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Allen-Bradley

Selection Guide for Smart Motor Controllers

Smart Choices for Motor Management

Allen-Bradley
RELIANCE ELECTRIC
DODGE
ROCKWELL SOFTWARE
Rockwell Automation

Bringing Together Leading Brands in Industrial Automation

Allen-Bradley Smart Motor Controllers: Intelligent, Robust, Reliable

As a world leader in industrial control systems, Rockwell Automation offers a complete line of Allen-Bradley Smart Motor Controllers (SMC) designed to meet the motor management needs of many applications. Our robust family of controllers features the reliability of solid-state electronics for controlling single- and three-phase induction motors.

Solid-state starting provides smooth acceleration without the arcing, chattering, or vibration problems associated with conventional electromechanical motor starters. Maintenance costs and production losses can be reduced, as can wear on moving parts such as belts, chains, gear boxes, and bearings.

When looking for compact, cost-effective solutions, STC and SMC-2 controllers are easy to set up and maintain.


STC™ Starting Torque Controller


SMC-2™ Smart Motor Controller


SMC PLUS™ Smart Motor Controller

A Few Familiar Applications

- Material Handling
- Centrifugal Pumps
- Compressors
- Overhead Cranes
- Conveyor Systems
- Stirrers and Mixers
- Lumber and Saw Mills
- Extruders

The SMC Dialog Plus™ controller offers sophisticated performance with advanced motor protection, networking capabilities and easy programmability – making it the next generation of intelligent motor control.

Allen-Bradley SMC PLUS™ and SMC Dialog Plus controllers offer a variety of options for soft stopping, slow speed operation, braking, and pump control, providing exceptional flexibility and motor management solutions.



SMC Dialog Plus™ Controller

Rock Crushers

Transport Systems

Ventilators and Blowers

Mills and Kneaders

Motor Management: The Essence of Automation

In today's automated industrial environments, electric motors handle more than half the workload, providing the power for virtually every process involved in production and manufacturing. This places a substantial premium on motor protection and up time.

With the trend toward consolidating multiple protective functions into a single motor control device, system performance, reliability and efficiency can be significantly enhanced. Solid-state devices offer even greater integration and functionality, with lower costs for components, installation and maintenance, and with smaller control panels.

In short, highly sophisticated motor management is now available in ways that were previously too costly or impractical to consider.

Through device level network communications, vital motor operating data can be gathered, processed and displayed, all at the local level. Problems can be detected and devices prevented from tripping at a critical stage in a process, helping to prevent costly downtime and unscheduled maintenance.

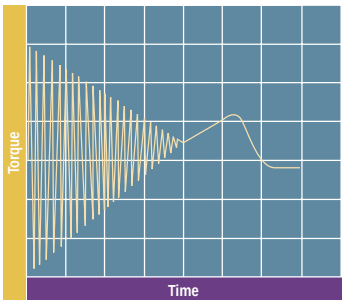
STC



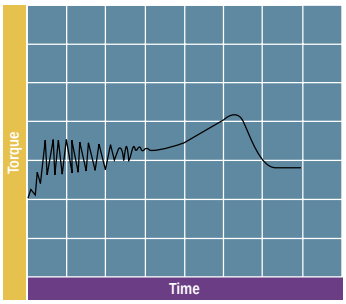
STC Starting Torque Controllers

Allen-Bradley STC controllers provide a reliable method of reducing unwanted problems encountered in typical across-the-line starting applications. With smoother starting of AC induction motors, equipment downtime due to problems related to mechanical shock and vibration is substantially reduced.

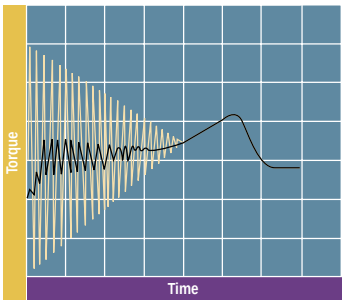
Current Range	1…22 A
Voltage Range	100…600V AC, 50/60Hz
Starting Mode	Soft Start
Features	Digital Adjustments Compact Design



Starting torque surge during DOL or across-the-line motor starting can cause damage to the motor and to the driven equipment.



The STC controller is effective in decreasing the magnitude of starting torque surges.



STC controller versus a typical across-the-line start.

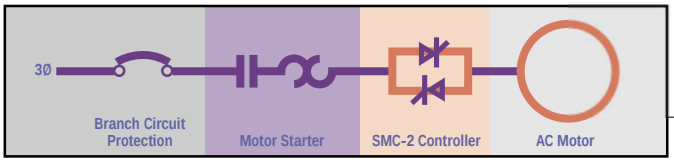


SMC-2

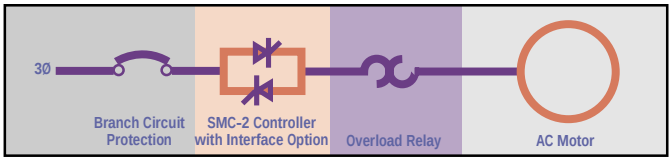
SMC-2 Smart Motor Controllers

The SMC-2 controllers offer a range of cost-effective solutions, with easy installation and set-up, for high-function control of AC induction motors.

Current Range	1…97 A
Voltage Range	200…600V AC, 50/60Hz
Starting Modes	Soft Start Current Limit Start Full Voltage Start
Features	Advisory and Diagnostic LED Digital Adjustments Energy Saver Compact Design
Interface Option	Soft Stop Configurable Auxiliary Contact Local On/Off Control



SMC-2 controller without Interface Option



SMC-2 controller with Interface Option

SMC PLUS



Current Range	1…1000 A
Voltage Range	200…600V AC, 50/60Hz
Starting Modes	Soft Start with Selectable Kickstart Current Limit Start Full Voltage Start
Features	Advisory and Diagnostic LEDs Digital Adjustments Energy Saver Configurable Auxiliary Contacts
Options	Soft Stop Pump Control Preset Slow Speed SMB™ Smart Motor Braking Accu-Stop™ Position Control Slow Speed with Braking

SMC PLUS Smart Motor Controllers

SMC PLUS controllers feature intelligent microprocessor control of motors rated from 1/3 through 1000 horsepower. Solid-state design provides outstanding reliability in a compact package with dramatically fewer parts than electromechanical devices.
All configurations provide three starting modes and self calibration.

SMC Dialog Plus Controllers

SMC Dialog Plus controllers provide the same unmatched performance, as well as all the control features and options available in the SMC PLUS controller line. In addition, they offer highly advanced motor protection with features, such as dynamic phase rebalance, flexible communication and straightforward programming.



Current Range	1…1000 A
Voltage Range	200…600V AC, 50/60Hz
Starting Modes	Soft Start with Selectable Kickstart Current Limit Start Dual Ramp Start Full Voltage Start
Features	Electronic Motor Overload Protection Power Monitoring Built-in SCANport™ Communication 2-line, 16-character Backlit LCD Display Keypad Programming Programmable Auxiliary Contacts
Options	Soft Stop Pump Control Preset Slow Speed SMB™ Smart Motor Braking Accu-Stop™ Position Control Slow Speed with Braking

Advanced Motor Management

Overload Protection

Increased accuracy is accomplished electronically with an I^2t algorithm. Thermal memory accurately models motor operating temperature. Ambient insensitivity is inherent in the electronic design.

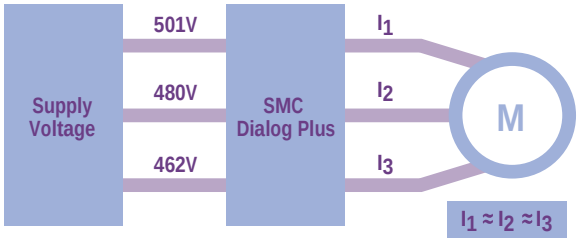
Flexibility

Selectable trip classes — 10, 15, 20, and 30 — meet the requirements of a wide range of applications. A programmable trip setting eliminates the need for heater elements and simplifies start-up while reducing your inventory investment.



Protecting Your Investment

As little as 4% supply voltage unbalance can cause a 20% current unbalance. This can result in a 25% increase in motor temperature, which may lead to premature motor failure.



Rockwell Automation understands the shortcomings of traditional voltage unbalance protection, which de-energizes motor operation upon unbalance detection. The Allen-Bradley SMC Dialog Plus controllers incorporate a Dynamic Phase Rebalance* feature that compensates for voltage unbalance by automatically adjusting the voltage output to balance the three-phase currents drawn by the motor.

Advanced diagnostics

Fault diagnostic capabilities built into the SMC Dialog Plus controllers help you pinpoint a problem for easy troubleshooting and quick re-starting.

- Line Fault
- Power Loss
- Voltage Unbalance
- Phase Reversal
- Undervoltage
- Overvoltage
- Overtemperature
- Open Gate
- Overload
- Excessive Starts Per Hour

- Jam - a motor jam is generally an indication of a mechanical problem. Quick detection can prevent equipment damage and unnecessary downtime.
- Stall - when a motor stalls during the starting process, it can take more than 20 seconds before the overload trips. Quick detection can reduce motor heating and allow for a quick restart once the problem is corrected.
- Underload - the operating current of a motor can provide detailed information about equipment performance. For instance, a sudden drop in motor current can signal conditions such as pump cavitation, tool breakage or belt breakage.







**Phase Rebalance requires the use of the converter module (Bulletin 825) and the fanning strip (cat. no. 150-NFS).*

Network Communications

Integrating intelligent motor management into your automation architecture is enhanced with the SMC Dialog Plus controller. Communication capabilities may increase reliability by reducing the total number of components and terminations per system. The SMC Dialog Plus controller delivers enhanced control through the ability to access parameter settings and provides faults diagnostics, metering and remote start-stop control.



Using the Allen-Bradley Bulletin 1203 communication modules, the SMC Dialog Plus controller offers networking capabilities over a variety of network protocols.

- *Remote I/O*
- *DeviceNet™ Communications*
- *RS 232/422/485 (all DF1 protocol)*
- *DH-485*
- *ControlNet*



You can view various functions either locally, using the controller's built-in LCD display, or remotely, through the communication port.

The SMC Dialog Plus controller is simple to program with organized, descriptive, application-specific parameters. It can be configured using the Allen-Bradley Windows-based DriveTools™ programming software — compatible with several Allen-Bradley AC and DC digital drive products. The built-in LCD display provides parameter identification using clear, informative text so you can program your controller without referring to a manual.

Power monitoring

The ability to monitor power comes standard with the SMC Dialog Plus controller. Vital information can be reported without the need for additional devices such as transducers and meters (quicker installation and reduced panel space and wiring at no additional cost.)

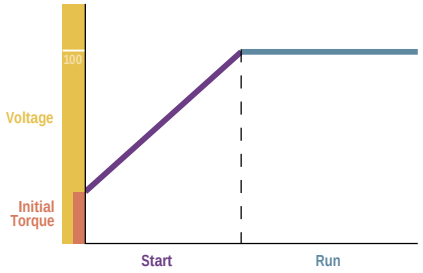
- Three-phase Currents
- Three-phase Voltages
- Power in kW
- Power Usage in kWH
- Motor Thermal Capacity Usage
- Power Factor of the Running Motor
- Elapsed Time of Motor Operation



Standard and Optional Start/Stop Controls Meet Virtually Any Application Need

Allen-Bradley Smart Motor Controllers provide ample design flexibility to meet the needs of a host of production applications. To help identify which controllers offer the standard and optional start/stop features described on the following pages, use the following code:

● SMC-2 ▲ SMC PLUS ■ SMC Dialog Plus

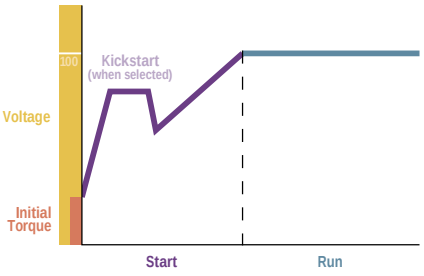


Soft Start

By reducing starting torque surges, Soft Start provides smooth, stepless motor acceleration while minimizing damage to gears, couplings and belts.

