

Smart Start Assist - Field Install Kit (Part#8733920430)

For SM/LM Single Phase Units



BOSCH

Installation Manual

6 720 808 954 (2013/10)

Contents

INTRODUCTION	3
Specifications	3
Installation of Smart Start Assist	4
Hardware Installation	4
Wiring Terminations	6
Perform Functionality Check and Install Cover	7
Standards	9
Mode of Operation	9
Mode of Operation (cont.)	10
Voltage Interruptions	11
Voltage Dips	12
LED Status Indication	13
Flashing Sequence	13
Notes	14

Key to symbols and safety instructions

Key to symbols

Warnings



Warnings in this document are identified by a warning triangle printed against a grey background. Keywords at the start of a warning indicate the type and seriousness of the ensuing risk if measures to prevent the risk are not taken.

The following keywords are defined and can be used in this document:

- **NOTE** indicates a situation that could result in damage to property or equipment.
- **CAUTION** indicates a situation that could result in minor to medium injury.
- **WARNING** indicates a situation that could result in severe injury or death.
- **DANGER** indicates a situation that will result in severe injury or death.

Important information



This symbol indicates important information where there is no risk to people or property.

General Safety Instructions



DANGER: Installation and servicing of this equipment can be hazardous due to system pressure and electrical components. Only trained and qualified personnel should install, repair, or service the equipment.



DANGER: Before performing service or maintenance operations on the system, turn off main power to the unit and assure power is disconnected before servicing this appliance. Electrical shock could cause personal injury or death.

Smart Start Assist Kit Contents

Description	Qty
Smart Start Assist	1
Smart Start Assist metal cover	1
Screw # 8 x 0.375	3
Smart Start Assist Harness	1
Insulated Snap Bushing 7/8"	1
Mounting Base	1

Required Tools:

- small flat-head screwdriver
- phillips screwdriver

INTRODUCTION

The BOSCH Smart Start Assist Kit is designed for SM and LM single phase units. The kit contains two main parts; both are installed on top of the unit's electrical box (e-box).

The Smart Start Assist attaches to the e-box top via a mounting plate, that, itself attaches to the Smart Start Assist as shown in Figure #1.

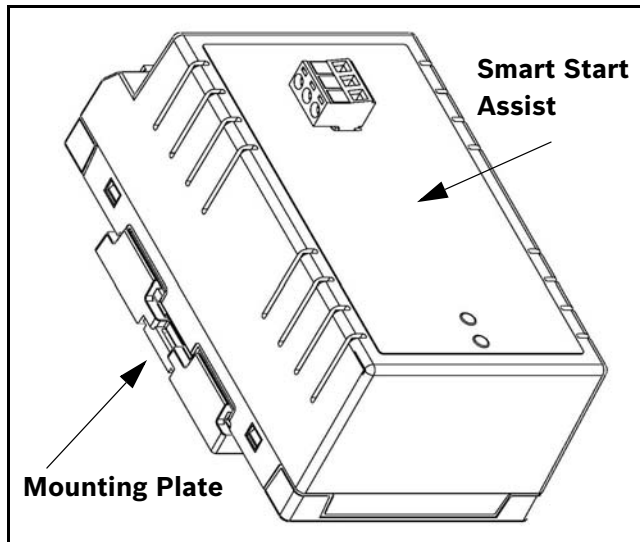


Figure # 1 Smart Start Assist - ISO View

Specifications

Rated Operational Voltage:	208/230VACrms +/- 15% 50-60 Hz
Environmental Operating Range:	-4° to 149°F (-20° to 65°C); < 95% @ 40 C relative humidity, non-condensing
Degree of Protection:	IP20
Overvoltage:	Category II
Operational Rated Current:	32 Amps
Max Starting Current:	80A ACrms
Min Full Load Current:	80A ACrms
Min time between starts:	6 minutes
Min time between stop to start:	3 minutes



See Standards on Pg 9 for more information.

Access to Internal Components for Vertical (VT) Units



To Access Internal Components

- HZ Units, unscrew visible screws on panels & remove.
- VT Units, please proceed to step 1.



See LM IOM for further reference. Manual is located inside of the unit.

1. Using a Flat screw driver remove and retain Panel Belt by inserting the screwdriver into the slot and releasing the catch. (Figures #2 and #3)



Heat pumps are supplied with panel belt which needs to be removed to access screws for panel removal. The belt is held in place by a clip on one side and an interference fit on the other end.

