

**Volume 1—Residential and Light Commercial**

**1**

**Volume 2—Commercial Distribution**

**2**

**Volume 3—Power Distribution and Control Assemblies**

**3**

**Volume 4—Circuit Protection**

**4**

**Volume 5—Motor Control and Protection**

**5**

**Volume 6—Solid-State Motor Control**

**6**

**Tab 1—Reduced Voltage Motor Starters . . . . . V6-T1-3**



**Volume 7—Logic Control, Operator Interface  
and Connectivity Solutions**

**7**

# Reduced Voltage Motor Starters

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S611 Soft Starters



S811+ Soft Starters



## 1.1 Solid-State Controllers

Product Overview . . . . .	V6-T1-4
Type S701, Soft Start Controllers . . . . .	V6-T1-5
Type S701, Soft Start Controllers with Auxiliary Contact . . . . .	V6-T1-11
Type S701, Soft Start Controllers with Brake . . . . .	V6-T1-14
Type S511, Semiconductor Reversing Contactors . . . . .	V6-T1-17

## 1.2 Solid-State Starters

Product Overview . . . . .	V6-T1-21
Type S611, Solid-State Soft Starters . . . . .	V6-T1-22
Type S801+, Soft Starters . . . . .	V6-T1-39
Type S811+, Soft Starters with DIM . . . . .	V6-T1-55
TRU-START . . . . .	V6-T1-79

## Soft Start Controllers



## Product Overview

**Type S701**

The S701 device is a reduced voltage soft start controller designed to control acceleration and deceleration of three-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.

**Type S701 with Auxiliary Contact**

The S701 device is a reduced voltage soft start controller designed to control acceleration and deceleration of three-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.

**Contents****Description****Page**

## Soft Start Controllers

Type S701, Soft Start Controllers . . . . . **V6-T1-5**

Type S701, Soft Start Controllers with Auxiliary Contact . . . . . **V6-T1-11**

Type S701, Soft Start Controllers with Brake . . . . . **V6-T1-14**

Type S511, Semiconductor Reversing Contactors . . . . . **V6-T1-17**

**Type S701 with Brake**

The S701 soft start controller with DC injection brake is designed to control acceleration and deceleration of three-phase motors. Brake current is adjustable from 0–50A DC. The ramp-up feature is adjustable from 0.5–10 seconds. Torque adjustment is adjustable with or without break loose (kick start) function.

**Semiconductor Reversing Contactor**

The S511 device is a semiconductor reversing contactor designed to switch three-phase motors forward and reverse. Unicore electronics and thermal design ensures high switching capacity and long lifetime.

**Type S701, Soft Start Controllers****Contents****Description****Page**

Type S701, Soft Start Controllers	
Standards and Certifications	<b>V6-T1-6</b>
Catalogue Number Selection	<b>V6-T1-6</b>
Product Selection	<b>V6-T1-6</b>
Technical Data and Specifications	<b>V6-T1-7</b>
Dimensions	<b>V6-T1-10</b>
Type S701, Soft Start Controllers with Auxiliary Contact	<b>V6-T1-11</b>
Type S701, Soft Start Controllers with Brake	<b>V6-T1-14</b>
Type S511, Semiconductor Reversing Contactors	<b>V6-T1-17</b>

**Type S701, Soft Start Controllers****Product Description**

The S701 device is a reduced voltage soft start controller designed to control acceleration and deceleration of three-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.

**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) three-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.

**Features**

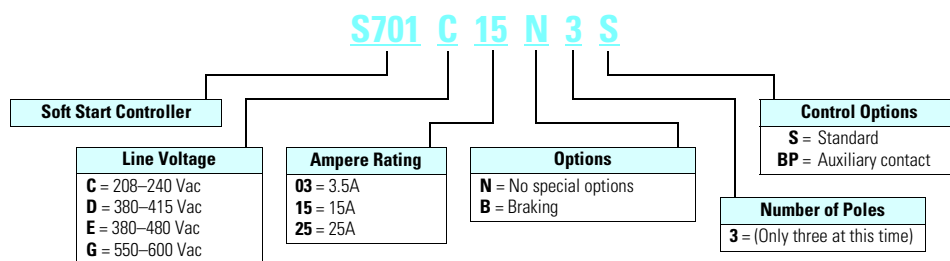
- Rated operational voltage up to 600 Vac
- Control voltage range from 24–480 Vac/Vdc
- Adjustable ramp times (0.5–10 seconds)
- Adjustable initial torque control (0–85%)
- Kick start feature
- Soft stop (0.5–10 seconds)
- Unlimited number of START/STOP operations per hour
- IP20 finger protection
- Fractional to 15 hp motors at 480V (20 hp at 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 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
- CSA certified
- UL listed (E108212)
- cUL listed

**Catalogue Number Selection****S701 Soft Starters****Product Selection****S701E15N3S****Soft Start Controllers****S701E25N3S**

Max. Current	Line Voltage	Control Voltage (Vac/Vdc)	Three-Phase Motor												Catalogue Number
			kW Rating (50 Hz)			hp Rating (60 Hz)									
			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		
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	24–415	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	24–480	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	24–480	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	24–480	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	24–480	N/A	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	24–480	N/A	11	12.5	N/A	N/A	N/A	N/A	15	15	N/A	N/A	S701E25N3S	
25	500–600	24–480	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	20	20	S701G25N3S	

## Technical Data and Specifications

## Soft Starters—S701\_03N3S

Description	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
<b>Electrical Characteristics</b>				
Line voltage (Vac)	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.	5 mA AC max.	5 mA AC max.	5 mA AC max.
Minimum operational current	50 mA	50 mA	50 mA	50 mA
Control voltage (Vac/Vdc)	24–240	24–415	24–480	24–480
Pickup voltage max.	20.4 Vac/Vdc	20.4 Vac/Vdc	20.4 Vac/Vdc	20.4 Vac/Vdc
Dropout voltage min.	5 Vac/Vdc	5 Vac/Vdc	5 Vac/Vdc	5 Vac/Vdc
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
<b>Control Characteristics</b>				
Ramp time (secs)	0.5–10	0.5–10	0.5–10	0.5–10
Ramp settings (% LRT)	85%	85%	85%	85%
Kick start settings (% LRT)	85%	85%	85%	85%
Soft stop (secs)	0.5–10	0.5–10	0.5–10	0.5–10
<b>Environment Characteristics</b>				
Temperature—operating (no derating)	–30° to 40°C	–30° to 40°C	–30° to 40°C	–30° to 40°C
Current rating 50°C	N/A	N/A	N/A	N/A
Limited duty cycle 50°C	N/A	N/A	N/A	N/A
Current rating 60°C	N/A	N/A	N/A	N/A
Limited duty cycle 60°C	N/A	N/A	N/A	N/A
Temperature—storage	–30° to 80°C	–30° to 80°C	–30° to 80°C	–30° to 80°C
Altitude (meters)—no derating	2000	2000	2000	2000
Humidity	95% noncondensing	95% noncondensing	95% noncondensing	95% noncondensing
Operating position (no derating)	Vertical ±30°	Vertical ±30°	Vertical ±30°	Vertical ±30°
Impulse withstand voltage IEC 947-4-1	4000V	4000V	4000V	4000V
Rated insulation voltage (Ui)	660V	660V	660V	660V
Installation category	III	III	III	III
Vibration	IEC 68-2-6 5g 10–150 Hz	IEC 68-2-6 5g 10–150 Hz	IEC 68-2-6 5g 10–150 Hz	IEC 68-2-6 5g 10–150 Hz
Power dissipation for intermittent operation	4 W/A x duty cycle	4 W/A x duty cycle	4 W/A x duty cycle	4 W/A x duty cycle
Power dissipation for continuous operation	4 W/A x duty cycle	4 W/A x duty cycle	4 W/A x duty cycle	4 W/A x duty cycle
Cooling method	Natural convection	Natural convection	Natural convection	Natural convection
Degree of protection	IP20	IP20	IP20	IP20
Pollution degree	3	3	3	3
Agency approvals	UL, cUL, CE	UL, cUL, CE	UL, cUL, CE	UL, cUL, CE

## Soft Starters—S701\_15N3S

Description	S701C15N3S	S701E15N3S	S701G15N3S
Maximum current capacity	15	15	15
Trip Class			
10A	15	15	15
10	15	15	15
20	12	12	12
30	10	10	10
<b>Electrical Characteristics</b>			
Line voltage (Vac)	208–240	380–480	500–600
Operating frequency (Hz)	50/60	50/60	50/60
Leakage current	5 mA AC max.	5 mA AC max.	5 mA AC max.
Minimum operational current	50 mA	50 mA	50 mA
Control voltage (Vac/Vdc)	24–240	24–480	24–480
Pickup voltage max.	20.4 Vac/Vdc	20.4 Vac/Vdc	20.4 Vac/Vdc
Dropout voltage min.	5 Vac/Vdc	5 Vac/Vdc	5 Vac/Vdc
Max. control current for no operation	1 mA	1 mA	1 mA
Response time max.	70 ms	70 ms	70 ms
<b>Control Characteristics</b>			
Ramp time (secs)	0.5–10	0.5–10	0.5–10
Ramp settings (% LRT)	85%	85%	85%
Kick start settings (% LRT)	85%	85%	85%
Soft stop (secs)	0.5–10	0.5–10	0.5–10
<b>Environment Characteristics</b>			
Temperature—operating (no derating)	–30° to 40°C	–30° to 40°C	–30° to 40°C
Current rating 50°C	12.5A	12.5A	12.5A
Limited duty cycle 50°C	15A on-time max. 15 min. duty cycle max. 0.8	15A on-time max. 15 min. duty cycle max. 0.8	15A on-time max. 15 min. duty cycle max. 0.8
Current rating 60°C	10A	10A	10A
Limited duty cycle 60°C	15A on-time max. 15 min. duty cycle max. 0.65	15A on-time max. 15 min. duty cycle max. 0.65	15A on-time max. 15 min. duty cycle max. 0.65
Temperature—storage	–30° to 80°C	–30° to 80°C	–30° to 80°C
Altitude (meters)—no derating	2000	2000	2000
Humidity	95% noncondensing	95% noncondensing	95% noncondensing
Operating position (no derating)	Vertical ±30°	Vertical ±30°	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	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	2 W/A x duty cycle
Power dissipation for continuous operation	2 W/A	2 W/A	2 W/A
Cooling method	Natural convection	Natural convection	Natural convection
Degree of protection	IP20	IP20	IP20
Pollution degree	3	3	3
Agency approvals	UL, CSA, CE	UL, CSA, CE	UL, CSA, CE



## Soft Starters—S701\_25N3S

Description	S701C25N3S	S701E25N3S	S701G25N3S
Maximum current capacity	25	25	25
Trip Class			
10A	25	25	25
10	25	25	25
20	20	20	20
30	15	15	15
<b>Electrical Characteristics</b>			
Line voltage (Vac)	208–240	380–480	500–600
Operating frequency (Hz)	50/60	50/60	50/60
Leakage current	5 mA AC max.	5 mA AC max.	5 mA AC max.
Minimum operational current	50 mA	50 mA	50 mA
Control voltage (Vac/Vdc)	24–240	24–480	24–480
Pickup voltage max.	20.4 Vac/Vdc	20.4 Vac/Vdc	20.4 Vac/Vdc
Dropout voltage min.	5 Vac/Vdc	5 Vac/Vdc	5 Vac/Vdc
Max. control current for no operation	1 mA	1 mA	1 mA
Response time max.	70 ms	70 ms	70 ms
<b>Control Characteristics</b>			
Ramp time (secs)	0.5–10	0.5–10	0.5–10
Ramp settings (% LRT)	85%	85%	85%
Kick start settings (% LRT)	85%	85%	85%
Soft stop (secs)	0.5–10	0.5–10	0.5–10
<b>Environment Characteristics</b>			
Temperature—operating (no derating)	–30° to 40°C	–30° to 40°C	–30° to 40°C
Current rating 50°C	20A	20A	20A
Limited duty cycle 50°C	25A on-time max. 15 min. duty cycle max. 0.8	25A on-time max. 15 min. duty cycle max. 0.8	25A on-time max. 15 min. duty cycle max. 0.8
Current rating 60°C	17A	17A	17A
Limited duty cycle 60°C	25A on-time max. 15 min. duty cycle max. 0.65	25A on-time max. 15 min. duty cycle max. 0.65	25A on-time max. 15 min. duty cycle max. 0.65
Temperature—storage	–30° to 80°C	–30° to 80°C	–30° to 80°C
Altitude (meters)—no derating	2000	2000	2000
Humidity	95% noncondensing	95% noncondensing	95% noncondensing
Operating position (no derating)	Vertical ±30°	Vertical ±30°	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	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	2 W/A x duty cycle
Power dissipation for continuous operation	2 W/A	2 W/A	2 W/A
Cooling method	Natural convection	Natural convection	Natural convection
Degree of protection	IP20	IP20	IP20
Pollution degree	3	3	3
Agency approvals	UL, CSA, CE	UL, CSA, CE	UL, CSA, CE

## 1

**Dimensions**

Approximate Dimensions in Inches (mm)

**Soft Starters—S701...N3S**

<b>Catalogue Number</b>	<b>W</b>	<b>H</b>	<b>D</b>	<b>Weight in Lbs (kg)</b>
<b>S701C03N3S</b>	0.89 (22.5)	3.94 (100)	5.01 (127)	0.6 (270)
<b>S701D03N3S</b>	0.89 (22.5)	3.94 (100)	5.01 (127)	0.6 (270)
<b>S701E03N3S</b>	0.89 (22.5)	3.94 (100)	5.01 (127)	0.6 (270)
<b>S701G03N3S</b>	0.89 (22.5)	3.94 (100)	5.01 (127)	0.6 (270)
<b>S701C15N3S</b>	1.77 (45)	3.94 (100)	5.04 (128)	1.52 (690)
<b>S701E15N3S</b>	1.77 (45)	3.94 (100)	5.04 (128)	1.52 (690)
<b>S701G15N3S</b>	1.77 (45)	3.94 (100)	5.04 (128)	1.52 (690)
<b>S701C25N3S</b>	3.54 (90)	3.94 (100)	5.04 (128)	2.53 (1150)
<b>S701E25N3S</b>	3.54 (90)	3.94 (100)	5.04 (128)	2.53 (1150)
<b>S701G25N3S</b>	3.54 (90)	3.94 (100)	5.04 (128)	2.53 (1150)

Type S701, Soft Start Controllers with Auxiliary Contact



## Contents

### Description

Description	Page
Type S701, Soft Start Controllers	V6-T1-5
Type S701, Soft Start Controllers with Auxiliary Contact	
Product Selection	V6-T1-12
Technical Data and Specifications	V6-T1-12
Dimensions	V6-T1-13
Type S701, Soft Start Controllers with Brake	V6-T1-14
Type S511, Semiconductor Reversing Contactors	V6-T1-17

## Type S701, 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 three-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) three-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 600 Vac
- Control voltage range from 24–300 Vac/Vdc
- Adjustable ramp times (0.5–20 seconds)
- Adjustable initial torque control (0–85%)
- Kick start feature (0–85% adjustment)
- Kick start for 200 ms
- Soft stop (0.5–20 seconds)
- IP20 finger protection
- Available up to 30A (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
- UL listed (E108212)
- cUL listed



**Product Selection**

For S701 catalogue number selection, see **Page V6-T1-6**.

**S701****Soft Start Controllers with Auxiliary Contact**

Max. Current	Line Voltage	Control Voltage (Vac/Vdc)	Three-Phase Motor											
			kW Rating (50 Hz)			hp Rating		230V		460V		575V		Catalogue Number
			230V	380–400V	440V	200V 1.0 SF	1.15 SF	1.0 SF	1.15 SF	1.0 SF	1.15 SF	1.0 SF	1.15 SF	
Ratings without Bypass														
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	24–480	N/A	12.5	12.5	N/A	N/A	N/A	N/A	15	15	N/A	N/A	S701E25N3BP
25	500–600	24–480	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	20	20	S701G25N3BP
Ratings with Bypass														
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	24–480	N/A	15	15	N/A	N/A	N/A	N/A	20	15	N/A	N/A	S701E25N3BP
30	500–600	24–480	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	25	20	S701G25N3BP

**Technical Data and Specifications****Soft Starters with Auxiliary Contact—S701\_25N3BP**

Description	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)
<b>Electrical Characteristics</b>			
Line voltage (Vac)	208–240	380–480	500–600
Operating frequency (Hz)	50/60	50/60	50/60
Leakage current	5 mA AC max.	5 mA AC max.	5 mA AC max.
Minimum operational current	50 mA	50 mA	50 mA
Control voltage (Vac/Vdc)	24–240	24–480	24–480
Pickup voltage max.	20.4 Vac/Vdc	20.4 Vac/Vdc	20.4 Vac/Vdc
Dropout voltage min.	5 Vac/Vdc	5 Vac/Vdc	5 Vac/Vdc
Max. control current for no operation	1 mA	1 mA	1 mA
Response time max.	70 ms	70 ms	70 ms

## Soft Starters with Auxiliary Contact—S701\_25N3BP, continued

Description	S701C25N3BP	S701E25N3BP	S701G25N3BP
<b>Control Characteristics</b>			
Ramp time (secs)	0.5–20	0.5–20	0.5–20
Ramp settings (% LRT)	85%	85%	85%
Kick start settings (% LRT)	85%	85%	85%
Soft stop (secs)	0.5–20	0.5–20	0.5–20
<b>Environmental Characteristics</b>			
Temperature—operating (no derating)	–30° to 40°C	–30° to 40°C	–30° to 40°C
Current rating 50°C	20A	20A	20A
Limited duty cycle 50°C	25A on-time max. 15 min. duty cycle max. 0.8	25A on-time max. 15 min. duty cycle max. 0.8	25A on-time max. 15 min. duty cycle max. 0.8
Current rating 60°C	17A	17A	17A
Limited duty cycle 60°C	25A on-time max. 15 min. duty cycle max. 0.65	25A on-time max. 15 min. duty cycle max. 0.65	25A on-time max. 15 min. duty cycle max. 0.65
Temperature—storage	–30° to 80°C	–30° to 80°C	–30° to 80°C
Altitude (meters)—no derating	2000	2000	2000
Humidity	95% noncondensing	95% noncondensing	95% noncondensing
Operating position (no derating)	Vertical ±30°	Vertical ±30°	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	IEC 68-2-6 5g 10–150 Hz	IEC 68-2-6 5g 10–150 Hz
Power dissipation for continuous operation	2 W/A without bypass	2 W/A without bypass	2 W/A without bypass
Power dissipation with semiconductor bypassed	5 W/A max. with bypass	5 W/A max. with bypass	5 W/A max. with bypass
Cooling method	Natural convection	Natural convection	Natural convection
Degree of protection	IP20	IP20	IP20
Pollution degree	3	3	3
Agency approvals	UL, cUL, CE	UL, cUL, CE	UL, cUL, CE

## Dimensions

Approximate Dimensions in Inches (mm)

## Soft Starters with Auxiliary Contact—S701\_25N3BP

Catalogue Number	W	H	D	Weight in Lbs (kg)
<b>S701C25N3BP</b>	3.54 (89.9)	3.94 (100.1)	5.04 (128.0)	2.53 (1150)
<b>S701E25N3BP</b>	3.54 (89.9)	3.94 (100.1)	5.04 (128.0)	2.53 (1150)
<b>S701G25N3BP</b>	3.54 (89.9)	3.94 (100.1)	5.04 (128.0)	2.53 (1150)

## Type S701, Soft Start Controllers with Brake



## Contents

## Description

## Page

Type S701, Soft Start Controllers	V6-T1-5
Type S701, Soft Start Controllers with Auxiliary Contact	V6-T1-11
Type S701, Soft Start Controllers with Brake	
Product Selection	V6-T1-15
Technical Data and Specifications	V6-T1-15
Dimensions	V6-T1-16
Type S511, Semiconductor Reversing Contactors	V6-T1-17

## Type S701, Soft Start Controllers with Brake

## Product Description

The S701 soft start controller with DC injection brake is designed to control acceleration and deceleration of three-phase motors. Brake current is adjustable from 0–50A DC. The ramp-up feature is adjustable from 0.5–10 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) three-phase motors. The braking option is a DC injection system, allowing for fast stopping of a three-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 480 Vac
- Control voltage range from 24–300 Vac/Vdc
- Adjustable ramp times (0.5–20 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
- UL listed (E108212)
- cUL listed



**Product Selection**

For S701 catalogue number selection, see **Page V6-T1-6**.

**S701E25B3S****Soft Start Controllers with Brake**

Max. Current	Line Voltage	Control Voltage (Vac/Vdc)	Three-Phase Motor kW Rating (50 Hz)			hp Rating 200V		230V		460V		Catalogue Number
			230V	380–400V	440V	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	<b>S701C25B3S</b>
25	380–480	24–480	N/A	12.5	12.5	N/A	N/A	N/A	N/A	15	15	<b>S701E25B3S</b>

**Technical Data and Specifications****Soft Starters with Brake—S701\_25B3S**

Description	S701C25B3S	S701E25B3S
Maximum current capacity	25	25
Trip Class		
10A	25	25
10	25	25
20	20	20
30	15	15
<b>Electrical Characteristics</b>		
Line voltage (Vac)	208–240	380–480
Operating frequency (Hz)	50/60	50/60
Leakage current	5 mA AC max.	5 mA AC max.
Minimum operational current	1A	1A
Control voltage (Vac/Vdc)	24–240	24–480
Pickup voltage max.	20.4 Vac/Vdc	20.4 Vac/Vdc
Dropout voltage min.	5 Vac/Vdc	5 Vac/Vdc
Max. control current for no operation	1 mA	1 mA
Response time max.	100 ms	100 ms
<b>Control Characteristics</b>		
Ramp time (secs)	0.5–10	0.5–10
Ramp settings (% LRT)	85%	85%
Kick start settings (% LRT)	85%	85%
Soft stop (secs)	0.5–10	0.5–10
Brake current	0–50 Vdc	0–50 Vdc

**Soft Starters with Brake—S701\_25B3S, continued**

Description	S701C25B3S	S701E25B3S
<b>Environmental Characteristics</b>		
Temperature—operating	–30° to 40°C	–30° to 40°C
Current rating 50°C	20A	20A
Limited duty cycle 50°C	25A on-time max. 15 min. duty cycle max. 0.8	25A on-time max. 15 min. duty cycle max. 0.8
Current rating 60°C	17A	17A
Limited duty cycle 60°C	25A on-time max. 15 min. duty cycle max. 0.65	25A on-time max. 15 min. duty cycle max. 0.65
Temperature—storage	–30° to 80°C	–30° to 80°C
Altitude (meters)—no derating	2000	2000
Humidity	95% noncondensing	95% noncondensing
Operating position	Vertical ± 0°	Vertical ± 0°
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	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	Natural convection
Degree of protection	IP20	IP20
Pollution degree	3	3
Agency approvals	UL, cUL, CE	UL, cUL, CE

**Dimensions**

Approximate Dimensions in Inches (mm)

**Soft Starters with Brake—S701\_25B3S**

Catalogue Number	W	H	D	Weight in Lbs (kg)
<b>S701C25B3S</b>	3.54 (89.9)	3.94 (100.1)	5.04 (128.0)	2.53 (1150)
<b>S701E25B3S</b>	3.54 (89.9)	3.94 (100.1)	5.04 (128.0)	2.53 (1150)



**Contents**

<b>Description</b>	<b>Page</b>
Type S701, Soft Start Controllers . . . . .	<b>V6-T1-5</b>
Type S701, Soft Start Controllers with Auxiliary Contact . . . . .	<b>V6-T1-11</b>
Type S701, Soft Start Controllers with Brake . . . . .	<b>V6-T1-14</b>
Type S511, Semiconductor Reversing Contactors	
Product Selection . . . . .	<b>V6-T1-18</b>
Technical Data and Specifications . . . . .	<b>V6-T1-18</b>
Dimensions . . . . .	<b>V6-T1-19</b>

**Type S511, Semiconductor Reversing Contactors****Product Description**

The S511 device is a semiconductor reversing contactor designed to switch three-phase motors forward and reverse. Unicore electronics and thermal design ensures high switching capacity and long lifetime.

**Application Description**

The S511 line of solid-state reversing contactors is specifically designed for high speed operations or when long contactor life is required. The reversing contactors are intended for small motor applications (5 hp and below). The S511 unit can be used in a variety of applications including fans, pumps, conveyors, doors, hoists, cranes, etc. It 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 480 Vac
- Control voltage ranges of 5–24 Vdc and 24–240 Vac/Vdc
- Unlimited number of START/STOP operations per hour
- IP20 finger protection
- AC-3 current rating of 10A
- AC-4 current rating of 8A

**Benefits**

- Extremely high switching rates possible
- Very long life expectancy and no contacts or movable parts to replace
- Compact design (45 mm wide) leads to significant panel savings

**Standards and Certifications**

- IEC 947 compliant
- EN 60947-4-2
- CE marked
- CSA certified
- UL listed



## Product Selection

## Reversing Solid-State Contactors

Max. Current	Line Voltage	Control Voltage	Three-Phase Motor kW Rating (50 Hz)			hp Rating		230V		460V		Catalogue Number
			230V	380–400V	440V	200V 1.0 SF	1.15 SF	1.0 SF	1.15 SF	1.0 SF	1.15 SF	
10	208–480	5–24 Vdc	2.2	4	4	2	2	3	2	5	5	S511E10N3D
10	208–480	24–240 Vac/Vdc	2.2	4	4	2	2	3	2	5	5	S511E10N3S

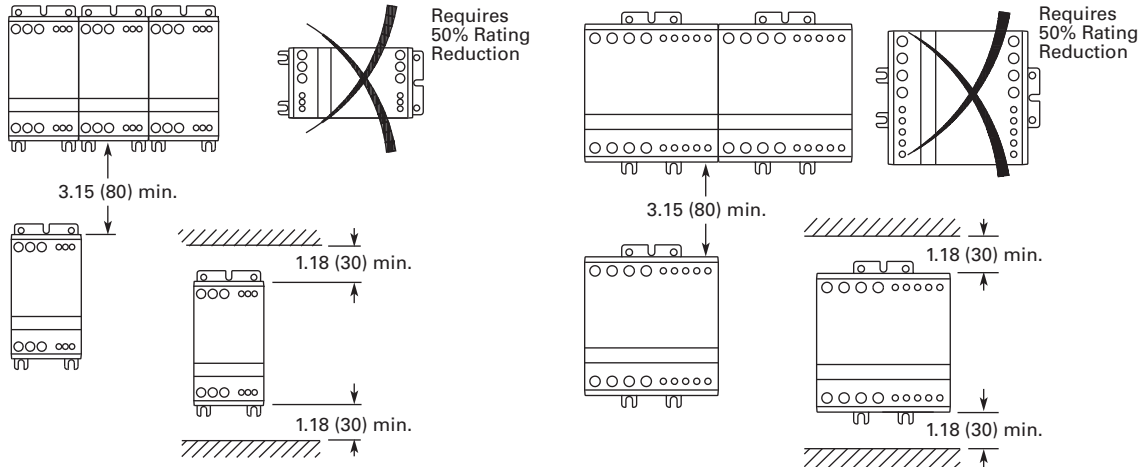
## Technical Data and Specifications

## Semiconductor Reversing Contactors—S511E10N3\_

Description	S511E10N3D	S511E10N3S
Maximum current capacity	10	10
Trip Class		
10A	10	10
10	10	10
20	8	8
30	6.5	6.5
<b>Electrical Characteristics</b>		
Line Voltage (Vac)	208–480	208–480
Operating frequency (Hz)	50/60	50/60
Control voltage	5–24 Vdc	24–240 Vac/Vdc
Pickup voltage max.	4.25 Vdc	20.4 Vac/Vdc
Dropout voltage min.	1.5 Vdc	7.2 Vac/Vdc
Max. control voltage	26.4 Vdc	253 Vac/Vdc
Response time max.	1/2 cycle	1 cycle
Interlock time max.	80 ms	150 ms
<b>Control Characteristics</b>		
Operation current AC-3	10	10
Operation current AC-4	8	8
Duty cycle	Continuous operation	Continuous operation
Leakage current	1 mA AC max.	1 mA AC max.
Minimum operation current	10 mA AC	10 mA AC
<b>Environmental Characteristics</b>		
Temperature—operating	0° to 60°C	0° to 60°C
Temperature—storage	–20° to 80°C	–20° to 80°C
Altitude (meters)	2000	2000
Humidity	95% noncondensing	95% noncondensing
Operating position	Vertical ±30°	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	IEC 68-2-6 5g 10–150 Hz
Power dissipation for intermittent operation	2.2 W/A x duty cycle	2.2 W/A x duty cycle
Power dissipation for continuous operation	2.2 W/A	2.2 W/A
Cooling method	Natural convection	Natural convection
Degree of protection	IP20	IP20
Pollution degree	3	3
Agency approvals	UL, CSA, CE	UL, CSA, CE

**Mounting Instructions**

**IMPORTANT:** The controller is designed for vertical mounting in free air. If the controller is mounted horizontally, the load current must be reduced to 50% of rated current.

