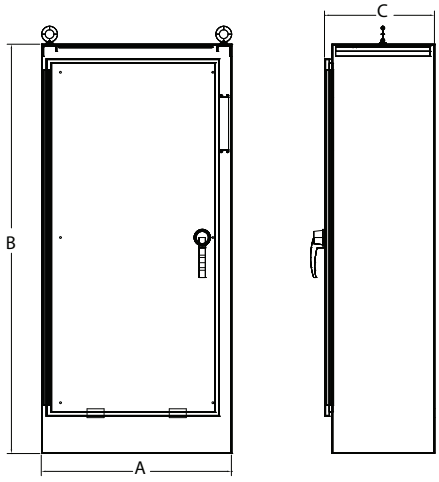


Figure 3 — Floor-Mount

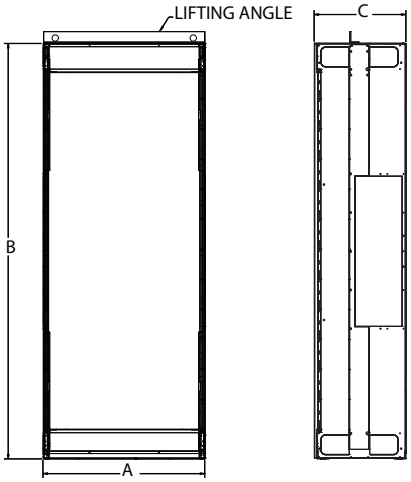


Figure 4 — Floor-Mount

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

Bulletin 150 — SMC™ Dialog Plus Smart Motor Controller

The SMC™ Dialog Plus controller provides microprocessor controlled starting for standard three-phase squirrel-cage induction motors. Four standard modes of operation are available within a single controller:

- Soft Start with Selectable Kickstart
- Current Limit Start with Selectable Kickstart
- Dual Ramp Start
- Full Voltage Start

Options include:

- Soft Stop
- Pump Control
- Preset Slow Speed
- SMB Smart Motor Braking
- Accu-Stop
- Slow Speed with Braking

Features include:

- Built-in electronic motor overload protection
- Metering
- SCANport communication
- Keypad programming
- Three programmable auxiliary contacts
- LCD display

The SMC™ Dialog Plus controller is available for motors rated 1…1000 A; 200…480V AC, or 200…600V AC, 50 and 60 Hz. In addition to motors, the SMC Dialog Plus™ controller can be used to control resistive loads.

Table of Contents

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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

Description of Features

Electronic Motor Overload Protection

The SMC Dialog Plus controller incorporates, as standard, electronic motor overload protection. This overload protection is accomplished electronically with an I^2t algorithm.
When coordinated with the proper short circuit protection, overload protection is intended to protect the motor, motor controller, and power wiring against overheating caused by excessive overcurrent. The SMC Dialog Plus controller meets applicable requirements as a motor overload protective device.
The controller's overload protection is programmable, providing the user with flexibility. The overload trip class can be selected for class 10, 15, 20, or 30 protection. The trip current is programmed by entering the motor full-load current rating.
Thermal memory is included to accurately model motor operating temperature. Ambient insensitivity is inherent in the electronic design of the overload.
Note: The current sensing capability of the SMC Dialog Plus controller is disabled during bypass operation. The Bulletin 825 Converter Module and 150-NFS fanning strip are required for providing current feedback in these applications. **Note:** To achieve calibration, 70% motor load or greater is required at the motor shaft for 2 s. Calibration is required when a Bulletin 825 Converter Module is not used.

Stall Protection and Jam Detection

Motors can experience locked rotor currents and develop high torque levels in the event of a stall or a jam. These conditions can result in winding insulation breakdown or mechanical damage to the connected load. The SMC Dialog Plus controller provides both stall protection and jam detection for enhanced motor and system protection. Stall protection allows the user to program a maximum stall protection delay time from 0…10 s. The stall protection delay time is in addition to the programmed start time and begins only after the start time has timed out. If the controller senses that the motor is stalled, it will shut down after the delay period has expired.
Jam detection allows the user to determine the motor jam detection level as a percentage of the motor's full load current rating. To prevent nuisance tripping, a jam detection delay time, from 0.0…10.0 s, can be programmed. This allows the user to select the time delay required before the SMC Dialog Plus controller will trip on a motor jam condition. The motor current must remain above the jam detection level during the delay time. Jam detection is active only after the motor has reached full speed.

