



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

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

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

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

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

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4

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

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

Standards Compliance

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

Certifications

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

Modes of Operation

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

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

Description of Features

Electronic Motor Overload Protection

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

Note: Trip rating is 120% of dial setting.

Over-temperature

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

Phase Reversal Protection

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

Phase Loss/Open Load

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

Phase Imbalance

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

Shorted SCR

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

Push to Test

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

LED Description (Number of Flashes)

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



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 | |
|-------------------------------|----------------------------------|
| Code | Description |
| 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 |

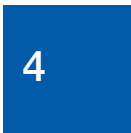
f

| 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 |

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.

f

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

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

| Rated Voltage [V AC] | Motor Current [A]* | Max. kW, 50 Hz | Max. Hp, 60 Hz | Control Power | Open Type — Line-Connected Motors | IP65 (Type 4/12) Enclosed Non-Combination Controllers§ |
|-------------------------|-----------------------|-------------------|-------------------------|-------------------------|--------------------------------------|---|
| | | | | | Cat. No. | Cat. No. |
| 200/208 | 1...3 | — | 0.5 | 100...240V AC, 50/60 Hz | 150-C3NBD | 150-C3FHD |
| | | — | | 24V AC/DC | 150-C3NBR | — |
| | 3...9 | — | 0.75...2 | 100...240V AC, 50/60 Hz | 150-C9NBD | 150-C9FHD |
| | | — | | 24V AC/DC | 150-C9NBR | — |
| | 5.3...16 | — | 1.5...3 | 100...240V AC, 50/60 Hz | 150-C16NBD | 150-C16FHD |
| | | — | | 24V AC/DC | 150-C16NBR | — |
| | 6.3...19 | — | 1.5...3 | 100...240V AC, 50/60 Hz | 150-C19NBD | 150-C25FHD |
| | | — | | 24V AC/DC | 150-C19NBR | — |
| | 9.2...25 | — | 3...7.5 | 100...240V AC, 50/60 Hz | 150-C25NBD | 150-C25FHD |
| | | — | | 24V AC/DC | 150-C25NBR | — |
| | 10...30 | — | 3...7.5 | 100...240V AC, 50/60 Hz | 150-C30NBD | 150-C30FHD |
| | | — | | 24V AC/DC | 150-C30NBR | — |
| | 12.3...37 | — | 5...10 | 100...240V AC, 50/60 Hz | 150-C37NBD | 150-C37FHD |
| | | — | | 24V AC/DC | 150-C37NBR | — |
| | 14.3...43 | — | 5...10 | 100...240V AC, 50/60 Hz | 150-C43NBD | 150-C43FHD |
| | | — | | 24V AC/DC | 150-C43NBR | — |
| | 20...60 | — | 7.5...15 | 100...240V AC, 50/60 Hz | 150-C60NBD | 150-C60FHD |
| | | — | | 24V AC/DC | 150-C60NBR | — |
| | 28.3...85 | — | 10...25 | 100...240V AC, 50/60 Hz | 150-C85NBD | 150-C85FHD |
| | | — | | 24V AC/DC | 150-C85NBR | — |
| 27...108 | — | 20...30 | 100...240V AC, 50/60 Hz | 150-C108NBD | 150-C108FHD | |
| | — | | 24V AC/DC♣ | 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.

Bulletin 150
SMC™-3 Smart Motor Controllers
 Modifications/Accessories


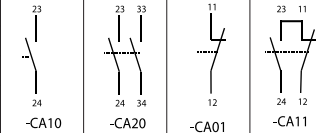
Enclosed Options

| 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 | | |


4

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 |  | 150-CA10 |
| | 2 | 0 | | 150-CA20 |
| | 0 | 1 | | 150-CA01 |
| | 1 | 1 | | 150-CA11 (Form C) |

Fans


| Description | Optional | For Use With | Pkg. Qty. | Cat. No. |
|---|-------------|--------------------|-----------|---------------------|
|  Fan Field installed | Replacement | 150-C3...37 | 1 | 150-CF64 |
| | | 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

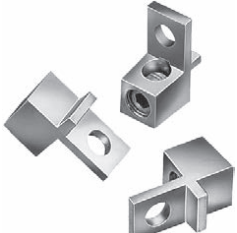
Protective modules must not be placed on the load side of a device when using an inside-the-delta connection.

