Contents

Torque Limiters

TL480N25

Product Description

The TL device line of Starting Torque Limiters is designed for the soft start of 3-phase or single-phase motors, i.e., it allows smoother starting of all AC induction motors, thus decreasing shock and vibration problems encountered during across-the-line starts. The device is ramp-up time/torque adjustable from .5 – 5 seconds/0 – 85% of nominal starting torque.

Application Description

The TL line of torque limiters is designed for single-phase and 3-phase motor applications. It provides a reduction in the peak inrush a motor experiences during start-up. The torque limiter controls current on one of the three motor phases to control the torque being applied to the motor, allowing for smooth starting of a motor. The torque limiter 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 600V AC
- Adjustable ramp times (.5 – 5 seconds)
- Adjustable initial torque control (0 – 85%)
- Unlimited number of START/STOP operations per hour
- IP20 finger protection

Benefits

- Reduced wear on belts, gears, chains, clutches, shafts and bearings
- Compact design allows easy installation and smaller enclosures
- 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

Product Selection

Table 39-1. Torque Limiter Controllers

Max. Current	Line Voltage	kW Rating (50 Hertz)				Horsepower Rating									Catalog Number	Price U.S. $
						110/120V	200V		230V		460V		575V			
		110/120V	230V	380 – 400V	440V		1.0 SF	1.15 SF	1.0 SF	1.15 SF	1.0 SF	1.15 SF	1.0 SF	1.15 SF		
1-Phase Motor — 115V Versions																
15	110 – 120	.5	N/A	N/A	N/A	3/4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**TL115N15**	
25	110 – 120	1.5	N/A	N/A	N/A	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**TL115N25**	
3-Phase Motor																
15 15	208 – 480 500 – 600	N/A N/A	4 N/A	5.5 N/A	7.5 N/A	N/A N/A	3 N/A	3 N/A	3 N/A	3 N/A	10 N/A	7-1/2 N/A	N/A 10	N/A 10	**TL480N15** **TL600N15**	
25 25	208 – 480 500 – 600	N/A N/A	7.5 N/A	12.5 N/A	12.5 N/A	N/A N/A	5 N/A	5 N/A	7-1/2 N/A	5 N/A	15 N/A	15 N/A	N/A 20	N/A 20	**TL480N25** **TL600N25**	
1-Phase Motor																
15 15	208 – 240 380 – 480	N/A N/A	2.2 N/A	N/A N/A	N/A N/A	N/A N/A	2 N/A	2 N/A	3 N/A	3 N/A	N/A 5	N/A 5	N/A N/A	N/A N/A	**TL480N15** **TL480N15**	
25 25	208 – 240 380 – 480	N/A N/A	4.0 N/A	7.5 7.5	N/A N/A	N/A N/A	3 N/A	3 N/A	5 N/A	5 N/A	N/A 10	N/A 10	N/A N/A	N/A N/A	**TL480N25** **TL480N25**	

Discount Symbol **1CD-1**

Technical Data — Specifications

Table 39-2. Torque Limiter

	TL115N15	TL480N15	TL600N15	TL115N25	TL480N25	TL600N25
Maximum Current Capacity	15	15	15	25	25	25
Trip Class — 10A — 10 — 20 — 30	15 15 12 10	15 15 12 10	15 15 12 10	25 25 20 15	25 25 20 15	25 25 20 15
Dimensions						
Width in Inches (mm)	1.77 (45)	1.77 (45)	1.77 (45)	1.77 (45)	1.77 (45)	1.77 (45)
Height in Inches (mm)	3.94 (100)	3.94 (100)	3.94 (100)	3.94 (100)	3.94 (100)	3.94 (100)
Depth in Inches (mm)	5.04 (128)	5.04 (128)	5.04 (128)	5.04 (128)	5.04 (128)	5.04 (128)
Weight in lbs. (kg)	1.52 (690)	1.52 (690)	1.52 (690)	1.52 (690)	1.52 (690)	1.52 (690)
Drawing	See **Figure 39-3** (**Page 39-13**)					
Electrical Characteristics						
Line Voltage (V AC)	110 – 120	208 – 480	500 – 600	110 – 120	208 – 480	500 – 600
Operating Frequency (Hz)	50/60	50/60	50/60	50/60	50/60	50/60
Leakage Current	5 mA AC max.					
Minimum Operational Current	50 mA					
Control Characteristics						
Ramp Time (secs)	.5 – 5	.5 – 5	.5 – 5	.5 – 5	.5 – 5	.5 – 5
Ramp Settings (% LRT)	85%	85%	85%	85%	85%	85%
Environment Characteristics						
Temperature — Operating (no derating)	-30° – 40°C	-30° – 40°C	-30° – 40°C	-30° – 40°C	-30° – 40°C	-30° – 40°C
Current Rating 50°C	12.5 Amps	12.5 Amps	12.5 Amps	20 Amps	20 Amps	20 Amps
Limited Duty Cycle 50°C	None			25A on-time max. 15 min. duty cycle max. .8		
Current Rating 60°C	10 Amps	10 Amps	10 Amps	15 Amps	17 Amps	17 Amps
Limited Duty Cycle 60°C	None			25A on-time max. 15 min. duty cycle max. .65		
Temperature — Storage	-30° – 80°C	-30° – 80°C	-30° – 80°C	-30° – 80°C	-30° – 80°C	-30° – 80°C
Altitude (Meters) — No Derating	2000	2000	2000	2000	2000	2000
Humidity	95% Non-condensing					
Operating Position	Vertical ± 30°					
Impulse Withstand Voltage IEC 947-4-1	4000V	4000V	4000V	4000V	4000V	4000V
Rated Insulation Voltage (Ui)	660V					
Installation Category	III					
Vibration	IEC 68-2-6 5g 10 – 150 Hz					
Power Dissipation for Intermittent Operation	1 W/A x Duty Cycle					
Power Dissipation for Continuous Operation	1 W/A					
Cooling Method	Natural Convection					
Degree of Protection	IP20	IP20	IP20	IP20	IP20	IP20
Pollution Degree	3	3	3	3	3	3
Agency Approvals	UL, cUL, CE	UL, CSA, CE		UL, cUL, CE	UL, CSA, CE	

Soft Start Controllers

S701E15N3S

39

Product Description

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

S701E25N3S

Application Description

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

Features

- Rated operational voltage up to 600V AC
- Control voltage range from 24 to 480V AC/DC
- Adjustable ramp times (.5 – 10 seconds)
- Adjustable initial torque control (0 – 85%)
- Kick Start feature
- Soft Stop (.5 – 10 seconds)
- Unlimited number of START/STOP operations per hour
- IP20 finger protection
- Fractional to 15 hp motors @ 480V (20 hp @ 600V)

Benefits

- Reduced wear on belts, gears, chains, clutches, shafts and bearings
- Allows for controlling the inrush current to the motor
- Reduced water-hammer in 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
- cUL Listed

Catalog Number Selection — S701

Table 39-4. S701 Catalog Numbering System

S701 C 15 N 3 S

Soft Start Controller

Line Voltage
C = 208 – 240V AC
D = 380 – 415V AC
E = 380 – 480V AC
G = 550 – 600V AC

Amperage
03 = 3.5 Amp
15 = 15 Amp
25 = 25 Amp

Number of Poles
(Only 3 at this time)

Control Options
S = Standard
BP = Aux. Contact

Options
N = No Special Options
B = Braking

Product Selection

Table 39-3. Soft Start Controllers

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

Discount Symbol **1CD-1**

Technical Data — Specifications

Table 39-5. Soft Starter — S701XXXN3S

	S701C03N3S	S701D03N3S	S701E03N3S	S701G03N3S
Maximum Current Capacity	3.5	3.5	3.5	3.5
Trip Class — 10A — 10 — 20 — 30	3.5 3.5 2.8 2.1	3.5 3.5 2.8 2.1	3.5 3.5 2.8 2.1	3.5 3.5 2.8 2.1
Dimensions				
Width in Inches (mm)	.89 (22.5)	.89 (22.5)	.89 (22.5)	.89 (22.5)
Height in Inches (mm)	3.94 (100)	3.94 (100)	3.94 (100)	3.94 (100)
Depth in Inches (mm)	5.01 (127)	5.01 (127)	5.01 (127)	5.01 (127)
Weight in lbs. (kg)	.6 (270)	.6 (270)	.6 (270)	.6 (270)
Drawing	See **Figure 39-2** (**Page 39-13**)			
Electrical Characteristics				
Line Voltage (V AC)	208 – 240	380 – 415	440 – 480	500 – 600
Operating Frequency (Hz)	50/60	50/60	50/60	50/60
Leakage Current	5 mA AC Max.			
Minimum Operational Current	50 mA			
Control Voltage (V AC/V DC)	24 – 240	24 – 300	24 – 300	24 – 300
Pick-Up Voltage Max.	20.4V AC/DC			
Drop out Voltage Min.	5V AC/DC			
Max. Control Current for No Operation	1 mA	1 mA	1 mA	1 mA
Response Time Max.	70 mS	70 mS	70 mS	70 mS
Control Characteristics				
Ramp Time (Secs)	.5 – 10	.5 – 10	.5 – 10	.5 – 10
Ramp Settings (% LRT)	85%	85%	85%	85%
Kick Start Settings (% LRT)	85%	85%	85%	85%
Soft Stop (secs)	.5 – 10	.5 – 10	.5 – 10	.5 – 10
Environment Characteristics				
Temperature – Operating (no derating)	-30° – 40°C	-30° – 40°C	-30° – 40°C	-30° – 40°C
Current Rating 50°C	NA	NA	NA	NA
Limited Duty Cycle 50°C	NA			
Current Rating 60°C	NA	NA	NA	NA
Limited Duty Cycle 60°C	NA			
Temperature – Storage	-30° – 80°C	-30° – 80°C	-30° – 80°C	-30° – 80°C
Altitude (Meters) – No Derating	2000	2000	2000	2000
Humidity	95% Non-condensing			
Operating Position (no derating)	Vertical ± 30°			
Impulse Withstand Voltage IEC 947-4-1	4000V	4000V	4000V	4000V
Rated Insulation Voltage (Ui)	660V			
Installation Category	III			
Vibration	IEC 68-2-6 5g 10 – 150 Hz			
Power Dissipation for Intermittent Operation	4 W/A x Duty Cycle			
Power Dissipation for Continuous Operation	4 W/A x Duty Cycle			
Cooling Method	Natural Convection			
Degree of Protection	IP20	IP20	IP20	IP20
Pollution Degree	3	3	3	3
Agency Approvals	UL, cUL, CE			

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

	S701C15N3S	S701E15N3S	S701G15N3S	S701C25N3S	S701E25N3S	S701G25N3S
Maximum Current Capacity	15	15	15	25	25	25
Trip Class — 10A — 10 — 20 — 30	15 15 12 10	15 15 12 10	15 15 12 10	25 25 20 15	25 25 20 15	25 25 20 15
Dimensions						
Width in Inches (mm)	1.77 (45)	1.77 (45)	1.77 (45)	3.54 (90)	3.54 (90)	3.54 (90)
Height in Inches (mm)	3.94 (100)	3.94 (100)	3.94 (100)	3.94 (100)	3.94 (100)	3.94 (100)
Depth in Inches (mm)	5.04 (128)	5.04 (128)	5.04 (128)	5.04 (128)	5.04 (128)	5.04 (128)
Weight in lbs. (kg)	1.52 (690)	1.52 (690)	1.52 (690)	2.53 (1150)	2.53 (1150)	2.53 (1150)
Drawing	See **Figure 39-3** (**Page 39-13**)			See **Figure 39-4** (**Page 39-13**)		
Electrical Characteristics						
Line Voltage (V AC)	208 – 240	380 – 480	500 – 600	208 – 240	380 – 480	500 – 600
Operating Frequency (Hz)	50/60	50/60	50/60	50/60	50/60	50/60
Leakage Current	5 mA AC max.			5 mA AC max.		
Minimum Operational Current	50 mA			50 mA		
Control Voltage (V AC/V DC)	24 – 240	24 – 480	24 – 480	24 – 240	24 – 300	24 – 300
Pick-Up Voltage Max.	20.4V AC/DC			20.4 V AC/DC		
Drop Out Voltage Min.	5V AC/DC			5V AC/DC		
Max. Control Current for No Operation	1 mA	1 mA	1 mA	1 mA	1 mA	1 mA
Response Time Max.	70 mS	70 mS	70 mS	70 mS	70 mS	70 mS
Control Characteristics						
Ramp Time (secs)	.5 – 10	.5 – 10	.5 – 10	.5 – 10	.5 – 10	.5 – 10
Ramp Settings (% LRT)	85%	85%	85%	85%	85%	85%
Kick Start Settings (% LRT)	85%	85%	85%	85%	85%	85%
Soft Stop (secs)	.5 – 10	.5 – 10	.5 – 10	.5 – 10	.5 – 10	.5 – 10
Environment Characteristics						
Temperature — Operating (no derating)	-30° – 40°C	-30° – 40°C	-30° – 40°C	-30° – 40°C	-30° – 40°C	-30° – 40°C
Current Rating 50°C	12.5 Amps	12.5 Amps	12.5 Amps	20 Amps	20 Amps	20 Amps
Limited Duty Cycle 50°C	15A on-time max. 15 min. duty cycle max. .8			25A on-time max. 15 min. duty cycle max. .8		
Current Rating 60°C	10 Amps	10 Amps	10 Amps	17 Amps	17 Amps	17 Amps
Limited Duty Cycle 60°C	15A on-time max. 15 min. duty cycle max. .65			25A on-time max. 15 min. duty cycle max. .65		
Temperature — Storage	-30° – 80°C	-30° – 80°C	-30° – 80°C	-30° – 80°C	-30° – 80°C	-30° – 80°C
Altitude (Meters) — No Derating	2000	2000	2000	2000	2000	2000
Humidity	95% Non-condensing					
Operating Position (no derating)	Vertical ± 30°					
Impulse Withstand Voltage IEC 947-4-1	4000V	4000V	4000V	4000V	4000V	4000V
Rated Insulation Voltage (Ui)	660V			660V		
Installation Category	III			III		
Vibration	IEC 68-2-6 5g 10 – 150 Hz			IEC 68-2-6 5g 10 – 150 Hz		
Power Dissipation for Intermittent Operation	2 W/A x Duty Cycle			2 W/A x Duty Cycle		
Power Dissipation for Continuous Operation	2 W/A			2 W/A		
Cooling Method	Natural Convection					
Degree of Protection	IP20	IP20	IP20	IP20	IP20	IP20
Pollution Degree	3	3	3	3	3	3
Agency Approvals	UL, CSA, CE					

Soft Start Controllers with Auxiliary Contact

Product Description

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

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

Application Description

The S701 line of soft start controllers is specifically designed to be a low cost option for soft starting small (15 hp and down) 3-phase motors. The Auxiliary Contact is designed to work in conjunction with an across-the-line contactor. The purpose of the contactor is to provide a parallel current path once the soft starter has brought the motor up to speed. Once the soft start controller reaches end of ramp, the auxiliary contact will close and send a signal to close the bypass contactor, thus providing a low impedance path for the current to the motor. The S701 unit controls current on two of three motor phases to control the torque being applied to the motor, allowing for smooth starting of a motor. The S701 is designed to be used with a Manual Motor Protector or a full voltage starter. These devices provide the necessary overload protection for the motor and also provide line isolation for the motor. Short-circuit protection can be provided by fuses or circuit breakers.

Features

- Rated operational voltage up to 600V AC
- Control voltage range from 24 to 300V AC/DC
- Adjustable ramp times (.5 – 20 seconds)
- Adjustable initial torque control (0 – 85%)
- Kick Start feature (0 – 85% adjustment)
- Kick Start for 200 mS
- Soft Stop (.5 – 20 seconds)
- IP20 finger protection
- Available up to 30 Amps (with Bypass installed)
- Auxiliary contact for up-to-speed indication

Benefits

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

Standards and Certifications

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

Product Selection

Table 39-6. Soft Start Controller with Auxiliary Contact

Max. Current	Line Voltage	Control Voltage (V AC/V DC)	3-Phase Motor												Catalog Number	Price U.S. $
			kW Rating (50 Hertz)			Horsepower Rating										
						200V		230V		460V		575V				
			230V	380 – 400V	440V	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 – 300	N/A	12.5	12.5	N/A	N/A	N/A	N/A	15	15	N/A	N/A	**S701E25N3BP**	
25	500 – 600	24 – 300	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	20	20	**S701G25N3BP**	
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 – 300	N/A	15	15	N/A	N/A	N/A	N/A	20	15	N/A	N/A	**S701E25N3BP**	
30	500 – 600	24 – 300	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	25	20	**S701G25N3BP**	

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

Discount Symbol **1CD-1**

Technical Data — Specifications

Table 39-7. Soft Starter — S701XXXN3BP

	S701C25N3BP	S701E25N3BP	S701G25N3BP
Maximum Current Capacity with Bypass (without Bypass)	30 (25)	30 (25)	30 (25)
Trip Class — 10A — 10 — 20 — 30	30 (25) 30 (25) 24 (20) 19.5 (15)	30 (25) 30 (25) 24 (20) 19.5 (15)	30 (25) 30 (25) 24 (20) 19.5 (15)
Dimensions			
Width in Inches (mm)	3.54 (90)	3.54 (90)	3.54 (90)
Height in Inches (mm)	3.94 (100)	3.94 (100)	3.94 (100)
Depth in Inches (mm)	5.04 (128)	5.04 (128)	5.04 (128)
Weight in lbs. (kg)	2.53 (1150)	2.53 (1150)	2.53 (1150)
Drawing	See **Figure 39-4** (**Page 39-13**)		
Electrical Characteristics			
Line Voltage (V AC)	208 – 240	380 – 480	500 – 600
Operating Frequency (Hz)	50/60	50/60	50/60
Leakage Current	5 mA AC max.		
Minimum Operational Current	50 mA		
Control Voltage (V AC/V DC)	24 – 240	24 – 300	24 – 300
Pick-Up Voltage Max.	20.4 V AC/DC		
Drop Out Voltage Min.	5V AC/DC		
Max. Control Current for No Operation	1 mA	1 mA	1 mA
Response Time Max.	70 mS	70 mS	70 mS
Control Characteristics			
Ramp Time (secs)	.5 – 20	.5 – 20	.5 – 20
Ramp Settings (% LRT)	85%	85%	85%
Kick Start Settings (% LRT)	85%	85%	85%
Soft Stop (secs)	.5 – 20	.5 – 20	.5 – 20
Environmental Characteristics			
Temperature — Operating (no derating)	-30° – 40°C	-30° – 40°C	-30° – 40°C
Current Rating 50°C	20 Amps	20 Amps	20 Amps
Limited Duty Cycle 50°C	25A on-time max. 15 min. duty cycle max. .8		
Current Rating 60°C	17 Amps	17 Amps	17 Amps
Limited Duty Cycle 60°C	25A on-time max. 15 min. duty cycle max. .65		
Temperature — Storage	-30° – 80°C	-30° – 80°C	-30° – 80°C
Altitude (Meters) — No Derating	2000	2000	2000
Humidity	95% Non-condensing		
Operating Position (no derating)	Vertical ± 30°		
Impulse Withstand Voltage IEC 947-4-1	4000V	4000V	4000V
Rated Insulation Voltage (Ui)	660V	660V	660V
Installation Category	III	III	III
Vibration	IEC 68-2-6 5g 10 – 150 Hz		
Power Dissipation for Continuous Operation	2 W/A without Bypass		
Power Dissipation with Semiconductor Bypassed	5 W/A max. with Bypass		
Cooling Method	Natural Convection		
Degree of Protection	IP20	IP20	IP20
Pollution Degree	3	3	3
Agency Approvals	UL, cUL, CE		