● ▲ ■



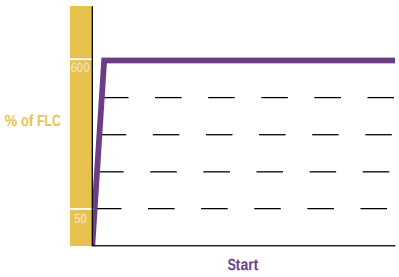


Soft Start with Selectable Kickstart

Activate the Selectable Kickstart function to provide an extra pulse of torque. This optional feature is ideal for overcoming stiction wherever high-friction loads are encountered.

▲ ■





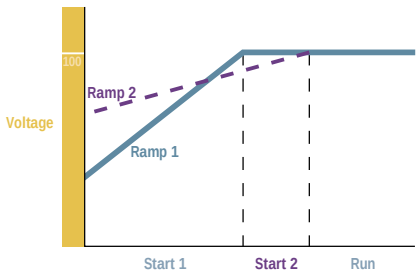
Current Limit Start

Current Limit starting is designed for applications which require the in-rush current to be limited during acceleration.

Selectable Kickstart is also available with the Current Limit Start.

● ▲ ■



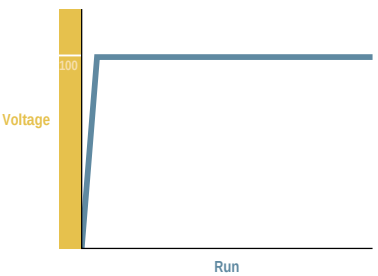


Dual Ramp Start

Available exclusively on the SMC Dialog Plus controller, Dual Ramp Start allows you to choose between two separate Soft Start profiles with independently adjustable ramp times and torque settings. It's designed for applications with varying loads, two speed requirements and reversing.

■





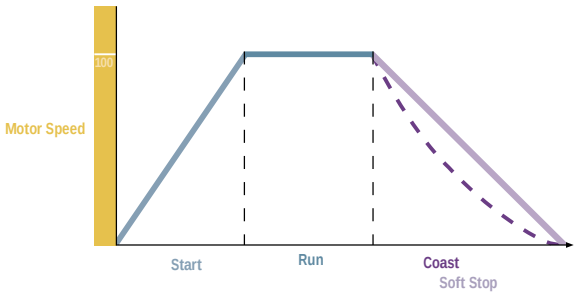
Full Voltage Start

In the Full Voltage Start mode, the SMC performs like a solid-state contactor, achieving full in-rush current and locked rotor torque.

● ▲ ■

Soft Stop

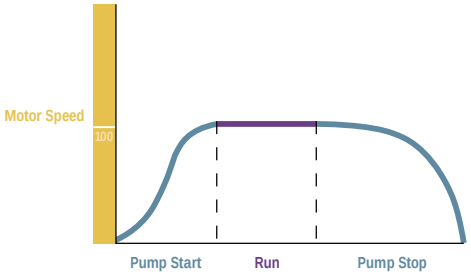
The Soft Stop option extends the stopping time to minimize load shifting or spillage.





Pump Control

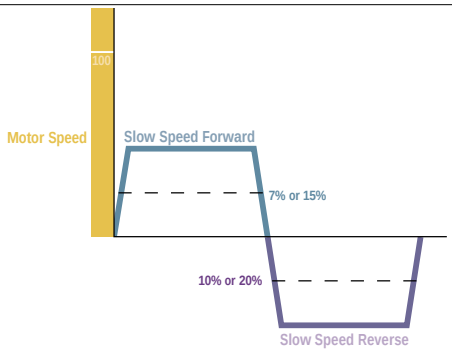
The SMC controller's unique, interactive Pump Control is designed to reduce fluid surges in pumping systems. It provides closed loop acceleration and deceleration control of centrifugal pump motors without need for feedback devices.

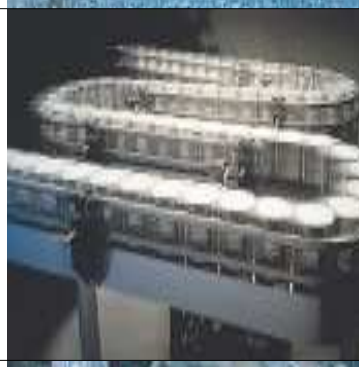




Preset Slow Speed

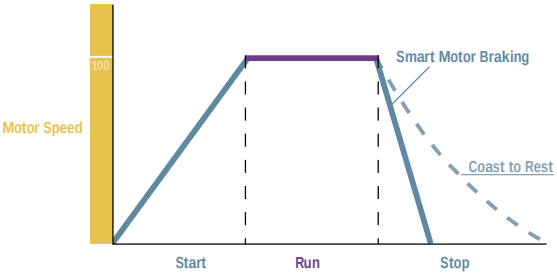
The Preset Slow Speed option furnishes two jog speeds to facilitate process set-up and alignment. These speeds are available in both the forward and reverse direction without a reversing contactor.





SMB™ Smart Motor Braking

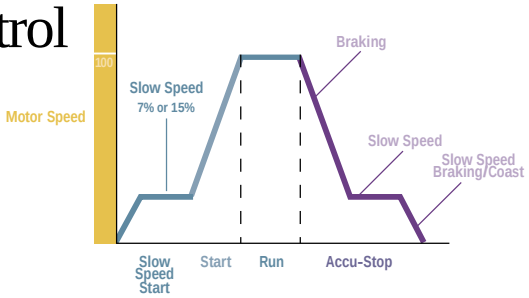
SMB Smart Motor Braking stops a motor quickly for improved operation cycle times and increased productivity. Braking control with automatic zero speed shut-off is fully integrated into the controller's compact design.





Accu-Stop™ Position Control

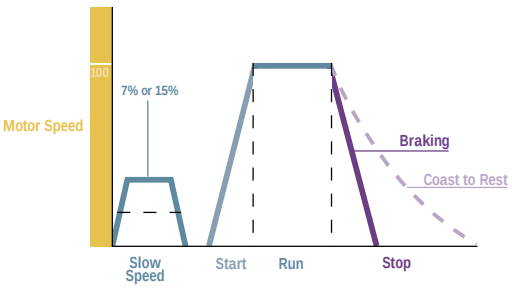
Accu-Stop position control provides rapid braking to a slow speed and then braking to a stop. This option facilitates cost-effective general positioning control.

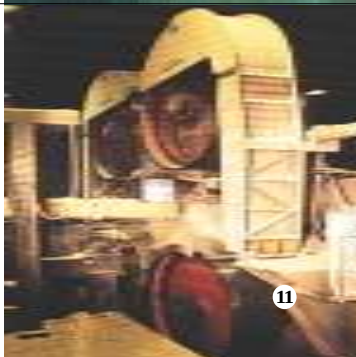




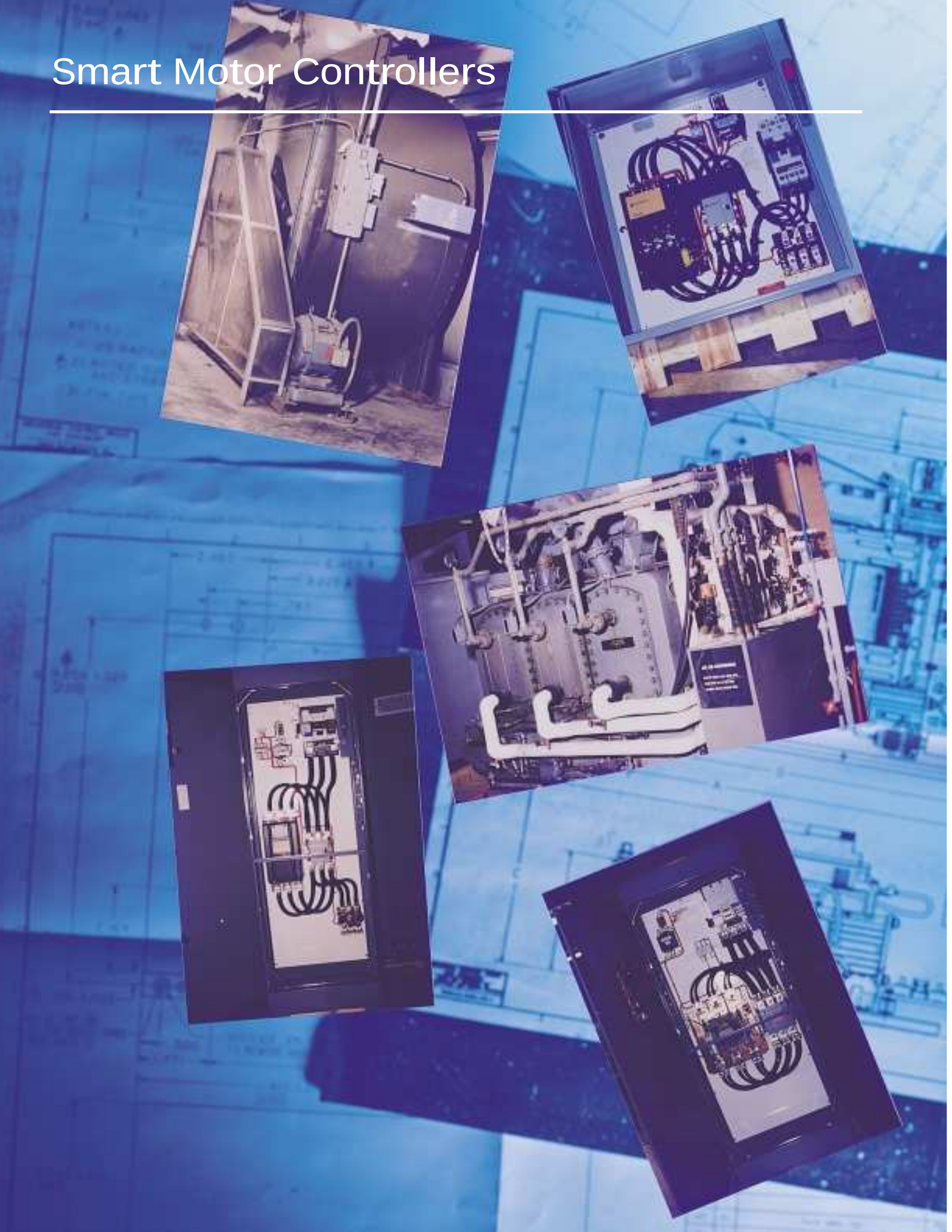
Slow Speed w/Braking

Slow Speed with Braking combines the benefits of SMB Smart Motor Braking and Preset Slow Speed for applications requiring slow set-up speeds and braking to a full stop.





Smart Motor Controllers



					
	STC Controller		**SMC-2 Controller**	**SMC Plus Controller**	**SMC Dialog Plus Controller**
Features	**100…240V, 1 1…22 A**	**200…600V, 3 1…22 A**	**200…600V 1…97 A**	**200…600V 1…1000 A**	**200…600V 1…1000 A**
Soft Start	S	S	S	S	S
Kickstart				S	S
Current Limit			S	S	S
Dual Ramp Start					S
Full Voltage			S	S	S
Energy Saver			S	S	S
Soft Stop			O	O	O
Pump Control				O	O
Preset Slow Speed				O	O
SMB Smart Motor Braking				O	O
Accu-Stop				O	O
Slow Speed with Braking				O	O
Single-phase Operation	S				
Motor Protection					S
Communication					S
Metering					S
Keypad Programming/LCD Display					S

S = Standard Feature
O = Optional Feature

Description

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

For prices, consult your local Allen-Bradley Sales Office or the Master Price List.

Approvals:

CE Marked (Open Type)
Per Low Voltage Directive
73/23/EEC, 93/68/EEC

CSA Certified (Open Type)
(File No. LR1234)

UL Listed (Open Type) (File No. E96956)

Your order must include:

- Cat. No. of the controller selected.
- Modifications.
- If required, Cat. No. of any options or accessories.



STC Starting Torque Controller

- 11…22 A Ratings
- Reduces Starting Torque Surge
- Feed-Through Wiring
- Single- and Three-Phase

Page 15



SMC-2 Smart Motor Controller

- 5…97 A Ratings
- 3 Starting Modes
- Optional Soft Stop Feature

Page 20



SMC Plus Smart Motor Controller

- 24…1000 A Ratings
- 3 Starting Modes
- 6 Optional Features

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SMC Dialog Plus Smart Motor Controller

- 24…1000 A Ratings
- 4 Starting Modes
- 6 Options
- Motor Protection
- Communication
- Keypad Programming

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Bulletin 154

- **STC Starting Torque Controller**
  - **11…22 A Ratings**
  - **Reduces Starting Torque Surges**

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Description

The STC Starting Torque Controller is a compact, simple to use, solid-state controller designed for low horsepower squirrel-cage induction motors. It is intended to relieve the starting torque surge encountered in typical across-the-line starting. This will allow for smoother starts and decreased equipment downtime due to shock and vibration problems.