| 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 mm ² ...120 mm ² | 3 | 3 | 3 | 199-LF1 |
| | 201...251♣ | | 6 | 6 | | |
| | 317...480♣ | #4...500 MCM AWG 25 mm ² ...240 mm ² | 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 Transparent Cover To be used with marking tag sheets | 150-C, 150-D | 10 | 100-FMP |
| | 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

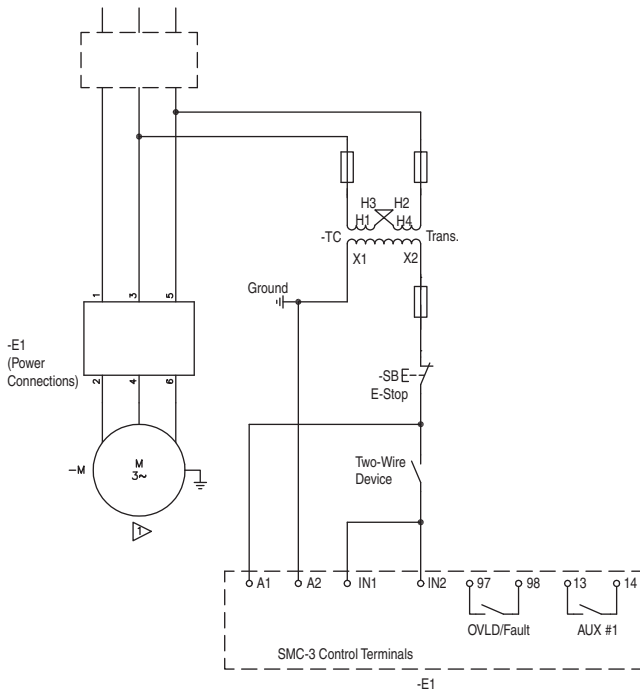
| Voltage | 24 | 48 | 110 | 115 | 120 | 220 | 240 |
|---------|-----|-----|-----|-----|-----|-----|-----|
| 50 Hz | J | — | D | — | — | A | — |
| 60 Hz | J | — | — | — | D | — | A |
| DC | Z24 | Z48 | — | Z01 | — | — | — |

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

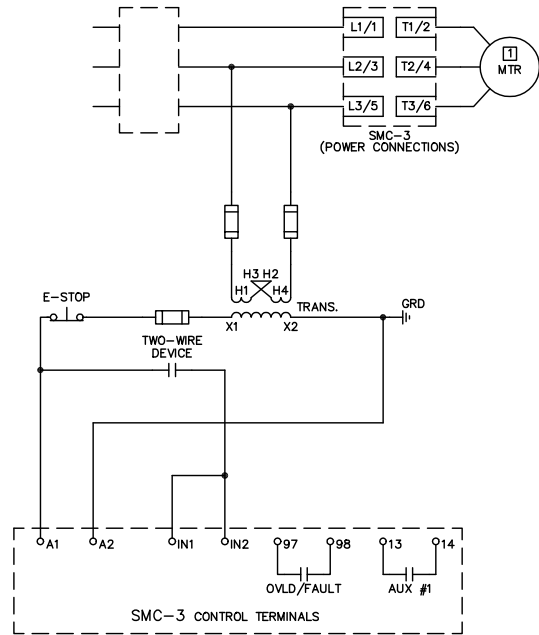
Available Coil Voltages 12...600V 50 Hz/12...600V 60 Hz