Soft Start Controllers with Brake

S701E25B3S

Product Description

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

Application Description

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

Features

- Rated operational voltage up to 480V AC
- Control voltage range from 24 to 300V AC/DC
- Adjustable ramp times (.5 – 20 seconds)
- Adjustable initial torque control (0 – 85%)
- Kick Start feature (0 – 85% adjustment)
- Kick Start for 200 mS
- IP20 finger protection
- Braking control adjustable from 0 – 50A DC
- Slow speed: 7.5% or 10% of nominal speed

Benefits

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

Standards and Certifications

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

Product Selection

Table 39-8. Soft Start Controller with Brake

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

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

Discount Symbol **1CD-1**

Technical Data — Specifications

Table 39-9. Soft Start Controller with Brake — S701XXXB3S

	S701C25B3S	S701E25B3S
Maximum Current Capacity	25	25
Trip Class — 10A — 10 — 20 — 30	25 25 20 15	25 25 20 15
Dimensions		
Width in Inches (mm)	3.54 (90)	3.54 (90)
Height in Inches (mm)	3.94 (100)	3.94 (100)
Depth in Inches (mm)	5.04 (128)	5.04 (128)
Weight in lbs. (kg)	2.53 (1150)	2.53 (1150)
Drawing	See **Figure 39-4** (**Page 39-13**)	
Electrical Characteristics		
Line Voltage (V AC)	208 – 240	380 – 480
Operating Frequency (Hz)	50/60	50/60
Leakage Current	5 mA AC max.	
Minimum Operational Current	1 Amp	
Control Voltage (V AC/V DC)	24 – 240	24 – 300
Pick-Up Voltage Max.	20.4V AC/DC	
Drop Out Voltage Min.	5V AC/DC	
Max. Control Current for No Operation	1 mA	1 mA
Response Time Max.	100 mS	100 mS
Control Characteristics		
Ramp Time (secs)	.5 – 10	.5 – 10
Ramp Settings (% LRT)	85%	85%
Kick Start Settings (% LRT)	85%	85%
Soft Stop (secs)	.5 – 10	.5 – 10
Brake Current	0 – 50V DC	

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

Semiconductor Reversing Contactor

Product Description

The S511 device is a Semiconductor Reversing Contactor designed to switch 3-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 480V AC
- Control voltage ranges of 5 – 24V DC and 24 – 240V AC/DC
- 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

Technical Data — Specifications

Table 39-11. Semiconductor Reversing Contactor— 511E10N3X

	S511E10N3D	S511E10N3S
Maximum Current Capacity	10	10
Trip Class — 10A — 10 — 20 — 30	10 10 8 6.5	10 10 8 6.5
Dimensions		
Width in Inches (mm)	1.77 (45)	1.77 (45)
Height in Inches (mm)	3.94 (100)	3.94 (100)
Depth in Inches (mm)	5.04 (128)	5.04 (128)
Weight in lbs. (kg)	1.52 (690)	1.52 (690)
Drawing	See **Figure 39-3** (**Page 39-13**)	
Electrical Characteristics		
Line Voltage (V AC)	208 – 480	208 – 480
Operating Frequency (Hz)	50/60	50/60
Control Voltage	5 – 24V DC	24 – 240V AC/DC
Pick-Up Voltage Max.	4.25V DC	20.4V AC/DC
Drop Out Voltage Min.	1.5V DC	7.2V AC/DC
Max. Control Voltage	26.4V DC	253V AC/DC
Response Time Max.	1/2 cycle	1 cycle
Interlock Time Max.	80 mS	150 mS
Control Characteristics		
Operation Current AC-3	10	10
Operation Current AC-4	8	8
Duty Cycle	Continuous operation	
Leakage Current	1 mA AC max.	
Minimum Operation Current	10 mA AC	
Environmental Characteristics		
Temperature — Operating	0° – 60°C	0° – 60°C
Temperature — Storage	-20° – 80°C	-20° – 80°C
Altitude (Meters)	2000	2000
Humidity	95% Non-condensing	
Operating Position	Vertical ± 30°	
Impulse Withstand Voltage IEC 947-4-1	4000V	4000V
Rated Insulation Voltage (Ui)	660V	660V
Installation Category	III	III
Vibration	IEC 68-2-6 5g 10 – 150 Hz	
Power Dissipation for Intermittent Operation	2.2 W/A x Duty Cycle	
Power Dissipation for Continuous Operation	2.2 W/A	
Cooling Method	Natural Convection	
Degree of Protection	IP20	IP20
Pollution Degree	3	3
Agency Approvals	UL, CSA, CE	

Product Selection

Table 39-10. Reversing Solid-State Contactor

Max. Current	Line Voltage	Control Voltage	3-Phase Motor									Catalog Number	Price U.S. $
			kW Rating (50 Hertz)			Horsepower Rating							
						200V		230V		460V			
			230V	380 – 400V	440V	1.0 SF	1.15 SF	1.0 SF	1.15 SF	1.0 SF	1.15 SF		
10	208 – 480	5 – 24V DC	2.2	4	4	2	2	3	2	5	5	**S511E10N3D**	
10	208 – 480	24 – 240V AC/DC	2.2	4	4	2	2	3	2	5	5	**S511E10N3S**	

Discount Symbol **1CD-1**

Cables, Mounting and Dimensions

Table 39-12. Cable Requirements and Sizing

75°C	AWG (mm^2)	AWG (mm^2)
	18 – 12 (.75 – 4)	20 – 16 (.5 – 1.5)
	2 – 18 (2 x 1)	2 x 20 – 18 (2 x .5 – .75)
	18 – 10 (.75 – 4)	20 – 16 (.5 – 1.5)
	2 x 18 – 14 (2 x .75 – 2.5)	2 x 20 – 16 (2 x .5 – 1.5)
	18 – 10 (.75 – 4)	20 – 16 (.5 – 1.5)
	2 x 18 – 16 (.75 – 6)	2 x 20 – 16 (2 x .5 – 1.5)
	Posidrive 1 4.4 in-lb. max. (.5 Nm max.)	N/A
	4 mm 4.4 in-lb max. (.5 Nm max.)	3 mm 3.5 in-lb max. (.4 Nm max.)

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Mounting Instructions

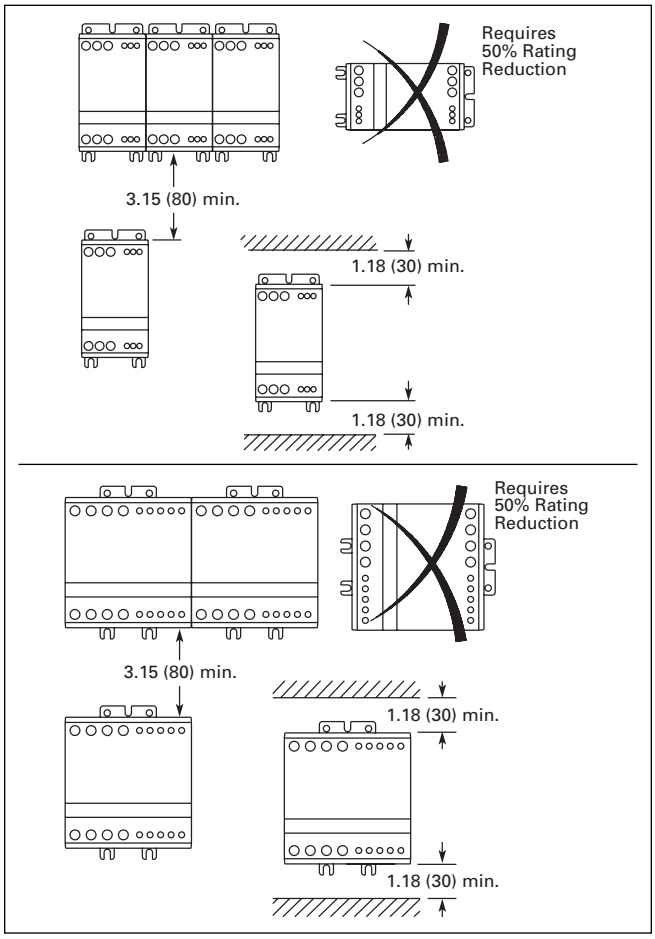

Figure 39-1. Recommended Mounting Distance in Inches (mm)

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.

Dimensions

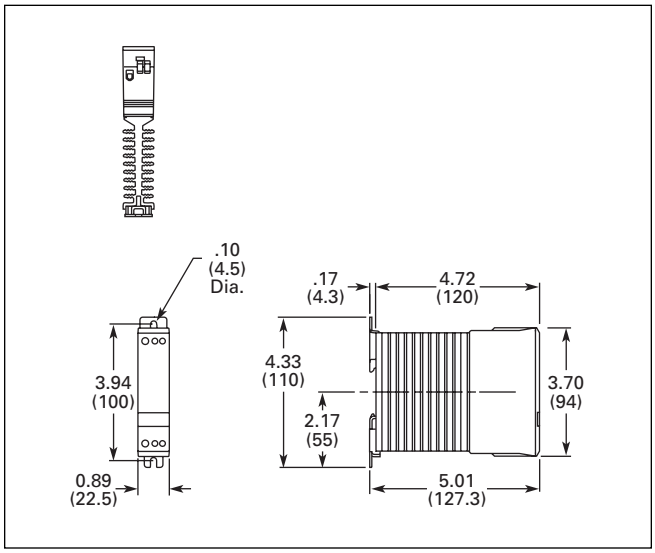

Figure 39-2. 22.5 mm Frame — Approximate Dimensions in Inches (mm)

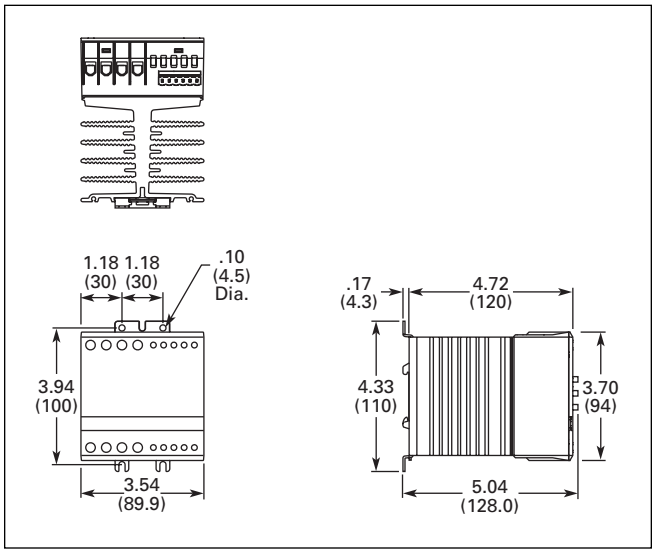

Figure 39-4. 90 mm Frame — Approximate Dimensions in Inches (mm)

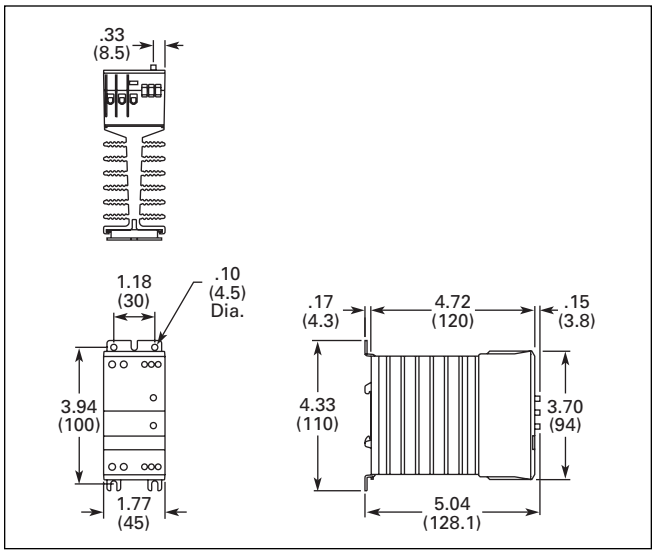

Figure 39-3. 45 mm Frame — Approximate Dimensions in Inches (mm)

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Contents

S752

Product Description

Eaton's Cutler-Hammer® Intelligent Technologies (*IT.*) S752 Line of Reduced Voltage Soft Starters is very compact, multi-functional, easy to install and easy to program. Designed to control the acceleration and deceleration of three-phase motors, the device is available in configurations to be applied either in the line of the motor, or in the delta windings of the motor. The in-line device is available for current ranges from 0.25 to 50 amps. The inside-the-delta device is available for current ranges from 0.44 to 78 amps.

The S752 is a redesign of the popular S751 soft starter. Design enhancements include an increased current rating, short circuit coordination ratings with breakers and fuses, and inside-the-delta control. The S752 has replaced the S751 in the Cutler-Hammer product offering.

The S752 is designed to be a complete package combining the SCRs, bypass contactor and overload in one, very compact device. The S752 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

The S752 combines the soft starter overload, bypass contactor into one device for fast and easy installation. With its small size, it can easily fit in place of existing soft starters, wye-delta starters or across-the-line NEMA and IEC starters. This feature allows easy upgrades to existing systems.

The in-line version is designed for use with three-phase motors in a delta (three-lead) configuration. The product is designed to be wired in the three-phase line feeding the three motor input leads as is done for normal across-the-line starting.

The inside-the-delta version is to be used on 6-lead or 12-lead wye-delta motors. The device is wired into the windings of the motor. A reduced voltage start is achieved without the need to reconnect the motor in wye and delta configurations. The S752 offers enhanced performance over traditional wye-delta electromechanical starters.

The starter uses Silicon Controlled Rectifiers (SCRs) to ramp the voltage to the motor, providing smooth acceleration and deceleration of the load. After the motor is started, the internal run bypass contactor closes, resulting in the motor running directly across-the-line. Internal run bypass significantly reduces the heat generated as compared to non-bypass starters. The soft stop option allows for a ramp stop time that is longer than the coast-to-stop time.

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.

The S752 was designed with safety in mind. The device features a fully motor-rated run bypass contactor. The bypass contactor is capable of breaking the motor load in failed SCR conditions. Short circuit protection ratings are offered with both circuit breakers and fuses. Safety is enhanced with the use of green materials, 24V DC control and finger safe IP20 terminals.

Features and Benefits

- Run bypass significantly reduces the heat generated as compared to non-bypass soft starters. Less heat minimizes enclosure size and cooling requirements and maximizes the life of all devices in the enclosure.
- Run bypass mode greatly reduces internal heating created by the power dissipation across the SCRs. The bypass contactor directly connects the motor to the line and improves system efficiency by reducing internal power losses.
- 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.
- Six SCRs control all three motor phases providing smooth acceleration and deceleration performance.
- Easy to read LED displays device status and provides fault indication.
- Internal run bypass contactors and overload protection eliminate the need for additional devices, thereby reducing enclosure sizes, minimizing installation and wiring time and reducing overall assembly size and cost.
- Variable ramp times and torque control settings provide unlimited starting configurations, allowing for maximum application flexibility.
- Soft stop control suits applications where an abrupt stop of the load is not acceptable.

- Wide range of overload FLA settings (31 – 100% of rated current) and selectable trip class (10, 20, 30) allows for wide application range while offering users the flexibility to fine tune the starter to match their specific application requirements.
- Soft acceleration and deceleration reduces wear on belts, gears, chains, clutches, shafts and bearings.
- Minimizes the peak inrush current's stress on the power system.
- Minimizes peak starting torque to diminish mechanical system wear and damage.
- 24V DC control module enhances personnel and equipment safety.
- Removable, lockable control terminal block reduces maintenance replacement costs. Also provides the opportunity for OEMs to reduce assembly and test costs by utilizing pre-assembled wire harnesses.

Protective Features

Motor Overload

The S752 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 S752 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 S752 stores the calculated motor heating value and will not allow a motor re-start until the motor has sufficiently cooled. This feature ensures the motor will not be damaged by repeated overload trip and re-start cycles.

The trip current is adjusted to match the specific application requirements by adjusting the overload FLA setting. The FLA adjustment includes a 3 to 1 adjustment range. The overload trip class is selectable for class 10, 20 and 30. The overload is ambient temperature compensated, meaning its trip characteristics will not vary with changes in ambient temperature.

Short Circuit

The use of a short circuit protective device in coordination with the S752 is required in branch motor circuits by most electrical codes. Short circuit coordination ratings with both Cutler-Hammer molded case circuit breakers and fuses are available providing customers with design flexibility. The S752 has short circuit coordination ratings as an open component, an enclosed starter, and in a Motor Control Center.

Pole Over Temperature

High ambient temperatures, extended ramp times and high duty cycle conditions may cause the S752 power pole conductors to reach a temperature that exceeds their thermal rating. The S752 is equipped with sensors that monitor the temperature of the power poles. Over temperature protection exists if the device's thermal capacity is exceeded. The soft starter will trip in over temperature conditions, preventing device failure.

Phase Loss

Loss of a phase can cause a significant increase in 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 S752 can detect a phase loss and after 10 seconds a phase loss trip will occur. The phase loss protection can be enabled or disabled.

Phase Imbalance

Phase current or voltage imbalance can cause a significant increase in the current drawn in the other phases. Phase imbalance can lead to motor damage before an eventual overload trip. Phase loss is typically an indication of a failure in the electrical distribution system or the motor. A phase current imbalance trip will occur if one or two of the line currents are 50% or less of the remaining line(s) for longer than 10 seconds. The phase imbalance protection can be enabled or disabled.

Reset Mode

The S752 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 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. The overload can be reset through the communications network. The overload can also be electrically reset by energizing a 24V DC control input on the control terminal block.

Bypass Dropout

The S752 can detect if the bypass contactor fails to close after the ramp start or opens while the motor is running. The S752 will trip on a bypass dropout fault if either of these conditions occur.

Diagnostic Features

The S752 has an easy to read LED that displays the device status as well as identifying the condition that caused a fault. The fault display is a useful tool in system troubleshooting. The following fault cross-reference is listed on the overload cover of the device to facilitate fault identification:

Table 39-13. S752 Diagnostic Features

LED Display Code	Device Status or Fault
0	Ready To Start
1	Line Phase Reversal
2	Phase Loss Fault
3	Phase Imbalance Fault
4	SCR Over Temperature Fault
5	Overload Trip Fault
6	Test Trip Fault
7	Bypass Dropout Fault
8	Overload Communications Fault
9	Temperature Sensor Fault

Communication Capabilities

Communications are enabled with the S752 soft starter with the addition of a SNAP (Starter Network Adapter Product). The SNAP allows for network control and monitoring of system parameters. See **Tab 50** for more information on SNAPs.

Operation

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 contactor(s) close after ramp time.

- Adjustable initial torque 0 – 95% of locked rotor torque.
- Adjustable ramp time .5 – 30 seconds.

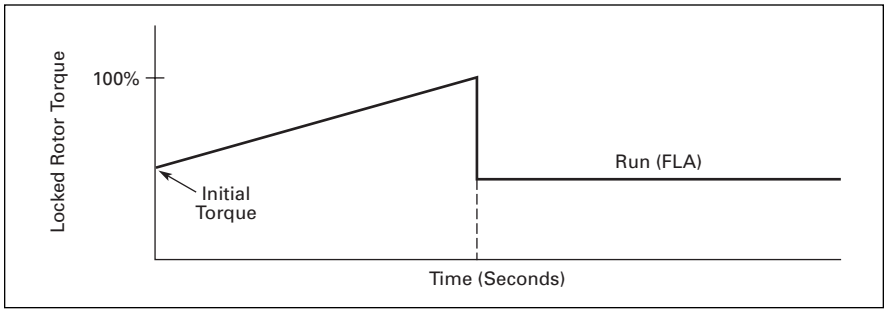


Figure 39-5. Starting Characteristics — Ramp Start

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 product damage.

- Stop time = 0 – 30 seconds.

