

Type S611, Soft Starter



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## Type S611, Soft Starters

### Product Description

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

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

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

### Application Description

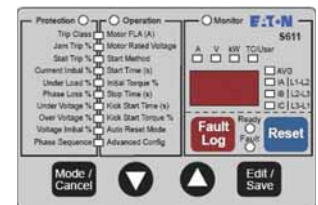
Designed to control the acceleration and deceleration of three-phase motors, the S611 soft starter uses Silicon Controlled Rectifiers (SCRs) to control the voltage to soft start and soft stop the motor. After the motor is started, internal run bypass contactors close, resulting in the motor running directly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

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

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

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

### User Interface Module (UI)



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

### Standards and Certifications

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



### Features and Benefits

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

### Protective Features

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

#### Motor Overload

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

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

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

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

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

#### Short Circuit

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

**Jam**

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

**Stall**

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

**Pole Over Temperature**

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

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

**Phase Loss**

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

**Phase Imbalance**

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

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

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

**Reset Mode**

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

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

**Phase Reversal**

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

**Shorted SCR Detection**

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

**Open SCR Detection**

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

**Low Current**

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

**Low Voltage**

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

**High Voltage**

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

**Monitoring Capabilities**

The S611 has an impressive array of system monitoring capabilities that allow users to access real time process and diagnostic data. This data can be viewed at the device with the UI or through a communications network. Data over a communications network can provide valuable insight into the condition of the equipment and processes. Maintenance and production personnel can monitor critical operational and maintenance data from a central control station that can be located far away from the production facility. Process data can be monitored to determine system anomalies that may indicate a need for preventive maintenance or an impending failure.

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

**Average Line Current**

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

**Average Pole Current**

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

**Average Line Current as a % FLA**

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

**Three-Phase Line Currents**

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

**Three-Phase Pole Currents**

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

**Three-Phase Line Voltages**

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

**Percent Thermal Memory**

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

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

**Pole Temperature**

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

**Power Monitoring**

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

**Start Count**

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

**Diagnostics****Fault Queue**

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

**Control Status**

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

**Field Serviceability**

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

### Operation

#### Instructional Leaflets

- Instruction Manual: MN03902011E
- Quick Start Guide: MN03901003E

#### Starting and Stopping Modes

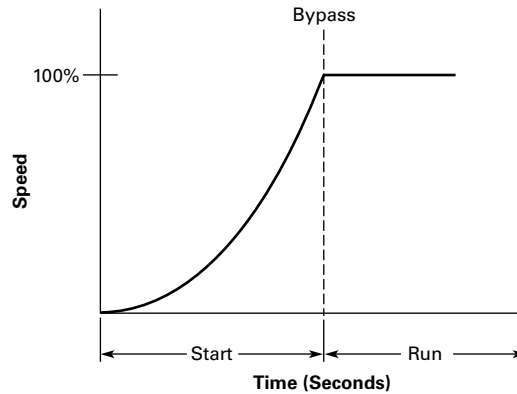
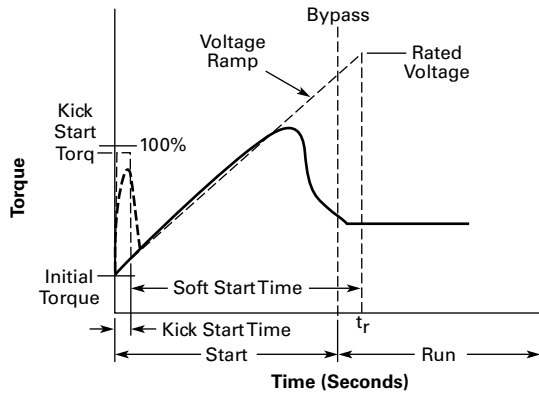
The S611 has a variety of starting and stopping methods to provide superior performance in the most demanding applications. The motor can be started in either Voltage Ramp Start or Current Limit Start mode. Kick Start and Soft Stop are available within both starting modes.

