

Frequently Asked Questions – Single Phase 230V Models

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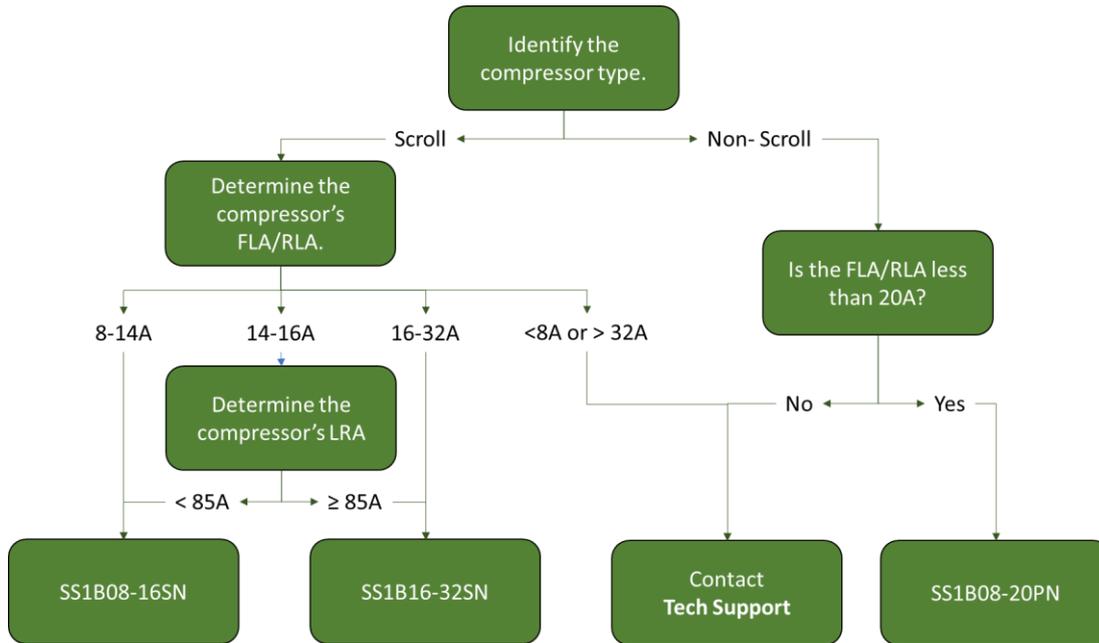
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1. Questions Before Installation

1.1. Model Selection

1.1.1. How is the size of the soft starter chosen correctly?

Model selection can be completed using the following flow chart. RLA/FLA and LRA data can be identified from the motor/equipment nameplate.



If there is any doubt in selection. Please contact **Tech Support**.

1.1.2. I have a limited generator/inverter capacity; how do I calculate if fitting a SureStart would be enough to make it work on my generator?

From the nameplate data of the ac unit, identify the nominal supply voltage and LRA value of the compressor. As a thumb rule, the inrush demand requirement for each model can then be estimated as:

SN Version: $\text{Surge kW needed} = (\text{Nominal Supply Voltage} \times \text{Compressor LRA}) \div 3125$

PN Version: $\text{Surge kW needed} = (\text{Nominal Supply Voltage} \times \text{Compressor LRA}) \div 1785$

- 1.1.3. I am concerned that my battery system will not be able to supply enough current. How do I calculate if fitting a SureStart would be enough to make it work on my battery?

From the nameplate data of the ac unit, identify the nominal LRA value of the compressor. Worst inrush current demand requirement can then be calculated as:

SN Version: Minimum battery RMS current capacity needed = 0.4 x Compressor LRA

PN Version: Minimum battery RMS current capacity needed = 0.7 x Compressor LRA

- 1.1.4. Can the SS1B16-32SN model be used for compressors with an RLA/FLA less than 16A?

