

# Starting Torque Controller Specifications

Bulletin 154

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## Additional Resources

These documents contain additional information concerning related products from Rockwell Automation.

| Resource   | Description   |
|--|---|
| Industrial Automation Wiring and Grounding Guidelines, publication <a href="#">1770-4.1</a>            | Provides general guidelines for installing a Rockwell Automation industrial system. |
| Product Certifications website, <a href="http://rok.auto/certifications">rok.auto/certifications</a> . | Provides declarations of conformity, certificates, and other certification details. |

You can view or download publications at <http://www.rockwellautomation.com/global/literature-library/overview.page>.

## Product Overview

The Bulletin 154 Starting Torque Controller (STC™) is designed for low-horsepower single- and three-phase squirrel cage induction motors. It is designed to reduce system shock (electrical and mechanical) that is typically seen when directly starting on line voltage. Reduced system shock provides smoother starts and decreased downtime that is caused by shock- and vibration-related problems.

Because the STC is fully solid state, it does not come equipped with a bypass, and one is not required. The controller is designed to run on full load motor current. The STC turns on when line phases are energized. Control power is required, but it is not the signaling means to turn on the controller.

You can operate the STC with one or two control phases. There is more current reduction on two-phase controlled STC for the same torque ramp up setting of a one control phase STC. This results in longer ramp-up time and a lower starting torque. Starting current can be above 50% for two-phase controlled devices. The current is more balanced than it is with one-phase control.

The STC is rated for 120V single-phase motors up to 25 A. You can use the STC to control permanent split capacitor (PSC) single-phase motors. You can also use the STC for capacitor start and capacitor run (CSCR) single-phase motors.

## Typical Applications

The STC is well suited for many applications that require a smooth start without any sudden starts. These applications include:

- Bridge cranes
- Trolleys
- Monorails
- Shrink wrap machines
- Overhead doors
- Material handling
- Compressors
- Fans and pumps
- Lifts
- Elevators
- Grinders
- Paint shakers
- Conveyors
- Aircraft hanger doors
- Car washes
- Isolation requirements

|  |  |  |  |
|--|---|--|---|
| <b>Bulletin</b>                                  | <b>154-SP1C</b>   | <b>154-TP1C</b>  | <b>154-TP2C</b>   |
| Fully solid-state                                | ✓   | ✓  | ✓   |
| Switching  | Single-pole   | Single-pole  | Double-pole   |
| Phase voltage                                    | Single  | Three  | Three   |
| Operational voltage range                        | 100...240V AC (-15%, +10%)  | 200...600V AC (-15%, +10%)   | 200...600V AC (-15%, +10%)  |
| Rated operational current                        | 12/16/25 A, AC53a   | 12/16/25 A, AC53a  | 12/16/25 A, AC53a   |
| Max. rated current                               | 25 A, up to 600V AC   | 25 A, up to 600V AC  | 25 A, up to 600V AC   |
| Control supply voltage                           | 24V AC/DC, 100...240V AC  | 24V AC/DC, 100...240V AC   | 24V AC/DC, 100...240V AC  |
| Integrated varistor (MOV) protection             | ✓   | ✓  | ✓   |
| Snubber across switched phases                   | ✓   | ✓  | ✓   |
| Required electrical isolation                    | No  | Yes  | No  |
| Adjustable start ramp time                       | 0.5...5 s   | 0.5...5 s  | 0.5...5 s   |
| Adjustable starting torque                       | 0...80%   | 0...80%  | 0...80%   |
| Status indication via light-emitting diode (LED) |   |  |   |
| Supply   |   |  |   |
| Ramp   | ✓   | ✓  | ✓   |
| Over-temperature alarm                           | ✓   | ✓  | ✓   |
| Soft start                                       | ✓   | ✓  | ✓   |
| Soft Stop  | —   | —  | —   |
| Overload Relay Compatibility                     |   |  |   |
| Solid-state                                      | ✓   | ✓  | ✓   |
| Bimetal  | ✓   | ✓  | ✓   |
| Auxiliary contacts                               | —   | —  | —   |
| Certifications                                   |   |  |   |
| RoHS   | ✓   | ✓  | ✓   |
| China RoHS                                       | ✓   | ✓  | ✓   |
| c-UL-us Listed                                   | ✓   | ✓  | ✓   |
| CE Marked  | ✓   | ✓  | ✓   |

## Catalog Number Explanation

Examples that are given in this section are not intended to be used for product selection. Not all combinations produce a valid catalog number.

154  
a
-
SP1C  
b
12  
c
N  
d
A  
e
R  
f

| <b>a</b>               |                            |
|------------------------|----------------------------|
| <b>Bulletin Number</b> |                            |
| Code                   | Description                |
| 154                    | Starting Torque Controller |

| <b>b</b>                         |                                   |
|----------------------------------|-----------------------------------|
| <b>Type of Motor and Control</b> |                                   |
| Code                             | Description                       |
| SP1C                             | 1-phase motor, one control phase  |
| TP1C                             | 3-phase motor, one control phase  |
| TP2C                             | 3-phase motor, two control phases |

| <b>c</b>                 |             |
|--------------------------|-------------|
| <b>Controller Rating</b> |             |
| Code                     | Description |
| 12                       | 12 A        |
| 16                       | 16 A        |
| 25                       | 25 A        |

| <b>d</b>              |             |
|-----------------------|-------------|
| <b>Enclosure Type</b> |             |
| Code                  | Description |
| N                     | Open/none   |

| <b>e</b>             |             |
|----------------------|-------------|
| <b>Rated Voltage</b> |             |
| Code                 | Description |
| A                    | 230V AC     |
| C                    | 600V AC     |

| <b>f</b>                 |                |
|--------------------------|----------------|
| <b>Controller Rating</b> |                |
| Code                     | Description    |
| R                        | 24V AC, 24V DC |
| D                        | 100...240V AC  |

## Product Selection

The tables in this section list selection information for the STC. You will need to provide separate overcurrent protection. Upstream protection may be either a bimetal or solid-state (E1 Plus™) overload or a 140M Motor protection circuit breaker. You can also use downstream protection with a self-protected motor. A contactor is recommended but not required because other motor disconnecting means are available.

### Single-phase Controllers with One Control Phase

| Current Rating [A] | Rated Power @ 40 °C (104 °F) |      |      |     | Control Voltage |               |
|--------------------|------------------------------|------|------|-----|-----------------|---------------|
|                    | 115V                         |      | 230V |     | 24V AC/DC       | 100...240V AC |
|                    | Hp                           | kW   | Hp   | kW  | Cat. No.        | Cat. No.      |
| 12                 | 0.5                          | 0.55 | 5    | 1.1 | 154-SP1C12NAR   | 154-SP1C12NAD |
| 16                 | 0.5                          | 0.75 | 2    | 1.5 | 154-SP1C16NAR   | 154-SP1C16NAD |
| 25                 | 1                            | 1.5  | 3    | 3   | 154-SP1C25NAR   | 154-SP1C25NAD |


### Three-phase Controllers with One Control Phase

| Current Rating [A] | Rated Power @ 40 °C (104 °F) |     |      |     |      |     |      |     | Control Voltage |               |
|--------------------|------------------------------|-----|------|-----|------|-----|------|-----|-----------------|---------------|
|                    | 220V                         |     | 400V |     | 460V |     | 575V |     | 24V AC/DC       | 100...240V AC |
|                    | Hp                           | kW  | Hp   | kW  | Hp   | kW  | Hp   | kW  | Cat. No.        | Cat. No.      |
| 12                 | 3                            | 3   | 5    | 5.5 | 7.5  | 6.3 | 10   | 6.3 | 154-TP1C12NCR   | 154-TP1C12NCD |
| 16                 | 5                            | 4   | 7.5  | 7.5 | 10   | 7.5 | 10   | 7.5 | 154-TP1C16NCR   | 154-TP1C16NCD |
| 25                 | 7.5                          | 6.3 | 10   | 11  | 15   | 13  | 20   | 15  | 154-TP1C25NCR   | 154-TP1C25NCD |

