SureStart
Single Phase Soft Starters

Submittal Data
English Language/IP Units
04/14

Contact Information:
Hyper Engineering, Pty. Ltd.
4 / 14 Ralph Black Dr
Wollongong Nth, NSW 2500
AUSTRALIA

www.hypereng.com
sales@hypereng.com
(877) 304-0724

CE
ETL
RoHS
UL

The manufacturer works continually to improve its products. As a result, the design and specifications of each product at the time of order may be changed without notice. Purchaser’s approval of this data set signifies that the equipment is acceptable under the provisions of the job specification. Statements and other information contained herein are not express warranties and do not form the basis of any bargain between the parties, but are merely the manufacturer’s opinion or commendation of its products.

Model Nomenclature

<table>
<thead>
<tr>
<th>Type</th>
<th>Contactor Function</th>
<th>Nominal Voltage Rating</th>
<th>Vintage</th>
<th>Auxiliary Alarm Relay</th>
<th>Standard</th>
<th>Full Load Amps (FLA) (Corresponds to Compressor Run Load Amps (RLA))</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>P – Primary1</td>
<td>0 – 115/60/1</td>
<td>B – Current, Single-Phase</td>
<td>N – None</td>
<td>S – Standard</td>
<td>12-20 – (115V Single Phase) 08-16 – (230V Single Phase) 16-32 – (230V Single Phase)</td>
</tr>
<tr>
<td>S</td>
<td>S – Secondary2</td>
<td>1 – 208-230/50-60/1</td>
<td></td>
<td>S – Standard</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes:
1. Not available in the United States.
2. Primary includes a contactor. Secondary operates in series with contactor.

Rev.: 27 February 2014
The manufacturer works continually to improve its products. As a result, the design and specifications of each product at the time of order may be changed without notice. Purchaser’s approval of this data set signifies that the equipment is acceptable under the provisions of the job specification. Statements and other information contained herein are not express warranties and do not form the basis of any bargain between the parties, but are merely the manufacturer’s opinion or commendation of its products.

Dimensional Data

Approved Mounting Positions

Not Approved
## Physical Characteristics

<table>
<thead>
<tr>
<th>SureStart Model</th>
<th>Single Phase</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SS0B12-20</td>
</tr>
<tr>
<td>Storage Temperature, °F [°C]</td>
<td>-40 [-40] to 185 [85]</td>
</tr>
<tr>
<td>Case Material</td>
<td>ABS Flameproof UL-94 V0</td>
</tr>
<tr>
<td>IP Rating</td>
<td>IP207</td>
</tr>
<tr>
<td>Line Conductor, AWG</td>
<td>14 - 6</td>
</tr>
<tr>
<td>Line Conductor Strip Length, in. [mm]</td>
<td>0.47 [12]</td>
</tr>
<tr>
<td>Minimum Line Conductor Length, in. [mm]</td>
<td>15.7 [400]</td>
</tr>
<tr>
<td>Line Terminal Tightening Torque, in-lbs [N-m]</td>
<td>11.5 [1.3]</td>
</tr>
<tr>
<td>Start Winding &amp; Compressor Common, AWG</td>
<td>16-12</td>
</tr>
</tbody>
</table>

## Operating Characteristics

<table>
<thead>
<tr>
<th>SureStart Model</th>
<th>Single Phase</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SS0B12-20</td>
</tr>
<tr>
<td>Rated Voltage, VAC</td>
<td>115</td>
</tr>
<tr>
<td>Rated Phase</td>
<td>1</td>
</tr>
<tr>
<td>Rated Frequency, Hz</td>
<td>60</td>
</tr>
<tr>
<td>Maximum Load Current, Amps</td>
<td>20</td>
</tr>
<tr>
<td>Maximum Starting Current, Amps</td>
<td>35</td>
</tr>
<tr>
<td>Control input, VAC</td>
<td>Auto-Start at Power Up</td>
</tr>
<tr>
<td>Number of Starts/Hour (Evenly Distributed)</td>
<td>15</td>
</tr>
<tr>
<td>Short Circuit Current Rating (SCCR), kA</td>
<td>5</td>
</tr>
<tr>
<td>Shutdown on Low Voltage</td>
<td>98</td>
</tr>
<tr>
<td>Minimum Startup Voltage</td>
<td>103</td>
</tr>
<tr>
<td>Maximum High Voltage</td>
<td>126</td>
</tr>
<tr>
<td>Operating Ambient, °F [°C]</td>
<td>-4 [-20] to 140 [60]</td>
</tr>
<tr>
<td>Life Expectancy (At Maximum Rated Load)</td>
<td>Minimum 100,000 Operations</td>
</tr>
</tbody>
</table>