**Recommended Mounting Distances****Dimensions**

Approximate Dimensions in Inches (mm)

**Semiconductor Reversing Contactors—S511E10N3\_**

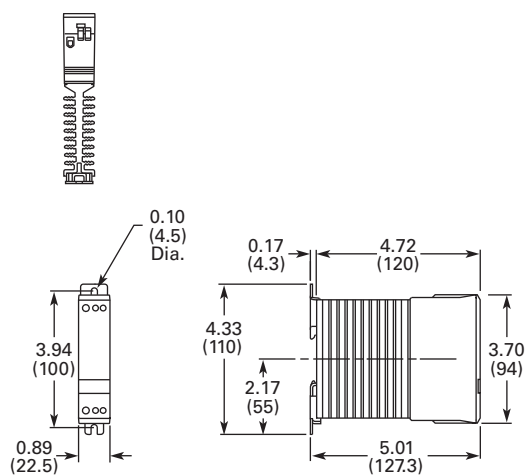
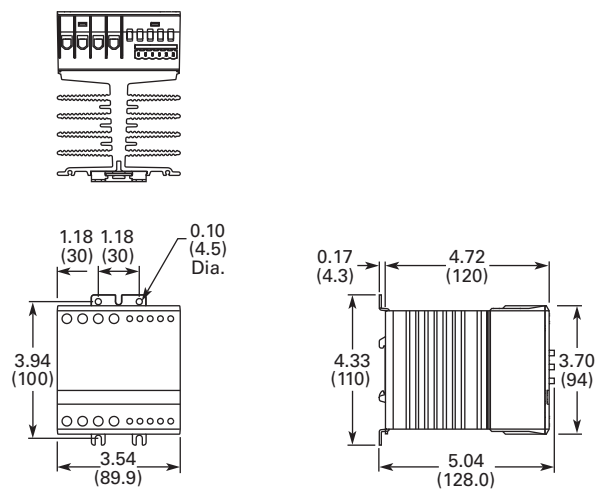
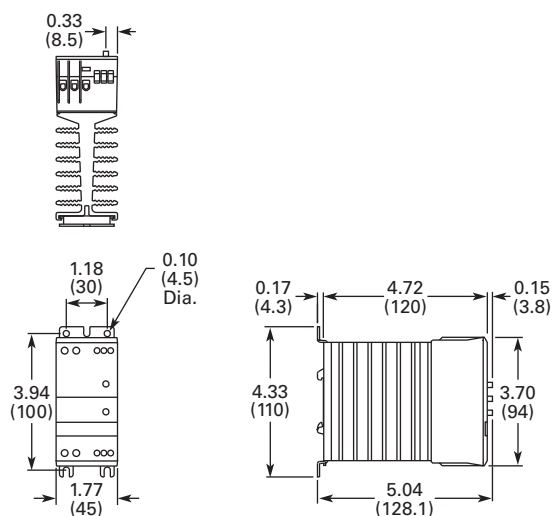
Catalogue Number	W	H	D	Weight in Lbs (kg)
<b>S511E10N3D</b>	1.77 (45.0)	3.94 (100.1)	5.04 (128.0)	1.52 (690)
<b>S511E10N3S</b>	1.77 (45.0)	3.94 (100.1)	5.04 (128.0)	1.52 (690)

Also refer to dimension drawings on **Page V6-T1-20**.

**Cable Requirements and Sizing**

75°C	AWG (mm <sup>2</sup> )	AWG (mm <sup>2</sup> )
	18–12 (0.75–4)	20–16 (0.5–1.5)
	2–18 (2 x 1)	2 x 20–18 (2 x 0.5–0.75)
	18–10 (0.75–4)	20–16 (0.5–1.5)
	2 x 18–14 (2 x 0.75–2.5)	2 x 20–16 (2 x 0.5–1.5)
	18–10 (0.75–4)	20–16 (0.5–1.5)
	2 x 18–16 (0.75–6)	2 x 20–16 (2 x 0.5–1.5)
	Posidrive 1 4.4 in-lb. max. 0.5 Nm max.)	N/A
	4 mm 4.4 in-lb max. (0.5 Nm max.)	3 mm 3.5 in-lb max. (0.4 Nm max.)

Approximate Dimensions in Inches (mm)

**22.5 mm Frame****90 mm Frame****45 mm Frame**

## Solid-State Starters



## Contents

## Description

## Page

## Solid-State Starters

Type S611, Solid-State Soft Starters . . . . .	<b>V6-T1-22</b>
Type S801+, Soft Starters . . . . .	<b>V6-T1-39</b>
Type S811+, Soft Starters with DIM . . . . .	<b>V6-T1-55</b>
TRU-START . . . . .	<b>V6-T1-79</b>

## Product Overview

## Type S611

The S611 soft starter is a powerful combination of performance capability, application flexibility, and the industry's best user interface experience.

Designed to control acceleration and deceleration of three-phase motors, the line is available for current ranges from 26A through 414A applications.

The S611 has integrated bypass and overload protection. The S611 is available as a component for panel mounting or in enclosed control—NEMA Type 1, 12, 3R, 4, 4X.

## Type S801+

Eaton's S801+ line of reduced voltage soft starters is very compact, multi-functional, easy to install and easy to program. Designed to control acceleration and deceleration of three-phase motors, the line is available for current ranges from 11A to 1000A applications, and is suitable for mounting in motor control centers or in enclosed control (NEMA Type 1, 4, 4X and 12) applications.

## Type S811+

Eaton's S811+ offers all the popular features of the S801+ and adds enhanced functionality with the new DIM (Digital Interface Module), communications, metering, monitoring and diagnostics capabilities.

Eaton's line of S811+ reduced voltage soft starters is very compact, multi-functional, easy to install and easy to set operating parameters. Designed to control the acceleration and deceleration of three-phase motors up to 690V, the line is available from 11A to 1000A.

The S811+ is designed to be a complete package, combining the silicon controlled rectifiers (SCRs), bypass contactor and overload in one, very compact unit. The S811+ is available as a component for panel mounting, in motor control centers or in enclosed control (NEMA Type 1, 3R, 4, 4X, 7/9 and 12).

## TRU-START

The Tru-Start "soft-start" starter is a general purpose, full featured starter which offers an "off the shelf" solution for most motor applications at a very economic price. The Tru-Start incorporates oversized SCR's and a class 20 solid-state over-load which will smoothly accelerate most motor loads and will require a minimum of maintenance or adjustment.

## Type S611, Solid-State Soft Starter



## Type S611, Solid-State Soft Starters

## Product Description

Eaton revolutionized the reduced voltage control marketplace with its advanced feature set and user-friendly user interface module to enhance system performance and reduce commissioning times. The S611 adds enhanced functionality with network communications, metering, monitoring and diagnostics capabilities.

The Eaton line of S611 reduced voltage soft starters is multi-functional, easy to install and easy to program. Designed to control the acceleration and deceleration of three-phase motors up to 600V, the line is available from 26 amps through 414 amps.

The S611 is designed to be a complete package combining the SCRs, bypass contactor and overload in one unit.

## Application Description

Designed to control the acceleration and deceleration of three-phase motors, the S611 soft starter uses Silicon Controlled Rectifiers (SCRs) to control the voltage to soft start and soft stop the motor. After the motor is started, internal run bypass contactors close, resulting in the motor running directly across-the-line. The built-in solid-state overload protects the motor from overload conditions with sophisticated algorithms that model true motor heating, resulting in better motor protection and fewer nuisance trips. Advanced protective and diagnostic features reduce downtime.

A voltage ramp start or current limit start is available. Kick start is available in either starting mode. The soft stop option allows for a ramp stop time that is longer than the coast to stop time. The pump control option provides a smooth transition for starting and stopping a motor and eliminating the “water-hammer” effect that can damage pipes, valves and pumps.

## Contents

## Description

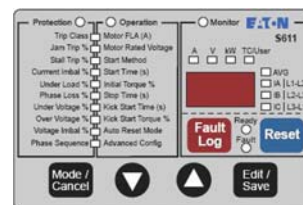
## Type S611, Solid-State Soft Starters

	<i>Page</i>
Communications . . . . .	<b>V6-T1-23</b>
Operation . . . . .	<b>V6-T1-24</b>
Features and Benefits . . . . .	<b>V6-T1-27</b>
Standards and Certifications . . . . .	<b>V6-T1-30</b>
Instructional Leaflets . . . . .	<b>V6-T1-30</b>
Catalogue Number Selection . . . . .	<b>V6-T1-30</b>
Product Selection . . . . .	<b>V6-T1-31</b>
Accessories . . . . .	<b>V6-T1-32</b>
Replacement Parts . . . . .	<b>V6-T1-33</b>
Technical Data and Specifications . . . . .	<b>V6-T1-34</b>
Dimensions . . . . .	<b>V6-T1-37</b>
Type S801+, Soft Starters . . . . .	<b>V6-T1-39</b>
Type S811+, Soft Starters with DIM . . . . .	<b>V6-T1-55</b>
TRU-START . . . . .	<b>V6-T1-79</b>

The S611 offers an impressive array of advanced protective features. Not only are the protective features selectable, but many offer variable settings allowing the user to fine tune the soft starter to meet specific system requirements.

The S611 has an easy to use User Interface Module (UI) that allows the user to configure the device and to read system parameters and values. The UI includes an LED display and keypad to scroll through the various parameters. The UI allows the user to modify control parameters, enable or disable protections, set communication variables, monitor system values such as line voltages and currents, and access the fault queue.

## User Interface Module (UI)



The UI can be removed from the S611 and remote mounted. Kits are available to door mount the UI, enabling users to safely configure, commission, monitor and troubleshoot the system at the electrical panel without opening the enclosure door. This will help eliminate the possibility of an arc flash incident.

### Communications

The S611 is equipped with native Modbus RTU communication capabilities and may be connected to a variety of networks, including DeviceNet, Modbus TCP, EtherNet/IP and PROFIBUS using the C441 series communication modules for easy integration into any PLC or DCS system.

The modules come standard with four inputs and two relay outputs. C441 communication modules can also be used independently for standalone I/O applications.



### C441 Communication Card Options

Designed for use with soft starters



Protocol	Catalogue Numbers	Input Signal Type	S611	General Purpose I/O <sup>①</sup>	Mounting Options
Modbus RTU	<b>C441NS</b>	120 Vac	■	■	Standalone—DIN rail/panel mount
	<b>C441PS</b>	24 Vdc	■	■	Standalone—DIN rail/panel mount
DeviceNet	<b>C441KS</b>	120 Vac	■	■	Standalone—DIN rail/panel mount
	<b>C441LS</b>	24 Vdc	■	■	Standalone—DIN rail/panel mount
PROFIBUS	<b>C441SS</b>	120 Vac	■	■	Standalone—DIN rail/panel mount
	<b>C441QS</b>	24 Vdc	■	■	Standalone—DIN rail/panel mount
Modbus EtherNet/IP	<b>C441U</b>	120 Vac	■	■	Standalone—DIN rail/panel mount
	<b>C441V</b>	24 Vdc	■	■	Standalone—DIN rail/panel mount

**Note:** Refer to Volume 5—Motor Control and Protection, **CAO033001EN**, tab 5.4 for additional details and **BR042002EN** brochure for C441 communication module accessories for overload relays and soft starters.

Recommended Power Supply	Catalogue Number
85–264 Vac single-phase input, 24 Vdc output	<b>PSG240E24RM</b>
360–575 Vac three-phase input, 24 Vdc output	<b>PSG240F24RM</b>
600 Vac three-phase input, 24 Vdc output	<b>PSS55D</b>

<sup>①</sup> C441 standalone communication modules can be used as general purpose I/O. This allows a customer to monitor the status of any non-communicating product over the selected protocol by wiring fault or auxiliary contacts from that product to the C441 communication module on-board I/O.

## Operation

### Starting and Stopping Modes

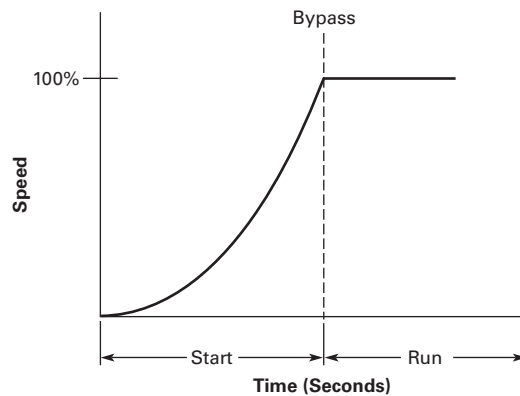
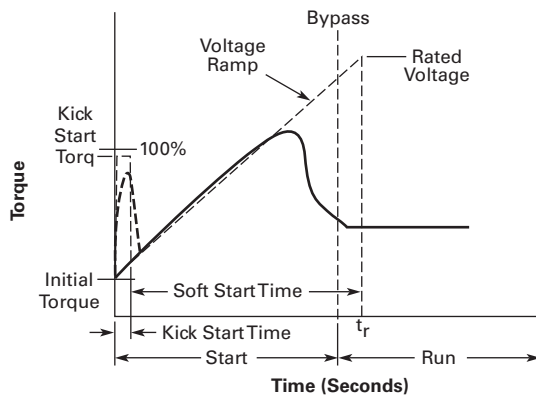
The S611 has a variety of starting and stopping methods to provide superior performance in the most demanding applications. The motor can be started in either Voltage Ramp Start or Current Limit Start mode. Kick Start and Soft Stop are available within both starting modes.

#### Voltage Ramp Start

Provides a voltage ramp to the motor resulting in a constant torque increase. The most commonly used form of soft start, this start mode allows you to set the initial torque value and the duration of the ramp to full voltage conditions. Bypass contactors close after ramp time.

- Adjustable initial torque 0–85% of locked rotor torque
- Adjustable ramp time 0.5–180 seconds (can be extended with factory modification)

#### Starting Characteristics—Ramp Start



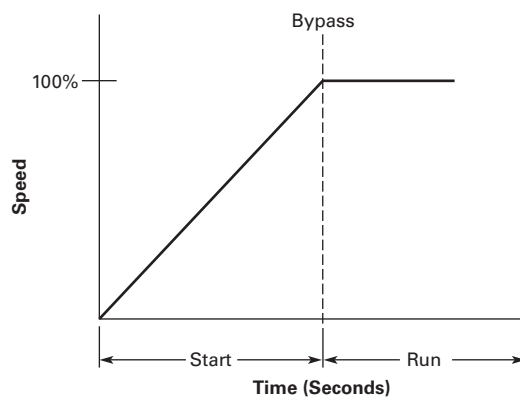
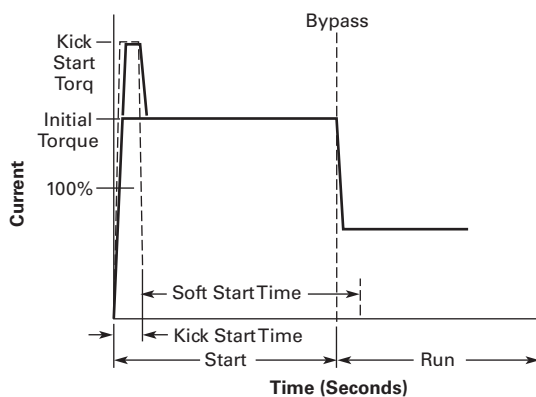
#### Current Limit Start

Limits the maximum current available to the motor during the start phase. This mode of soft starting is used when it becomes necessary to limit the maximum starting current due to long start times or to protect the motor. This start

mode allows you to set the maximum starting current as a percentage of locked rotor current and the duration of the current limit. Bypass contactors close after current limit time.

- Maximum current of 0–85% locked rotor current
- Adjustable ramp time 0.5–180 seconds (can be extended with factory modification)

#### Starting Characteristics—Current Limit Start

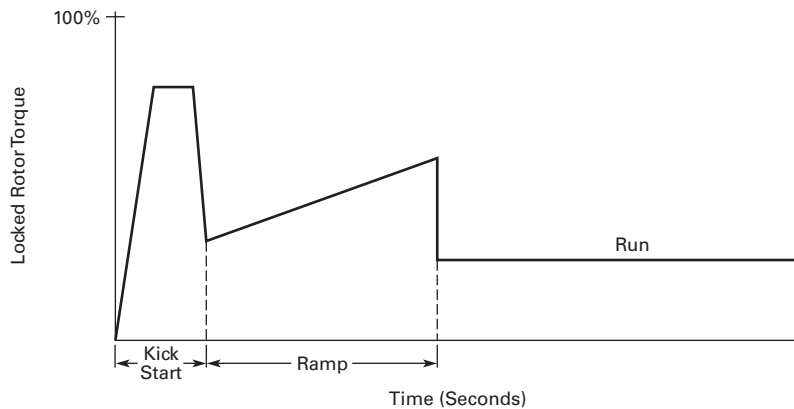




**Kick Start**

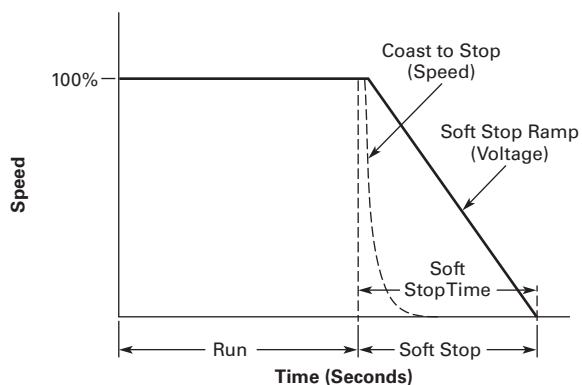
Selectable feature in both Voltage Ramp Start and Current Limit Start modes. Provides a current and torque “kick” for 0 to 2.0 seconds. This provides greater initial current to develop additional torque to breakaway a high friction load.

- 0–85% of locked rotor torque
- 0–2.0 seconds duration

**Starting Characteristics—Kick Start****Soft Stop**

Allows for a controlled stopping of a load. Used when a stop-time that is greater than the coast-to-stop time is desired. Often used with high friction loads where a sudden stop may cause system or load damage.

- Stop time = 0–60 seconds

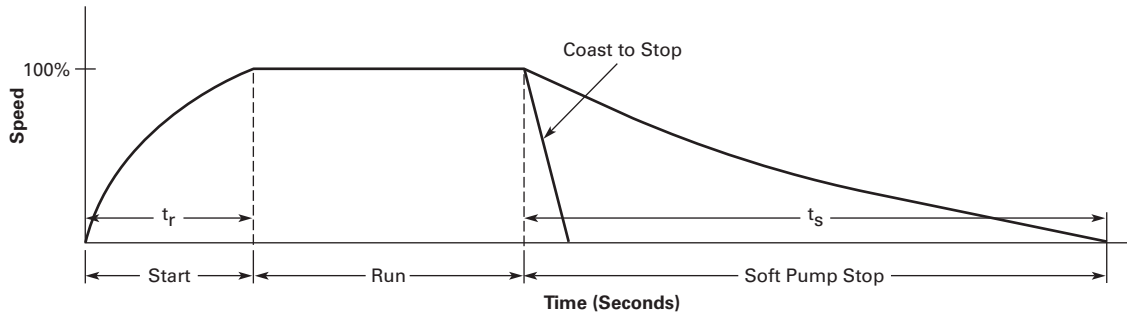
**Starting Characteristics—Soft Stop**

**Pump Control Option**

This option is intended to reduce the potential for water hammer in a centrifugal pump system by using a starting and stopping algorithm developed for pump control. Upon a start command, the speed of the motor is

increased, under the control of the S611 soft starter microprocessor, to achieve a gentle start. After the speed has reached its nominal value, the bypass contactors close and the pump operates as with any other starter.

Upon a stop command, the bypass contactors are opened and the motor speed is decreased in a tapered manner, to gradually slow the flow until the motor is brought to a stop.

**Pump Control Option****Edge and Level Sensing Control**

Edge or Level Sensing is selected with the Start Control parameter in the Advanced Configuration Menu. Factory default is Level Sensing.

**Edge Sensing**

Edge sensing requires 120 Vac power be momentarily applied to the Start terminal (with the Permissive terminal 120 Vac) to initiate a start under all conditions. After a stop or fault occurs, the 120 Vac must be reapplied to the start terminal before another start can occur. This control configuration should be used when restarting of the motor after a fault or stop must be supervised manually or as a part of a control scheme. The cycling of 120 Vac power to the Permissive terminal before starting is required regardless of the position of the auto reset parameter.

**Level Sensing**

Level sensing will enable a motor to restart after a fault is cleared without cycling 120V AC to the Permissive terminal as long as:

- Permissive terminal is supplied with 120 Vac
- The auto reset parameter is set to enabled
- All faults have cleared or have been reset

This control configuration should be used where it is desirable to restart a motor after a fault without additional manual or automatic control. An example of this condition would be on a remote pumping station where it is desirable to automatically restart a pump after a power outage without operator intervention.

**Note:** If the auto reset feature is used, CAUTION must be exercised to assure that any restart occurs in a safe manner.

### Features and Benefits

- The User Interface Module (UI) provides an intuitive, easy-to-use human interface with powerful configuration capabilities to maximize system performance
- Door or device mounted UI enables users to safely configure, commission, monitor and troubleshoot the system at the electrical panel without opening the enclosure door, eliminating the possibility of an arc flash incident
- System operating parameters can be monitored enterprise-wide through a communications network. Increase uptime by providing data for process management and preventive diagnostics
- Run bypass mode greatly reduces internal heating created by the greater power dissipation in the SCRs. Bypass contactors directly connect the motor to the line and improves system efficiency by reducing internal power losses
- Internal solid-state overload protection provides accurate current measurement and trip settings. Sophisticated algorithms solve a series of differential equations that model true motor heating and cooling, resulting in superior motor overload protection while minimizing nuisance trips. Advanced selectable protective features safeguard the motor and system against a variety of system faults
- Internal run bypass contactors and overload protection eliminate the need for additional devices, reducing enclosure sizes minimizing installation and wiring time and reducing overall assembly size and cost
- Wide range of overload FLA settings (50–100% of rated frame current) and a selectable trip class (5–30) offers users the flexibility to fine tune the starter to match specific application requirements
- Variable ramp times and torque control settings provide unlimited starting configurations, allowing for maximum application flexibility
- Kick-start feature enables soft starting of high friction loads
- Soft stop control for applications where an abrupt stop of the load is not acceptable
- Pump control option with sophisticated pump algorithms on both starting and stopping that minimize the pressure surges that cause water hammer. The pump control option will maximize the life of the pump and piping systems while minimizing the downtime caused by system failure
- Six SCRs control all three motor phases, providing smooth acceleration and deceleration performance
- Soft acceleration and deceleration reduces wear on belts, gears, chains, clutches, shafts and bearings
- Reduce the peak inrush current's stress on the power system
- Minimize peak starting torque to diminish mechanical system wear and damage
- 120 Vac control voltage enhances ease of connections
- The S611 lends itself to serviceability. The PCBs and contactors can be replaced in the field

### Protective Features

All protective features can be configured, enabled or disabled with the UI or through the communications network.

#### Motor Overload

The S611 includes electronic overload protection as standard. The overload meets applicable requirements for a motor overload protective device. The overload protects the motor from over heat conditions with the use of sophisticated algorithms that model true motor heating, resulting in superior motor protection and fewer nuisance trips.

The S611 calculates a thermal memory value. A 100% value represents the maximum safe temperature of the motor. When the thermal memory value reaches 100%, an overload trip will occur removing power to the motor.

Upon trip, the S611 stores the calculated motor heating value and will not allow a motor re-start until the motor has cooled. This feature ensures the motor will not be damaged by repeated overload trip, reset and re-start cycles.

The thermal memory value can be monitored through the UI or the communications network. The thermal memory value can be of great use in determining an impending overload trip condition. Alarms can be implemented in the process monitoring system warning of an impending trip before a trip occurs halting the process. Costly system downtime can be avoided.

The trip current is adjusted to match the specific application requirements by entering the motor nameplate full load current rating and trip class. The FLA adjustment includes a 2 to 1 adjustment range. The overload trip class is adjustable from class 5 through class 30. The overload is ambient temperature compensated - meaning its trip characteristics will not vary with changes in ambient temperature. The overload protection can be enabled, disabled, or disabled on start.

#### Short Circuit

The use of a short circuit protective device in coordination with the S611 is required in branch motor circuits by most electrical codes. Short circuit coordination ratings with both fuses and Eaton moulded case circuit breakers are available providing customers with design flexibility. The S611 has short circuit coordination ratings as an open component, an enclosed starter, and in a motor control center. The short circuit ratings can go up to 100KA.

**Jam**

Excessive current and torque up to locked rotor levels can occur in a jam condition. The condition can result in stress and damage to the motor, load, mechanical system, and the electrical distribution system. Jam protection prevents the stress and damage from a jam during normal run. After the motor is started, a current greater than 300% FLA setting will cause the starter to trip on a jam fault.

**Stall**

Excessive current and torque up to locked rotor levels can occur in a stall condition. The condition can lead to an overload trip and result in stress and damage to the motor, load, mechanical system, and the electrical distribution system. Stall protection prevents stress and damage to a motor that has not come up to speed, or stalled after the soft start time. The S611 will trip to protect the system in the event that the motor did not get to the rated speed in the defined soft start period. A current greater than 200% FLA at the end of the soft start period will cause the starter to trip on a stall fault.

**Pole Over Temperature**

High ambient temperatures, extended ramp times and high duty cycle conditions may cause the S611 power pole conductors to reach a temperature that exceeds their thermal rating. The S611 is equipped with sensors that monitor the temperature of the power poles. Over temperature protection occurs if the device's thermal capacity is exceeded. The soft starter will trip in over temperature conditions, preventing device failure.

The device pole temperature value can be monitored through the UI or the communications network. This feature can be of use in determining an impending over temperature trip condition. Alarms can be implemented in the process monitoring system warning of an impending trip before a trip occurs, halting the process. Costly system shutdown can be avoided.