Energy Saver

This is a standard feature with the SMC Dialog Plus controller. It is used to save energy on applications where the motor is lightly loaded or unloaded for long periods of time. The Energy Saver is a built-in feature of the controller. It does not require additional panel space or external wiring. It also does not require a complicated setup procedure.

Phase Rebalance

The SMC Dialog Plus controller incorporates, as standard, a dynamic Phase Rebalance feature. The controller compensates for voltage unbalance by automatically adjusting the voltage output to balance the 3-phase currents drawn by the motor. When phase rebalance is achieved, motor life may be extended and production can continue without interruption. Phase Rebalance is a built-in feature of the controller and does not require a complicated setup procedure.
Note: Phase Rebalance requires the use of the Bulletin 825 Converter Module and the Cat. No. 150-NFS fanning strip.
Note: The performance of the Phase Rebalance feature is dependent on the motor's loading and characteristics. Severe imbalances cannot be corrected.

Underload Protection

Utilizing the underload protection of the SMC Dialog Plus controller, motor operation can be halted if a drop in current is sensed.
The SMC Dialog Plus controller provides an adjustable underload trip setting from 0…99% of the programmed motor full load current rating with an adjustable trip delay time of 0…99 s.

Undervoltage Protection

The SMC Dialog Plus controller's undervoltage protection will halt motor operation if a drop in the incoming line voltage is detected. The undervoltage trip level is adjustable as a percentage of the programmed line voltage, from 0…99%. To eliminate nuisance trips, a programmable undervoltage trip delay time of 0…99 s can also be programmed. The line voltage must remain below the undervoltage trip level during the programmed delay time.

Overvoltage Protection

If a rise in the incoming line voltage is detected, the SMC Dialog Plus controller's overvoltage protection will halt motor operation. The overvoltage trip level is adjustable as a percentage of the programmed line voltage, from 0…99%. To eliminate nuisance trips, a programmable overvoltage trip delay time of 0…99 s can also be programmed. The line voltage must remain above the overvoltage trip level during the programmed delay time.

Voltage Unbalance Protection

Voltage unbalance is detected by monitoring the 3-phase supply voltage magnitudes in conjunction with the rotational relationship of the three phases. The controller will halt motor operation when the calculated voltage unbalance reaches the user-programmed trip level.
The voltage unbalance trip level is programmable from 0…25% unbalance.

Excessive Starts Per Hour

The SMC Dialog Plus controller allows the user to program the allowed number of starts per hour (up to 99). This helps eliminate motor stress caused by repeated starting during a short time period.

Metering

Power monitoring parameters include:

- 3-phase current
- 3-phase voltage
- Power in kW
- Power usage in kWH
- Power factor
- Motor thermal capacity usage
- Elapsed time

Note: The motor thermal capacity usage allows the user to monitor the amount of overload thermal capacity usage before the SMC Dialog Plus controller's built-in electronic overload trips.
Note: In bypass configurations, the current sensing and power factor measurement capability of the SMC Dialog Plus controller is disabled. Three-phase current measurement, kW, kWH, and motor thermal capacity usage can still be maintained with the use of the Bulletin 825 Converter Module.
Note: The usage of an SMC Controller on a generator and line power requires the use of a Bulletin 825 Converter Module.

Built-in SCANport™ Communication

A serial interface port is provided as standard, which allows connection to a Bulletin 1201 Human Interface Module or a variety of Bulletin 1203 Communication Modules. This includes Allen-Bradley Remote I/O, DeviceNet network and RS-232/422/485-DF1.

LCD Display

The SMC Dialog Plus controller's two-line 16-character backlit LCD display provides parameter identification using clear, informative text. Controller set up can be performed quickly and easily without the use of a reference manual. Parameters are arranged in an organized four-level menu structure for ease of programming and fast access to parameters.

