Smart Start Assist Kit
For use with Single-Phase Residential Geothermal Heat Pumps

8-733-934-497

Installation Instructions

NOTE: Read the entire instruction manual before starting the installation.

SAFETY CONSIDERATIONS

Improper installation, adjustment, alteration, service, maintenance, or use can cause explosion, fire, electrical shock, or other conditions which may cause death, personal injury, or property damage. Consult a qualified installer, service agency, or your distributor or branch for information or assistance. The qualified installer or agency must use factory-authorized kits or accessories when modifying this product. Refer to the individual instructions packaged with the kits or accessories when installing.

Follow all safety codes. Wear safety glasses, protective clothing, and work gloves. Use quenching cloth for brazing operations. Have fire extinguisher available. Read these instructions thoroughly and follow all warnings or cautions included in literature and attached to the unit.. Consult local building codes and current editions of the National Electrical Code (NEC) NFPA 70. In Canada, refer to current editions of the Canadian electrical code CSA 22.1.

Recognize safety information. This is the safety-alert symbol ⚠. When you see this symbol on the unit and in instructions or manuals, be alert to the potential for personal injury.

Understand the signal words DANGER, WARNING, and CAUTION. These words are used with the safety-alert symbol. DANGER identifies the most serious hazards which **will** result in severe personal injury or death. WARNING signifies hazards which **could** result in personal injury or death. CAUTION is used to identify unsafe practices which **may** result in minor personal injury or product and property damage. NOTE is used to highlight suggestions which **will** result in enhanced installation, reliability, or operation.

⚠ WARNING

ELECTRICAL SHOCK HAZARD

Failure to follow this warning could result in personal injury or death.

Before beginning any installation or modification, be sure the main electrical disconnect switch is in the OFF position. TAG THE DISCONNECT SWITCH WITH A SUITABLE WARNING LABEL

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

⚠ CAUTION

CUT HAZARD

Failure to follow this caution may result in personal injury.

Sheet metal parts may have sharp edges or burrs. Use care and wear appropriate protective clothing and gloves when handling parts.

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:

- Phillips screwdriver
- Small flat head screwdriver

INTRODUCTION

The Smart Start Assist Kit is designed for single phase, residential geothermal units. The kit contains two main parts which are installed on top of the geothermal unit’s electrical box (E-box). The Smart Start Assist attaches to the E-box top via a mounting plate as shown in Fig. 1.

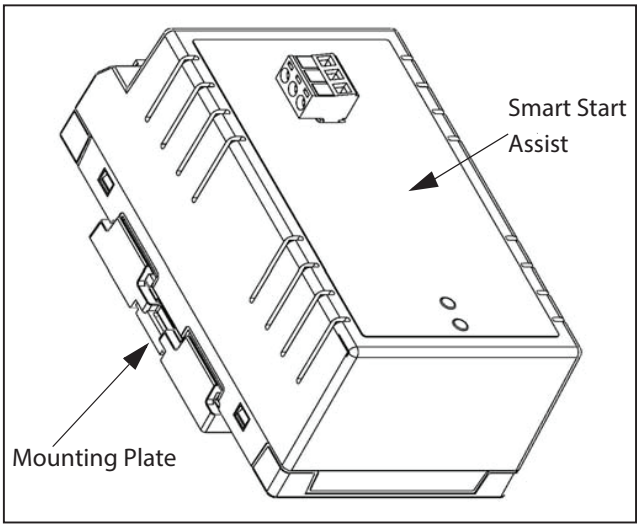

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Fig. 1 — Smart Start Assist

⚠ WARNING

UNIT DAMAGE, PERSONAL INJURY OR DEATH HAZARD

Failure to follow this warning could result in unit damage, personal injury or death.

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.

SPECIFICATIONS

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

STANDARDS

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

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INSTALLATION

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 Fig. 2.

⚠ WARNING

ELECTRICAL SHOCK HAZARD

Failure to follow this warning could result in personal injury or death.

Before beginning any installation or modification, be sure the main electrical disconnect switch is in the OFF position. TAG THE DISCONNECT SWITCH WITH A SUITABLE WARNING LABEL

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

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.

