

Type S701, Soft Start Controller

Soft Start Controllers



S701E15N3S

Application Description

The S701 line of soft start controllers is specifically designed to be a low cost option for soft starting small (15 hp and down) 3-phase motors. The S701 unit controls current on two of three motor phases to control the torque being applied to the motor, allowing for smooth starting of a motor. The S701 is designed to be used with a Manual Motor Starter or a full voltage starter. These devices provide the necessary overload protection for the motor and also provide line isolation for the motor. Short-circuit protection can be provided by fuses or circuit breakers.

- Soft Stop (.5 – 10 seconds)
- Unlimited number of START/STOP operations per hour
- IP20 finger protection
- Fractional to 15 hp motors @ 480V (20 hp @ 600V)

Benefits

- Reduced wear on belts, gears, chains, clutches, shafts and bearings
- Allows for controlling the inrush current to the motor
- Reduced water-hammer in pump-ing applications
- Less shock to product on conveyor lines and material handling gear

Features

- Rated operational voltage up to 600V AC
- Control voltage range from 24 to 480V AC/DC
- Adjustable ramp times (.5 – 10 seconds)
- Adjustable initial torque control (0 – 85%)
- Kick Start feature

Standards and Certifications

- IEC 947 compliant
- EN 60947-4-2
- CE marked
- CSA Certified
- UL Listed
- cUL Listed

Product Description

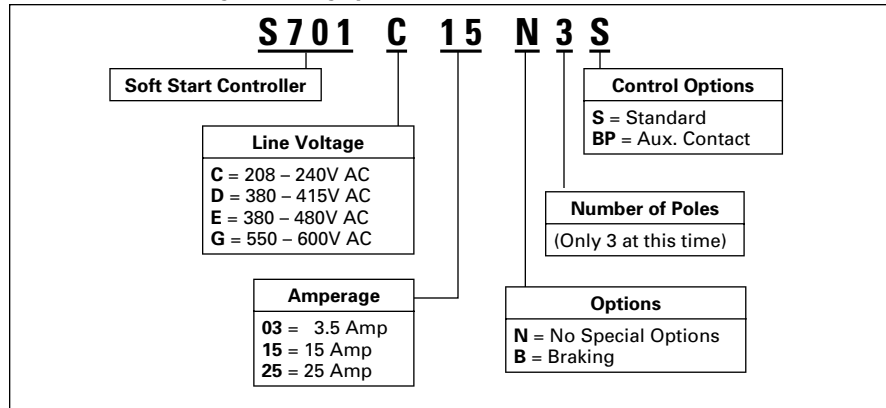
The S701 device is a Reduced Voltage Soft Start Controller designed to control acceleration and deceleration of 3-phase motors. The S701 provides the user with the ability to adjust initial torque, ramp up and down time and also select Kick Start for high inertial loads.



S701E25N3S

Catalog Number Selection — S701

Table 39-4. S701 Catalog Numbering System



Product Selection

Table 39-3. Soft Start Controllers

| Max. Current | Line Voltage | Control Voltage (V AC/V DC) | 3-Phase Motor        |            |        |                              |        |         |        |         |        |         | Catalog Number | Price U.S. \$ |  |
|--------------|--------------|-----------------------------|----------------------|------------|--------|------------------------------|--------|---------|--------|---------|--------|---------|----------------|---------------|--|
|              |              |                             | kW Rating (50 Hertz) |            |        | Horsepower Rating (60 Hertz) |        |         |        |         |        |         |                |               |  |
|              |              |                             | 230V                 | 380 – 400V | 440V   | 200V                         |        | 230V    |        | 460V    |        | 575V    |                |               |  |
|              |              |                             | 1.0 SF               | 1.15 SF    | 1.0 SF | 1.15 SF                      | 1.0 SF | 1.15 SF | 1.0 SF | 1.15 SF | 1.0 SF | 1.15 SF |                |               |  |
| 3.5          | 208 – 240    | 24 – 240                    | 7.5                  | N/A        | N/A    | 1                            | 1      | 1       | 1      | N/A     | N/A    | N/A     | N/A            | S701C03N3S    |  |
| 3.5          | 380 – 415    | 24 – 300                    | N/A                  | 1.1        | N/A    | N/A                          | N/A    | N/A     | N/A    | 1-1/2   | 1-1/2  | N/A     | N/A            | S701D03N3S    |  |
| 3.5          | 440 – 480    | 24 – 300                    | N/A                  | N/A        | 1.5    | N/A                          | N/A    | N/A     | N/A    | 2       | 2      | N/A     | N/A            | S701E03N3S    |  |
| 3.5          | 500 – 600    | 24 – 300                    | N/A                  | N/A        | N/A    | N/A                          | N/A    | N/A     | N/A    | N/A     | N/A    | 2       | 2              | S701G03N3S    |  |
| 15           | 208 – 240    | 24 – 240                    | 4                    | N/A        | N/A    | 3                            | 3      | 3       | 3      | N/A     | N/A    | N/A     | N/A            | S701C15N3S    |  |
| 15           | 380 – 480    | 24 – 300                    | N/A                  | 5.5        | 7.5    | N/A                          | N/A    | N/A     | N/A    | 10      | 7-1/2  | N/A     | N/A            | S701E15N3S    |  |
| 15           | 500 – 600    | 24 – 300                    | N/A                  | N/A        | N/A    | N/A                          | N/A    | N/A     | N/A    | N/A     | 10     | 10      |                | S701G15N3S    |  |
| 25           | 208 – 240    | 24 – 240                    | 7.5                  | N/A        | N/A    | 5                            | 5      | 7-1/2   | 5      | N/A     | N/A    | N/A     | N/A            | S701C25N3S    |  |
| 25           | 380 – 480    | 24 – 300                    | N/A                  | 11         | 12.5   | N/A                          | N/A    | N/A     | N/A    | 15      | 15     | N/A     | N/A            | S701E25N3S    |  |
| 25           | 500 – 600    | 24 – 300                    | N/A                  | N/A        | N/A    | N/A                          | N/A    | N/A     | N/A    | N/A     | 20     | 20      |                | S701G25N3S    |  |