Keypad Programming

Programming of parameters is accomplished through a five-button keypad on the front of the SMC Dialog Plus controller. The five buttons include up and down arrows, an Enter button, a Select button, and an Escape button. The user needs only to enter the correct sequence of keystrokes for programming the SMC Dialog Plus controller.

Auxiliary Contacts

Three hard contacts are furnished as standard with the SMC Dialog Plus controller. The first two contacts are programmable for Normal/Up-to-speed. The third is programmable for Normal/Fault.

Open Controllers

150 – B180 N B D A – 8L
a *b* *c* *d* *e* *f* *g*

a

Bulletin Number	
Code	Description
150	Solid-State Controller
150B 152H 153H	Solid-State Controller and Isolation Contactor (enclosed only)❄

b

Controller Ratings	
Code	Description
B24	24 A, 1…15 Hp @ 460V AC
B35	35 A, 1…25 Hp @ 460V AC
B54	54 A, 1…40 Hp @ 460V AC
B97	97 A, 5…75 Hp @ 460V AC
B135	135 A, 5…100 Hp @ 460V AC
B180	180 A, 5…150 Hp @ 460V AC
B240	240 A, 5…200 Hp @ 460V AC
B360	360 A, 5…300 Hp @ 460V AC
B500	500 A, 4…400 Hp @ 460V AC
B650	650 A, 5…500 Hp @ 460V AC
B720	720 A, 5…600 Hp @ 460V AC
B850	850 A, 10…700 Hp @ 460V AC
B1000	1000 A, 10…800 Hp @ 460V AC

❄ For enclosed products, visit www.ab.com/catalogs.

c

Enclosure Type	
Code	Description
N	Open

d

Input Line Voltage	
Open Type	
Code	Description
B	200…460V AC, 3-phase, 50 and 60 Hz
C	200…575V AC, 3-phase, 50 and 60 Hz

f

Control Options (see page 4-162 for a full listing.)	
Note: Select Only One	
Code	Description
Blank	Standard
A	Soft Stop
B	Pump Control
C	Preset Slow Speed
D	SMB Smart Motor Braking
E	Accu-Stop
F	Slow Speed with Braking

g

Options	
Code	Description
8L	Line-Mounted Protective Module
8M	Load-Mounted Protective Module
8B	Line- and Load-Mounted Protective Modules

4

Open Type Controllers

Up to 460V AC

Current∗ Rating [A]	kW❄ 230V AC 50 Hz	kW❄ 400V AC 50 Hz	Hp‡ 200V AC 60 Hz	Hp‡ 230V AC 60 Hz	Hp‡ 460V AC 60 Hz	100…240V AC 50/60 Hz Control Cat. No.	24V AC/DC Control Cat. No.
24	5.5	11	1…5	1…7.5	1…15	**150-B24NBD**	150-B24NBR
35	10	18.5	1…10	1…10	1…25	150-B35NBD	150-B35NBR
54	15	22	1…15	1…20	1…40	**150-B54NBD**	150-B54NBR
97	25	45	5…30	5…30	5…75	**150-B97NBD**	§ 150-B97NBR
135	37	75	5…40	5…50	5…100	**150-B135NBD**	§ 150-B135NBR
180	51	90	5…60	5…60	5…150	**150-B180NBD**	§ 150-B180NBR
240	75	132	5…75	5…75	5…200	**150-B240NBD**	§ 150-B240NBR
360	110	200	5…125	5…150	5…300	**150-B360NBD**	§ 150-B360NBR
500	150	257	5…150	5…200	5…400	**150-B500NBD**	§ 150-B500NBR
650	200	355	5…200	5…250	5…500	150-B650NBD	§ 150-B650NBR
720	220	400	5…250	5…300	5…600	150-B720NBD	§ 150-B720NBR
850	257	475	10…300	10…350	10…700	150-B850NBD	§ 150-B850NBR
1000	315	530	10…350	10…400	10…800	150-B1000NBD	§ 150-B1000NBR

∗ Controllers rated 97…360 A are not equipped with line and load terminal lugs. See [T-2097386] for terminal lug kits.
❄ The minimum rating is: 0.7 kW for devices with current ratings of 54 A or less; 4 kW for devices rated 97…720 A; 7.5 kW for devices rated 850 A and greater.
‡ Hp ratings at motor terminal voltages for 208, 480, and 600 line volts, respectively.
§ 120V AC control is required for heatsink fan operation.

