Submittal

SureStart® SP1xx Series Single Phase Soft Starter

SP1XX series is a Primary verison softstarter which performs the function of both contactor and softstarter.

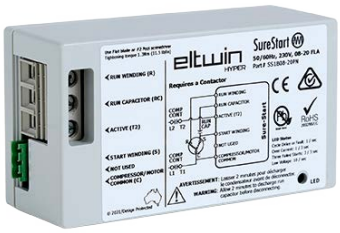
The Product has CE and ETL approval and is RoHS compliant.

Type	SP1B08-16SN	SP1B10-25SN	SP1B16-32SN
Nominal Voltage rating	208-230VAC	208-230VAC	208-230VAC
Single/Three phase	Single Phase	Single Phase	Single Phase
Main Frequency (Tolerance +/-3 Hz)	50Hz/60Hz	50Hz/60Hz	50Hz/60Hz
Motor Current, max RLA/FLA range	8A -16A	10A - 25A	16A - 32A
Contactor function as Primary	Included	Included	Included
LRA max	85A	150A	185A
Start Current reduction	60 % - 70 % of LRA	60 % - 70 % of LRA	60 % - 70 % of LRA
Startup torque reduction	30-40%	30-40%	30-40%
Degree of protection	IP20	IP20	IP20
Operating Temperature (°C / °F)	-20° to 60°C / -4° to 140°F	-20° to 60°C / -4° to 140°F	-20° to 60°C / -4° to 140°F
Storage Temperature (°C / °F)	-40° to 85°C / -40° to 185°F	-40° to 85°C / -40° to 185°F	-40° to 85°C / -40° to 185°F
Number of starts per hour	12 starts / hr	12 starts / hr	12 starts / hr
Minimum startup voltage	190V	190V	190V
Maximum high voltage	253V	253V	253V
Shutdown on low voltage	185V	185V	185V
Short Circuit Current Rating SCCR, kA	5	5	5
Control voltage input (ac) Control voltage dropout	230/240 Mains voltage Line voltage (+0 / -5V)	230/240 Mains voltage Line voltage (+0 / -5V)	230/240 Mains voltage Line voltage (+0 / -5V)
Dimensions	5.30" x 1.96" x 2.94" (135 x 50 x 75mm)	5.30" x 1.96" x 2.94" (135 x 50 x 75mm)	5.30" x 1.96" x 2.94" (135 x 50 x 75mm)
Weight g / lb	500g / 1.1 lb	500g / 1.1 lb	500g / 1.1 lb

Control Specifications

Nominal Fault Delay (s)	270	270	270
Power On Delay (s)	2	2	2
Power loss reset (ms)	100	100	100
Motor reversal Protection	Yes	Yes	Yes
Software optimisation	Auto Tuning within acceptable compressor range		
Overcurrent limit* (A) - Slow 5 sec	23	38	47
Overcurrent limit* (A) - Fast <1 sec	35	55	75
Maximum allowable hardstart attempts/hour	3	3	3

* Not an overload protection. Limit varies due to load variations.



S P 1 B 10-25 S N

Type
S - SureStart

Contactor Function
P - Primary

Nominal Voltage Rating
1 - 208-230V/50-60Hz/1Ø

Generation
B - Current, Single-Phase

Full Load Amps (FLA)
Corresponds to Compressor Run Load Amps (RLA)
08- 16 : 230V
10 - 25 : 230V
16 - 32 : 230V

Standard
S - Standard

Auxiliary Alarm Relay
N - None

Rev 1.1.1

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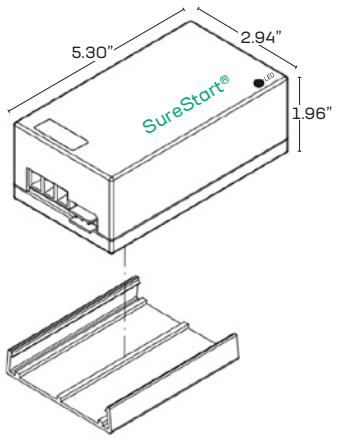
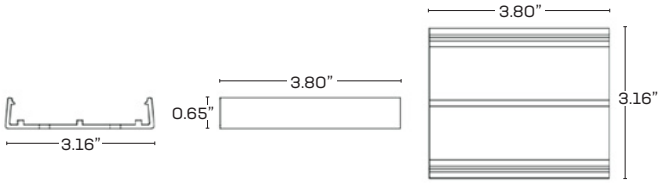
Dimensional Data:

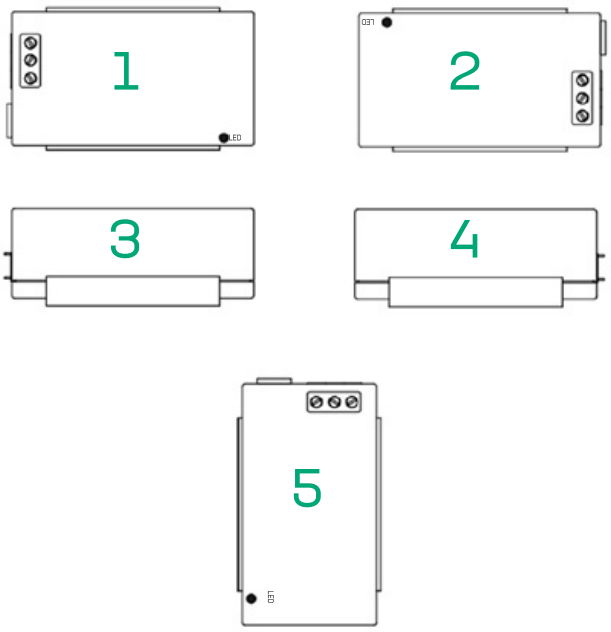
Soft Starter



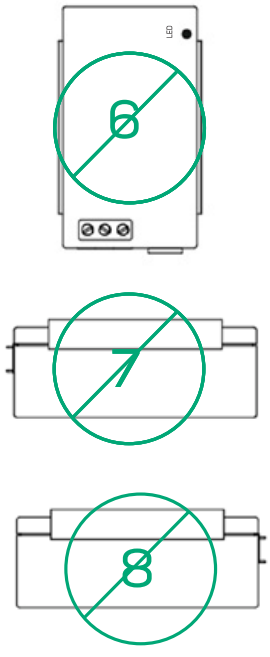
Mounting Bracket



Approved Mounting Positions:



Not Approved:



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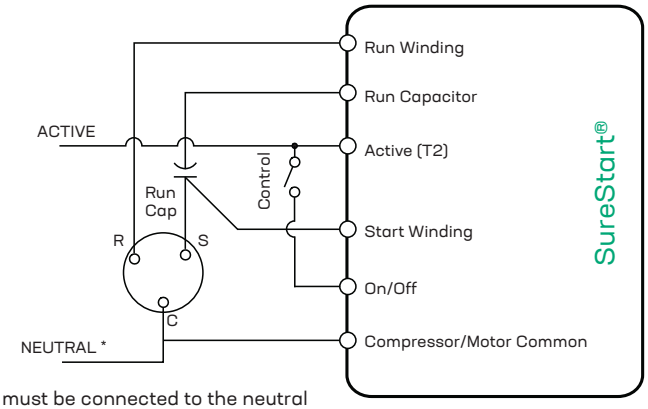
Wiring Schematics:

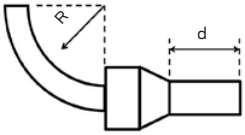


* Compressor common must be connected to the neutral

CAUTION:

SureStart® must be installed in a location that ensures that the external heat from a hot gas line, compressor discharge piping, or similar heat source will not cause damage. Minimum 3" (76 mm) clearance is recommended.

Crimp correct sized ferrules to ensure proper termination
Insertion length of ferrule "d": 11 ± 1 mm (0.43 ±0.04")
Cable bend radius "R" > 38mm (1.5") minimum.



SureStart® Single Phase LED Flash Codes (Fault Indicator):

LED indicator shall operate under the following modes.

Ready to START (2 / 5 secs)

- Waiting for "ON" command
- Reset duration (N/A)

Rapid Flash (10 / sec) : Low Voltage

- Displayed for low supply voltage before or after a softstart.
- If low voltage is detected before a start, a re-start is attempted after 60 seconds.
- If low voltage is detected after a start, a re-start is attempted after 3 minutes.

Triple Flash Every Three Seconds (3 / 3 secs): Lockout on Three Failed Starts

- Displayed after failure to start on Three consecutive start attempts.
- Re-start is attempted after 50 minutes.
- Standard lockout period is revised to 4.5 minutes after a successful start.

In circumstances where the compressor may have seized or is unable to startup due to failure of other components in the HVAC system, the software will check for three consecutive failed starts. On the third sequential failed start, the program goes into lockout for 50 minutes. On failing to get a good start even after 50 minutes, it will re-attempt start again after duration of 50 minutes. Once a good start is eventually achieved, it will reset the hardstart counter and will require 3 failed starts again to force it back into Lockout mode. Lockout can be cleared anytime through a power reset of the SureStart® device.

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Slow Flash (1 / 3 secs): Lockout on Over Current

- Displayed for "Overcurrent" in running mode of the compressor motor.
- Also displayed, if internal Klixon of the compressor trips out on overheat.
- Re-start is attempted after 10 minutes.
-

To limit the current in compressors from extending abnormally beyond its standard operating limits, SureStart® is equipped with overcurrent limit protection. Both failed start lockout and overcurrent limit protection have been designed to prevent the compressor from drawing abnormal currents in conditions not feasible for safe compressor operation. Please note that this NOT a substitute for overload protection.