Discount Symbol ..... 1CD-1

## Technical Data — Specifications

**Table 39-5. Soft Starter — S701XXN3S**

|                          | S701C03N3S | S701D03N3S | S701E03N3S | S701G03N3S |
|--------------------------|------------|------------|------------|------------|
| Maximum Current Capacity | 3.5        | 3.5        | 3.5        | 3.5        |
| Trip Class — 10A         | 3.5        | 3.5        | 3.5        | 3.5        |
| — 10                     | 3.5        | 3.5        | 3.5        | 3.5        |
| — 20                     | 2.8        | 2.8        | 2.8        | 2.8        |
| — 30                     | 2.1        | 2.1        | 2.1        | 2.1        |

**Dimensions**

|                       |                              |            |            |            |
|-----------------------|------------------------------|------------|------------|------------|
| Width in Inches (mm)  | .89 (22.5)                   | .89 (22.5) | .89 (22.5) | .89 (22.5) |
| Height in Inches (mm) | 3.94 (100)                   | 3.94 (100) | 3.94 (100) | 3.94 (100) |
| Depth in Inches (mm)  | 5.01 (127)                   | 5.01 (127) | 5.01 (127) | 5.01 (127) |
| Weight in lbs. (kg)   | .6 (270)                     | .6 (270)   | .6 (270)   | .6 (270)   |
| Drawing               | See Figure 39-2 (Page 39-13) |            |            |            |

**Electrical Characteristics**

|                                       |              |           |           |           |
|---------------------------------------|--------------|-----------|-----------|-----------|
| Line Voltage (V AC)                   | 208 – 240    | 380 – 415 | 440 – 480 | 500 – 600 |
| Operating Frequency (Hz)              | 50/60        | 50/60     | 50/60     | 50/60     |
| Leakage Current                       | 5 mA AC Max. |           |           |           |
| Minimum Operational Current           | 50 mA        |           |           |           |
| Control Voltage (V AC/V DC)           | 24 – 240     | 24 – 300  | 24 – 300  | 24 – 300  |
| Pick-Up Voltage Max.                  | 20.4V AC/DC  |           |           |           |
| Drop out Voltage Min.                 | 5V AC/DC     |           |           |           |
| Max. Control Current for No Operation | 1 mA         | 1 mA      | 1 mA      | 1 mA      |
| Response Time Max.                    | 70 mS        | 70 mS     | 70 mS     | 70 mS     |

**Control Characteristics**

|                             |         |         |         |         |
|-----------------------------|---------|---------|---------|---------|
| Ramp Time (Secs)            | .5 – 10 | .5 – 10 | .5 – 10 | .5 – 10 |
| Ramp Settings (% LRT)       | 85%     | 85%     | 85%     | 85%     |
| Kick Start Settings (% LRT) | 85%     | 85%     | 85%     | 85%     |
| Soft Stop (secs)            | .5 – 10 | .5 – 10 | .5 – 10 | .5 – 10 |