Up to 575V AC

Current∗ Rating [A]	kW❄ 230V AC 50 Hz	kW❄ 400V AC 50 Hz	kW❄ 500V AC 50 Hz	Hp‡ 200V AC 60 Hz	Hp‡ 230V AC 60 Hz	Hp‡ 460V AC 60 Hz	Hp‡ 575V AC 60 Hz	100…240V AC 50/60 Hz Control Cat. No.	24V AC/DC Control Cat. No.
24	5.5	11	15	1…5	1…7.5	1…15	1…20	150-B24NCD	150-B24NCR
35	10	18.5	22	1…10	1…10	1…25	1…30	150-B35NCD	150-B35NCR
54	15	22	37	1…15	1…20	1…40	1…50	150-B54NCD	150-B54NCR
97	25	45	63	5…30	5…30	5…75	5…75	150-B97NCD	§ 150-B97NCR
135	37	75	90	5…40	5…50	5…100	5…125	150-B135NCD	§ 150-B135NCR
180	51	90	132	5…60	5…60	5…150	5…150	150-B180NCD	§ 150-B180NCR
240	75	132	160	5…75	5…75	5…200	5…250	150-B240NCD	§ 150-B240NCR
360	110	200	250	5…125	5…150	5…300	5…350	150-B360NCD	§ 150-B360NCR
500	150	257	355	5…150	5…200	5…400	5…500	150-B500NCD	§ 150-B500NCR
650	200	355	475	5…200	5…250	5…500	5…600	150-B650NCD	§ 150-B650NCR
720	220	400	500	5…250	5…300	5…600	5…700	150-B720NCD	§ 150-B720NCR
850	257	475	600	10…300	10…350	10…700	10…800	150-B850NCD	§ 150-B850NCR
1000	315	530	710	10…350	10…400	10…800	10…1000	150-B1000NCD	§ 150-B1000NCR

∗ Controllers rated 97…360 A are not equipped with line and load terminal lugs. See [T-2097386] for terminal lug kits.
❄ The minimum rating is: 0.7 kW for devices with current ratings of 54 A or less; 4 kW for devices rated 97…720 A; 7.5 kW for devices rated 850 A and greater.
‡ Hp ratings at motor terminal voltages for 208, 480, and 600 line volts, respectively.
§ 120V AC control is required for heatsink fan operation.

Open Type Options (only one selection allowed)

Option	Description	Cat. No. Modification
Soft Stop	Provides a ramp down time of 0…60 s for applications which require an extended coast-to-rest.	A§
Pump Control	Provides smooth motor acceleration and deceleration, reducing surges caused by the starting and stopping of centrifugal pumps. Starting time is adjustable from 0…30 s, and stopping time is adjustable from 0…120 s.	B§
Preset Slow Speed	Provides preset slow speeds for positioning or alignment applications. Preset speeds can be selected at either 7% or 15% of rated motor speed, with adjustable slow speed current from 0…450% of full-load motor current.	C§
SMB Smart Motor Braking	Provides a microprocessor-based braking system that applies 3-phase braking current to a standard squirrel-cage induction motor. The strength of the braking current is adjustable from 0…400% of the motor's full-load current rating.	D§
Accu-Stop	Provides stopping control for general positioning or to minimize jogging to stop. A 3-phase braking current is applied to the motor (adjustable from 0…400% of full-load current) until it reaches a preset slow speed (either 7% or 15% of rated motor speed). The motor is held at this speed until a stop command is given. Braking torque is then applied until the motor reaches zero speed. Slow speed current is adjustable from 0…450% of full-load current.	E§
Slow Speed with Braking	Provides a preset slow speed for positioning or alignment applications. Preset speeds can be selected at either 7% or 15% of rated motor speed, with adjustable slow speed current from 0…450% of full-load current. Provides a microprocessor-based braking system that applies 3-phase braking current to a standard squirrel-cage induction motor. The strength of the braking current is adjustable from 0…400% of full-load motor current.	F§