Standard Coil Voltages

Two-Wire Configuration
 IEC

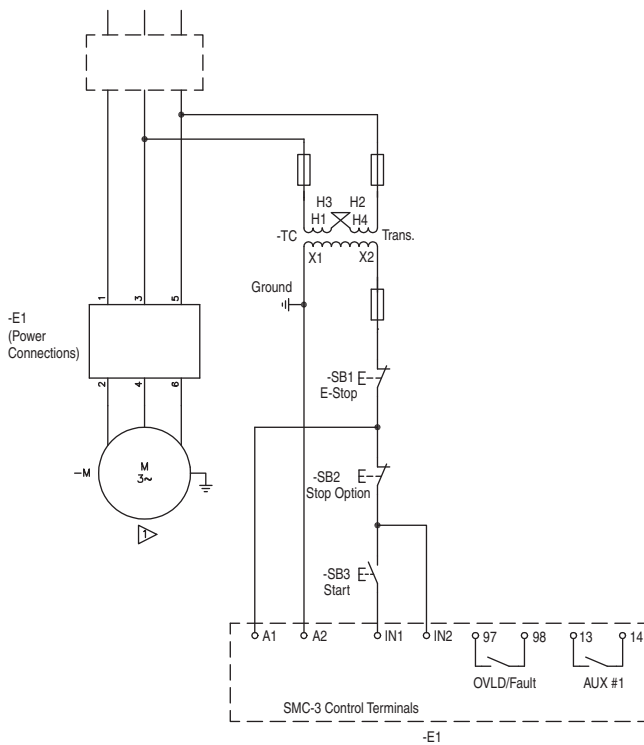


NEMA

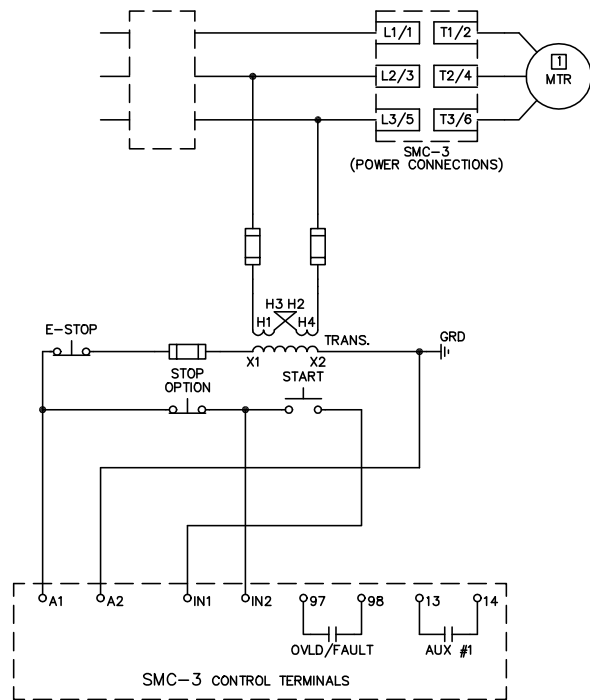


Three-Wire Configuration

IEC

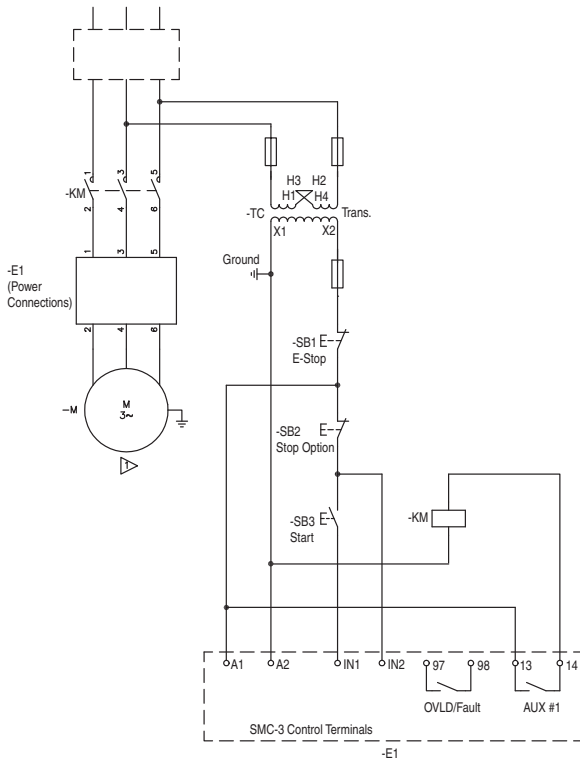


NEMA