The STC Controller is available in three current rated sizes: 11 A, 16 A and 22 A. It is offered in four voltage ranges: 100…120V, 200…240V, 380…480V, and 500…600V, 50/60 Hz.

The STC Controller is intended to operate in conjunction with an electromechanical motor starter.

For prices, consult your local Allen-Bradley Sales Office or the Master Price List.

Approvals:

CE Marked (Open Type) Per Low Voltage Directive 73/23/EEC, 93/68/EEC

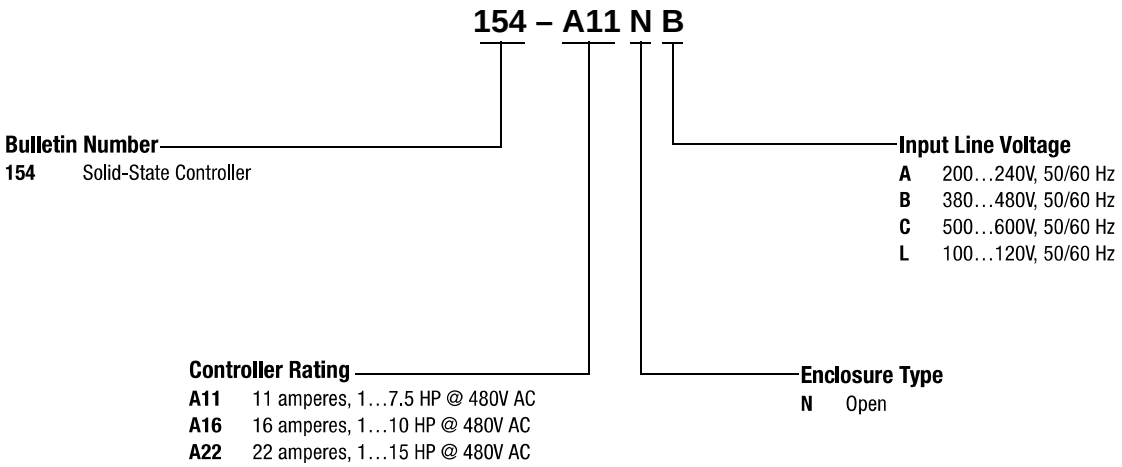
CSA Certified (Open Type) (File No. LR 1234)

UL Listed (Open Type) (File No. E96956)

Your order must include:

- Cat. No. of the controller selected.

Catalog Number Identification

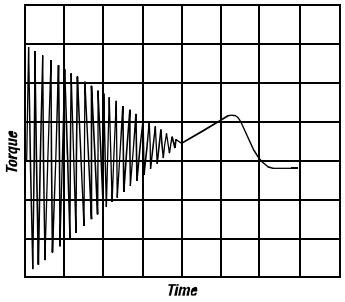


Single-Phase Selection — Open Type

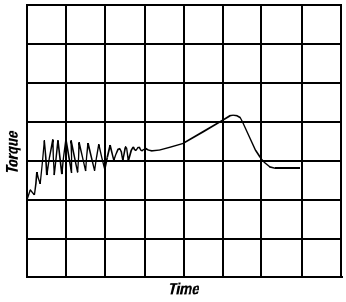
Current Rating (A)	kW	HP	Cat. No.
110…120V AC, 50/60 Hz			
11	0.75	0.5	154-A11NL
16	1.1	1	154-A16NL
22	1.5	1.5	154-A22NL
200…240V AC, 50/60 Hz			
11	1.5	1.5	154-A11NA
16	2.2	2	154-A16NA
22	3	3	154-A22NA

Three-Phase Selection — Open Type

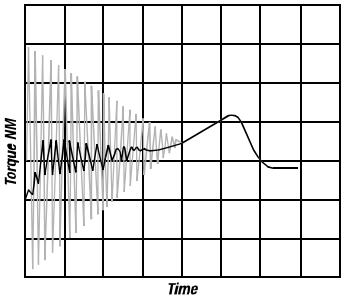
Current Rating (A)	kW	HP	Cat. No.
200V AC, 60 Hz			
11	—	3	154-A11NA
16	—	3	154-A16NA
22	—	5	154-A22NA
230V AC, 50/60 Hz			
11	2.2	3	154-A11NA
16	4	5	154-A16NA
22	5.5	7.5	154-A22NA
380…480V AC, 50/60 Hz			
11	4	7.5	154-A11NB
16	7.5	10	154-A16NB
22	11	15	154-A22NB
500…575V AC, 50/60 Hz			
11	5.5	10	154-A11NC
16	7.5	10	154-A16NC
22	11	20	154-A22NC



Typical Across-the-Line Response
The figure above shows how starting torque surge during motor starting can cause damage to the motor and to driver equipment.



STC Response
The figure above shows how the STC controller is effective in decreasing the magnitude of starting torque surges.



Comparison of Across-the-Line Response versus STC Response
The figure above shows the comparison of the STC controller versus a typical across-the-line start.

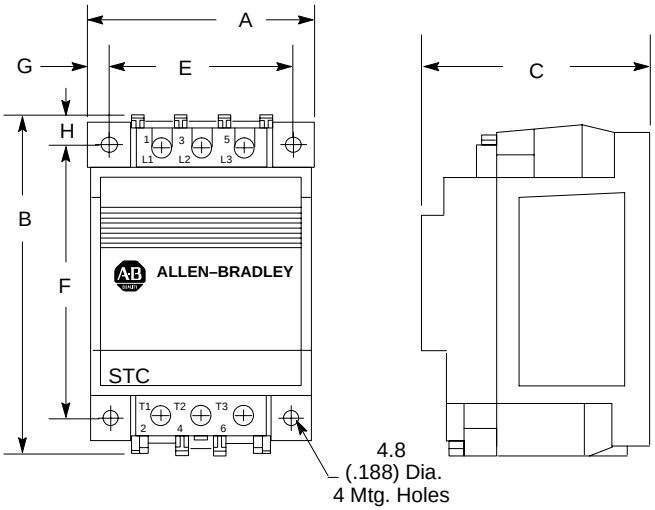
Specifications — Page 18
Approximate Dimensions — Page 19

Electrical Ratings			Cat. No. 154-A11…	154-A16…	154-A22…
Rated Operating Current		(A)	11	16	22
Maximum Heat Dissipation		(Watts)	15	18	24
Power Section			Back-to-back SCR(s)		
Rated Operational Voltage (+10%, –15%)			100…120, 200…240V AC, 50/60 Hz, 1-phase, or 200…240, 380…480, 500…600V AC, 50/60 Hz, 3-phase		
Cable Size	Power Terminals		Wire Size: 1.5…6 mm^2 (#14…#12 AWG)		
Thermal Capacity			IEC 34 (S1), NEMA MG 1		
Electrical Design Specifications/Test Requirements					
Repetitive Peak Inverse Voltage Rating			1400V up to 480V Line 1600V up to 600V Line		
Selectable Start Times Selectable Initial Torque Settings			0.1…4.5 seconds 10…80% Locked Rotor Torque		
Noise & RF Immunity			Surge Transient Peak 3400V. Showering Arc 1500V		
DV/DT Protection			RC Snubber Network		
Mechanical Design Specifications/Test Requirements					
Vibration Shock			2.5 G for 60 minutes 30 G for 11 mSecs		
Construction			Power Poles:	High temperature thermoplastic moldings	
			Control:	Thermoplastic moldings	
			Metal Parts:	Anodized aluminum, plated brass or copper	
Terminals			Power Terminals:	6.0 mm hole with clamping plate	
			Power Terminals Markings:	CENELEC EN50 012, NEMA	
Functional Design Specification					
Standard Features	Set-up	Wiring	The STC controller is wired in series with a motor starter.		
		Configuring	The STC controller is configured with rotary digital switches.		
	Starting		From an initial torque setting, the STC controller increases the voltage gradually during the acceleration period until full voltage is achieved.		
	Running	Protection	Motor overload protection is provided by the overload relay as part of the motor starter.		
Environmental					
Temperature		Operating	0 C…+50 C (32 F…+122 F)		
		Storage	–40 C…+85 C (–40 F…+185 F)		
Altitude			2000 meters (6560 feet)		
Humidity			5…95% RH (non-condensing)		

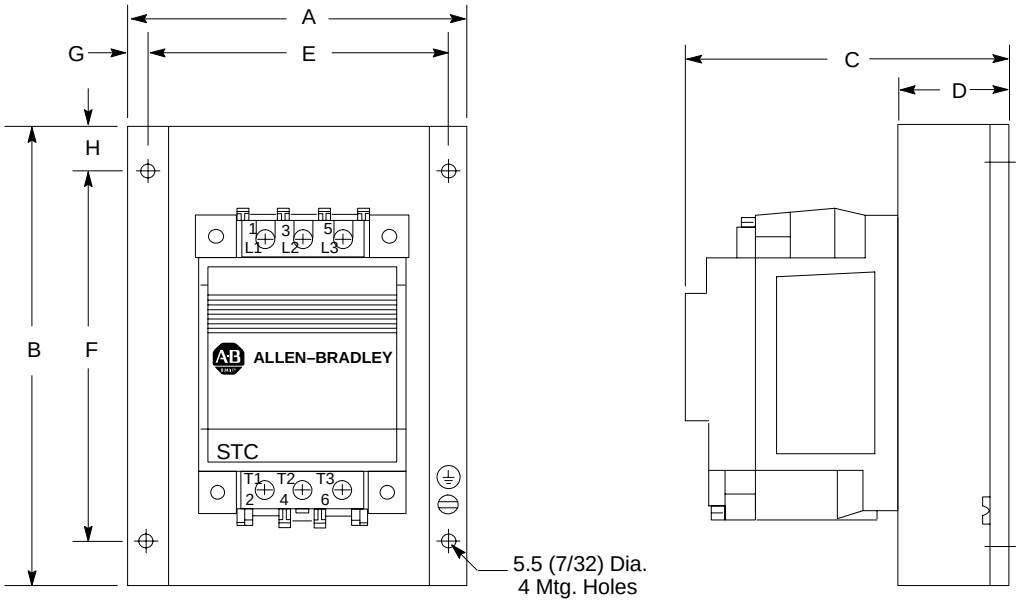
Product Selection — Page 17

Dimensions are shown in millimeters (inches). Dimensions are not intended to be used for manufacturing purposes.

11 A Controller



16…22 A Controller



Open Type

Controller	Unit	A Width	B Height	C Depth	D	E	F	G	H	Approx. Ship. Wt.
11 A	Millimeter (Inch)	75 (2-61/64)	111 (4-23/64)	77 (3-1/32)	—	60 (2-23/64)	90 (3-35/64)	7.5 (19/64)	10 (3-35/64)	2 kg (4.5 lbs)
16 A	Millimeter (Inch)	122 (4-13/16)	127 (5)	101 (3-31/32)	24 (15/16)	110 (4-21/64)	90 (3-35/64)	6 (1/4)	18.5 (3/4)	2.25 kg (5 lbs)
22 A	Millimeter (Inch)	154 (6-1/16)	180 (7-3/32)	127 (5)	50 (1–31/32)	140 (5-33/64)	140 (5-33/64)	7 (9/32)	20 (25/32)	3.15 kg (7 lbs)



Bulletin 150

- **SMC-2 Smart Motor Controller**
  - **5…97 A Ratings**
  - **3 Start Modes**
  - **Optional Soft Stop (Requires Interface Module)**

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Description	Page	Description	Page
Modes of Operation	21	Options	31
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Product Selection	24	Approximate Dimensions	37
Accessories	30		

Description

The SMC-2 Controller is a compact, multi-functional, versatile solid-state controller used in starting standard three-phase squirrel-cage induction motors. Three standard modes of operation are available within a single controller:

- Soft Start
- Current Limit Start
- Full Voltage Start

The SMC-2 Controller is available in eight sizes: 5, 9,16, 24, 35, 54, 68 and 97 A. It is offered in three voltage ranges: 200…240V, 380…480V, and 500…600V, 50/60 Hz.