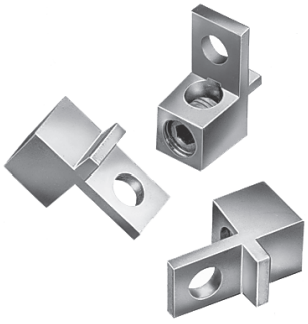
§ Add the designated letter to the end of the cat. no. Example: To add the Pump Control option: **Cat. No. 150-B24NBDB**.

Protective Modules*♣

Current Rating [A]	Description	Field Modification Cat. No.
24…54	480 V Protective Module (Field Installed)	**150-N84**
	600 V Protective Module (Field Installed)	150-N86
97…360	480 V Protective Module (Field Installed)	**150-N84L**
	600 V Protective Module (Field Installed)	150-N86L

* The same protective module mounts on the line or load side of the SMC Dialog Plus Controller. For applications requiring both line and load side protection, two protective modules must be ordered.
♣ Surge protection is provided as standard on 500…1000 A units

Terminal Lug Kits (97…1000 A)



Current Rating [A]	Wire Size	Total No. of Terminal Lugs Possible Each Side		Pkg. Quantity	Cat. No.
		Line Side	Load Side		
97…135	#6…250 MCM AWG 16 mm²…120 mm²	3	3	3	**199-LF1**
180…360		6	6		
500‡	#4…500 MCM AWG 25 mm²…240 mm²	6	6		**199-LG1**
650…720‡		9	9		
850…1000‡	(2) 1/0…500 MCM AWG 50 mm²…240 mm²	6	6		**199-LJ1**

‡ Lugs are supplied with SMC.

IEC Terminal Covers

Description	Field Modification Cat. No.
IEC line- or load-side terminal covers for 97…135 A devices (includes line and load termination covers)	150-NT1
IEC line- or load-side terminal covers for 180…360 A devices (includes line and load termination covers)	150-NT2

4

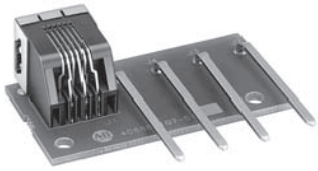
Description			Degree of Protection	Cat. No.
 Cat. No. 1201-HAP	**Human Interface Module❖**	Door Mount Bezel Kit	IP30 (Type 1)	**1201-DMA**
		Programmer Only	IP30 (Type 1)✦	**1201-HAP**
 Cat. No. 1201-HA1		Programmer Only	IP65 (Type 4/12) with Bezel	**1201-HJP**
		Analog Control Panel⌘	IP30 (Type 1)✦	**1201-HA1**
 Cat. No. 1201-HA2		Digital Control Panel⌘	IP30 (Type 1)✦	**1201-HA2**
		Digital Control Panel⌘	IP65 (Type 4/12) with Bezel	**1201-HJ2**

Description				For Use With	Cat. No.
 ***Communication Cable Cat. No. 1202-C10***	**Communication Cable**	Male-Male	0.3 m	Human Interface Module and Communication Modules	**1202-C03**
			1 m		**1202-C10**
			3 m		**1202-C30**
			9 m		**1202-C90**
 ***Communication Module Cat. No. 1203-GD1***	**Communication Module❖**	RS-232/RS-422/RS-485/DF1, or DH485 (Series B)		Bulletin 150 SMC Dialog Plus	**1203-GD2**
		ControlNet			1203-CN1
		Enhanced DeviceNet			**1203-GU6**
 ***Cat. No. 1203-FM1***  ***Cat No. 1203-SM1*** ***Communication Option Kits***	**Flex I/O SCANport Module♣** Flex I/O Terminal Base			Bulletin 150 SMC Dialog Plus	**1203-FB1**
	Flex I/O Module➢				1203-FM1
	SLC Communication Module				**1203-SM1**