## Software Characteristics

<table>
<thead>
<tr>
<th>SureStart Model</th>
<th>Single Phase</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SS0B12-20</td>
</tr>
<tr>
<td>Software Fault Delay, seconds</td>
<td>300</td>
</tr>
<tr>
<td>Power Loss Reset, milliseconds</td>
<td>100</td>
</tr>
<tr>
<td>Contactor Chatter Protection</td>
<td>Yes</td>
</tr>
<tr>
<td>Motor Reversal Protection</td>
<td>Yes</td>
</tr>
<tr>
<td>Software Optimization</td>
<td>Auto tune</td>
</tr>
</tbody>
</table>
SureStart Compatibility Guide

<table>
<thead>
<tr>
<th>Nominal Supply Voltage*</th>
<th>Single Phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>115/60/1</td>
<td>SS0B12-20</td>
</tr>
<tr>
<td>208-230/50-60/1</td>
<td>SS1B08-16</td>
</tr>
<tr>
<td>Full Load Amperage, FLA (Typical)</td>
<td>12-20 08-16 16-32</td>
</tr>
</tbody>
</table>

* - Voltage/Hz/Phase

Wiring Schematics

SureStart

RUN WINDING
RUN CAPACITOR
ACTIVE (T2)
START WINDING
NOT USED
COMPRESSOR COMMON

COMP CONT
L2 T2
R S

SureStart

RUN WINDING
RUN CAPACITOR
ACTIVE (T)
START WINDING
NOT USED
COMPRESSOR/MOTOR COMMON

COMP CONT
L T
R S

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” [76mm] clearance is recommended.

The manufacturer works continually to improve its products. As a result, the design and specifications of each product at the time of order may be changed without notice. Purchaser’s approval of this data set signifies that the equipment is acceptable under the provisions of the job specification. Statements and other information contained herein are not express warranties and do not form the basis of any bargain between the parties, but are merely the manufacturer’s opinion or commendation of its products.

04/14 5
SureStart Mode of Operation

SureStart - Basic Operation

1. **Contactor Closes**
   - (t = 0 sec)

2. **SureStart turns ON**
   - Initial Motor Diagnostics
   - (t = 0.5 sec)

3. **Initial Power on Delay**
   - (t = 1 sec)

4. **Is Voltage in range?**
   - **NO**
     - **Fault Delay**: 50 secs
   - **YES**
     - **Fault Delay**: 180 seconds

5. **Begin Motor Soft Start**

6. **Was Motor Start successful?**
   - **NO**
     - **Shutdown Motor**
   - **YES**
     - **Is Voltage in range?**
       - **NO**
         - **Shutdown Motor**
       - **YES**
         - **SureStart Continuous Motor Diagnostics**

7. **Fault Delay**
   - Based on type of fault

8. **Is there a fault?**
   - **NO**
     - **Continue in Running Mode**
   - **YES**
     - **Contactor Opens**
     - **SureStart turns OFF**

**NOTE:**
- *'Fault Delay' is the cycle waiting time before a re-start is attempted. Refer to LED flash codes for any fault diagnostics.*
- **'Operating Characteristics table for cut-off voltage ranges***
SureStart Single Phase LED Flash Codes

**Led Flash Codes**

A Red LED indicator will flash under the following conditions.

**[NOTE: LED fault indicator is turned off in normal running mode.]**

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

**Flash Code (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 50 seconds.
- If Low voltage is detected after a start, a re-start is attempted after 3 minutes.

**Flash Code (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 3 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 mins. On failing to get a good start even after 50 mins, it will re-attempt start again after duration of 50 mins. 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.

**Flash Code (Slow Flash (1 / 3 secs): Lockout on Over current)**

- Displayed for “Overcurrent” in running mode of the compressor motor.
- Overcurrent limit is “25A for 08-16A version” and “50A for 16-32A rated version”.
- 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 stated capacities, SureStart is also equipped with Overcurrent limit protection. For models rated from 16-32A, SureStart is designed to trip out in overload conditions exceeding 50A. In smaller models, it is designed to cutoff power to the compressor if the current drawn exceeds 25A. On overcurrent lockout, SureStart attempts a re-start automatically after 10 minutes.

Both failed start lockout and overcurrent limit protection have been designed to prevent the compressor from drawing abnormal currents in conditions not feasible for the compressor operation.