### Three-phase Controllers with Two Control Phases

| Current Rating [A] | Rated Power @ 40 °C (104 °F) |     |      |     |      |     |      |     | Control Voltage |               |
|--------------------|------------------------------|-----|------|-----|------|-----|------|-----|-----------------|---------------|
|                    | 220V                         |     | 400V |     | 460V |     | 575V |     | 24V AC/DC       | 100...240V AC |
|                    | Hp                           | kW  | Hp   | kW  | Hp   | kW  | Hp   | kW  | Cat. No.        | Cat. No.      |
| 12                 | 3                            | 3   | 5    | 5.5 | 7.5  | 6.3 | 10   | 6.3 | 154-TP2C12NCR   | 154-TP2C12NCD |
| 16                 | 5                            | 4   | 7.5  | 7.5 | 10   | 7.5 | 10   | 7.5 | 154-TP2C16NCR   | 154-TP2C16NCD |
| 25                 | 7.5                          | 6.3 | 10   | 11  | 15   | 13  | 20   | 15  | 154-TP2C25NCR   | 154-TP2C25NCD |

### Accessories

|   | Description  | For Use With                       | Cat. No.  |
|---|--|------------------------------------|-----------|
|  | Flexible Connection Module <ul style="list-style-type: none"> <li>Used for 2-component systems</li> <li>Used for some 3-component systems</li> </ul> | Bul.140M or Bul. 100-C to Bul. 154 | 140U-D-PF |
|   | Replacement Fan  | 156-TP2C25                         | 156-CRF40 |

## Specifications

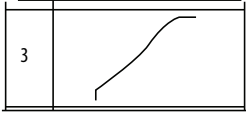
**Table 1 - Output Voltage**

| Attribute                 | 154-SP1C...                             | 154-TP1C...                             | 154-TP2C...                             |
|---------------------------|---|---|---|
| Rated Operational Voltage | 100...240V AC <sub>rms</sub> +10%, -15% | 200...600V AC <sub>rms</sub> +10%, -15% | 200...600V AC <sub>rms</sub> +10%, -15% |
| Blocking Voltage          | 1200V <sub>p</sub>                      | 1600V <sub>p</sub>                      | 1800V <sub>p</sub>                      |
| Operational Frequency     | 50/60 Hz ±10%                           |   |   |
| Rated Insulation Voltage  | 600V AC                                 |   |   |
| Varistor Protection       | Across switched phases                  |   |   |

**Table 2 - Control Voltage**

| Attribute             | 154-SP1C..., 154-TP1C..., 154-TP2C...   |
|-----------------------|---|
| Control Voltage Range |   |
| Control Voltage "R"   | 24V DC, -15% +20%; 24V AC, ±15%   |
| Control Voltage "D"   | 90...265V AC  |
| Isolation             |   |
| Input to Output       | 2.5kV <sub>rms</sub>  |
| Output to Case        | 4kV <sub>rms</sub>  |
| Input to Case         | 4kV <sub>rms</sub>  |
| Other circuits        | to respect requirements as imposed by applicable standards (2x rated voltage + 1000V) |

**Table 3 - General Specifications**

| Attribute                                 | 154-SP1C..., 154-TP1C..., 154-TP2C...  |                   |                              |
|---|--|-------------------|------------------------------|
| Starting Method                           |  |                   |                              |
| Initial Torque Setting (via rotary knob)  | 10...80%   |                   |                              |
| Ramp-up time (via rotary knob)            | 0.5...5 s  |                   |                              |
| Ramp-down time (via rotary knob)          | 0 s (no setting required)  |                   |                              |
| Cooling Type                              | Natural convection   |                   |                              |
| Status Indication LEDs                    | <b>Green LED</b>   | <b>Orange LED</b> | <b>Red LED<sup>(3)</sup></b> |
| Power supply ON                           | On   | Off               | Off                          |
| Ramp-up                                   | On   | Flashing          | Off                          |
| Fully ON                                  | On   | On                | Off                          |
| Alarm wrong phase sequence <sup>(1)</sup> | Flashing   | Off               | Off                          |
| Alarm overtemperature <sup>(2)</sup>      | On   | Off               | Flashing                     |

(1) Phase Sequence detection is only available on the 154-TP2C devices. In case of an incorrect motor phase sequence error, the 154-TP2C output will remain OFF. User intervention is required to change the phase sequence.

(2) Available on 154-TP2C 25 A devices.

(3) Red LED is only available on 154-TP2C 25 A devices.

**Table 4 - Output Specifications**

| Attribute                                  | 12 A Devices       | 16 A Devices | 25 A Devices |
|--|--------------------|--------------|--------------|
| Rated Operational Current @ 40 °C (104 °F) | 12 A, AC53a        | 16 A, AC53a  | 25 A, AC53a  |
| Utilization Category                       | AC53a:3.5-10:99-10 |              |              |
| Max. starts per hour                       | 10                 | 10           | 10           |
| Min. Operational Current                   | 250 mA             | 400 mA       | 400 mA       |
| $I^2t$ for fusing                          | 1800 A @ 2 s       | 6600 A @ 2 s | 6600 A @ 2 s |

**Table 5 - Housing Specifications**

| Attribute  | Value          |
|--|----------------|
| Material   | PA66           |
| Protection Category  | IP20           |
| Mounting   | DIN Rail/Panel |
| Vibration Resistance (2...100 Hz, IEC 60068-2-6, IEC 50155, IEC 61373) | 2g per axis    |
| Impact Resistance (IEC 50155, IEC 61373)                               | 15/11 g/ms     |
| UL Flammability rating (for plastic)                                   | UL 94V0        |

**Table 6 - Environmental Specifications**

| Attribute                         | Value   |
|-----------------------------------|---|
| Operating Temperature             | -40...60 °C (-40...140 °F)                                      |
| Storage Temperature               | -40...100 °C (-40...212°F)                                      |
| Relative Humidity                 | <95% noncondensing  |
| Installation Altitude             | 1000 m - derating of 1% per 100 m up to max. altitude of 2000 m |
| RoHS (2002/95/EC)                 | Compliant   |
| Pollution Degree                  | 2 (non-conductive pollution with possibilities of condensation) |
| Overvoltage/Installation Category | III (fixed installation)  |