⌘ Start, Stop, and Jog buttons are the only active controls when used with the SMC Dialog Plus Controller.
✦ Requires Type 1 Door Mount Bezel Kit.
❖ Separately powered 120/240V AC.
♣ Each Flex I/O SCANport Module requires (1) Cat. No. 1203-FB1 and (1) Cat. No. 1203-FM1.
➢ Requires a Communication Option Cable (Cat. No. 1202-C03/C10/C30/C90) to be functional. These units are not acceptable for NEMA Type 4 door mounting or UL Type 4X outdoor only.

Converter Modules*

	Motor Full Load Current Range [A]	Cat. No.
 *Cat. No. 825-MCM180*	2.5…20 A	**825-MCM20**
	9…100 A	**825-MCM180**
 *Cat. No. 825-MCM630*	64…360 A	**825-MCM630**
Connection Cable (Replacement) Bul. 825-P to Bul. 825-MCM connection		**825-MCA**

	Description	Cat. No.
 *Cat. No. 150-NFS*	**Fanning Strip for Bulletin 825 Converter Modules**	**150-NFS**
	**M8 connections** Set of three 4 x 16 x 102 mm (1/8 x 5/8 x 4-1/64 in.) (125 A max.) Universally applicable Weight: 230 g	825-MVM

* Must be used with fanning strip Cat. No. 150-NFS.

Specifications

Functional Design Specifications			
Standard Features	Installation	Power Wiring	The SMC Dialog Plus Controller can be wired with or without an isolation contactor. Bypass contactors can be employed after the controller has brought the motor to full speed.
		Control Wiring	2- and 3-wire control for a wide variety of applications.
	Setup	Keypad	The SMC Dialog Plus Controller is configured with the front keypad and backlit LCD display.
		Software	Parameter values can be downloaded to the SMC Dialog Plus Controller with DriveTools programming software and the Cat. No. 1203-GD2 communication module.
	Communications		One serial port provided for connection to optional human interface and communication modules.
	Starting Modes		Soft start with selectable kickstart, current limit, dual ramp, and full voltage in one unit.
	Protection and Diagnostics		Power loss, line fault, voltage unbalance, excessive starts/hour, phase reversal, undervoltage, overvoltage, controller temp, stall, jam, open gate, overload, underload, communication fault.
	Metering		Amps, volts, kW, kWH, elapsed time, power factor, motor thermal capacity usage.
	Status Indication		Stopped, ramping, stopping, at speed, and fault.
	Auxiliary Contacts		(1) Single-pole double-throw contact programmable as normal or up-to-speed; one programmable as normal or fault.
Optional Features	Soft Stop		Extended coast-to-rest to minimize load shifting. Ramp down time is adjustable from 0…60 s.
	Pump Control		Helps reduce fluid surges in centrifugal pumping systems during starting and stopping period. Starting time is adjustable from 0…30 s. Stopping time is adjustable from 0…120 s.
	Preset Slow Speed		Enables the operator to position material. The preset slow speed can be set for low (7% of base speed), high (15% of base speed), reverse low (10% of base speed) or reverse high (20% of base speed).
	SMB Smart Motor Braking		Provides motor braking without additional equipment for applications that require the motor to stop quickly. Braking current is adjustable from 0…400% of the motor's full-load current rating.
	Accu-Stop/Slow Speed with Braking		Combines Smart Motor Braking and Preset Slow Speed. Braking current is adjustable from 0…400% of full-load current. Slow speed can be set for either Low (7% of base speed) or High (15% of base speed).