**Flash Code (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 3 minutes.
- Other possible reasons for this Fault mode indicator can be due to
  - incorrect wiring during installation,
  - a failed Softstart attempt,
  - intermittent power loss (duration longer than 100ms),
  - frequency out of range, or
  - failed run capacitor.
Declaration of Conformity

SureStart technology has been tested and certified under the following standards that apply.

For United States, Canada, & Mexico

UL 508/ CSA 22.2 # 14 (ETL control # 4004190)

For European Union, Australia, and other countries accepting CE Marking

Low Voltage Directive (LVD)
IEC/ EN 60947-4-2: Low Voltage switchgear and control gear: contactors and motor-starters

Electromagnetic Compliance (EMC)
IEC/ EN 55014-1 Conducted & radiated emissions
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
CISPR16 and CISPR22
VCCI V-3/2007.04
Definitions

Case Material - SureStart enclosure material

Line conductor - Wiring that connects to the “run winding” and “active” terminations on single phase SureStart.

Line Conductor Strip Length - This is the length of insulation stripped away in order to properly insert into the SureStart.

Line Terminal Tightening Torque - The necessary torque needed to secure line conductors to the SureStart.

Rated Voltage - This is the nominal supply voltage to the SureStart.

Rated Frequency - This is the nominal frequency, Hz, of the power supply to the SureStart.

Maximum Starting Current - The maximum current at motor startup for the largest motor that can be applied to the SureStart.

Control Input - Any AC/DC voltage that needs to be applied in addition to active supply to SureStart.

Short Circuit Current Rating - This is the maximum fault current that can be applied without damaging the SureStart.

Shutdown on Low Voltage - SureStart will shutdown motor if the supply voltage falls below this threshold.

Maximum High Voltage - The maximum voltage that can be applied to SureStart.

Maximum Operating Ambient - The maximum temperature the SureStart can properly operate.

Maximum Load Current - This is the maximum current the SureStart is capable of handling.

Minimum Startup Voltage - SureStart will not attempt a motor start if the supply voltage is below this limit.

Software Fault Delay - This is the time delay that will initiate if the SureStart encounters a problem during motor operation.

Initial Power Delay - The time delay from when the SureStart receives power and motor start occurs.

Power Loss Reset - SureStart is designed to turn motor off in the event power is lost for more than this time period.

Contactor Chatter Protection - SureStart can detect faulty contactor conditions and shut the motor off.

Motor Reversal Protection - SureStart will prevent a single phase motor from reverse rotation due to intermittent power outages.

Software Optimization - The maximum number of starts required to achieve optimized motor starting.
The manufacturer works continually to improve its products. As a result, the design and specifications of each product at the time of order may be changed without notice. Purchaser’s approval of this data set signifies that the equipment is acceptable under the provisions of the job specification. Statements and other information contained herein are not express warranties and do not form the basis of any bargain between the parties, but are merely the manufacturer’s opinion or commendation of its products.
# Revision Guide

<table>
<thead>
<tr>
<th>Pages</th>
<th>Description</th>
<th>Date</th>
<th>By</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Updated Nomenclature for New Revision</td>
<td>22 Apr 2014</td>
<td>DS</td>
</tr>
<tr>
<td>4</td>
<td>Updated Single Phase Dimensional Drawing</td>
<td>22 Apr 2014</td>
<td>DS</td>
</tr>
<tr>
<td>5</td>
<td>Updated Physical and Operational Characteristics</td>
<td>22 Apr 2014</td>
<td>DS</td>
</tr>
<tr>
<td>7</td>
<td>Updated Operation Flow Chart</td>
<td>22 Apr 2014</td>
<td>DS</td>
</tr>
<tr>
<td>8</td>
<td>Added LED Flash Code Description</td>
<td>22 Apr 2014</td>
<td>DS</td>
</tr>
<tr>
<td>9</td>
<td>Updated Declaration of Conformity</td>
<td>22 Apr 2014</td>
<td>DS</td>
</tr>
<tr>
<td>10</td>
<td>Updated Definitions</td>
<td>22 Apr 2014</td>
<td>DS</td>
</tr>
<tr>
<td>5</td>
<td>Updated Physical and Operational Characteristics</td>
<td>21 Nov 2013</td>
<td>DS</td>
</tr>
<tr>
<td>6</td>
<td>Updated SureStart Compatibility Guide</td>
<td>21 Nov 2013</td>
<td>DS</td>
</tr>
<tr>
<td>All</td>
<td>Updated Model Nomenclature</td>
<td>10 Oct 2013</td>
<td>DS</td>
</tr>
<tr>
<td>All</td>
<td>First Published</td>
<td>26 Jun 2013</td>
<td>DS</td>
</tr>
</tbody>
</table>