**Phase Loss**

Loss of a phase can cause a significant increase in the current drawn in the remaining two phases. Phase loss can lead to motor damage before an eventual overload trip occurs. Phase loss is typically an indication of a failure in the electrical distribution system. The S611 will detect a phase loss and trip if any phase current drops below a preset value. The phase loss trip level is adjustable from 0% to 100% of the average of the other two phase levels with an adjustable trip delay of 0.1 to 60 seconds.

**Phase Imbalance**

Phase current or voltage imbalance can cause a significant increase in the current drawn in the remaining two phases. Phase imbalance can lead to motor damage before an eventual overload trip. Phase imbalance is typically an indication of a failure in the electrical distribution system or the motor. The S611 will detect both current and voltage phase imbalances and trip if any phase becomes imbalanced as compared to the average of the other two phases.

The phase current imbalance trip level is adjustable from 0% to 100% of the average of the current in the other two phases with an adjustable trip delay of 0.1 to 60 seconds.

The phase voltage imbalance trip level is adjustable from 0% to 100% of the average of the voltage in the other two phases with an adjustable trip delay of 0.1 to 60 seconds.

**Reset Mode**

The S611 can be set up for automatic or manual reset on trip. The manual reset mode requires the operator to physically press the RESET button located on the soft starter. The overload can be manually reset through the UI or through the communications network.

The automatic reset mode allows the soft starter to be automatically reset as soon as the trip condition is no longer present. With the automatic reset mode, after the fault is no longer present, the motor will be restarted as soon as a valid start signal is present.

**Phase Reversal**

The S611 can determine if the proper line phase sequence is present by default. The device will trip if the line phase sequence is something other than A-B-C. The S611 can be configured to operate under reversed phase conditions (A-C-B).

**Shorted SCR Detection**

The S611 monitors the operation of the power poles and will trip under a shorted SCR condition.

**Open SCR Detection**

The S611 monitors the operation of the power poles and will trip under an open SCR condition.

**Low Current**

Low current conditions can be a result of a loss of load or a failure in the mechanical system. The S611 has low current protection that will trip if the average RMS current falls below a preset value. The low current protection can be programmed as a percent of motor FLA from 0% to 100%.

**Low Voltage**

Low voltage conditions can result from disturbances in the electrical power distribution system. Low voltage conditions can cause a malfunction and damage to electrical equipment. The S611 has low voltage protection that will trip if the average RMS voltage falls below a preset value. The low voltage protection can be programmed as a percent of nominal voltage from 1% to 99% with a trip delay of 0.1 to 60 seconds.

**High Voltage**

High voltage conditions can result from disturbances in the electrical power distribution system. High voltage conditions can cause malfunctions or failures of electrical equipment. The S611 has high voltage protection that will trip if the average RMS voltage is greater than a preset value. The high voltage protection can be programmed as a percent of nominal voltage from 101% to 120% with a trip delay of 0.1 to 60 seconds.

**Monitoring Capabilities**

The S611 has an impressive array of system monitoring capabilities that allow users to access real time process and diagnostic data. This data can be viewed at the device with the UI or through a communications network. Data over a communications network can provide valuable insight into the condition of the equipment and processes. Maintenance and production personnel can

monitor critical operational and maintenance data from a central control station that can be located far away from the production facility. Process data can be monitored to determine system anomalies that may indicate a need for preventive maintenance or an impending failure.

Adjustments made through the communications network can reduce costs by minimizing

the time traveling to the location where the motor controls are located. When faults do occur, real time fault data can assist maintenance in troubleshooting and planning repair resources. Remote reset signals can be given to tripped devices without the need for manual intervention by maintenance personnel.

**Average Line Current**

Provides the average of the three phase RMS line currents in amps, accurate to within 2%. Current data can be used to indicate a need for maintenance. Increased currents in a fixed load application can indicate a reduction in system efficiencies and performance, signifying system maintenance is due.

**Average Pole Current**

Provides the average of the three phase RMS pole currents in amps, accurate to within 2%. The pole current is the current through the soft starter. The line and pole current will be identical in in-line applications, and will differ in inside-the-delta applications.

**Average Line Current as a % FLA**

Provides the average RMS line current as a percentage of the S611 FLA setting.

**Three-Phase Line Currents**

Provides three RMS phase line currents in amps, accurate to within 2%. Imbalances or changes in the relative phase current to one another can indicate anomalies in the motor or electrical distribution system.

**Three-Phase Pole Currents**

Provides three RMS phase pole currents in amps, accurate to within 2%. The pole current is the current through the soft starter. The line and pole current will be identical in in-line applications.

**Three-Phase Line Voltages**

Provides the individual RMS three phase line voltages. Imbalances or changes in the relative phase voltage to one another can indicate anomalies in the motor or electrical distribution system. Voltage can be used to monitor electrical distribution system performance. Warnings, alarms and system actions to low or high voltage conditions can be implemented.

**Percent Thermal Memory**

Provides the real time calculated thermal memory value. The S611 calculates thermal memory value. A 100% value represents the maximum safe temperature of the motor. When the thermal memory value reaches 100%, an overload trip will occur, removing power to the motor.

The thermal memory value can be of great use in determining an impending overload trip Condition. Alarms can be implemented in the process monitoring system warning of an Impending trip before a trip occurs, halting the process. Costly system downtime can be avoided.

**Pole Temperature**

Increases in pole temperature are caused by increases in ambient temperature, start/stop times and start duty cycles. Changes in pole temperatures represent a change in system operating conditions. Identifying unexpected operating conditions or changes can prompt maintenance and aid in process evaluation activities.

**Power Monitoring**

S611 can monitor power and it can be displayed on the UI.

**Start Count**

Number of starts are stored in the device and can be displayed using field bus.

**Diagnostics****Fault Queue**

Current fault and a fault queue containing the last nine system faults can be read through the UI or communications network. Fault identification can minimize troubleshooting time and cost and prevent arc flash incidents. The fault queue can be remotely accessed through a communications network to assist in planning maintenance resources. 30 different faults can be identified by the S611.

**Control Status**

The S611 provides data that represents system conditions that can be read through the UI or the communications network. This data identifies the status of the system and the control commands the system is requesting of the S611. This can be used for advanced Troubleshooting and system integration activities.

**Field Serviceability**

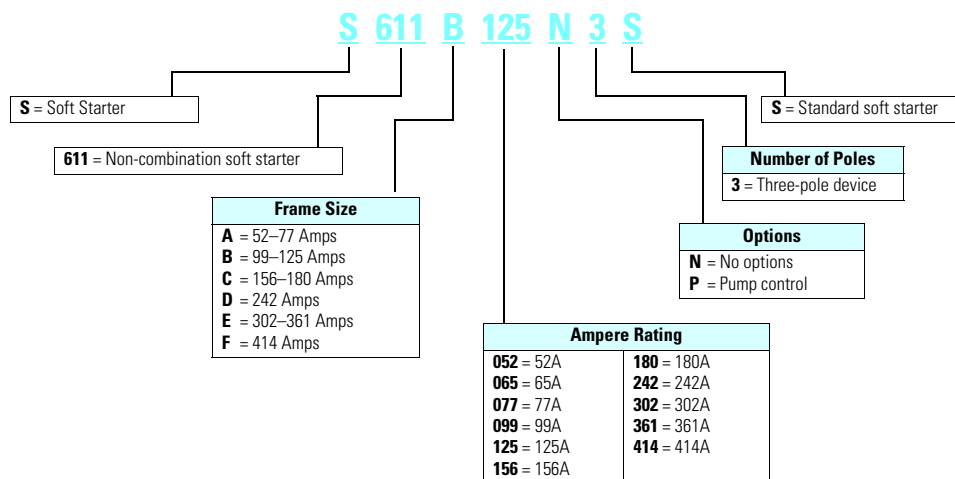
In the case of maintenance, the S611 provides easy access and replacement of key components including control board and internal bypass contactors—significantly increasing its service life. If a component ever needs to be replaced, this straightforward operation can be completed by an end-user without the need to call in an outside service technician or engineer. These components are stocked and available for order and quick fulfillment—ensuring your operation continues with minimal downtime.

**Standards and Certifications**

- IEC 60947-4-2
- UL listed
- CSA certified (3211 06)

**Instructional Leaflets**

- Instruction Manual: MN03902011E
- Quick Start Guide: MN03901003E

**Catalogue Number Selection****S611 Soft Starters**

**Product Selection**

Motor applications and customer needs come in many different varieties. With the standard and severe duty rating tables, we have attempted to provide

guidelines on what the soft starter is capable of. If the application falls under these categories, you can use these charts. For other applications, or when a question arises,

consult with your local Eaton Representative or contact EatonCare.

**Horsepower Ratings**

**Note:** Always refer to motor plate FLA and ensure that the motor plate FLA is equal to or lower than the maximum current value in the tables.

**S611****Standard Duty—300% Current for 15 Seconds, 115% Continuous**

Maximum Current (Amps)	Horsepower Rating		480V	600V	Catalogue Number
	208V	240V			
52	15	15	40	50	S611A052N3S
65	20	20	50	60	S611A065N3S
77	25	25	60	75	S611A077N3S
99	30	30	75	100	S611B099N3S
125	40	40	100	125	S611B125N3S
156	50	60	125	150	S611C156N3S
180	60	60	150	150	S611C180N3S
242	75	75	200	250	S611D242N3S
302	100	100	250	300	S611E302N3S
361	125	150	300	350	S611E361N3S
414	150	150	350	450	S611F414N3S

**Standard Duty Plus—350% FLA for 30 Seconds, 115% Continuous**

Maximum Current (Amps)	Horsepower Rating		480V	600V	Catalogue Number
	208V	240V			
52	15	15	40	50	S611A052N3S
65	20	20	50	60	S611A065N3S
71	20	25	60	75	S611A077N3S
99	30	30	75	100	S611B099N3S
119	40	40	100	125	S611B125N3S
156	50	60	125	150	S611C156N3S
180	60	60	150	150	S611C180N3S
242	75	75	200	250	S611D242N3S
302	100	100	250	300	S611E302N3S
361	125	150	300	350	S611E361N3S
407	150	150	350	400	S611F414N3S

**Note:** Always refer to motor plate FLA and ensure that the motor plate FLA is equal to or lower than the maximum current value in the tables.

**S611****Heavy Duty—500% FLA for 30 Seconds, 125% Continuous**

Maximum Current (Amps)	Horsepower Rating				Catalogue Number
	208V	240V	480V	600V	
49	15	15	40	50	S611A052N3S
83	25	30	60	75	S611B099N3S
142	40	60	125	150	S611C156N3S
225	75	75	200	200	S611D242N3S
256	75	100	200	250	S611E361N3S
285	100	125	250	300	S611F414N3S

**Severe Duty—600% FLA for 30 Seconds, 125% Continuous**

Maximum Current (Amps)	Horsepower Rating				Catalogue Number
	208V	240V	480V	600V	
41	10	15	30	40	S611A052N3S
69	20	30	60	60	S611B099N3S
117	30	50	100	125	S611C180N3S
187	60	75	150	200	S611D242N3S
213	75	75	150	200	S611E361N3S
238	75	100	200	250	S611F414N3S

**Accessories****Optional Accessory Kits**

Description	S611 Current Rating	Accessory Kit Part Number
User interface remote mounting kit—3.28 ft (1m)	52–414A	S611-RMK-100
User interface remote mounting kit—6.56 ft (2m)	52–414A	S611-RMK-200
User interface remote mounting kit—9.84 ft (3m)	52–414A	S611-RMK-300
User interface communication cable—3.28 ft (1m)	52–414A	D77E-QPIP100
User interface communication cable—6.56 ft (2m)	52–414A	D77E-QPIP200
User interface communication cable—9.84 ft (3m)	52–414A	D77E-QPIP300
Lug kit—mechanical	52–77A	S611-LUG-M01
	99–125A	S611-LUG-M02
	156–242A	S611-LUG-M03
	302–414A	S611-LUG-M04



## Options

### Pump Control

For pump control option, change the **8th** digit in the Catalogue Number to **P**, as in S611XXX**P**3S.

## Replacement Parts

### S611 Replacement Components

Description	Part Number
User interface	<b>S611-KEYPAD</b>
User interface communication cable—0.25m (0.82 ft)	<b>D77E-QPIP25</b>
Control board assembly—52A standard	<b>S611-PCB-052S</b>
Control board assembly—65A standard	<b>S611-PCB-065S</b>
Control board assembly—77A standard	<b>S611-PCB-077S</b>
Control board assembly—99A standard	<b>S611-PCB-099S</b>
Control board assembly—125A standard	<b>S611-PCB-125S</b>
Control board assembly—156A standard	<b>S611-PCB-156S</b>
Control board assembly—180A standard	<b>S611-PCB-180S</b>
Control board assembly—242A standard	<b>S611-PCB-242S</b>
Control board assembly—302A standard	<b>S611-PCB-302S</b>
Control board assembly—361A standard	<b>S611-PCB-361S</b>
Control board assembly—414A standard	<b>S611-PCB-414S</b>
Control board assembly—52A pump	<b>S611-PCB-052P</b>
Control board assembly—65A pump	<b>S611-PCB-065P</b>
Control board assembly—77A pump	<b>S611-PCB-077P</b>
Control board assembly—99A pump	<b>S611-PCB-099P</b>
Control board assembly—125A pump	<b>S611-PCB-125P</b>
Control board assembly—156A pump	<b>S611-PCB-156P</b>
Control board assembly—180A pump	<b>S611-PCB-180P</b>
Control board assembly—242A pump	<b>S611-PCB-242P</b>
Control board assembly—302A pump	<b>S611-PCB-302P</b>
Control board assembly—361A pump	<b>S611-PCB-361P</b>
Control board assembly—414A pump	<b>S611-PCB-414P</b>
Frame A/B CT	<b>S611-CT-AB</b>
Frame C/D CT	<b>S611-CT-CD</b>
Frame E/F CT	<b>S611-CT-EF</b>
Contactors assembly—52–180A	<b>C25DNY172</b>
Contactors assembly—242–414A	<b>C25DNY173</b>

## Technical Data and Specifications

## Soft Starters—S611

Description		S611 Soft Starter (Partial Catalogue Number)			
		S611A052	S611A065	S611A072	S611B099
Max. current capacity	A	52	65	77	99
FLA range	A	26–52	32.5–65	38.5–77	48–99
<b>Dimensions</b>					
Width	inch (mm)	11.58 (294)	11.58 (294)	11.58 (294)	11.58 (294)
Height	inch (mm)	19.45 (494)	19.45 (494)	19.45 (494)	19.45 (494)
Depth	inch (mm)	7.46 (189)	7.46 (189)	7.46 (189)	7.46 (189)
Weight	lb (kg)	24 (11)	24 (11)	24 (11)	24 (11)
<b>General Information</b>					
Bypass mechanical lifespan		10M	10M	10M	10M
Insulating voltage	V	660	660	660	660
Ramp time range	Seconds	0.5–180	0.5–180	0.5–180	0.5–180
Vibration resistance—non-operating	g	3g up to 242A units, 2g on 302A to 414A units	3g up to 242A units, 2g on 302A to 414A units	3g up to 242A units, 2g on 302A to 414A units	3g up to 242A units, 2g on 302A to 414A units
Vibration resistance—operating	g	1	1	1	1
Shock resistance	g	15g up to 242A units, 5g on 302A to 414A units	15g up to 242A units, 5g on 302A to 414A units	15g up to 242A units, 5g on 302A to 414A units	15g up to 242A units, 5g on 302A to 414A units
<b>Electrical Information</b>					
Operating voltage	V	130–600	130–600	130–600	130–600
Operating frequency	Hertz	47–63	47–63	47–63	47–63
Overload setting (frame)	% FLA	50–100	50–100	50–100	50–100
Trip class		5, 10, 20, 30	5, 10, 20, 30	5, 10, 20, 30	5, 10, 20, 30
<b>Cabling Capacity (IEC 947)</b>					
Number of conductors		1	1	1	1
Wire sizes	AWG	14–2/0	14–2/0	14–2/0	14–2/0
Type of connectors		Lug	Lug	Lug	Lug
<b>Control Wiring</b>					
Wire sizes	AWG	22–12	22–12	22–12	22–12
Number of conductors		2 (or one 12–14 AWG)	2 (or one 12–14 AWG)	2 (or one 12–14 AWG)	2 (or one 12–14 AWG)
Torque requirements	lb-in	3.5	3.5	3.5	3.5
Maximum size	AWG	12	12	12	12
<b>Control Power Requirements</b>					
Voltage range (120V ±10%)	V	108–132	108–132	108–132	108–132
Steady state current	A	0.375	0.375	0.375	0.375
Inrush current	A	0.5	0.5	0.5	0.5
Ripple	%	1	1	1	1
<b>Relays (1) Class A and C</b>					
Voltage AC—maximum	V	120	120	120	120
Voltage DC—maximum	V	24	24	24	24
Amps—maximum	A	3	3	3	3
<b>Environment</b>					
Temperature—operating	°C	–20° to 50°C	–20° to 50°C	–20° to 50°C	–20° to 50°C
Temperature—storage	°C	–40° to 85°C	–40° to 85°C	–40° to 85°C	–40° to 85°C
Altitude	Meters	<2000m, derate 0.5% per 100m >2000m	<2000m, derate 0.5% per 100m >2000m	<2000m, derate 0.5% per 100m >2000m	<2000m, derate 0.5% per 100m >2000m
Humidity	%	<95% non-condensing	<95% non-condensing	<95% non-condensing	<95% non-condensing
Operating position		Vertical, line side up	Vertical, line side up	Vertical, line side up	Vertical, line side up
Pollution degree IEC947-1		3	3	3	3
Impulse withstand voltage IEC947-4-1	V	6000	6000	6000	6000

## Soft Starters—S611, continued

Description		S611 Soft Starter (Partial Catalogue Number)			
		S611B125	S611C156	S611C180	S611D242
Max. current capacity	A	125	156	180	242
FLA range	A	62.5–125	78–156	90–180	120–242
<b>Dimensions</b>					
Width	inch (mm)	11.58 (294)	11.58 (294)	11.58 (294)	11.58 (294)
Height	inch (mm)	19.45 (494)	20.83 (529)	20.83 (529)	20.83 (529)
Depth	inch (mm)	7.46 (189)	8.37 (213)	8.37 (213)	8.37 (213)
Weight	lb (kg)	24 (11)	33 (15)	33 (15)	38 (17)
<b>General Information</b>					
Bypass mechanical lifespan		10M	10M	10M	10M
Insulating voltage	V	660	660	660	660
Ramp time range	Seconds	0.5–180	0.5–180	0.5–180	0.5–180
Vibration resistance—non-operating	g	3g up to 242A units, 2g on 302A to 414A units	3g up to 242A units, 2g on 302A to 414A units	3g up to 242A units, 2g on 302A to 414A units	3g up to 242A units, 2g on 302A to 414A units
Vibration resistance—operating	g	1	1	1	1
Shock resistance	g	15g up to 242A units, 5g on 302A to 414A units	15g up to 242A units, 5g on 302A to 414A units	15g up to 242A units, 5g on 302A to 414A units	15g up to 242A units, 5g on 302A to 414A units
<b>Electrical Information</b>					
Operating voltage	V	130–600	130–600	130–600	130–600
Operating frequency	Hertz	47–63	47–63	47–63	47–63
Overload setting (frame)	% FLA	50–100	50–100	50–100	50–100
Trip class		5, 10, 20, 30	5, 10, 20, 30	5, 10, 20, 30	5, 10, 20, 30
<b>Cabling Capacity (IEC 947)</b>					
Number of conductors		1	1	1	1
Wire sizes	AWG	2–600 kcmil	2–600 kcmil	2–600 kcmil	2–600 kcmil
Type of connectors		Lug	Lug	Lug	Lug
<b>Control Wiring</b>					
Wire sizes	AWG	22–12	22–12	22–12	22–12
Number of conductors		2 (or one 12–14 AWG)	2 (or one 12–14 AWG)	2 (or one 12–14 AWG)	2 (or one 12–14 AWG)
Torque requirements	lb-in	3.5	3.5	3.5	3.5
Maximum size	AWG	12	12	12	12
<b>Control Power Requirements</b>					
Voltage range (120V ±10%)	V	108–132	108–132	108–132	108–132
Steady state current	A	0.375	0.375	0.375	0.375
Inrush current	A	0.5	0.5	0.5	0.5
Ripple	%	1	1	1	1
<b>Relays (1) Class A and C</b>					
Voltage AC—maximum	V	120	120	120	120
Voltage DC—maximum	V	24	24	24	24
Amps—maximum	A	3	3	3	3
<b>Environment</b>					
Temperature—operating	°C	–20° to 50°C	–20° to 50°C	–20° to 50°C	–20° to 50°C
Temperature—storage	°C	–40° to 85°C	–40° to 85°C	–40° to 85°C	–40° to 85°C
Altitude	Meters	<2000m, derate 0.5% per 100m >2000m	<2000m, derate 0.5% per 100m >2000m	<2000m, derate 0.5% per 100m >2000m	<2000m, derate 0.5% per 100m >2000m
Humidity	%	<95% non-condensing	<95% non-condensing	<95% non-condensing	<95% non-condensing
Operating position		Vertical, line side up	Vertical, line side up	Vertical, line side up	Vertical, line side up
Pollution degree IEC947-1		3	3	3	3
Impulse withstand voltage IEC947-4-1	V	6000	6000	6000	6000

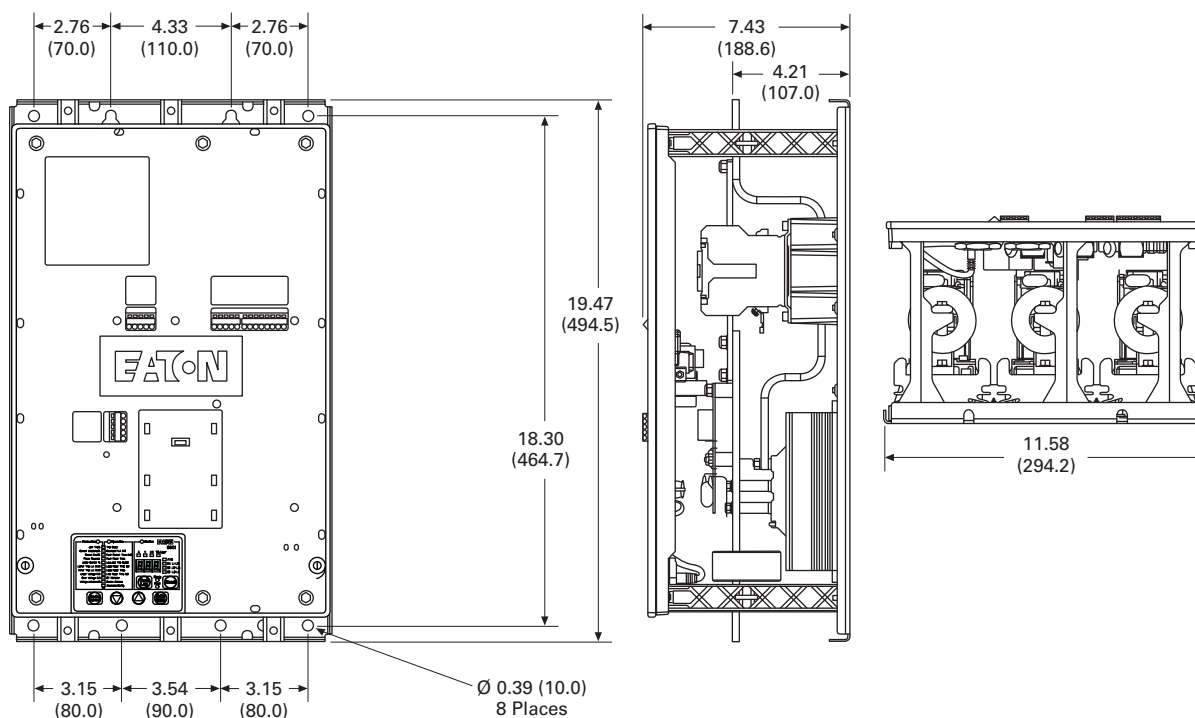
## Soft Starters—S611, continued

Description		S611 Soft Starter (Partial Catalogue Number)		
		S611E302	S611E361	S611F414
Max. current capacity	A	302	361	414
FLA range	A	151–302	180.5–361	207–414
<b>Dimensions</b>				
Width	inch (mm)	17.56 (446)	17.56 (446)	17.56 (446)
Height	inch (mm)	31.15 (791)	31.15 (791)	31.15 (791)
Depth	inch (mm)	9.54 (242)	9.54 (242)	9.54 (242)
Weight	lb (kg)	86 (39)	86 (39)	102 (46)
<b>General Information</b>				
Bypass mechanical lifespan		10M	10M	10M
Insulating voltage	V	660	660	660
Ramp time range	Seconds	0.5–180	0.5–180	0.5–180
Vibration resistance—non-operating	g	3g up to 242A units, 2g on 302A to 414A units	3g up to 242A units, 2g on 302A to 414A units	3g up to 242A units, 2g on 302A to 414A units
Vibration resistance—operating	g	1	1	1
Shock resistance	g	15g up to 242A units, 5g on 302A to 414A units	15g up to 242A units, 5g on 302A to 414A units	15g up to 242A units, 5g on 302A to 414A units
<b>Electrical Information</b>				
Operating voltage	V	130–600	130–600	130–600
Operating frequency	Hertz	47–63	47–63	47–63
Overload setting (frame)	% FLA	50–100	50–100	50–100
Trip class		5, 10, 20, 30	5, 10, 20, 30	5, 10, 20, 30
<b>Cabling Capacity (IEC 947)</b>				
Number of conductors		2	2	2
Wire sizes	AWG	2–600 kcmil	2–600 kcmil	2–600 kcmil
Type of connectors		Lug	Lug	Lug
<b>Control Wiring</b>				
Wire sizes	AWG	22–12	22–12	22–12
Number of conductors		2 (or one 12–14 AWG)	2 (or one 12–14 AWG)	2 (or one 12–14 AWG)
Torque requirements	lb-in	3.5	3.5	3.5
Maximum size	AWG	12	12	12
<b>Control Power Requirements</b>				
Voltage range (120V ±10%)	V	108–132	108–132	108–132
Steady state current	A	0.75	0.75	0.75
Inrush current	A	1	1	1
Ripple	%	1	1	1
<b>Relays (1) Class A and C</b>				
Voltage AC—maximum	V	120	120	120
Voltage DC—maximum	V	24	24	24
Amps—maximum	A	3	3	3
<b>Environment</b>				
Temperature—operating	°C	–20° to 50°C	–20° to 50°C	–20° to 50°C
Temperature—storage	°C	–40° to 85°C	–40° to 85°C	–40° to 85°C
Altitude	Meters	<2000m, derate 0.5% per 100m >2000m	<2000m, derate 0.5% per 100m >2000m	<2000m, derate 0.5% per 100m >2000m
Humidity	%	<95% non-condensing	<95% non-condensing	<95% non-condensing
Operating position		Vertical, line side up	Vertical, line side up	Vertical, line side up
Pollution degree IEC947-1		3	3	3
Impulse withstand voltage IEC947-4-1	V	6000	6000	6000