Electrical Ratings				
			UL/CSA/NEMA	IEC
Power Circuit	Rated Operation Voltage		200…480V AC 200…600V AC (–15%, +10%)	200…415V 200…500V
	Rated Insulation Voltage		N/A	500V
	Rated Impulse Voltage		N/A	6000V
	Dielectric Withstand		2200V AC	2500V
	Repetitive Peak Inverse Voltage Rating		200…480V AC: 1400V 200…600V AC: 1600V	200…415V: 1400V 200…500V: 1600V
	Operating Frequency		50/60 Hz	50/60 Hz
	Utilization Category		MG 1	AC-53a
	Protection Against Electrical Shock		N/A	IP00 (open device)
	DV/DT Protection		RC Snubber Network	
	Transient Protection		Metal Oxide Varistors: 220 Joules @ 24…360 A 220 Joules @ 480V, 500…1000 A 300 Joules @ 600V, 500…1000 A	
Short-Circuit Protection	SCPD Performance		Type 1	
	SCPD List		Maximum Fuse or Circuit Breaker (A):	
	Device Operational Current Rating [A]	24	80	
		35	125	
		54	200	
		97	350	
		135	500	
		180	600	
		240	700	
		360	1000	
		500	1200	
		650	1600	
		720	2000	
		850	2500	
		1000	3000	
Control Circuit	Rated Operational Voltage		100…240V AC 24V AC 24V DC	100…240V 24V 24V DC
	Rated Insulation Voltage		N/A	240V
	Rated Impulse Voltage		N/A	3000V
	Dielectric Withstand		1600V AC	2000V
	Operating Frequency		50/60 Hz	50/60 Hz
	Protection Against Electric Shock		N/A	IP20
Power Requirements	Control Module		40 VA	
	Heatsink Fan(s) [A]*	24	—	
		35	—	
		54	—	
		97	45 VA	
		135	45 VA	
		180	45 VA	
		240	45 VA	
		360	45 VA	
		500	145 VA	
		650	320 VA	
		720	320 VA	
		850	320 VA	
		1000	320 VA	

* For devices rated 24…500 A, heatsink fans can be powered by either 110/120V AC or 220/240V AC. For devices rated 650…1000 A, heatsink fans can only be powered by 110/120V AC.

Electrical Ratings, Continued				
			UL/CSA/NEMA	IEC
Maximum Heat Dissipation [W]	Current Rating [A]	24	110	
		35	150	
		54	200	
		97	285	
		135	490	
		180	660	
		240	935	
		360	1170	
		500	1400	
		650	2025	
		720	2250	
		850	2400	
		1000	2760	
Auxiliary Contacts	Rated Operation Voltage		240V AC	240V
	Rated Insulation Voltage		N/A	240V
	Dielectric Withstand		1600V AC	2000V
	Operating Frequency		50/60 Hz	50/60 Hz
	Utilization Category		B300 (terminals 18…19) C300 (terminals 18…20) C300 (terminals 29…30)	AC-15
	SCPD Performance		Type 2	
	SCPD List		Class CC 8 A @ 1000 A Available Fault Current	
Environmental				
Operating Temperature Range			0…+50 °C (32…122 °F) (open) 0…+40 °C (32…104 °F) (enclosed)	
Storage and Transportation Temperature Range			–20…+75 °C	
			2000 m (6560 ft)	
Humidity			5…95% (non-condensing)	
Pollution Degree			2	
Mechanical				
Resistance to Vibration	Operational Non-Operational		1.0 G Peak, 0.006 in. displacement 2.5 G, 0.015 in. displacement	
Resistance to Shock	Operational Non-Operational		15 G 30 G	
Construction	Power Poles	Thermoset Moldings Heatsink hockey puck thyristor	24…135 A 180…1000 A	
	Control Modules		Thermoset and Thermoplastic Moldings	
	Metal Parts		Anodized Aluminum, Plated Brass, Copper, or Painted Steel	
Terminals	Power Terminals	24…54 A	6.0 mm hole with clamp screw	
		97 and 135 A	One 11.5 mm (0.453 in.) diameter hole each	
		180…360 A	One 10.5 mm (0.413 in.) diameter hole each	
		500 A	Two 13.5 mm (0.531 in.) diameter holes each	
		650 and 720 A	Three 13.1 mm (0.515 in.) diameter holes each	
		850 and 1000 A	Six 13.1 mm (0.515 in.) diameter holes each	
	Power Terminal Markings		NEMA, CENELEC EN50 012	
	Control Terminals		M 3.5 x 0.6 Pozidriv screw with self-lifting clamp plate	
Other				
EMC Emission Levels	Conducted Radio Frequency Emissions Radiated Emissions		Class A Class A	
EMC Immunity Levels	Electrostatic Discharge		8 kV Air Discharge	
	Radio Frequency Electromagnetic Field		Per IEC 947-4-2	
	Fast Transient		Per IEC 947-4-2	
	Surge Transient		Per IEC 947-4-2	
Overload Characteristics	Current Range		1.0…999.9 A	
	Trip Classes		10, 15, 20, and 30	
	Trip Current Rating		120% of Motor FLC	
	Number of Poles		3	