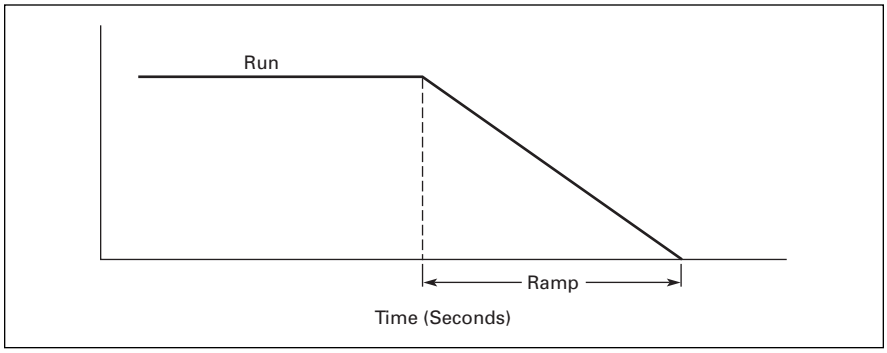
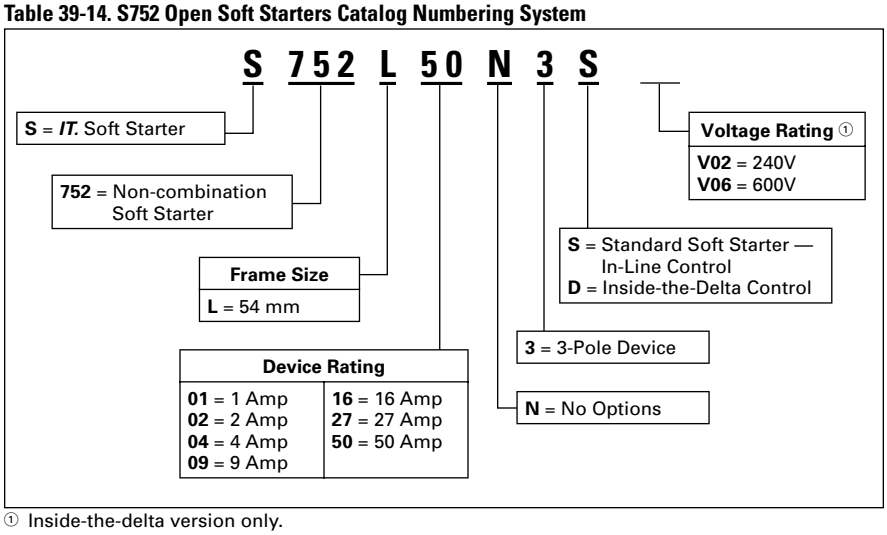


Figure 39-6. Starting Characteristics — Soft Stop

Catalog Number Selection

Table 39-14. S752 Open Soft Starters Catalog Numbering System



① Inside-the-delta version only.

Product Selection

IT. S752 Product Selection — In-Line

Standard Duty Ratings

Standard duty ratings are defined as those that do not exceed any of the following operating conditions:

- 25 second ramp, 2 starts per hour, 40°C ambient, 300% FLA current
- 15 second ramp, 4 starts per hour, 40°C ambient, 300% FLA current
- 10 second ramp, 6 starts per hour, 40°C ambient, 300% FLA current
- 7.5 second ramp, 8 starts per hour, 40°C ambient, 300% FLA current
- 3.0 second ramp, 15 starts per hour, 40°C ambient, 300% FLA current

Table 39-15. *IT.* S752 Soft Starter Standard Duty Ratings ① — In-Line

Maximum Continuous Current	FLA Current Range	kW Rating (50 Hz)			Horsepower Rating (60 Hz)				Catalog Number	Price U.S. $
		230V	380 – 400V	440V	200V	230V	460V	575V		
0.8	0.25 – 0.8	0.3	0.37	0.55	1/8	1/6	1/3	1/3	**S752L01N3S**	
1.9	0.59 – 1.9	0.6	1.1	1.1	1/3	1/3	3/4	1	**S752L02N3S**	
4.4	1.4 – 4.4	1.5	2.2	3	3/4	1	2	3	**S752L04N3S**	
9	2.8 – 9.0	3	5.5	5.5	2	2	5	7-1/2	**S752L09N3S**	
16	5.0 – 16	5.5	10	11	3	5	10	10	**S752L16N3S**	
27	8.4 – 27	10	15	18.5	7-1/2	7-1/2	20	25	**S752L27N3S**	
50	16 – 50	12.5	22	30	15	15	30	40	**S752L50N3S**	

① For applications above 40°C, derate 1% per °C.

Heavy Duty Ratings

Heavy duty ratings are defined as those that do exceed any of the following operating conditions:

- 25 second ramp, 2 starts per hour, 40°C ambient, 400% FLA current
- 15 second ramp, 4 starts per hour, 40°C ambient, 400% FLA current
- 10 second ramp, 6 starts per hour, 40°C ambient, 400% FLA current
- 7.5 second ramp, 8 starts per hour, 40°C ambient, 400% FLA current
- 3.0 second ramp, 15 starts per hour, 40°C ambient, 400% FLA current

Table 39-16. *IT.* S752 Soft Starter Heavy Duty Ratings ② — In-Line

Maximum Continuous Current	FLA Current Range	kW Rating (50 Hz)			Horsepower Rating (60 Hz)				Catalog Number	Price U.S. $
		230V	380 – 400V	440V	200V	230V	460V	575V		
0.8	0.25 – 0.8	0.3	0.37	0.55	1/8	1/6	1/3	1/3	**S752L01N3S**	
1.9	0.59 – 1.9	0.6	1.1	1.1	1/3	1/3	3/4	1	**S752L02N3S**	
4.4	1.4 – 4.4	1.5	2.2	3	3/4	1	2	3	**S752L04N3S**	
9	2.8 – 9.0	3	5.5	5.5	2	2	5	7-1/2	**S752L09N3S**	
16	5.0 – 16	5.5	10	11	3	5	10	10	**S752L16N3S**	
27	8.4 – 27	10	15	18.5	5	7-1/2	15	20	**S752L27N3S**	
50	16 – 50	12.5	15	20	7-1/2	10	20	25	**S752L50N3S**	

② For applications above 40°C, derate 1% per °C.

Severe Duty Ratings

Severe Duty ratings are defined as those that do exceed any of the Heavy Duty operating conditions. Please contact the Technical Resource Center for Severe Duty application assistance.

Discount Symbol **1CD1**

IT. S752 Product Selection — Inside-the-Delta

Standard Duty Ratings

Standard duty ratings are defined as those that do not exceed any of the following operating conditions:

- 10 second ramp, 6 starts per hour, 40°C ambient, 300% FLA current
- 7.5 second ramp, 8 starts per hour, 40°C ambient, 300% FLA current
- 3.0 second ramp, 15 starts per hour, 40°C ambient, 300% FLA current

Table 39-17. *IT.* S752 Soft Starter Standard Duty Ratings ① — Inside-the-Delta

Maximum Continuous Current	FLA Current Range	kW Rating (50 Hz)			Horsepower Rating (60 Hz)				Catalog Number ②	Price U.S. $
		230V	380 – 400V	440V	200V	230V	460V	575V		
1.3	0.44 – 1.3	0.18	0.37	0.55	1/4	1/3	1/2	3/4	**S752L01N3D_ _ _**	
3.2	1.1 – 3.2	0.55	1.1	1.5	1/2	3/4	1-1/2	2	**S752L02N3D_ _ _**	
7.6	2.5 – 7.6	1.5	3	4	1-1/2	1-1/2	3	5	**S752L04N3D_ _ _**	
15	4.9 – 15	3.7	6.5	8	3	3	7-1/2	10	**S752L09N3D_ _ _**	
27	8.7 – 27	6.5	12.5	15	7-1/2	7-1/2	15	25	**S752L16N3D_ _ _**	
46	15 – 46	12.5	22	25	10	15	30	40	**S752L27N3D_ _ _**	
78	28 – 86	22	37	45	25	25	60	75	**S752L50N3D_ _ _**	

① For applications above 40°C, derate 1% per °C.
② For Voltage Suffix, See **Table 39-18**.

Table 39-18. Voltage Suffix Code

Voltage Suffix	Voltage
V02	< 240V
V06	250 – 600V

Heavy Duty Ratings

Heavy duty ratings are defined as those that do not exceed any of the following operating conditions:

- 10 second ramp, 6 starts per hour, 40°C ambient, 400% FLA current
- 7.5 second ramp, 8 starts per hour, 40°C ambient, 400% FLA current
- 3.0 second ramp, 15 starts per hour, 40°C ambient, 400% FLA current

Table 39-19. *IT.* S752 Soft Starter Heavy Duty Ratings ③ — Inside-the-Delta

Maximum Continuous Current	FLA Current Range	kW Rating (50 Hz)			Horsepower Rating (60 Hz)				Catalog Number ④	Price U.S. $
		230V	380 – 400V	440V	200V	230V	460V	575V		
1.3	0.44 – 1.3	0.18	0.37	0.55	1/4	1/3	1/2	3/4	**S752L01N3D_ _ _**	
3.2	1.1 – 3.2	0.55	1.1	1.5	1/2	3/4	1-1/2	2	**S752L02N3D_ _ _**	
7.6	2.5 – 7.6	1.5	3	4	1-1/2	1-1/2	3	5	**S752L04N3D_ _ _**	
15	4.9 – 15	3.7	6.5	8	3	3	7-1/2	10	**S752L09N3D_ _ _**	
27	8.7 – 27	6.5	12.5	15	7-1/2	7-1/2	15	25	**S752L16N3D_ _ _**	
46	15 – 46	12.5	22	25	10	15	30	40	**S752L27N3D_ _ _**	
78	28 – 86	15	25	30	15	20	40	60	**S752L50N3D_ _ _**	

③ For applications above 40°C, derate 1% per °C.
④ For Voltage Suffix, See **Table 39-20**.

Table 39-20. Voltage Suffix Code

Voltage Suffix	Voltage
V02	< 240V
V06	250 – 600V

Severe Duty Ratings

Severe Duty ratings are defined as those that do exceed any of the Heavy Duty operating conditions. Please contact the Technical Resource Center for Severe Duty application assistance.

Discount Symbol **1CD1**

Accessories

Auxiliary Contacts

The S752 allows for the use of top mounted auxiliary contacts. These contacts can be used for up-to-speed indication.

Table 39-21. S752 Auxiliary Contacts

Poles	Catalog Number	Price U.S. $
1NO 1NC 1NO/1NC	**EMA13** **EMA14** **EMA15**	
2NO 2NC 1NO/1NC Logic Level	**EMA16** **EMA17** **EMA70**	

Table 39-22. S752 — Maximum Number of Auxiliary Contacts

EMA13 1NO	EMA14 1NC	EMA15 1NO/1NC	EMA16 2NO	EMA17 2NC	EMA70 1NO/1NC Logic Level
3	3	2 ①	2 ①	2 ①	3

① One EMA70 or one EMA13/EMA14 may be used in the center position in conjunction with two of these devices in the outer positions.

Table 39-23. S752 — Auxiliary Contact Ratings (EMA13 – EMA17)

DC-13		AC-15	
U_e Voltage	I_e Amps	U_e Voltage	I_e Amps
24 48	5 2.5	48 120	8 6
125 250	1.1 0.55	240 440	4 2

Table 39-24. S752 — Auxiliary Contact Ratings (EMA70)

DC-12		AC-12	
U_e Voltage	I_e Amps	U_e Voltage	I_e Amps
30	0.1	250	0.1

Renewal Parts

The only renewal part available for the S752 Soft Starter is the Control Terminal Block. There are no serviceable or replaceable internal parts.

Table 39-25. S752 Control Terminal Block

Description	Catalog Number	Price U.S. $
Locking Terminal Block	**EMA76LS**	

S751 Replacement Cross-Reference

The S752 has replaced the S751 in the Cutler-Hammer product offering. **Table 39-26** summarizes the S752 Catalog Numbers that are used to replace an existing S751 device:

Table 39-26. S751 Replacement Cross-Reference

Current Range in Amps	S751 Catalog Number	Replacement S752 Catalog Number
0.25 – 0.8	**S751L01N3S**	**S752L01N3S**
0.59 – 1.9	**S751L02N3S**	**S752L02N3S**
1.4 – 4.4	**S751L04N3S**	**S752L04N3S**
2.8 – 9.0	**S751L09N3S**	**S752L09N3S**
5.0 – 16	**S751L16N3S**	**S752L16N3S**
8.4 – 27	**S751L27N3S**	**S752L27N3S**

Standards and Certifications

- IEC 60947-4-2
- EN 60947-4-2
- UL Listed (NMFT)
- CSA Certified (321106)
- CSA Elevator Duty (241103)
- CE marked

Instructional Leaflets

Instruction Manual	MN03902001E
Outline Drawings	S752: 10-8673 S751: 10-8328

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Discount Symbol **1CD1**

Technical Data and Specifications

Table 39-27. S752 Open Soft Starters

Soft Starter (Partial Catalog Number)	S752 L01	S752 L02	S752 L04	S752 L09	S752 L16	S752 L27	S752 L50
In-Line Current Capacity	0.8	1.9	4.4	9.0	16	27	50
Inside-the-Delta Current Capacity	1.3	3.2	7.6	15	27	46	78
Dimensions							
Width in Inches (mm)	2.14 (54)	2.14 (54)	2.14 (54)	2.14 (54)	2.14 (54)	2.14 (54)	2.14 (54)
Height in Inches (mm)	7.78 (198)	7.78 (198)	7.78 (198)	7.78 (198)	7.78 (198)	7.78 (198)	7.78 (198)
Depth in Inches (mm)	5.13 (130)	5.13 (130)	5.13 (130)	5.13 (130)	5.13 (130)	5.13 (130)	5.13 (130)
Weight in lbs. (kg)	3.5 (1.6)	3.5 (1.6)	3.5 (1.6)	3.5 (1.6)	3.5 (1.6)	3.5 (1.6)	3.5 (1.6)
Drawing	See **Figure 39-7**.						
Electrical Characteristics							
Line Voltage (V AC)	200 – 600	200 – 600	200 – 600	200 – 600	200 – 600	200 – 600	200 – 600
Operating Frequency (Hz)	47 – 63	47 – 63	47 – 63	47 – 63	47 – 63	47 – 63	47 – 63
Leakage Current	15 mA AC max.						
Min. Operating Current	100 mA						
Control Voltage (24V DC ±10%)	21.6 – 26.4	21.6 – 26.4	21.6 – 26.4	21.6 – 26.4	21.6 – 26.4	21.6 – 26.4	21.6 – 26.4
Response Time Max.	100 mS	100 mS	100 mS	100 mS	100 mS	100 mS	100 mS
Control Steady State Current	200 mA	200 mA	200 mA	200 mA	200 mA	200 mA	200 mA
Inrush Current (During Bypass)	3.6A @ 50 mS	3.6A @ 50 mS	3.6A @ 50 mS	3.6A @ 50 mS	3.6A @ 50 mS	3.6A @ 50 mS	3.6A @ 50 mS
Control Wiring							
(+ and -) 1 Wire per Terminal	14 – 12 AWG (1.5 – 2.5 mm^2)	14 – 12 AWG (1.5 – 2.5 mm^2)	14 – 12 AWG (1.5 – 2.5 mm^2)	14 – 12 AWG (1.5 – 2.5 mm^2)	14 – 12 AWG (1.5 – 2.5 mm^2)	14 – 12 AWG (1.5 – 2.5 mm^2)	14 – 12 AWG (1.5 – 2.5 mm^2)
(+ and -) 2 Wires per Terminal	14 AWG (1.5 mm^2)	14 AWG (1.5 mm^2)	14 AWG (1.5 mm^2)	14 AWG (1.5 mm^2)	14 AWG (1.5 mm^2)	14 AWG (1.5 mm^2)	14 AWG (1.5 mm^2)
(P,F,1,2,3) 1 Wire per Terminal	22 – 12 AWG (0.5 – 2.5 mm^2)	22 – 12 AWG (0.5 – 2.5 mm^2)	22 – 12 AWG (0.5 – 2.5 mm^2)	22 – 12 AWG (0.5 – 2.5 mm^2)	22 – 12 AWG (0.5 – 2.5 mm^2)	22 – 12 AWG (0.5 – 2.5 mm^2)	22 – 12 AWG (0.5 – 2.5 mm^2)
(P,F,1,2,3) 2 Wires per Terminal	18 – 14 AWG (0.75 – 1.5 mm^2)	18 – 14 AWG (0.75 – 1.5 mm^2)	18 – 14 AWG (0.75 – 1.5 mm^2)	18 – 14 AWG (0.75 – 1.5 mm^2)	18 – 14 AWG (0.75 – 1.5 mm^2)	18 – 14 AWG (0.75 – 1.5 mm^2)	18 – 14 AWG (0.75 – 1.5 mm^2)
Torque (max.)	4.5 lb-in (0.5 Nm)	4.5 lb-in (0.5 Nm)	4.5 lb-in (0.5 Nm)	4.5 lb-in (0.5 Nm)	4.5 lb-in (0.5 Nm)	4.5 lb-in (0.5 Nm)	4.5 lb-in (0.5 Nm)
Driver	0.13 (3.5 mm) Flat	0.13 (3.5 mm) Flat	0.13 (3.5 mm) Flat	0.13 (3.5 mm) Flat	0.13 (3.5 mm) Flat	0.13 (3.5 mm) Flat	0.13 (3.5 mm) Flat
Terminals L1, L2, L3/T1, T2, T3 — Use Class B 75°C copper wire only							
1 Wire per Terminal	14 – 4 AWG (1.5 – 16 mm^2)	14 – 4 AWG (1.5 – 16 mm^2)	14 – 4 AWG (1.5 – 16 mm^2)	14 – 4 AWG (1.5 – 16 mm^2)	14 – 4 AWG (1.5 – 16 mm^2)	14 – 4 AWG (1.5 – 16 mm^2)	14 – 4 AWG (1.5 – 16 mm^2)
2 Wires per Terminal	14 – 6 AWG (1.5 – 12 mm^2)	14 – 6 AWG (1.5 – 12 mm^2)	14 – 6 AWG (1.5 – 12 mm^2)	14 – 6 AWG (1.5 – 12 mm^2)	14 – 6 AWG (1.5 – 12 mm^2)	14 – 6 AWG (1.5 – 12 mm^2)	14 – 6 AWG (1.5 – 12 mm^2)
Torque (max.) 14 – 10 AWG (1.5 – 6 mm^2) 8 AWG (10 mm^2) 6 – 4 AWG (6 – 4 mm^2)	 35 lb-in (4 Nm) 40 lb-in (4.5 Nm) 45 lb-in (5 Nm)	 35 lb-in (4 Nm) 40 lb-in (4.5 Nm) 45 lb-in (5 Nm)	 35 lb-in (4 Nm) 40 lb-in (4.5 Nm) 45 lb-in (5 Nm)	 35 lb-in (4 Nm) 40 lb-in (4.5 Nm) 45 lb-in (5 Nm)	 35 lb-in (4 Nm) 40 lb-in (4.5 Nm) 45 lb-in (5 Nm)	 35 lb-in (4 Nm) 40 lb-in (4.5 Nm) 45 lb-in (5 Nm)	 35 lb-in (4 Nm) 40 lb-in (4.5 Nm) 45 lb-in (5 Nm)
Connector Type	Box Lug	Box Lug	Box Lug	Box Lug	Box Lug	Box Lug	Box Lug
Driver	3mm Hex Key	3mm Hex Key	3mm Hex Key	3mm Hex Key	3mm Hex Key	3mm Hex Key	3mm Hex Key
Environmental Characteristics							
Temperature — Operating (no derating)	-35° – 50°C	-35° – 50°C	-35° – 50°C	-35° – 50°C	-35° – 50°C	-35° – 50°C	-35° – 50°C
Temperature — Derate >50°C (max. 65°C)	-1% per °C	-1% per °C	-1% per °C	-1% per °C	-1% per °C	-1% per °C	-1% per °C
Temperature — Storage	-40° – 80°C	-40° – 80°C	-40° – 80°C	-40° – 80°C	-40° – 80°C	-40° – 80°C	-40° – 80°C
Altitude (Meters) — No Derating	2000	2000	2000	2000	2000	2000	2000
Altitude > 2000M	1% per 100m	1% per 100m	1% per 100m	1% per 100m	1% per 100m	1% per 100m	1% per 100m
Humidity	95% Non-condensing						
Operating Position	Vertical ± 30°						
Impulse Withstand Voltage IEC 947-4-1	4000V	4000V	4000V	4000V	4000V	4000V	4000V
Rated Insulation Voltage (Ui)	660V						
Installation Category	III						
Vibration	IEC 68-2-6 3g 10 – 150 Hz						
Shock	15g	15g	15g	15g	15g	15g	15g
Degree of Protection	IP20	IP20	IP20	IP20	IP20	IP20	IP20
Agency Approvals	UL, CSA, CE						