Please note that there is a false notion that using a larger model is better. Using the larger model on a unit with less than 16A RLA will not achieve the same inrush current reduction as the SS1B08-16SN. The larger model will over-drive the compressor's start winding and cause the compressor to fail prematurely.

- 1.1.5. Can a compressor with an RLA/FLA less than 8A be run using a SS1B08-16SN?

The SS1B08-16SN can be used for compressors with an RLA/FLA no lower than 5A. When the running current is below 8A, the expected current reduction is up to 10% less than a correctly sized compressor.

1.2. Operation

- 1.2.1. What reduction in inrush current is expected with the SureStart?

For SN models, the RMS current reduction is 60 to 70%. Otherwise for the PN type, the reduction is 30 to 50%.

- 1.2.2. What is the frequency range of SureStart?

The allowable frequency deviation is ± 3 Hz as applicable for both 50 and 60Hz applications. SureStart will not attempt a start-up if these limits are exceeded.

- 1.2.3. What is the life expectancy of the units?

The average life of a unit is 7 to 10 years, subject to the frequency of operation.

- 1.2.4. Does the unit have any components that potentially wear out?

The minimum life expectancy of SureStart's internal components is 100,000 cycles.

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1.2.5. What is the ramp up/down time of the SureStart?

SureStart does not employ a soft-start ramp profile. The soft-starter self-optimizes the start-up current and duration for any given size of AC unit and supply voltage. Please note that it does normally take 6 to 8 starts to do so after the first install.

1.2.6. What is the typical power saving when using SureStart compared to a simple contactor/capacitor design without a soft starter?

SureStart only engages with the compressor at start-up. As the soft-starter is bypassed after start-up, it does not provide power savings during the normal running operation of the motor. The benefits come from reducing the inrush currents (by up to 70%), ability to operate on back-up power sources like battery or generators and providing safety features such as under-voltage and motor reversal protection.

1.2.7. Do soft starters affect the harmonic emission of an AC unit/heat pump?

The soft starter has very little to no impact on the harmonic emissions in the line as it simply acts as a bypass switch during running mode. A soft-start lasts barely 0.3-0.5 seconds. So, the resultant harmonics emissions will simply reflect any inherent load current harmonics from the AC unit/heat pump.

1.2.8. What is the SureStart maximum duty cycle at rated ambient temperature?

The recommended duty cycle is not to exceed 15 starts per hour.

1.2.9. Can the SureStart duty cycle be increased by forced cooling it?

The soft-starter is in an enclosed box so forced cooling will not be effective. Opening the box voids warranty.

1.2.10. Does SureStart have any transient suppression on the incoming power?

It only has suppression to protect the soft-starter's internal circuit. It will not protect the compressor motor from a surge event.

1.3. Application

1.3.1. What is the difference between a soft-starter and a hard-start kit?

The difference can be found in the following white paper.

[Hardstart-Softstart Comparison.pdf](#)

For permanent split capacitor motors, the torque is dictated by:

1. The current magnitude (more current means more torque) and
2. The phase difference between the run and start winding currents (a cosine function, where the max. torque occurs when the start current leads the run current by 90°).

Both hard-start kits and SureStart manipulate the phase and current to change the start-up torque.

Hard-start kits change the current by temporarily adding a start capacitor in parallel with the run capacitor. This extra capacitance increases the current and phase angle on the start winding. The net result is a larger torque, but due to its simplicity, it does not regulate nor limit the current drawn by the motor. This results in a larger start-up current.

SureStart uses a start-capacitor to increase the phase difference but also regulates and limits the current flowing through the run winding. To accommodate for the torque lost due the smaller current, the soft-starter extends the starting-time (and increases starting energy) of the motor.

1.3.2. Does SureStart work with two-wire motors?

SureStart requires three wires (run, start and common) to be accessible for installation. Please contact **Tech Support** to see if a custom model of SureStart is suitable.

1.3.3. Is it possible to install SureStart on a motor outside of an AC/heat pump application?

There may be a possible solution for the application so please contact **Tech Support** with the following information.