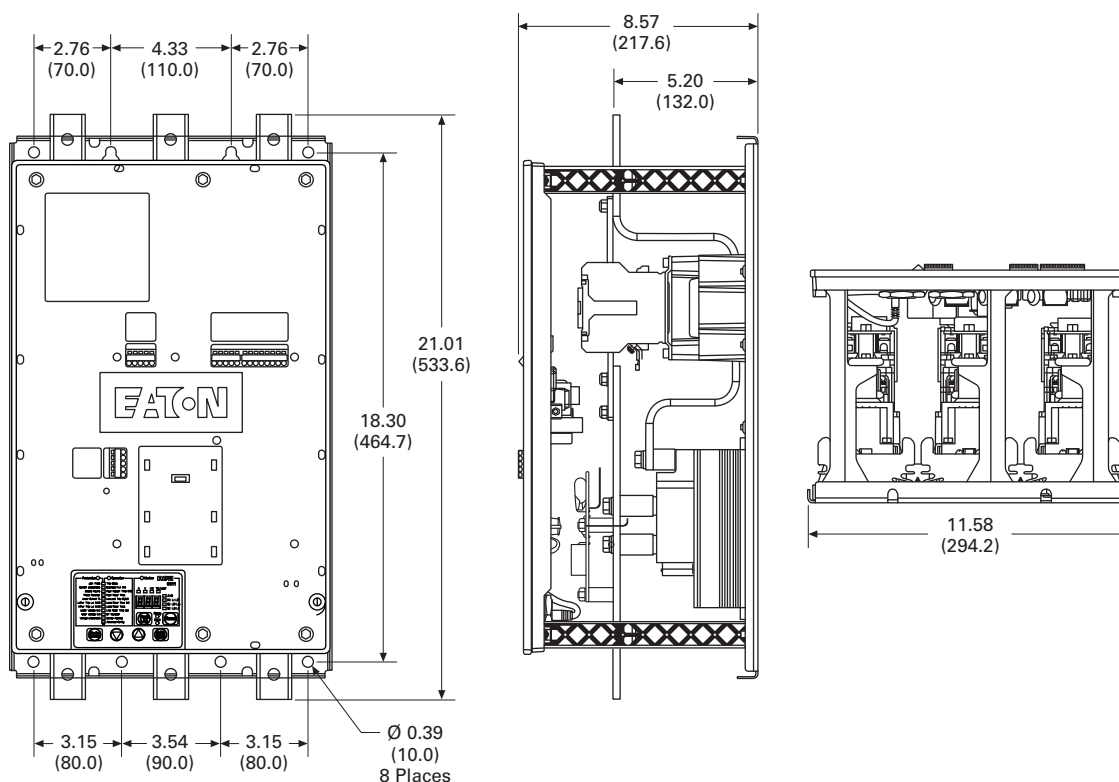
### Dimensions

Approximate Dimensions in inches (mm)

#### A and B Frame



#### C and D Frame



# 1.1

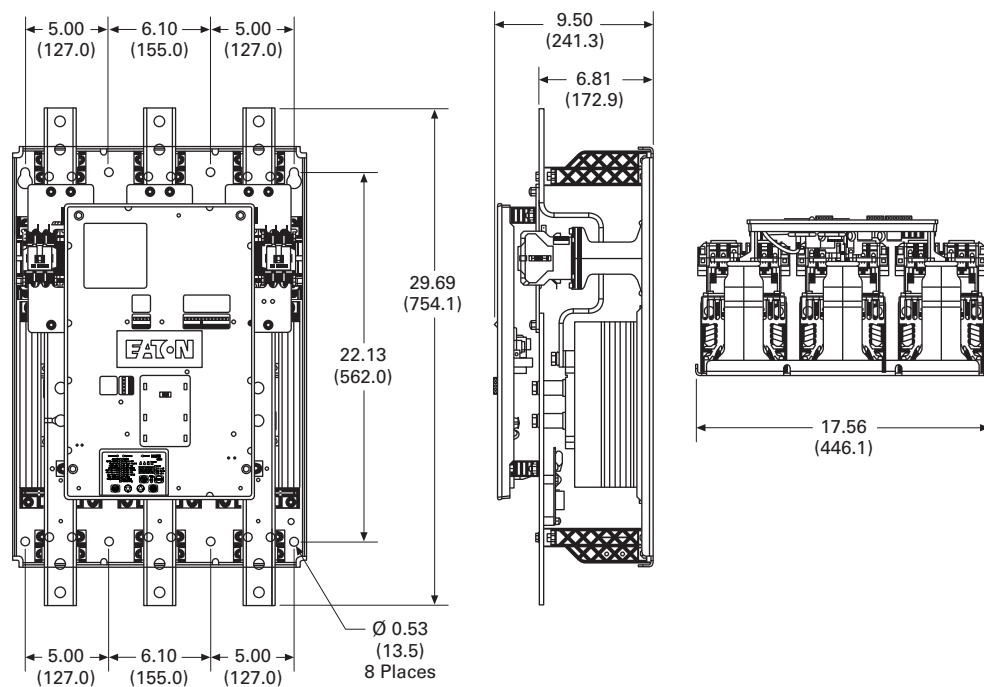
## Reduced Voltage Motor Starters

### Solid-State Starters

1

Approximate Dimensions in inches (mm)

#### E and F Frame



**Type S801+, Soft Starters****Type S801+, Soft Starters****Product Description**

Eaton's S801+ line of reduced voltage soft starters is very compact, multi-functional, easy to install and easy to program. Designed to control acceleration and deceleration of three-phase motors, the line is available for current ranges from 11A all the way through 1000A applications, and is suitable for mounting in motor control centers or in enclosed control (NEMA 1, 4, 4X and 12) applications.

**Application Description**

The S801+ line of soft starters is designed to be the smallest, most compact soft starter in the market today. With this small size, it can easily fit in place of existing soft starter designs, wye-delta starters or across-the-line NEMA and IEC starters. This feature allows easy retrofits of existing motor control centers or enclosures, and saves the expense of replacing existing structure or adding a new one to house a soft starter.

**Contents****Description**

	<b>Page</b>
Type S611, Solid-State Soft Starters . . . . .	<b>V6-T1-22</b>
Type S801+, Soft Starters	
Operation . . . . .	<b>V6-T1-40</b>
Features . . . . .	<b>V6-T1-42</b>
Benefits . . . . .	<b>V6-T1-42</b>
Standards and Certifications . . . . .	<b>V6-T1-42</b>
User Manuals . . . . .	<b>V6-T1-42</b>
Catalogue Number Selection . . . . .	<b>V6-T1-42</b>
Product Selection . . . . .	<b>V6-T1-43</b>
Accessories . . . . .	<b>V6-T1-45</b>
Options . . . . .	<b>V6-T1-46</b>
Technical Data and Specifications . . . . .	<b>V6-T1-47</b>
Wiring Diagram . . . . .	<b>V6-T1-51</b>
Dimensions . . . . .	<b>V6-T1-51</b>
Type S811+, Soft Starters with DIM. . . . .	<b>V6-T1-55</b>
TRU-START . . . . .	<b>V6-T1-79</b>

The product is designed to work with three-phase motors in a delta (three-lead) configuration. The S801+ works with all motors from fractional horsepower up to motors requiring 1000A of steady-state current. The built-in overload (in ranges from 11–1000A) and run bypass contactor make installation and setup quick and easy. The overload also offers some advanced protective functions to give additional motor protection.

**Operation****Overload Functionality****Overtemperature**

Protects the device from overheating. Starter will shut down at 100°C.

**Stall**

Selectable protective feature, unit trips to protect system in event motor can not get to rated speed in the defined ramp period.

**Jam**

Selectable protective feature, unit trips to prevent damage to motor during normal run.

**Phase Loss**

Selectable protective feature, trips under voltage loss condition to any phase.

**Phase Reversal**

Selectable protective feature, trips when phase rotation is something other than A-B-C.

**Kick Start**

Selectable feature that provides a current "kick" of up to 550% of full load current for 0 to 2.0 seconds. This provides the additional torque required at startup to break free a motor.

**Ramp Start**

Provides a constant increase in torque to the motor.

**Current Limit Start**

Limits the maximum current available to the motor during the startup phase.

**Soft Stop**

Allows for a controlled stopping of a frictional load.

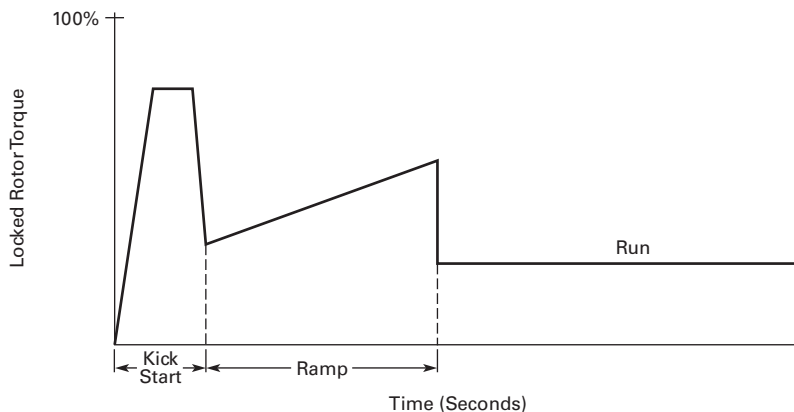
**Shorted SCR Detection**

Monitors for shorted SCR in the power poles.

**Starting Characteristics****Kick Start**

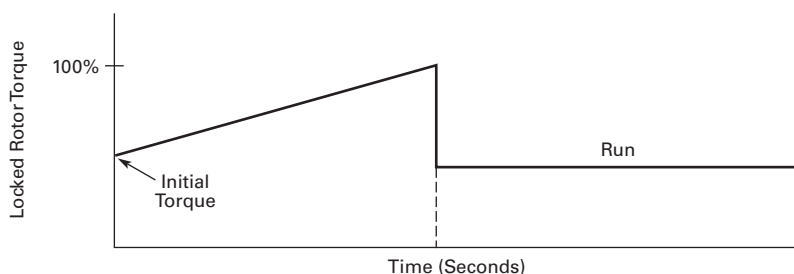
Provides an initial boost of current to the motor to help overcome motor inertia and begin motor rotation.

- 0–85% of locked rotor torque
- 0–2.0 seconds duration

**Starting Characteristics—Kick Start****Ramp Start**

The most commonly used form of soft start. This allows you to set the initial torque value (of the ramp) and then raises it to full voltage conditions.

- Adjustable initial torque = 0–85% of locked rotor torque
- Adjustable ramp time = 0.5–180 seconds

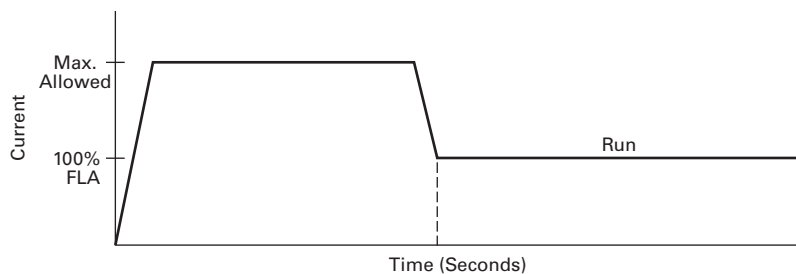
**Starting Characteristics—Ramp Start**



**Current Limit**

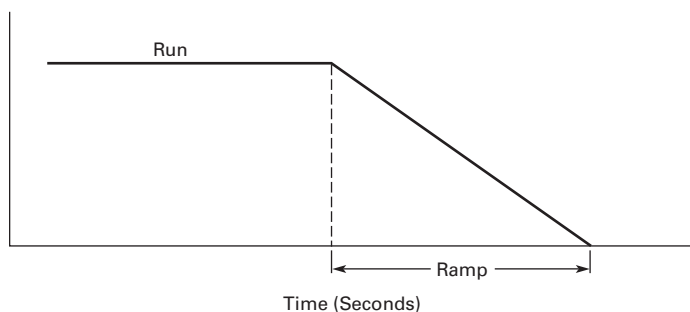
This mode of soft starting is used when it becomes necessary to limit the maximum starting current due to long start times or to protect the motor.

- Maximum current of 0–85% locked rotor current
- Adjustable ramp time = 0.5–180 seconds

**Starting Characteristics—Current Limit****Soft Stop**

Used when an extended coast-to-rest period is desired. Often used with high friction loads where a sudden stop may cause system or product damage.

- Stop time = 0–60 seconds

**Starting Characteristics—Soft Stop**

**Features**

- Built-in overload protection
- Built-in run bypass contactor
- Adjustable ramp times
- Adjustable torque control
- Adjustable kick start control
- Programmable overload settings, 31–100% (3.2:1) of rated current for the unit
- Physically fits in place of most NEMA and IEC starters
- Easy to use control interface module
- Soft stop control
- Multiple trip class settings (5, 10, 20 and 30)
- Six SCR control
- Optional CIM door mount kit for safety
- Optional IP20 protection

**Benefits**

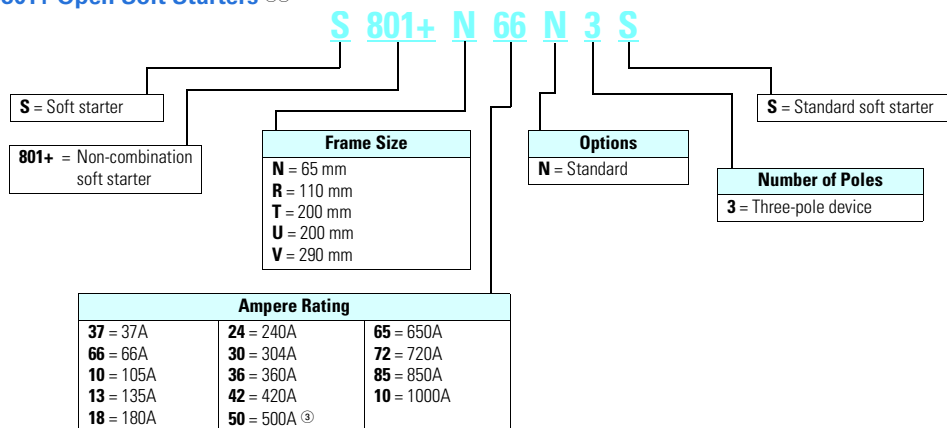
- Reduced wear on belts, gears, chains, clutches, shafts and bearings
- Allows for controlling the inrush current to the motor
- Reduced inrush current leads to more stable power grid and can lower peak demand charges
- Less shock to product on conveyor lines and material handling gear
- 24 Vdc control enhances personnel and equipment safety

**Standards and Certifications**

- IEC 947 compliant
- EN 60947-4-2
- CSA certification
- cULus listed (File No. E202571)
- CE marked
- CSA elevator (2411 01)

**User Manuals**

A comprehensive user manual is available and can be downloaded free of charge from [www.eaton.com](http://www.eaton.com) by performing a document search for MN03900002E.

**Catalogue Number Selection****S801+ Open Soft Starters** <sup>①②</sup>**Notes**

- ① S801+T\_, S801+U\_ and S801+V\_ units require lug kits found on **Page V6-T1-45**.  
 ② All units require a 24 Vdc power supply found on Catalogue **Page V6-T1-45**, or equivalent.  
 ③ S801+U50N3S unit does not have IEC certification.

## Product Selection

### Standard Duty Ratings

The table below is the base ratings for the soft starter. The tables included in this Catalogue are meant to be a reference table for different applications, but to match a unit to your exact application, consult with your local Eaton representative or contact EatonCare.

### Standard Duty Ratings

Starting Method	Ramp Current % of FLA	Ramp Time Seconds	Starts per Hour	Ambient Temperature
Soft start	300%	30 sec.	3	50°C
Full voltage	500%	10 sec.	3	50°C
Wye-delta	350%	20 sec.	3	50°C
80% RVAT	480%	20 sec.	2	50°C
65% RVAT	390%	20 sec.	3	50°C
50% RVAT	300%	20 sec.	4	50°C

Motor applications and customer needs come in many different varieties. With the standard and severe duty rating tables, we have attempted to provide

guidelines on what the soft starter is capable of. If the application falls under these categories, you can use these charts. For other applications, or when a

question arises, consult with your local Eaton representative or contact EatonCare.

### S801+



### Standard Duty—15 Second Ramp, 300% Current Limit at 40°C, Inline Connection

Max. Current	Three-Phase Motors kW Rating (50 Hz)			hp Rating (60 Hz)								Catalogue Number
	230V	380–400V	440V	200V		230V		460V		575–600V		
				1.0SF	1.15SF	1.0SF	1.15SF	1.0SF	1.15SF	1.0SF	1.15SF	
Frame Size N												
37	10	18.5	18.5	10	10	10	10	25	20	30	30	S801+N37N3S
66	18.5	30	37	20	15	20	20	50	40	60	50	S801+N66N3S
Frame Size R												
105	30	55	59	30	25	40	30	75	60	100	75	S801+R10N3S
135	40	63	80	40	30	50	40	100	75	125	100	S801+R13N3S
Frame Size T												
180	51	90	110	60	50	60	60	150	125	150	150	S801+T18N3S
240	75	110	147	75	60	75	75	200	150	200	200	S801+T24N3S
304	90	160	185	100	75	100	100	250	200	300	250	S801+T30N3S
Frame Size U												
360	110	185	220	125	100	150	125	300	250	350	300	S801+U36N3S
420	129	220	257	150	125	175	150	350	300	450	350	S801+U42N3S
500	150	257	300	150	150	200	150	400	350	500	450	S801+U50N3S ①
Frame Size V												
360	110	185	220	125	100	150	125	300	250	350	300	S801+V36N3S
420	129	220	257	150	125	175	150	350	300	450	350	S801+V42N3S
500	150	257	300	150	150	200	150	400	350	500	450	S801+V50N3S
650	200	355	425	250	200	250	200	500	450	600	500	S801+V65N3S
720	220	400	450	—	—	300	250	600	500	700	600	S801+V72N3S
850	257	475	500	—	—	350	300	700	600	900	700	S801+V85N3S
1000	277	525	550	—	—	400	350	800	700	900	800	S801+V10N3S

#### Note

① S801+U50N3S does not have IEC certification.

**Severe Duty Ratings**

The table below is the base ratings for the soft starter. The tables included in this catalogue are meant to be a reference table for different applications, but to match a unit to your exact application, consult with your local Eaton representative or contact EatonCare.

**Severe Duty Ratings**

Starting Method	Ramp Current % of FLA	Ramp Time Seconds	Starts per Hour	Ambient Temperature
Soft start	450%	30 sec.	4	50°C
Full voltage	500%	10 sec.	10	50°C
Wye-delta	350%	65 sec.	3	50°C
80% RVAT	480%	25 sec.	4	50°C
65% RVAT	390%	40 sec.	4	50°C
50% RVAT	300%	60 sec.	4	50°C

Severe duty ratings are defined as any combination of parameters that exceed the standard duty ratings where

the ramp time is over 30 seconds, and/or the number of starts per hour exceeds 4, and/or the current limit set is

over 300%. *Example:* 35-second ramp, 5 starts per hour, 350% current limit at 40°C ambient.

**S801+****Severe Duty—>30 Second Ramp, >300% Current Limit**

Max. Current	Three-Phase Motor kW Rating (50 Hz)			hp Rating (60 Hz)								Catalogue Number
	230V	380–400V	440V	200V 1.0SF	1.15SF	230V 1.0SF	1.15SF	460V 1.0SF	1.15SF	575V 1.0SF	1.15SF	
Frame Size N												
22	5.5	10	11	5	5	7-1/2	5	15	10	20	15	S801+N37N3S
42	11	18.5	22	10	10	15	10	30	25	40	30	S801+N66N3S
Frame Size R												
65	15	30	33	15	15	20	15	50	40	50	50	S801+R10N3S
80	22	40	45	25	20	30	25	60	50	75	60	S801+R13N3S
Frame Size T												
115	33	59	63	30	30	40	30	75	75	100	100	S801+T18N3S
150	45	80	90	50	40	50	50	100	100	150	125	S801+T24N3S
192	55	100	110	60	50	75	60	150	125	200	150	S801+T30N3S
Frame Size U												
240	75	110	147	75	60	75	75	200	150	200	200	S801+U36N3S
305	90	160	185	100	75	100	100	250	200	300	250	S801+U42N3S
365	110	185	220	125	100	150	125	300	250	350	300	S801+U50N3S ①
Frame Size V												
240	75	110	147	75	60	75	75	200	150	200	200	S801+V36N3S
305	90	160	185	100	75	100	100	250	200	300	250	S801+V42N3S
365	110	185	220	125	100	150	125	300	250	350	300	S801+V50N3S
420	129	220	257	150	125	150	150	350	300	450	350	S801+V65N3S
480	147	257	295	150	150	200	150	400	350	500	450	S801+V72N3S
525	160	280	335	150	150	200	150	450	350	500	450	S801+V85N3S
600	185	315	375	200	150	250	200	500	450	600	500	S801+V10N3S

**Note**

① S801+U50N3S unit does not have IEC certification.

## Accessories

### Lug Kits

S801+T\_, S801+U\_ and S801+V\_ soft starters each have different lug options based on your wiring needs.

Each lug kit contains three lugs that can be mounted on either the load or line side.

#### Lug Kit



#### Lug Kits

S801+ Catalogue Number	Description	Kits Required	Catalogue Number
S801+T_, S801+U_	2 cable connections, 4 AWG to 1/0 cable	2	<b>EML22</b>
	1 cable connection, 4/0 to 500 kcmil cable		<b>EML23</b>
	2 cable connections, 4/0 to 500 kcmil cable		<b>EML24</b>
	1 cable connection, 2/0 to 300 kcmil cable		<b>EML25</b>
	2 cable connections, 2/0 to 300 kcmil cable		<b>EML26</b>
S801+V_	2 cable connections, 4/0 to 500 kcmil cable	2	<b>EML28</b>
	4 cable connections, 4/0 to 500 kcmil cable		<b>EML30</b>
	6 cable connections, 4/0 to 500 kcmil cable		<b>EML32</b>
	4 cable connections, 2/0 to 300 kcmil cable		<b>EML33</b>

### Power Supplies

24 Vdc power supply that can be used with the S801+ SSRV or as a stand-alone device.

#### Power Supplies

Description	Catalogue Number
85–264 Vac input 24 Vdc output	<b>PSG240E</b>
360–575 Vac input 24 Vdc output	<b>PSG240F</b>
600 Vac input 24 Vdc output	<b>PSS55D</b>

### Lug Cover Kits

Replacement covers for the S801+T\_ and S801+U\_ soft starters are available in case of damage to the existing covers.

#### Lug Cover Kits

Description	Catalogue Number
Lug cover S801+T_, S801+U_	<b>EML27</b>
Lug cover S801+V_	<b>EML34</b>

### IP20 Kits

#### IP20 Kits

Description	Catalogue Number
S801+N_	<b>SS-IP20-N</b>
S801+R_	<b>SS-IP20-R</b>
S801+T_ and S801+U_	<b>SS-IP20-TU</b>
S801+V_	<b>SS-IP20-V</b>

### Surge Suppressors

The surge suppressor can mount on either the line or load side of the soft starter. It is designed to clip the line voltage (or load side induced voltage).

#### Surge Suppressor



#### Surge Suppressors

Description	Catalogue Number
600V MOV for S801+_ units	<b>EMS39</b>
690V MOV for S801+_ units	<b>EMS41</b>

**Mounting Plates**

The mounting plates are designed to help make it easy to install or retrofit the soft starter into enclosures and MCCs. The soft starter can be mounted onto the plate prior to installation. The mounting plate is designed with tear drop mounting holes for easier installation.

**Mounting Plates**

Description	Catalogue Number
S801+N_	<b>EMM13N</b>
S801+R_	<b>EMM13R</b>
S801+T_ and S801+U_	<b>EMM13T</b>
S801+V_	<b>EMM13V</b>

**Vibration Plates**

The vibration plates allow the soft starter to be applied in high shock and vibration applications. The vibration plate allows vibration up to 5g and shock in up to 40g. The soft starter is mounted onto the vibration plate prior to installation in the panel.

**Vibration Plates**

Description	Catalogue Number
S801+N_	<b>EMM14N</b>
S801+R_	<b>EMM14R</b>
S801+T_ and S801+U_	<b>EMM14T</b>
S801+V_	<b>EMM14V</b>

**Adapter Plates**

The adapter plate allows customers to retrofit a S801+V\_ soft starter with the S801+U\_ soft starter.

**Adapter Plates**

Description	Catalogue Number
Adapter plates	<b>EMM13U</b>

**Control Wire Connector****Control Wire Connector**

Description	Catalogue Number
12-pin, 5 mm pitch connector for control wiring	<b>EMA75</b>

**Control Interface Module**

The Control Interface Module (CIM) is available as a replacement part.

**CIM**

Description	Catalogue Number
Blank cover (filler)	<b>EMA68</b>
CIM for standard unit	<b>EMA71</b>
Panel mounting kit	
3 ft cable	<b>EMA69A</b>
5 ft cable	<b>EMA69B</b>
8 ft cable	<b>EMA69C</b>
10 ft cable	<b>EMA69D</b>

**Options****Cooling Fan Kit**

The EMM18 cooling fan kit mounts on either side of any frame size S801+ soft starter to provide additional printed circuit board cooling in high ambient operating temperatures.