Slow Steady Flash (1 / sec): Cycle Delay / Fault Mode

- Displayed for "Cycle delay" between two consecutive softstarts or other faults mentioned below.
- Re-start is attempted after a default period of 4.5 minutes.
- Other possible reasons for this fault mode indicator can be due to:
    - Incorrect wiring during installation
    - A failed soft start attempt,
    - Intermittent power loss (duration longer than 100ms), or
    - Frequency out of range.

Long Flash (5 secs on/5 secs off): Internal Fault Mode

- Displayed for internal fault in the start capacitor circuitry.
- Potential failed start capacitor or internal relay welded.
- Re-start is attempted after a default period of 4.5 minutes.

Flash Code	Definition	Time to re-start attempt
Rapid Flash (10 / 1 sec)	Low Voltage	3 mins
Triple Flash (3 / 3 secs)	Lockout on 3 failed starts	50 mins
Slow Flash (1 / 3 secs)	Lockout on overcurrent	10 mins
Steady Flash (1 / 1 sec)	Cycle delay / Faults	4.5 mins

[NOTE: LED fault indicator remains off in normal running mode.]

SureStart® 208/230V Installation and standard operation

Caution & Warnings

- All power to equipment MUST be disconnected before removing any devices.
- Unauthorised opening of the Sure Start will void warranty.
- Allow 2 minutes to discharge run capacitor before disconnecting.
- Prior to installation, ensure all start capacitors, start relays, along with hard-starters and/or any other related start assist devices, are removed.
- Do not swap the Run & Start Windings. The run winding is not connected to the run capacitor.
- Do not use any external start capacitor with the product. The start capacitor is built into the soft starter.
- SureStart must be installed in a location that ensures that the external heat from a hot gas line, compressor discharge piping, or similar heat source will not cause damage. Minimum 76mm clearance is recommended.
- Above tightening torques must be ensured.
- Loose termination can lead to heating and subsequent damage to the soft starter.
- Correctly sized ferrules must be used to ensure proper termination.
- Minimum cable bend radius at termination must be greater than 38mm(1.5 in).

Field Wiring Specifications

Wire Range:

- 2.5 to 6 mm2 (8 to 12 AWG) Cu, stranded, for terminals (Run Winding (R) and Active)
- 1.5 mm2 (12 to 16 AWG) Cu, stranded, for terminals (Run Capacitor (RC), Start Winding (S), ON/OFF, and Compressor/Motor Common (C)
- 0.75 to 1.5 mm2 (14 to 18 AWG) Cu, stranded, for terminal (ON/OFF)
- Tightening Torque: 1.3 Nm (11.5 lbs-in) large terminal, 0.5 Nm (4.5 lbs-in) small terminal.
- Field wiring conductors shall be rated 167°F [75°C] or higher.
- Minimum end use enclosure size space: 250mm x 200mm x 150mm (10" x 8" x 6")

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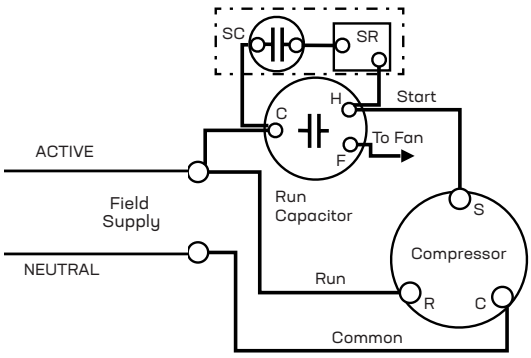
Suitable for use on a circuit capable of delivering no more than 5000rms symmetrical amperes, 240 volts maximum, when protected by a non-time delay RK5 fuse or circuit breaker rated 80A, or a time delay fuse rated 70A. The device does not provide current limiting control or equivalent.

SureStart® is **NOT** an overcurrent protection device and must **NOT** be used as a replacement for any primary circuit overcurrent protection.

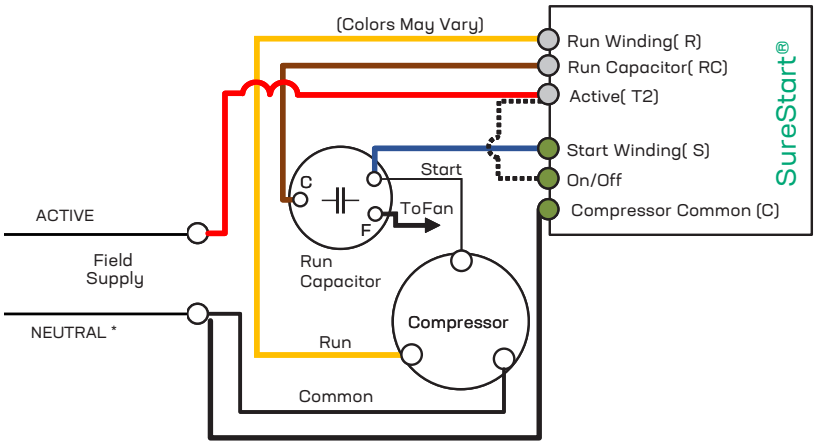
Soft starter must be installed by qualified/licensed technician.