- A description of the motor application.
- Brand and model of the motor. A picture of the nameplate would be helpful.
- A picture of the manufacturer's wiring diagram.

1.3.4. How does SureStart compare to other brands in the market?

SureStart's reliability is well established and has been trusted by a number of globally reputable HVAC companies for over 20 years. It has been in the market longer than other brands and is the most compact solution, should you be restricted in space to install it.

1.3.5. Can SureStart be installed on HVAC systems that use reciprocating or rotary compressors?

The SN version can be installed if the refrigerant system equalizes within 3 minutes of the system shut down. Otherwise the PN version may need to be considered for the application. Please refer to Question 1.1.1 for correct model selection.

1.3.6. Can SureStart be installed on HVAC systems with variable speed or "inverter-driven" compressors?

Variable speed and similar compressors do not experience dramatically increased LRA that single/two stage compressors do. Therefore, a soft starter would not be required.

1.4. Warranty

1.4.1. What is the warranty?

The warranty is 1 year from date of purchase. If you can provide the distributor with the purchase receipt indicating the date of purchase, they can help you to get a replacement unit if it falls within the warranty period.

Opening the enclosure, mis-wiring or misapplication will void the warranty of the product.

1.4.2. Does SureStart void warranty on the A/C unit?

Although true in general that HVAC manufacturers can be sceptical of installing third party devices, it is quite commonplace to install start assist devices in HVAC units. Other typical examples would be drives and hard-start kits. Over the past 5 years, it has become an accepted industry standard to install soft-starters in AC/heat pump units to overcome the limitations of residential solar/battery back-up.

Our product range has been associated with many after-market installations over the past 20 years. Since SureStart is aimed to enhance the life of the compressor, we have never encountered any case where the manufacturer has voided warranty for use of start assist devices.

1.4.3. Do I need to register the unit for warranty?

No registration necessary, just ensure that you maintain a proof of purchase.

2. Questions During Installation

2.1. Wiring

2.1.1. Is SureStart easy to install?

Yes. SureStart should take approximately 15 minutes to properly mount and connect inside the HVAC system control/electrical service compartment. The wiring leads necessary for a normal HVAC system installation and unit mounting bracket are included. Installation Instructions are included with SureStart models and all steps should be followed for proper installation and operations.

***All electrical power should be DISCONNECTED before beginning installation procedures.**

2.1.2. I am having trouble wiring the SureStart into my AC or heat pump unit, how can I get help?

A sample wiring diagram can be found in the installation instructions. If the wiring is substantially different from the diagram, please send a picture of the manufacturer's wiring schematic to **Tech Support** and we can make a mark-up of the installation wiring for you to verify.

2.1.3. What would be the longest recommended distance to have installed or longest length of the wires connecting the device to a compressor?

As a general thumb rule, we recommend that the wire length between SureStart to the compressor does not have a resistance large enough to exceed an additional 5% voltage drop.

2.1.4. The unit has a separate capacitor for the compressor and the fan. Will SureStart still work with this application?

Yes, SureStart works with both double and single capacitors. In both cases the SureStart's START WINDING lead is connected to the same terminal on the capacitor as the compressor's start winding.

2.1.5. In my installation, only one side of the power input is switched by the contactor. Will the SureStart device still work?

Yes, SureStart will still work in this case. Only one side of the contactor needs to be switched to ensure that the soft-starter will work.

2.1.6. How is SureStart installed on HVAC units which power the compressor through a control board rather than a contactor?

Please send a picture of the manufacturer's wiring diagram to **Tech Support** and an installation diagram can be created for the HVAC unit.

2.1.7. Does the wiring change if there is an Emerson SureSwitch™ present in the system?

The wiring and performance of the SureStart does not change with use in conjunction with an Emerson Sureswitch™, as it simply acts as a series contactor. Please note that there is 1 second delay at start up to avoid any conflict.