**Environment Characteristics**

|  |                           |             |             |             |
|--|---------------------------|-------------|-------------|-------------|
| Temperature – Operating (no derating)        | -30° – 40°C               | -30° – 40°C | -30° – 40°C | -30° – 40°C |
| Current Rating 50°C                          | NA                        | NA          | NA          | NA          |
| Limited Duty Cycle 50°C                      | NA                        |             |             |             |
| Current Rating 60°C                          | NA                        | NA          | NA          | NA          |
| Limited Duty Cycle 60°C                      | NA                        |             |             |             |
| Temperature – Storage                        | -30° – 80°C               | -30° – 80°C | -30° – 80°C | -30° – 80°C |
| Altitude (Meters) – No Derating              | 2000                      | 2000        | 2000        | 2000        |
| Humidity                                     | 95% Non-condensing        |             |             |             |
| Operating Position (no derating)             | Vertical ± 30°            |             |             |             |
| Impulse Withstand Voltage IEC 947-4-1        | 4000V                     | 4000V       | 4000V       | 4000V       |
| Rated Insulation Voltage (Ui)                | 660V                      |             |             |             |
| Installation Category                        | III                       |             |             |             |
| Vibration                                    | IEC 68-2-6 5g 10 – 150 Hz |             |             |             |
| Power Dissipation for Intermittent Operation | 4 W/A x Duty Cycle        |             |             |             |
| Power Dissipation for Continuous Operation   | 4 W/A x Duty Cycle        |             |             |             |
| Cooling Method                               | Natural Convection        |             |             |             |
| Degree of Protection                         | IP20                      | IP20        | IP20        | IP20        |
| Pollution Degree                             | 3                         | 3           | 3           | 3           |
| Agency Approvals                             | UL, cUL, CE               |             |             |             |

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## Type S701, Soft Start Controller

**Table 39-5. Soft Starter — S701XXXN3S (Continued)**

|                          | S701C15N3S | S701E15N3S | S701G15N3S | S701C25N3S | S701E25N3S | S701G25N3S |
|--------------------------|------------|------------|------------|------------|------------|------------|
| Maximum Current Capacity | 15         | 15         | 15         | 25         | 25         | 25         |
| Trip Class — 10A         | 15         | 15         | 15         | 25         | 25         | 25         |
| — 10                     | 15         | 15         | 15         | 25         | 25         | 25         |
| — 20                     | 12         | 12         | 12         | 20         | 20         | 20         |
| — 30                     | 10         | 10         | 10         | 15         | 15         | 15         |

**Dimensions**

|                       |                              |            |            |                              |             |             |
|-----------------------|------------------------------|------------|------------|------------------------------|-------------|-------------|
| Width in Inches (mm)  | 1.77 (45)                    | 1.77 (45)  | 1.77 (45)  | 3.54 (90)                    | 3.54 (90)   | 3.54 (90)   |
| Height in Inches (mm) | 3.94 (100)                   | 3.94 (100) | 3.94 (100) | 3.94 (100)                   | 3.94 (100)  | 3.94 (100)  |
| Depth in Inches (mm)  | 5.04 (128)                   | 5.04 (128) | 5.04 (128) | 5.04 (128)                   | 5.04 (128)  | 5.04 (128)  |
| Weight in lbs. (kg)   | 1.52 (690)                   | 1.52 (690) | 1.52 (690) | 2.53 (1150)                  | 2.53 (1150) | 2.53 (1150) |
| Drawing               | See Figure 39-3 (Page 39-13) |            |            | See Figure 39-4 (Page 39-13) |             |             |

**Electrical Characteristics**

|                                       |              |           |           |              |           |           |
|---------------------------------------|--------------|-----------|-----------|--------------|-----------|-----------|
| Line Voltage (V AC)                   | 208 – 240    | 380 – 480 | 500 – 600 | 208 – 240    | 380 – 480 | 500 – 600 |
| Operating Frequency (Hz)              | 50/60        | 50/60     | 50/60     | 50/60        | 50/60     | 50/60     |
| Leakage Current                       | 5 mA AC max. |           |           | 5 mA AC max. |           |           |
| Minimum Operational Current           | 50 mA        |           |           | 50 mA        |           |           |
| Control Voltage (V AC/V DC)           | 24 – 240     | 24 – 480  | 24 – 480  | 24 – 240     | 24 – 300  | 24 – 300  |
| Pick-Up Voltage Max.                  | 20.4V AC/DC  |           |           | 20.4 V AC/DC |           |           |
| Drop Out Voltage Min.                 | 5V AC/DC     |           |           | 5V AC/DC     |           |           |
| Max. Control Current for No Operation | 1 mA         | 1 mA      | 1 mA      | 1 mA         | 1 mA      | 1 mA      |
| Response Time Max.                    | 70 mS        | 70 mS     | 70 mS     | 70 mS        | 70 mS     | 70 mS     |