Dimensions

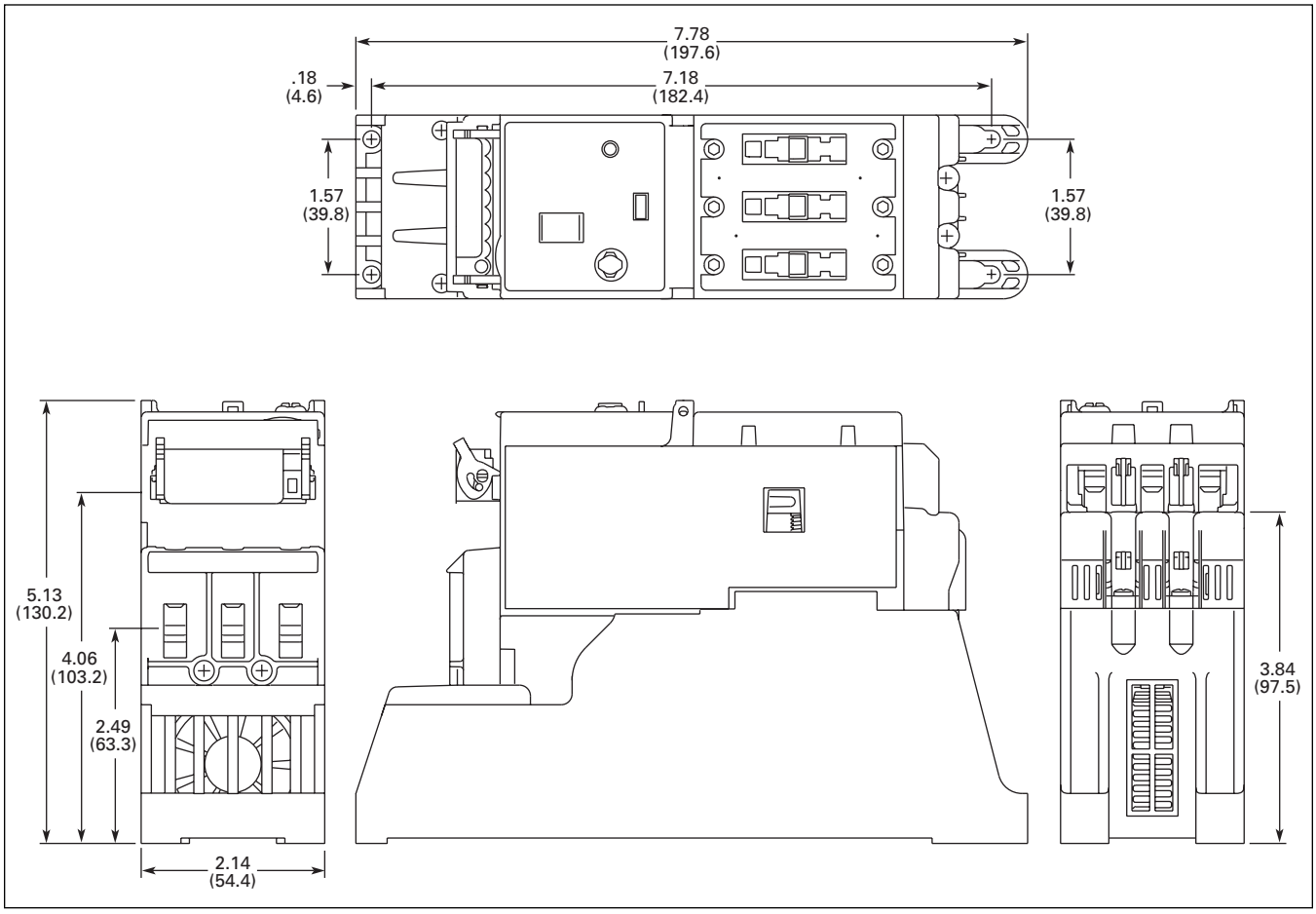

Figure 39-7. S752 Approximate Dimensions in Inches (mm)

Contents

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S801

Product Description

Eaton's Cutler-Hammer® Intelligent Technologies (***IT.***) 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 3-phase motors, the line is available for current ranges from 12 amp all the way through 1000 amp 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 ***IT.*** 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.

The product is designed to work with 3-phase motors in a Delta (3-lead) configuration. The S801 works with all motors from fractional horsepower up to motors requiring 1000 amps of steady state current. The built-in overload (in ranges from 12 – 1000 amps) and run bypass contactor make installation and setup quick and easy. The overload also offers some advanced protective functions to give additional motor protection.

With the pump control option, it is the number one soft starter available for pumping applications. The unique soft stopping control provides a smooth transition for stopping a motor and eliminates the "water-hammer" effect that can damage pipes, valves and pumps.

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 pump control

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
- Elimination of water-hammer in pumping applications
- Less shock to product on conveyor lines and material handling gear
- 24V DC control enhances personnel and equipment safety

Operation

Overload Functionality

Overtemperature

Protects the device from overheating. Starter will shutdown at 110°C.

Jam

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

Stall

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

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 which 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 polls.

Starting Characteristics

Kick Start

Provides an initial boost of current to the motor to help break free the rotor and start spinning the motor.

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

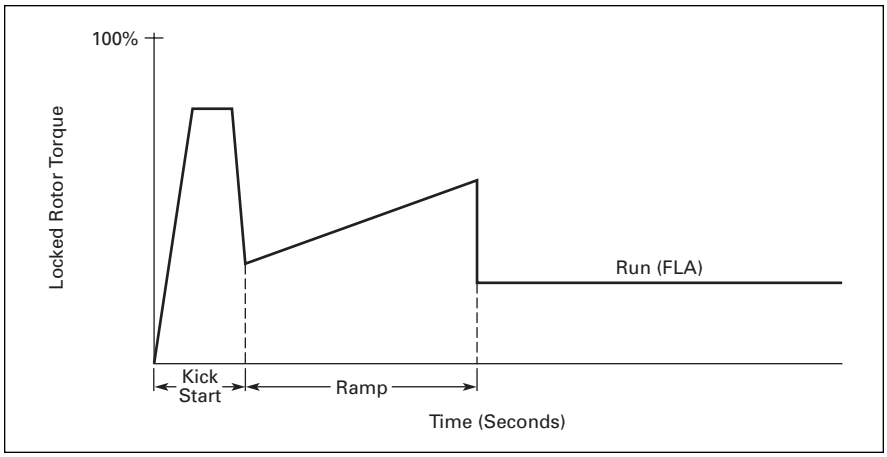

Figure 39-8. Starting Characteristics — Kick Start

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 = .5 – 180 seconds (can be extended with factory modification).

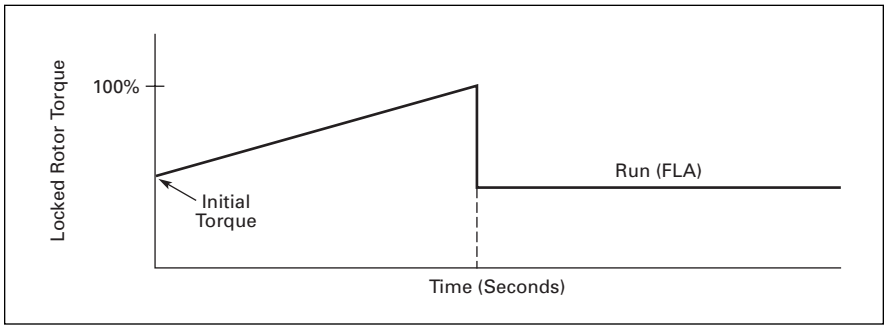

Figure 39-9. Starting Characteristics — Ramp Start

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 = .5 – 180 seconds (can be extended with factory modification).

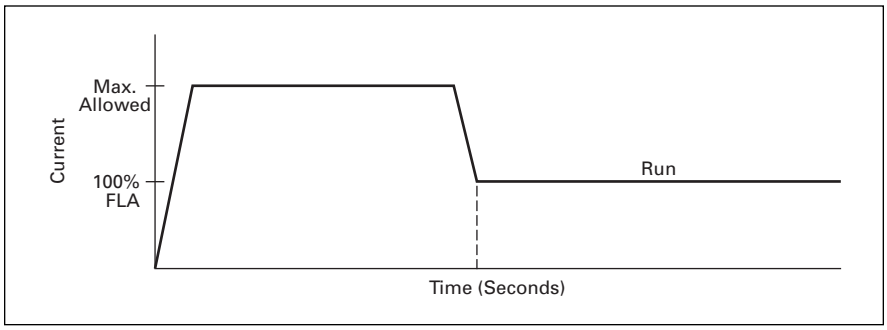

Figure 39-10. Starting Characteristics — Current Limit

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.

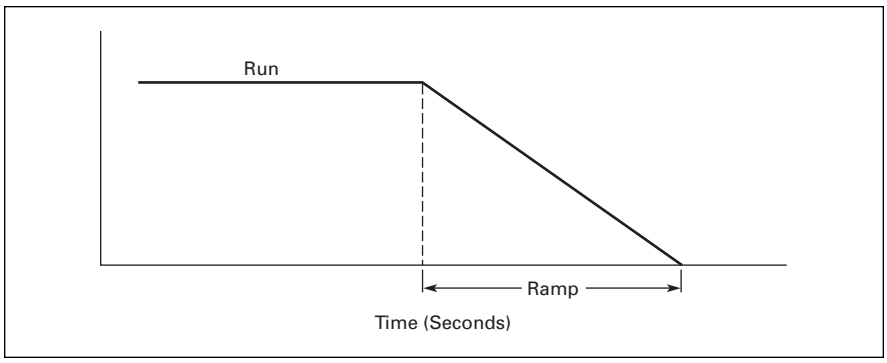

Figure 39-11. Starting Characteristics — Soft Stop

Catalog Number Selection

Table 39-28. S801 Open Soft Starters Catalog Numbering System

S 801 N66 N 3 S

S = *IT.* Soft Starter

801 = Non-combination Soft Starter

Ampacity Rating

N37 = 37 amps	**U50** = 500 amps
N66 = 66 amps	**V36** = 360 amps
R10 = 105 amps	**V42** = 420 amps
R13 = 135 amps	**V50** = 500 amps
T18 = 180 amps	**V65** = 650 amps
T24 = 240 amps	**V72** = 720 amps
T30 = 304 amps	**V85** = 850 amps
U36 = 360 amps	**V10** = 1000 amps
U42 = 420 amps	

B = Level Sensing
D = Inside the Delta
L = Extended Ramp Start
S = Standard Soft Starter Overload
W = Without CIM (Control Interface Module)

3 = 3-Pole Device

N = No Options
P = Pump Control
V = 690 Volt Option ①

① Not available on U-Frame.

65 mm, Catalog Number S801N

110 mm, Catalog Number S801R

200 mm, Catalog Number S801T

290 mm, Catalog Number S801V

Product Selection

Base Ratings

The table below is the base ratings for the ***IT.*** Soft Starter. The tables included in this catalog are meant to be a selection table for different applications, but to match a unit to your exact application, consult with your local Eaton representative or call our Technical Resource Center.

Table 39-29. Standard Duty Ratings

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

Table 39-30. Product Selection — Standard Duty Rating Open Soft Starters

Max. Current	Three-Phase Motor											Catalog Number ①②	Price U.S. $
	kW Rating (50 Hertz)			hp Rating (60 Hertz)									
	230	380 – 400	440	200V		230V		460V		575V			
	Volt	Volt	Volt	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	**S801N37N3S**	
66	18.5	30	37	20	15	20	20	50	40	60	50	**S801N66N3S**	
Frame Size R													
105	30	55	59	30	25	40	30	75	60	100	75	**S801R10N3S**	
135	40	63	80	40	30	50	40	100	75	125	100	**S801R13N3S**	
Frame Size T													
180	51	90	110	60	50	60	60	150	125	150	150	**S801T18N3S**	
240	75	110	147	75	60	75	75	200	150	200	200	**S801T24N3S**	
304	90	160	185	100	75	100	100	250	200	300	250	**S801T30N3S**	
Frame Size U													
360	110	185	220	125	100	150	125	300	250	350	300	**S801U36N3S**	
420	129	220	257	150	125	175	150	350	300	450	350	**S801U42N3S**	
500	150	257	300	150	150	200	150	400	350	500	450	**S801U50N3S** ③	
Frame Size V													
360	110	185	220	125	100	150	125	300	250	350	300	**S801V36N3S**	
420	129	220	257	150	125	175	150	350	300	450	350	**S801V42N3S**	
500	150	257	300	150	150	200	150	400	350	500	450	**S801V50N3S**	
650	200	355	425	250	200	250	200	500	450	600	500	**S801V65N3S**	
720	220	400	450	—	—	300	250	600	500	700	600	**S801V72N3S**	
850	257	475	500	—	—	350	300	700	600	900	700	**S801V85N3S**	
1000	315	560	600	—	—	400	350	800	700	1000	800	**S801V10N3S**	

① For a longer ramp acceleration time of .5 to 360 seconds, see **Page 39-31**.
② For 2-wire (level sensing) control, change the last digit from **S** to **2**.
③ 15 sec. start, 300% inrush, 40°C, 1 start every 15 minutes. If these start parameters are exceeded, please refer to 290 mm V-Frame, 500A starter.

Discount Symbol **1CD1**

Severe Duty Ratings

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 ***IT.*** 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, a program in Bid Manager is designed to assist you in selecting the proper soft starter.

Table 39-31. Severe Duty Ratings

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

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Table 39-32. Product Selection — Severe Duty Rating Open Soft Starters

Max. Current	Three-Phase Motor											Catalog Number ①②	Price U.S. $
	kW Rating (50 Hertz)			hp Rating (60 Hertz)									
	230	380 – 400	440	200V		230V		460V		575V			
	Volt	Volt	Volt	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	**S801N37N3S**	
42	11	18.5	22	10	10	15	10	30	25	40	30	**S801N66N3S**	
Frame Size R													
65	15	30	33	15	15	20	15	50	40	50	50	**S801R10N3S**	
80	22	40	45	25	20	30	25	60	50	75	60	**S801R13N3S**	
Frame Size T													
115	33	59	63	30	30	40	30	75	75	100	100	**S801T18N3S**	
150	45	80	90	50	40	50	50	100	100	150	125	**S801T24N3S**	
192	55	100	110	60	50	75	60	150	125	200	150	**S801T30N3S**	
Frame Size U													
240	75	110	147	75	60	75	75	200	150	200	200	**S801U36N3S**	
305	90	160	185	100	75	100	100	250	200	300	250	**S801U42N3S**	
365	110	185	220	125	100	150	125	300	250	350	300	**S801U50N3S**	
Frame Size V													
240	75	110	147	75	60	75	75	200	150	200	200	**S801V36N3S**	
305	90	160	185	100	75	100	100	250	200	300	250	**S801V42N3S**	
365	110	185	220	125	100	150	125	300	250	350	300	**S801V50N3S**	
420	129	220	257	150	125	150	150	350	300	450	350	**S801V65N3S**	
480	147	257	295	150	150	200	150	400	350	500	450	**S801V72N3S**	
525	160	280	335	150	150	200	150	450	350	500	450	**S801V85N3S**	
600	185	315	375	200	150	250	200	500	450	600	500	**S801V10N3S**	

① For a longer ramp acceleration time of .5 to 360 seconds, see **Page 39-31**.
② For 2-wire (level sensing) control, change the last digit from **S** to **2**.

Discount Symbol **1CD1**

Inside-the-Delta Standard Duty Ratings

Table 39-33. 15 Second Ramp, 4 Starts per Hour, 300% Current Limit @ 40°C Ambient

Max. Continuous Motor Line Current	Three-Phase Motor											Catalog Number	Price U.S. $
	kW Rating (50 Hertz)			hp Rating (60 Hertz)									
	230	380 – 400	440	200V		230V		460V		575V			
	Volt	Volt	Volt	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	**S801N37N3D**	
114	18.5	30	37	30	25	30	30	75	60	100	75	**S801N66N3D**	
Frame Size R													
182	30	55	59	50	40	60	50	125	100	150	125	**S801R10N3D**	
234	40	63	80	60	50	75	60	150	125	200	150	**S801R13N3D**	
Frame Size T													
311	51	90	110	100	75	100	100	250	200	250	250	**S801T18N3D**	
415	75	110	147	125	100	125	125	300	250	300	300	**S801T24N3D**	
526	90	160	185	150	125	150	150	400	300	400	400	**S801T30N3D**	
Frame Size U													
623	110	185	220	200	150	250	200	450	400	550	450	**S801U36N3D**	
727	129	220	257	250	200	300	250	550	450	700	550	**S801U42N3D**	
865	150	257	300	250	250	300	250	600	550	750	700	**S801U50N3D** ①	
Frame Size V													
623	110	185	220	200	150	250	200	450	400	550	450	**S801V36N3D**	
727	129	220	257	250	200	300	250	550	450	700	550	**S801V42N3D**	
865	150	257	300	250	250	300	250	600	550	750	700	**S801V50N3D**	
1125	200	355	425	400	300	400	300	750	700	900	750	**S801V65N3D**	
1246	—	—	—	—	—	—	—	—	—	—	—	**S801V72N3D**	
1471	—	—	—	—	—	—	—	—	—	—	—	**S801V85N3D**	
—	—	—	—	—	—	—	—	—	—	—	—	**S801V10N3D**	

① 15 sec. start, 300% inrush, 40°C, 1 start every 15 minutes. If these start parameters are exceeded, please refer to 290 mm V-Frame, 865A Inside-the-Delta Starter.

Table 39-34. 25 Second Ramp, 4 Starts per Hour, 300% Current Limit @ 40°C Ambient

Max. Continuous Motor Line Current	Three-Phase Motor											Catalog Number	Price U.S. $
	kW Rating (50 Hertz)			hp Rating (60 Hertz)									
	230	380 – 400	440	200V		230V		460V		575V			
	Volt	Volt	Volt	1.0SF	1.15SF	1.0SF	1.15SF	1.0SF	1.15SF	1.0SF	1.15SF		
Frame Size N													
58	9	15	18.5	15	10	15	15	40	30	50	40	**S801N37N3D**	
108	15	30	33	30	25	30	30	60	60	100	75	**S801N66N3D**	
Frame Size R													
164	25	45	55	50	40	50	50	125	100	125	125	**S801R10N3D**	
206	33	63	63	60	50	60	50	125	125	150	150	**S801R13N3D**	
Frame Size T													
257	45	80	90	75	60	75	60	150	150	250	200	**S801T18N3D**	
365	63	110	132	100	100	125	100	250	250	300	250	**S801T24N3D**	
477	80	147	160	125	125	150	125	300	300	400	400	**S801T30N3D**	
Frame Size U													
554	90	160	185	150	125	200	150	400	300	450	400	**S801U36N3D**	
646	110	200	220	200	150	250	200	500	400	550	450	**S801U42N3D**	
796	140	250	280	250	200	250	250	550	500	700	600	**S801U50N3D** ②	
Frame Size V													
554	90	160	185	150	125	200	150	400	300	450	400	**S801V36N3D**	
646	110	200	220	200	150	250	200	500	400	550	450	**S801V42N3D**	
796	140	250	280	250	200	250	250	550	500	700	600	**S801V50N3D**	
1055	185	315	375	400	250	300	300	800	700	900	750	**S801V65N3D**	
1176	200	375	445	—	300	400	300	900	800	900	900	**S801V72N3D**	
1358	—	—	—	—	—	—	—	—	—	—	—	**S801V85N3D**	
—	—	—	—	—	—	—	—	—	—	—	—	**S801V10N3D**	

② 15 sec. start, 300% inrush, 40°C, 1 start every 15 minutes. If these start parameters are exceeded, please refer to 290 mm V-Frame, 796A Inside-the-Delta Starter.