**Table 7 - Terminal Specifications**

| Attribute   |  | Cat. Nos.                             |   |   |  |           |
|---|--|---------------------------------------|---|---|--|-----------|
|   |  | Cat. No. 154-SP1C12, -TP1C12, -TP2C12 |   | 154-SP1C16, -SP1C25, TP1C16, TP1C25, -TP2C16, -TP2C25 | 154-SP1C, -TP1C, -TP2C   |           |
| Type of terminals   |  |                                       |   |   |  |           |
| Terminal Nos.   |  | 1/L1, 3/L2, 5/L3, 2/T1, 4/T2, 6/T3    |   | 1/L1, 3/L2, 5/L3, 2/T1, 4/T2, 6/T3                    | A1, A2, A3, A4   |           |
| Conductor   |  | Use 75 °C copper (Cu) conductors      |   |   |  |           |
| Stripping Length (X)  |  | 12 mm                                 |   | 8   |  |           |
| Connection type   |  | M4 screw with captivated washer       |   | M5 screw with box clamp                               | M3 screw with box clamp  |           |
| Rigid Conductors (Solid and Stranded)<br>UL/c-UL rated data |  | [mm <sup>2</sup> ]                    | (2) 2.5...6   | 2.5...6   | 2.5...25   | 1...2.5   |
|   |  | [AWG]                                 | (2) 14...10   | 14...10   | 14...3   | 18...12   |
| Flexible with end sleeve                                    |  | [mm <sup>2</sup> ]                    | (2) 1.0...2.5<br>(2) 2.5...4  | 1.0...4   | 2.5...16   | 0.5...2.5 |
|   |  | [AWG]                                 | (2) 18...14<br>(2) 14...12  | 18...12   | 14...6   | 20...12   |
| Flexible without end sleeve                                 |  | [mm <sup>2</sup> ]                    | (2) 1.0...2.5<br>(2) 2.5...6  | 1.0...6   | 4...25   | —         |
|   |  | [AWG]                                 | (2) 18...14<br>(2) 14...10  | 18...10   | 12...3   | —         |
| Torque specifications                                       |  |                                       | Pozidriv 2<br>UL: 2 N•m (17.7 lb•in)<br>IEC: 1.5...2.0 N•m (13.3...17.7 lb•in)  |   | Pozidriv 2<br>UL: 2.5 N•m (22 lb•in)<br>IEC: 2.5...3.0 N•m (22...26.6 lb•in) |           |
| Aperture for termination lug                                |  | [mm (in.)]                            | 12.3 (0.48)   |   | —  |           |
| Protective Earth (PE) Connection                            |  |                                       | M5, 1.5 N•m (13.3 in•lb)<br>Note: M5 PE screw not provided with SSR. PE connection is required when product is intended to be used in Class 1 applications according to EN/IEC 61140. |   |  | —         |

Figure 1 - Terminal Layout

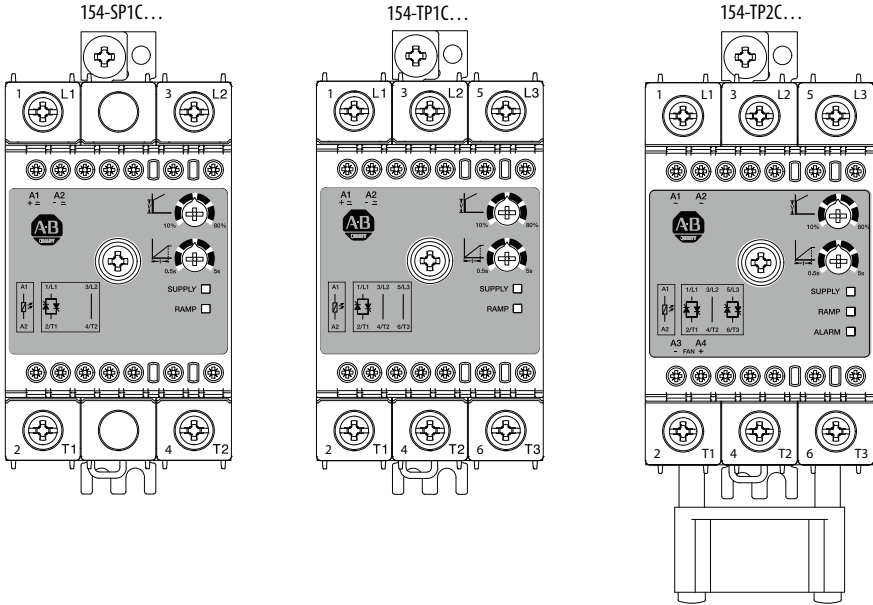
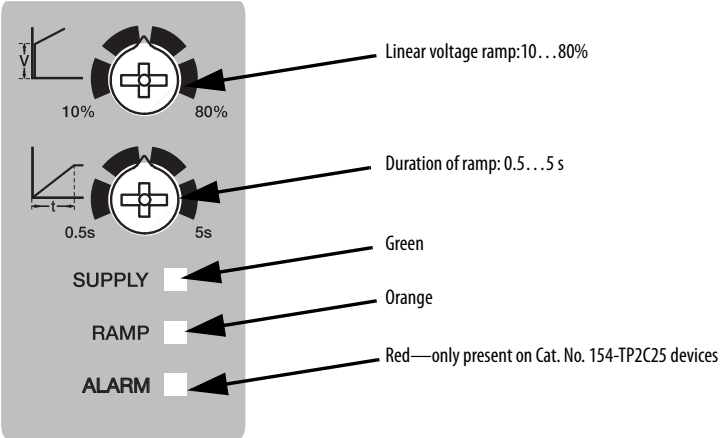


Figure 2 - Adjustment Dial



**Table 8 - Electromagnetic Compatibility Ratings**

| Attribute               | Value  | Notes:  |
|-------------------------|--|---|
| <b>Immunity</b>         |  |   |
| Electrostatic Discharge | IEC/EN 61000-4-2<br>4kV contact (PC2)<br>8kV Air Discharge (PC2)                         | <ul style="list-style-type: none"> <li>• Performance Criteria 1 (PC1): No degradation of performance or loss of function is allowed when the product is operated as intended.</li> <li>• Performance Criteria 2 (PC2): During the test, degradation of performance or partial loss of function is allowed. However when the test is complete the product should return operating as intended by itself.</li> <li>• Performance Criteria 3 (PC3): Temporary loss of function is allowed, provided the function can be restored by manual operation of the controls.</li> </ul> |
| Radiated RF             | IEC/EN 61000-4-3   |   |
| PC1 @ 10V/m             | 80...1000 MHz  |   |
| PC1 @ 10V/m             | 1.4...2.0 GHz  |   |
| PC1 @ 1V/m              | 2.0...2.7 GHz  |   |
| Fast Transients (Burst) | IEC/EN 61000-4-4   |   |
| <b>Output</b>           |  |   |
| PC1                     | 2kV  |   |
| PC2                     | 2kV/5 kHz  |   |
| <b>Signal/Input</b>     |  |   |
| PC1                     | 1kV  |   |
| PC2                     | 1kV,5 kHz  |   |
| Voltage Surges          | IEC/EN 61000-4-5   |   |
| Output, line to line    | 1kV, PC2   |   |
| Output, line to earth   | 2kV, PC2   |   |
| Input, line to line     | 1kV, PC2   |   |
| Input, line to earth    | 2kV, PC2   |   |
| Conducted RF            | IEC/EN 61000-4-6<br>0.15...80 MHz (PC1 @ 10Vrms)   |   |
| Voltage Dips            | 0% for 10 ms (PC2)<br>0% for 20 ms (PC2)<br>40% for 200 ms (PC2)<br>70% for 500 ms (PC2) |   |
| Voltage Interruptions   | 0% for 5000 ms (PC2)   |   |
| <b>Emissions</b>        |  |   |
| Wire conducted RF       | IEC/EN 55011<br>0.15...30 MHz Class A (with external filtering)                          |   |
| Radiated RF             | IEC/EN 55011<br>30...1000 MHz Class A (with external filtering)                          |   |



## Short-circuit Protection

This section provides information about the short-circuit ratings of the Starting Torque Controller.

### Protection Co-ordination, Type 1 versus Type 2:

Type 1 protection implies that after a short circuit, the device under test is no longer in a functioning state. In Type 2 co-ordination the device under test is still functional after the short circuit. In both cases, however the short circuit has to be interrupted. The fuse between enclosure and supply shall not open. The door or cover of the enclosure shall not be blown open. There shall be no damage to conductors or terminals and the conductors shall not separate from terminals. There shall be no breakage or cracking of insulating bases to the extent that the integrity of the mounting of live parts is impaired. Discharge of parts or any risk of fire shall not occur.