**Control Characteristics**

|                             |         |         |         |         |         |         |
|-----------------------------|---------|---------|---------|---------|---------|---------|
| Ramp Time (secs)            | .5 – 10 | .5 – 10 | .5 – 10 | .5 – 10 | .5 – 10 | .5 – 10 |
| Ramp Settings (% LRT)       | 85%     | 85%     | 85%     | 85%     | 85%     | 85%     |
| Kick Start Settings (% LRT) | 85%     | 85%     | 85%     | 85%     | 85%     | 85%     |
| Soft Stop (secs)            | .5 – 10 | .5 – 10 | .5 – 10 | .5 – 10 | .5 – 10 | .5 – 10 |

**Environment Characteristics**

|  |  |             |             |  |             |             |
|--|--|-------------|-------------|--|-------------|-------------|
| Temperature — Operating (no derating)        | -30° – 40°C  | -30° – 40°C | -30° – 40°C | -30° – 40°C  | -30° – 40°C | -30° – 40°C |
| Current Rating 50°C                          | 12.5 Amps  | 12.5 Amps   | 12.5 Amps   | 20 Amps  | 20 Amps     | 20 Amps     |
| Limited Duty Cycle 50°C                      | 15A on-time max.<br>15 min. duty cycle<br>max. .8  |             |             | 25A on-time max.<br>15 min. duty cycle<br>max. .8  |             |             |
| Current Rating 60°C                          | 10 Amps  | 10 Amps     | 10 Amps     | 17 Amps  | 17 Amps     | 17 Amps     |
| Limited Duty Cycle 60°C                      | 15A on-time max.<br>15 min. duty cycle<br>max. .65 |             |             | 25A on-time max.<br>15 min. duty cycle<br>max. .65 |             |             |
| Temperature — Storage                        | -30° – 80°C  | -30° – 80°C | -30° – 80°C | -30° – 80°C  | -30° – 80°C | -30° – 80°C |
| Altitude (Meters) — No Derating              | 2000   | 2000        | 2000        | 2000   | 2000        | 2000        |
| Humidity                                     | 95% Non-condensing                                 |             |             |  |             |             |
| Operating Position (no derating)             | Vertical ± 30°                                     |             |             |  |             |             |
| Impulse Withstand Voltage IEC 947-4-1        | 4000V  | 4000V       | 4000V       | 4000V  | 4000V       | 4000V       |
| Rated Insulation Voltage (Ui)                | 660V   |             |             | 660V   |             |             |
| Installation Category                        | III  |             |             | III  |             |             |
| Vibration                                    | IEC 68-2-6 5g 10 – 150 Hz                          |             |             | IEC 68-2-6 5g 10 – 150 Hz                          |             |             |
| Power Dissipation for Intermittent Operation | 2 W/A x Duty Cycle                                 |             |             | 2 W/A x Duty Cycle                                 |             |             |
| Power Dissipation for Continuous Operation   | 2 W/A  |             |             | 2 W/A  |             |             |
| Cooling Method                               | Natural Convection                                 |             |             |  |             |             |
| Degree of Protection                         | IP20   | IP20        | IP20        | IP20   | IP20        | IP20        |
| Pollution Degree                             | 3  | 3           | 3           | 3  | 3           | 3           |
| Agency Approvals                             | UL, CSA, CE  |             |             |  |             |             |

**Type S701, Soft Start with Auxiliary Contact**

**Soft Start Controllers with Auxiliary Contact**

**Product Description**

The S701 device is a Reduced Voltage Soft Start Controller designed to control acceleration and deceleration of 3-phase motors. With the Auxiliary Contact, it is possible to control an external bypass to reduce heating and increase acceleration and deceleration times.

The unit provides the user with the ability to adjust initial torque, ramp up and down time and also select Kick Start for high inertia loads.

**Application Description**

The S701 line of soft start controllers is specifically designed to be a low cost option for soft starting small (15 hp and down) 3-phase motors. The Auxiliary Contact is designed to work in conjunction with an across-the-line contactor. The purpose of the contactor is to provide a parallel current path once the soft starter has brought the motor up to speed. Once the soft start controller reaches end of ramp, the

auxiliary contact will close and send a signal to close the bypass contactor, thus providing a low impedance path for the current to the motor. The S701 unit controls current on two of three motor phases to control the torque being applied to the motor, allowing for smooth starting of a motor. The S701 is designed to be used with a Manual Motor Protector or a full voltage starter. These devices provide the necessary overload protection for the motor and also provide line isolation for the motor. Short-circuit protection can be provided by fuses or circuit breakers.