The SMC-2 Controller can be used in two configurations: as a series controller and as a motor controller with an interface option.

For prices, consult your local Allen-Bradley Sales Office or the Master Price List.

Approvals:

CE Marked (Open Type) Per Low Voltage Directive 73/23/EEC, 93/68/EEC

CSA Certified (Open Type) (File No. LR1234)

UL Listed (Open Type) (File No. E96956)

Your order must include:

- Cat. No. of the controller selected.
- If required, suffix code and description of any modifications.
- If required, Cat. No. of any options or accessories.

Series Controller

The SMC-2 Controller is designed to operate in series with an electromechanical motor starter. The series mode has the following features:

- Eliminates the need for additional control wiring, simplifying initial installation.
- Works in unison with an existing electromechanical motor starter for easy retrofits.
- Allows easy set-up with digital adjustments, eliminating the guesswork of setting analog potentiometers.

Controller with Interface Option

The SMC-2 Controller with the interface option is designed so it can be operated by an external device. The interface option enhances the capabilities of the controller. It can be field or factory installed. For devices rated 5…16 A, this is a plug-in module. For devices rated 24…97 A, there is a PC board that replaces the existing board. The SMC-2 Controller with the interface option offers the following features:

- Provides ON/OFF control directly to the controller through an external pilot device. In many applications the interface option may eliminate the need for an additional contactor if electrical isolation or soft stop is not required. This reduces panel space requirements.
- Provides a selectable auxiliary contact, which operates as either an instantaneous or up-to-speed contact, making it available for a wide variety of control schemes.
- Provides a Soft Stop feature that extends stopping time to minimize load shifting or spillage during stopping.

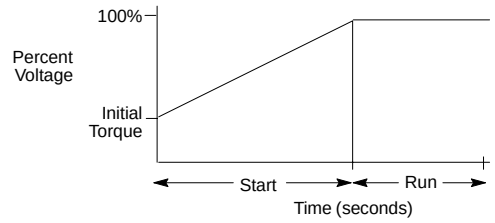
Energy Saver

This built-in feature of the SMC-2 Controller is used to save energy on applications where the motor is lightly loaded or unloaded for long periods of time.

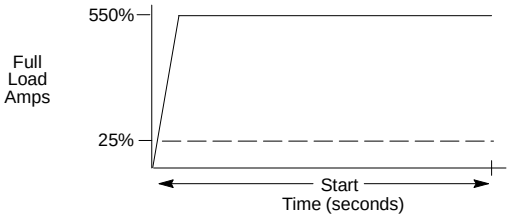
Protective Module

In applications where the SMC-2 Controller is exposed to high or abnormal line transients, an optional protective module is available and can be mounted on both the line and load side of the unit. The protective module contains MOVs (Metal Oxide Varistors) that protect the SCR from line surges and snubber networks to shunt noise energy away.

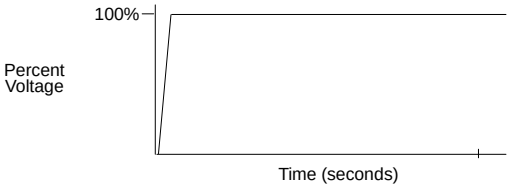
Modes of Operation



Soft Start
This method has the most general application. The motor is raised from an initial torque value to full voltage. This initial torque is adjustable between 0…70% of locked rotor torque. The motor voltage is gradually increased during the acceleration ramp time, which can be adjusted from 2…30 seconds.

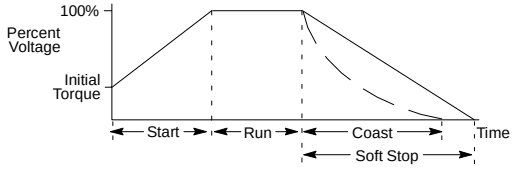


Current Limit Starting
This starting mode is used when it is necessary to limit the maximum starting current. It can be adjusted for 25…550% of full load amps. If the motor is not up to speed after the selected time elapses, the controller will transition to full voltage.



Full Voltage Starting
This mode is used for applications requiring across-the-line starting. The ramp time is set for less than 1/10 second as shown.

Options



Soft Stop
The Soft Stop feature is available with an optional interface module. This function can be used with applications that require an extended coast to rest. The voltage ramp down time can be set from 5…110 seconds. The motor will stop when the motor voltage drops to a point where the load torque is greater than the motor torque.

Smart Motor Controllers — SMC-2

Catalog Number Identification

Open and Non-Combination

150 – A05 N B – A9 – 8L – NA – 7

Bulletin Number

150	Solid-State Controller
150R	Solid-State Controller with Reversing Contactor (Non-Combination Only)

Controller Ratings

Cat. No.	Amps	Max HP				Max kW			
		200	230	460	575	220	380	415	500
A05	5	1	1	3	3	1.1	2.2	2.2	3
A09	9	2	2	5	7.5	2.2	4	4	5.5
A16	16	3	5	10	10	4	7.5	7.5	7.5
A24	24	5	7.5	15	20	5.5	11	11	15
A35	35	10	10	25	30	10	18.5	22	22
A54	54	15	20	40	50	15	22	30	37
A68	68	20	25	50	60	18.5	33	37	45
A97	97	30	30	75	75	25	45	55	63

Enclosure Type

N	Open	**H**	NEMA Type 3R
F	NEMA Type 4 (IP65)	**S**	NEMA Type 4X (Stainless Steel)
J	NEMA		

Input Line Voltage

A	200…240 volts (+10%, -15%), 50 and 60 Hz, 3-phase
B	380…480 volts (+10%, -15%), 50 and 60 Hz, 3-phase
C	500…600 volts (+10%, -15%), 50 and 60 Hz, 3-phase

OPTIONS/ACCESSORIES

Overload Selection [1] [2]

Cat. No.	Current Rating	Cat. No.	Current Rating	Cat. No.	Current Rating
C1	0.32…1.0	**F1**	3.7…12	**J2**	14…45
D1	1.0…2.9	**H1**	12…32	**K3**	23…75
E1	1.6…5.0	**H2**	12…38	**L4**	66…110

Protective Modules [3]

Line Side	240V AC	**8L2**	**Both Line & Load**	240V	**8B2** [4]
	480V AC	**8L4**		480V	**8B4** [4]
	600V AC	**8L6**		600V	**8B6** [4]

Interface Option [5]

NA	200…240V (+10%, -15%), 50 and 60 Hz, single-phase
ND	100…120V (+10%, -15%), 50 and 60 Hz, single-phase

External Reset [6]

7	For NEMA Type 4 (IP65) or NEMA Type 12 (IP64)

[1] IEC overload relays are rated for Class 10 operation.
[2] Overload option for 5…16 A only (open type) and non-combination or combination unit (5…97 A units).
[3] Protective modules factory installed on 5…54 A units only. 68 A and 97 A are field modifications only.
[4] When an IEC overload relay is selected, protective modules are limited to line side only. (For 5…16 A rated controllers only.)
[5] Interface option provides selectable auxiliary contact and Soft Stop feature.
[6] External overload reset available for 5…97 A rated controllers ordered as a non-combination or combination unit with an overload relay.

Combination

152C – WO5 J BD – A90 – ND – 8L4

Bulletin Number

152C Combination Solid-State Reduced Voltage Controller with Fusible Disconnect and Isolation Contactor
152X Combination Solid-State Reduced Voltage Controller with Fusible Disconnect, 120V Interface Module and Control Circuit Transformer, without Isolation Contactor
152R Combination Solid-State Reduced Voltage Controller with Fusible Disconnect and Reversing Contactor
152XR Combination Solid-State Reduced Voltage Controller with Fusible Disconnect, 120V Interface Module and Control Circuit Transformer with Reversing Contactor
153C Combination Solid-State Reduced Voltage Controller Breaker Disconnect and Isolation Contactor
153X Combination Solid-State Reduced Voltage Controller with Circuit Breaker Disconnect, 120V Interface Module and Control Circuit Transfomer, without Isolation Contactor
153R Combination Solid-State Reduced Voltage Controller with Circuit Breaker Disconnect and Reversing Contactor
153XR Combination Solid-State Reduced Voltage Controller with Circuit Breaker Disconnect, 120V Interface Module and Control Circuit Transformer, with Reversing Contactor

Interface Option

NA 200…240V (+10%, -15%), 50 and 60 Hz, single-phase
ND 100…120V (+10%, -15%), 50 and 60 Hz, single-phase

Controller Ratings

Cat. No.	Amps	Max HP				Max kW			
		200	230	460	575	220	380	415	500
W05	5	1	1	3	3	1.1	2.2	2.2	3
W09	9	2	2	5	7.5	2.2	4	4	5.5
W16	16	3	5	10	10	4	7.5	7.5	7.5
W24	24	5	7.5	15	20	5.5	11	11	15
W35	35	10	10	25	30	10	18.5	22	22
W54	54	15	20	40	50	15	22	30	37
W68	68	20	25	50	60	18.5	33	37	45
W97	97	30	30	75	75	25	45	55	63

Enclosure Type

F NEMA Type 4 (IP65)
J NEMA Type 12 (IP64)
H NEMA Type 3R
S NEMA Type 4X (Stainless Steel)

Input Line Voltage

AC Line Voltage	Hertz	Common	Control Wiring Method Separate Control	
			120V/60 Hz Secondary	110V/50 Hz Secondary
200	50	H	—	HS
208	60	H	HD	—
240	60	A	AD	—
400	50	I	—	NS
480	60	B	BD	—
500	50	M	—	MS
600	60	C	CD	—

Overload Selection ①

OPTIONS/ACCESSORIES

Protective Modules ②

Line Side			Both Line & Load		
	240V	8L2		240V	8B2
	480V	8L4		480V	8B4
	600V	8L6		600V	8B6

① IEC overload relays are rated for Class 10 operation for 5…97 A rated controllers only. See previous page for IEC overload selection. For 24…97 A rated controllers, NEMA overloads are furnished as standard.

② When an IEC overload relay is selected, protective modules are limited to line side only. (For 5…16 A rated controllers only.)

③ Requires control power source.

Open Type

Open type is a stand-alone SMC-2 Controller. Options which can be added to open type 5…16 A controllers are an interface module, solid-state type overload relay and protective module(s).

Current Rating (A)	kW	HP	Cat. No.
200V AC, 50/60 Hz			
5	—	1/3…1	150-A05NA
9	—	1/3…2	150-A09NA
16	—	1/3…3	150-A16NA
24	—	1…5	150-A24NA
35	—	1…10	150-A35NA
54	—	1…15	150-A54NA
68	—	1…20	150-A68NA
97	—	1…30	150-A97NA
230V AC, 50/60 Hz			
5	1.1	1/3…1	150-A05NA
9	2.2	1/3…2	150-A09NA
16	4	1/3…5	150-A16NA
24	5.5	1…7-1/2	150-A24NA
35	7.5	1…10	150-A35NA
54	15	1…20	150-A54NA
68	18.5	1…25	150-A68NA
97	25	1…30	150-A97NA
400…480V AC, 50/60 Hz			
5	2.2	1/3…3	150-A05NB
9	4	1/3…5	150-A09NB
16	7.5	1/3…10	150-A16NB
24	11	1…15	150-A24NB
35	22	1…25	150-A35NB
54	30	1…40	150-A54NB
68	37	1…50	150-A68NB
97	55	1…75	150-A97NB
500…575V AC, 50/60 Hz			
5	3	1/3…3	150-A05NC
9	5.5	1/3…7-1/2	150-A09NC
16	7.5	1/3…10	150-A16NC
24	15	1…20	150-A24NC
35	22	1…30	150-A35NC
54	30	1…50	150-A54NC
68	45	1…60	150-A68NC
97	63	1…75	150-A97NC

For factory-installed options, add the appropriate suffix from pages 30…31.

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Non-Combination Controllers

Non-combination is the SMC-2 Controller in an IP65 (Type 4) or IP54 (Type 12) enclosure. It is available with the same options as the Open Type and is also available with an external reset for overloads. See Accessories and Options on pages 30 and 31.