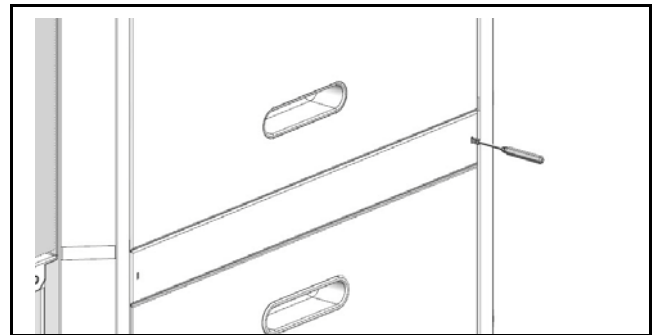


Figure # 2

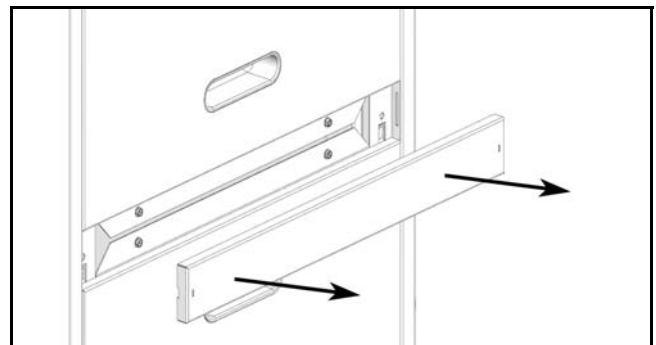


Figure # 3

2. Remove and retain lower panel by removing (3)three screws. (Figure #4)

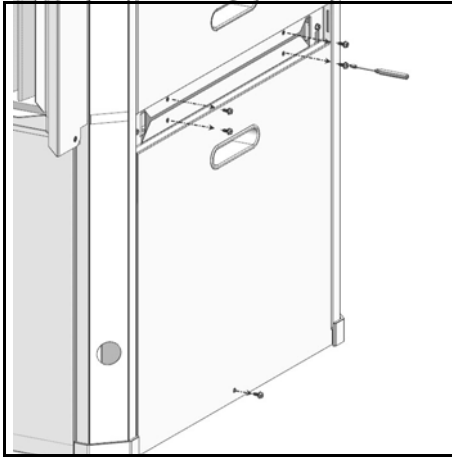


Figure # 4

3. Remove and retain upper panel by lifting up and out as shown in Figure #5.

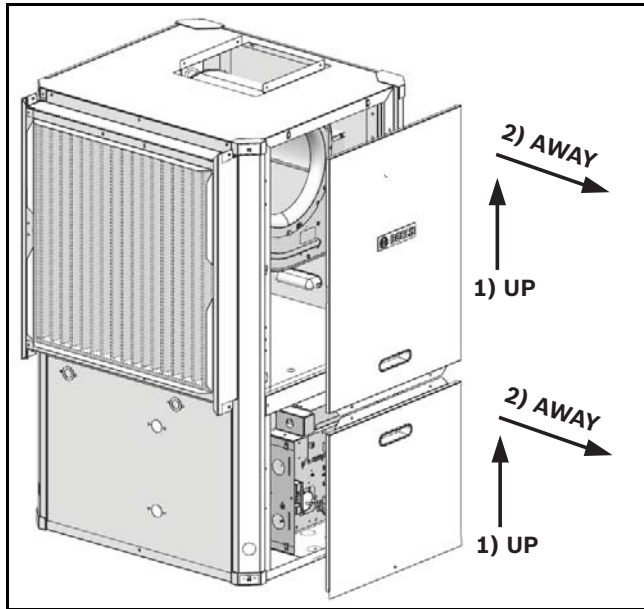


Figure # 5

4. Repeat steps 1–3 for other sides as necessary.

INSTALLATION OF SMART START ASSIST

The Smart Start Assist Kit includes all components required for installation. The Smart Start Assist (SSA) module attaches to the unit by clipping onto its plastic holder (base).

The Smart Start Assist module can be mounted with its terminal block facing left or right, depending on the unit configurations (left or right discharge air). The unit's e-box has two (2) configurations, as shown in Figure #7.

1. Remove power to the unit. Be sure to follow all applicable state and federal laws and regulations concerning lock out and tag out for the power source. Use a multi-meter to verify there is no power at the unit.



Unit may contain two power sources. Ensure both are de-energized, locked out and tagged out.

Hardware Installation

Follow these steps to mount the Smart Start Assist (SSA) module on top of the electrical control box.



Both Horizontal (HZ) and Vertical (VT) configurations use the same mounting procedure.

1. Remove the plastic base from the Smart Start Assist module. To do this, use a small flat screwdriver and press outwards on the clip-on tabs, located on either side of the module. (Fig #6)
2. Align the mounting base with pilot holes on top of the e-box.
3. Secure plastic base to control box by using provided screws. [two (2) #8 screws]

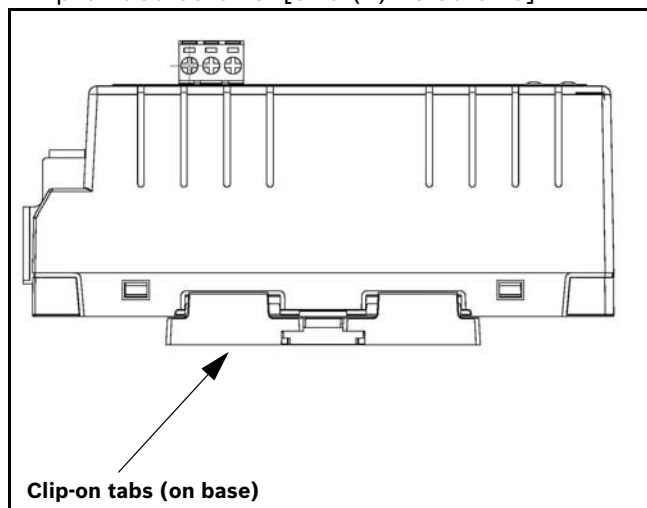


Figure # 6 Smart Start Assist - Side View



The Smart Start Assist (SSA) module comes with a termination block located at the front of the device.



Electrical Box (e-box) shown in the figure is for **reference only**. Actual components in the unit's electrical box will vary depending on the installed options.



Make sure all wires are routed through the plastic bushing on the sheet metal cover knockout.