The product variants listed in the table hereunder are suitable for use on a circuit capable of delivering not more than 100,000 A rms Symmetrical Amperes, 600V maximum when protected by fuses. Tests at 100,000 A were performed with Class J, fast acting; see [Table 9](#) and [Table 10](#) for maximum allowed ampere rating of the fuse. Tests with Class J fuses are representative of Class CC fuses.

**Table 9 - Type 1 Coordination (UL 508)**

| Cat. No.     | Prospective Short-circuit Current [kA <sub>rms</sub> ] | Max. Fuse Size [A] | Class   | Max. Voltage [V AC] |
|--------------|--|--------------------|---------|---------------------|
| 154-SP1C12NA | 100  | 30                 | J or CC | 600                 |
| 154-SP1C16NA | 100  | 30                 | J or CC | 600                 |
| 154-SP1C25NA | 100  | 30                 | J or CC | 600                 |
| 154-TP1C12NA | 100  | 30                 | J or CC | 600                 |
| 154-TP1C16NA | 100  | 30                 | J or CC | 600                 |
| 154-TP1C25NA | 100  | 30                 | J or CC | 600                 |
| 154-TP2C12NA | 100  | 30                 | J or CC | 600                 |
| 154-TP2C16NA | 100  | 40                 | J       | 600                 |
| 154-TP2C25NA | 100  | 40                 | J       | 600                 |

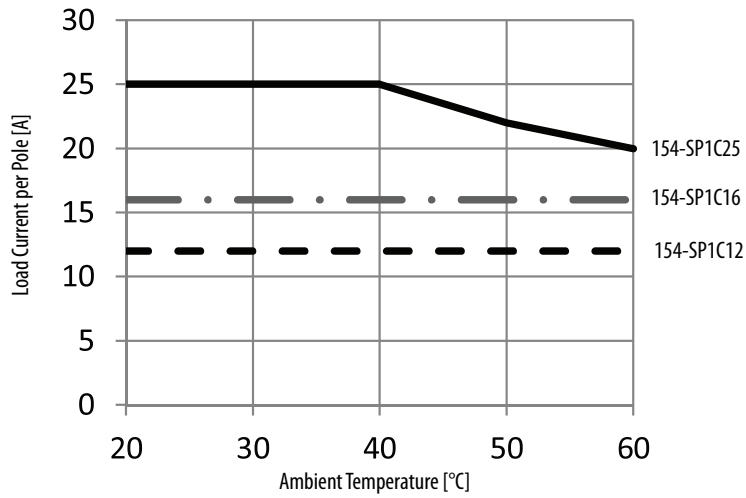
**Table 10 - Type 2 Coordination (EN/IEC 60947-4-2)**

| Cat. No.     | Ferraz-Shawmut (Mersen) |               | Siba               |               | Short-circuit Current [kA <sub>rms</sub> ] | Rated Voltage [V AC] |
|--------------|-------------------------|---------------|--------------------|---------------|--|----------------------|
|              | Max. Fuse Size [A]      | Fuse Part No. | Max. Fuse Size [A] | Fuse Part No. |  |                      |
| 154-SP1C12NA | 40                      | A70QS40-4     | 50                 | 50 142 06 50  | 100  | 600                  |
| 154-SP1C16NA | 60                      | A70QS60-4     | 80                 | 50 194 20 80  | 100  | 600                  |
| 154-SP1C25NA | 90                      | A70QS90-4     | 100                | 50 194 20 100 | 100  | 600                  |
| 154-TP1C12NA | 40                      | A70QS40-4     | 50                 | 50 142 06 50  | 100  | 600                  |
| 154-TP1C16NA | 60                      | A70QS60-4     | 80                 | 50 194 20 80  | 100  | 600                  |
| 154-TP1C25NA | 90                      | A70QS90-4     | 100                | 50 194 20 100 | 100  | 600                  |
| 154-TP2C12NA | 40                      | A70QS40-4     | 50                 | 50 142 06 50  | 100  | 600                  |
| 154-TP2C16NA | 60                      | A70QS60-4     | 80                 | 50 194 20 80  | 100  | 600                  |
| 154-TP2C25NA | 90                      | A70QS90-4     | 100                | 50 194 20 100 | 100  | 600                  |

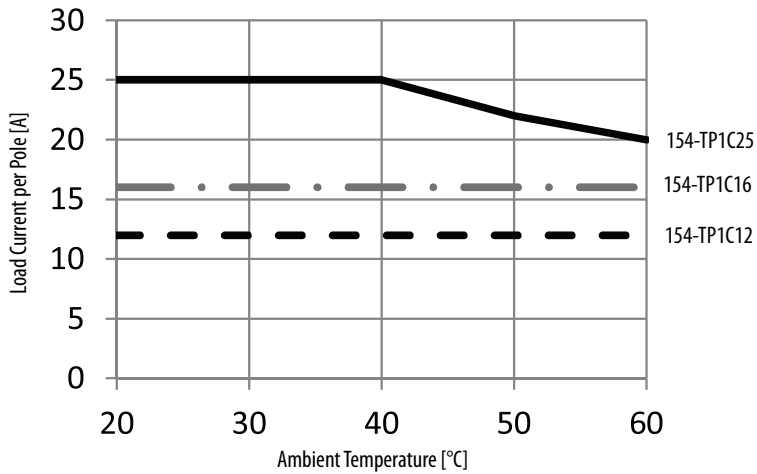
### Load vs. Ambient Temperature Derating Curves

Figure 3 through Figure 5 show the current derating information.

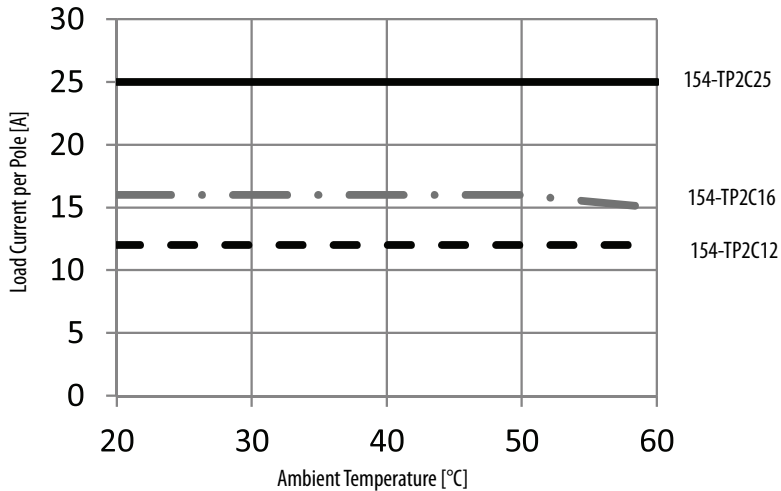
**Figure 3 - Current Derating—Cat. No. 154-SP1... Devices**