**Features**

- Rated operational voltage up to 600V AC
- Control voltage range from 24 to 300V AC/DC
- Adjustable ramp times (.5 – 20 seconds)
- Adjustable initial torque control (0 – 85%)
- Kick Start feature (0 – 85% adjustment)
- Kick Start for 200 mS
- Soft Stop (.5 – 20 seconds)

- IP20 finger protection
- Available up to 30 Amps (with Bypass installed)
- Auxiliary contact for up-to-speed indication

**Benefits**

- Reduced wear on belts, gears, chains, clutches, shafts and bearings
- Bypass option allows for greater current capacity in the unit
- Bypass option helps to reduce heat in the enclosure
- Allows for controlling the inrush current to the motor
- Reduced water-hammer in pumping applications
- Less shock to product on conveyor lines and material handling gear

**Standards and Certifications**

- IEC 947 compliant
- EN 60947-4-2
- CE marked
- cUL Listed
- UL Listed

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**Product Selection**

**Table 39-6. Soft Start Controller with Auxiliary Contact**

| Max. Current                  | Line Voltage | Control Voltage (V AC/V DC) | 3-Phase Motor        |            |        |                   |        |         |        |         |     |      | Catalog Number | Price U.S. \$ |  |
|-------------------------------|--------------|-----------------------------|----------------------|------------|--------|-------------------|--------|---------|--------|---------|-----|------|----------------|---------------|--|
|                               |              |                             | kW Rating (50 Hertz) |            |        | Horsepower Rating |        |         |        |         |     |      |                |               |  |
|                               |              |                             | 230V                 | 380 – 400V | 440V   | 200V              |        | 230V    |        | 460V    |     | 575V |                |               |  |
|                               |              |                             | 1.0 SF               | 1.15 SF    | 1.0 SF | 1.15 SF           | 1.0 SF | 1.15 SF | 1.0 SF | 1.15 SF |     |      |                |               |  |
| <b>Ratings without Bypass</b> |              |                             |                      |            |        |                   |        |         |        |         |     |      |                |               |  |
| 25                            | 208 – 240    | 24 – 240                    | 5.5                  | N/A        | N/A    | 5                 | 5      | 7-1/2   | 5      | N/A     | N/A | N/A  | N/A            | S701C25N3BP   |  |
| 25                            | 380 – 480    | 24 – 300                    | N/A                  | 12.5       | 12.5   | N/A               | N/A    | N/A     | N/A    | 15      | 15  | N/A  | N/A            | S701E25N3BP   |  |
| 25                            | 500 – 600    | 24 – 300                    | N/A                  | N/A        | N/A    | N/A               | N/A    | N/A     | N/A    | N/A     | N/A | 20   | 20             | S701G25N3BP   |  |
| <b>Ratings with Bypass</b>    |              |                             |                      |            |        |                   |        |         |        |         |     |      |                |               |  |
| 30                            | 208 – 240    | 24 – 240                    | 7.5                  | N/A        | N/A    | 7-1/2             | 7-1/2  | 10      | 7-1/2  | N/A     | N/A | N/A  | N/A            | S701C25N3BP   |  |
| 30                            | 380 – 480    | 24 – 300                    | N/A                  | 15         | 15     | N/A               | N/A    | N/A     | N/A    | 20      | 15  | N/A  | N/A            | S701E25N3BP   |  |
| 30                            | 500 – 600    | 24 – 300                    | N/A                  | N/A        | N/A    | N/A               | N/A    | N/A     | N/A    | N/A     | N/A | 25   | 20             | S701G25N3BP   |  |

**Note:** For S701 Catalog Number Selection, see **Table 39-4, Page 39-4.**

Discount Symbol ..... **1CD-1**

## Type S701, Soft Start with Auxiliary Contact

### Technical Data — Specifications

**Table 39-7. Soft Starter — S701XXXN3BP**

|   | S701C25N3BP | S701E25N3BP | S701G25N3BP |
|---|-------------|-------------|-------------|
| Maximum Current Capacity with Bypass (without Bypass) | 30 (25)     | 30 (25)     | 30 (25)     |
| Trip Class — 10A                                      | 30 (25)     | 30 (25)     | 30 (25)     |
| — 10  | 30 (25)     | 30 (25)     | 30 (25)     |
| — 20  | 24 (20)     | 24 (20)     | 24 (20)     |
| — 30  | 19.5 (15)   | 19.5 (15)   | 19.5 (15)   |

**Dimensions**

|                       |                                     |             |             |
|-----------------------|-------------------------------------|-------------|-------------|
| Width in Inches (mm)  | 3.54 (90)                           | 3.54 (90)   | 3.54 (90)   |
| Height in Inches (mm) | 3.94 (100)                          | 3.94 (100)  | 3.94 (100)  |
| Depth in Inches (mm)  | 5.04 (128)                          | 5.04 (128)  | 5.04 (128)  |
| Weight in lbs. (kg)   | 2.53 (1150)                         | 2.53 (1150) | 2.53 (1150) |
| Drawing               | See <b>Figure 39-4 (Page 39-13)</b> |             |             |