Discount Symbol **1CD1**

Inside-the-Delta Standard Duty Ratings

Table 39-35. 15 Second Ramp, 4 Starts per Hour, 300% Current Limit @ 50°C Ambient

Max. Continuous Motor Line Current	Three-Phase Motor											Catalog Number	Price U.S. $
	kW Rating (50 Hertz)			hp Rating (60 Hertz)									
	230	380 – 400	440	200V		230V		460V		575V			
	Volt	Volt	Volt	1.0SF	1.15SF	1.0SF	1.15SF	1.0SF	1.15SF	1.0SF	1.15SF		
Frame Size N													
58	9	15	18.5	15	10	15	15	40	30	50	40	**S801N37N3D**	
108	15	30	33	30	25	30	30	60	60	100	75	**S801N66N3D**	
Frame Size R													
164	25	45	55	50	40	50	50	125	100	125	125	**S801R10N3D**	
206	33	63	63	60	50	60	60	125	125	150	150	**S801R13N3D**	
Frame Size T													
257	45	80	90	75	60	75	75	150	150	250	200	**S801T18N3D**	
365	63	110	132	100	100	125	100	250	250	300	250	**S801T24N3D**	
477	80	147	160	125	125	150	125	300	300	400	400	**S801T30N3D**	
Frame Size U													
554	90	160	185	150	125	200	150	400	300	450	400	**S801U36N3D**	
646	110	200	220	200	150	250	200	450	400	550	450	**S801U42N3D**	
796	140	250	280	250	200	250	250	550	450	700	600	**S801U50N3D**	
Frame Size V													
554	90	160	185	150	125	200	150	400	300	450	400	**S801V36N3D**	
646	110	200	220	200	150	250	200	450	400	550	450	**S801V42N3D**	
796	140	250	280	250	200	250	250	550	450	700	600	**S801V50N3D**	
1055	185	315	375	400	250	300	300	750	700	900	750	**S801V65N3D**	
1176	200	375	445	—	—	—	—	—	—	—	—	**S801V72N3D**	
1358	257	450	500	—	—	—	—	—	—	—	—	**S801V85N3D**	
—	—	—	—	—	—	—	—	—	—	—	—	**S801V10N3D**	

Table 39-36. 50 Second Ramp, 2 Starts per Hour, 300% Current Limit @ 50°C Ambient

Max. Continuous Motor Line Current	Three-Phase Motor											Catalog Number	Price U.S. $
	kW Rating (50 Hertz)			hp Rating (60 Hertz)									
	230	380 – 400	440	200V		230V		460V		575V			
	Volt	Volt	Volt	1.0SF	1.15SF	1.0SF	1.15SF	1.0SF	1.15SF	1.0SF	1.15SF		
Frame Size N													
36	5.5	10	11	7-1/2	7-1/2	7-1/2	7-1/2	25	15	25	25	**S801N37N3D**	
73	11	18.5	22	15	15	25	15	50	40	60	50	**S801N66N3D**	
Frame Size R													
103	15	30	33	25	25	30	25	60	60	75	75	**S801R10N3D**	
138	22	40	45	40	30	50	40	100	75	125	100	**S801R13N3D**	
Frame Size T													
199	33	59	63	50	50	60	50	125	125	150	150	**S801T18N3D**	
257	45	80	90	75	60	75	75	150	150	250	200	**S801T24N3D**	
324	55	100	110	100	75	100	100	250	200	300	250	**S801T30N3D**	
Frame Size U													
485	80	150	160	125	125	150	125	300	300	400	400	**S801U36N3D**	
580	100	180	200	150	150	200	150	400	300	550	450	**S801U42N3D**	
646	110	200	220	200	150	250	200	450	400	550	450	**S801U50N3D**	
Frame Size V													
485	80	150	160	125	125	150	125	300	300	400	400	**S801V36N3D**	
580	100	180	200	150	150	200	150	400	300	550	450	**S801V42N3D**	
646	110	200	220	200	150	250	200	450	400	550	450	**S801V50N3D**	
727	129	220	257	250	200	250	250	550	500	700	550	**S801V65N3D**	
816	147	257	295	250	250	300	250	600	550	750	700	**S801V72N3D**	
1021	180	315	375	300	250	300	300	750	600	900	750	**S801V85N3D**	
—	—	—	—	—	—	—	—	—	—	—	—	**S801V10N3D**	

Discount Symbol **1CD1**

Inside-the-Delta Standard Duty Ratings

Table 39-37. 15 Second Ramp, 4 Starts per Hour, 450% Current Limit @ 40°C Ambient

Max. Continuous Motor Line Current	Three-Phase Motor											Catalog Number	Price U.S. $
	kW Rating (50 Hertz)			hp Rating (60 Hertz)									
	230	380 – 400	440	200V		230V		460V		575V			
	Volt	Volt	Volt	1.0SF	1.15SF	1.0SF	1.15SF	1.0SF	1.15SF	1.0SF	1.15SF		
Frame Size N													
47	7.5	12.5	15	10	10	15	10	30	25	40	30	**S801N37N3D**	
83	12.5	22	25	25	15	25	25	50	50	60	60	**S801N66N3D**	
Frame Size R													
126	18.5	37	40	30	30	40	30	75	60	100	100	**S801R10N3D**	
162	25	45	55	50	40	50	50	100	100	125	125	**S801R13N3D**	
Frame Size T													
266	45	80	90	75	60	100	75	150	150	250	200	**S801T18N3D**	
379	63	110	132	100	100	125	100	250	250	300	250	**S801T24N3D**	
485	80	150	160	125	125	150	125	300	300	400	400	**S801T30N3D**	
Frame Size U													
580	100	185	200	150	150	200	150	400	300	550	450	**S801U36N3D**	
695	110	200	250	200	150	250	200	450	400	600	550	**S801U42N3D**	
798	140	250	280	250	200	250	250	550	450	700	600	**S801U50N3D**	
Frame Size V													
580	100	185	200	150	150	200	150	400	300	550	450	**S801V36N3D**	
695	110	200	250	200	150	250	200	450	400	600	550	**S801V42N3D**	
798	140	250	280	250	200	250	250	550	450	700	600	**S801V50N3D**	
908	160	280	335	250	250	300	250	700	550	750	700	**S801V65N3D**	
1021	—	—	—	—	—	—	—	—	—	—	—	**S801V72N3D**	
1125	—	—	—	—	—	—	—	—	—	—_	—	**S801V85N3D**	

Table 39-38. 30 Second Ramp, 4 Starts per Hour, 450% Current Limit @ 40°C Ambient

Max. Continuous Motor Line Current	Three-Phase Motor											Catalog Number	Price U.S. $
	kW Rating (50 Hertz)			hp Rating (60 Hertz)									
	230	380 – 400	440	200V		230V		460V		575V			
	Volt	Volt	Volt	1.0SF	1.15SF	1.0SF	1.15SF	1.0SF	1.15SF	1.0SF	1.15SF		
Frame Size N													
36	5.5	10	12.5	7-1/2	7-1/2	7-1/2	7-1/2	25	15	25	25	**S801N37N3D**	
69	11	18.5	22	15	15	15	15	50	40	50	50	**S801N66N3D**	
Frame Size R													
96	15	25	30	25	25	30	25	60	50	75	60	**S801R10N3D**	
130	22	37	45	30	30	40	30	75	75	100	100	**S801R13N3D**	
Frame Size T													
257	45	80	90	75	60	75	75	150	150	250	200	**S801T18N3D**	
365	63	110	132	100	100	125	100	250	250	300	250	**S801T24N3D**	
448	80	140	160	125	125	150	125	300	250	400	300	**S801T30N3D**	
Frame Size U													
503	90	160	185	150	125	150	150	300	300	450	400	**S801U36N3D**	
580	100	180	200	150	150	200	150	400	300	550	450	**S801U42N3D**	
646	110	200	220	200	150	250	200	450	400	550	450	**S801U50N3D**	
Frame Size V													
503	90	160	185	150	125	150	150	300	300	450	400	**S801V36N3D**	
580	100	180	200	150	150	200	150	400	300	550	450	**S801V42N3D**	
646	110	200	220	200	150	250	200	450	400	550	450	**S801V50N3D**	
727	129	220	257	250	200	250	250	550	450	700	550	**S801V65N3D**	
796	—	—	—	—	—	—	—	—	—	—	—	**S801V72N3D**	
865	—	—	—	—	—	—	—	—	—	—	—	**S801V85N3D**	

Discount Symbol **1CD1**

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, the number of starts per hour exceeds 4, or the current limit set is over 300%.

Example: 35-Second Ramp, 5 Starts per Hour 350% Current Limit @ 40°C Ambient.

Table 39-39. Severe Duty Inside-the-Delta Ratings

Max. Continuous Motor Line Current	Three-Phase Motor											Catalog Number	Price U.S. $
	kW Rating (50 Hertz)			hp Rating (60 Hertz)									
	230	380 – 400	440	200V		230V		460V		575V			
	Volt	Volt	Volt	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	**S801N37N3D**	
73	11	18.5	22	15	15	25	15	50	40	60	50	**S801N66N3D**	
Frame Size R													
111	15	30	33	25	25	30	25	75	60	75	75	**S801R10N3D**	
138	22	40	45	40	30	50	40	100	75	120	100	**S801R13N3D**	
Frame Size T													
199	33	59	63	50	50	60	50	125	125	150	150	**S801T18N3D**	
257	45	80	90	75	60	75	75	150	150	250	200	**S801T24N3D**	
324	55	100	110	100	75	100	100	250	200	300	250	**S801T30N3D**	
Frame Size U													
415	75	110	147	125	100	125	125	300	250	300	300	**S801U36N3D**	
526	90	160	185	150	120	150	150	400	300	450	400	**S801U42N3D**	
623	110	185	220	200	150	250	200	450	400	550	450	**S801U50N3D**	
Frame Size V													
415	75	110	147	125	100	125	125	300	250	300	300	**S801V36N3D**	
526	90	160	185	150	120	150	150	400	300	450	400	**S801V42N3D**	
623	110	185	220	200	150	250	200	450	400	550	450	**S801V50N3D**	
727	129	220	257	250	200	250	250	550	450	700	550	**S801V65N3D**	
816	147	257	295	250	250	300	250	600	550	750	700	**S801V72N3D**	
908	160	280	335	250	250	300	250	700	550	750	700	**S801V85N3D**	
—	—	—	—	—	—	—	—	—	—	—	—	**S801V10N3D**	

Discount Symbol **1CD1**

Options

Extended Ramp

For a longer ramp acceleration time of .5 – 360 seconds, change the last digit in the Catalog Number from **Page 39-25** to **L**.

Table 39-40. Extended Ramp Option

Frame Size	Max. Current	Catalog Number	Price U.S. $
N	37 66	**S801N37N3L** **S801N66N3L**	
R	105 135	**S801R10N3L** **S801R13N3L**	
T	180 240 304	**S801T18N3L** **S801T24N3L** **S801T30N3L**	
U	360 420 500	**S801U36N3L** **S801U42N3L** **S801U50N3L**	
V	360 420 500 650	**S801V36N3L** **S801V42N3L** **S801V50N3L** **S801V65N3L**	
	720 850 1000	**S801V72N3L** **S801V85N3L** **S801V10N3L**	

Extended Ramp and 690V Option

For voltage ratings of 690V, use the table below.

Table 39-41. 690V Option

Frame Size	Max. Current	Catalog Number	Price U.S. $
T	180 240 304	**S801T18V3L** **S801T24V3L** **S801T30V3L**	
V	360 420 500	**S801V36V3L** **S801V42V3L** **S801V50V3L**	
	650 720 850	**S801V65V3L** **S801V72V3L** **S801V85V3L**	

Pump Control

For pump control option, use the following table to select the product you are looking for. For sizing information, use the tables on **Pages 39-25** to **39-30**.

Table 39-42. Pump Control Option

Frame Size	Max. Current	Catalog Number	Price U.S. $
N	37 66	**S801N37P3S** **S801N66P3S**	
R	105 135	**S801R10P3S** **S801R13P3S**	
T	180 240 304	**S801T18P3S** **S801T24P3S** **S801T30P3S**	
U	360 420 500	**S801U36P3S** **S801U42P3S** **S801U50P3S**	
V	360 420 500 650	**S801V36P3S** **S801V42P3S** **S801V50P3S** **S801V65P3S**	
	720 850 1000	**S801V72P3S** **S801V85P3S** **S801V10P3S**	

Accessories

Surge Suppressors

The surge suppressor can mount on either the line or load side of the ***IT.*** Soft Starter. It is designed to clip the line voltage (or load side induced voltage).

Table 39-43. Surge Suppressors

Description	Catalog Number	Price U.S. $
600V MOV for 65 mm and 110 mm units	**EMS38**	
600V MOV for 200 mm and 290 mm units	**EMS39**	
690V MOV for 200 mm ① and 290 mm units	**EMS41**	

① T-Frame only.

Surge Suppressor

Surge Suppressor Mounted on a 200 mm Device

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Discount Symbol **1-CD1**

Lug Kits

The 200 mm and 290 mm soft starters each have different lug options based on your wiring needs. Each lug kit contains three lugs which can be mounted on either the load or line side.

Lug Kits — EML23

Table 39-44. Lug Kits

Frame Size	Frame Designation	Description	Catalog Number	Price U.S. $
200 mm SSRV	T, U	2 cable connections, 4 AWG to 1/0 cable 1 cable connection, 4/0 to 500 MCM cable 2 cable connections, 4/0 to 500 MCM cable 1 cable connection, 2/0 to 300 MCM cable 2 cable connections, 2/0 to 300 MCM cable	**EML22** **EML23** **EML24** **EML25** **EML26**	
290 mm SSRV	V	2 cable connections, 4/0 to 500 MCM cable 4 cable connections, 4/0 to 500 MCM cable 6 cable connections, 4/0 to 500 MCM cable 4 cable connections, 2/0 to 300 MCM cable	**EML28** **EML30** **EML32** **EML33** ①	

① The EML33 does not have a CSA Listing.

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Lug Cover Kits

Replacement covers for the T and V frame are available in case of damage to the existing covers.

Table 39-45. Lug Cover Kits

Description	Catalog Number	Price U.S.$
Lug Cover T, U Frame	**EML27**	
Lug Cover V Frame	**EML34**	

Control Interface Module

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

Table 39-46. CIM

Description	Catalog Number	Price U.S. $
Blank Cover (Filler)	**EMA68**	
CIM for Standard Unit	**EMA71**	
CIM for Pump Control Option	**EMA72**	
Panel Mounting Kit — 3 ft. Cable 5 ft. Cable 8 ft. Cable 10 ft. Cable	 **EMA69A** **EMA69B** **EMA69C** **EMA69D**	

Control Wire Connector

Table 39-47. Control Wire Connector

Description	Catalog Number	Price U.S.$
12 pin, 5 mm pitch Connector for Control Wiring	**EMA75**	

User Manual

A comprehensive User Manual is available and can be downloaded free of charge from www.EatonElectrical.com by performing a document search for MN03902008E. The Inside-the-Delta User Manual can be found by searching for Pub. No. MN03902009E.

Sales Demo Kit

A Demo Kit is available for use in customer presentations. It comes in a solid, lightweight carry case for easy use. The kit includes the following items:

- S801N66N3S — 65 Amp Soft Starter or S801R13N35
- PSS55A — 55 Watt Power Supply
- *IT.* Soft Starter brochure
- Cutout pictures of the four frame sizes
- Family photo

Table 39-48. Sales Demo Kits

Description	Catalog Number	Price U.S. $
Functional Kits		
S801N66N3S	**S801DEMOW**	
S801R13N3S	**S801RDEMOW**	

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.

Table 39-49. Mounting Plates

Description	Catalog Number	Price U.S.$
Mounting Plate N Frame	**EMM13N**	
Mounting Plate R Frame	**EMM13R**	
Mounting Plate T, U Frame	**EMM13T**	
Mounting Plate V Frame	**EMM13V**	
Fan/Hood Accessory	**EMM18**	

Adapter Plates

The Adapter Plate allows customers to retrofit a V-Frame 290 mm Soft Starter with the U-Frame 200 mm Soft Starter.

Table 39-50. Adapter Plates

Description	Catalog Number	Price U.S.$
Adapter Plates ②	**EMM13N**	

② For more information see Pub51719.

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.

Table 39-51. Vibration Plates

Description	Catalog Number	Price U.S.$
Vibration Plate N Frame	**EMM14N**	
Vibration Plate R Frame	**EMM14R**	
Vibration Plate T, U Frame	**EMM14T**	
Vibration Plate V Frame	**EMM14V**	

Power Supplies

24V DC Power Supply which can be used with the S801 SSRV or as a stand-alone device.