**Figure 4 - Current Derating—Cat. No. 154-TP1... Devices**



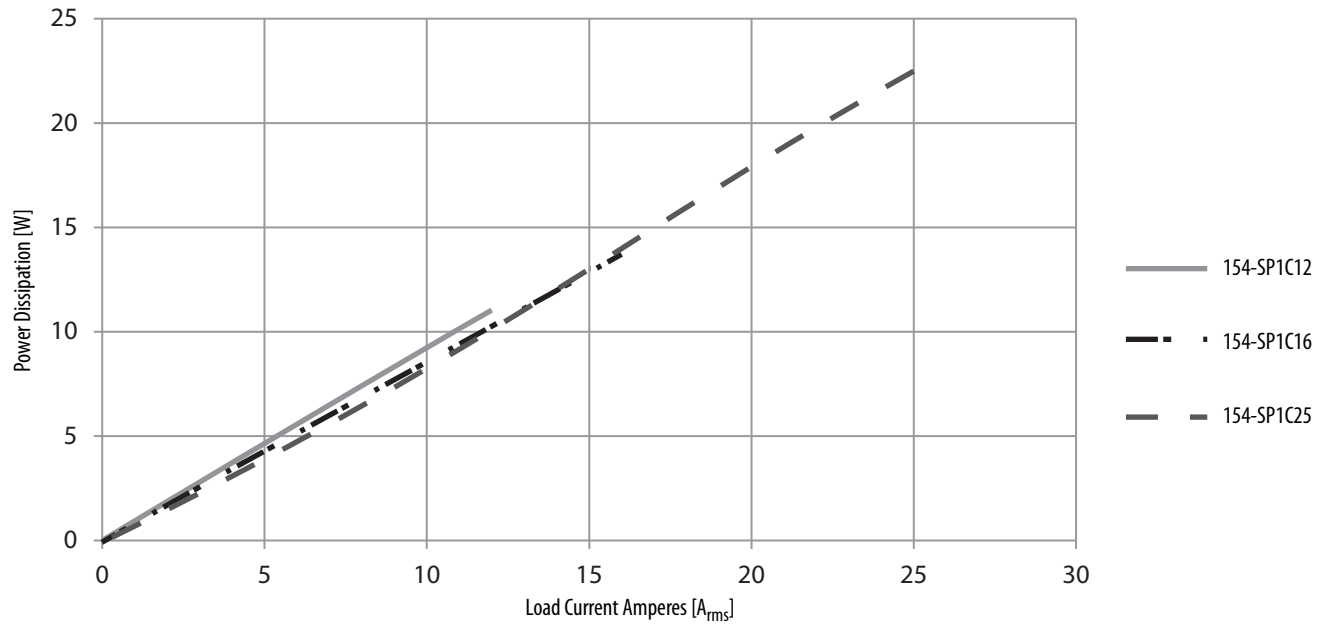
**Figure 5 - Current Derating—Cat. No. 154-TP2... Devices**



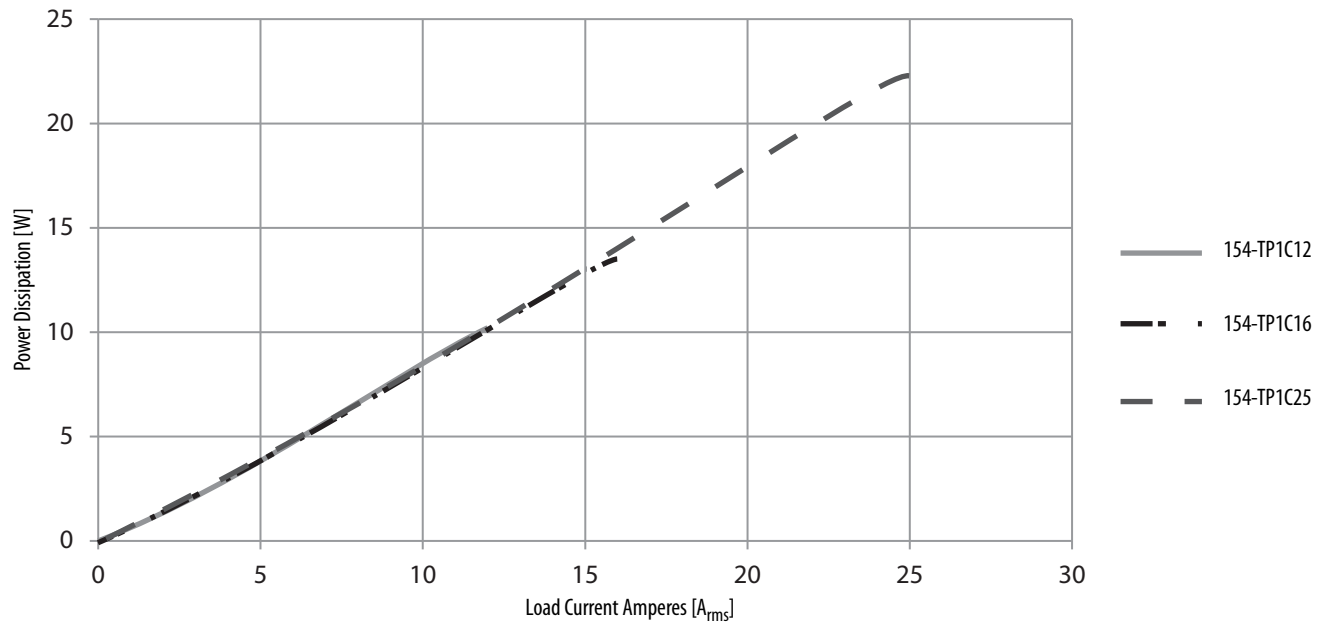
## Output Power Dissipation Curves

Figure 6 through Figure 8 show the power dissipation information.

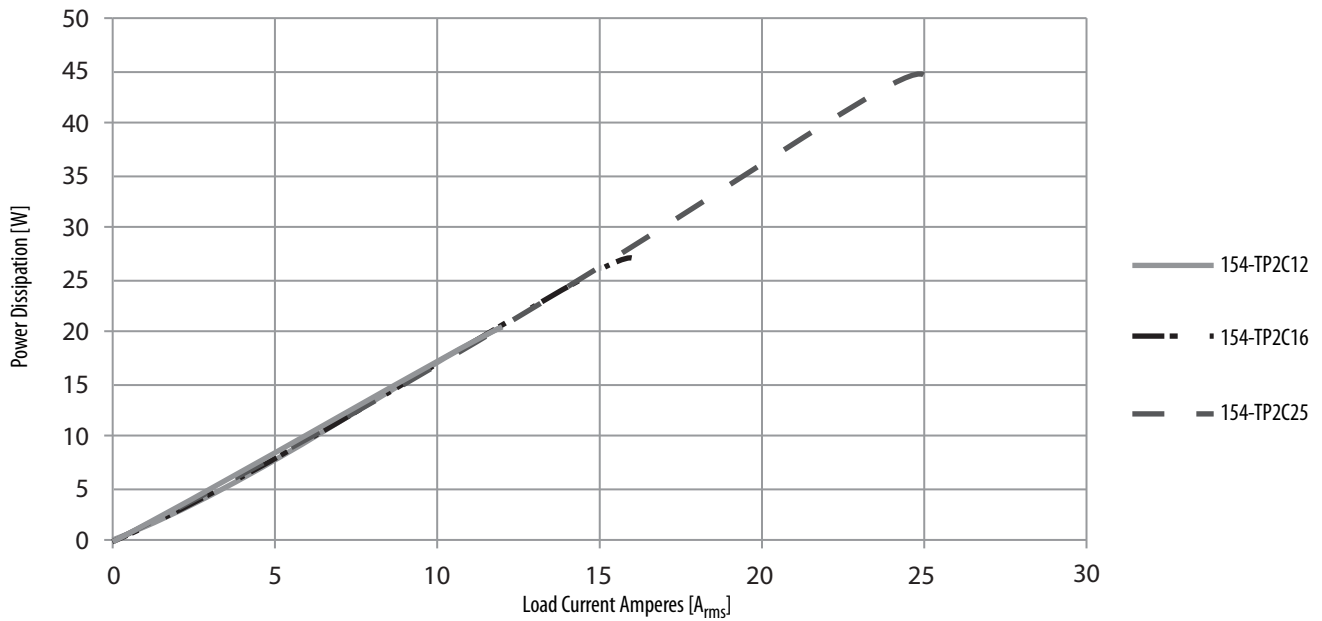
**Figure 6 - Output Power Dissipation—Cat. No. 154-SP1C...Devices**