**Cooling Fan Kit**

Description	Catalogue Number
Fan kit	<b>EMM18</b>

## Technical Data and Specifications

## Soft Starters—S801+

Description	S801+N37N3S	S801+N66N3S	S801+R10N3S	S801+R13N3S
Max. current capacity	37	66	105	135
<b>General Information</b>				
Bypass mechanical lifespan	10M	10M	10M	10M
Insulating voltage $U_i$	660V	660V	660V	660V
Ramp time range	0.5–180 seconds	0.5–180 seconds	0.5–180 seconds	0.5–180 seconds
Resistance to vibration	3g	3g	3g	3g
Resistance to shock	15g	15g	15g	15g
<b>Electrical Information</b>				
Operating voltage	200–600V	200–600V	200–600V	200–600V
Operating frequency	47–63 Hz	47–63 Hz	47–63 Hz	47–63 Hz
Overload setting	30–100%	30–100%	30–100%	30–100%
Trip class	5, 10, 20 and 30	5, 10, 20 and 30	5, 10, 20 and 30	5, 10, 20 and 30
<b>Cabling Capacity (IEC 947)</b>				
Number of conductors	1	1	1	1
Wire sizes	14–2	14–2	14–4/0	14–4/0
Type of connectors	Box lug	Box lug	Box lug	Box lug
<b>Control Wiring (12-Pin)</b>				
Wire sizes in AWG	22–14	22–14	22–14	22–14
Number of conductors (stranded)	2 (or one AWG 12)	2 (or one AWG 12)	2 (or one AWG 12)	2 (or one AWG 12)
Torque requirements in lb-in	3.5	3.5	3.5	3.5
Solid, stranded or flexible max. size in mm <sup>2</sup>	3.31	3.31	3.31	3.31
<b>Control Power Requirements</b>				
Voltage range (24V $\pm$ 10%)	21.6–26.4	21.6–26.4	21.6–26.4	21.6–26.4
Steady-state current amps	1.0	1.0	1.0	1.0
Inrush current amps	10	10	10	10
Ripple	1%	1%	1%	1%
<b>Relays (1) Class A and C</b>				
Voltage AC—maximum	240	240	240	240
Voltage DC—maximum	120	120	120	120
Amps—maximum	3	3	3	3
<b>Environment</b>				
Temperature—operating	–30° to 50°C (no derating) consult Eaton for operation >50°C	–30° to 50°C (no derating) consult Eaton for operation >50°C	–30° to 50°C (no derating) consult Eaton for operation >50°C	–30° to 50°C (no derating) consult Eaton for operation >50°C
Temperature—storage	–50° to 70°C	–50° to 70°C	–50° to 70°C	–50° to 70°C
Altitude	<2000m—consult Eaton for operation >2000m	<2000m—consult Eaton for operation >2000m	<2000m—consult Eaton for operation >2000m	<2000m—consult Eaton for operation >2000m
Humidity	<95% noncondensing	<95% noncondensing	<95% noncondensing	<95% noncondensing
Operating position	Any	Any	Any	Any
Pollution degree IEC947-1	3	3	3	3
Impulse withstand voltage IEC947-4-1	6000V	6000V	6000V	6000V

## Soft Starters—S801+, continued

Description	S801+T18N3S	S801+T24N3S	S801+T30N3S	S801+U36N3S
Max. current capacity	180	240	304	360
<b>General Information</b>				
Bypass mechanical lifespan	10M	10M	10M	10M
Insulating voltage Ui	660V	660V	660V	660V
Ramp time range	0.5–180 seconds	0.5–180 seconds	0.5–180 seconds	0.5–180 seconds
Resistance to vibration	3g	3g	3g	3g
Resistance to shock	15g	15g	15g	15g
<b>Electrical Information</b>				
Operating voltage	200–600V	200–600V	200–600V	200–600V
Operating frequency	47–63 Hz	47–63 Hz	47–63 Hz	47–63 Hz
Overload setting	30–100%	30–100%	30–100%	30–100%
Trip class	5, 10, 20 and 30	5, 10, 20 and 30	5, 10, 20 and 30	5, 10, 20 and 30
<b>Cabling Capacity (IEC 947)</b>				
Number of conductors	1 or 2	1 or 2	1 or 2	1 or 2
Wire sizes	4 AWG to 500 kcmil	4 AWG to 500 kcmil	4 AWG to 500 kcmil	4 AWG to 500 kcmil
Type of connectors	Add-on lug kit	Add-on lug kit	Add-on lug kit	Add-on lug kit
<b>Control Wiring (12-Pin)</b>				
Wire sizes in AWG	22–14	22–14	22–14	22–14
Number of conductors (stranded)	2 (or one AWG 12)	2 (or one AWG 12)	2 (or one AWG 12)	2 (or one AWG 12)
Torque requirements in lb-in	3.5	3.5	3.5	3.5
Solid, stranded or flexible max. size in mm <sup>2</sup>	3.31	3.31	3.31	3.31
<b>Control Power Requirements</b>				
Voltage range (24V ±10%)	21.6–26.4	21.6–26.4	21.6–26.4	21.6–26.4
Steady-state current amps	1.0	1.0	1.0	1.0
Inrush current amps	10	10	10	10
Ripple	1%	1%	1%	1%
<b>Relays (1) Class A and C</b>				
Voltage AC—maximum	240	240	240	240
Voltage DC—maximum	120	120	120	120
Amps—maximum	3	3	3	3
<b>Environment</b>				
Temperature—operating	–30° to 50°C (no derating) consult Eaton for operation >50°C	–30° to 50°C (no derating) consult Eaton for operation >50°C	–30° to 50°C (no derating) consult Eaton for operation >50°C	–30° to 50°C (no derating) consult Eaton for operation >50°C
Temperature—storage	–50° to 70°C	–50° to 70°C	–50° to 70°C	–50° to 70°C
Altitude	<2000m—consult Eaton for operation >2000m	<2000m—consult Eaton for operation >2000m	<2000m—consult Eaton for operation >2000m	<2000m—consult Eaton for operation >2000m
Humidity	<95% noncondensing	<95% noncondensing	<95% noncondensing	<95% noncondensing
Operating position	Any	Any	Any	Any
Pollution degree IEC947-1	3	3	3	3
Impulse withstand voltage IEC947-4-1	6000V	6000V	6000V	6000V



## Soft Starters—S801+, continued

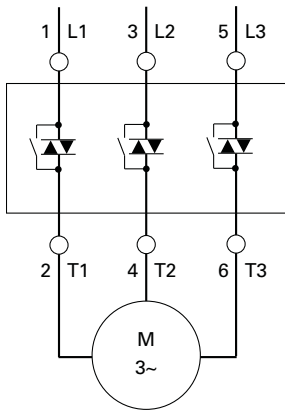
Description	S801+U42N3S	S801+U50N3S ①	S801+V36N3S	S801+V42N3S
Max. current capacity	420	500	360	420
<b>General Information</b>				
Bypass mechanical lifespan	10M	10M	10M	10M
Insulating voltage Ui	660V	660V	660V	660V
Ramp time range	0.5–180 seconds	0.5–180 seconds	0.5–180 seconds	0.5–180 seconds
Resistance to vibration	3g	3g	3g	3g
Resistance to shock	15g	15g	15g	15g
<b>Electrical Information</b>				
Operating voltage	200–600V	200–600V	200–600V	200–600V
Operating frequency	47–63 Hz	47–63 Hz	47–63 Hz	47–63 Hz
Overload setting	30–100%	30–100%	30–100%	30–100%
Trip class	5, 10, 20 and 30	5, 10, 20 and 30	5, 10, 20 and 30	5, 10, 20 and 30
<b>Cabling Capacity (IEC 947)</b>				
Number of conductors	1 or 2	1 or 2	2, 4 or 6	2, 4 or 6
Wire sizes	4 AWG to 500 kcmil	4 AWG to 500 kcmil	2/0 to 500 kcmil	2/0 to 500 kcmil
Type of connectors	Add-on lug kit	Add-on lug kit	Add-on lug kit	Add-on lug kit
<b>Control Wiring (12-Pin)</b>				
Wire sizes in AWG	22–14	22–14	22–14	22–14
Number of conductors (stranded)	2 (or one AWG 12)	2 (or one AWG 12)	2 (or one AWG 12)	2 (or one AWG 12)
Torque requirements in lb-in	3.5	3.5	3.5	3.5
Solid, stranded or flexible max. size in mm <sup>2</sup>	3.31	3.31	3.31	3.31
<b>Control Power Requirements</b>				
Voltage range (24V ±10%)	21.6–26.4	21.6–26.4	21.6–26.4	21.6–26.4
Steady-state current amps	1.0	1.0	1.4	1.4
Inrush current amps	10	10	10	10
Ripple	1%	1%	1%	1%
<b>Relays (1) Class A and C</b>				
Voltage AC—maximum	240	240	240	240
Voltage DC—maximum	120	120	120	120
Amps—maximum	3	3	3	3
<b>Environment</b>				
Temperature—operating	–30° to 50°C (no derating) consult Eaton for operation >50°C	–30° to 50°C (no derating) consult Eaton for operation >50°C	–30° to 50°C (no derating) consult Eaton for operation >50°C	–30° to 50°C (no derating) consult Eaton for operation >50°C
Temperature—storage	–50° to 70°C	–50° to 70°C	–50° to 70°C	–50° to 70°C
Altitude	<2000m—consult Eaton for operation >2000m	<2000m—consult Eaton for operation >2000m	<2000m—consult Eaton for operation >2000m	<2000m—consult Eaton for operation >2000m
Humidity	<95% noncondensing	<95% noncondensing	<95% noncondensing	<95% noncondensing
Operating position	Any	Any	Any	Any
Pollution degree IEC947-1	3	3	3	3
Impulse withstand voltage IEC947-4-1	6000V	6000V	6000V	6000V

**Note**

① 801+U50N3S unit does not have IEC certification.

## Soft Starters—S801+, continued

Description	S801+V50N3S	S801+V65N3S	S801+V72N3S	S801+V85N3S	S801+V10N3S
Max. current capacity	500	650	720	850	1000
<b>Dimensions</b>					
Width in inches (mm)	11.03 (280.2)	11.03 (280.2)	11.03 (280.2)	11.03 (280.2)	11.03 (280.2)
Height in inches (mm)	16.57 (420.8)	16.57 (420.8)	16.57 (420.8)	16.57 (420.8)	16.57 (420.8)
Depth in inches (mm)	7.23 (183.7)	7.23 (183.7)	7.23 (183.7)	7.23 (183.7)	7.23 (183.7)
Weight in lbs (kg)	103 (46.8) with lugs 91 (41.4) without lugs	103 (46.8) with lugs 91 (41.4) without lugs	103 (46.8) with lugs 91 (41.4) without lugs	103 (46.8) with lugs 91 (41.4) without lugs	103 (46.8) with lugs 91 (41.4) without lugs
<b>General Information</b>					
Bypass mechanical lifespan	10M	10M	10M	10M	10M
Insulating voltage $U_i$	660V	660V	660V	660V	660V
Ramp time range	0.5–180 seconds	0.5–180 seconds	0.5–180 seconds	0.5–180 seconds	0.5–180 seconds
Resistance to vibration	3g	3g	3g	3g	3g
Resistance to shock	15g	15g	15g	15g	15g
<b>Electrical Information</b>					
Operating voltage	200–600V	200–600V	200–600V	200–600V	200–600V
Operating frequency	47–63 Hz	47–63 Hz	47–63 Hz	47–63 Hz	47–63 Hz
Overload setting	30–100%	30–100%	30–100%	30–100%	30–100%
Trip class	5, 10, 20 and 30	5, 10, 20 and 30	5, 10, 20 and 30	5, 10, 20 and 30	5, 10, 20 and 30
<b>Cabling Capacity (IEC 947)</b>					
Number of conductors	2, 4 or 6	2, 4 or 6	2, 4 or 6	2, 4 or 6	2, 4 or 6
Wire sizes	2/0 to 500 kcmil	2/0 to 500 kcmil	2/0 to 500 kcmil	2/0 to 500 kcmil	2/0 to 500 kcmil
Type of connectors	Add-on lug kit	Add-on lug kit	Add-on lug kit	Add-on lug kit	Add-on lug kit
<b>Control Wiring (12-Pin)</b>					
Wire sizes in AWG	22–14	22–14	22–14	22–14	22–14
Number of conductors (stranded)	2 (or one AWG 12)	2 (or one AWG 12)	2 (or one AWG 12)	2 (or one AWG 12)	2 (or one AWG 12)
Torque requirements in lb-in	3.5	3.5	3.5	3.5	3.5
Solid, stranded or flexible max. size in mm <sup>2</sup>	3.31	3.31	3.31	3.31	3.31
<b>Control Power Requirements</b>					
Voltage range (24V $\pm$ 10%)	21.6–26.4	21.6–26.4	21.6–26.4	21.6–26.4	21.6–26.4
Steady-state current amps	1.4	1.4	1.4	1.4	1.4
Inrush current amps	10	10	10	10	10
Ripple	1%	1%	1%	1%	1%
<b>Relays (1) Class A and C</b>					
Voltage AC—maximum	240	240	240	240	240
Voltage DC—maximum	120	120	120	120	120
Amps—maximum	3	3	3	3	3
<b>Environment</b>					
Temperature—operating	–30° to 50°C (no derating) consult Eaton for operation >50°C	–30° to 50°C (no derating) consult Eaton for operation >50°C	–30° to 50°C (no derating) consult Eaton for operation >50°C	–30° to 50°C (no derating) consult Eaton for operation >50°C	–30° to 50°C (no derating) consult Eaton for operation >50°C
Temperature—storage	–50° to 70°C	–50° to 70°C	–50° to 70°C	–50° to 70°C	–50° to 70°C
Altitude	<2000m—consult Eaton for operation >2000m	<2000m—consult Eaton for operation >2000m	<2000m—consult Eaton for operation >2000m	<2000m—consult Eaton for operation >2000m	<2000m—consult Eaton for operation >2000m
Humidity	<95% noncondensing	<95% noncondensing	<95% noncondensing	<95% noncondensing	<95% noncondensing
Operating position	Any	Any	Any	Any	Any
Pollution degree IEC947-1	3	3	3	3	3
Impulse withstand voltage IEC947-4-1	6000V	6000V	6000V	6000V	6000V

**Wiring Diagram****Line Connected Soft Starter****Dimensions**

Approximate Dimensions in Inches (mm)

**Soft Starters—S801+**

Catalogue Number	W	H	D	Weight in Lbs (kg)
<b>S801+N37N3S</b>	2.66 (67.6)	7.37 (187.2)	6.45 (163.9)	5.8 (2.6)
<b>S801+N66N3S</b>	2.66 (67.6)	7.37 (187.2)	6.45 (163.9)	5.8 (2.6)
<b>S801+R10N3S</b>	4.38 (111.3)	7.92 (201.1)	6.64 (168.6)	10.5 (4.8)
<b>S801+R13N3S</b>	4.38 (111.3)	7.92 (201.1)	6.64 (168.6)	10.5 (4.8)
<b>S801+T18N3S</b>	7.65 (194.4)	12.71 (322.9)	6.47 (164.4)	48 (21.8) with lugs 41 (18.6) without lugs
<b>S801+T24N3S</b>	7.65 (194.4)	12.71 (322.9)	6.47 (164.4)	48 (21.8) with lugs 41 (18.6) without lugs
<b>S801+T30N3S</b>	7.65 (194.4)	12.71 (322.9)	6.47 (164.4)	48 (21.8) with lugs 41 (18.6) without lugs
<b>S801+U36N3S</b>	7.73 (196.3)	12.72 (323.1)	7.16 (181.8)	48 (21.8) with lugs 41 (18.6) without lugs
<b>S801+U42N3S</b>	7.73 (196.3)	12.72 (323.1)	7.16 (181.8)	48 (21.8) with lugs 41 (18.6) without lugs
<b>S801+U50N3S</b>	7.73 (196.3)	12.72 (323.1)	7.16 (181.8)	48 (21.8) with lugs 41 (18.6) without lugs
<b>S801+V36N3S</b>	11.05 (280.6)	16.57 (420.8)	7.39 (187.8)	103 (46.8) with lugs 91 (41.4) without lugs
<b>S801+V42N3S</b>	11.05 (280.6)	16.57 (420.8)	7.39 (187.8)	103 (46.8) with lugs 91 (41.4) without lugs
<b>S801+V50N3S</b>	11.05 (280.6)	16.57 (420.8)	7.39 (187.8)	103 (46.8) with lugs 91 (41.4) without lugs
<b>S801+V65N3S</b>	11.05 (280.6)	16.57 (420.8)	7.39 (187.8)	103 (46.8) with lugs 91 (41.4) without lugs
<b>S801+V72N3S</b>	11.05 (280.6)	16.57 (420.8)	7.39 (187.8)	103 (46.8) with lugs 91 (41.4) without lugs
<b>S801+V85N3S</b>	11.05 (280.6)	16.57 (420.8)	7.39 (187.8)	103 (46.8) with lugs 91 (41.4) without lugs
<b>S801+V10N3S</b>	11.05 (280.6)	16.57 (420.8)	7.39 (187.8)	103 (46.8) with lugs 91 (41.4) without lugs

Also refer to dimension drawings on **Pages V6-T1-52 through V6-T1-54.**

# 1.1

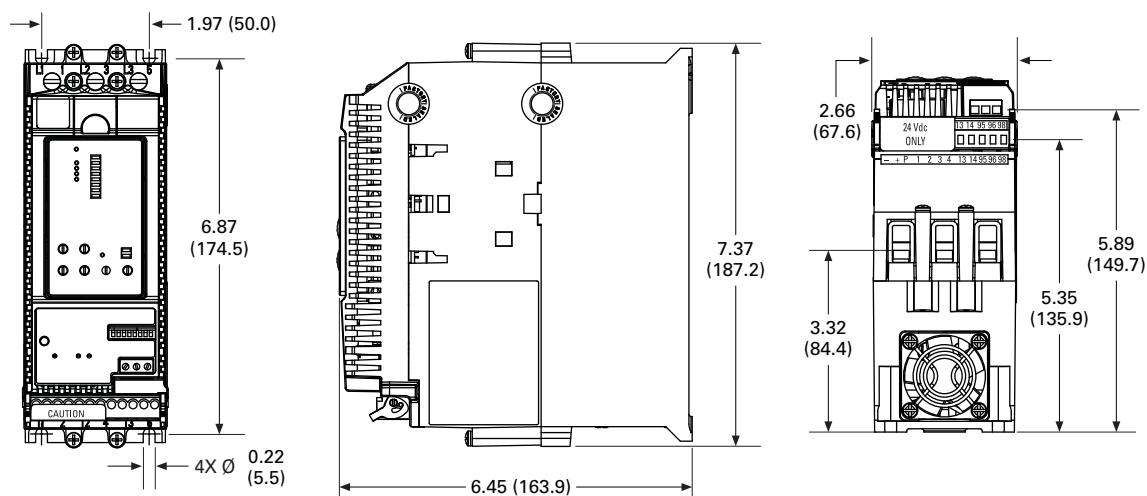
## Reduced Voltage Motor Starters

### Solid-State Starters

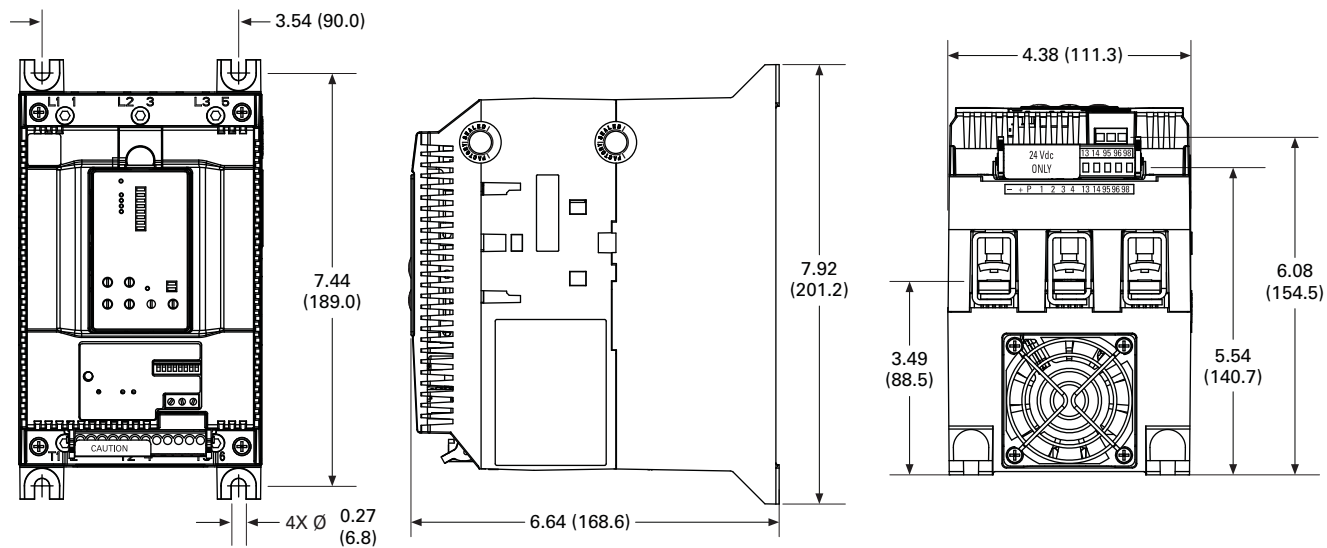
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Approximate Dimensions in Inches (mm)

#### S801+N\_

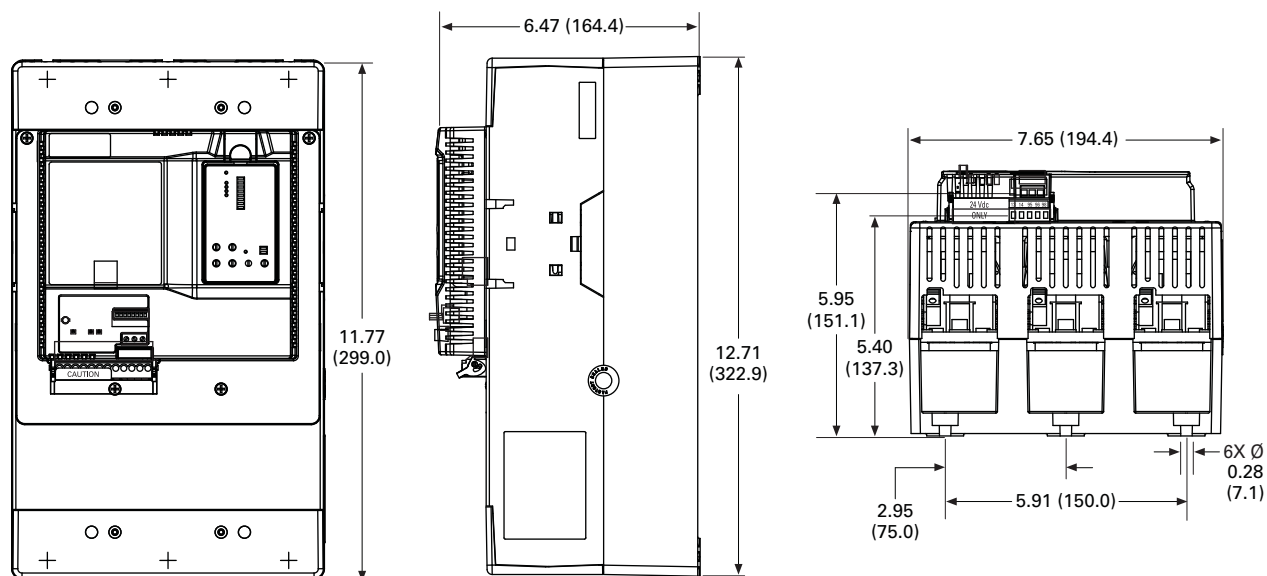


#### S801+R\_

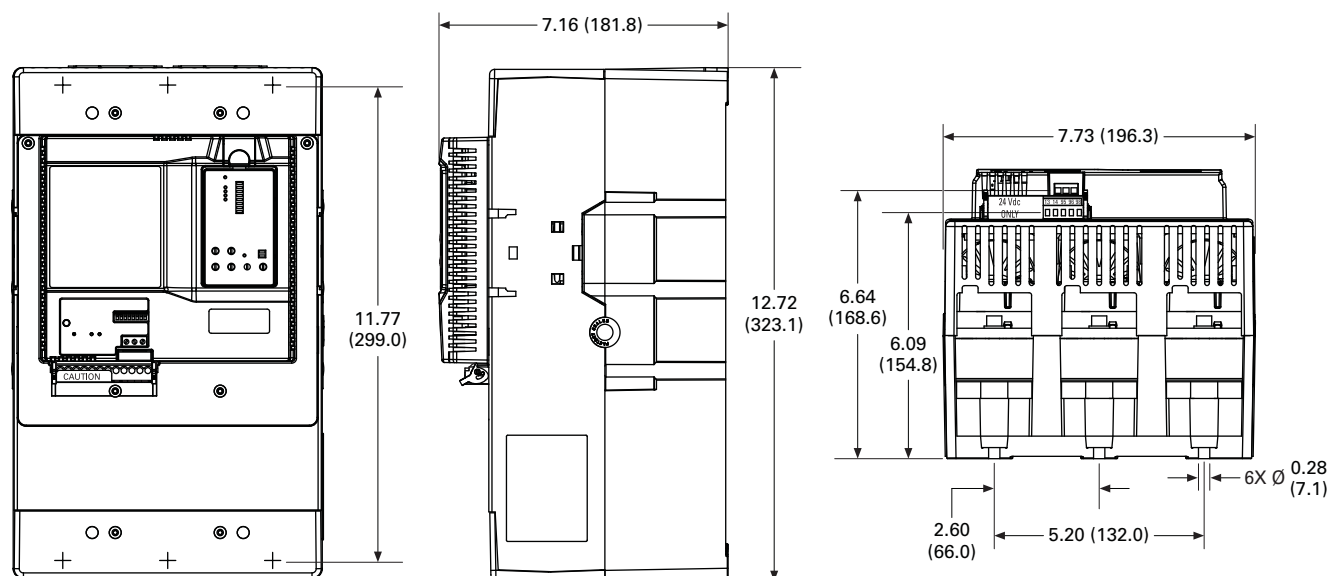


Approximate Dimensions in Inches (mm)

### S801+T\_



### S801+U\_



# 1.1

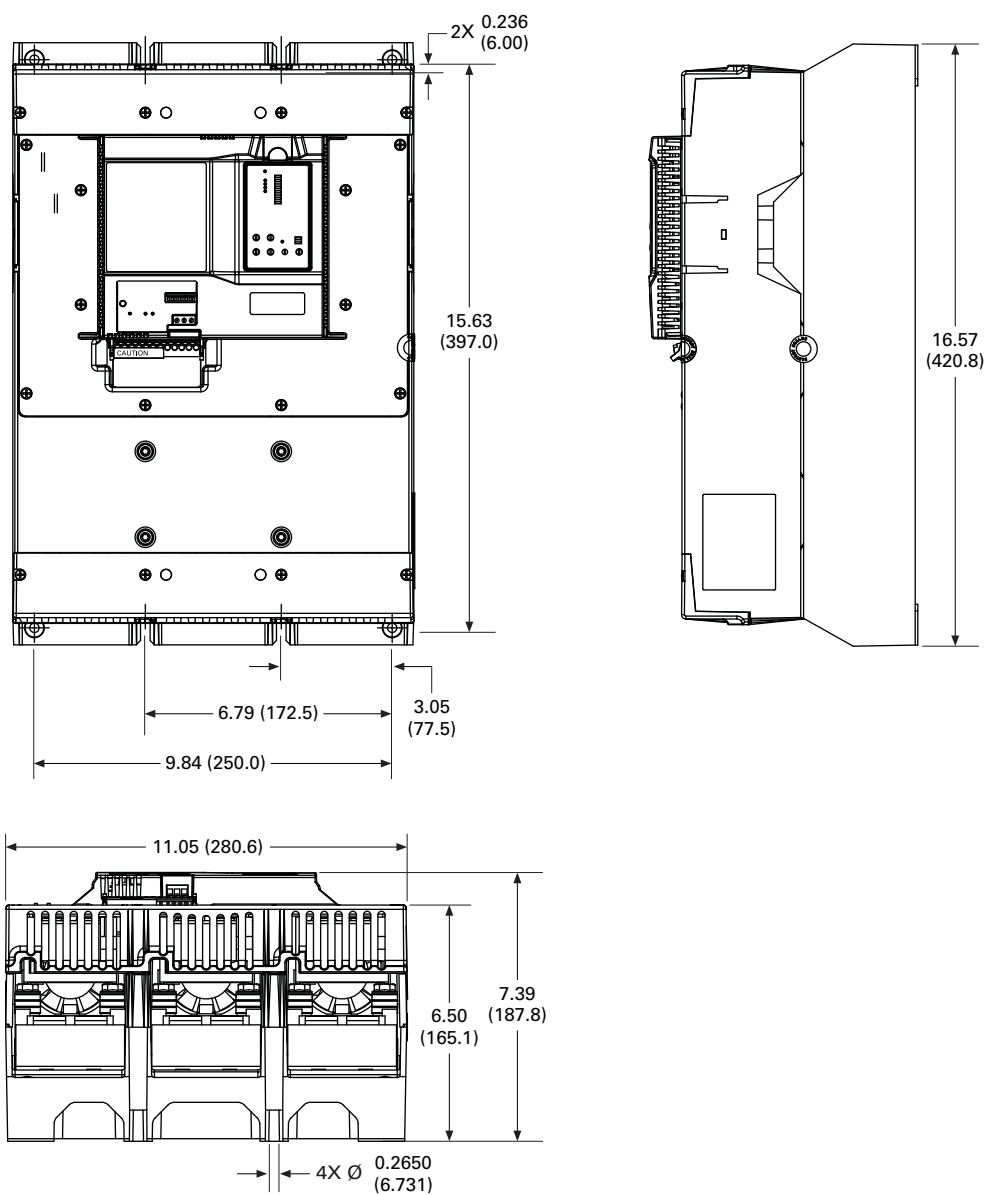
## Reduced Voltage Motor Starters

### Solid-State Starters

1

Approximate Dimensions in Inches (mm)

S801+V\_



**Type S811+, Soft Starters with Digital Interface Module (DIM)****Type S811+, Soft Starters with DIM****Product Description**

Eaton's S811+ offers all the popular features of the S801+ and adds new enhanced functionality with the new Digital Interface Module (DIM), communications, metering, monitoring and diagnostics capabilities.