Current Rating (A)	kW	HP	IP65 — NEMA Type 4 Enclosure			IP54 — NEMA Type 12 Enclosure	
			Price Adder Code	Dimension Code	Cat. No.	Dimension Code	Cat. No.
200V AC, 50/60 Hz							
5	—	1	a	S	150-A05FA	S	150-A05JA
9	—	2	b	S	150-A09FA	S	150-A09JA
16	—	3	c	T	150-A16FA	T	150-A16JA
24	—	5	d	U	150-A24FA	U	150-A24JA
35	—	10	e	V	150-A35FA	V	150-A35JA
54	—	15	f	W	150-A54FA	W	150-A54JA
68	—	20	g	X	150-A68FA	X	150-A68JA
97	—	30	h	X	150-A97FA	X	150-A97JA
230V AC, 50/60 Hz							
5	1.1	1	a	S	150-A05FA	S	150-A05JA
9	2.2	2	b	S	150-A09FA	S	150-A09JA
16	4	5	c	T	150-A16FA	T	150-A16JA
24	5.5	7.5	d	U	150-A24FA	U	150-A24JA
35	7.5	10	e	V	150-A35FA	V	150-A35JA
54	15	20	f	W	150-A54FA	W	150-A54JA
68	18.5	25	g	X	150-A68FA	X	150-A68JA
97	25	30	h	X	150-A97FA	X	150-A97JA
400…480V AC, 50/60 Hz							
5	2.2	3	a	S	150-A05FB	S	150-A05JB
9	4	5	b	S	150-A09FB	S	150-A09JB
16	7.5	10	c	T	150-A16FB	T	150-A16JB
24	11	15	d	U	150-A24FB	U	150-A24JB
35	22	25	e	V	150-A35FB	V	150-A35JB
54	30	40	f	W	150-A54FB	W	150-A54JB
68	37	50	g	X	150-A68FB	X	150-A68JB
97	55	75	h	X	150-A97FB	X	150-A97JB
500…575V AC, 50/60 Hz							
5	3	3	a	S	150-A05FC	S	150-A05JC
9	5.5	7.5	b	S	150-A09FC	S	150-A09JC
16	7.5	10	c	T	150-A16FC	T	150-A16JC
24	15	20	d	U	150-A24FC	U	150-A24JC
35	22	30	e	V	150-A35FC	V	150-A35JC
54	30	50	f	W	150-A54FC	W	150-A54JC
68	45	60	g	X	150-A68FC	X	150-A68JC
97	63	75	h	X	150-A97FC	X	150-A97JC

Optional accessories may increase panel dimensions.
For factory-installed options, add the appropriate suffix from page 30…31.
97 A (Type 4 and Type 12) controllers include bypass contactors.

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IP65 (Type 4) Combination Controllers

Combination controllers can be ordered with or without the isolation contactor. A combination controller with the isolation contactor consists of a rod-operated fusible disconnect , the SMC-2 Controller and a 3-pole thermal overload relay. For 5…97 A controllers, the current range of the solid-state overload relay must be selected from the chart on page 31. Otherwise, a eutectic alloy type overload relay (less elements) will be provided in place of the solid-state overload. Eutectic alloy overloads are standard on 24…97 A controllers. A combination controller without the isolation contactor consists of a rod operated fusible disconnect, the SMC-2 Controller with an interface option, a control circuit transformer and a 3-pole thermal overload relay. Again, for 5…97 A controllers, the current range must be selected for a solid-state overload or a eutectic alloy type overload will be provided.

Current Rating (A)	kW	HP	Price Adder Code	Dimension Code	With Isolation Contactor	Without Isolation Contactor
					Cat. No.	Cat. No.
220V AC, 50 Hz						
5	1.1	—	a	S	152C-W05FA	152X-W05FA-ND-6P
9	2.2	—	b	T	152C-W09FA	152X-W09FA-ND-6P
16	4	—	c	T	152C-W16FA	152X-W16FA-ND-6P
24	5.5	—	d	U	152C-W24FA	152X-W24FA-ND-6P
35	7.5	—	e	U	152C-W35FA	152X-W35FA-ND-6P
54	15	—	f	V	152C-W54FA	152X-W54FA-ND-6P
68	18.5	—	g	W	152C-W68FA	152X-W68FA-ND-6P
97	25	—	h	Y	152C-W97FA	152X-W97FA-ND-6P
400V AC, 50 Hz						
5	2.2	—	a	S	152C-W05FI	152X-W05FI-ND-6P
9	4	—	b	T	152C-W09FI	152X-W09FI-ND-6P
16	7.5	—	c	T	152C-W16FI	152X-W16FI-ND-6P
24	11	—	d	U	152C-W24FI	152X-W24FI-ND-6P
35	22	—	e	U	152C-W35FI	152X-W35FI-ND-6P
54	30	—	f	V	152C-W54FI	152X-W54FI-ND-6P
68	37	—	g	W	152C-W68FI	152X-W68FI-ND-6P
97	55	—	h	Y	152C-W97FI	152X-W97FI-ND-6P
500V AC, 50 Hz						
5	3	—	a	S	152C-W05FM	152X-W05FM-ND-6P
9	5.5	—	b	T	152C-W09FM	152X-W09FM-ND-6P
16	7.5	—	c	T	152C-W16FM	152X-W16FM-ND-6P
24	15	—	d	U	152C-W24FM	152X-W24FM-ND-6P
35	22	—	e	U	152C-W35FM	152X-W35FM-ND-6P
54	30	—	f	V	152C-W54FM	152X-W54FM-ND-6P
68	45	—	g	W	152C-W68FM	152X-W68FM-ND-6P
97	63	—	h	Y	152C-W97FM	152X-W97FM-ND-6P

- For combination controllers with circuit breakers, refer to Catalog Number Identification on page 23.
- Refer to page 36 for fuse clip sizing and type information.
- Fuses are not included.
- For 120V, 60 Hz separate control, add the letter "**D**" after the 9th character. For 110V, 50 Hz separate control, add the letter "**S**" after the 9th character. Example: **Cat. No. 152C-W05FH** becomes **Cat. No. 152C-W05FHD** for 120V, 60 Hz separate control.
- For 5…97 A controllers, a solid-state overload current range must be selected from the chart on page 31 and the suffix added to the Cat. No. Otherwise, an eutectic alloy overload will be provided.
- 97 A Type 4 SMC-2 Smart Motor Controllers include Bulletin 100 bypass contactors wired for 120V AC 50/60 Hz control.

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IP65 (Type 4) Combination Controllers , Continued

Current Rating (A)	kW	HP	Price Adder Code	Dimension Code	With Isolation Contactor	Without Isolation Contactor
					Cat. No.	Cat. No.
220V AC, 60 Hz						
5	—	1/3…1	a	S	152C-W05FH	152X-W05FH-ND-6P
9	—	1/3…2	b	T	152C-W09FH	152X-W09FH-ND-6P
16	—	1/3…3	c	T	152C-W16FH	152X-W16FH-ND-6P
24	—	1…5	d	U	152C-W24FH	152X-W24FH-ND-6P
35	—	1…10	e	U	152C-W35FH	152X-W35FH-ND-6P
54	—	1…15	f	V	152C-W54FH	152X-W54FH-ND-6P
68	—	1…20	g	W	152C-W68FH	152X-W68FH-ND-6P
97	—	1…30	h	Y	152C-W97FH	152X-W97FH-ND-6P
230V AC, 60 Hz						
5	—	1/3…1	a	S	152C-W05FA	152X-W05FA-ND-6P
9	—	1/3…2	b	T	152C-W09FA	152X-W09FA-ND-6P
16	—	1/3…5	c	T	152C-W16FA	152X-W16FA-ND-6P
24	—	1…7-1/2	d	U	152C-W24FA	152X-W24FA-ND-6P
35	—	1…10	e	U	152C-W35FA	152X-W35FA-ND-6P
54	—	1…20	f	V	152C-W54FA	152X-W54FA-ND-6P
68	—	1…25	g	W	152C-W68FA	152X-W68FA-ND-6P
97	—	1…30	h	Y	152C-W97FA	152X-W97FA-ND-6P
460V AC, 60 Hz						
5	—	1/3…3	a	S	152C-W05FB	152X-W05FB-ND-6P
9	—	1/3…5	b	T	152C-W09FB	152X-W09FB-ND-6P
16	—	1/3…10	c	T	152C-W16FB	152X-W16FB-ND-6P
24	—	1…15	d	U	152C-W24FB	152X-W24FB-ND-6P
35	—	1…25	e	U	152C-W35FB	152X-W35FB-ND-6P
54	—	1…40	f	V	152C-W54FB	152X-W54FB-ND-6P
68	—	1…50	g	W	152C-W68FB	152X-W68FB-ND-6P
97	—	1…75	h	Y	152C-W97FB	152X-W97FB-ND-6P
575V AC, 60 Hz						
5	—	1/3…3	a	S	152C-W05FC	152X-W05FC-ND-6P
9	—	1/3…7-1/2	b	T	152C-W09FC	152X-W09FC-ND-6P
16	—	1/3…10	c	T	152C-W16FC	152X-W16FC-ND-6P
24	—	1…20	d	U	152C-W24FC	152X-W24FC-ND-6P
35	—	1…30	e	U	152C-W35FC	152X-W35FC-ND-6P
54	—	1…50	f	V	152C-W54FC	152X-W54FC-ND-6P
68	—	1…60	g	W	152C-W68FC	152X-W68FC-ND-6P
97	—	1…75	h	Y	152C-W97FC	152X-W97FC-ND-6P

- For combination controllers with circuit breakers, refer to Catalog Number Identification on page 23.
- For 120V, 60 Hz separate control, add the letter "**D**" after the 9th character. For 110V, 50 Hz separate control, add the letter "**S**" after the 9th character. Example: **Cat. No. 152C-W05FA** becomes **Cat. No. 152C-W05FAD** for 120V, 60 Hz separate control.
- For 5…97 A controllers, a solid-state overload current range must be selected from the chart on page 31 and the suffix added to the Cat. No. Otherwise, an eutectic overload will be provided.
- 97 A Type 4 SMC-2 Smart Motor Controllers include Bulletin 100 bypass contactors wired for 120V AC 50/60 Hz control.

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IP54 (Type 12) Combination Controllers

Combination controllers can be ordered with or without the isolation contactor. A combination controller with the isolation contactor consists of a rod operated fusible disconnect , the SMC-2 Controller and a 3-pole thermal overload relay. For 5…97 A controllers, the current range of the solid-state overload relay must be selected from the chart on page 31. Otherwise, a eutectic alloy type overload relay (less elements) will be provided in place of the solid-state overload. Eutectic alloy overloads are standard on 24…97 A controllers. A combination controller without the isolation contactor consists of a rod-operated fusible disconnect, the SMC-2 Controller with an interface option, a control circuit transformer and a 3-pole thermal overload relay. Again, for 5…97 A controllers, the current range must be selected for a solid-state overload or a eutectic alloy type overload will be provided.

Current Rating (A)	kW	HP	Price Adder Code	Dimension Code	With Isolation Contactor	Without Isolation Contactor
					Cat. No.	Cat. No.
220V AC, 50 Hz						
5	1.1	—	a	S	152C-W05JA	152X-W05JA-ND-6P
9	2.2	—	b	T	152C-W09JA	152X-W09JA-ND-6P
16	4	—	c	T	152C-W16JA	152X-W16JA-ND-6P
24	5.5	—	d	U	152C-W24JA	152X-W24JA-ND-6P
35	7.5	—	e	U	152C-W35JA	152X-W35JA-ND-6P
54	15	—	f	V	152C-W54JA	152X-W54JA-ND-6P
68	18.5	—	g	W	152C-W68JA	152X-W68JA-ND-6P
97	25	—	h	Y	152C-W97JA	152X-W97JA-ND-6P
400V AC, 50 Hz						
5	2.2	—	a	S	152C-W05JI	152X-W05JI-ND-6P
9	4	—	b	T	152C-W09JI	152X-W09JI-ND-6P
16	7.5	—	c	T	152C-W16JI	152X-W16JI-ND-6P
24	11	—	d	U	152C-W24JI	152X-W24JI-ND-6P
35	22	—	e	U	152C-W35JI	152X-W35JI-ND-6P
54	30	—	f	V	152C-W54JI	152X-W54JI-ND-6P
68	37	—	g	W	152C-W68JI	152X-W68JI-ND-6P
97	55	—	h	Y	152C-W97JI	152X-W97JI-ND-6P
500V AC, 50 Hz						
5	3	—	a	S	152C-W05JM	152X-W05JM-ND-6P
9	5.5	—	b	T	152C-W09JM	152X-W09JM-ND-6P
16	7.5	—	c	T	152C-W16JM	152X-W16JM-ND-6P
24	15	—	d	U	152C-W24JM	152X-W24JM-ND-6P
35	22	—	e	U	152C-W35JM	152X-W35JM-ND-6P
54	30	—	f	V	152C-W54JM	152X-W54JM-ND-6P
68	45	—	g	W	152C-W68JM	152X-W68JM-ND-6P
97	63	—	h	Y	152C-W97JM	152X-W97JM-ND-6P

- For combination controllers with circuit breakers, refer to Catalog Number Identification on page 23.
- Refer to page 36 for fuse clip sizing and type information.
- Fuses are not included.
- For 120V, 60 Hz separate control, add the letter "**D**" after the 9th character. For 110V, 50 Hz separate control, add the letter "**S**" after the 9th character. Example: **Cat. No. 152C-W05FH** becomes **Cat. No. 152C-W05FHD** for 120V, 60 Hz separate control.
- For 5…97 A controllers, a solid-state overload current range must be selected from the chart on page 31 and the suffix added to the Cat. No. Otherwise, an eutectic alloy overload will be provided.
- 97 A Type 12 SMC-2 Smart Motor Controllers include Bulletin 100 bypass contactors wired for 120V AC 50/60 Hz control.