**Figure 7 - Output Power Dissipation—Cat. No. 154-TP1C...Devices**



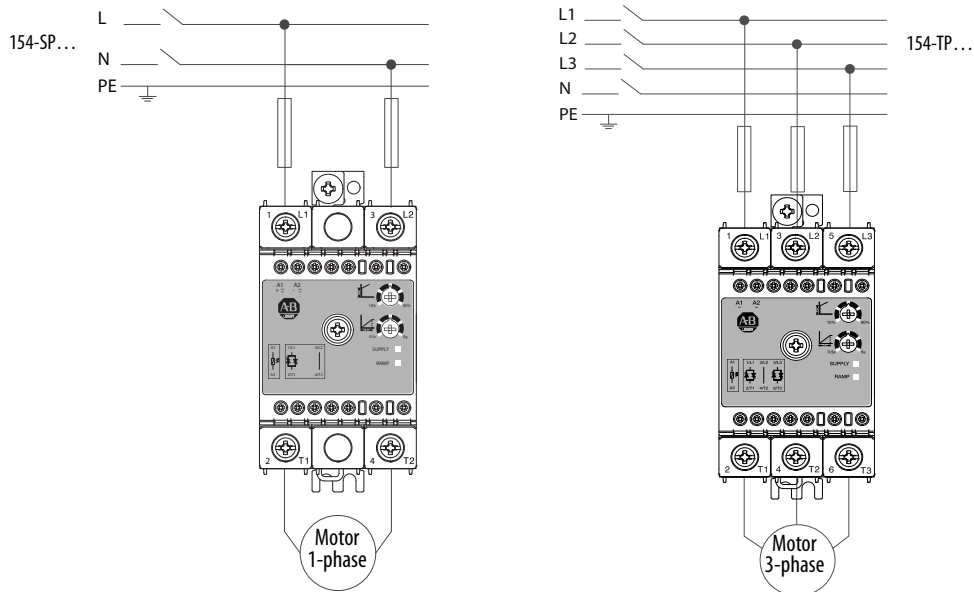
**Figure 8 - Output Power Dissipation—Cat. No. 154-TP2C... Devices**



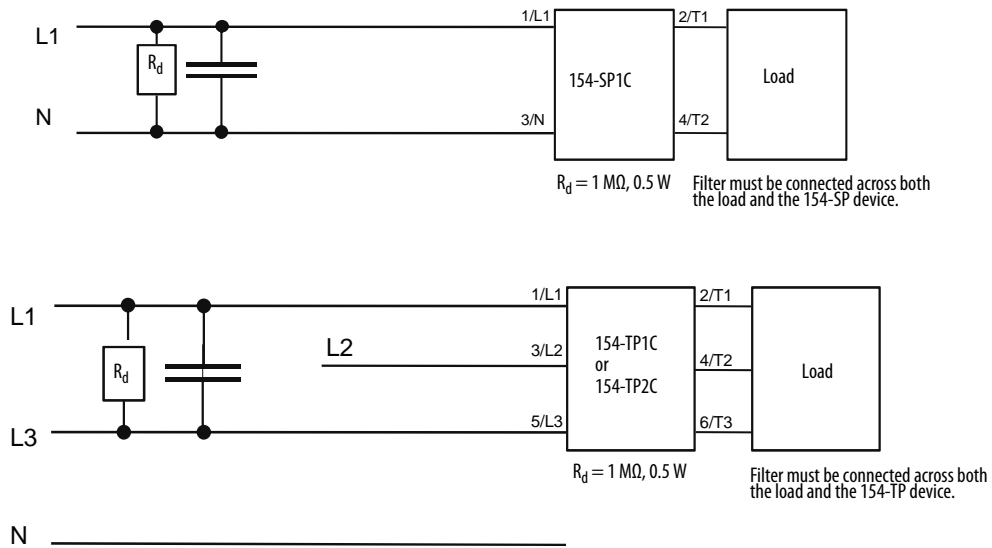
## Wiring Diagrams

The diagrams in this section depict wiring information for the Starting Torque Controller.

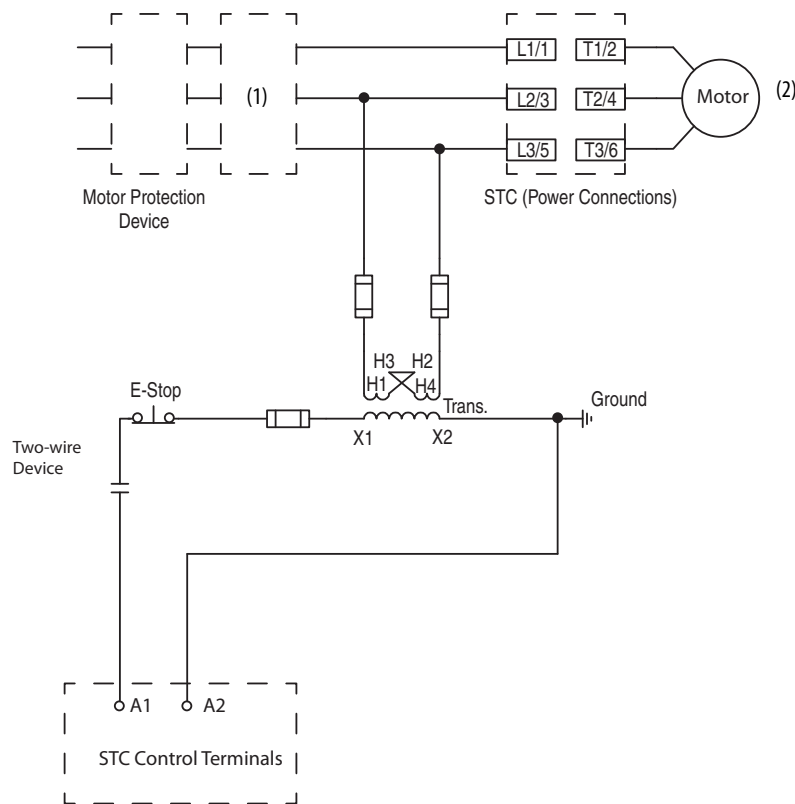
**Figure 9 - Connection Diagram**



**Figure 10 - Filter Connection Diagrams**

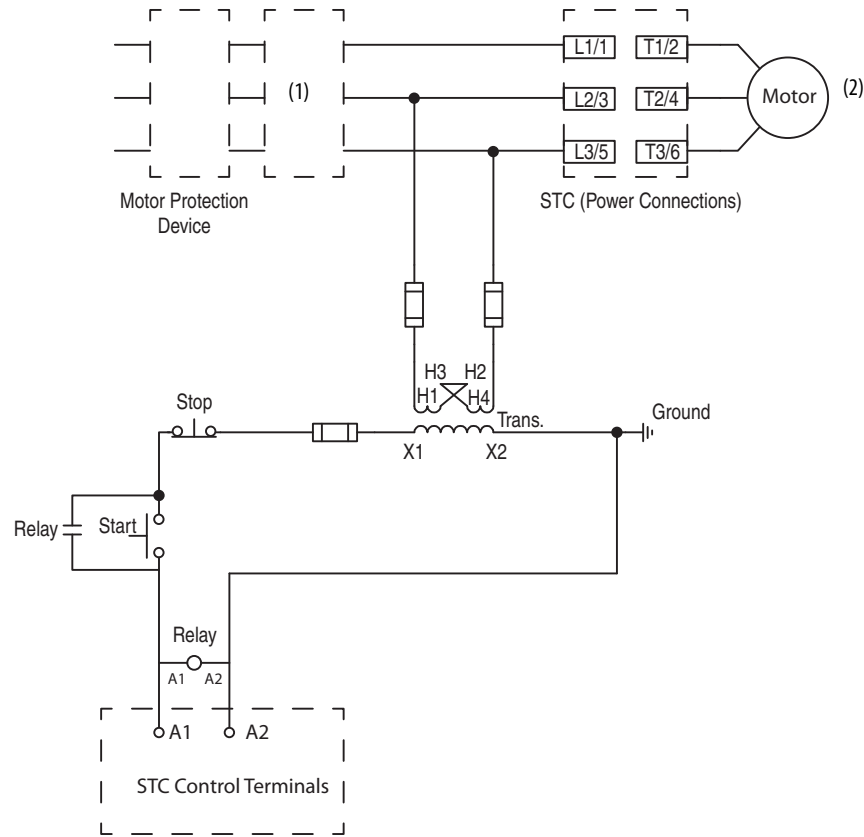


**Figure 11 - Two-wire Configuration**



- (1) Cat. No. 154-TP1C requires electrical isolation.
- (2) Customer supplied.