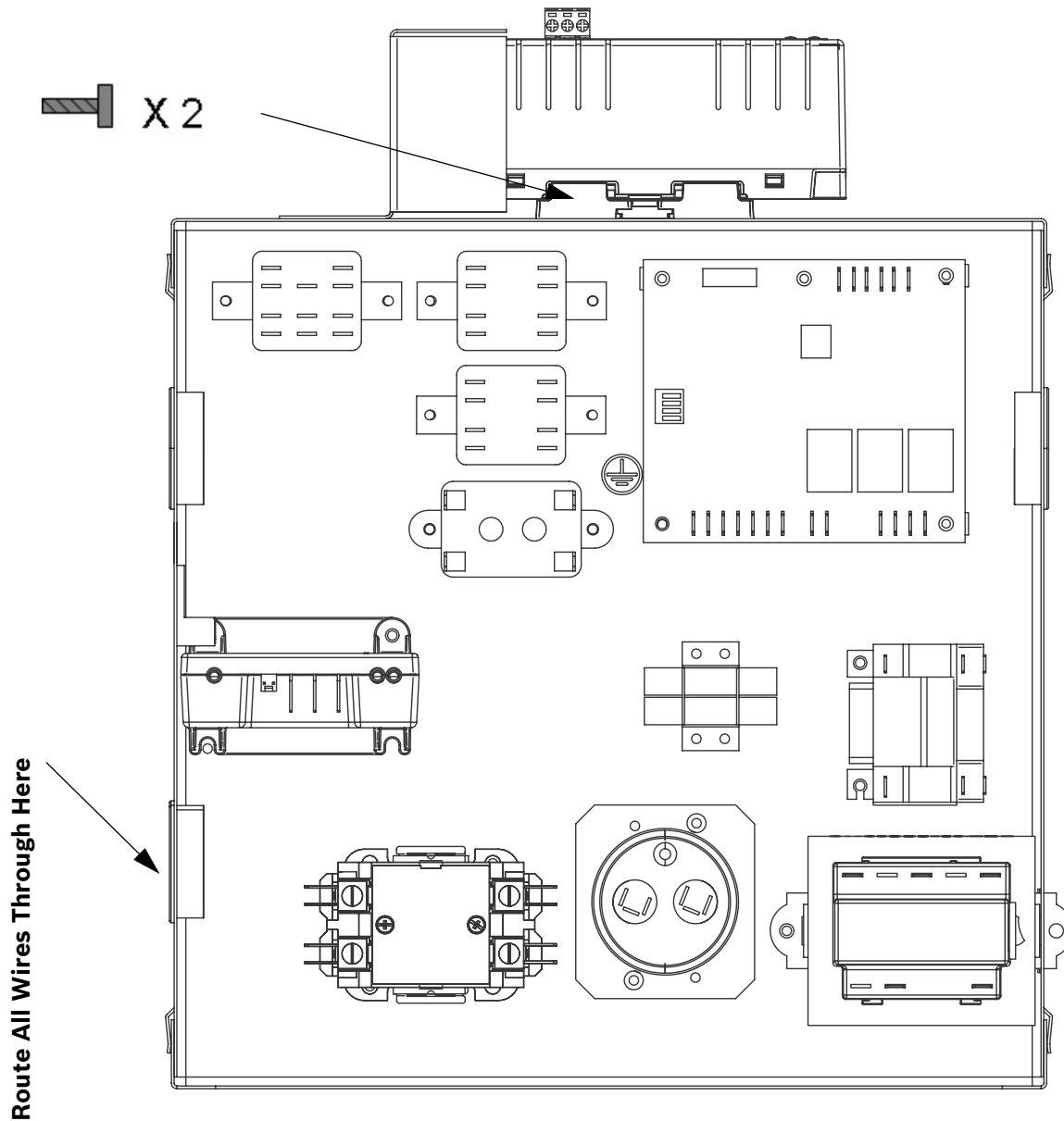


Figure # 7 Smart Start Assist Mounting Location

Wiring Terminations

The Smart Start Assist (SSA) module comes with a termination block located at the front of the device. The terminal block is labeled as shown in Figure #8.

The Smart Start Assist kit comes with its own respective harness needed for compressor high voltage re-wiring.



The wires are labeled according to the terminal block on the Smart Start Assist, compressor contactor and run capacitor terminals for easy identification.



The wires that terminate on the Smart Start Assist (SSA) do not have any crimped-on terminals.

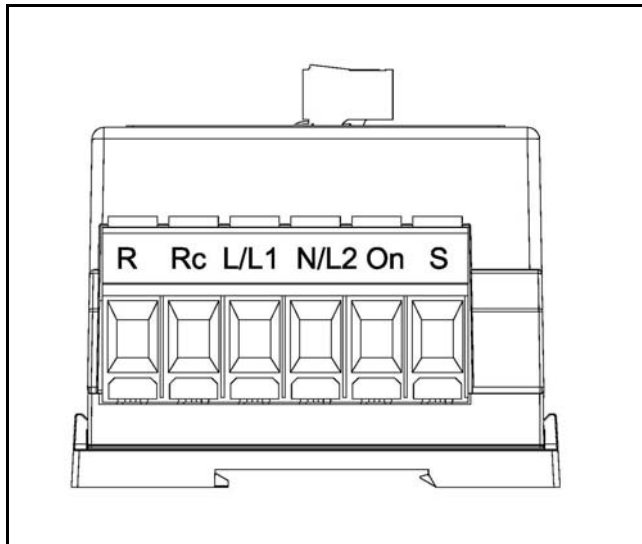


Figure # 8 Smart Start Assist Terminations

1. Remove the compressor wires from T1 and T2 terminals side on the compressor contactor. Pull them out of the e-box. See Figure #9.
2. Locate the Smart Start Assist terminal cover and make sure all wires that are to be terminated on the SSA terminal block pass through the 7/8" bushing. (Provided in kit, see Figure #7 for location.)
3. Terminate the compressor R (red) wire on the R position from the SSA terminal block.
4. Terminate the C (black) wire on the N/L2 position of the terminal block, along with the wire labeled N/L2 from the SSA harness.

5. Terminate the remainder of wires on the SSA terminal block by following the labels ON, S and RC.
6. Route the SSA harness through the high voltage knock out on the e-box. See Figure #7.
7. Disconnect the harness that connects the run capacitor to the compressor contactor and remove it from the unit.
8. Terminate the wires from the supplied wiring harness, labeled CC1-L1 and CC2-L2 on compressor contactor (CC) L1 and L2 terminals.
9. Terminate wire labeled CC-T1 on compressor contactor T1 terminal.
10. Terminate the C1-1 (black) wire on the same terminal that the compressor S (yellow) wire is terminated (run capacitor).
11. Terminate the C1-2 (red) wire on the open terminal of the run capacitor.

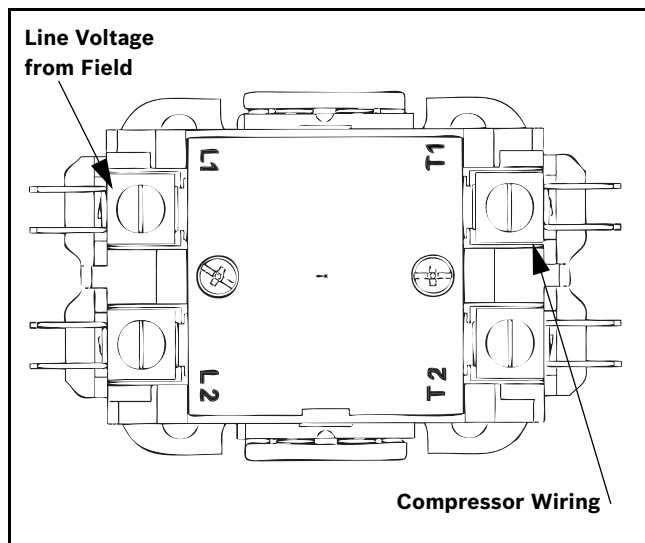


Figure # 9 Compressor Contactor

Perform Functionality Check and Install Cover



This diagram is shown as optional in all LM and SM products wiring diagrams. For more detail please reference the LM/SM manual.