Eaton's line of S811+ reduced voltage soft starters is very compact, multi-functional, easy to install and easy to set operating parameters. Designed to control the acceleration and deceleration of three-phase motors up to 690V, the line is available from 11A to 1000A.

The S811+ is designed to be a complete package, combining the silicon controlled rectifiers (SCRs), bypass contactor and overload in one, very compact unit. The S811+ is available as a component for panel mounting, in motor control centers or in enclosed control (NEMA Type 1, 3R, 4, 4X, 7/9 and 12).

**Application Description**

Designed to control the acceleration and deceleration of three-phase motors, the S811+ soft starter uses SCRs to control the voltage to soft start and soft stop the motor. After the motor is started, internal run bypass contactors close, resulting in the motor running directly across-the-line. The built-in solid-state overload protects the motor from overload conditions with sophisticated algorithms that model true motor heating, resulting in better motor protection and fewer nuisance trips. Advanced protective and diagnostic features reduce downtime.

A voltage ramp start or current limit start is available. Kick start is available in either starting mode. The soft stop option allows for a ramp stop time that is longer than the coast to stop time. The pump control option in the S811+ Premium provides a smooth transition for starting and stopping a motor and eliminating the "water-hammer" effect that can damage pipes, valves and pumps.

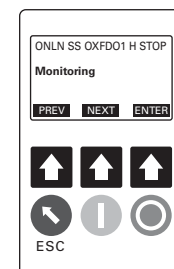
**Contents****Description**

	<b>Page</b>
Type S611, Solid-State Soft Starters . . . . .	<b>V6-T1-22</b>
Type S801+, Soft Starters . . . . .	<b>V6-T1-39</b>
Type S811+, Soft Starters with DIM	
Communications . . . . .	<b>V6-T1-56</b>
Operation . . . . .	<b>V6-T1-56</b>
Features and Benefits . . . . .	<b>V6-T1-59</b>
Standards and Certifications . . . . .	<b>V6-T1-63</b>
Instructional Leaflets . . . . .	<b>V6-T1-63</b>
Catalogue Number Selection . . . . .	<b>V6-T1-63</b>
Product Selection . . . . .	<b>V6-T1-64</b>
Accessories . . . . .	<b>V6-T1-68</b>
Options . . . . .	<b>V6-T1-69</b>
Technical Data and Specifications . . . . .	<b>V6-T1-70</b>
Wiring Diagrams . . . . .	<b>V6-T1-74</b>
Dimensions . . . . .	<b>V6-T1-75</b>
TRU-START . . . . .	<b>V6-T1-79</b>

The S811+ offers an impressive array of advanced protective features. Not only are the protective features selectable, but many offer variable settings and adjustable time delays to ride through system discrepancies. Protective features may also be set to Warning status to avoid nuisance trips.

The S811+ has an easy to use Digital Interface Module (DIM) that allows the user to configure the device and to read system parameters and monitor system values. The DIM includes an LCD display and keypad to scroll through the various menus. The DIM allows the user to modify control parameters, enable or disable protections, set communication variables, monitor system parameters such as line voltages and currents, and access the fault queue.

The DIM can be removed from the S811+ and be remote mounted. Kits are available to door mount the DIM, enabling users to safely configure, commission, monitor and troubleshoot the system at the electrical panel without opening the enclosure door. This will help eliminate the possibility of an arc flash incident.

**Digital Interface Module (DIM)**

### Communications

The S811+ is equipped with native Modbus RTU communication capabilities and may be connected to a variety of networks, including DeviceNet, Modbus TCP, EtherNet/IP and PROFIBUS using the C441 series communication modules for easy integration into any PLC or DCS system.

The modules come standard with four inputs and two relay outputs. C441 communication modules can also be used independently for standalone I/O applications.



### C441 Communication Card Options

Designed for use with soft starters



Protocol	Catalogue Numbers	Input Signal Type	S811+	General Purpose I/O ①	Mounting Options
Modbus RTU	<b>C441NS</b>	120 Vac	■	■	Standalone—DIN rail/panel mount
	<b>C441PS</b>	24 Vdc	■	■	Standalone—DIN rail/panel mount
DeviceNet	<b>C441KS</b>	120 Vac	■	■	Standalone—DIN rail/panel mount
	<b>C441LS</b>	24 Vdc	■	■	Standalone—DIN rail/panel mount
PROFIBUS	<b>C441SS</b>	120 Vac	■	■	Standalone—DIN rail/panel mount
	<b>C441QS</b>	24 Vdc	■	■	Standalone—DIN rail/panel mount
Modbus EtherNet/IP	<b>C441U</b>	120 Vac	■	■	Standalone—DIN rail/panel mount
	<b>C441V</b>	24 Vdc	■	■	Standalone—DIN rail/panel mount

**Note:** Refer to Volume 5—Motor Control and Protection, **CAO033001EN**, tab 5.4 for additional details and **BR042002EN** brochure for C441 communication module accessories for overload relays and soft starters.

Recommended Power Supply	Catalogue Number
85–264 Vac single-phase input, 24 Vdc output	<b>PSG240E24RM</b>
360–575 Vac three-phase input, 24 Vdc output	<b>PSG240F24RM</b>
600 Vac three-phase input, 24 Vdc output	<b>PSS55D</b>

### Operation

#### Starting and Stopping Modes

The S811+ has a variety of starting and stopping methods to provide superior performance in the most demanding applications. The motor can be started in either voltage ramp start or current limit start mode. Kick start and soft stop are available within both starting modes. The user has the option to configure two independent start ramp profiles to accommodate variations in starting requirements.

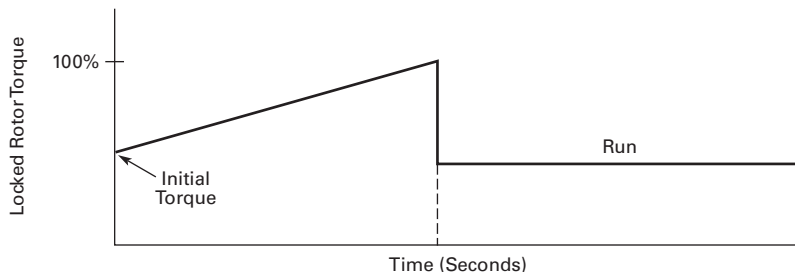
#### Voltage Ramp Start

Provides a voltage ramp to the motor resulting in a constant torque increase. The most commonly used form of soft start, this start mode allows

you to set the initial torque value and the duration of the ramp to full voltage conditions. Bypass contactors close after ramp time.

- Adjustable initial torque 0–85% of locked rotor torque
- Adjustable ramp time 0.5–180 seconds (0.5–360 seconds with the S811+ Premium)

#### Starting Characteristics—Ramp Start



① C441 standalone communication modules can be used as general purpose I/O. This allows a customer to monitor the status of any non-communicating product over the selected protocol by wiring fault or auxiliary contacts from that product to the C441 communication module on-board I/O.



### Current Limit Start

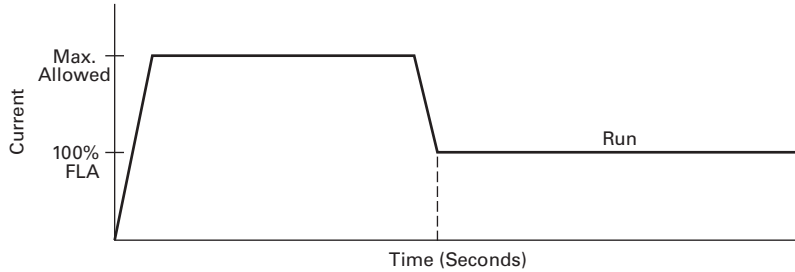
Limits the maximum current available to the motor during the start phase. This mode of soft starting is used when it becomes necessary to limit

the maximum starting current due to long start times or to protect the motor. This start mode allows you to set the maximum starting current as a

percentage of locked rotor current and the duration of the current limit. Bypass contactors close after current limit time.

- Maximum current of 0–85% locked rotor current
- Adjustable ramp time 0.5–180 seconds (0.5–360 seconds with the S811+ Premium)

### Starting Characteristics—Current Limit Start



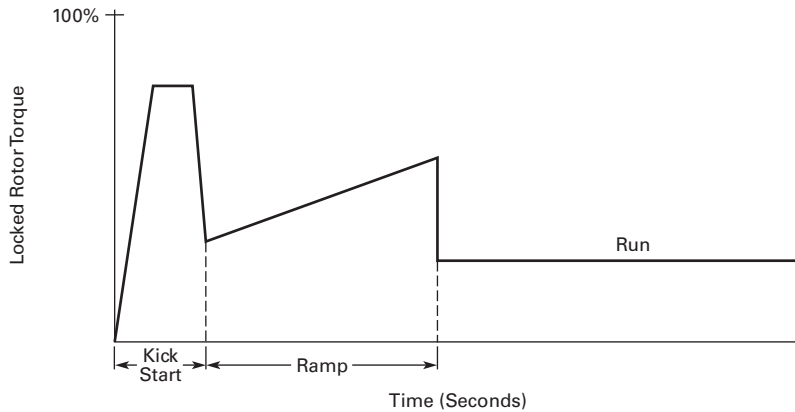
### Kick Start

Selectable feature in both voltage ramp start and current limit start modes. Provides a current and torque “kick” for 0 to 2.0 seconds.

This provides greater initial current to develop additional torque to breakaway a high friction load.

- 0–85% of locked rotor torque
- 0–2.0 seconds duration

### Starting Characteristics—Kick Start



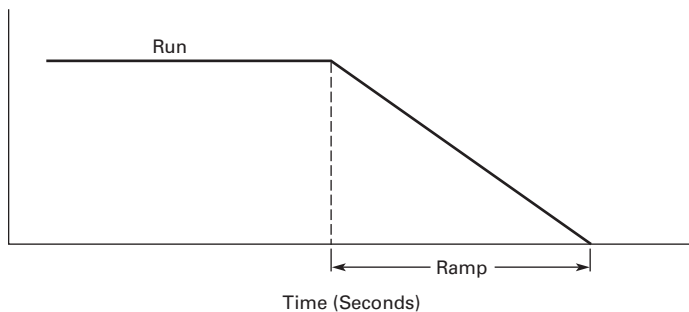
### Soft Stop

Allows for a controlled stopping of a load. Used when a stop-time that is greater than the coast-to-stop

time is desired. Often used with high friction loads where a sudden stop may cause system or load damage.

- Stop time = 0–60 seconds

### Starting Characteristics—Soft Stop



**Edge and Level Sensing Control****Edge Sensing**

Edge sensing requires +24 Vdc power be momentarily applied to Control Terminal Block Pin 1 (with Terminal P at +24 Vdc) to initiate a start under all conditions. After a stop or fault occurs, the +24 Vdc must be removed, then reapplied to Terminal Pin 1 before another start can occur. This control configuration should be used when restarting of the motor after a fault or stop must be supervised manually or as a part of a control scheme. The cycling of +24 Vdc power to Terminal 1 Pin before starting is required regardless of the position of the auto reset switch on the DIM.

**Level Sensing**

Level sensing will enable a motor to restart after a fault is cleared without cycling +24 Vdc power to Terminal Pin 1 as long as:

- Terminal Pin P is supplied with +24 Vdc (to start from Control Terminal Block, Terminal Pin 3 must also be enabled)
- The auto reset switch on the DIM is set to enabled
- All faults have been reset

This control configuration should be used where it is desirable to restart a motor after a fault without additional manual or automatic control. An example of this condition would be on a remote pumping station where it is desirable to automatically restart a pump after a power outage without operator intervention.

**Note:** If the auto reset feature is used, CAUTION must be exercised to ensure that any restart occurs in a safe manner.

### Features and Benefits

- Communication capabilities with various protocols
- The Digital Interface Module (DIM) provides an intuitive, easy-to-use human interface with powerful configuration capabilities to maximize system performance
- Door or device mounted DIM enables users to safely configure, commission, monitor and troubleshoot the system at the electrical panel without opening the enclosure door, eliminating the possibility of an arc flash incident
- System operating parameters can be monitored enterprise-wide through a communications network. Increase uptime by providing data for process management and preventive diagnostics
- Run internal bypass mode greatly reduces internal heating created by the greater power dissipation in the SCRs. Bypass contactor directly connects the motor to the line and improves system efficiency by reducing internal power losses
- Internal solid-state overload protection provides accurate current measurement and trip settings. Sophisticated algorithms solve a series of differential equations that model true motor heating and cooling, resulting in superior motor overload protection while minimizing nuisance trips. Advanced selectable protective features safeguard the motor and system against a variety of system faults
- Internal run bypass contactors and overload protection eliminate the need for additional devices, reducing enclosure sizes, minimizing installation and wiring time, and reducing overall assembly size and cost
- Wide range of overload FLA settings (31–100% of rated current) and a selectable trip class (5–30) offers users the flexibility to fine tune the starter to match specific application requirements
- Variable ramp times and torque control settings provide unlimited starting configurations, allowing for maximum application flexibility
- Kick-start feature enables soft starting of high friction loads
- Soft stop control for applications where an abrupt stop of the load is not acceptable
- The S811+ Premium with sophisticated pump control algorithms on both starting and stopping that minimize the pressure surges that cause water hammer. The pump control feature will maximize the life of the pump and piping systems while minimizing the downtime caused by system failure
- Six SCRs control all three motor phases, providing smooth acceleration and deceleration performance
- Soft acceleration and deceleration reduces wear on belts, gears, chains, clutches, shafts and bearings
- Reduce the peak inrush current's stress on the power system
- Manage peak starting torque to diminish mechanical system wear and damage
- 24 Vdc control voltage enhances personnel and equipment safety
- Removable, lockable control terminal block reduces maintenance costs. Also provides the opportunity for OEMs to reduce assembly and test costs by utilizing pre-assembled wire harnesses

### Motor Wiring Configuration User Selectable Inline or Inside-the-Delta

Mains Motor Wiring Configuration is accomplished by simply selecting the required configuration from a menu. This feature allows adaptability from one configuration to another without any additional programming operations and reduces inventory levels by not having to stock both configurations.

### Modbus Native Communications Protocol

Modbus RTU communications is now standard on all S811+ units. This allows users to quickly configure the unit for network communications using a common protocol. Adapters are available for users who prefer to use EtherNet/IP or Modbus TCP protocols.

### Programmable Control Terminal Block Functionality

Four programmable terminals on the S811+ enable the user to expand functionality with options such as a second start ramp profile, externally triggered trip or warning functions, analogue inputs, and others, in addition to the normal start, stop, reset, and so on, functions.

### Second Start Ramp Profile Capability

A second start ramp profile may be configured for the soft starter. This profile is independent of the primary profile and retains all the parameter options such as start time and initial torques. With a signal at a terminal programmed for this feature, the second profile may be selected by a pushbutton station or a network.

### Alarm-No-Trip Functionality

Some applications require the ability to effectively disable most protections with the intent of enabling the RVSS unit to control a motor under the most severe operating conditions characterized by current or voltage imbalances, high or low value deviations, or other fault conditions. This function causes the S811+ to ignore most fault trip conditions and continue operation of the application.

### Digital Interface Module (DIM) Cloning

For OEMs or other users that desire to load identical parameter settings into multiple RVSS units, the DIM may be used to extract and duplicate parameter settings from one RVSS and loaded into other units, saving time, effort, and reducing chances for errors while programming.

**Protective Features**

All protective features can be configured, enabled or disabled with the DIM or through the communications network.

**Motor Overload**

The S811+ includes electronic overload protection as standard. The overload meets applicable requirements for a motor overload protective device. The overload protects the motor from over heat conditions with the use of sophisticated algorithms that model true motor heating, resulting in superior motor protection and fewer nuisance trips.

The S811+ calculates a thermal memory value based on the heat energy introduced into the motor during the start process. A 100% value represents the maximum safe internal temperature of the motor.

When the thermal memory value reaches 100%, an overload trip will occur removing power to the motor. Upon trip, the S811+ stores the calculated motor heating value and will not allow a motor re-start until the motor has a thermal memory value of less than 100%. This feature ensures the motor will not be damaged by repeated overload trip, reset and re-start cycles.

The thermal memory value can be monitored through the DIM or the communications network. The thermal memory value can be of great use in determining an impending overload trip condition. Alarms can be implemented in the process monitoring system warning of an impending trip before a trip occurs halting the process. Costly system downtime can be avoided.

The trip current is adjusted to match the specific application requirements by entering the motor nameplate full load current rating and trip class. The FLA parameter is adjustable from 32% to 100% of the unit's rated current. The overload trip class is adjustable from class 5 through class 30. The overload is ambient temperature compensated—meaning its trip characteristics will not vary with changes in ambient temperature. The overload protection can be enabled, disabled, or disabled on start.

**Short Circuit**

The use of a short-circuit protective device in coordination with the S811+ is required in branch motor circuits by most electrical codes. Short-circuit coordination ratings with both fuses and Eaton moulded case circuit breakers are available providing customers with design flexibility.

The S811+ has short-circuit coordination ratings as an open component, an enclosed starter, and in a motor control center.

**External E-Stop**

Emergency Stop functionality may be triggered from an external source. Removal of the 24 Vdc signal from a terminal configured for E-Stop will initiate an E-Stop action. The External E-Stop option is useful in applications where it is desirable to accomplish a motor shutdown in the event that an external condition(s) exist that will damage system components and/or product flows or operations.

**External Trip**

External Trip functionality may be triggered from an external source. Removal of the 24 Vdc signal from a terminal configured for External Trip will initiate an External Trip action. The External Trip option is useful in applications where it is desirable to accomplish a motor stop in the event that an external condition(s) exist that will damage system components and/or product flows or operations.

**Fault Warning Functionality**

Selected protection parameters may be assigned to provide a Fault Warning instead of a Fault Trip with user adjustable set points. When a Fault Warning condition is detected, the fault condition is reported via the DIM, network connection, or an auxiliary relay configured for this function. The soft starter remains in operation. At such time the fault condition no longer exists, the Fault Warning message will be extinguished.

**External Warning**

The S811+ will accept a Warning signal from an external source or device. In a fashion similar to the Fault Warning, the fault condition is reported via the DIM, network connection, or an auxiliary relay configured for this function. The soft starter remains in operation. At such time the fault condition no longer exists, the Fault Warning message will be extinguished.

**Custom Fault/Warning Auxiliary Relays**

Up to three fault and/or warning codes may be selected to operate an auxiliary relay configured to operate when any of these codes are detected. This option enables the user to provide external warnings or fault indications to increase monitoring effectiveness and to provide additional system control.

**Motor Power**

Motor Power can be not only be monitored, but trip levels can be adjusted to provide indications of system malfunctions or operating discrepancies. Both High and Low Power thresholds can be set to provide Fault Warning or Fault Trip functions. Additionally, fault delays times may be set to up to 60 seconds.

**Analogue Input**

An input control terminal may be configured to accept a 0–20 mA DC signal with range scaling. This feature enables the S811+ to respond to an external device that may be monitoring a critical component or process and provides Fault Trip or Fault Warning capability to protect operating systems and processes.

**Start Delay**

Three start delay timers are available to enhance motor protection or to provide simple logic functions to coordinate motor control with other devices in the system. The timers will allow delays from 24 Vdc power up, receipt of a valid START command, or a delay in switch from one start ramp profile to another.

**Jam**

Excessive current and torque up to locked rotor levels can occur in a jam condition. The condition can result in stress and damage to the motor, load, mechanical system, and the electrical distribution system. Jam protection prevents the stress and damage from a jam during normal run. After the motor is in bypass, a current greater than 300% FLA setting will cause the starter to trip on a jam fault.

**Stall**

Excessive current and torque up to locked rotor levels can occur in a stall condition. The condition can lead to an overload trip and result in stress and damage to the motor, load, mechanical system, and the electrical distribution system. Stall protection prevents stress and damage to a motor that has not come up to speed during the soft start time. The S811+ will trip to protect the system in the event that the motor did not get to the rated speed in the defined soft start period. A current greater than 200% FLA at the end of the soft start period will cause the starter to trip on a stall fault.

**Pole Over Temperature**

High ambient temperatures, extended ramp times and high duty cycle conditions may cause the S811+ power pole conductors to reach a temperature that exceeds their thermal rating. The S811+ is equipped with sensors that monitor the temperature of the power poles. Over temperature protection occurs if the power pole's thermal capacity is exceeded. The soft starter will trip in over temperature conditions, preventing device failure.

Each power pole temperature value can be monitored through the DIM or the communications network. This feature can be of use in determining an impending over temperature trip condition.

When using a communications network, alarms can be implemented in the process monitoring system warning of an impending trip before the trip occurs, halting the process.

**Phase Loss**

Loss of a phase can cause a significant increase in the current drawn in the remaining two phases. Phase loss can lead to motor damage before an eventual overload trip occurs. Phase loss is typically an indication of a failure in the electrical distribution system. The S811+ will detect a phase loss and trip if any phase current drops below a preset value. The phase loss trip level is adjustable from 0% to 100% of the average of the other two phase levels with an adjustable trip delay of 0.1 to 60 seconds.

**Phase Imbalance**

Phase current or voltage imbalance can cause a significant increase in the current drawn in the remaining two phases. Phase imbalance can lead to motor damage before an eventual overload trip. Phase imbalance is typically an indication of a failure in the electrical distribution system or the motor. The S811+ will detect both current and voltage phase imbalances and trip if any phase becomes imbalanced as compared to the average of the other two phases.

The phase current imbalance trip level is adjustable from 0% to 100% of the average of the current in the other two phases with an adjustable trip delay of 0.1 to 60 seconds.

The phase voltage imbalance trip level is adjustable from 0% to 100% of the average of the voltage in the other two phases with an adjustable trip delay of 0.1 to 60 seconds.

**Reset Mode**

The S811+ can be set up for automatic or manual reset on trip. The manual reset mode requires the operator to physically press the RESET button located on the soft starter. The trip can be manually reset through the DIM or through the communications network. The trip can also be electrically reset by energizing a 24 Vdc input on the control terminal block.

The automatic reset mode allows the soft starter to be automatically reset as soon as the trip condition is no longer present. With the automatic reset mode, after the fault is no longer present, the motor will be restarted as soon as a valid start signal is present.

**Phase Reversal**

The S811+ can determine if the proper line phase sequence is present by default. The device will trip if the line phase sequence is something other than A-B-C. The S811+ can be configured to operate under reversed phase conditions (A-C-B).

**Shorted SCR Detection**

The S811+ monitors the operation of the power poles and will trip under a shorted SCR condition.

**Open SCR Detection**

The S811+ monitors the operation of the power poles and will trip under an open SCR condition.

**Low Current**

Low current conditions can be a result of a loss of load or a failure in the mechanical system. The S811+ has low current protection that will trip if the average rms current falls below a preset value. The low current protection can be programmed as a percent of motor FLA from 0% to 100%.

**Low Voltage**

Low voltage conditions can result from disturbances in the electrical power distribution system. Low voltage conditions can cause a malfunction and damage to electrical equipment. The S811+ has low voltage protection that will trip if the average rms voltage falls below a preset value. The low voltage protection can be programmed as a percent of nominal voltage from 1% to 99% with a trip delay of 0.1 to 60 seconds to accommodate short temporary voltage drops during the start process.

**High Voltage**

High voltage conditions can result from disturbances in the electrical power distribution system. High voltage conditions can cause malfunctions or failures of electrical equipment. The S811+ has high voltage protection that will trip if the average rms voltage is greater than a preset value. The high voltage protection can be programmed as a percent of nominal voltage from 101% to 120% with a trip delay of 0.1 to 60 seconds.

**Monitoring Capabilities**

The S811+ has an impressive array of system monitoring capabilities that allows users to access real time process and diagnostic data. This data can be viewed at the device with the DIM or through a communications network. Data over a communications network can provide valuable insight into the condition of the equipment and processes. Maintenance and production personnel can monitor critical operational and maintenance data from a central control station that can be located far away from the production facility. Process data can be monitored to determine system anomalies that may indicate a need for preventive maintenance or an impending failure. Adjustments made through the communications network can reduce costs by minimizing the time traveling to the location where the motor controls are located. When faults do occur, real time fault data can assist maintenance in trouble-shooting and planning repair resources. Remote reset signals can be given to tripped devices without the need for manual intervention by maintenance personnel.

**Average Line Current**

Provides the average of the three-phase rms line currents in amps, accurate to within 2%. Current data can be used to indicate a need for maintenance. Increased currents in a fixed load application can indicate a reduction in system efficiencies and performance, signifying system maintenance is due.

**Average Pole Current**

Provides the average of the three-phase rms pole currents in amps, accurate to within 2%. The pole current is the current through the soft starter. The line and pole current will be identical in inline applications, and will differ in inside-the-delta applications.

**Average Line Current as a % FLA**

Provides the average rms line current as a percentage of the S811+ FLA setting.

**Three-Phase Line Currents**

Provides three rms phase line currents in amps, accurate to within 2%. Imbalances or changes in the relative phase current to one another can indicate anomalies in the motor or electrical distribution system.

**Three-Phase Pole Currents**

Provides three rms phase pole currents in amps, accurate to within 2%. The pole current is the current through the soft starter. The line and pole current will be identical in in-line applications, and will differ in inside-the-delta applications.

**Three-Phase Line Voltages**

Provides the individual rms three-phase line voltages. Imbalances or changes in the relative phase voltage to one another can indicate anomalies in the motor or electrical distribution system. Voltage can be used to monitor electrical distribution system performance. Warnings, alarms and system actions to low or high voltage conditions can be implemented.

**Percent Thermal Memory**

Provides the real time calculated thermal memory value. The S811+ calculates thermal memory value. A 100% value represents the maximum safe internal temperature of the motor. When the thermal memory value reaches 100%, an overload trip will occur, removing power to the motor.

The thermal memory value can be of great use in determining an impending overload trip condition. When using a communications network, alarms can be implemented in the process monitoring system warning of an impending trip before the trip occurs, halting the process. Costly system downtime can be avoided.

**DC Control Voltage**

Monitors level of the 24 Vdc control voltage. Fluctuations in control voltage can cause component malfunction and failure. System control voltage data can be used to implement warnings, alarms and system actions to low or high voltage conditions.

**Pole Temperature**

Increases in power pole temperature are caused by increases in ambient temperature, start/stop times and start duty cycles. Changes in pole temperatures represent a change in system operating conditions. Identifying unexpected operating conditions or changes can prompt maintenance and aid in process evaluation activities.

**PCB Device Temperature**

An increase in printed circuit board (PCB) device temperature is a strong indication of an increase in ambient temperature. High ambient temperature operation can be identified with the device temperature data. Device temperature increases can be due to undersized enclosures, failure of cooling fans or blocked venting. High operating temperatures will reduce the life of all electrical equipment in the enclosure.

**Start Count**

Start count data can be used to monitor system output, schedule preventative maintenance, identify system anomalies and identify changes in system operation.

**Average Line Power**

Provides the average of the three-phase line power in kilowatts, accurate to 5%. Power data may be used to monitor power transmitted to the load. Increased power demand may indicate degraded system components or connections. Additionally, such data is useful in determine power utilization in branch circuits consisting of multiple loads.

**Power Factor**

Provides the three-phase power factor value, accurate to 5%. The power factor of the circuit may be used to identify circuit conditions that may need to be corrected due to low power factor indications. Low circuit power factor can indicate improper or degraded components.