**Figure 12 - Three-wire Configuration**



(1) Cat. No. 154-TP1C requires electrical isolation.  
 (2) Customer supplied.

**Table 11 - Filtering—EN/IEC Class A Compliance**

| Cat. No.                   | Suggested Filter for Compliance <sup>(1)</sup> | Max. Motor Current [A] |
|----------------------------|--|------------------------|
| 154-SP1C...                | No filter required                             | up to 5 A              |
|                            | 10 nF/275V/X1                                  | >5A...10 A             |
|                            | 100 nF/275V/X1                                 | >10 A...25 A           |
| 154-TP1C...<br>154-TP2C... | No filter required                             | up to 5 A              |
|                            | 10 nF/760V/X1                                  | >5A...10 A             |
|                            | 100 nF/760V/X1                                 | >10 A...25 A           |

(1) The filter recommendations are for compliance to EN-5501 Class A.

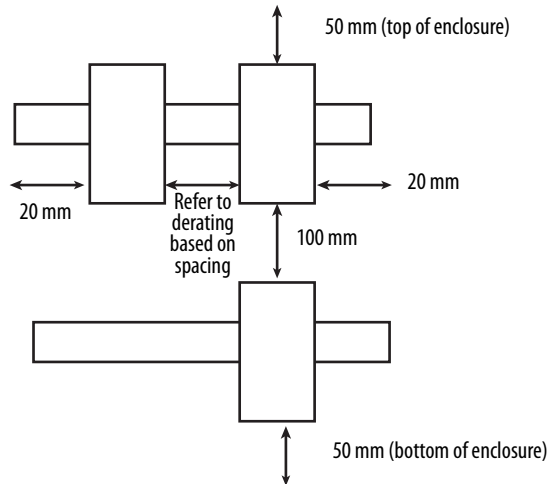
You must take note of the following considerations when applying filters.

- Control input lines must be installed together to maintain products' susceptibility to Radio Frequency Interference.
- Use of AC solid-state devices may, according to the application and the load current, cause conducted radio interferences. Use of filters on mains may be necessary for cases where the user must meet E.M.C requirements. The capacitor values given inside the filtering specification tables should be taken only as indications, the attenuation will depend on the final application.
- This product has been designed for Class A equipment. Use of this product in domestic environments may cause radio interference, in which case you may be required to employ additional mitigation methods.
- Surge tests were carried out with the signal line impedance network. In case the line impedance is less than 40 Ω, it is suggested that AC supply is provided through a secondary circuit where the short circuit limit between conductors or between conductors and ground is 1500VA or less.

## Approximate Dimensions

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

**Figure 13 - Recommended Spacing**



**Table 12 - Derating Spacing Table**

| Ambient Temperature [°C (°F)] | Spacing [mm (in.)] | Load Current per Pole [AAC] |      |      |                      |      |      |                      |      |      |
|-------------------------------|--------------------|-----------------------------|------|------|----------------------|------|------|----------------------|------|------|
|                               |                    | 154-SP1                     |      |      | 154-TP1              |      |      | 154-TP2              |      |      |
|                               |                    | 12 A                        | 16 A | 25 A | 12 A                 | 16 A | 25 A | 12 A                 | 16 A | 25 A |
| 40 (104)                      | 0 (0)              | No Derating Required        |      | 20   | No Derating Required |      | 20   | No Derating Required |      |      |
|                               | 20 (0.79)          |                             |      | 22   |                      |      | 22   |                      |      |      |
|                               | 50 (1.97)          |                             |      | 23   |                      |      | 23   |                      |      |      |
| 50 (122)                      | 0 (0)              | No Derating Required        |      | 17   | No Derating Required |      | 17   | 11                   | 15   | 22   |
|                               | 20 (0.79)          |                             |      | 19   |                      |      | 19   | No Derating Required |      |      |
|                               | 50 (1.97)          |                             |      | 20   |                      |      | 20   |                      |      |      |
| 60 (140)                      | 0 (0)              | 12                          | 15   | 15   | 11                   | 15   | 15   | 10                   | 14   | 20   |
|                               | 20 (0.79)          | No Derating Required        |      | 17   | No Derating Required |      | 17   | No Derating Required |      |      |
|                               | 50 (1.97)          |                             |      | 18   |                      |      | 18   |                      |      |      |