1. Verify that the installation and termination of all the wires match the electrical schematic shown in Figure #10.

2. Install the sheet metal plate that was provided in this kit, and cover the SSA terminal block.

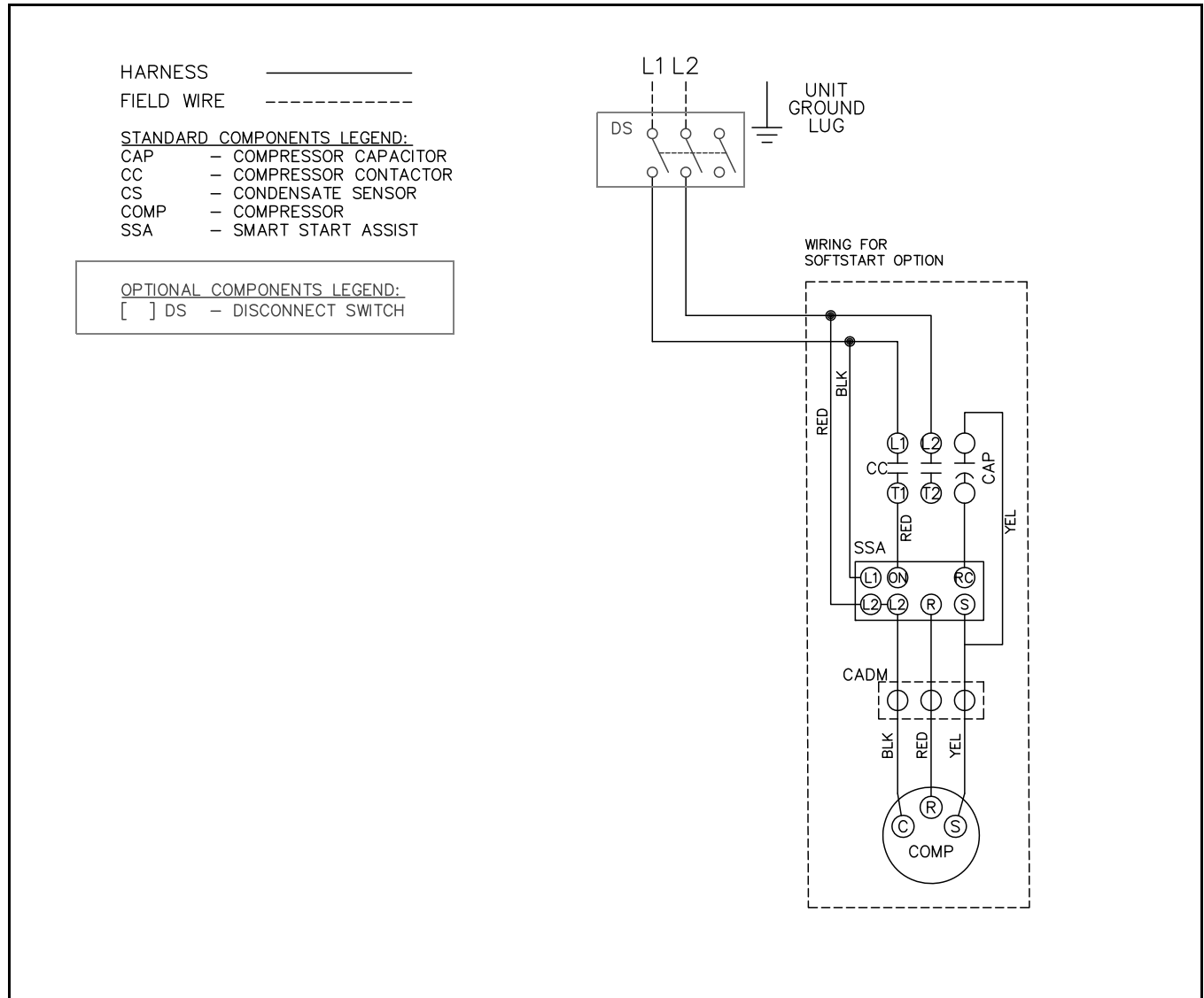


Figure # 10 Smart Start Assist Wiring Schematic

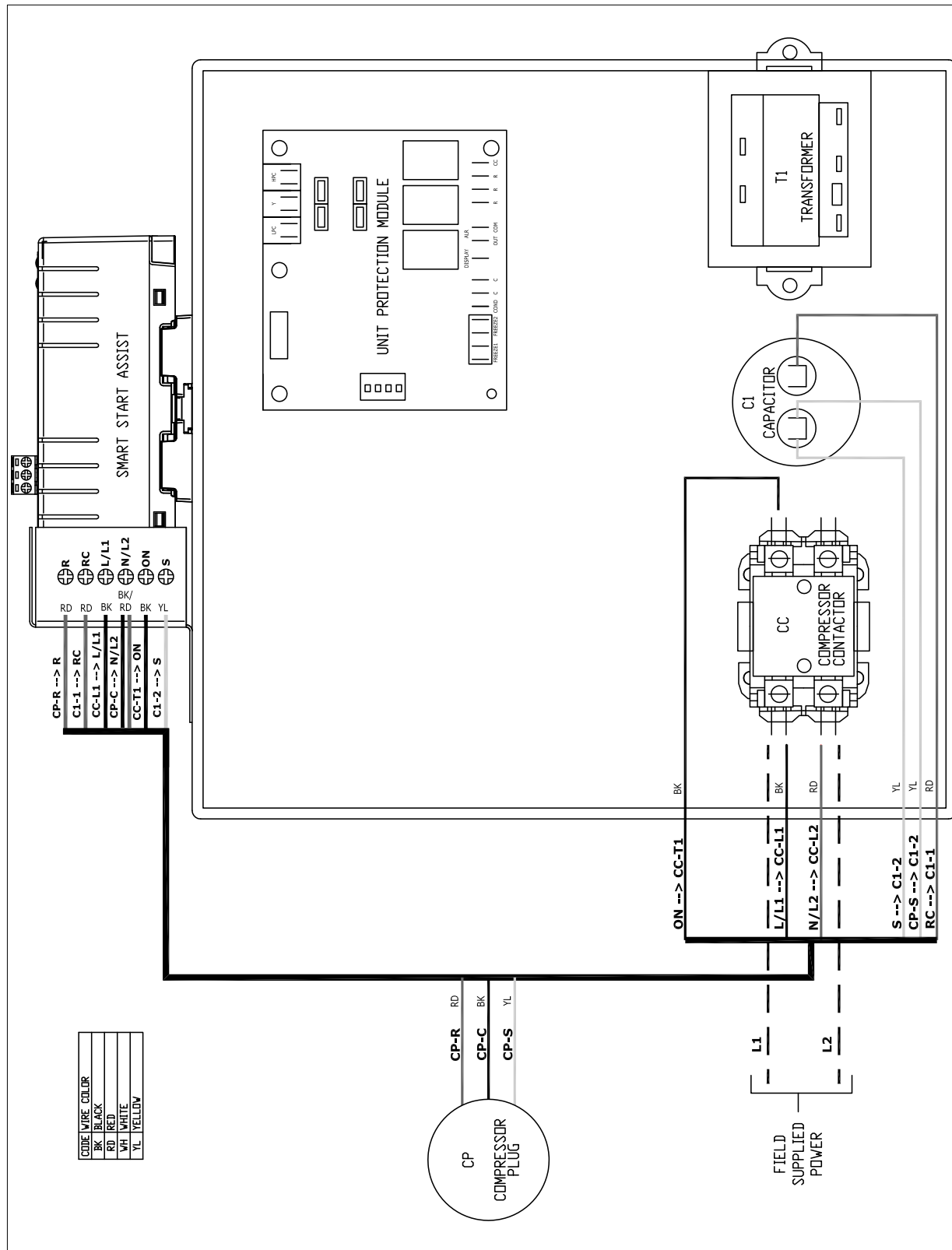


Figure # 11 SSA Harness Wiring Guide

STANDARDS

Approvals	UL (E172877), cUL		
CE Marking	LVD	IEC/ EN 60947-4-2/ EN60335-1/ EN 60335-2-40 ^{2,3}	Conducted radio-frequency immunity
EMC : Immunity		IEC/ EN 61000-6-1, EN 55014-2	IEC/ EN 61000-4-6, PC1 3V/m, 0.15-80MHz
Emission		IEC/ EN 55014-1	Voltage dips & interruptions ⁴
		IEC/ EN 61000-3-11, IEC/ EN 61000-3-12	IEC/ EN 61000-4-11
Electrostatic Discharge ESD Immunity		IEC/ EN 61000-4-2 8kV, PC2 air discharge	Continuous disturbance
Electrical fast transient/ Burst Immunity		4kV, PC2 contact IEC/ EN 61000-4-4	IEC/ EN 55014-1 ¹
Output		2kV, PC2	Radio interference voltage emissions (conducted)