**Electrical Characteristics**

|                                       |              |           |           |
|---------------------------------------|--------------|-----------|-----------|
| Line Voltage (V AC)                   | 208 – 240    | 380 – 480 | 500 – 600 |
| Operating Frequency (Hz)              | 50/60        | 50/60     | 50/60     |
| Leakage Current                       | 5 mA AC max. |           |           |
| Minimum Operational Current           | 50 mA        |           |           |
| Control Voltage (V AC/V DC)           | 24 – 240     | 24 – 300  | 24 – 300  |
| Pick-Up Voltage Max.                  | 20.4 V AC/DC |           |           |
| Drop Out Voltage Min.                 | 5V AC/DC     |           |           |
| Max. Control Current for No Operation | 1 mA         | 1 mA      | 1 mA      |
| Response Time Max.                    | 70 mS        | 70 mS     | 70 mS     |

**Control Characteristics**

|                             |         |         |         |
|-----------------------------|---------|---------|---------|
| Ramp Time (secs)            | .5 – 20 | .5 – 20 | .5 – 20 |
| Ramp Settings (% LRT)       | 85%     | 85%     | 85%     |
| Kick Start Settings (% LRT) | 85%     | 85%     | 85%     |
| Soft Stop (secs)            | .5 – 20 | .5 – 20 | .5 – 20 |

**Environmental Characteristics**

|   |  |             |             |
|---|--|-------------|-------------|
| Temperature — Operating (no derating)         | -30° – 40°C  | -30° – 40°C | -30° – 40°C |
| Current Rating 50°C                           | 20 Amps  | 20 Amps     | 20 Amps     |
| Limited Duty Cycle 50°C                       | 25A on-time max.<br>15 min. duty cycle<br>max. .8  |             |             |
| Current Rating 60°C                           | 17 Amps  | 17 Amps     | 17 Amps     |
| Limited Duty Cycle 60°C                       | 25A on-time max.<br>15 min. duty cycle<br>max. .65 |             |             |
| Temperature — Storage                         | -30° – 80°C  | -30° – 80°C | -30° – 80°C |
| Altitude (Meters) — No Derating               | 2000   | 2000        | 2000        |
| Humidity                                      | 95% Non-condensing                                 |             |             |
| Operating Position (no derating)              | Vertical ± 30°                                     |             |             |
| Impulse Withstand Voltage IEC 947-4-1         | 4000V  | 4000V       | 4000V       |
| Rated Insulation Voltage (Ui)                 | 660V   | 660V        | 660V        |
| Installation Category                         | III  | III         | III         |
| Vibration                                     | IEC 68-2-6 5g 10 – 150 Hz                          |             |             |
| Power Dissipation for Continuous Operation    | 2 W/A without Bypass                               |             |             |
| Power Dissipation with Semiconductor Bypassed | 5 W/A max. with Bypass                             |             |             |
| Cooling Method                                | Natural Convection                                 |             |             |
| Degree of Protection                          | IP20   | IP20        | IP20        |
| Pollution Degree                              | 3  | 3           | 3           |
| Agency Approvals                              | UL, cUL, CE  |             |             |

**Type S701, Soft Start with Brake**

**Soft Start Controllers with Brake**



**S701E25B3S**

**Product Description**

The S701 Soft Start Controller with DC Injection Brake is designed to control acceleration and deceleration of 3-phase motors. Brake current is adjustable from 0 – 50A DC. The ramp-up feature is adjustable from .5 – 10 seconds. Torque adjustment is adjustable with or without break loose (Kick Start) function.

**Application Description**

The S701 line of soft start controllers is specifically designed to be a low cost option for soft starting small (15 hp and down) 3-phase motors. The braking option is a DC injection system, allowing for fast stopping of a 3-phase motor. The S701 unit controls current on two of the three phases to control the torque being applied to the motor, allowing for smooth starting of a motor. The S701 is designed to be used with a Manual Motor Starter or a full voltage starter. These devices provide the necessary overload protection for the motor and also provide line isolation for the motor. Short-circuit protection can be provided by fuses or circuit breakers.