2.1.8. Can SureStart be installed in tandem with the Emerson CoreSense™?

SureStart is compatible and should be wired as indicated in the installation diagram. Please ensure that the three compressor wires are fed through the correct holes of the CoreSense™. **Failure to loop the necessary cabling through can lead to spurious fault codes to be flagged by the AC control board.**

2.1.9. What happens when the hard-start kit is left connected when the SureStart is installed?

If left in the system for too long, the hard-start combined with the SureStart will over-drive the compressor's start winding and cause the compressor to fail prematurely.

The hard-start will also upset the operation of the SureStart and will not result in a good reduction in inrush current.

3. Questions After Installation

3.1. Fault Finding

3.1.1. Why is the motor not running after power has been turned on? Many issues can be a result of incorrect wiring. Please send **Tech Support** a picture of the manufacturer's wiring schematic and we can make a mark-up of the installation wiring for you to verify.

Should the problem persist after the connections have been checked to be correct and securely fastened, then the flash code on the SureStart's LED light can be a useful tool for determining a fault. A Red LED indicator will flash under the following conditions.

- a) Rapid Flash (10 / sec): Low Voltage
- b) Triple Flash Every Three Seconds (3 / 3 secs): Lockout on Three Failed Starts
- c) Slow Flash (1 / 3 secs): Lockout on Over Current
- d) Slow Steady Flash (1 / sec): Cycle Delay / Fault Mode

3.1.2. The SureStart's LED light is flashing, what does it mean? The flash code will vary according to the fault. Please review Installation Instructions, Specification Catalog, or Submittal Sets to determine the fault codes.

3.1.3. I have wired up the SureStart into my AC or heat Pump unit. The compressor runs fine, but why does the fan not turn on? There is an error in wiring during installation. Send **Tech Support** a picture of the manufacturer's wiring schematic and we can make a mark-up of the installation wiring for you to verify.

Please note that the compressor is at risk of overheating if it runs for more than 30 seconds without the fan operating.

3.1.4. Is there a problem when the SureStart's LED is not flashing but the compressor is operating correctly? The LED only turns on to indicate that a fault has occurred. Unless the compressor has not turned on, then the SureStart should be operating correctly.

3.1.5. Why after the installation of SureStart, is the meter reading too low/high of a current?

A soft-start typically takes less than a third of a second to complete. Conventional ammeters/multimeters do not have adequate time resolution to capture this. Meters equipped with inrush current measurement is needed for accurate results. An example of an inrush current meter is the FLUKE® 375 Clamp Meter.

3.1.6. The motor is running correctly but when measuring the inrush current, why is there not a reduction in current?

The inrush current cannot be measured by a typical current meter. To verify LRA reduction in a field installation, technicians will require a device that can capture inrush current and display this LRA value in a digital readout. FLUKE® 375 Clamp Meter is one such tool that is available for field use.

Should the current be correctly measured and there is no improvement in inrush current, please check the connections are correct and secure and note if there are any visible flash codes on the LED light. Please contact **Tech Support** with the findings.

3.1.7. The SureStart is showing the over current flash code (1 / 3 secs) when attempting to start-up the SureStart, is there something wrong with the SureStart?

This fault can be a result of loose or failing terminations upstream from the compressor. Please check that the connections to the contactor or to the compressor's common terminal are not loose. Should the problem persist after the connections are found to be secure, then this problem may be a result of a failing circuit breaker or wiring upstream of the contactor. **Since this can be cause of serious electrical fire hazard, a qualified technician should be requested to check the electrical connections immediately.**

3.1.8. I have tried everything, but the unit is still not working. What can I do?

To help assess the issue, please email **Tech Support** with the following information.

- The SureStart model number used in the installation.
- The brand and model number of the HVAC unit. A picture of the nameplate data would be helpful.
- A picture of the HVAC unit's manufacturer wiring diagram. From it a mark-up of the installation wiring can be created and used to verify the installation.
- If there is a flash code visible on the SureStart's LED light.