Figure 16 - Cat. No. 154-TP1C12, -TP2C12

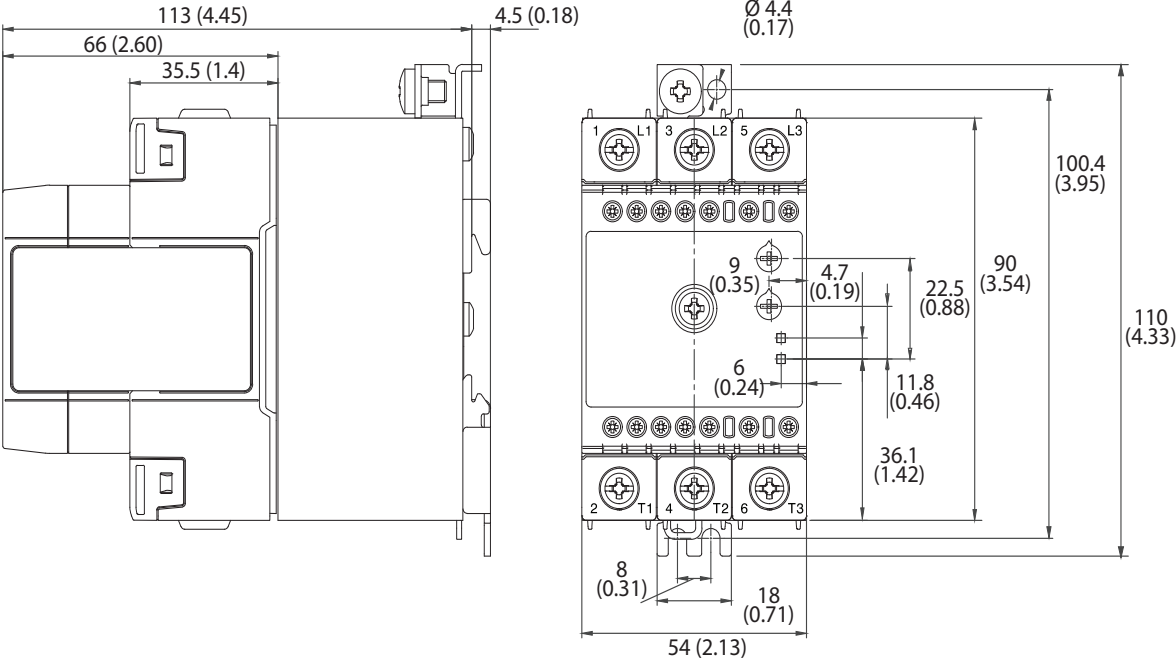
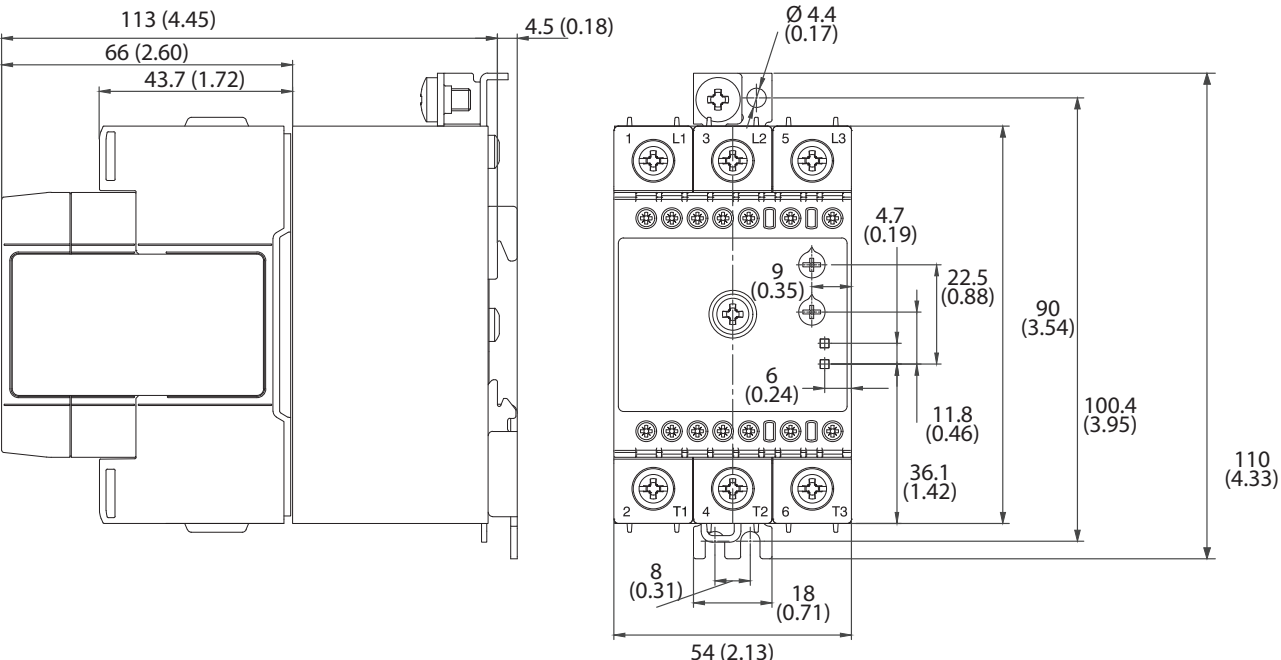
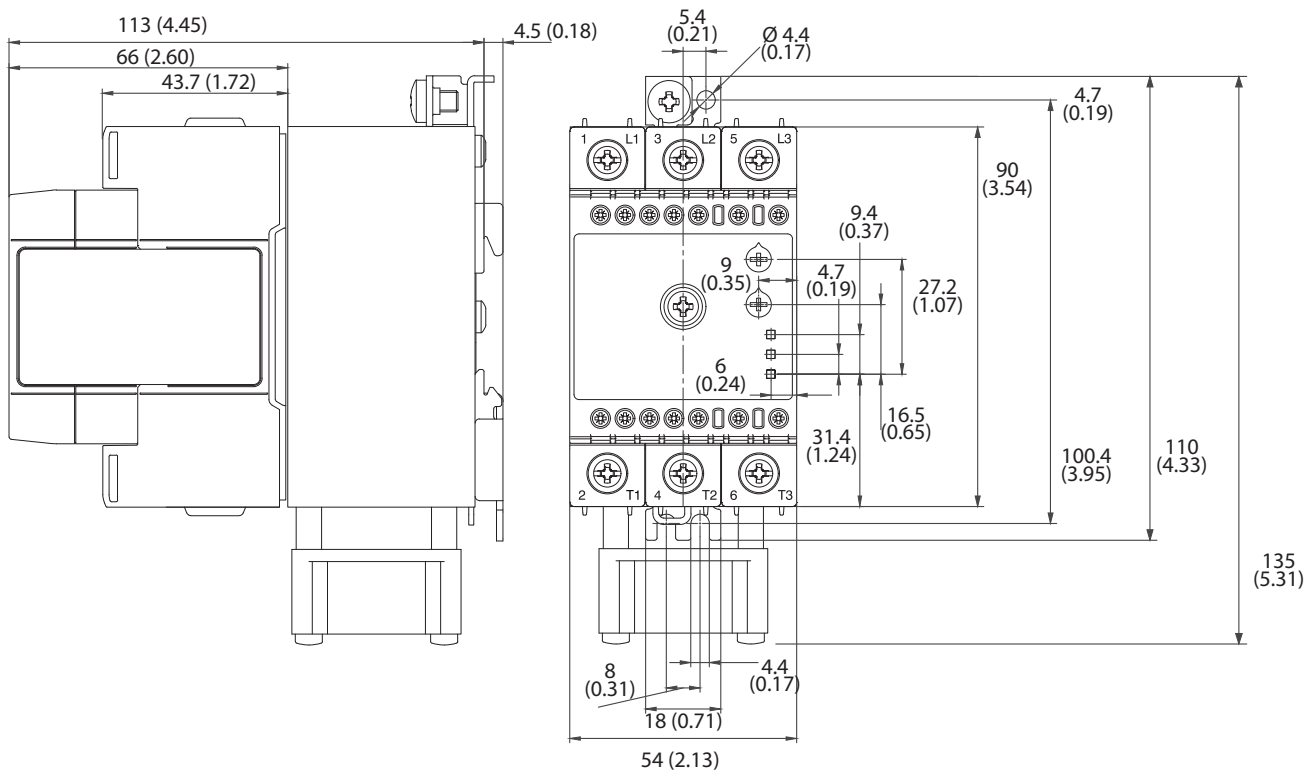


Figure 17 - Cat. No. 154-TP1C16, -TP1C25, -TP2C16



**Figure 18 - Cat. No. 154-TP2C25**



**Notes:**

## Rockwell Automation Support

Use the following resources to access support information.

|   |   |  |
|---|---|--|
| <b>Technical Support Center</b>                         | Knowledgebase Articles, How-to Videos, FAQs, Chat, User Forums, and Product Notification Updates.                     | <a href="http://www.rockwellautomation.com/knowledgebase">www.rockwellautomation.com/knowledgebase</a>   |
| <b>Local Technical Support Phone Numbers</b>            | Locate the phone number for your country.   | <a href="http://www.rockwellautomation.com/global/support/get-support-now.page">www.rockwellautomation.com/global/support/get-support-now.page</a> |
| <b>Direct Dial Codes</b>                                | Find the Direct Dial Code for your product. Use the code to route your call directly to a technical support engineer. | <a href="http://www.rockwellautomation.com/global/support/direct-dial.page">www.rockwellautomation.com/global/support/direct-dial.page</a>         |
| <b>Literature Library</b>                               | Installation Instructions, Manuals, Brochures, and Technical Data.  | <a href="http://www.rockwellautomation.com/literature">www.rockwellautomation.com/literature</a>   |
| <b>Product Compatibility and Download Center (PCDC)</b> | Get help determining how products interact, check features and capabilities, and find associated firmware.            | <a href="http://www.rockwellautomation.com/global/support/pcdc.page">www.rockwellautomation.com/global/support/pcdc.page</a>                       |

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