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IP54 (Type 12) Combination Controllers , Continued

Current Rating (A)	kW	HP	Price Adder Code	Dimension Code	With Isolation Contactor	Without Isolation Contactor
					Cat. No.	Cat. No.
200V AC, 60 Hz						
5	—	1/3…1	a	S	152C-W05JH	152X-W05JH-ND-6P
9	—	1/3…2	b	T	152C-W09JH	152X-W09JH-ND-6P
16	—	1/3…3	c	T	152C-W16JH	152X-W16JH-ND-6P
24	—	1…5	d	U	152C-W24JH	152X-W24JH-ND-6P
35	—	1…10	e	U	152C-W35JH	152X-W35JH-ND-6P
54	—	1…15	f	V	152C-W54JH	152X-W54JH-ND-6P
68	—	1…20	g	W	152C-W68JH	152X-W68JH-ND-6P
97	—	1…30	h	Y	152C-W97JH	152X-W97JH-ND-6P
230V AC, 60 Hz						
5	—	1/3…1	a	S	152C-W05JA	152X-W05JA-ND-6P
9	—	1/3…2	b	T	152C-W09JA	152X-W09JA-ND-6P
16	—	1/3…5	c	T	152C-W16JA	152X-W16JA-ND-6P
24	—	1…7-1/2	d	U	152C-W24JA	152X-W24JA-ND-6P
35	—	1…10	e	U	152C-W35JA	152X-W35JA-ND-6P
54	—	1…20	f	V	152C-W54JA	152X-W54JA-ND-6P
68	—	1…25	g	W	152C-W68JA	152X-W68JA-ND-6P
97	—	1…30	h	Y	152C-W97JA	152X-W97JA-ND-6P
460V AC, 60 Hz						
5	—	1/3…3	a	S	152C-W05JB	152X-W05JB-ND-6P
9	—	1/3…5	b	T	152C-W09JB	152X-W09JB-ND-6P
16	—	1/3…10	c	T	152C-W16JB	152X-W16JB-ND-6P
24	—	1…15	d	U	152C-W24JB	152X-W24JB-ND-6P
35	—	1…25	e	U	152C-W35JB	152X-W35JB-ND-6P
54	—	1…40	f	V	152C-W54JB	152X-W54JB-ND-6P
68	—	1…50	g	W	152C-W68JB	152X-W68JB-ND-6P
97	—	1…75	h	Y	152C-W97JB	152X-W97JB-ND-6P
575V AC, 60 Hz						
5	—	1/3…3	a	S	152C-W05JC	152X-W05JC-ND-6P
9	—	1/3…7-1/2	b	T	152C-W09JC	152X-W09JC-ND-6P
16	—	1/3…10	c	T	152C-W16JC	152X-W16JC-ND-6P
24	—	1…20	d	U	152C-W24JC	152X-W24JC-ND-6P
35	—	1…30	e	U	152C-W35JC	152X-W35JC-ND-6P
54	—	1…50	f	V	152C-W54JC	152X-W54JC-ND-6P
68	—	1…60	g	W	152C-W68JC	152X-W68JC-ND-6P
97	—	1…75	h	Y	152C-W97JC	152X-W97JC-ND-6P

- For combination controllers with circuit breakers, refer to catalog number identification on page 23.
- For 120V, 60 Hz separate control, add the letter "**D**" after the 9th character. For 110V, 50 Hz separate control, add the letter "**S**" after the 9th character. Example: **Cat. No. 152C-W05FH** becomes **Cat. No. 152C-W05FHD** for 120V, 60 Hz separate control.
- For 5…97 A controllers, a solid-state overload current range must be selected from the chart on page 31 and the suffix added to the Cat. No. Otherwise, an eutectic alloy overload will be provided.
- 97 A Type 4 SMC-2 Smart Motor Controllers include Bulletin 100 bypass contactors wired for 120V AC 50/60 Hz control.

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Protective Module for 5…16 A



Protective Module for 24…97 A

Protective Module

The Protective Module mounts on the line or load side of the SMC-2 Controller. When the solid-state overload is used on a 5…16 A device, **the Protective Module will mount only on the line side**.

SMC-2 Current Rating (A)	Field Modification Cat. No.	Factory Modification Suffix Number Line or Load Side [1]	Factory Modification Suffix Number Both Line and Load
200…240V AC, 50/60 Hz			
5…16	150-N82T	-8L2	-8B2
24…54	150-N82P	-8L2	-8B2
68	150-N82P6	-8L2	-8B2
97	150-N82P9	-8L2	-8B2
380…480V AC, 50/60 Hz			
5…16	150-N84T	-8L4	-8B4
24…54	150-N84P	-8L4	-8B4
68	150-N84P6	-8L4	-8B4
97	150-N84P9	-8L4	-8B4
500…600V AC, 50/60 Hz			
5…16	150-N86T	-8L6	-8B6
24…54	150-N86P	-8L6	-8B6
68	150-N86P6	-8L6	-8B6
97	150-N86P9	-8L6	-8B6

[1] One Protective Module is provided, which will mount on either the line side or the load side. If a solid-state overload relay is used, the Protective Module mounts on the line side only.

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Interface Option for Soft Stop and Auxiliary Contact

The interface option provides ON/OFF control through an external device, a selectable auxiliary contact and the soft stop feature. The interface option for the 24…97 A controller is a Printed Circuit Board (PCB) that replaces the existing board.

	SMC-2 Current Rating (A)	Control Voltage	Line Voltage	Field Installed Cat. No.	Factory Installed Suffix Code
 *Interface Module for 5...16 A*	5…16	120V (+10%, –15%)	200…600V	150-ND	-ND
		240V (+10%, –15%)	200…600V	150-NA	-NA
	24…97	120V (+10%, –15%)	240V 480V 600V	150-N2D 150-N4D 150-N6D	-ND
		240V (+10%, –15%)	240V 480V 600V	150-N2A 150-N4A 150-N6A	-NA

Overloads

Solid-State Overload Relay

Current Rating (A)	Suffix	Current Rating (A)	Suffix
0.32…1.0	-C1	12…38	-H2
1.0…2.9	-D1	14…45	-J2
1.6…5.0	-E1	23…75	-K3
3.7…12	-F1	66…110	-L4
12…32	-H1		

Solid-State overload relays are rated for Class 10 operation only. If an overload is selected for the SMC-2 Controller, the current range must be indicated and the suffix added to the Cat. No. (for 5…16 A open type controller and 5…97 A non-combination and combination controllers).

NEMA Overload Relay

The eutectic alloy overload relay is not available on the 5…16 A non-combination or open type SMC-2 Controllers, found on pages 24 and 25. To add a eutectic alloy overload relay to a combination controller, consult Allen-Bradley Sales Office.

External Overload Relay Reset

Add the suffix "**-7**" to any enclosed SMC-2 Controller (NEMA Type 4 and 12 non-combination or combination controller) containing an overload relay.

- When Soft Stop is used without an isolation contactor, and the overload trips, the SMC-2 Controller will Soft Stop, not coast-to-stop.
- Field Kit consists of a new control board for unit.
- Overload relay option for 5…16 A open type and non-combination controllers 5…97 A. Overload provided as standard for combination units and at no additional cost.

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Option	Description	Price Adder Code	Cat. No. Modification
Push Buttons	Start-Stop Push Button	a...h	-1
	Start-Stop Push Button with H-O-A Selector Switch		-1F
	Soft Stop Push Button		-1XA
	Emergency Stop		-1E
Selector Switch	Hand-Off-Auto Selector Switch	a...h	-3
	SMC-Off-Bypass Selector Switch		-3B
	Forward-Off-Reverse Selector Switch		-3R
Pilot Light	Transformer Pilot Light	a...h	-4_
	Push-to-Test Pilot Light		-5_
Control Circuit Transformer	Control Circuit Transformer (fused primary and secondary)	a...h	-6P
	Additional 100 VA Control Circuit Transformer (fused primary and		-6PX
Protective Module	5…16 A, 200…240V Line or Load Side Protective Module	a...c	-8L2
	24…54 A, 200…240V Line or Load Side Protective Module	d...f	
	68 A, 200…240V Line or Load Side Protective Module	g	
	97 A, 200…240V Line or Load Side Protective Module	h	
	5…16 A, 380…480V Line or Load Side Protective Module	a...c	-8L4
	24…54 A, 380…480V Line or Load Side Protective Module	d...f	
	68 A, 380…480V Line or Load Side Protective Module	g	
	97 A, 380…480V Line or Load Side Protective Module	h	
	5…16 A, 500…600V Line or Load Side Protective Module	a...c	-8L6
	24…54 A, 500…600V Line or Load Side Protective Module	d...f	
	68 A, 500…600V Line or Load Side Protective Module	g	
	97 A, 500…600V Line or Load Side Protective Module	h	
	5…16 A, 200…240V Both Line and Load Side Protective Module	a...c	-8B2
	24…54 A, 200…240V Both Line and Load Side Protective Module	d...f	
	68 A, 200…240V Both Line and Load Side Protective Module	g	
	97 A, 200…240V Both Line and Load Side Protective Module	h	
	5…16 A, 380…480V Both Line and Load Side Protective Module	a...c	-8B4
	24…54 A, 380…480V Both Line and Load Side Protective Module	d...f	
	68 A, 380…480V Both Line and Load Side Protective Module	g	
	97 A, 380…480V Both Line and Load Side Protective Module	h	
	5…16 A, 500…600V Both Line and Load Side Protective Module	a...c	-8B6
	24…54 A, 500…600V Both Line and Load Side Protective Module	d...f	
	68 A, 500…600V Both Line and Load Side Protective Module	g	
	97 A, 500…600V Both Line and Load Side Protective Module	h	
Solid State Overload Relay	**Current Rating (A)**		
	0.32…1.0		-C1
	1.0…2.9		-D1
	1.6…5.0		-E1
	3.7…12		-F1
	12…32		-H1
	12…38		-H2
	14…45		-J2
	23…75		-K3
	66…110		-L4
Eutectic Alloy Overload Relay	Three-pole thermal overload for 24 A units	d	-OL
	Three-pole thermal overload for 35 A units	e	
	Three-pole thermal overload for 54 A units	f	
	Three-pole thermal overload for 68 A units	g	
	Three-pole thermal overload for 97 A units	h	

- Requires the Interface option to provide the Soft Stop feature. For example: **Cat. No. 152X-W24JB-ND-6P-1-1XA**.
- Specify the pilot light lens color. Options: **A**mber, **B**lue, **C**lear, **G**reen, **R**ed, and **W**hite. For example: -4R for a red lens.
- When an IEC overload is selected, protective modules are limited to line side only. (For 5…16 A controllers only.)
- Solid-State Overload Relay will have a manual reset and Class 10 trip class.
- Three-pole thermal overload for Bulletin 150 enclosed controllers only. Overload standard on Bulletins 152 and 153. (For 24…97 A controllers only.)
- Three-pole thermal overload does not include heater elements.