#### Voltage Ramp Start

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

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

#### Starting Characteristics—Ramp Start



#### 1

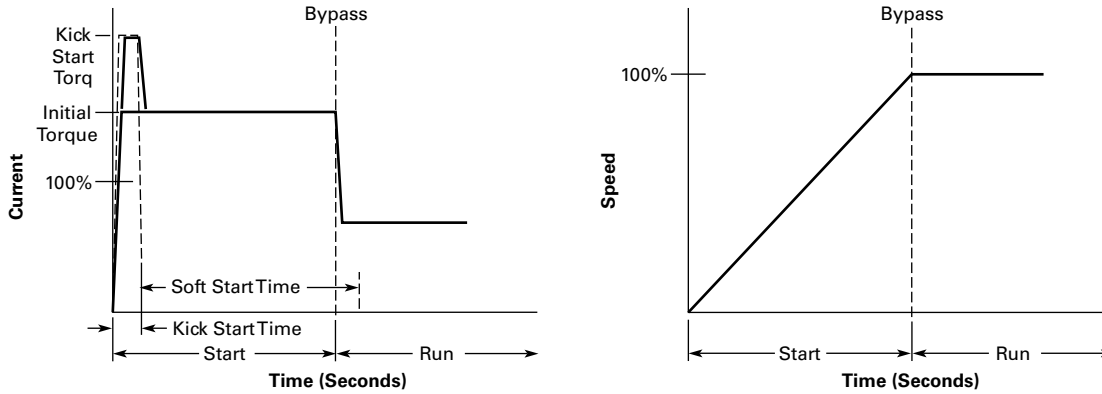
#### Current Limit Start

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 start ramp time 0.5–180 seconds (can be extended with factory modification)

#### Starting Characteristics—Current Limit Start

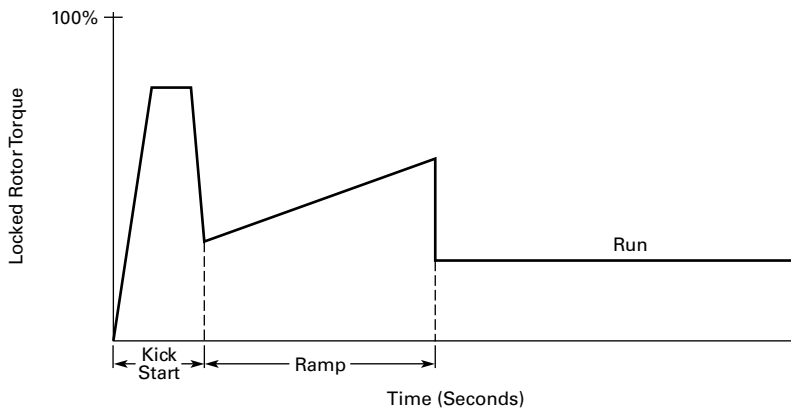


#### Kick Start

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

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

#### Starting Characteristics—Kick Start

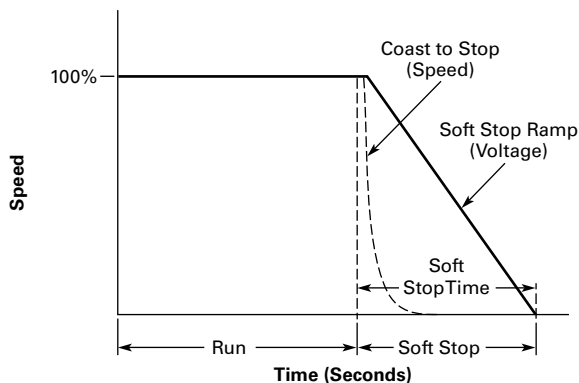


### Soft Stop

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

- Stop time = 0–60 seconds

### Starting Characteristics—Soft Stop



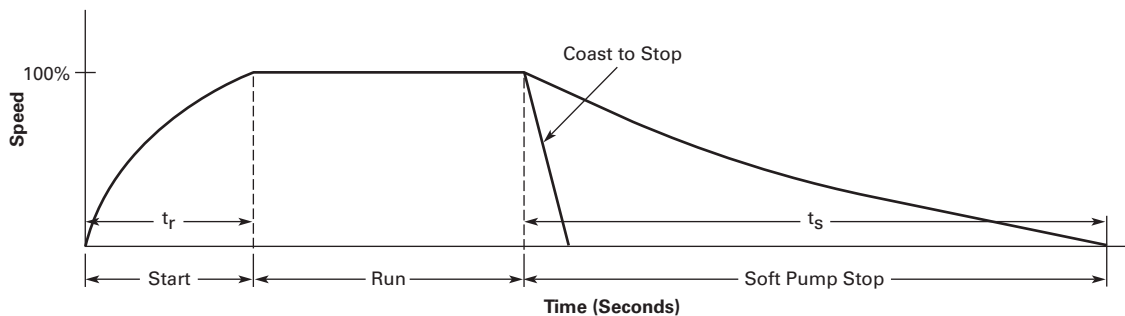
### Pump Control Option

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

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

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

### Pump Control Option



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#### Edge and Level Sensing Control