**Features**

- Rated operational voltage up to 480V AC
- Control voltage range from 24 to 300V AC/DC
- Adjustable ramp times (.5 – 20 seconds)
- Adjustable initial torque control (0 – 85%)
- Kick Start feature (0 – 85% adjustment)

- Kick Start for 200 mS
- IP20 finger protection
- Braking control adjustable from 0 – 50A DC
- Slow speed: 7.5% or 10% of nominal speed

**Benefits**

- Reduced wear on bolts, gears, chains, clutches, shafts and bearings
- Braking option allows for quick stopping of loads
- Brake control can help eliminate expensive mechanical brakes
- Allows for controlling the inrush current to the motor
- Reduced water-hammer in pumping applications
- Less shock to product on conveyor lines and material handling gear

**Standards and Certifications**

- IEC 947 compliant
- EN 60947-4-2
- CE marked
- cUL Listed
- UL Listed

**Product Selection**

**Table 39-8. Soft Start Controller with Brake**

| Max. Current | Line Voltage | Control Voltage (V AC/V DC) | 3-Phase Motor        |            |        |                   |        |         |     |      |     | Catalog Number           | Price U.S. \$ |
|--------------|--------------|-----------------------------|----------------------|------------|--------|-------------------|--------|---------|-----|------|-----|--------------------------|---------------|
|              |              |                             | kW Rating (50 Hertz) |            |        | Horsepower Rating |        |         |     |      |     |                          |               |
|              |              |                             | 230V                 | 380 – 400V | 440V   | 200V              |        | 230V    |     | 460V |     |                          |               |
|              |              |                             | 1.0 SF               | 1.15 SF    | 1.0 SF | 1.15 SF           | 1.0 SF | 1.15 SF |     |      |     |                          |               |
| 25           | 208 – 240    | 24 – 240                    | 5.5                  | N/A        | N/A    | 5                 | 5      | 7-1/2   | 5   | N/A  | N/A | S701C25B3S<br>S701E25B3S |               |
| 25           | 380 – 480    | 24 – 300                    | N/A                  | 12.5       | 12.5   | N/A               | N/A    | N/A     | N/A | 15   | 15  |                          |               |

**Note:** For S701 Catalog Number Selection, see Table 39-4, Page 39-4.

## Type S701, Soft Start with Brake

### Technical Data — Specifications

**Table 39-9. Soft Start Controller with Brake — S701XXB3S**

|                          | S701C25B3S | S701E25B3S |
|--------------------------|------------|------------|
| Maximum Current Capacity | 25         | 25         |
| Trip Class — 10A         | 25         | 25         |
| — 10                     | 25         | 25         |
| — 20                     | 20         | 20         |
| — 30                     | 15         | 15         |

**Dimensions**

|                       |                                     |             |
|-----------------------|-------------------------------------|-------------|
| Width in Inches (mm)  | 3.54 (90)                           | 3.54 (90)   |
| Height in Inches (mm) | 3.94 (100)                          | 3.94 (100)  |
| Depth in Inches (mm)  | 5.04 (128)                          | 5.04 (128)  |
| Weight in lbs. (kg)   | 2.53 (1150)                         | 2.53 (1150) |
| Drawing               | See <b>Figure 39-4 (Page 39-13)</b> |             |

**Electrical Characteristics**

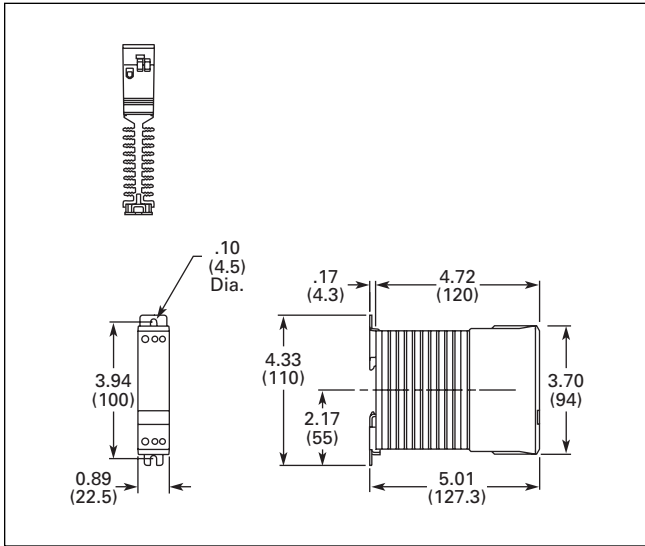
|                                       |              |           |
|---------------------------------------|--------------|-----------|
| Line Voltage (V AC)                   | 208 – 240    | 380 – 480 |
| Operating Frequency (Hz)              | 50/60        | 50/60     |
| Leakage Current                       | 5 mA AC max. |           |
| Minimum Operational Current           | 1 Amp        |           |
| Control Voltage (V AC/V DC)           | 24 – 240     | 24 – 300  |
| Pick-Up Voltage Max.                  | 20.4V AC/DC  |           |
| Drop Out Voltage Min.                 | 5V AC/DC     |           |
| Max. Control Current for No Operation | 1 mA         | 1 mA      |
| Response Time Max.                    | 100 mS       | 100 mS    |