Option	Description	Price Adder Code	Cat. No. Modification
External Overload	External Overload Relay Reset	a...h	-7
Overload Auxiliary Contact	N.O. Overload Relay Auxiliary Contact	a...h	-9
	N.C. Overload Relay Auxiliary Contact		-9A
Reversing Contactor	Reversing Contactor	a…c d…h	
IEC Bypass Contactor	IEC Bypass for 5 A unit	a	-IB
	IEC Bypass for 9 A unit	b	
	IEC Bypass for 16 A unit	c	
	IEC Bypass for 24 A unit	d	
	IEC Bypass for 35 A unit	e	
	IEC Bypass for 54 A unit	f	
	IEC Bypass for 68 A unit	g	
NEMA Bypass Contactor	NEMA Bypass for 5 A unit	a	-NB
	NEMA Bypass for 9 A unit	b	
	NEMA Bypass for 16 A unit	c	
	NEMA Bypass for 24 A unit	d	
	NEMA Bypass for 35 A unit	e	
	NEMA Bypass for 54 A unit	f	
	NEMA Bypass for 68 A unit	g	
	NEMA Bypass for 97 A unit	h	
NEMA Isolation Contactor	NEMA Isolation for 5 A unit	a	-NI
	NEMA Isolation for 9 A unit	b	
	NEMA Isolation for 16 A unit	c	
	NEMA Isolation for 24 A unit	d	
	NEMA Isolation for 35 A unit	e	
	NEMA Isolation for 54 A unit	f	
	NEMA Isolation for 68 A unit	g	
	NEMA Isolation for 97 A unit	h	
Power Factor Correction Capacitors	2 kVAR		-PFCC
	2.5 kVAR		
	3 kVAR		
	4 kVAR		
	5 kVAR		
	6 kVAR		
	7 kVAR		
	7.5 kVAR		
	8 kVAR		
	9 kVAR		
	10 kVAR		
	11 kVAR		
	12.5 kVAR		
	14 kVAR		
	15 kVAR		
	16 kVAR		
Power Factor Correction Contactor	Power Factor Correction Capacitor Contactor	a…d	-PFCCC
		e…f	
		g	
		h	

- External Overload Relay Reset is available with Bulletins 152, 153, and enclosed Bulletin 150 devices with overload option only.
- To order a non-combination or combination enclosed controller with a reversing contactor, add an “R” to the bulletin prefix. Example: **Cat. No. 150R-A97JB**. See pages 22…23. Bulletin 104 contactor will be used. Enclosure dimensions are subject to change. Consult factory for dimensions.
- IEC Bypass Contactor is provided as standard for the 97 A unit with a non-combination or combination enclosure.
- Power Factor Correction Capacitor to include Power Capacitors with 3-phase Class J Time-Delay Fusing and appropriately-sized contactor.
- To order Power Factor Correction Capacitors indicate kVAR rating. For example: -**PFCC16kVAR**.
- Only the contactor will be provided.

Option	Description	Price Adder Code	Cat. No. Modification
SCR Fusing	Fast acting current limiting SCR fusing for 5 A unit	a	-SCR
	Fast acting current limiting SCR fusing for 9 A unit	b	
	Fast acting current limiting SCR fusing for 16 A unit	c	
	Fast acting current limiting SCR fusing for 24 A units	d	
	Fast acting current limiting SCR fusing for 35 A unit	e	
	Fast acting current limiting SCR fusing for 54 A unit	f	
	Fast acting current limiting SCR fusing for 68 A unit	g	
	Fast acting current limiting SCR fusing for 97 A unit	h	
Panel Board Type Ammeter	Single-phase panel board type ammeter for 5…24 A units	a…d	-85AA
	Single-phase panel board type ammeter for 35…97 A units	e...h	
	Panel board type ammeter with switch for monitoring all three phases	a...h	-86AA
Panel Board Type Voltmeter	Single-phase panel board type voltmeter	a...h	-85VA
	Panel board type voltmeter with switch for monitoring all three phases.		-86VA
Elapsed Time Meter	Elapsed time meter	a...h	-85T
Control Relays	On-Delay	a...h	-89FOD
	Off-Delay		-89FOFD
Unwired Control Relays	Bulletin 700CF 4-pole relay – 2 N.O. and 2 N.C.	a...h	-89F22
	Bulletin 700CF 4-pole relay – 3 N.O. and 1 N.C.		-89F31
	Bulletin 700CF 4-pole relay – 4 N.O.		-89F40
Auxiliary Contacts	N.C. auxiliary contacts for 5…97 A units	a…h	-90
	N.O. auxiliary contacts for 5…97 A units		-91
	1 N.O.…1 N.C. auxiliary contacts for 5...97 A units		-901
Disconnect Auxiliary	N.O. disconnect auxiliary mounted on operating mechanism	a...h	-98
	N.C. disconnect auxiliary mounted on operating mechanism		-99
Circuit Breaker Disconnect Auxiliary	Internal N.O. circuit breaker auxiliary	a...h	-98X
	Internal N.C. circuit breaker auxiliary		-99X
Circuit Breaker Disconnect	Circuit Breaker Disconnect	a…c d…f g h	
High Interrupting Circuit Breaker	High Interrupting Circuit Breaker for 5...16 A units	a…c	-HICB
	High Interrupting Circuit Breaker for 24...54 A units	d…f	
	High Interrupting Circuit Breaker for 68A unit	g	
	High Interrupting Circuit Breaker for 97 A unit	h	
Shunt Trip	Circuit Breaker Shunt Trip for 5...16 A units	a…c	-754
	Circuit Breaker Shunt Trip for 24...54 A units	d…f	
	Circuit Breaker Shunt Trip for 68...97 A units	g…h	
Additional Load Circuit Breakers	Additional load circuit breakers to be installed in panel. Customer is to stipulate size and quantity.		-ALCB
Line Voltage Monitor	Bulletin 813S Line Voltage Monitor	a…h	-813S
Smart Motor Manager	Bulletin 825 Smart Motor Manager and Bulletin 825 Converter Module	a...h	-SMM

Instantaneous auxiliary contacts on Bulletin 700F Relays are non-convertible.
To order a combination enclosed controller with a Circuit Breaker Disconnect, change the bulletin prefix from “152” to “153”. See page 23. Enclosure dimensions are subject to change. Consult factory for dimensions.
Pricing to be determined upon request.

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Option	Description	Price Adder Code	Cat. No. Modification
IQ1000 Protective Relay	Cutler-Hammer IQ1000 Protective Relay	a…h	-IQ1000
Multilin 269 Plus	GE Multilin 269 Plus Protective Relay	a...h	-269Plus
Thermistor Protection Relay	Bulletin 817 Thermistor Protection Relay	a...h	-817
Transducer Output	4-20 mA output signal proportional to 1-100% motor FLC	a...h	-TO
Ground Fault Protection	Bulletin 1409 Arcing Ground Fault Relay and Sensor for applications up to 75 HP	a...h	-GFP
Motor Winding Heater	Bulletin 1410 Motor Winding Heater for applications up to 75 HP	a...h	-MWH
Lightning Arrestor	Lightning Surge Protection	a...h	-LA
Strip Heater	Cabinet Strip Heater with Thermostat	a...h	-SH
Service Entrance Label	Service Entrance Label	a...h	-SEL
U.L. Label	U.L. Label	a...h	-UL
Unwired Terminal Blocks	Panel-mounted unwired terminal blocks 6 or 12 position	a...h	-TB6 -TB12
Panel Mount	Components mounted on enclosure mounting plate only	a...h	-PM
Specified Panel Dimensions	Customer is to stipulate panel dimensions	a...h	-SPD
Enclosure Color (custom paint)	Customer is to stipulate paint color for enclosure	a...h	-EC
Enclosure Shock Mounts	Ship Board – MIL-S-901D Shock and Vibration Mountings	a...h	-SM
Enclosure Type NEMA 3R	Enclosure Type NEMA 3R Non-Combination	a…d e…g h	—
Enclosure Type NEMA 3R	Enclosure Type NEMA 3R Combination	a…d e…g h	—
Enclosure Type NEMA 4X Stainless Steel	Enclosure Type NEMA 4X Stainless Steel Non-Combination	a…b c d…f g…h	—
Enclosure Type NEMA 4X Stainless Steel	Enclosure Type NEMA 4X Stainless Steel Combination	a…c d…f g…h	—
Air Conditioning	AC Unit mounted on enclosure	a...h	-AC
Wiring Diagrams	AutoCad Drawing of panel wiring	a...h	-WD
Print Approval	Customer Requested Print Approval Drawings	a...h	-PA

 Requires an isolation contactor on the output of the SMC.
 Pricing to be determined upon request.
 To order a non-combination or combination enclosed controller with a NEMA 3R enclosure, add an “H” to the enclosure type prefix. Example: **Cat. No. 150-A68HB**. See pages 22…23. Enclosure dimensions are subject to change. Consult factory for dimensions. Enclosure price adder is to be added to NEMA 12 non-combination or combination price.
 To order a non-combination or combination enclosed controller with a NEMA 4X stainless steel enclosure, add an “S” to the enclosure type prefix. Example: **Cat. No 152X-A16SB-ND**. See pages 22…23. Enclosure dimensions are subject to change. Consult factory for dimensions. Enclosure price adder is to be added to the NEMA 12 non-combination or combination price.
 Order to be released to manufacturing upon return of signed print approval drawings.

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Electrical Ratings		Cat. No. 150-A05…	150-A09…	150-A16…	150-A24…	150-A35…	150-A54…	150-A68…	150-A97…
Rated Operating Current (A)		5	9	16	24	35	54	68	97
Maximum Heat Dissipation (Watts)		32	45	70	80	120	170	215	285
Cable Size	Power Terminals	1.5…6 mm^2	1.5…6 mm^2	1.5…6 mm^2	10 mm^2	10 mm^2	10 mm^2	25 mm^2	50 mm^2
	Interface Option Terminals	#14…#12 AWG	#14…#12 AWG	#14…#12 AWG	#8 AWG	#8 AWG	#4 AWG	#2 AWG	#1/0 AWG
Rated Operational Voltage (+10%, –15%)		200…240, 380…480, 500…600V AC, 50/60 Hz, 3-phase							
Thermal Capacity		IEC 34 (S1), NEMA MG1							
Interface Option Voltage (+10%, –15%)		100/120V or 200/240V, 50/60 Hz, 1-phase							
	Power Requirements	15 VA Maximum							
	Heatsink Fan	—	—	—	—	—	—	—	45 VA
Auxiliary Contact Rating		NEMA C300				IEC AC-15			

Electrical Design Specifications/Test Requirements	
Repetitive Peak Inverse Voltage Rating	1200V up to 240V Line, 1400V up to 480V Line, 1600V up to 600V Line
Selectable Soft Start Times	2, 5, 10, 20, 25, & 30 seconds
Current Limit Times	15 & 30 seconds
Selectable Across-the-Line Starting	1/10 second
Soft Stop Times	5, 10, 15, 25, 35, 45, 55, 110 seconds
Noise & RF Immunity	Surge Transient Peak 3400V. Showering Arc 1500V
DV/DT Protection	RC Snubber Network
Transient Protection (Optional)	Metal Oxide Varistors: (80 joules)

Mechanical Design Specifications/Test Requirements		
Vibration		2.5 G for 60 minutes
Shock		30 G for 11 mSecs
Construction	Power Poles:	High temperature thermoplastic moldings
	Control:	Thermoplastic moldings
	Metal Parts:	Anodized aluminum, plated brass, or copper
Terminals	Power Terminals:	6.0 mm hole with clamping plate
	Control Terminals:	UNC 6-32 Screw with self-tilting clamp plate
	Power Terminal Markings:	CENELEC EN50 012, NEMA

Functional Design Specifications			
Standard Features	Set-up	Wiring	The SMC-2 Controller without options is wired in series with a motor starter.
		Adjustments	The SMC-2 Controller is configured with DIP switches and a rotary digital switch.
	Starting	3 Modes	Soft Start, Current Limit, Full Voltage in one unit.
		Protection	The controller has pre-start protection from phase loss and shorted SCRs. An LED is provided to indicate the status of the unit. The LED is ON when 3-phase power is applied. A flashing LED indicates one of 3 conditions: shorted SCR or phase loss during start, or a stalled motor during run.
	Running	Protection	Stall protection available during starting and run condition for additional motor protection.
		Energy Level	Built-in energy saver available for low load conditions.
Optional Interface Features	Set-up	Wiring	2- and 3-wire control for wider variety of applications. Interface option requires no additional space and can be factory or field installed.
	Starting	Auxiliary Contact	Selectable auxiliary contact available for either up-to-speed or instantaneous operation.
	Stopping		Module allows for soft stopping to minimize load shifting. Also adjusted from standard DIP switches.