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

#### Edge Sensing

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

#### Level Sensing

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

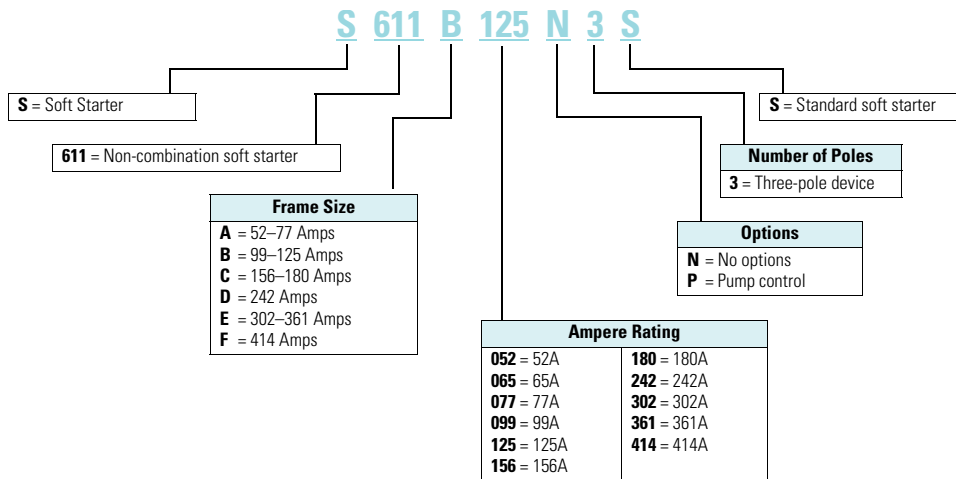
- Permissive terminal is supplied with 120 Vac
- The auto reset parameter is set to enabled
- All faults have cleared or have been reset

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

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

#### Catalog Number Selection

##### S611 Soft Starters





### Product Selection

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

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

consult with your local Eaton Representative or call the Eaton Technical Resource Center.

### Pump Control Option

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

### Horsepower Ratings

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

#### S611



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

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

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

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

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

S611



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

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

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

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

### Accessories

#### Optional Accessory Kits

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

#### Communications

##### Network Communications Reference

Description	Catalog Number
Modbus communication adapter without I/O	C441M
Modbus communication adapter with 120 Vac I/O	C441N
Modbus communication adapter with 24 Vdc I/O	C441P
DeviceNet communication adapter with 120 Vac I/O	C441K
DeviceNet communication adapter with 24 Vdc I/O	C441L
PROFIBUS communication adapter with 120 Vac I/O	C441S
PROFIBUS communication adapter with 24 Vdc I/O	C441Q
Ethernet IP/Modbus TCP communication adapter with 120 Vac I/O	C441R
Ethernet IP/Modbus TCP communication adapter with 24 Vdc I/O	C441T
Communication adapter	C440-COM-ADP