Input		1kV, PC2	CISPR 11 IEC/ EN 55011, Class B ¹
Electrical Surge Immunity		IEC/ EN 61000-4-5, PC2	Disturbance power
Output, line to line		1kV	CISPR 14 IEC/ EN 55014-1 ¹
Output, line to earth		2kV	Harmonics
Input, line to line		500V	IEC/ EN 61000-3-2 ¹ IEC/ EN 61000-3-12 ¹
Input, line to earth		1kV	Flicker (Load Conditions apply)
Radiated Radio Frequency		EN 61000-4-3, PC1 3V/m, 80-2700MHz	IEC/ EN 61000-3-11 ¹

1. Applicable when current limit is ≤ 45 AACrms

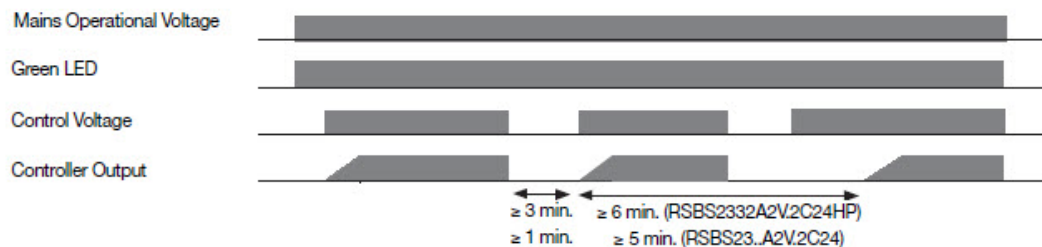
2. Safety of household and similar electrical appliances. Particular requirements for electrical heatpumps, airconditioners and dehumidifiers.

3. Auxiliary relay terminal (available on RSBS23..A2V22C24) is not suitable to be connected to accessible SELV circuits.

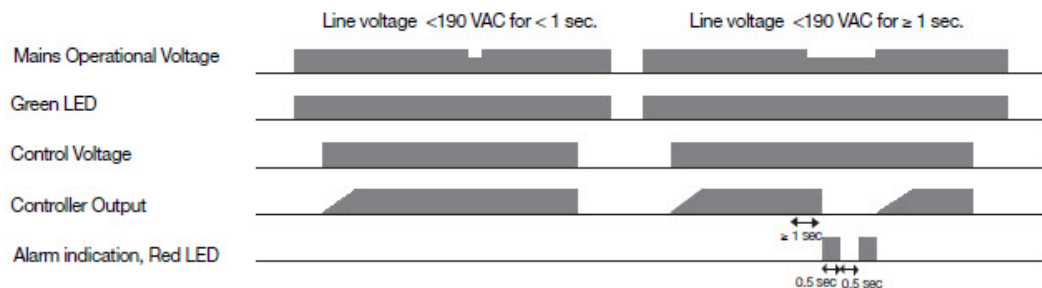
4. Refer to voltage dips and interruptions section for mode of operation.

MODE OF OPERATION

Normal Condition (Note 3)

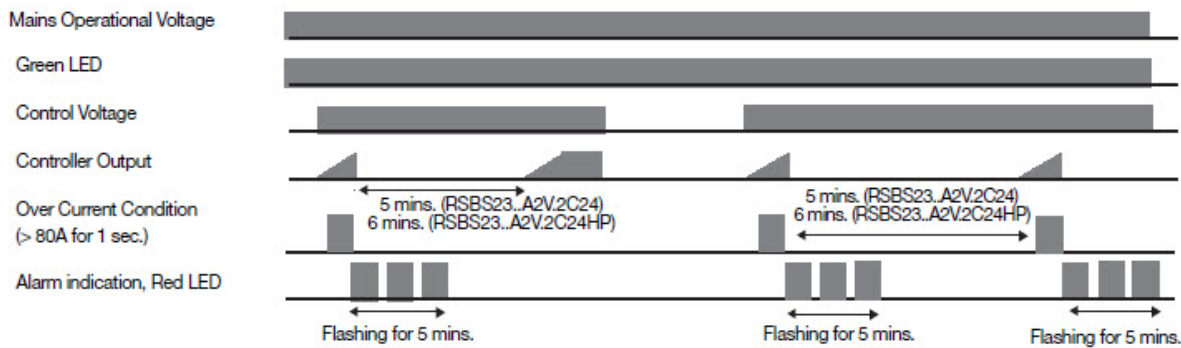


Undervoltage Condition (Note 4)