Table 39-52. Power Supplies

Description	Catalog Number	Price U.S. $
115V AC Input 24V DC Output	**PSS55A**	
230V AC Input 24V DC Output	**PSS55B**	
380 – 480V AC Input 24V DC Output	**PSS55C**	

DIN Rail Power Supply Mounting Kit (35 mm)

Table 39-53. DIN Rail Mounting Kit

Description	Catalog Number	Price U.S. $
DIN Rail Mounting Kit (35 mm)	**PSSDIN**	

Discount Symbol **1-CD1**

Standards and Certifications

- IEC 947 compliant
- EN 60947-4-2
- CSA Certification
- cUL$_{US}$ Listed (File # E202571)
- CE marked

Technical Data and Specifications

Table 39-54. Specifications— *IT.* Soft Starter

Soft Starter (Partial Catalog Number)	S801 N37	S801 N66	S801 R10	S801 R13	S801 T18	S801 T24	S801 T30	S801 U36	S801 U42	S801 U50	S801 V36	S801 V42	S801 V50	S801 V65	S801 V72	S801 V85	S801 V10 ①
Max. Current Capacity	37	66	105	135	180	240	304	360	420	500	360	420	500	650	720	850	1000
Dimensions																	
Width in Inches (mm)	2.60 (66.0)		4.37 (111.0)		7.65 (194.4)			7.73 (196.3)			11.03 (280.2)						
Height in Inches (mm)	7.38 (187.4)		7.92 (201.1)		12.71 (322.9)			12.72 (323.1)			16.57 (420.8)						
Depth in Inches (mm)	6.63 (168.4)		7.03 (178.6)		6.69 (169.8)			7.08 (179.9)			7.23 (183.7)						
Weight in lbs. (kg)	5.8 (2.6)		10.5 (4.8)		48 (21.8) w/Lugs 41 (18.6) w/o Lugs			48 (21.8) w/Lugs 41 (18.6) w/o Lugs			103 (46.8) w/Lugs 91 (41.4) w/o Lugs						
General Information																	
Bypass Mechanical Lifespan	10M																
Insulating Voltage Ui	660V																
Ramp Time Range	.5 – 180 Seconds (.5 – 360 Seconds Extended Ramp)																
Resistance to Vibration	3g																
Resistance to Shock	15g																
Electrical Information																	
Operating Voltage	200 – 600V																
Operating Frequency	47 – 63 Hz																
Overload Setting	30 – 100%																
Trip Class	5, 10, 20, & 30																
Cabling Capacity (IEC 947)																	
Number of Conductors	1		1		1 or 2			1 or 2			2, 4 or 6						
Wire Sizes	14 – 2		14 – 4/0		4 AWG to 500 MCM			4 AWG to 500 MCM			2/0 to 500 MCM						
Type of Connectors	Box Lug				Add-On Lug Kit												
Control Wiring (12-Pin)																	
Wire Sizes in AWG	22 – 14																
Number of Conductors (Stranded)	2 (or one AWG 12)																
Torque Requirements in lb-in	3.5																
Solid, Stranded or Flexible Max. Size in mm^2	3.31																
Control Power Requirements																	
Voltage Range (24V ± 10%)	21.6 – 26.4																
Steady State Current Amps	1.0	1.0	1.0	1.0	1.4												
Inrush Current Amps	10	10	10	10	10												
Ripple	1%																
Relays (1) Class A and C																	
Voltage AC — maximum	240																
Voltage DC — maximum	120																
Amps — maximum	3																
Environment																	
Temperature — Operating	-30 – 50°C (No derating) Consult factory for operation > 50° C																
Temperature — Storage	-50 – 70°C																
Altitude	<2000 Meters — Consult factory for operation > 2000m																
Humidity	<95% Non-condensing																
Operating Position	Any																
Pollution degree IEC947-1	3																
Impulse withstand Voltage IEC947-4-1	6000V																

① UR Recognized Product

Dimensions

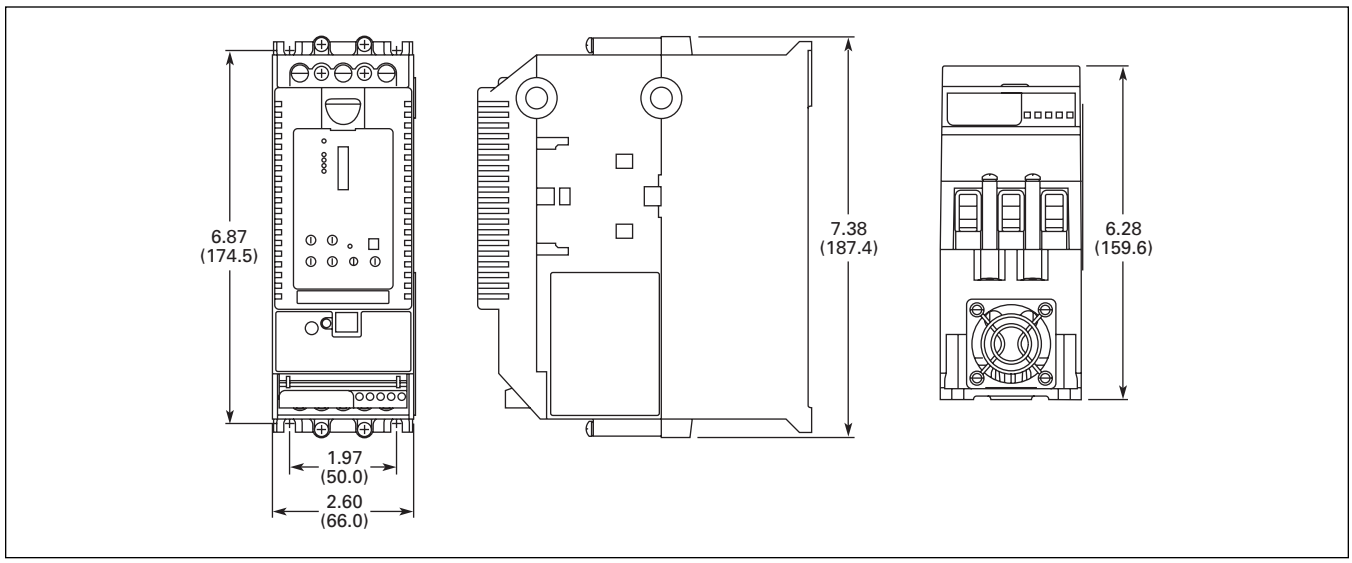


Figure 39-12. N-Frame (65 mm) S801 Approximate Dimensions in Inches (mm)

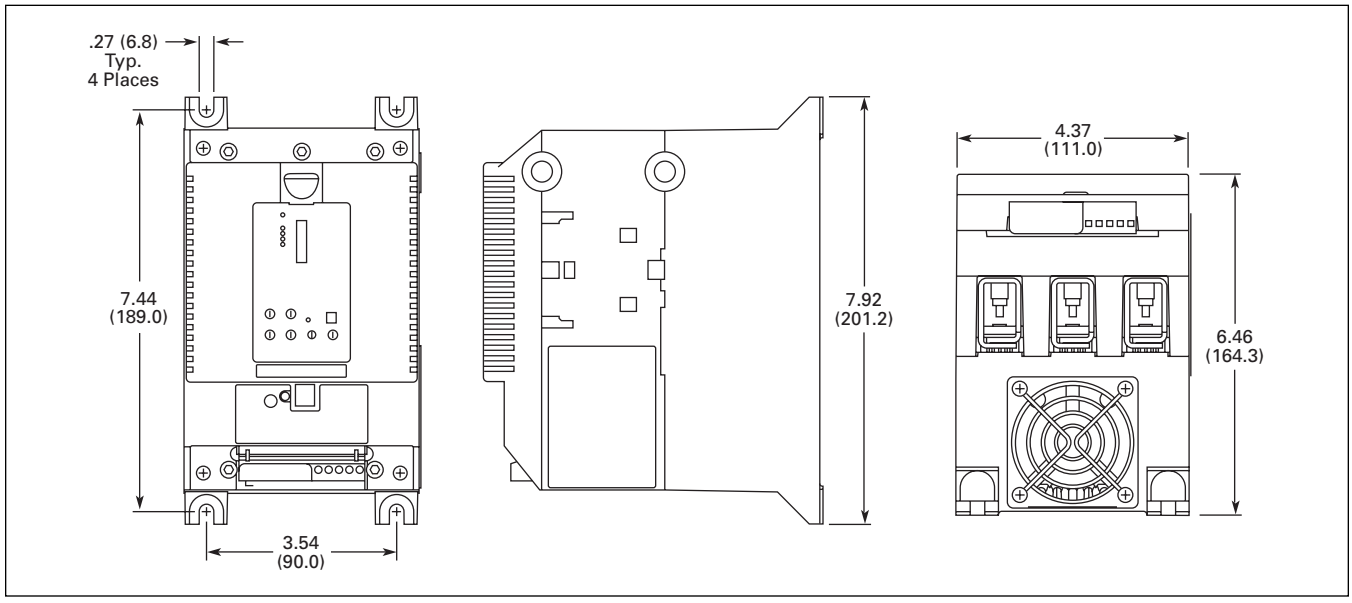


Figure 39-13. R-Frame (110 mm) S801 Approximate Dimensions in Inches (mm)

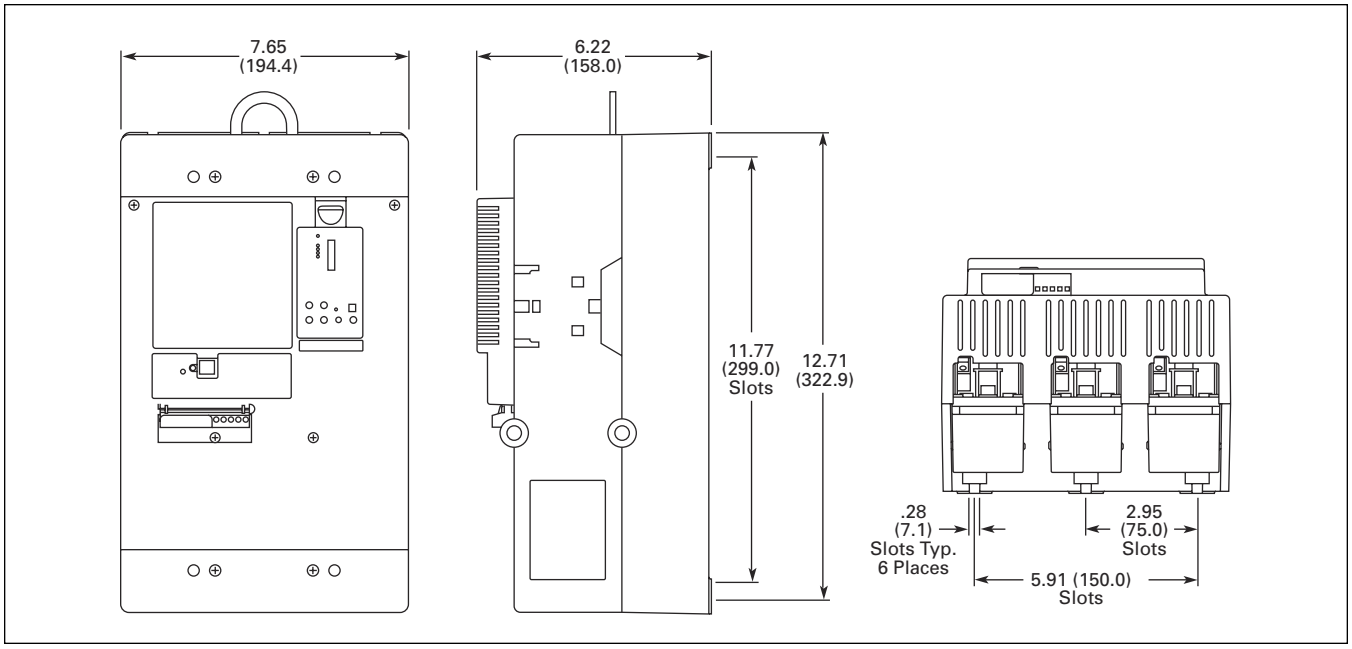


Figure 39-14. T-Frame (200 mm) S801 Approximate Dimensions in Inches (mm)

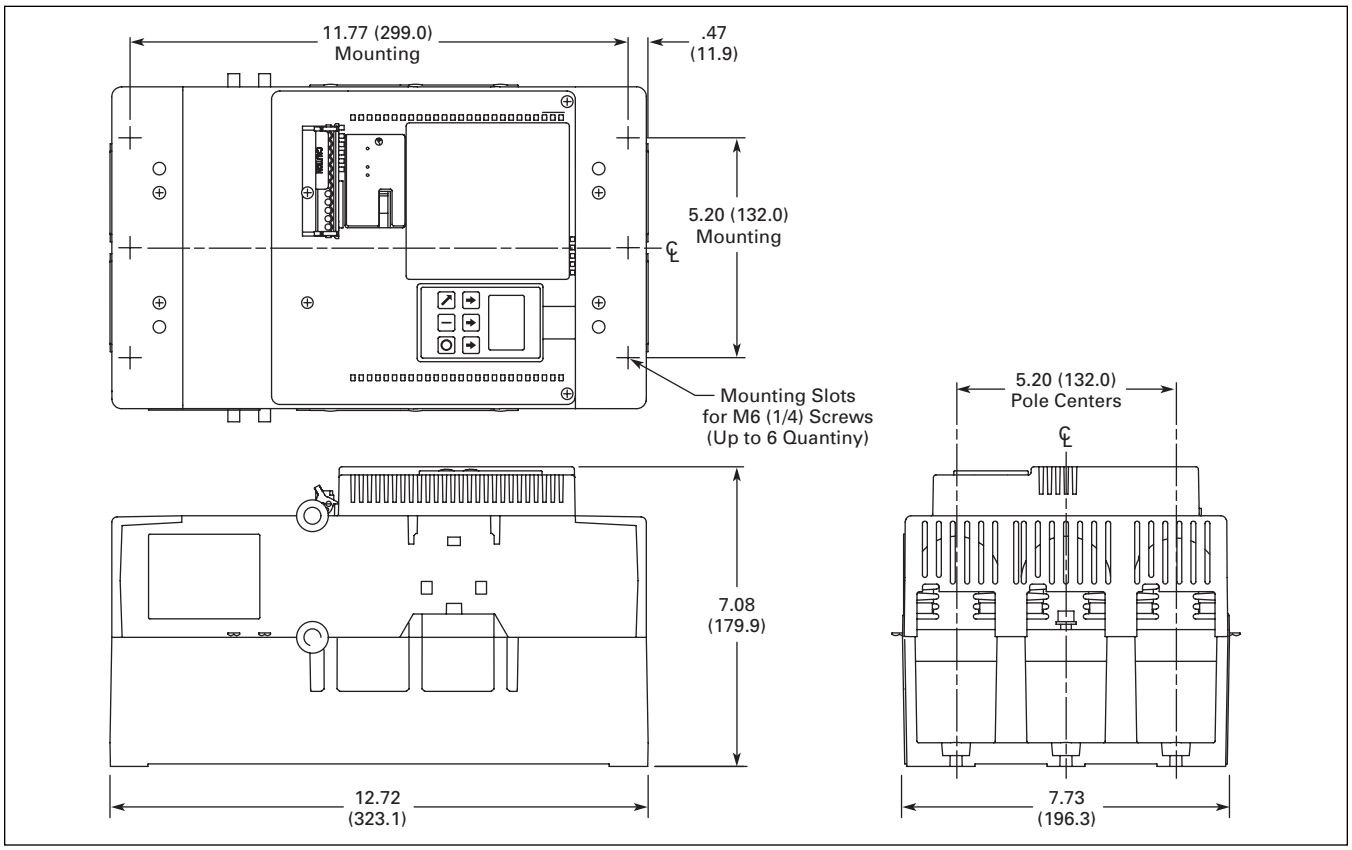


Figure 39-15. U-Frame (200 mm) S801 Approximate Dimensions in Inches (mm)

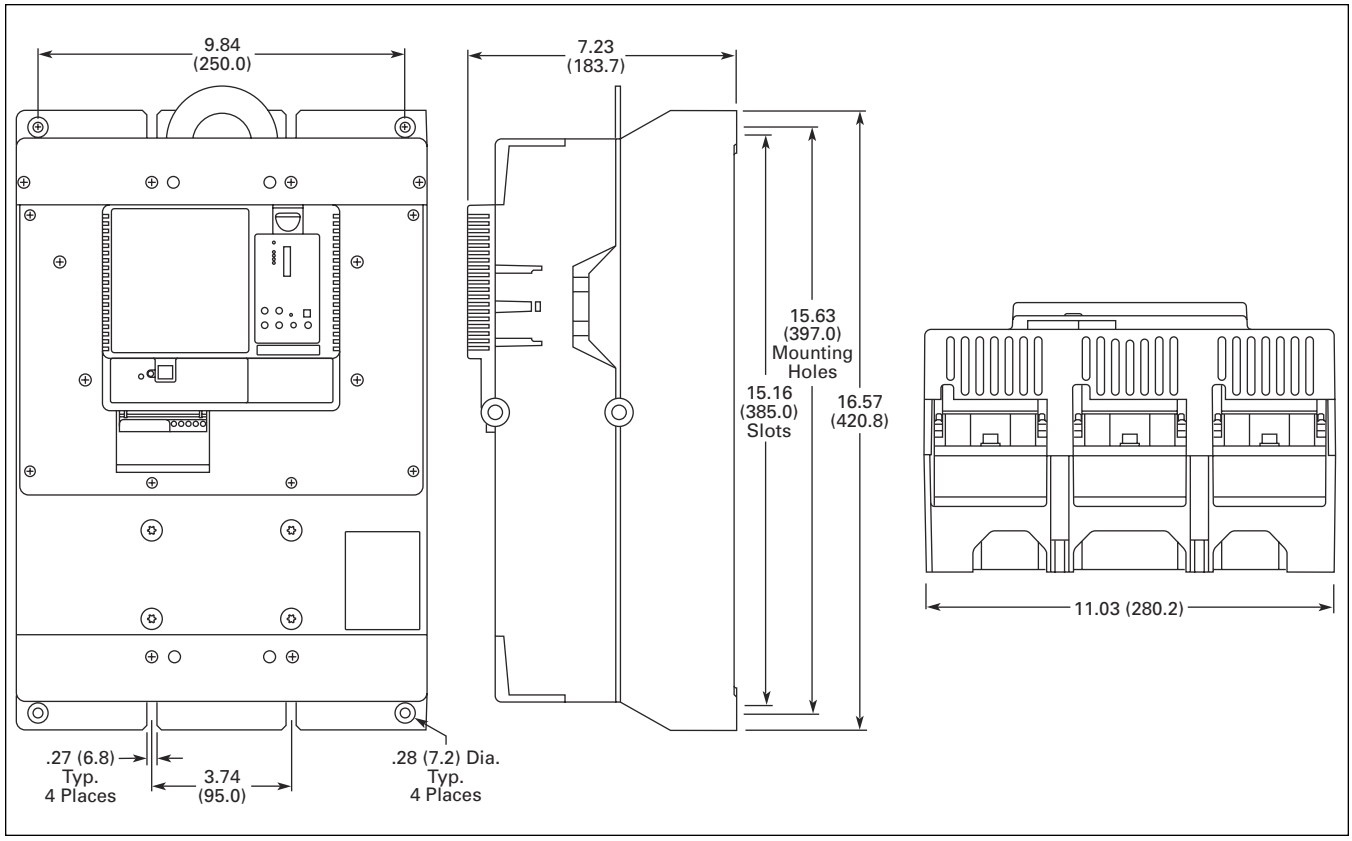


Figure 39-16. V-Frame (290 mm) S801 Approximate Dimensions in Inches (mm)

Contents

S811 Open Soft Starter

Product Description

Eaton's Cutler-Hammer® ***IT.*** S801 revolutionized the reduced voltage control marketplace with its advanced feature set and small size. In fact, readers of an industry leading control publication rated Cutler-Hammer Soft Starters best in customer satisfaction in March 2004 and April 2006. The new ***IT.*** S811 from Eaton's electrical business offers all the popular features of the S801, but adds enhanced functionality with the new DIM (Digital Interface Module), communications, metering, monitoring and diagnostics capabilities.

The Cutler-Hammer Intelligent Technologies (***IT.***) Line of S811 Reduced Voltage Soft Starters is very compact, multi-functional, easy to install and easy to program. Designed to control the acceleration and deceleration of three-phase motors up to 690V, the line is available from 11 amps through 1,000 amps.

The S811 is designed to be a complete package combining the 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 ***IT.*** S811 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.

The S811 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 starter to meet specific system requirements.

The S811 has an easy to use Digital Interface Module (DIM) that allows the user to configure the device and to read system parameters. 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.

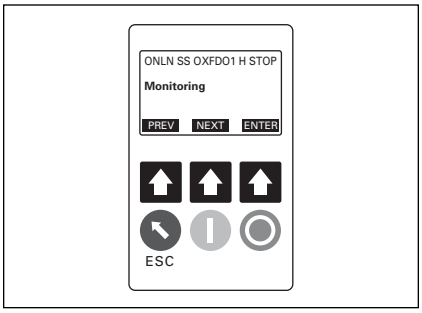


Figure 39-17. Digital Interface Module (DIM)

The DIM can be removed from the S811 and 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.

Communications

The S811 has built-in communication capabilities through Cutler-Hammer QC (Quick Connect) Port. QCPort enables the soft starter to be connected to a variety of networks, including DeviceNet™, EtherNet/Modbus, EtherNet/IP and PROFIBUS. The advantage of QCPort is that multiple control components can be connected to one Cutler-Hammer ***IT.*** D77D gateway. The gateway concentrates data from the devices into a single node. Configuration is simple — a single press of the gateway's Auto Configuration button sets the system up for default operation. This automatically configures the I/O assemblies to the QCPort system devices. The data from these devices are then assembled into single input and output messages.

The S811 communication parameters can be configured with the DIM or through the fieldbus using CH Studio Component Manager. Advanced communication configuration settings provide the system integrator with powerful tools to facilitate system optimization.