**Replacement Parts****S611 Replacement Components**

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

## Technical Data and Specifications

### Soft Starters—S611

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

## Soft Starters—S611, continued

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

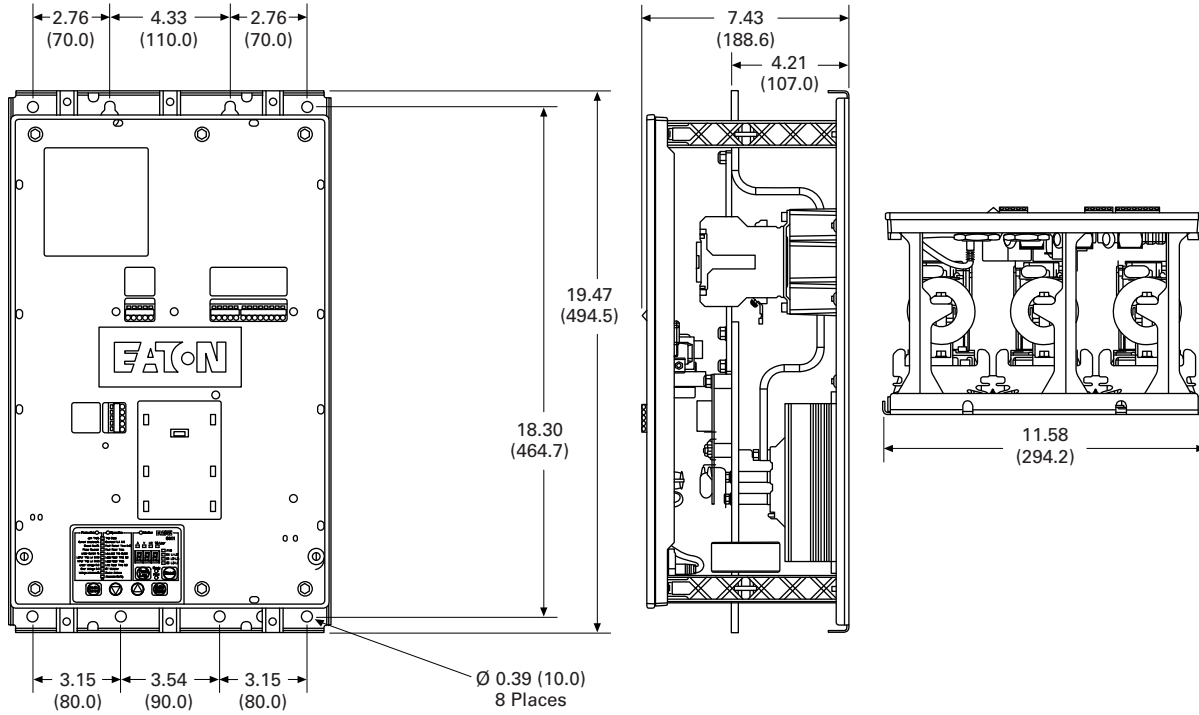
## Soft Starters—S611, continued

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

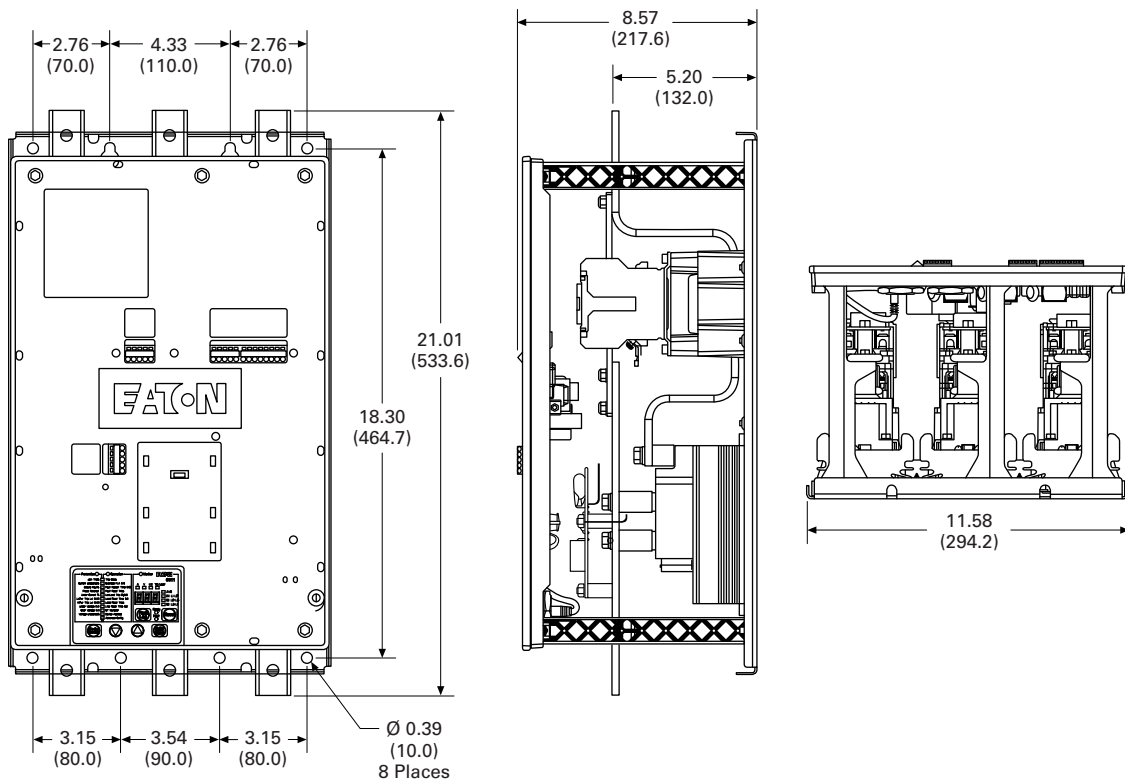
### Dimensions

Approximate Dimensions in inches (mm)

#### S611A..., S611B...



#### S611C..., S611D...



# 1.2

## Reduced Voltage Motor Starters

### Solid-State Starters

1

Approximate Dimensions in inches (mm)

S611E..., S611F...