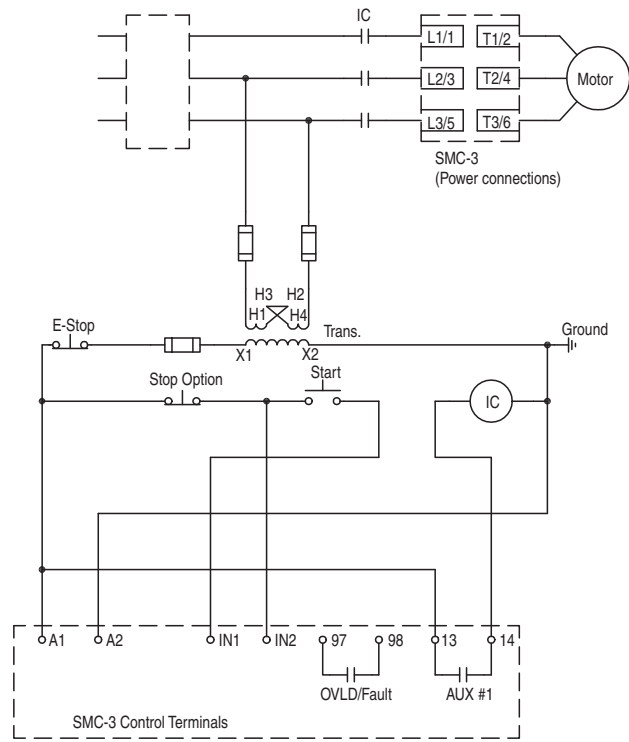


Isolation Contactor Configuration

IEC



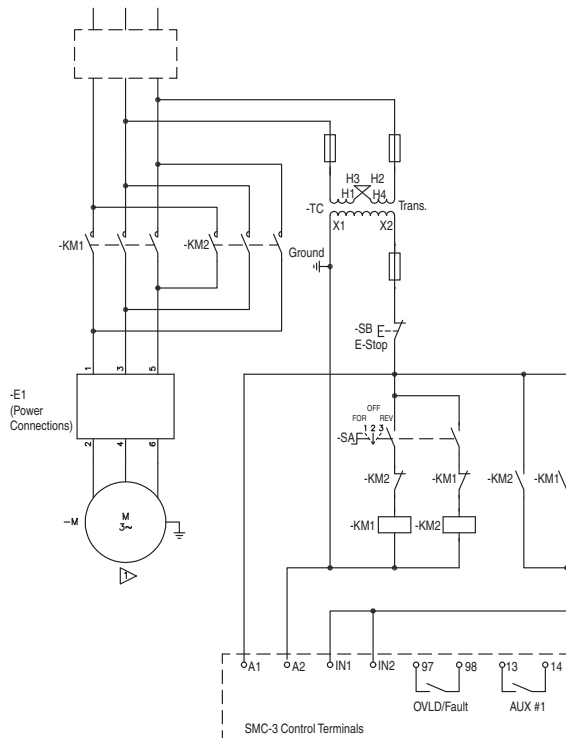
NEMA



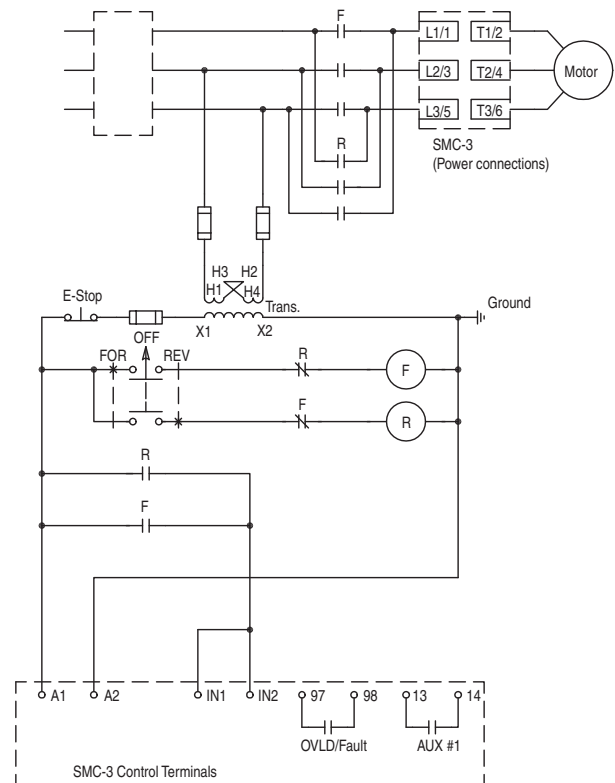
Reversing Configuration

Note: Minimum Off time equals 1.0 s.