**Control Characteristics**

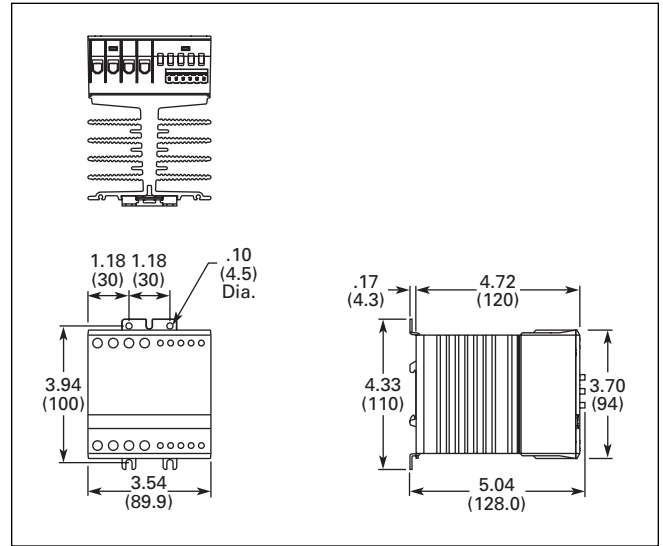
|                             |            |         |
|-----------------------------|------------|---------|
| Ramp Time (secs)            | .5 – 10    | .5 – 10 |
| Ramp Settings (% LRT)       | 85%        | 85%     |
| Kick Start Settings (% LRT) | 85%        | 85%     |
| Soft Stop (secs)            | .5 – 10    | .5 – 10 |
| Brake Current               | 0 – 50V DC |         |

|  | S701C25B3S   | S701E25B3S  |
|--|--|-------------|
| <b>Environment Characteristics</b>           |  |             |
| Temperature — Operating                      | -30° – 40°C  | -30° – 40°C |
| Current Rating 50°C                          | 20 Amps  | 20 Amps     |
| Limited Duty Cycle 50°C                      | 25A on-time max.<br>15 min. duty cycle<br>max. .8  |             |
| Current Rating 60°C                          | 17 Amps  | 17 Amps     |
| Limited Duty Cycle 60°C                      | 25A on-time max.<br>15 min. duty cycle<br>max. .65 |             |
| Temperature — Storage                        | -30° – 80°C  | -30° – 80°C |
| Altitude (Meters) — No Derating              | 2000   | 2000        |
| Humidity                                     | 95% Non-condensing                                 |             |
| Operating Position                           | Vertical ± 30°                                     |             |
| Impulse Withstand Voltage IEC 947-4-1        | 4000V  | 4000V       |
| Rated Insulation Voltage (Ui)                | 660V   | 660V        |
| Installation Category                        | III  | III         |
| Vibration                                    | IEC 68-2-6 5g 10 – 150 Hz                          |             |
| Power Dissipation for Intermittent Operation | 2 W/A x Duty Cycle                                 |             |
| Power Dissipation for Continuous Operation   | 2 W/A  |             |
| Cooling Method                               | Natural Convection                                 |             |
| Degree of Protection                         | IP20   | IP20        |
| Pollution Degree                             | 3  | 3           |
| Agency Approvals                             | UL, cUL, CE  |             |

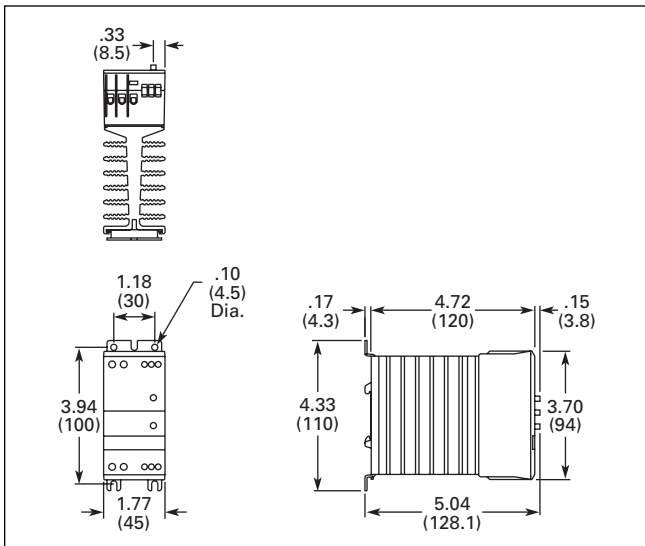
**Dimensions**



**Figure 39-2. 22.5 mm Frame — Approximate Dimensions in Inches (mm)**



**Figure 39-4. 90 mm Frame — Approximate Dimensions in Inches (mm)**



**Figure 39-3. 45 mm Frame — Approximate Dimensions in Inches (mm)**