Environmental		
Temperature	Operating	0 C…+50 C (32 F…+122 F)
	Storage	-40 C…+85 C (-40 F…+185 F)
Altitude		2000 meters (6560 feet)
Humidity		5…95% Relative Humidity (non-condensing)

Fuse Clip Sizing and Type for Fusible Combination Controllers

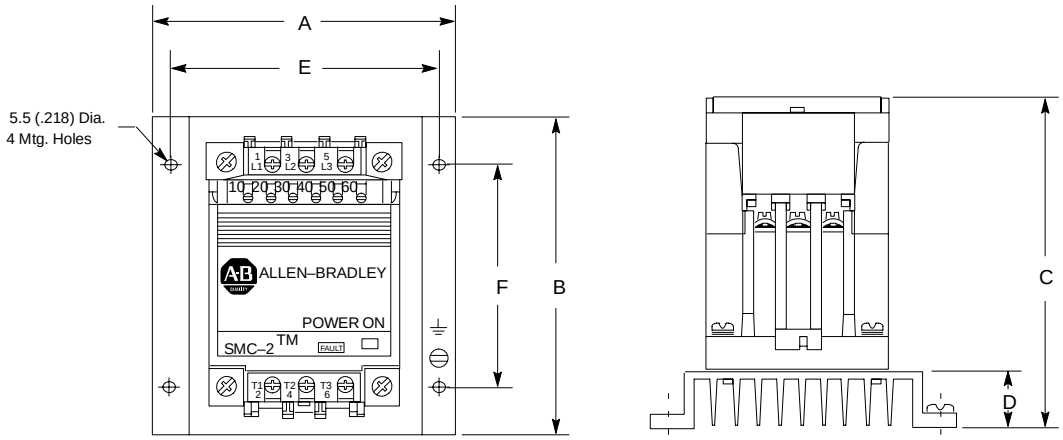
Horsepower @ 480V	Fuse Clip Size/Type	Fuse Size Range
15	30 A/Class J	0…30
20	60 A/Class J	31…60
25	60 A/Class J	31…60
30	60 A/Class J	31…60
40	100 A/Class J	61…100
50	100 A/Class J	61…100
60	200 A/Class J	101…200
75	200 A/Class J	101…200

Consult NEC Handbook for proper fuse sizing guidelines.
Optional fuse clip sizes and types are available upon request. Consult Allen-Bradley Sales Office.

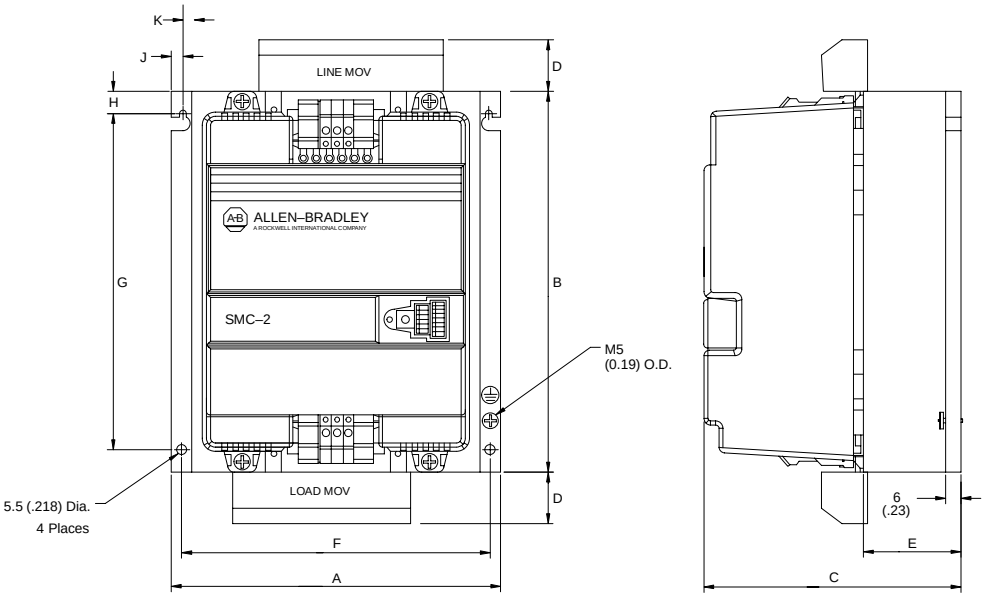
Product Selection — Page 24

Open Type

Dimensions are shown in millimeters (inches). Dimensions are not intended to be used for manufacturing purposes.



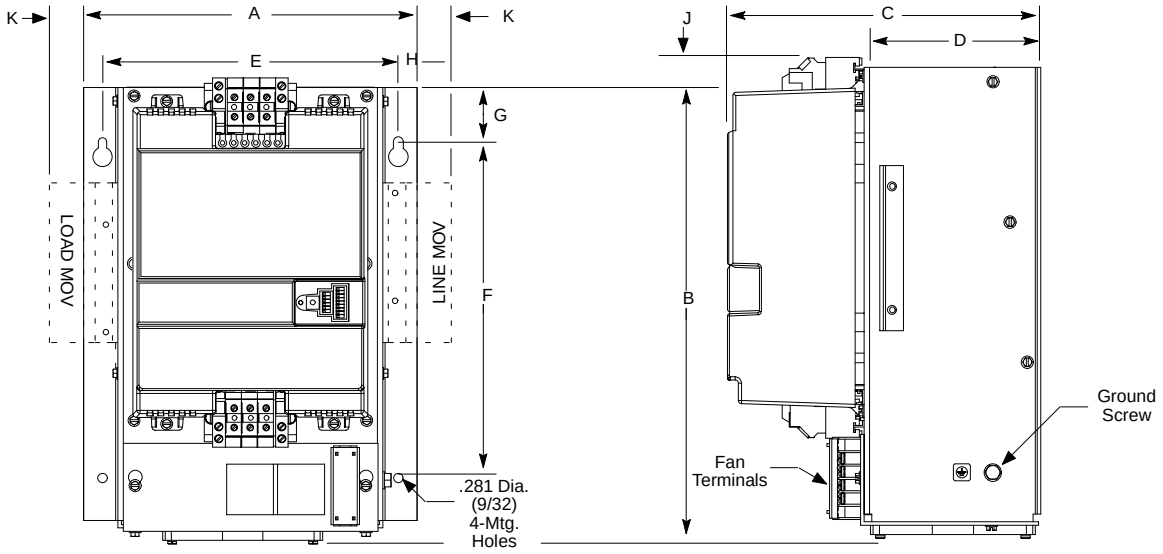
Controller	Unit	A Width	B Height	C Depth	D	E	F	Approx. Ship. Wt.
5 A	Millimeter (Inch)	122 (4-13/16)	127 (5)	134 (5-9/32)	24 (61/64)	110 (4-11/32)	90 (3-35/64)	2 kg 4.5 lbs.
9 A	Millimeter (Inch)	122 (4-13/16)	180 (7-3/32)	134 (5-9/32)	24 (61/64)	110 (4-11/32)	140 (5-33/64)	2.25 kg 5 lbs.
16 A	Millimeter (Inch)	154 (6-5/64)	180 (7-3/32)	160 (6-5/16)	50 (1-31/32)	140 (5-33/64)	140 (5-33/64)	3.15 kg 7 lbs.



Controller	Unit	A Width	B Height	C Depth	D	E	F	G	H	J	K	Approx. Ship. Wt.
24…35 A	mm (inch)	214 (8-27/64)	250 (9-27/32)	160 (6-19/64)	34 (1-11/32)	60 (2-23/64)	200 (7-7/8)	220 (8-21/32)	15 (19/32)	7 (17/64)	8 (21/64)	4.5 kg 10 lbs
54 A…68 A	mm (inch)	244 (9-39/64)	290 (11-27/64)	190 (7-31/64)	34 (1-11/32)	90 (3-35/64)	230 (9-1/16)	250 (9-27/32)	20 (51/64)	7 (17/64)	8 (21/64)	6.8 kg 15 lbs

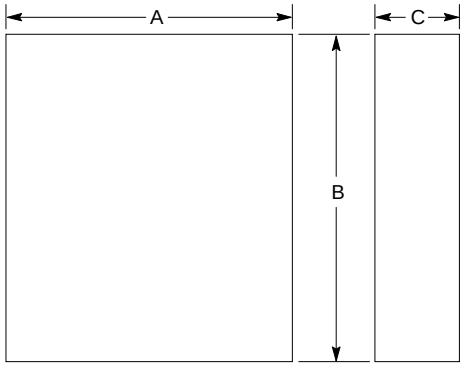
Open Type, Continued

Dimensions are shown in millimeters (inches). Dimensions are not intended to be used for manufacturing purposes.



Controller	Unit	A Width	B Height	C Depth	D	E	F	G	H	J	K	Approx. Ship. Wt.
97 A	mm (inch)	248 (9-25/32)	336 (13-15/64)	230 (9-3/64)	128 (5-3/64)	220 (8-43/64)	250 (9-55/64)	40 (1-5/8)	14 (35/64)	9.5 (3/8)	25.4 (1)	10.5 kg 23 lbs

Enclosed Type



Dimension Code	Unit	Non-Combination Controllers			Combination Controllers with Fusible Disconnect		
		A Width	B Height	C Depth	A Width	B Height	C Depth
S	Millimeter (Inch)	154 (6-5/64)	290 (11-27/64)	140 (5-33/64)	400 (16)	350 (14)	210 (8)
T	Millimeter (Inch)	154 (6-5/64)	290 (11-27/64)	171 (6-47/64)	406 (16)	610 (24)	230 (9)
U	Millimeter (Inch)	244 (9-39/64)	410 (16-9/64)	218 (8-37/64)	610 (24)	762 (30)	276 (12)
V	Millimeter (Inch)	244 (9-39/64)	410 (16-9/64)	218 (8-37/64)	610 (24)	762 (30)	276 (12)
W	Millimeter (Inch)	244 (9-39/64)	410 (16-9/64)	218 (8-37/64)	762 (30)	965 (38)	302 (14)
X	Millimeter (Inch)	610 (24)	762 (30)	276 (12)	—	—	—
Y	Millimeter (Inch)	—	—	—	914 (36)	1295 (51)	356 (14)

Any option(s) added to enclosed controllers may change size of enclosure.



Cat. No. 150-A360NBD *Cat. No. 150-A24NBD* *Cat. No. 150-A97NBD*

Bulletin 150

- **SMC PLUS Smart Motor Controller**
  - **24…1000 A Ratings**
  - **3 Start Modes**
  - **Options Include:**
    - **Pump Control**
    - **SMB Smart Motor Braking**
    - **Slow Speed with Braking**
    - **Accu-Stop**
    - **Preset Slow Speed**
    - **Soft Stop**

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Description

The SMC PLUS Solid-State Motor Controller provides microcomputer controlled starting for standard three-phase squirrel-cage induction motors. Three standard modes of operation are available within a single controller:

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

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

Energy Saver
This is a standard feature with the SMC 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**. And, it does not require a complicated setup procedure.

For prices, consult your local Allen-Bradley Sales Office or the Master Price List.

Approvals:

CE Marked (Open Type) Per Low Voltage Directive 73/23/EEC, 93/68/EEC

CSA Certified (Open Type) (File No. LR1234)

UL Listed (Open Type) (File No. E96956)

Optional SMC Easy Ship Program

- Non-Combination Controllers — Cat. Nos. printed in blue will ship in two working days.
- Combination Controllers — Cat. Nos. printed in blue will ship in four working days.
- Contact your distributor for availability.
- Orders for multiple quantities may increase lead time.

Your order must include:

- Cat. No. of the controller selected.
- Modifications.
- If required, Cat. No. of any options or accessories.

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