**Diagnostics****Fault Queue**

Current fault and a fault queue containing the last nine system faults can be read through the DIM or communications network. Fault identification can minimize troubleshooting time and cost, and prevent arc flash incidents. The fault queue can be remotely accessed through a communications network to assist in planning maintenance resources. Thirty (30) different faults can be identified by the S811+.

**Control Status**

The S811+ provides data that represents system conditions that can be read through the DIM or the communications network. This data identifies the status of the system and the control commands the system is requesting of the S811+. This can be used for advanced troubleshooting and system integration activities.

**Breaker Status**

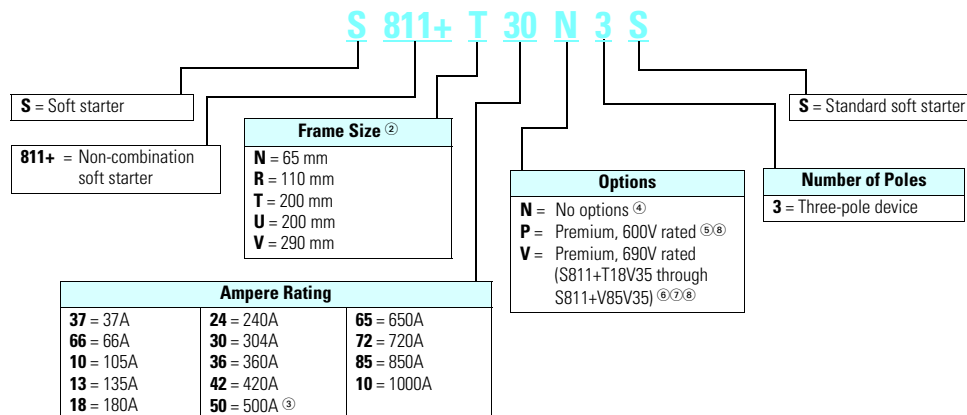
The S811+ has provisions to read and display circuit breaker status. Eaton communicating cover control or other communicating protective device is required to take advantage of this feature.

**Standards and Certifications**

- IEC 60947-4-2
- EN 60947-4-2
- UL listed (NMFT-E202571) S811+N37\_ through S811+V85\_
- UL recognized (NMFT2) S811+V10\_
- CE marked
- CSA certified (3211 06)
- CSA elevator (2411 01)

**Instructional Leaflets**

- User manual MN03900001E
- Outline drawings:
  - S811+N\_: 10-8574
  - S811+R\_: 10-8575
  - S811+T\_: 10-8576
  - S811+U\_: 10-8857
  - S811+V\_: 10-8577

**Catalogue Number Selection****S811+ Open Soft Starters** <sup>①</sup>**Notes**

- ① All units require a 24 Vdc power supply found on Catalogue **Page V6-T1-68**, or equivalent.
- ② S811+T\_, S811+U\_ and S811+V\_ units require lug kits found on **Page V6-T1-68**.
- ③ S811+U50\_ unit does not have IEC certification.
- ④ Level/Edge Sense, Inline or Inside-the-Delta wiring configuration.
- ⑤ Level/Edge Sense, Inline or Inside-the-Delta wiring configuration, pump control and extended ramp.
- ⑥ Not available in S811+U\_.
- ⑦ Level/Edge Sense, Inline wiring configuration, pump control, extended ramp.
- ⑧ Ground fault protection included.

## Product Selection

## Standard Duty Ratings

Starting Method	Ramp Current % of FLA	Ramp Time Seconds	Starts per Hour	Ambient Temperature
Soft start	300%	30 sec.	3	50°C
Full voltage	500%	10 sec.	3	50°C
Wye-delta	350%	20 sec.	3	50°C
80% RVAT	480%	20 sec.	2	50°C
65% RVAT	390%	20 sec.	3	50°C
50% RVAT	300%	20 sec.	4	50°C

Motor applications and customer needs come in many different varieties. With the standard and severe duty rating tables, we have attempted to provide

guidelines on what the soft starter is capable of. If the application falls under these categories, you can use these charts. For other applications, or when a

question arises, consult with your local Eaton representative or contact EatonCare.

## S811+



## Standard Duty—15 Second Ramp, 300% Current Limit at 40°C, Inline Connection

Three-Phase Motors												
Max. Current	kW Rating (50 Hz)			hp Rating (60 Hz)								Catalogue ① Number
	230V	380–400V	440V	200V		230V		460V		575–690V		
				1.0SF	1.15SF	1.0SF	1.15SF	1.0SF	1.15SF	1.0SF	1.15SF	
Frame Size N												
37	10	18.5	18.5	10	10	10	10	25	20	30	30	S811+N37N3S
66	18.5	30	37	20	15	20	20	50	40	60	50	S811+N66N3S
Frame Size R												
105	30	55	59	30	25	40	30	75	60	100	75	S811+R10N3S
135	40	63	80	40	30	50	40	100	75	125	100	S811+R13N3S
Frame Size T												
180	51	90	110	60	50	60	60	150	125	150	150	S811+T18N3S
240	75	110	147	75	60	75	75	200	150	200	200	S811+T24N3S
304	90	160	185	100	75	100	100	250	200	300	250	S811+T30N3S
Frame Size U												
360	110	185	220	125	100	150	125	300	250	350	300	S811+U36N3S
420	129	220	257	150	125	175	150	350	300	450	350	S811+U42N3S
500	150	257	300	150	150	200	150	400	350	500	450	S811+U50N3S ②
Frame Size V												
360	110	185	220	125	100	150	125	300	250	350	300	S811+V36N3S
420	129	220	257	150	125	175	150	350	300	450	350	S811+V42N3S
500	150	257	300	150	150	200	150	400	350	500	450	S811+V50N3S
650	200	355	425	250	200	250	200	500	450	600	500	S811+V65N3S
720	220	400	450	—	—	300	250	600	500	700	600	S811+V72N3S
850	257	475	500	—	—	350	300	700	600	900	700	S811+V85N3S
1000	277	525	550	—	—	400	350	800	700	900	800	S811+V10N3S

## Notes

- ① Replace N3S with P3S for premium/pump option.  
 ② S811+U50\_ rating does not have IEC certification.



**Severe Duty****Severe Duty Ratings**

Starting Method	Ramp Current % of FLA	Ramp Time Seconds	Starts per Hour	Ambient Temperature
Soft start	450%	30 sec.	4	50°C
Full voltage	500%	10 sec.	10	50°C
Wye-delta	350%	65 sec.	3	50°C
80% RVAT	480%	25 sec.	4	50°C
65% RVAT	390%	40 sec.	4	50°C
50% RVAT	300%	60 sec.	4	50°C

Severe duty ratings are defined as any combination of parameters that exceed the standard duty ratings where

the ramp time is over 30 seconds, and/or the number of starts per hour exceeds 4, and/or the current limit set is

over 300%. *Example:* 35-second ramp, 5 starts per hour, 350% current limit at 40°C ambient.

**S811+****Severe Duty—30 Second Ramp and/or 450% Current Limit at 50°C, Inline Connection**

Three-Phase Motors												
Max. Current	kW Rating (50 Hz)			hp Rating (60 Hz)								Catalogue ① Number
	230V	380–400V	440V	200V		230V		460V		575–690V		
				1.0SF	1.15SF	1.0SF	1.15SF	1.0SF	1.15SF	1.0SF	1.15SF	
Frame Size N												
22	5.5	10	11	5	5	7-1/2	5	15	10	20	15	S811+N37N3S
42	11	18.5	22	10	10	15	10	30	25	40	30	S811+N66N3S
Frame Size R												
65	15	30	33	15	15	20	15	50	40	50	50	S811+R10N3S
80	22	40	45	25	20	30	25	60	50	75	60	S811+R13N3S
Frame Size T												
115	33	59	63	30	30	40	30	75	75	100	100	S811+T18N3S
150	45	80	90	50	40	50	50	100	100	150	125	S811+T24N3S
192	55	100	110	60	50	75	60	150	125	200	150	S811+T30N3S
Frame Size U												
240	75	110	147	75	60	75	75	200	150	200	200	S811+U36N3S
305	90	160	185	100	75	100	100	250	200	300	250	S811+U42N3S
365	110	185	220	125	100	150	125	300	250	350	300	S811+U50N3S ②
Frame Size V												
240	75	110	147	75	60	75	75	200	150	200	200	S811+V36N3S
305	90	160	185	100	75	100	100	250	200	300	250	S811+V42N3S
365	110	185	220	125	100	150	125	300	250	350	300	S811+V50N3S
420	129	220	257	150	125	150	150	350	300	450	350	S811+V65N3S
480	147	257	295	150	150	200	150	400	350	500	450	S811+V72N3S
525	160	280	335	150	150	200	150	450	350	500	450	S811+V85N3S
575	172	303	370	200	150	250	200	500	450	600	500	S811+V10N3S

**Note**

① Replace N3S with P3S for premium/pump option.

② S811+U50\_ rating does not have IEC certification.

**Inside-the-Delta Standard Duty Ratings****S811+****Standard Duty – 15 Second Ramp, 300% Current Limit at 40°C, Inside-the-Delta Connection**

Max. Continuous Motor Line Current	Three-Phase Motor kW Rating (50 Hz)			hp Rating (60 Hz)								Catalogue <sup>①</sup> Number
				200V		230V		460V		575V		
	230V	380–400V	440V	1.0SF	1.15SF	1.0SF	1.15SF	1.0SF	1.15SF	1.0SF	1.15SF	
Frame Size N												
65	10	18.5	18.5	15	15	15	15	40	30	50	50	S811+N37N3S
114	18.5	30	37	30	25	30	30	75	60	100	75	S811+N66N3S
Frame Size R												
182	30	55	59	50	40	60	50	125	100	150	125	S811+R10N3S
234	40	63	80	60	50	75	60	150	125	200	150	S811+R13N3S
Frame Size T												
311	51	90	110	100	75	100	100	250	200	250	250	S811+T18N3S
415	75	110	147	125	100	125	125	300	250	300	300	S811+T24N3S
526	90	160	185	150	125	150	150	400	300	400	400	S811+T30N3S
Frame Size U												
623	110	185	220	200	150	250	200	450	400	550	450	S811+U36N3S
727	129	220	257	250	200	300	250	550	450	700	550	S811+U42N3S
865	150	257	300	250	250	300	250	600	550	750	700	S811+U50N3S <sup>②③</sup>
Frame Size V												
623	110	185	220	200	150	250	200	450	400	550	450	S811+V36N3S
727	129	220	257	250	200	300	250	550	450	700	550	S811+V42N3S
865	150	257	300	250	250	300	250	600	550	750	700	S811+V50N3S
1125	200	355	425	400	300	400	300	750	700	900	750	S811+V65N3S
1246	—	—	—	—	—	—	—	—	—	—	—	S811+V72N3S
1471	—	—	—	—	—	—	—	—	—	—	—	S811+V85N3S
—	—	—	—	—	—	—	—	—	—	—	—	S811+V10N3S

**Notes**

① Replace N3S with P3S for premium/pump option.

② S811+U50\_ unit does not have IEC certification.

③ 15 sec. start, 300% inrush, 40°C, 1 start every 15 minutes. If these start parameters are exceeded, please refer to S811+V50\_.

**Inside-the-Delta Severe Duty Ratings**

Severe duty ratings are defined as any combination of parameters that exceed the standard duty ratings where the ramp time is over 30 seconds, and/or the number of starts per hour exceeds 4, and/or the current limit set is over 300%.

Example: 35-second ramp, 5 starts per hour 350% current limit at 40°C ambient.

**S811+****Severe Duty—30 Second Ramp and/or 450% Current Limit at 50°C, Inside-the-Delta Connection**

Max. Continuous Motor Line Current	Three-Phase Motor											
	kW Rating (50 Hz)			hp Rating (60 Hz)								Catalogue <sup>①</sup> Number
	230V	380–400V	440V	200V		230V		460V		575V		
				1.0SF	1.15SF	1.0SF	1.15SF	1.0SF	1.15SF	1.0SF	1.15SF	
Frame Size N												
39	5.5	10	11	7-1/2	7-1/2	10	7-1/2	25	15	30	25	S811+N37N3S
73	11	18.5	22	15	15	25	15	50	40	60	50	S811+N66N3S
Frame Size R												
111	15	30	33	25	25	30	25	75	60	75	75	S811+R10N3S
138	22	40	45	40	30	50	40	100	75	120	100	S811+R13N3S
Frame Size T												
199	33	59	63	50	50	60	50	125	125	150	150	S811+T18N3S
257	45	80	90	75	60	75	75	150	150	250	200	S811+T24N3S
324	55	100	110	100	75	100	100	250	200	300	250	S811+T30N3S
Frame Size U												
415	75	110	147	125	100	125	125	300	250	300	300	S811+U36N3S
526	90	160	185	150	120	150	150	400	300	450	400	S811+U42N3S
623	110	185	220	200	150	250	200	450	400	550	450	S811+U50N3S <sup>②</sup>
Frame Size V												
415	75	110	147	125	100	125	125	300	250	300	300	S811+V36N3S
526	90	160	185	150	120	150	150	400	300	450	400	S811+V42N3S
623	110	185	220	200	150	250	200	450	400	550	450	S811+V50N3S
727	129	220	257	250	200	250	250	550	450	700	550	S811+V65N3S
816	147	257	295	250	250	300	250	600	550	750	700	S811+V72N3S
908	160	280	335	250	250	300	250	700	550	750	700	S811+V85N3S
—	—	—	—	—	—	—	—	—	—	—	—	S811+V10N3S

**Note**

① Replace N3S with P3S for premium/pump option.

② S811+U50\_ unit does not have IEC certification.

## Accessories

### Lug Kits

S811+T\_, S811U\_ and S811+V\_ soft starters each have different lug options based on your wiring needs. Each lug kit contains three lugs that can be mounted on either the load or line side.

#### Lug Kit



### Lug Kits

S811+ Catalogue Number	Description	Kits Required	Catalogue Number
S811+T_, S811+U_	2 cable connections, 4 AWG to 1/0 cable	2	<b>EML22</b>
	1 cable connection, 4/0 to 500 kcmil cable		<b>EML23</b>
	2 cable connections, 4/0 to 500 kcmil cable		<b>EML24</b>
	1 cable connection, 2/0 to 300 kcmil cable		<b>EML25</b>
	2 cable connections, 2/0 to 300 kcmil cable		<b>EML26</b>
S811+V_	2 cable connections, 4/0 to 500 kcmil cable	2	<b>EML28</b>
	4 cable connections, 4/0 to 500 kcmil cable		<b>EML30</b>
	6 cable connections, 4/0 to 500 kcmil cable		<b>EML32</b>
	4 cable connections, 2/0 to 300 kcmil cable		<b>EML33</b>

### Power Supplies

24 Vdc power supply that can be used with the S811+ SSRV or as a stand-alone device.

### Power Supplies

Description	Catalogue Number
85–264 Vac input 24 Vdc output	<b>PSG240E</b>
360–575 Vac input 24 Vdc output	<b>PSG240F</b>
600 Vac input 24 Vdc output	<b>PSS55D</b>

### Lug Cover Kits

Replacement covers for the S811+T\_, S811+U\_ and S811+V\_ soft starters are available in case of damage to the existing covers.

### Lug Cover Kits

Description	Catalogue Number
Lug cover S811+T_, S811+U_	<b>EML27</b>
Lug cover S811+V_	<b>EML34</b>

### IP20 Kits

### IP20 Kits

Description	Catalogue Number
S811+N_	<b>SS-IP20-N</b>
S811+R_	<b>SS-IP20-R</b>
S811+T_ and S811+U_	<b>SS-IP20-TU</b>
S811+V_	<b>SS-IP20-V</b>

### Surge Suppressors

The surge suppressor can mount on either the line or load side of the soft starter. It is designed to clip the line voltage (or load side induced voltage).

#### Surge Suppressor



### Surge Suppressors

Description	Catalogue Number
600V MOV for S811+_ units	<b>EMS39</b>
690V MOV for S811+_ units ①	<b>EMS41</b>

#### Note

① S811+T\_ only.

**Mounting Plates**

The mounting plates are designed to help make it easy to install or retrofit the soft starter into enclosures and MCCs. The soft starter can be mounted onto the plate prior to installation. The mounting plate is designed with tear drop mounting holes for easier installation.

**Mounting Plates**

Description	Catalogue Number
S811+N_	<b>EMM13N</b>
S811+R_	<b>EMM13R</b>
S811+T_ and S811+U_	<b>EMM13T</b>
S811+V_	<b>EMM13V</b>

**Vibration Plates**

The vibration plates allow the soft starter to be applied in high shock and vibration applications. The vibration plate allows vibration up to 5g and shock in up to 40g. The soft starter is mounted onto the vibration plate prior to installation in the panel.

**Vibration Plates**

Description	Catalogue Number
S811+N_	<b>EMM14N</b>
S811+R_	<b>EMM14R</b>
S811+T_ and S811+U_	<b>EMM14T</b>
S811+V_	<b>EMM14V</b>

**Adapter Plates**

The adapter plate allows customers to retrofit a S811+V\_ soft starter with the S811+U\_ soft starter.

**Adapter Plates**

Description	Catalogue Number
Adapter plates	<b>EMM13U</b>

**Control Wire Connector****Control Wire Connector**

Description	Catalogue Number
12-pin, 5 mm pitch connector for control wiring	<b>EMA75</b>

**Digital Interface Module**

The Digital Interface Module (DIM) is available as a replacement part.

**DIM**

Description	Catalogue Number
Blank cover (filler)	<b>EMA68</b>
DIM for standard unit	<b>EMA91</b>
Panel mounting kit	
3 ft cable	<b>EMA69A</b>
5 ft cable	<b>EMA69B</b>
8 ft cable	<b>EMA69C</b>
10 ft cable	<b>EMA69D</b>

**Options****S811+ Premium**

In addition to what is already there in the S811+ standard, these devices offer pump control and extended ramp functions.

**S811+ Premium**

Current Range	Catalogue Number
11–37	<b>S811+N37P3S</b>
20–66	<b>S811+N66P3S</b>
32–105	<b>S811+R10P3S</b>
42–135	<b>S811+R13P3S</b>
56–180	<b>S811+T18P3S</b>
75–240	<b>S811+T24P3S</b>
95–304	<b>S811+T30P3S</b>
112–360	<b>S811+U36P3S</b>
131–420	<b>S811+U42P3S</b>
156–500	<b>S811+U50P3S</b> <sup>①</sup>
112–360	<b>S811+V36P3S</b>
131–420	<b>S811+V42P3S</b>
156–500	<b>S811+V50P3S</b>
203–650	<b>S811+V65P3S</b>
225–720	<b>S811+V72P3S</b>
265–850	<b>S811+V85P3S</b>
312–1000	<b>S811+V10P3S</b>

**Note**

① S811+U50\_ unit does not have IEC certification.

**S811+ Premium 690V Option**

In addition to what is already there in S811+ standard, this product offers 690V, pump control and extended ramp functions.

**S811+ Premium 690V Option**

Current Range	Catalogue Number
56–180	<b>S811+T18V3S</b>
75–240	<b>S811+T24V3S</b>
95–304	<b>S811+T30V3S</b>
112–360	<b>S811+V36V3S</b>
131–420	<b>S811+V42V3S</b>
156–500	<b>S811+V50V3S</b>
203–650	<b>S811+V65V3S</b>
225–720	<b>S811+V72V3S</b>
265–850	<b>S811+V85V3S</b>

**Cooling Fan Kit**

The EMM18 cooling fan kit mounts on either side of any frame size S811+ soft starter to provide additional printed circuit board cooling in high ambient operating temperatures.

**Cooling Fan Kit**

Description	Catalogue Number
Fan kit	<b>EMM18</b>

## Technical Data and Specifications

## Soft Starters—S811+

Description	S811+N37_	S811+N66_	S811+R10+	S811+R13_
Max. current capacity	37	66	105	135
FLA range	11–37	20–66	32–105	42–135
<b>General Information</b>				
Bypass mechanical lifespan	10M	10M	10M	10M
Insulating voltage $U_i$	660V	660V	660V	660V
Ramp time range	0.5–180 seconds (0.5–360 seconds S811+ Premium)	0.5–180 seconds (0.5–360 seconds S811+ Premium)	0.5–180 seconds (0.5–360 seconds S811+ Premium)	0.5–180 seconds (0.5–360 seconds S811+ Premium)
Resistance to vibration	3g	3g	3g	3g
Resistance to shock	15g	15g	15g	15g
<b>Electrical Information</b>				
Operating voltage	200–600V	200–600V	200–600V	200–600V
Operating frequency	47–63 Hz	47–63 Hz	47–63 Hz	47–63 Hz
Overload setting	30–100%	30–100%	30–100%	30–100%
Trip class	5, 10, 20 and 30	5, 10, 20 and 30	5, 10, 20 and 30	5, 10, 20 and 30
<b>Cabling Capacity (IEC 947)</b>				
Number of conductors	1	1	1	1
Wire sizes	14–2	14–2	14–4/0	14–4/0
Type of connectors	Box lug	Box lug	Box lug	Box lug
<b>Control Wiring (12-Pin)</b>				
Wire sizes in AWG	22–14	22–14	22–14	22–14
Number of conductors (stranded)	2 (or one AWG 12)	2 (or one AWG 12)	2 (or one AWG 12)	2 (or one AWG 12)
Torque requirements in lb-in	3.5	3.5	3.5	3.5
Solid, stranded or flexible max. size in mm <sup>2</sup>	3.31	3.31	3.31	3.31
<b>Control Power Requirements</b>				
Voltage range (24V ±10%)	21.6–26.4	21.6–26.4	21.6–26.4	21.6–26.4
Steady-state current amps	1.0	1.0	1.0	1.0
Inrush current amps	10	10	10	10
Ripple	1%	1%	1%	1%
<b>Relays (1) Class A and C</b>				
Voltage AC—maximum	240	240	240	240
Voltage DC—maximum	120	120	120	120
Amps—maximum	3	3	3	3
<b>Environment</b>				
Temperature—operating	–30° to 50°C (no derating) consult Eaton for operation >50°C	–30° to 50°C (no derating) consult Eaton for operation >50°C	–30° to 50°C (no derating) consult Eaton for operation >50°C	–30° to 50°C (no derating) consult Eaton for operation >50°C
Temperature—storage	–50° to 70°C	–50° to 70°C	–50° to 70°C	–50° to 70°C
Altitude	<2000m—consult Eaton for operation >2000m	<2000m—consult Eaton for operation >2000m	<2000m—consult Eaton for operation >2000m	<2000m—consult Eaton for operation >2000m
Humidity	<95% noncondensing	<95% noncondensing	<95% noncondensing	<95% noncondensing
Operating position	Any	Any	Any	Any
Pollution degree IEC947-1	3	3	3	3
Impulse withstand voltage IEC947-4-1	6000V	6000V	6000V	6000V

## Soft Starters—S811+, continued

Description	S811+T18	S811+T24	S811+T30	S811+U36
Max. current capacity	180	240	304	360
FLA range	56–180	75–240	95–304	112–360
<b>General Information</b>				
Bypass mechanical lifespan	10M	10M	10M	10M
Insulating voltage Ui	660V	660V	660V	660V
Ramp time range	0.5–180 seconds (0.5–360 seconds S811+ Premium)	0.5–180 seconds (0.5–360 seconds S811+ Premium)	0.5–180 seconds (0.5–360 seconds S811+ Premium)	0.5–180 seconds (0.5–360 seconds S811+ Premium)
Resistance to vibration	3g	3g	3g	3g
Resistance to shock	15g	15g	15g	15g
<b>Electrical Information</b>				
Operating voltage	200–600V	200–600V	200–600V	200–600V
Operating frequency	47–63 Hz	47–63 Hz	47–63 Hz	47–63 Hz
Overload setting	30–100%	30–100%	30–100%	30–100%
Trip class	5, 10, 20 and 30	5, 10, 20 and 30	5, 10, 20 and 30	5, 10, 20 and 30
<b>Cabling Capacity (IEC 947)</b>				
Number of conductors	1 or 2	1 or 2	1 or 2	1 or 2
Wire sizes	4 AWG to 500 kcmil	4 AWG to 500 kcmil	4 AWG to 500 kcmil	4 AWG to 500 kcmil
Type of connectors	Add-on lug kit	Add-on lug kit	Add-on lug kit	Add-on lug kit
<b>Control Wiring (12-Pin)</b>				
Wire sizes in AWG	22–14	22–14	22–14	22–14
Number of conductors (stranded)	2 (or one AWG 12)	2 (or one AWG 12)	2 (or one AWG 12)	2 (or one AWG 12)
Torque requirements in lb-in	3.5	3.5	3.5	3.5
Solid, stranded or flexible max. size in mm <sup>2</sup>	3.31	3.31	3.31	3.31
<b>Control Power Requirements</b>				
Voltage range (24V ±10%)	21.6–26.4	21.6–26.4	21.6–26.4	21.6–26.4
Steady-state current amps	1.0	1.0	1.0	1.0
Inrush current amps	10	10	10	10
Ripple	1%	1%	1%	1%
<b>Relays (1) Class A and C</b>				
Voltage AC—maximum	240	240	240	240
Voltage DC—maximum	120	120	120	120
Amps—maximum	3	3	3	3
<b>Environment</b>				
Temperature—operating	–30° to 50°C (no derating) consult Eaton for operation >50°C	–30° to 50°C (no derating) consult Eaton for operation >50°C	–30° to 50°C (no derating) consult Eaton for operation >50°C	–30° to 50°C (no derating) consult Eaton for operation >50°C
Temperature—storage	–50° to 70°C	–50° to 70°C	–50° to 70°C	–50° to 70°C
Altitude	<2000m—consult Eaton for operation >2000m	<2000m—consult Eaton for operation >2000m	<2000m—consult Eaton for operation >2000m	<2000m—consult Eaton for operation >2000m
Humidity	<95% noncondensing	<95% noncondensing	<95% noncondensing	<95% noncondensing
Operating position	Any	Any	Any	Any
Pollution degree IEC947-1	3	3	3	3
Impulse withstand voltage IEC947-4-1	6000V	6000V	6000V	6000V

## Soft Starters—S811+, continued

Description	S811+U42_	S811+U50_ ①	S811+V36_	S811+V42_
Max. current capacity	420	500	360	420
FLA range	131–420	156–500	112–360	131–420
<b>General Information</b>				
Bypass mechanical lifespan	10M	10M	10M	10M
Insulating voltage $U_i$	660V	660V	660V	660V
Ramp time range	0.5–180 seconds (0.5–360 seconds S811+ Premium)	0.5–180 seconds (0.5–360 seconds S811+ Premium)	0.5–180 seconds (0.5–360 seconds S811+ Premium)	0.5–180 seconds (0.5–360 seconds S811+ Premium)
Resistance to vibration	3g	3g	3g	3g
Resistance to shock	15g	15g	15g	15g
<b>Electrical Information</b>				
Operating voltage	200–600V	200–600V	200–600V	200–600V
Operating frequency	47–63 Hz	47–63 Hz	47–63 Hz	47–63 Hz
Overload setting	30–100%	30–100%	30–100%	30–100%
Trip class	5, 10, 20 and 30	5, 10, 20 and 30	5, 10, 20 and 30	5, 10, 20 and 30
<b>Cabling Capacity (IEC 947)</b>				
Number of conductors	1 or 2	1 or 2	2, 4 or 6	2, 4 or 6
Wire sizes	4 AWG to 500 kcmil	4 AWG to 500 kcmil	2/0 to 500 kcmil	2/0 to 500 kcmil
Type of connectors	Add-on lug kit	Add-on lug kit	Add-on lug kit	Add-on lug kit
<b>Control Wiring (12-Pin)</b>				
Wire sizes in AWG	22–14	22–14	22–14	22–14
Number of conductors (stranded)	2 (or one AWG 12)	2 (or one AWG 12)	2 (or one AWG 12)	2 (or one AWG 12)
Torque requirements in lb-in	3.5	3.5	3.5	3.5
Solid, stranded or flexible max. size in mm <sup>2</sup>	3.31	3.31	3.31	3.31
<b>Control Power Requirements</b>				
Voltage range (24V $\pm$ 10%)	21.6–26.4	21.6–26.4	21.6–26.4	21.6–26.4
Steady-state current amps	1.0	1.0	1.4	1.4
Inrush current amps	10	10	10	10
Ripple	1%	1%	1%	1%
<b>Relays (1) Class A and C</b>				
Voltage AC—maximum	240	240	240	240
Voltage DC—maximum	120	120	120	120
Amps—maximum	3	3	3	3
<b>Environment</b>				
Temperature—operating	–30° to 50°C (no derating) consult Eaton for operation >50°C	–30° to 50°C (no derating) consult Eaton for operation >50°C	–30° to 50°C (no derating) consult Eaton for operation >50°C	–30° to 50°C (no derating) consult Eaton for operation >50°C
Temperature—storage	–50° to 70°C	–50° to 70°C	–50° to 70°C	–50° to 70°C
Altitude	<2000m—consult Eaton for operation >2000m	<2000m—consult Eaton for operation >2000m	<2000m—consult Eaton for operation >2000m	<2000m—consult Eaton for operation >2000m
Humidity	<95% noncondensing	<95% noncondensing	<95% noncondensing	<95% noncondensing
Operating position	Any	Any	Any	Any
Pollution degree IEC947-1	3	3	3	3
Impulse withstand voltage IEC947-4-1	6000V	6000V	6000V	6000V

**Note**

① S811+U50\_ unit does not have IEC certification.