IEC



NEMA



Bulletin 150
SMC™-3 Smart Motor Controllers
 Specifications

| Standard Features | | | | | | | | |
|----------------------------------|---|--|-------------------------|----------------------------------|--------------------------------------|---------------------------------------|---------------|-----|
| Selectable Start Times | 2, 5, 10, 15, 20, 25, or 30 s | | | | | | | |
| Selectable Initial Torque | 0%, 25%, 35%, and 65% of locked rotor torque | | | | | | | |
| Selectable Current Limit | 150%, 250%, 350%, and 450% of full load current | | | | | | | |
| Selectable Kick Start — 450% FLA | 0, 0.5, 1.0, or 1.5 s | | | | | | | |
| Selectable Soft Stop | Off, 100%, 200%, or 300% of the start time setting when wired | | | | | | | |
| Electrical Ratings | | | | | | | | |
| Power Circuit | UL/CSA/NEMA | | | IEC | | | | |
| | Rated Operation Voltage | 200...480V AC 200...600V AC | | | 200...480V~ — 400V~ 500V~ — 500V~ | | | |
| | Rated Insulation Voltage | 600V AC | | | 500V~ | | | |
| | Dielectric Withstand | 2200V AC | | | 2500V~ | | | |
| | Repetitive Peak | 200...480V AC: 1400V 200...600V AC: 1600V | | | 200...480V~: 1400V 500V~: 1600V | | | |
| | Operating Frequency | 50/60 Hz | | | 50/60 Hz | | | |
| | Utilization Category | 1...37 A | — | | | AC-53b: 3.5-15:3585 | | |
| | | 43...60 A | — | | | AC-53b: 4.5-30:1770 | | |
| | | 85 A | — | | | AC-53b: 4.5-30:3570 | | |
| | | 108 A | — | | | AC-53b: 4.5-30:1770 | | |
| | | 135 A | — | | | AC-53b: 3.5-30: 1770 | | |
| | | 201...251 A | — | | | AC-53b: 3.5-30: 1770 | | |
| | 317...480 A | — | | | AC-53b: 3.5-30: 1770 | | | |
| | Number of Poles | Equipment designed for 3-phase only | | | | | | |
| Rated Impulse Voltage | 6 kV | | | | | | | |
| DV/DT Protection | 1000V/μs | | | | | | | |
| Overvoltage Category | III | | | | | | | |
| 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 | | |
| | Rated Insulation Voltage | 250V | | |
| | Rated Impulse Voltage | 2.5 kV | | |
| | Dielectric Withstand | 1500V AC | | |
| | Overvoltage Category | II | | |
| | Operating Frequency | 50/60 Hz | | |
| | Input onstate voltage minimum, during start (IN1, IN2) | 85V AC, 19.2V DC / 19.2V AC | | |
| | Input onstate current (IN1, IN2) | 9.8 mA @ 120V AC/19.6 mA @ 240V AC, 7.3 mA @ 24V AC/DC | | |
| | Input offstate voltage maximum (IN1, IN2) | 40V AC, 17V DC / 12V AC | | |
| | Input offstate current @ input offstate voltage (IN1, IN2) | <10 mA, <12 mA | | |
| | Control Power with Fan, during start | 3...37 A | 215 mA @ 120V AC / 180 mA @ 240V AC, 800 mA @ 24V DC / 660 mA @ 24V AC | |
| | | 43...85 A | 200 mA @ 120V AC / 100 mA @ 240V AC, 700 mA @ 24V AC/DC | |
| | | Fan Power | Control Power | |
| 108...135 A | | 20VA | 200 mA @ 120V AC / 120 mA @ 240V AC, 600 mA @ 24V AC/DC | |
| 201...251 A | | 40VA | | |
| 317...480 A | | 60VA | | |
| Control Power without Fan, during start | 3...37 A | 205 mA @ 120V AC / 145 mA @ 240V AC, 705 mA @ 24V DC / 580 mA @ 24V AC | | |

| | Controller Rating [A] | Steady State Heat Dissipation [W] | Overload Current Range [A] |
|--|-----------------------|-----------------------------------|----------------------------|
| | | 3 | 11 |
| | 9 | 12 | 3...9 |
| | 16 | 14 | 5.3...16 |
| | 19 | 15 | 6.3...19 |
| | 25 | 17 | 9.2...27.7 |
| | 30 | 19 | 10...30 |
| | 37 | 24 | 12.3...37 |
| | 43 | 34 | 14.3...43 |
| | 60 | 50 | 20...60 |
| | 85 | 82 | 28.3...85 |
| | 108 | 62 | 27...108 |
| | 135 | 75 | 34...135 |
| | 201 | 129 | 67...201 |
| | 251 | 147 | 84...251 |
| | 317 | 174 | 106...317 |
| | 361 | 194 | 120...361 |
| | 480 | 239 | 160...480 |