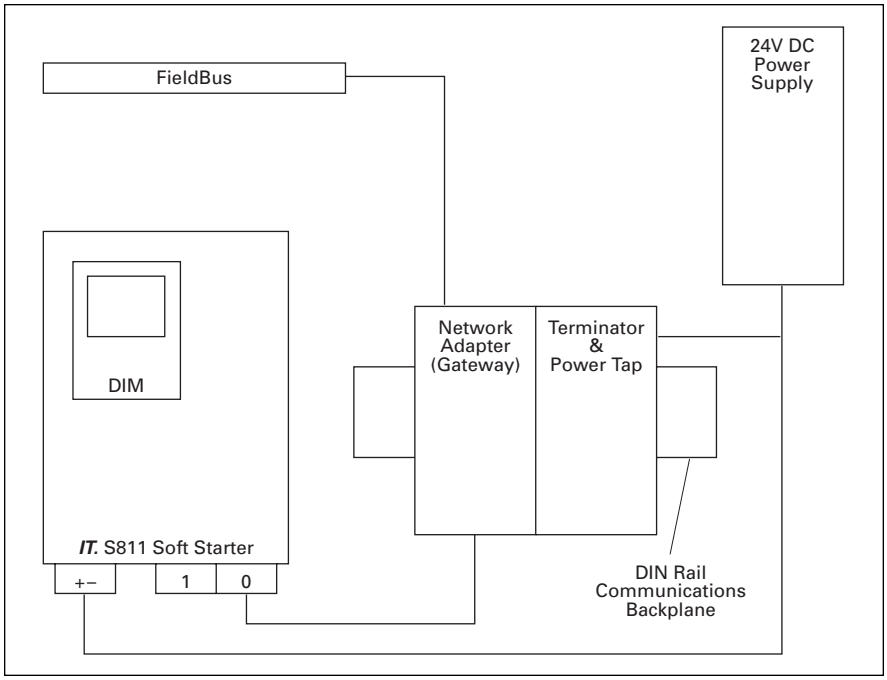


Figure 39-18. S811 Connection Diagram

Table 39-55. Communications Reference

Description	Part Number	Catalog Page
DeviceNet Network Adapter	**D77D-DNA**	**50-36**
EtherNet Modbus Network Adapter	**D77D-EMA**	**50-38**
EtherNet/IP Network Adapter	**D77D-EIP**	**50-40**
PROFIBUS Network Adapter	**D77D-PNA**	**50-42**
Terminator and Power Tap	**D77E-QPLR**	**50-31**
DIN Rail Communications Backplane, 7-position	**D77E-BP7**	**50-31**
DIN Rail Communications Backplane, 12-position	**D77E-BP12**	**50-31**
24V DC Power Supply (120V AC Input)	**PSS55A**	**44-65**
24V DC Power Supply (240V AC Input)	**PSS55B**	**44-65**
24V DC Power Supply (480V AC Input)	**PSS55C**	**44-65**

Features and Benefits

- The DIM (Digital Interface Module) 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 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.
- 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.
- 24V DC control module 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.

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. 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 S811 stores the calculated motor heating value and will not allow a motor re-start until the motor has sufficiently 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 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 adjustment includes a 3 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 S811 is required in branch motor circuits by most electrical codes. Short circuit coordination ratings with both fuses and Cutler-Hammer molded 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.

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 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 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 DIM 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 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 overload can be manually reset through the DIM or through the communications network. The overload can also be electrically reset by energizing a 24V DC 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.

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 allow 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 impeding 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 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 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.

DC Control Voltage

Monitors level of the 24V DC 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 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.

Device Temperature

An increase in device temperature is a strong indication of an increase in ambient temperature. High ambient temperature operation can be identified with the Device Temperature data. Ambient temperature increases can be due to loss of enclosure cooling fans or blocked venting. High ambient 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.

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. 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. Cutler-Hammer communicating Cover Control or other communicating protective device is required to take advantage of this feature.

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.

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).

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).

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

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.

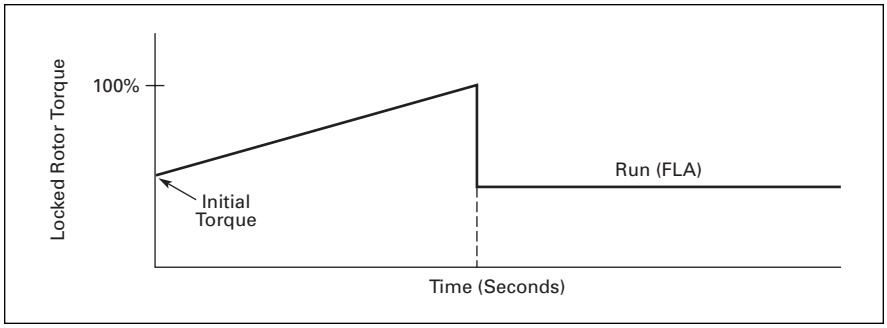


Figure 39-19. Starting Characteristics — Ramp Start

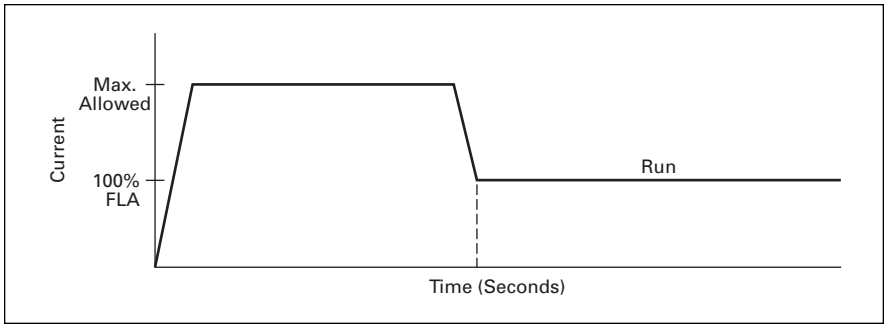


Figure 39-20. Starting Characteristics — Current Limit Start

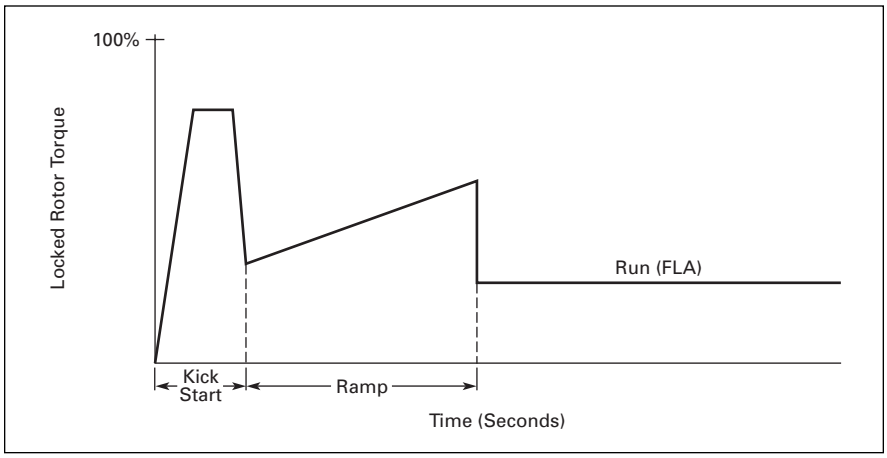


Figure 39-21. Starting Characteristics — Kick Start

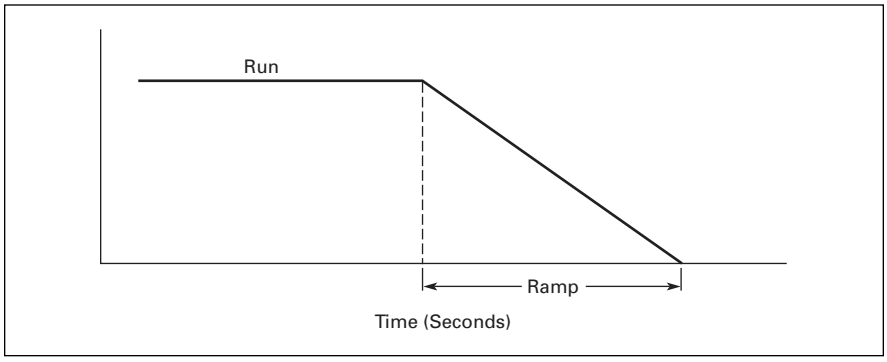
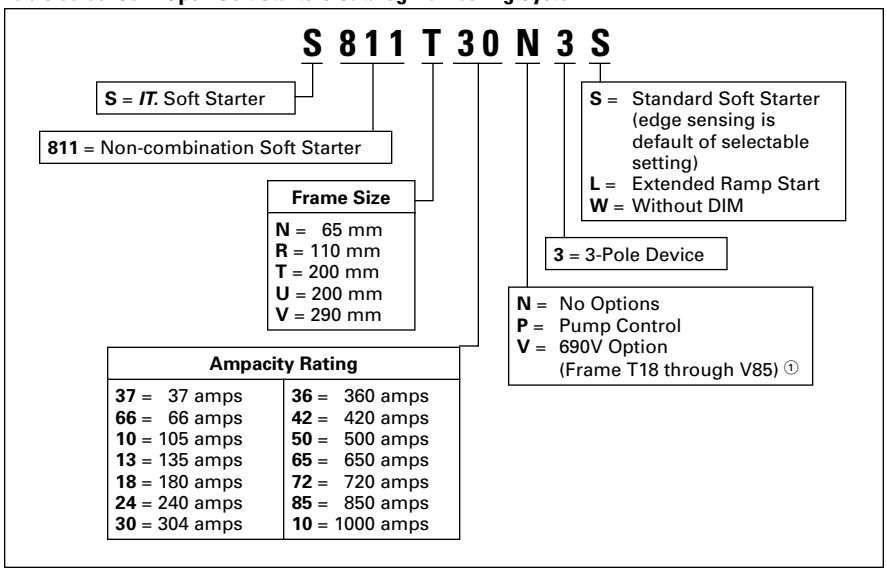


Figure 39-22. Starting Characteristics — Soft Stop

Catalog Number Selection

Table 39-56. S811 Open Soft Starters Catalog Numbering System



① Not available in U-Frame.

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 ***IT.*** 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 call our Technical Resource Center.

Table 39-57. Standard Duty Ratings

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

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Table 39-58. Product Selection — Standard Duty Rating Open Soft Starters

Frame Size	Max. Current	Three-Phase Motor											Catalog Number ①	Price U.S. $
		kW Rating (50 Hertz)			hp Rating (60 Hertz)									
		230	380 – 400	440	200V		230V		460V		575V			
		Volt	Volt	Volt	1.0SF	1.15SF	1.0SF	1.15SF	1.0SF	1.15SF	1.0SF	1.15SF		
N	37	10	18.5	18.5	10	10	10	10	25	20	30	30	**S811N37N3S**	
	66	18.5	30	37	20	15	20	20	50	40	60	50	**S811N66N3S**	
R	105	30	55	59	30	25	40	30	75	60	100	75	**S811R10N3S**	
	135	40	63	80	40	30	50	40	100	75	125	100	**S811R13N3S**	
T	180	51	90	110	60	50	60	60	150	125	150	150	**S811T18N3S**	
	240	75	110	147	75	60	75	75	200	150	200	200	**S811T24N3S**	
	304	90	160	185	100	75	100	100	250	200	300	250	**S811T30N3S**	
U	360	110	185	220	125	100	150	125	300	250	350	300	**S811U36N3S**	
	420	129	220	257	150	125	175	150	350	300	450	350	**S811U42N3S**	
	500	150	257	300	150	150	200	150	400	350	500	450	**S811U50N3S** ②	
V	360	110	185	220	125	100	150	125	300	250	350	300	**S811V36N3S**	
	420	129	220	257	150	125	175	150	350	300	450	350	**S811V42N3S**	
	500	150	257	300	150	150	200	150	400	350	500	450	**S811V50N3S**	
	650	200	355	425	250	200	250	200	500	450	600	500	**S811V65N3S**	
	720	220	400	450	—	—	300	250	600	500	700	600	**S811V72N3S**	
	850	257	475	500	—	—	350	300	700	600	900	700	**S811V85N3S**	
	1000	315	560	600	—	—	400	350	800	700	1000	800	**S811V10N3S**	

① For a longer ramp acceleration time of 0.5 to 360 seconds, see **Page 39-46**.

② 15 sec. start, 300% inrush, 40°C, 1 start every 15 minutes. If these start parameters are exceeded, please refer to 290 mm V-Frame, 500A starter.

Discount Symbol **1CD1**

Table 39-59. Severe Duty Ratings

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

Table 39-60. Product Selection — Severe Duty Rating Open Soft Starters

Frame Size	Max. Current	Three-Phase Motor											Catalog Number ①	Price U.S. $
		kW Rating (50 Hertz)			hp Rating (60 Hertz)									
		230	380 – 400	440	200V		230V		460V		575V			
		Volt	Volt	Volt	1.0SF	1.15SF	1.0SF	1.15SF	1.0SF	1.15SF	1.0SF	1.15SF		
N	22	5.5	10	11	5	5	7-1/2	5	15	10	20	15	**S811N37N3S**	
	42	11	18.5	22	10	10	15	10	30	25	40	30	**S811N66N3S**	
R	65	15	30	33	15	15	20	15	50	40	50	50	**S811R10N3S**	
	80	22	40	45	25	20	30	25	60	50	75	60	**S811R13N3S**	
T	115	33	59	63	30	30	40	30	75	75	100	100	**S811T18N3S**	
	150	45	80	90	50	40	50	50	100	100	150	125	**S811T24N3S**	
	192	55	100	110	60	50	75	60	150	125	200	150	**S811T30N3S**	
U	240	75	110	147	75	60	75	75	200	150	200	200	**S811U36N3S**	
	305	90	160	185	100	75	100	100	250	200	300	250	**S811U42N3S**	
	365	110	185	220	125	100	150	125	300	250	350	300	**S811U50N3S**	
V	240	75	110	147	75	60	75	75	200	150	200	200	**S811V36N3S**	
	305	90	160	185	100	75	100	100	250	200	300	250	**S811V42N3S**	
	365	110	185	220	125	100	150	125	300	250	350	300	**S811V50N3S**	
	420	129	220	257	150	125	150	150	350	300	450	350	**S811V65N3S**	
	480	147	257	295	150	150	200	150	400	350	500	450	**S811V72N3S**	
	525	160	280	335	150	150	200	150	450	350	500	450	**S811V85N3S**	
	600	185	315	375	200	150	250	200	500	450	600	500	**S811V10N3S**	

① For a longer ramp acceleration time of 0.5 to 360 seconds, see **Page 39-46**.

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Discount Symbol **1CD1**

Options

Extended Ramp

For a longer ramp acceleration time of .5 – 360 seconds, change the last digit in the Catalog Number from **Page 39-25** to **L**.

Table 39-61. Extended Ramp Option

Frame Size	Max. Current	Catalog Number	Price U.S. $
N	37	**S811N37N3L**	
	66	**S811N66N3L**	
R	105	**S811R10N3L**	
	135	**S811R13N3L**	
T	180	**S811T18N3L**	
	240	**S811T24N3L**	
	304	**S811T30N3L**	
U	360	**S811U36N3L**	
	420	**S811U42N3L**	
	500	**S811U50N3L**	
V	360	**S811V36N3L**	
	420	**S811V42N3L**	
	500	**S811V50N3L**	
	650	**S811V65N3L**	
	720	**S811V72N3L**	
	850	**S811V85N3L**	
	1000	**S811V10N3L**	

Extended Ramp and 690V Option

690V ratings are available on the T and V Frames by changing the **8th** digit in the Catalog Number to **V**.

Table 39-62. 690V Option

Frame Size	Max. Current	Catalog Number	Price U.S. $
T	180	**S811T18V3L**	
	240	**S811T24V3L**	
	304	**S811T30V3L**	
V	360	**S811V36V3L**	
	420	**S811V42V3L**	
	500	**S811V50V3L**	
	650	**S811V65V3L**	
	720	**S811V72V3L**	
	850	**S811V85V3L**	

Pump Control

For pump control option, change the **8th** digit in the Catalog Number to **P**.

Table 39-63. Pump Control Option

Frame Size	Max. Current	Catalog Number	Price U.S. $
N	37	**S811N37P3S**	
	66	**S811N66P3S**	
R	105	**S811R10P3S**	
	135	**S811R13P3S**	
T	180	**S811T18P3S**	
	240	**S811T24P3S**	
	304	**S811T30P3S**	
U	360	**S811U36P3S**	
	420	**S811U42P3S**	
	500	**S811U50P3S**	
V	360	**S811V36P3S**	
	420	**S811V42P3S**	
	500	**S811V50P3S**	
	650	**S811V65P3S**	
	720	**S811V72P3S**	
	850	**S811V85P3S**	
	1000	**S811V10P3S**	

Accessories

Surge Suppressors

The surge suppressor can mount on either the line or load side of the ***IT.*** Soft Starter. It is designed to clip the line voltage (or load side induced voltage).

Table 39-64. Surge Suppressors

Description	Catalog Number	Price U.S. $
600V MOV for 65 mm and 110 mm units	**EMS38**	
600V MOV for 200 mm and 290 mm units	**EMS39**	
690V MOV for 200 mm ① and 290 mm units	**EMS41**	

① T-Frame only.

Surge Suppressor

Surge Suppressor Mounted on a 200 mm Device

Lug Kits

The 200 mm and 290 mm soft starters do not include lugs.

The 200 mm and 290 mm soft starters each have different lug options based on your wiring needs. Each lug kit contains three lugs which can be mounted on either the load or line side.

Lug Kits — EML23

Table 39-65. Lug Kits

Frame Size	Frame Designation	Description	Catalog Number	Price U.S. $
200 mm SSRV	T, U	2 cable connections, 4 AWG to 1/0 cable	**EML22**	
		1 cable connection, 4/0 to 500 MCM cable	**EML23**	
		2 cable connections, 4/0 to 500 MCM cable	**EML24**	
		1 cable connection, 2/0 to 300 MCM cable	**EML25**	
		2 cable connections, 2/0 to 300 MCM cable	**EML26**	
290 mm SSRV	V	2 cable connections, 4/0 to 500 MCM cable	**EML28**	
		4 cable connections, 4/0 to 500 MCM cable	**EML30**	
		6 cable connections, 4/0 to 500 MCM cable	**EML32**	
		4 cable connections, 2/0 to 300 MCM cable	**EML33** ①	

① The EML33 does not have a CSA Listing.

Lug Cover Kits

Replacement covers for the T and V frame are available in case of damage to the existing covers.

Table 39-66. Lug Cover Kits

Description	Catalog Number	Price U.S.$
Lug Cover T, U Frame	**EML27**	
Lug Cover V Frame	**EML34**	

Discount Symbol **1CD1**

Digital Interface Module

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

Table 39-67. DIM

Description	Catalog Number	Price U.S. $
Blank Cover (Filler)	**EMA68**	
DIM	**EMA91**	
Panel Mounting Kit — 3 ft. Cable 5 ft. Cable 8 ft. Cable 10 ft. Cable	 **EMA69A** **EMA69B** **EMA69C** **EMA69D**	

Control Wire Connector

Table 39-68. Control Wire Connector

Description	Catalog Number	Price U.S.$
12 pin, 5 mm pitch Connector for Control Wiring	**EMA75L**	

User Manual

A comprehensive user manual is available and can be downloaded free of charge from www.EatonElectrical.com by performing a document search for MN03902002E.

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.

Table 39-69. Mounting Plates

Description	Catalog Number	Price U.S. $
Mounting Plate N Frame	**EMM13N**	
Mounting Plate R Frame	**EMM13R**	
Mounting Plate T, U Frame	**EMM13T**	
Mounting Plate V Frame	**EMM13V**	
Fan/Hood Accessory	**EMM18**	

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.

Table 39-70. Vibration Plates

Description	Catalog Number	Price U.S. $
Vibration Plate N Frame	**EMM14N**	
Vibration Plate R Frame	**EMM14R**	
Vibration Plate T, U Frame	**EMM14T**	
Vibration Plate V Frame	**EMM14V**	

Power Supplies

24V DC Power Supply which can be used with the S811 SSRV or as a stand-alone device.