	SureStart® Terminal		Destination Connection	
CONNECTION	**NAME**	**CONNECTION TYPE**	**NAME**	**CONNECTION TYPE**
1	Run Winding	1/2- inch (12mm) strip/ferrule	Run Winding	-
2	Run Capacitor	1/2- inch (12mm) strip/ferrule	Capacitor (C)	Flagged Quick Connect
3	Active	1/2- inch (12mm) strip/ferrule	Contactor	1/2-inch (12mm) strip
4	Start Winding	1/3- inch (8mm) strip/ferrule	Capacitor (H)	Flagged Quick Connect
5*	ON/OFF	1/3- inch (8mm) strip/ferrule	Active	1/2-inch (12mm) strip
6	Compressor Common	1/3- inch (8mm) strip/ferrule	Contactor	Flagged Quick Connect

Conventional Wiring



With Surestart Installation



* Compressor common must be connected to the neutral

OPERATION:

- After the thermostat connects the ON to ACTIVE, the compressor will start after a 2 seconds delay. If the motor does not start (due to back pressure, etc.), the start sequence is terminated within 1 second. The SureStart forces a 5 minute delay and then tries again.
- If the ON command is enforced before first power up, SureStart will enforce a one-off 2 minute delay to prevent nuisance operation.
- SureStart has an adaptive anti-cycle delay timer. The maximum number of evenly distributed starts per hour is limited to 12. However, under abnormal conditions, the compressor can be cycled back on with minimum delay, for example during a defrost cycle (within 30 seconds).
- Compressor is turned off when ON command is disconnected from ACTIVE.
- The ON control lead will read approximately 200V floating with relation to NEUTRAL in the OFF state and full ACTIVE line voltage when requested to start.

PROTECTION:

- SureStart offers low voltage protection both before start and in running mode. Voltage detection levels include hysteresis to help prevent stalling at startup.
- SureStart will safely shutdown the compressor if the internal Klixon trips or if it detects a reversed motor rotation.
- SureStart offers Overcurrent shutdown if the compressor running amperage exceeds safe limits. Please note this is an instantaneous protection feature, not a overload protection which usually requires measuring heating over a period of time.
- Should the SureStart fail to start the compressor in three consecutive start attempts, it will enforce a long 50 minute shutdown to allow the start conditions to normalise before attempting another start.

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Declaration of Conformity

SureStart® technology has been tested and certified under the following standards that apply.
For United States, Canada, & Mexico
Conforms to UL60947-1 & UL60947- 4-2
Certified to CSA C22.2 #60947-1 & 60947-4-2

For European Union, Australia, and other countries accepting CE Marking
Low Voltage Directive (LVD) 2014/35/EU
IEC/ EN 60947-4-2: Low Voltage switchgear and control gear: contactors and motor-starters
IEC/ EN 60335-1 & IEC/ EN 60335-2-40: Safety requirements for electrical heat pumps, air conditioners, dehumidifiers.

Electromagnetic Compliance (EMC) 2014/30/EU
IEC/ EN 55014-1 Conducted & radiated emissions
IEC/ EN 55014-2 Electromagnetic compatibility Part 2: Immunity
IEC/ EN 61000-3-11 Flicker
IEC/ EN 61000-3-12 Harmonics emissions
IEC/ EN 61000-3-2 Harmonic current emissions
IEC/ EN 55014-2 Conducted & radiated immunity
IEC/ EN 61000-6-1 Immunity for residential, light commercial, and light industrial
IEC EN 61000-3-3 Voltage fluctuations
IEC/ EN 61000-4-2 Electrostatic discharge (ESD) immunity test
IEC/ EN 61000-4-3 Radiated, radio-frequency, electromagnetic field immunity test
IEC/ EN 61000-4-4 Electrical fast transient/burst immunity test
IEC/ EN 61000-4-5 Surge Immunity Test
IEC/ EN 61000-4-6 Conducted radio-frequency immunity
IEC/ EN 61000-4-11 Voltage dips, short interruptions, and voltage variations immunity tests
EMC compliance tested in accordance with: ANSI C63.4, EN55022, CISPR16 and CISPR22

WARNING:

Proposition 65 Declaration: This product can expose you to chemicals including Bisphenol A and Ethylene Glycol, which are known to the State of California to cause cancer or birth defects or other reproductive harm. For more information, go to www.P65Warnings.ca.gov.

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