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

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

Bulletin 150
SMC™-3 Smart Motor Controllers
 Specifications

| Electrical Ratings | | | |
|--|---------------------------------------|---|----------------|
| Side-Mount Auxiliary Contacts | | | |
| | | UL/CSA/NEMA | IEC |
| Rated Operational Voltage | | 250V AC/30V DC | 250V AC/30V DC |
| Rated Insulation Voltage | | 250V | 250V AC |
| Rated Impulse Voltage | | 2.5 kV | 4 kV |
| Dielectric Withstand | | 1500V AC | 2000V AC |
| Overvoltage Category | | II | III* |
| Operating Frequency | | 50/60 Hz | 50/60 Hz |
| 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 |

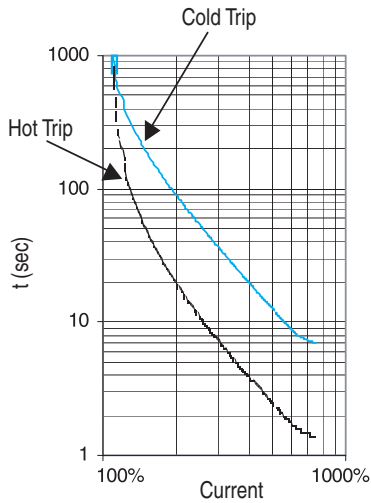
| Mechanical Ratings | | | |
|-------------------------|---------------------------------|--|---|
| Resistance to Vibration | Operational | 1.0 G Peak, 0.15 mm (0.006 in.) displacement | |
| | Non-Operational | 2.5 G Peak, 0.38 mm (0.015 in.) displacement | |
| Resistance to Shock | Operational | 15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

| Other | | | |
|---------------------|---------------------------------------|-------------------------------------|----------------------|
| | | UL/CSA/NEMA | IEC |
| EMC Emission Levels | Conducted Radio Frequency Emissions | — | 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 |