Table 39-71. Power Supplies

Description	Catalog Number	Price U.S. $
115V AC Input 24V DC Output	**PSS55A**	
230V AC Input 24V DC Output	**PSS55B**	
380 – 480V AC Input 24V DC Output	**PSS55C**	

DIN Rail Power Supply Mounting Kit (35 mm)

Table 39-72. DIN Rail Mounting Kit

Description	Catalog Number	Price U.S. $
DIN Rail Mounting Kit (35 mm)	**PSSDIN**	

Standards and Certifications

- IEC 60947-4-2
- EN 60947-4-2
- UL Listed (NMFT) – Frame N37 to V85
- UL Recognized (NMFT2) – Frame V10
- CE Marked
- CSA Certified (3211 06)
- CSA Elevator (2411 01)

Instructional Leaflets

- Instruction Manual: MN03902002E
- Outline Drawings:
  - 65 mm, N-Frame: 10-8574
  - 110 mm, R-Frame: 10-8575
  - 200 mm, T-Frame: 10-8576
  - 200 mm, U-Frame: 10-8857
  - 290 mm, V-Frame: 10-8577

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Discount Symbol **1CD1**

Technical Data and Specifications

Table 39-73. Specifications— *IT.* Soft Starter

Soft Starter (Partial Catalog Number)	S811 N37	S811 N66	S811 R10	S811 R13	S811 T18	S811 T24	S811 T30	S811 U36	S811 U42	S811 U50	S811 V36	S811 V42	S811 V50	S811 V65	S811 V72	S811 V85	S811 V10 ①
Max. Current Capacity	37	66	105	135	180	240	304	360	420	500	360	420	500	650	720	850	1000
FLA Range	11 – 37	20 – 66	32 – 105	42 – 135	56 – 180	75 – 240	95 – 304	112 – 360	131 – 420	156 – 500	112 – 360	131 – 420	156 – 500	203 – 650	225 – 720	265 – 580	320 – 1000

Dimensions

Width in Inches (mm)	2.66 (67.6)	4.38 (111.3)	7.67 (194.8)	7.73 (196.3)	11.05 (280.6)
Height in Inches (mm)	7.38 (187.4)	7.92 (201.2)	12.71 (322.9)	12.72 (323.1)	16.57 (420.8)
Depth in Inches (mm)	6.47 (164.4)	6.66 (169.2)	6.39 (162.4)	7.08 (179.9)	7.35 (186.6)
Weight in lbs. (kg)	5.8 (2.6)	10.5 (4.8)	48 (21.8) with lugs 41 (18.6) without lugs	48 (21.8) with lugs 41 (18.6) without lugs	103 (46.8) with lugs 91 (41.4) without lugs

General Information

Bypass Mechanical Lifespan	10M
Insulating Voltage Ui	660V
Ramp Time Range	.5 – 180 Seconds (.5 – 360 Seconds Extended Ramp)
Resistance to Vibration	3g
Resistance to Shock	15g

Electrical Information

Operating Voltage	200 – 600V
Operating Frequency	47 – 63 Hz
Overload Setting	30 – 100%
Trip Class	5, 10, 20, & 30

Cabling Capacity (IEC 947)

Number of Conductors	1	1	1 or 2	1 or 2	2, 4 or 6
Wire Sizes	14 – 2	14 – 4/0	4 AWG to 500 MCM	4 AWG to 500 MCM	2/0 to 500 MCM
Type of Connectors	Box Lug		Add-On Lug Kit		

Control Wiring (12-Pin)

Wire Sizes in AWG	22 – 14
Number of Conductors (Stranded)	2 (or one AWG 12)
Torque Requirements in lb-in	3.5
Solid, Stranded or Flexible Max. Size in mm^2	3.31

Control Power Requirements

Voltage Range (24V ± 10%)	21.6 – 26.4				
Steady State Current Amps	1.0	1.0	1.0	1.0	1.4
Inrush Current Amps	10	10	10	10	10
Ripple	1%				

Relays (1) Class A and C

Voltage AC — maximum	240
Voltage DC — maximum	120
Amps — maximum	3

Environment

Temperature — Operating	-30 – 50°C (No derating) Consult factory for operation > 50° C
Temperature — Storage	-50 – 70°C
Altitude	<2000 Meters — Consult factory for operation > 2000m
Humidity	<95% Non-condensing
Operating Position	Any
Pollution degree IEC947-1	3
Impulse withstand Voltage IEC947-4-1	6000V

① UR Recognized Product

Dimensions

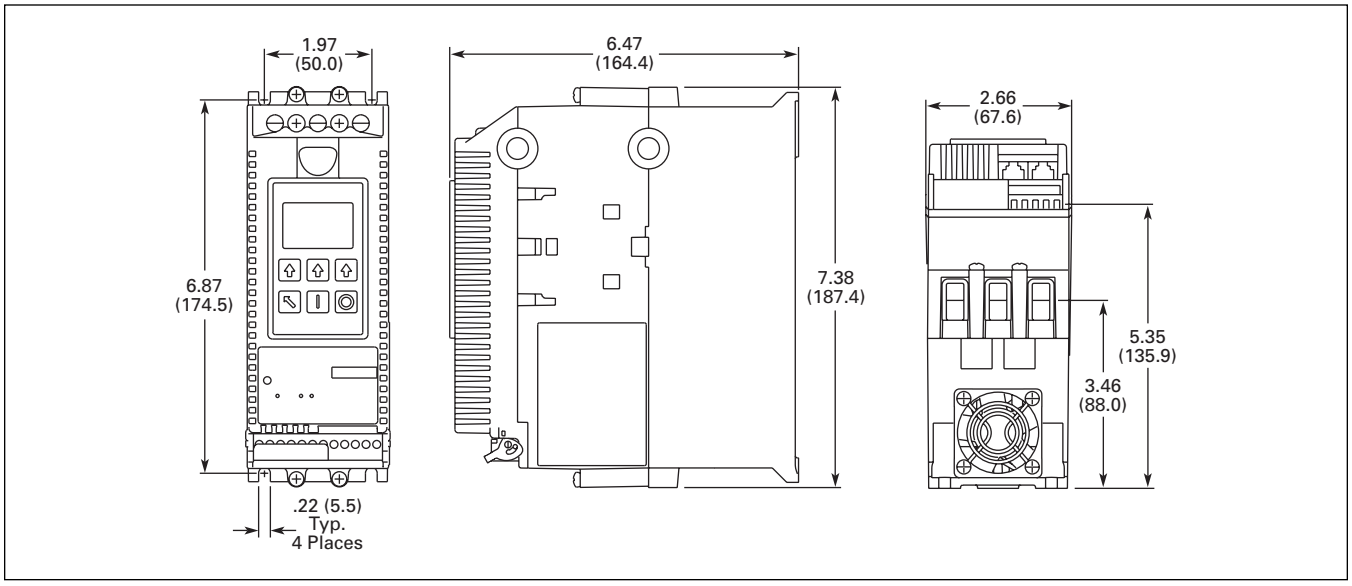

Figure 39-23. N-Frame (65 mm) S811 Approximate Dimensions in Inches (mm)

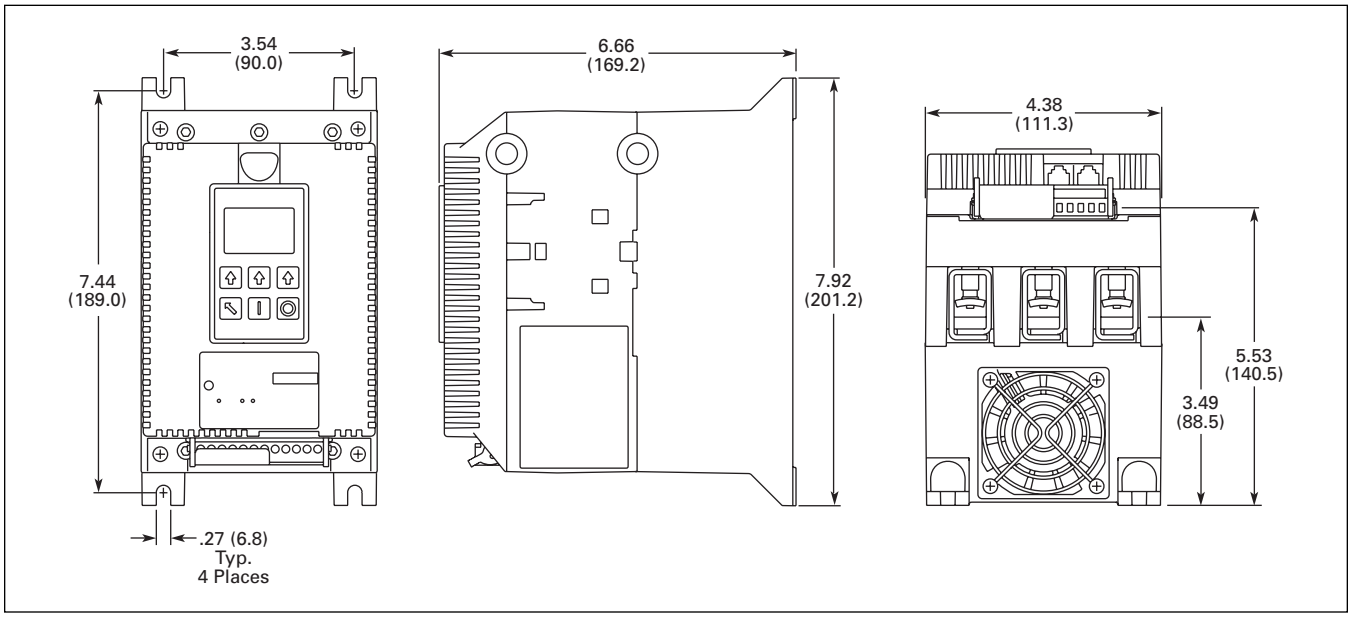

Figure 39-24. R-Frame (110 mm) S811 Approximate Dimensions in Inches (mm)

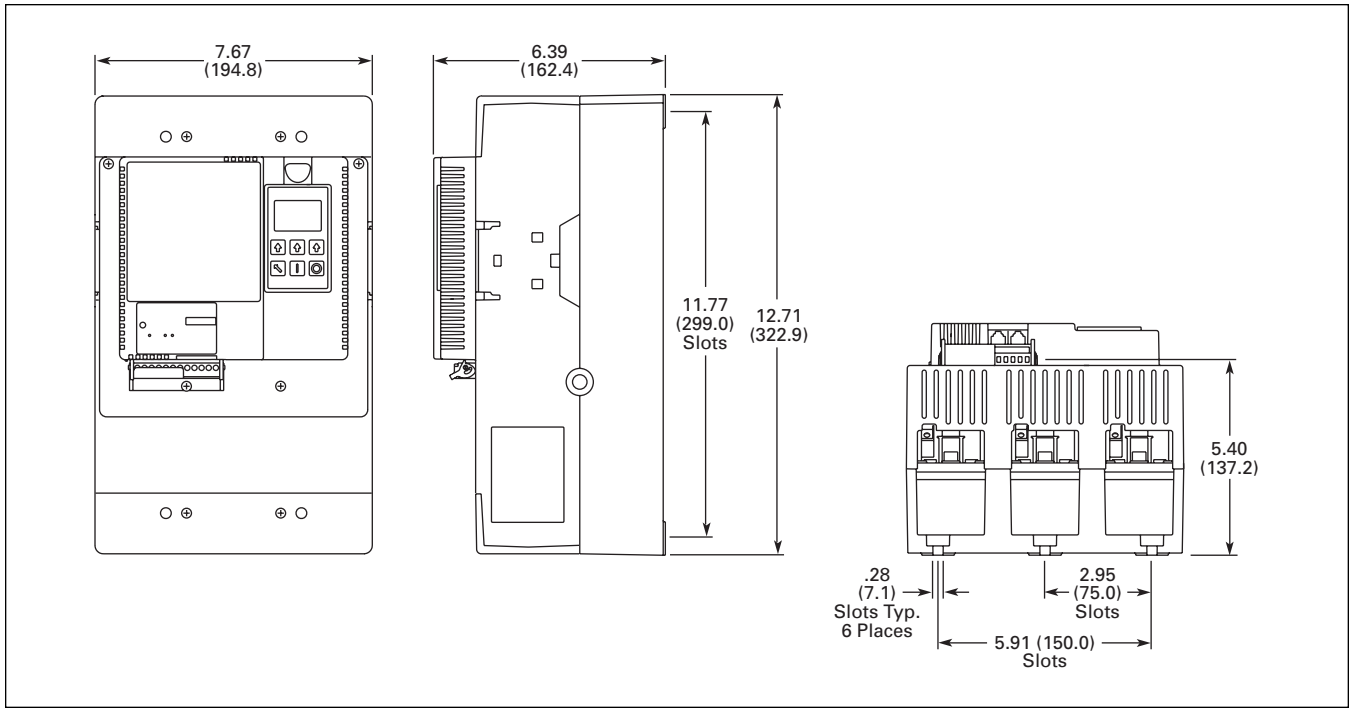

Figure 39-25. T-Frame (200 mm) S811 Approximate Dimensions in Inches (mm)

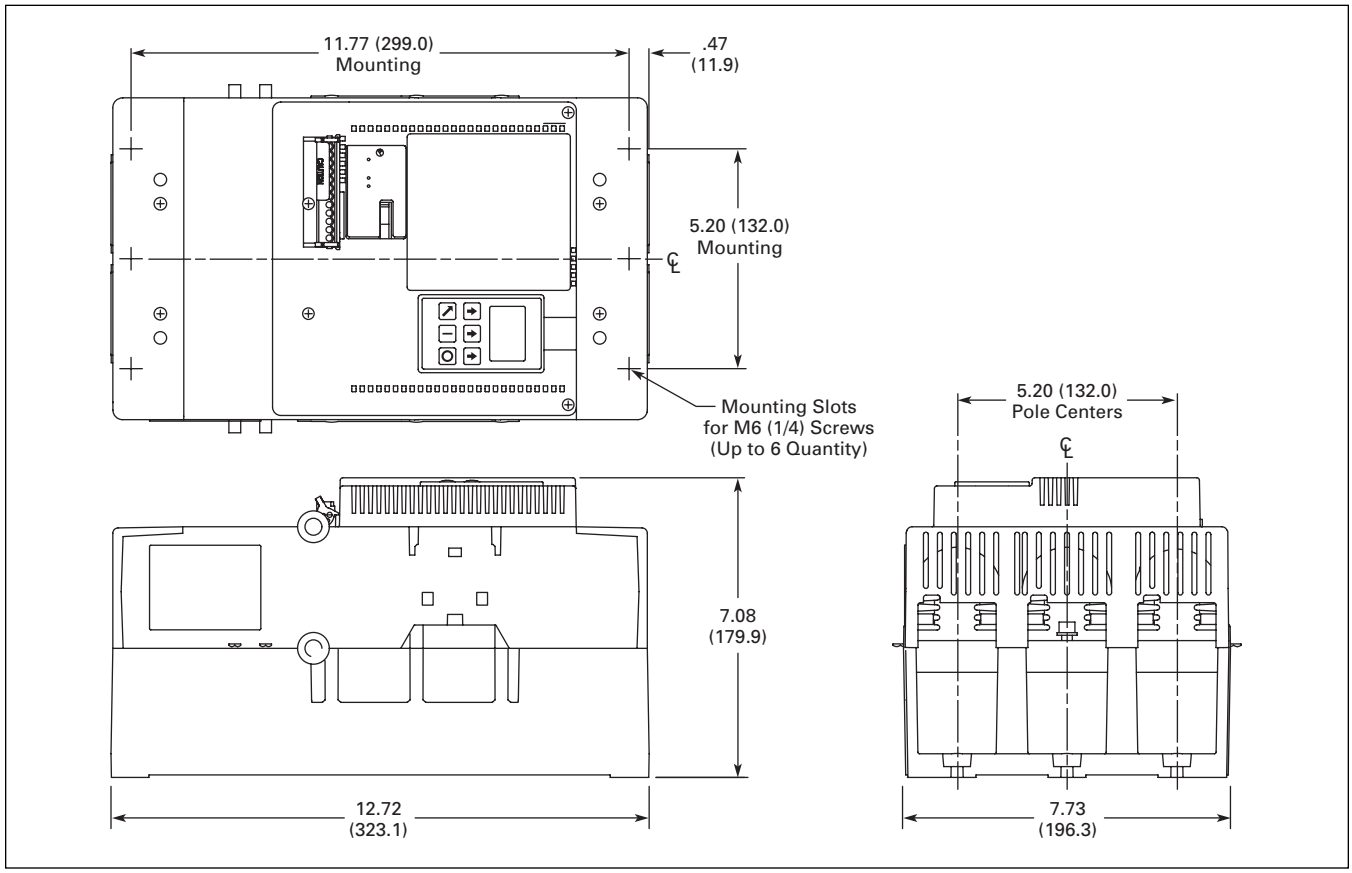

Figure 39-26. U-Frame (200 mm) S811 Approximate Dimensions in Inches (mm)

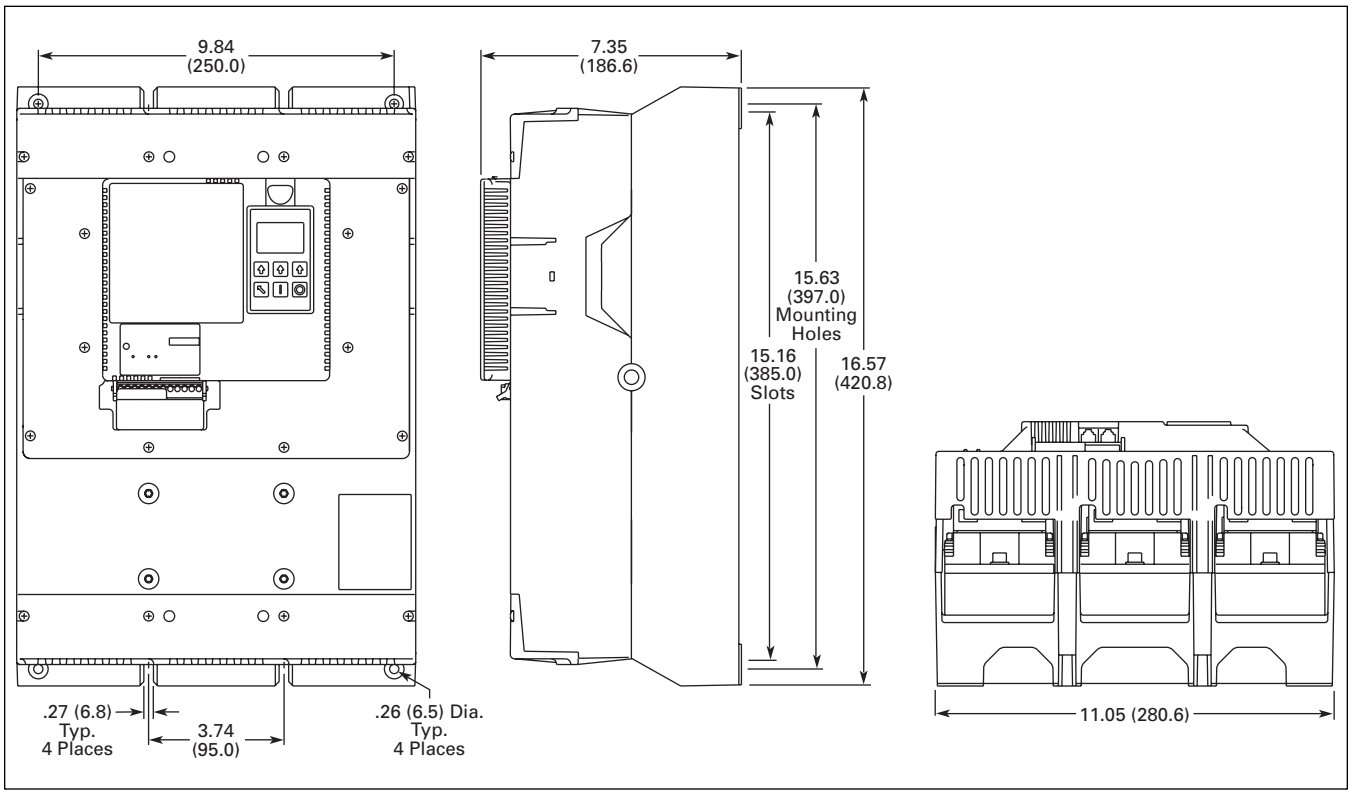

Figure 39-27. V-Frame (290 mm) S811 Approximate Dimensions in Inches (mm)