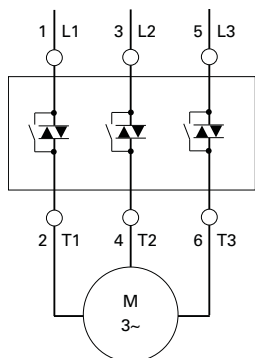


## Soft Starters—S811+, continued

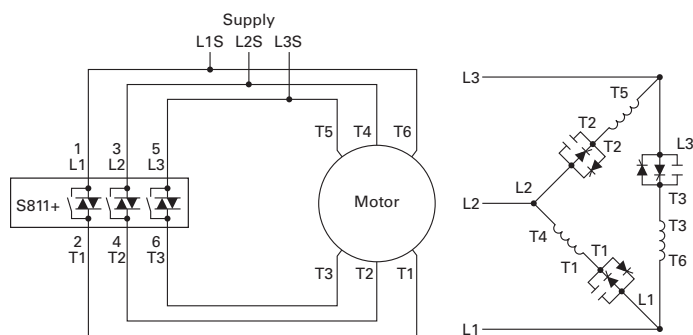
Description	S811+V50_	S811+V65_	S811+V72_	S811+V85_	S811+V10_
Max. current capacity	500	650	720	850	1000
FLA range	156–500	203–650	225–720	265–580	320–1000
<b>General Information</b>					
Bypass mechanical lifespan	10M	10M	10M	10M	10M
Insulating voltage $U_i$	660V	660V	660V	660V	660V
Ramp time range	0.5–180 seconds (0.5–360 seconds S811+ Premium)	0.5–180 seconds (0.5–360 seconds S811+ Premium)	0.5–180 seconds (0.5–360 seconds S811+ Premium)	0.5–180 seconds (0.5–360 seconds S811+ Premium)	0.5–180 seconds (0.5–360 seconds S811+ Premium)
Resistance to vibration	3g	3g	3g	3g	3g
Resistance to shock	15g	15g	15g	15g	15g
<b>Electrical Information</b>					
Operating voltage	200–600V	200–600V	200–600V	200–600V	200–600V
Operating frequency	47–63 Hz	47–63 Hz	47–63 Hz	47–63 Hz	47–63 Hz
Overload setting	30–100%	30–100%	30–100%	30–100%	30–100%
Trip class	5, 10, 20 and 30	5, 10, 20 and 30	5, 10, 20 and 30	5, 10, 20 and 30	5, 10, 20 and 30
<b>Cabling Capacity (IEC 947)</b>					
Number of conductors	2, 4 or 6	2, 4 or 6	2, 4 or 6	2, 4 or 6	2, 4 or 6
Wire sizes	2/0 to 500 kcmil	2/0 to 500 kcmil	2/0 to 500 kcmil	2/0 to 500 kcmil	2/0 to 500 kcmil
Type of connectors	Add-on lug kit	Add-on lug kit	Add-on lug kit	Add-on lug kit	Add-on lug kit
<b>Control Wiring (12-Pin)</b>					
Wire sizes in AWG	22–14	22–14	22–14	22–14	22–14
Number of conductors (stranded)	2 (or one AWG 12)	2 (or one AWG 12)	2 (or one AWG 12)	2 (or one AWG 12)	2 (or one AWG 12)
Torque requirements in lb-in	3.5	3.5	3.5	3.5	3.5
Solid, stranded or flexible max. size in mm <sup>2</sup>	3.31	3.31	3.31	3.31	3.31
<b>Control Power Requirements</b>					
Voltage range (24V $\pm 10\%$ )	21.6–26.4	21.6–26.4	21.6–26.4	21.6–26.4	21.6–26.4
Steady-state current amps	1.4	1.4	1.4	1.4	1.4
Inrush current amps	10	10	10	10	10
Ripple	1%	1%	1%	1%	1%
<b>Relays (1) Class A and C</b>					
Voltage AC—maximum	240	240	240	240	240
Voltage DC—maximum	120	120	120	120	120
Amps—maximum	3	3	3	3	3
<b>Environment</b>					
Temperature—operating	–30° to 50°C (no derating) consult Eaton for operation >50°C	–30° to 50°C (no derating) consult Eaton for operation >50°C	–30° to 50°C (no derating) consult Eaton for operation >50°C	–30° to 50°C (no derating) consult Eaton for operation >50°C	–30° to 50°C (no derating) consult Eaton for operation >50°C
Temperature—storage	–50° to 70°C	–50° to 70°C	–50° to 70°C	–50° to 70°C	–50° to 70°C
Altitude	<2000m—consult Eaton for operation >2000m	<2000m—consult Eaton for operation >2000m	<2000m—consult Eaton for operation >2000m	<2000m—consult Eaton for operation >2000m	<2000m—consult Eaton for operation >2000m
Humidity	<95% noncondensing	<95% noncondensing	<95% noncondensing	<95% noncondensing	<95% noncondensing
Operating position	Any	Any	Any	Any	Any
Pollution degree IEC947-1	3	3	3	3	3
Impulse withstand voltage IEC947-4-1	6000V	6000V	6000V	6000V	6000V

## Wiring Diagrams

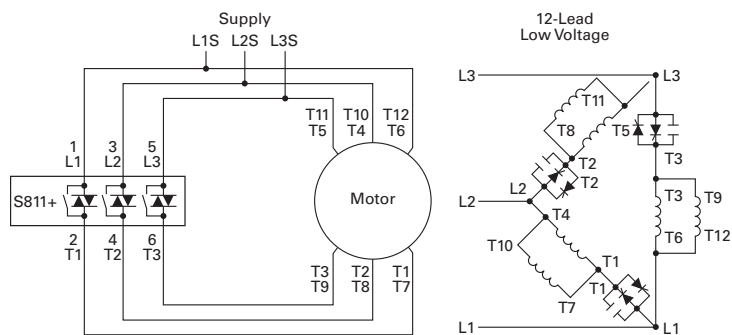
## Line Connected Soft Starter



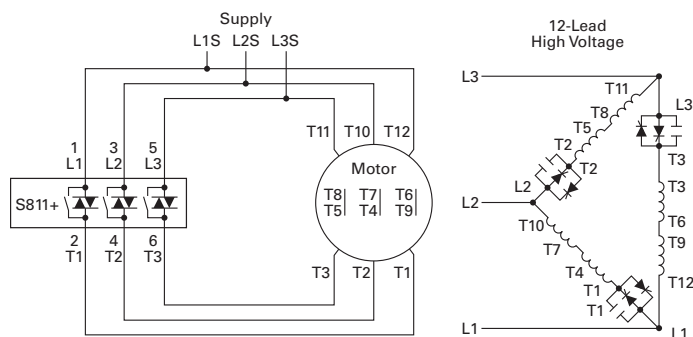
## Inside-the-Delta Connected Soft Starter for a 6-Lead Motor



## Inside-the-Delta Connected Soft Starter for a 12-Lead Low Voltage Motor



## Inside-the-Delta Connected Soft Starter for a 12-Lead High Voltage Motor



**Dimensions**

Approximate Dimensions in Inches (mm)

**Soft Starters—S811+**

<b>Catalogue Number</b>	<b>W</b>	<b>H</b>	<b>D</b>	<b>Weight in Lbs (kg)</b>
<b>S811+N37N3S</b>	2.66 (67.6)	7.37 (187.2)	6.45 (163.9)	5.8 (2.6)
<b>S811+N66N3S</b>	2.66 (67.6)	7.37 (187.2)	6.45 (163.9)	5.8 (2.6)
<b>S811+R10N3S</b>	4.38 (111.3)	7.92 (201.1)	6.64 (168.6)	10.5 (4.8)
<b>S811+R13N3S</b>	4.38 (111.3)	7.92 (201.1)	6.64 (168.6)	10.5 (4.8)
<b>S811+T18N3S</b>	7.65 (194.4)	12.71 (322.9)	6.47 (164.4)	48 (21.8) with lugs 41 (18.6) without lugs
<b>S811+T24N3S</b>	7.65 (194.4)	12.71 (322.9)	6.47 (164.4)	48 (21.8) with lugs 41 (18.6) without lugs
<b>S811+T30N3S</b>	7.65 (194.4)	12.71 (322.9)	6.47 (164.4)	48 (21.8) with lugs 41 (18.6) without lugs
<b>S811+U36N3S</b>	7.73 (196.3)	12.72 (323.1)	7.16 (181.8)	48 (21.8) with lugs 41 (18.6) without lugs
<b>S811+U42N3S</b>	7.73 (196.3)	12.72 (323.1)	7.16 (181.8)	48 (21.8) with lugs 41 (18.6) without lugs
<b>S811+U50N3S</b>	7.73 (196.3)	12.72 (323.1)	7.16 (181.8)	48 (21.8) with lugs 41 (18.6) without lugs
<b>S811+V36N3S</b>	11.05 (280.6)	16.57 (420.8)	7.39 (187.8)	103 (46.8) with lugs 91 (41.4) without lugs
<b>S811+V42N3S</b>	11.05 (280.6)	16.57 (420.8)	7.39 (187.8)	103 (46.8) with lugs 91 (41.4) without lugs
<b>S811+V50N3S</b>	11.05 (280.6)	16.57 (420.8)	7.39 (187.8)	103 (46.8) with lugs 91 (41.4) without lugs
<b>S811+V65N3S</b>	11.05 (280.6)	16.57 (420.8)	7.39 (187.8)	103 (46.8) with lugs 91 (41.4) without lugs
<b>S811+V72N3S</b>	11.05 (280.6)	16.57 (420.8)	7.39 (187.8)	103 (46.8) with lugs 91 (41.4) without lugs
<b>S811+V85N3S</b>	11.05 (280.6)	16.57 (420.8)	7.39 (187.8)	103 (46.8) with lugs 91 (41.4) without lugs
<b>S811+V10N3S</b>	11.05 (280.6)	16.57 (420.8)	7.39 (187.8)	103 (46.8) with lugs 91 (41.4) without lugs

Also refer to dimension drawings on **Pages V6-T1-76 through V6-T1-78.**

# 1.1

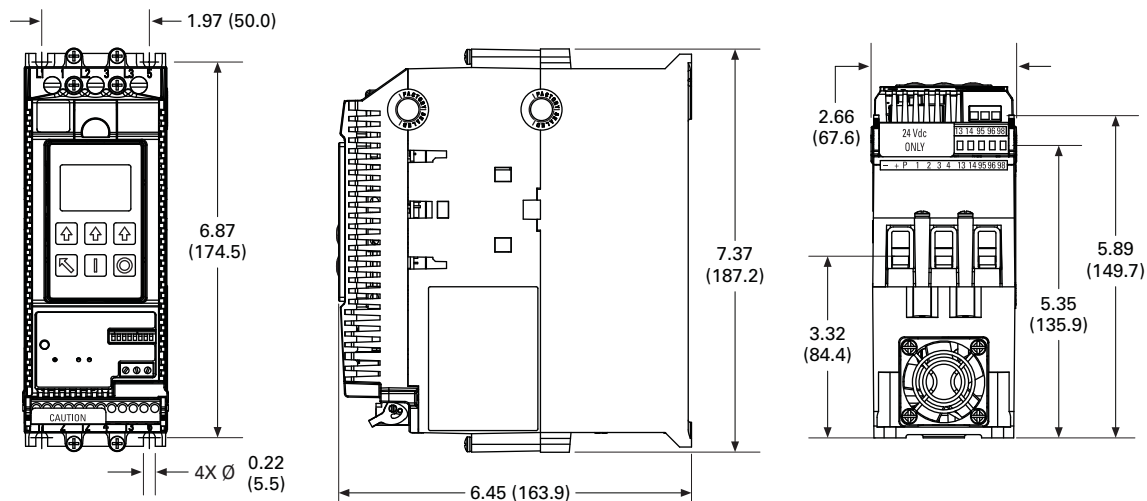
## Reduced Voltage Motor Starters

### Solid-State Starters

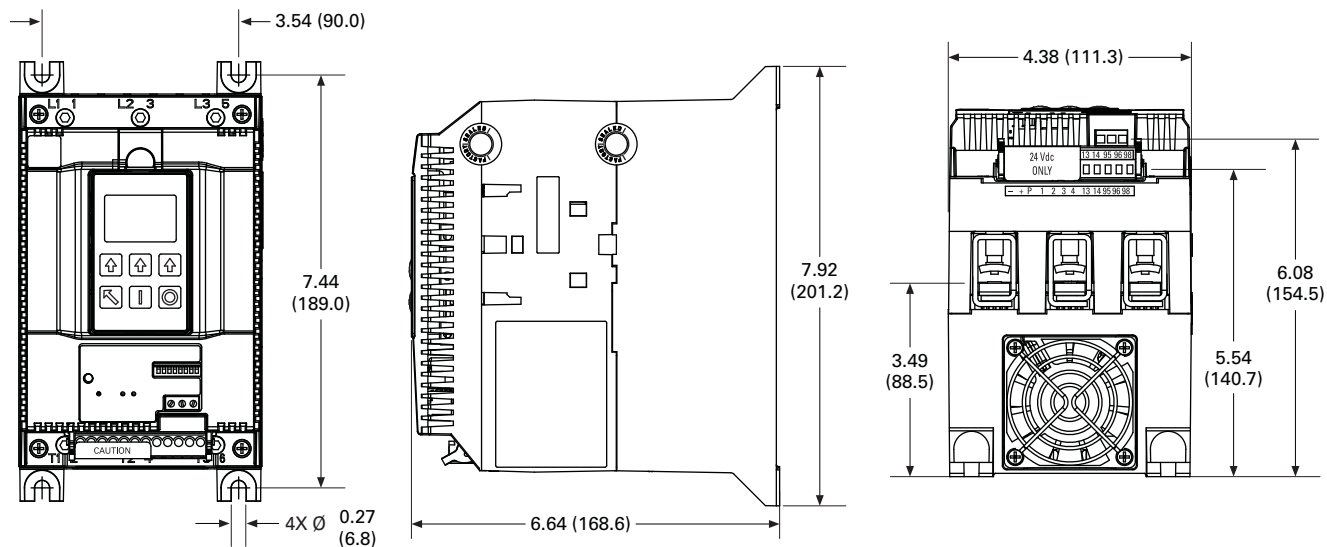
1

Approximate Dimensions in Inches (mm)

#### S811+N\_



#### S811+R\_





# 1.1

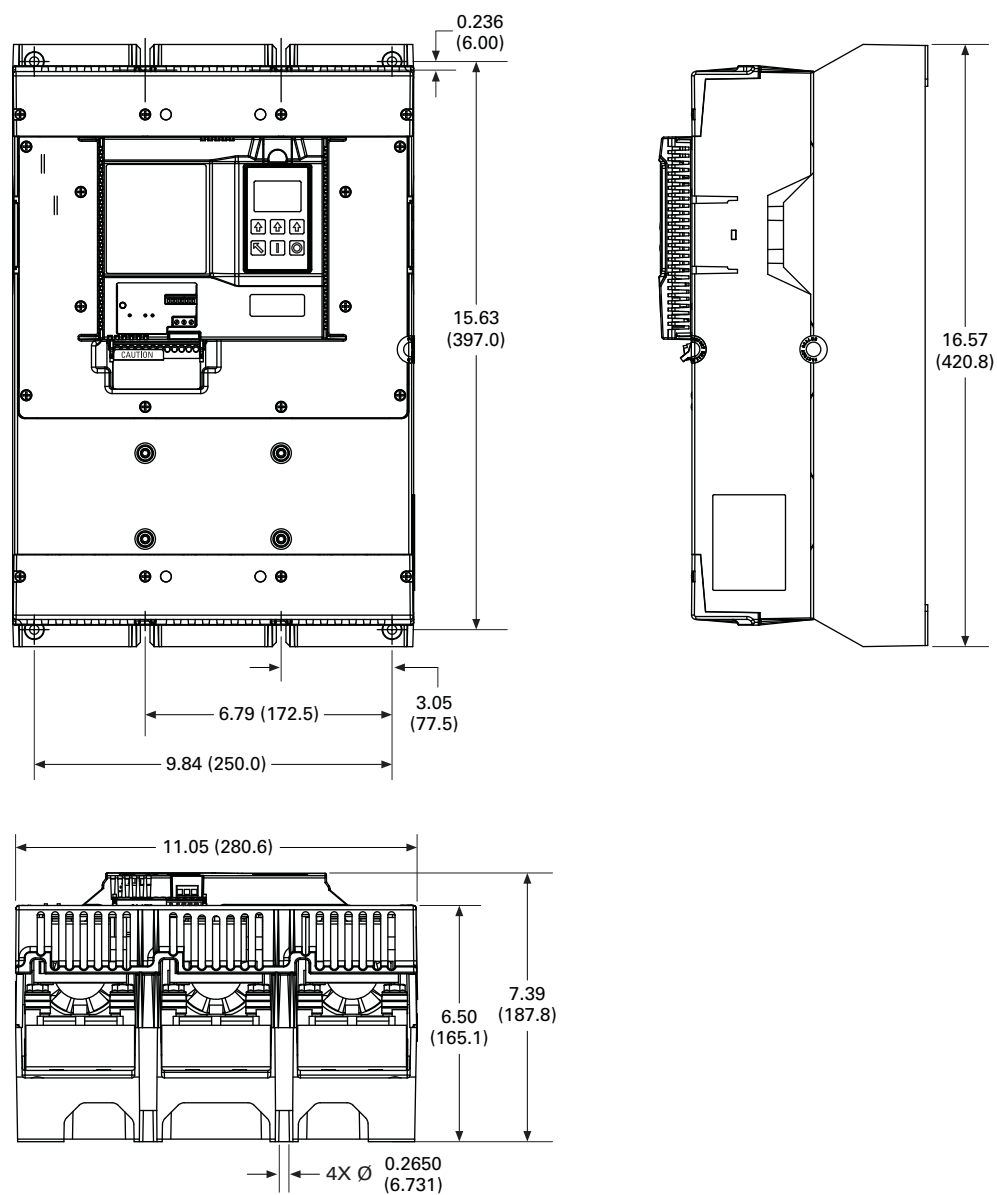
## Reduced Voltage Motor Starters

### Solid-State Starters

1

Approximate Dimensions in Inches (mm)

S811+V\_\_



## TRU-START

### Description

The Tru-Start “soft-start” starter is a general purpose, full featured starter which offers an “off the shelf” solution for most motor applications at a very economic price. The Tru-Start incorporates oversized SCR's and a class 20 solid-state over-load which will smoothly accelerate most motor loads and will require a minimum of maintenance or adjustment. Simple selection and installation ensures that the application is up and running with a minimum of effort. Additional options may be installed to provide smooth stop, up to speed detection, jam detection, energy saver and shorted SCR detection. The Tru-Start is designed to accomplish smooth reversing with the addition of four SCR's and a reversing logic board. DC injection stopping is also available as a standard option.

### Features

- Simple installation with only one adjustment for FLA
- Universal power section will accept 200-600V
- “Constant current” or “Current ramp” modes
- Complete troubleshooting diagnostics as standard
- Regulates current to the motor (not voltage)
- 150-350% current limit adjustment
- 2-30 second current ramp adjustment
- Common logic board for entire product range
- Heavy Duty Rated (500% FLA for 35 seconds)
- CSA Approved



### Non-Reversing and Reversing Starters

#### NON-REVERSING STARTERS

Horsepower				Open Panel	NEMA 1 Encl.	NEMA 12 Encl.
Amps	230V	460V	575V	Catalogue Number	Catalogue Number	Catalogue Number
15	5	10	15	TRU-015-P	TRU-015-N1	TRU-015-N12
30	10	25	30	TRU-030-P	TRU-030-N1	TRU-030-N12
50	20	40	50	TRU-050-P	TRU-050-N1	TRU-050-N12
75	30	60	75	TRU-075-P	TRU-075-N1	TRU-075-N12
125	50	100	125	TRU-125-P	TRU-125-N1	TRU-125-N12
200	75	150	200	TRU-200-P	TRU-200-N1	TRU-200-N12
360	150	300	350	TRU-360-P	TRU-360-N1	TRU-360-N12
500	200	400	500	TRU-500-P	TRU-500-N1	TRU-500-N12
600	250	500	600	TRU-600-P	TRU-600-N1	TRU-600-N12
800	300	600	800	TRU-800-P	TRU-800-N1	TRU-800-N12

#### REVERSING STARTERS

15	5	10	15	TRU-015R-P	TRU-015R-N1	TRU-015R-N12
30	10	25	30	TRU-030R-P	TRU-030R-N1	TRU-030R-N12
50	20	40	50	TRU-050R-P	TRU-050R-N1	TRU-050R-N12
75	30	60	75	TRU-075R-P	TRU-075R-N1	TRU-075R-N12
125	50	100	125	TRU-125R-P	TRU-125R-N1	TRU-125R-N12
200	75	150	200	TRU-200R-P	TRU-200R-N1	TRU-200R-N12
360	150	300	350	TRU-360R-P	TRU-360R-N1	TRU-360R-N12
500	200	400	500	TRU-500R-P	TRU-500R-N1	TRU-500R-N12
600	250	500	600	TRU-600R-P	TRU-600R-N1	TRU-600R-N12
800	300	600	800	TRU-800R-P	TRU-800R-N1	TRU-800R-N12

## DC Injection Braking

DCI braking chassis provides smooth deceleration of AC induction motors. DCI braking may be used to decelerate large inertia loads for increased safety and production.

### DC Injection Braking

Amps	Hp at 575 V Ac	Hp at 460 V Ac	Catalogue Number	Dimensions
20	20	15	<b>TRU-020-DCI</b>	16 x 8.5 x 6
40	40	30	<b>TRU-040-DCI</b>	17 x 10 x 8.5
80	75	60	<b>TRU-080-DCI</b>	17 x 10 x 8.5
125	125	100	<b>TRU-125-DCI</b>	21 x 10.5 x 9
200	200	150	<b>TRU-200-DCI</b>	11 x 13 x 10.5
300	300	250	<b>TRU-300-DCI</b>	16.5 x 14.5 x 11
500	500	400	<b>TRU-500-DCI</b>	17.5 x 16.5 x 14

### Factory Options

Catalogue Number	Description
<b>ST</b>	Soft Stop
<b>SC</b>	Shorted SCR detection
<b>MO</b>	Multi-Option includes Energy Saver, Up-To-Speed and Locked Rotor Jam protection
<b>BY</b>	Bypass Lugs
<b>DCI</b>	DCI Brake

### Dimensions

Amps	Open Panel	NEMA 1	NEMA 12
15	13 x 8.5 x 6	13 x 8.5 x 7	13 x 8.5 x 7 Non Vented
30	16 x 8.5 x 6	16 x 8.5 x 7	24 x 20 x 12 Non Vented
50	17 x 10.5 x 7.5	17 x 12 x 10.5	17 x 12 x 10.5 Non Vented
75	17 x 10.5 x 8.5	17 x 12 x 10.5	17 x 12 x 10.5 Non Vented
125	21 x 10.5 x 9.5	21 x 12 x 10.5	21 x 12 x 10.5 Fan Cooled
200	13.5 x 20.5 x 10.5	30 x 24 x 16	48 x 36 x 16 with Bypass
360	19 x 22 x 11	36 x 30 x 16	48 x 36 x 16 with Bypass
500	19.5 x 25 x 13.5	48 x 36 x 16	60 x 48 x 16 with Bypass
600	19.5 x 25 x 13.5	48 x 36 x 16	60 x 48 x 16 with Bypass
800	25.5 x 28 x 16.5	48 x 36 x 20	60 x 60 x 20 with Bypass

### Spare Parts

Catalogue Number	Description
<b>CA388-4</b>	Reversing Logic Card
<b>CA390-2</b>	Soft Stop Card
<b>CA391-3</b>	Multi-Option Card
<b>CA392-3</b>	Controller Logic Card
<b>CA395-2</b>	Shorted SCR Card
<b>CA398-3</b>	DC Injection Braking Card
<b>T261123</b>	C/T 1500:1
<b>T262320</b>	C/T 2500:1
<b>T265320</b>	C/T 5000:1
<b>T268320</b>	C/T 8500:1
<b>T261321</b>	C/T 10000:1
<b>N10SP06</b>	Dual SCR 90A (TRU-015, TRU-030, TRU-050)
<b>N10SP16</b>	Dual SCR 140A (TRU-075)
<b>N20SP06</b>	Dual SCR 250A (TRU-125)
<b>N728452</b>	SCR 580A (TRU-200)
<b>N718602</b>	SCR 720A (TRU-360)
<b>N718133</b>	SCR 1100A (TRU-500)
<b>N718153</b>	SCR 1200A (TRU-600)
<b>N718552</b>	SCR 1500A (TRU-800)
<b>0210050</b>	MOV 625V
<b>A760201</b>	Bypass Lugs (Set) for 200 AMP TRU START
<b>A760361</b>	Bypass Lugs (Set) for 360 AMP TRU START
<b>A760501</b>	Bypass Lugs (Set) for 500 AMP TRU START
<b>A760601</b>	Bypass Lugs (Set) for 600 AMP TRU START
<b>G010007</b>	Fan (TRU-075 / TRU-125)
<b>G010001</b>	Fan (TRU-200 / TRU-360 / TRU-500 / TRU-600)
<b>G010003</b>	Fan (TRU-800)
<b>A760002B</b>	15A Burden Resistor
<b>A760003B</b>	30A Burden Resistor
<b>A760008B</b>	50A Burden Resistor
<b>A760004B</b>	80A Burden Resistor
<b>A760005B</b>	125A Burden Resistor
<b>A760007</b>	200A Burden Resistor
<b>A760006B</b>	360A Burden Resistor
<b>A760009</b>	500A Burden Resistor