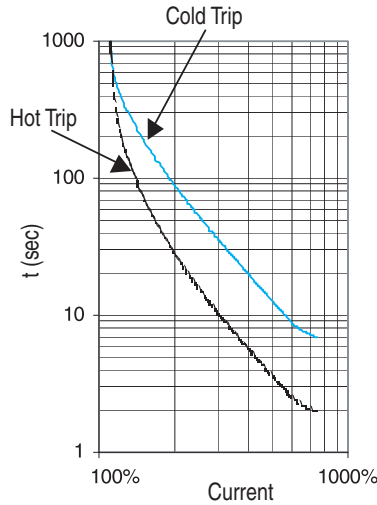


SMC-3 Overload Trip Curves

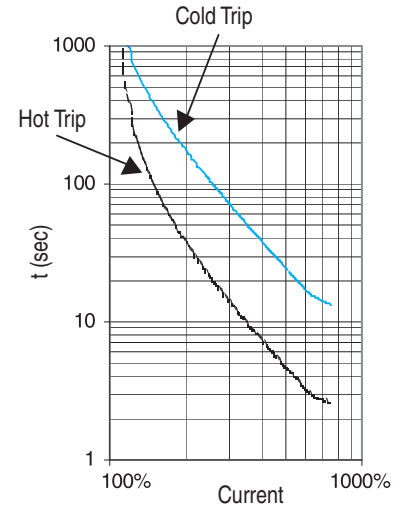
Trip Class 10



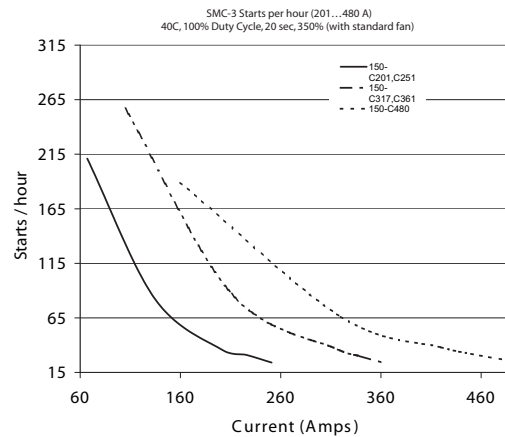
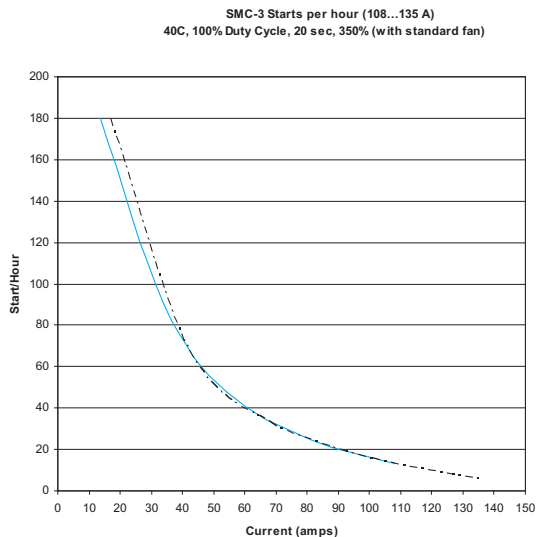
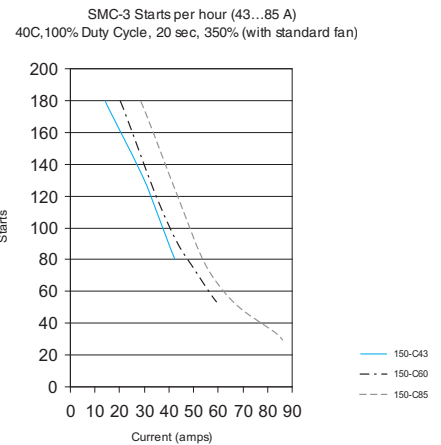
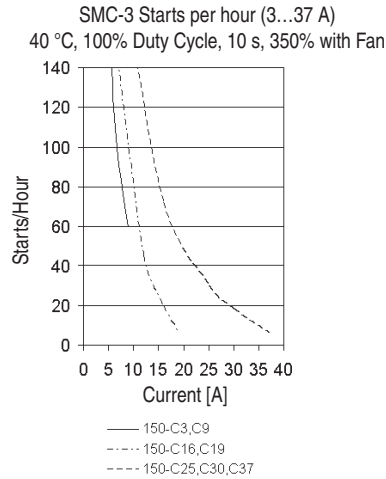
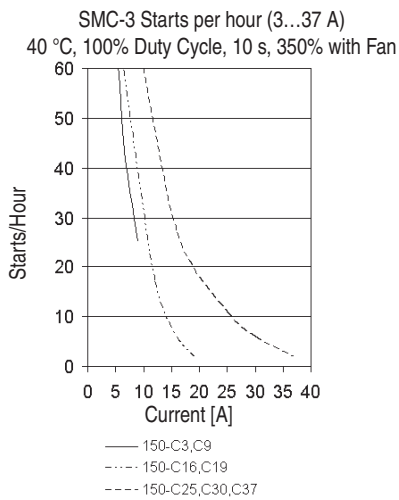
Trip Class 15