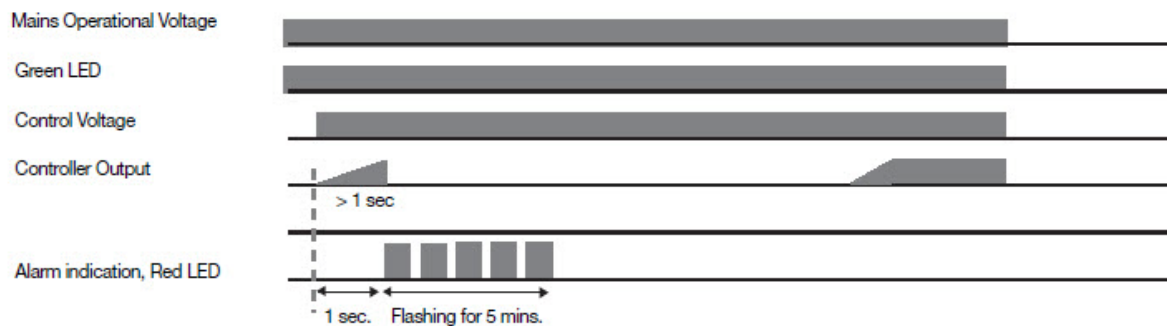


Mode of Operation (cont.)

Overcurrent Condition (Note 5)



Incomplete Ramp Alarm (Note 7)

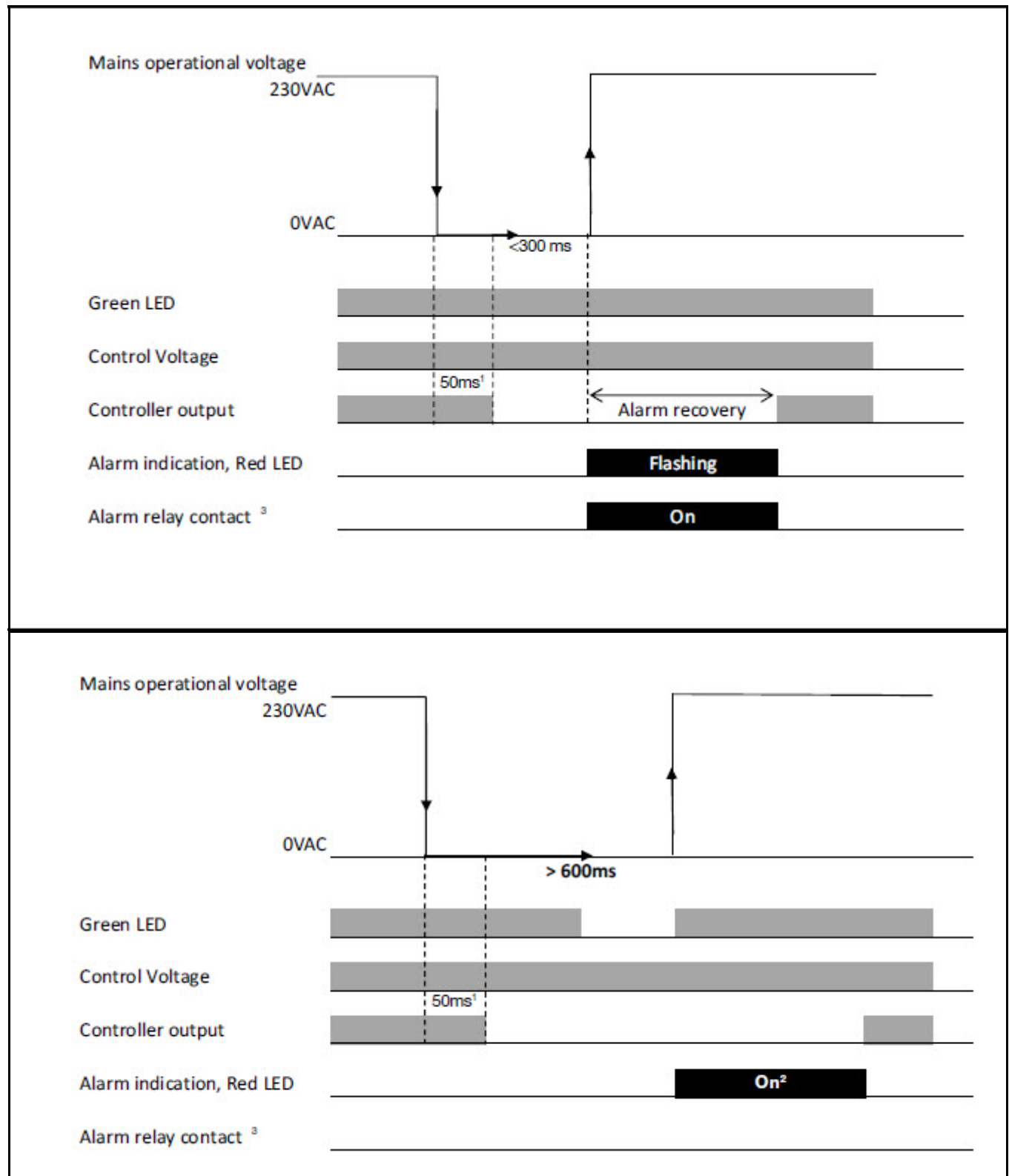


Notes:

1. The RSBS has 2 indication LEDs on board. The green LED indicates the status of the on-board power supply, whilst the red LED indicates an alarm condition or the recovery time between starts¹.
2. Once the mains voltage is present, the green LED will be fully ON. In case the mains voltage is less than the stated pickup voltage alarm value, the green LED will be flashing. In case mains voltage is higher than the stated pick-up voltage and green LED is flashing, then this may indicate that the on-board power supply is faulty. (Power Supply Alarm)
3. Upon closing K1, the RSBS will start ramping, duration of which is < 1 second, provided that the minimum time from stop to start is respected. When opening K1, the RSBS will stop without any ramp down.
4. In the case of an undervoltage, the RSBS will shut down and the Red LED flashes 2 times as long as the undervoltage is present. Once the mains voltage is restored the red LED will continue flashing for 5 minutes. Following these 5 minutes (6 minutes for HP versions), the RSBS will start ramping function in the case K1 is closed. The device can be reset at any time by removing power on L1 - N connection. When the power is reapplied, the soft starter will start ramping up as soon as K1 is closed, provided that the minimum time between starts and the minimum time from stop to start are respected.
5. If an overcurrent (>80A for 1 sec.) is sensed, the RSBS will shut down and the red LED will flash 3 times indicating an overcurrent situation. This continues for 5 minutes. In the case that the overcurrent is still present at the second attempt, user intervention is required to reset the controller by cycling power for the device to operate again as this implies that there are problems in the system.
6. A detection circuitry provides protection in case of a faulty starting capacitor EMR. In such a situation, the red LED will flash 4 times for 5 minutes. RSBS will check the status of the starting capacitor EMR before attempting a ramping function (in the case K1 is closed). If the starting capacitor EMR is found faulty at the second attempt, user intervention is required to reset the controller by cycling power for the device.
7. In the case of incomplete ramping of the softstarter, the red LED will flash 5 times. This flashing will be indicated by the red LED for 5 minutes. If after the second attempt there is another incomplete ramp alarm, user intervention is required to reset controller.
8. During recovery from Undervoltage, Overcurrent, Incomplete ramp alarms, the red LED will flash at twice the normal flashing frequency, using the same number of flashes. The figure shows the flashing in case of a recovery from an undervoltage alarm.
9. During the recovery time between starts, the RSBS red LED will be continuously ON until the necessary recovery time elapses.¹
10. If supply on RSBS is removed before the recovery period has elapsed, when supply is restored the delay will continue until the remaining recovery time from the last start/ stop (before supply removal) is over. Following this, another start may be attempted. If supply is removed during alarm recovery (red LED Flashing), upon re-applying supply, the alarm will be reset and the RSBS will only wait for the respective delays between starts and/or stop to start to elapse before attempting another start (assuming K1 is closed.)

Note 1: Applicable to RSBS23..A2V2C24HP models only.

Voltage Interruptions



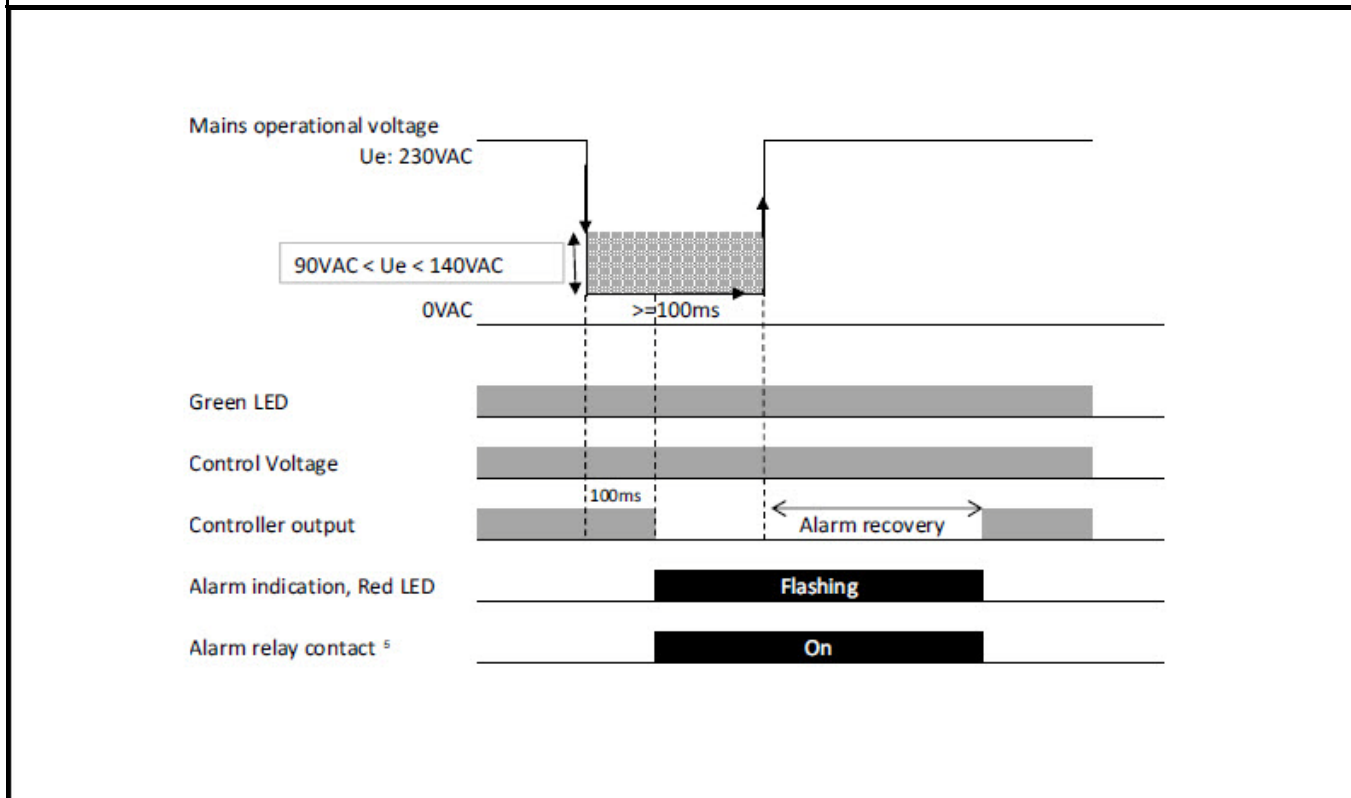
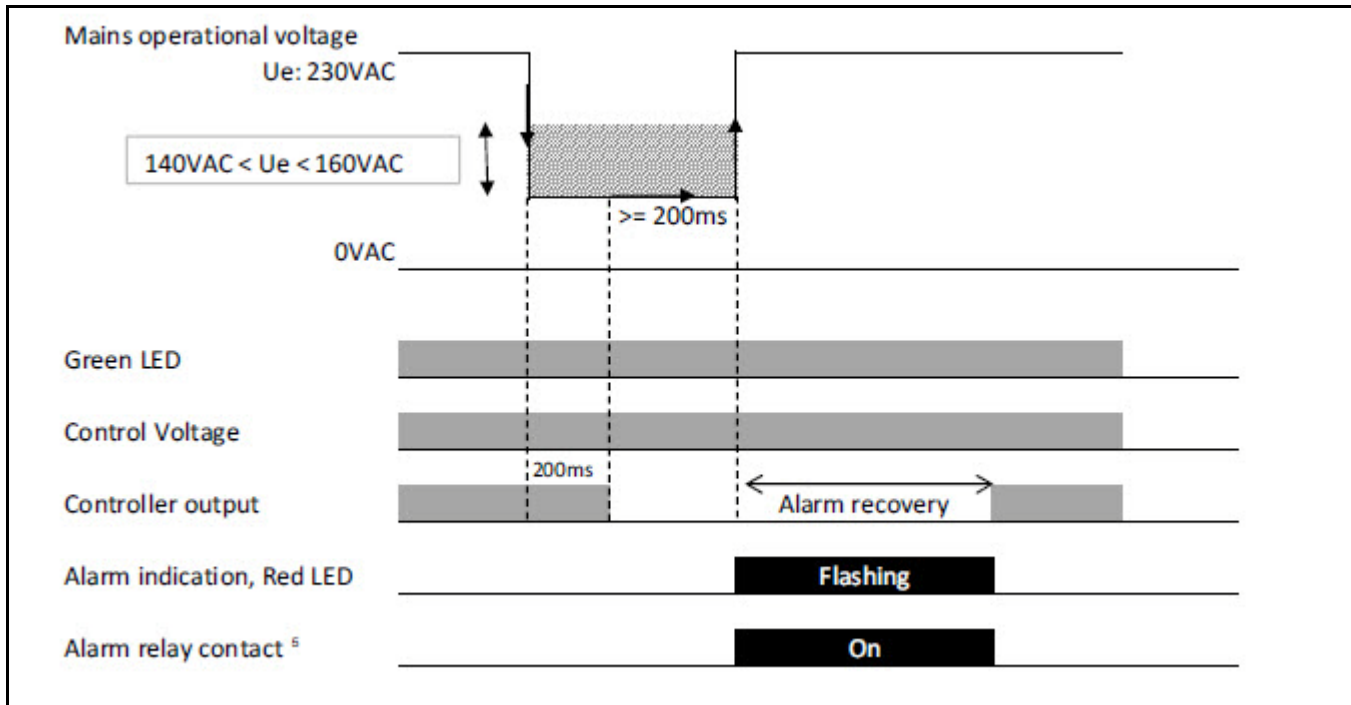
¹ For a 50Hz supply, minimum interruption detection is of 50ms (+20ms/ -0ms).