Fuse Clip Sizing and Type for Fusible Combination Controllers∗❄

Horsepower @ 480V	Fuse Clip Size/Type	Fuse Size Range [A]
15	30 A/Class J	0…30
20	60 A/Class J	31…60
25	60 A/Class J	31…60
30	60 A/Class J	31…60
40	100 A/Class J	61…100
50	100 A/Class J	61…100
60	200 A/Class J	101…200
75	200 A/Class J	101…200
100	200 A/Class J	101…200
125	400 A/Class J	201…400
150	400 A/Class J	201…400
200	400 A/Class J	201…400
250	400 A/Class J	401…600
300	600 A/Class J	401…600
350	600 A/Class J	401…600
400	1200 A/Class L	601…1600
450	1200 A/Class L	601…1600
500	1200 A/Class L	601…1600
600	1200 A/Class L	601…1600
700	1200 A/Class L	601…1600
800	1200 A/Class L	601…1600

∗ Consult NEC Handbook for proper fuse sizing guidelines.

❄ Optional fuse clip sizes and types are available upon request. Consult your local Rockwell Automation sales office or Allen-Bradley distributor.

Circuit Breaker Sizes and Rating Plug Sizes

Horsepower @ 480V	Circuit Breaker Size [A]/ Rating Plug Size [A]	Interrupting Rating in Symmetrical Amps @ 480V‡
15	150/50	14 000
20	150/50	14 000
25	150/60	14 000
30	150/70	14 000
40	150/100	14 000
50	150/125	14 000
60	250/150	25 000
75	250/175	25 000
100	250/225	25 000
125	250/250	25 000
150	400/300	35 000
200	400/400	35 000
250	600/500	35 000
300	600/600	35 000
350	800/800	35 000
400	800/800	50 000
450	1200/1000	50 000
500	1200/1200	50 000
600	1200/1200	50 000
700	2000/1600	65 000
800	2000/2000	65 000

‡ For higher interrupting ratings, consult your local Rockwell Automation sales office or Allen-Bradley distributor.

Approximate Dimensions and Shipping Weights

Open Type Controllers

Dimensions are in millimeters (inches). Dimensions are not intended for manufacturing purposes.

Controller Rating [A]	Height	Width	Depth	Weight
24	180 (7.09)	154 (6.06)	185 (7.29)	4.5 kg (10 lbs)
35	240 (9.45)	214 (8.43)	195 (7.68)	6.8 kg (15 lbs)
54	290 (11.42)	244 (9.61)	225 (8.86)	11.3 kg (25 lbs)
97	336 (13.23)	248 (9.77)	256 (10.09)	10.4 kg (23 lbs)
135	336 (13.23)	248 (9.77)	256 (10.09)	11.8 kg (26 lbs)
180	560 (22.06)	273 (10.75)	294 (11.58)	25 kg (55 lbs)
240	560 (22.06)	273 (10.75)	294 (11.58)	30 kg (65 lbs)
360	560 (22.06)	273 (10.75)	294 (11.58)	30 kg (65 lbs)
500	588 (23.17)	508 (20.00)	311 (12.23)	40.8 kg (90 lbs)
650…1000	1524 (60.0)	813 (32.00)	402 (15.83)	167.8 kg (370 lbs)