Trip Class 20



Starts per Hour Curves

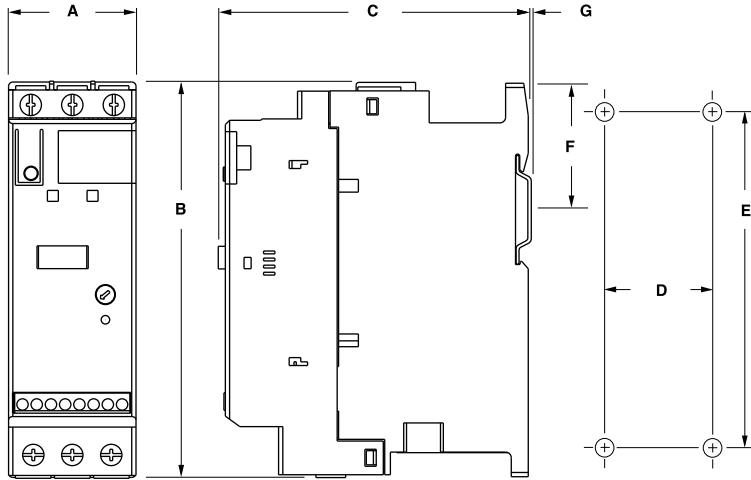


SMC™-3 Smart Motor Controllers

Approximate Dimensions

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

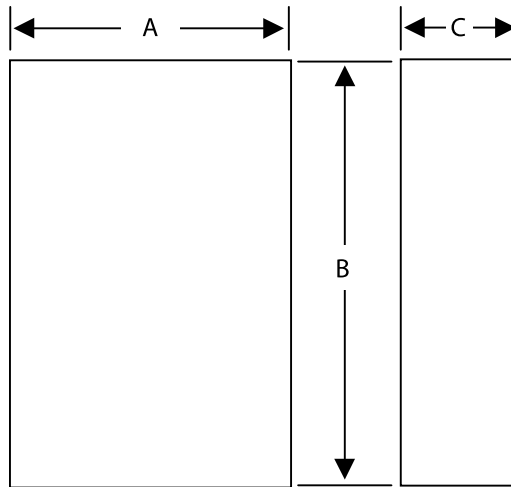
Open Type



4

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

Minimum Enclosure Size



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

Enclosed Type Line-Connected Controllers

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

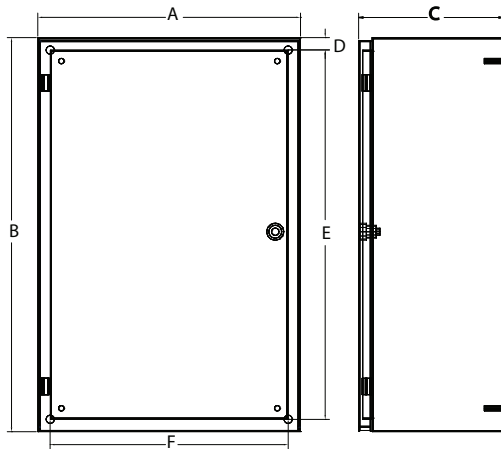


Figure 1 — Wall-Mount

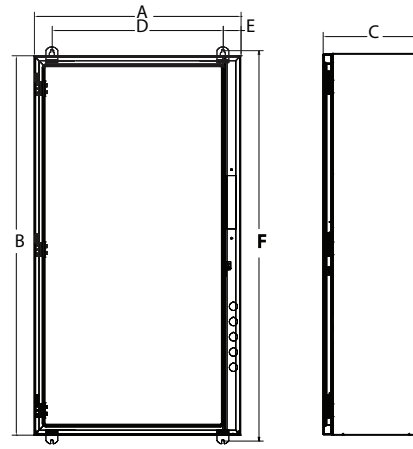


Figure 2 — Wall-Mount

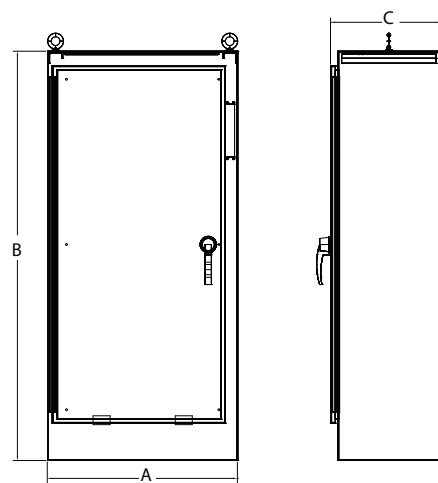


Figure 3 — Floor-Mount

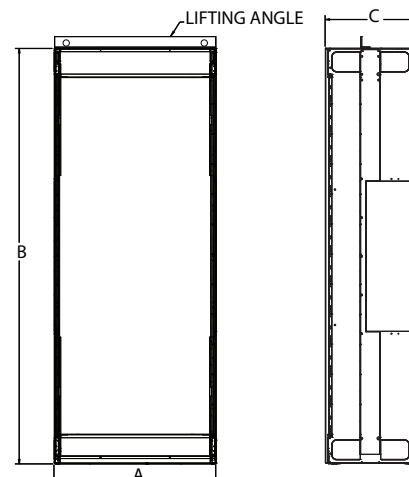


Figure 4 — Floor-Mount

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