² Red LED will be ON (for HP versions only) if the time between starts and/or time from stop to start has not elapsed.

Following the recovery between starts and/or from stop to start, if control voltage is present, the RSBS shall try to restart the compressor.

³ Applicable to RSBS23..A2V22C24... versions

Voltage Dips



Note:

1. When a voltage dip and/or interruption is detected the Under voltage alarm will be triggered (2 flashes on red LED).
2. If, during bypass, the current (I_e) is $\leq 2.5\text{AACrms}$ for $U_e \geq 190\text{VAC}$, the under-voltage alarm will also be triggered as this might indicate a voltage interruption condition.
3. Voltage dips/interruptions occurring during recovery between starts and/or alarm recovery shall be ignored.
4. Voltage dips/interruptions are not monitored during ramping and idle (control OFF) states.
5. Applicable to RSBS23...A2V22C24... versions

LED STATUS INDICATION

Red LED	Relay Contact*	Condition	Action
Fully ON ¹	11/12	Min. recovery time between starts and/or recovery time between stop to start	Auto reset when minimum recovery time elapses.
2 flashes	11/14	Undervoltage ($U_e < 190\text{VAC}$)****	Auto reset with 5 mins recovery **
3 flashes	11/14	Overcurrent ($>80\text{A}$ for ≥ 1 sec.)	Auto reset with 5 mins recovery
4 flashes	11/14	Relay protection	Auto reset with 5 mins recovery ***
5 flashes	11/14	Incomplete ramp	Auto reset with 5 mins recovery
N/A	11/12	Supply phase loss	Physical check
N/A	11/12	Idle state	
N/A	11/12	Ramping state	
N/A	11/12	Bypass mode	
Green LED	Relay Contact*	Condition	Action
Flashing	11/12	Power supply alarm	Contact BOSCH Technical Support 866-642-3198
Fully ON	11/12	Idle state	RSBS waiting for control signal to start

1. Applicable to RSBS2332A2V2C24HP. For other models, no indication on the red LED is provided.

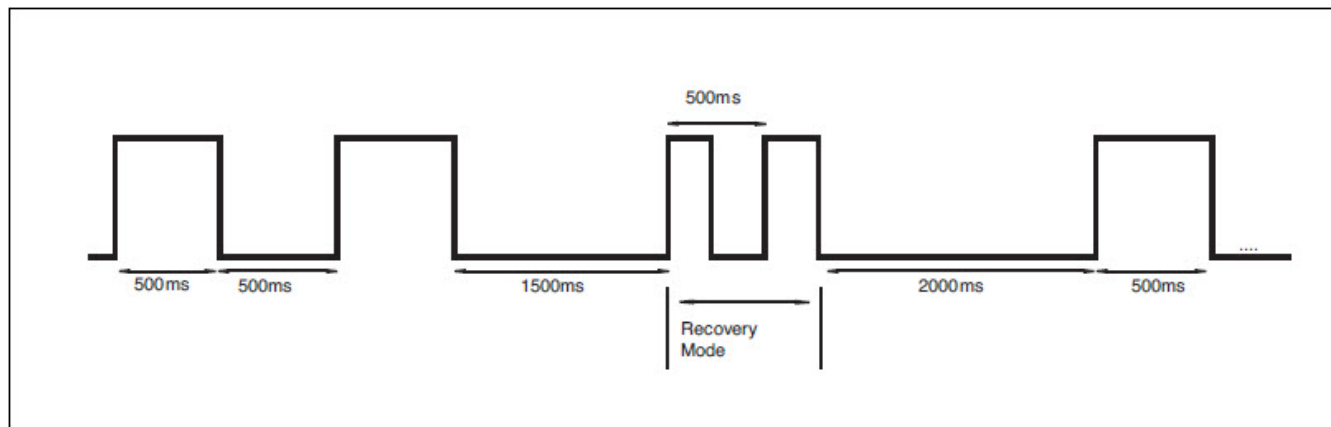
* Applies only to RSBS23xxA2V22C24.. models

** Monitored during idle and bypass

*** Refer to note 6 in Mode of operation section

**** Refer to voltage dips and interruptions section for mode of operation

Flashing Sequence



Note: During recovery from an alarm condition, the red LED will flash at twice the normal flashing frequency between successive flashing cycles as shown above to indicate that the softstarter is in recovery mode which recovery lasts for 5 minutes

NOTES



BOSCH

601 N.W. 65th Court, Ft. Lauderdale, FL 33309
Phone: 866-642-3198 | Fax: 954-776-5529
www.boschtaxcredit.com | www.bosch-climate.us
(2013/10)



672000004 Smart Start Resist IM