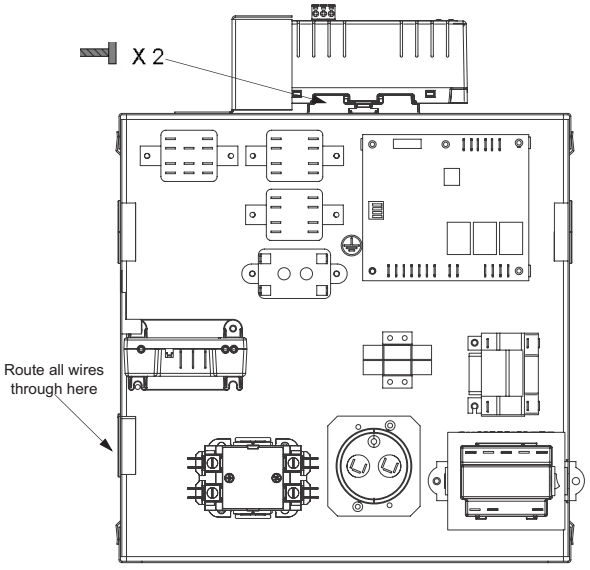

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Fig. 2 — Smart Start Assist Mounting Locations

NOTE: Electrical Box (e-box) shown in the Fig. 2 is for reference only. Actual components in the unit's electrical box will vary depending on the installed options.

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

HARDWARE INSTALLATION

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

NOTE: 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 (see Fig. 3).
2. Align the mounting base with pilot holes on top of the e-box.
3. Secure plastic base to control box by using the provided two (2) #8 screws.

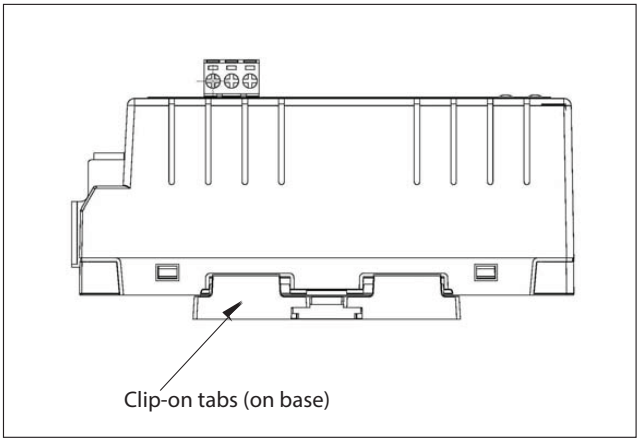

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Fig. 3 — Smart Start Assist Plastic Base Location

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 Fig.

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.

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

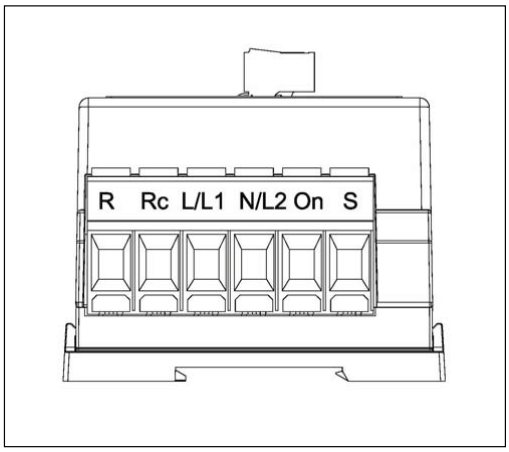

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Fig. 4 — Smart Start Assist Terminations

1. Remove the compressor wires from T1 and T2 terminals side on the compressor contactor. Pull them out of the e-box. See Fig. 5.
2. Locate the Smart Start Assist terminal cover. Make sure all wires that are to be terminated on the SSA terminal block pass through the 7/8" bushing (provided in kit, see Fig. 2 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 Fig. 2.

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.

PERFORM FUNCTIONALITY CHECK AND INSTALL COVER

1. Verify that the installation and termination of all the wires match the electrical schematic shown in Fig. 6.
2. Install the sheet metal plate that was provided in this kit, and cover the SSA terminal block.

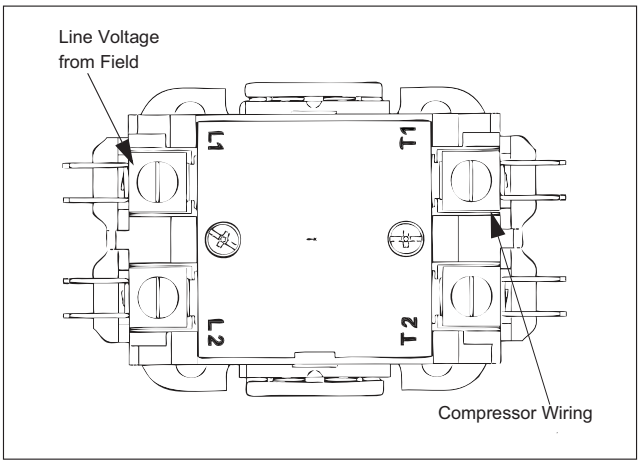

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Fig. 5 — Compressor Contactor

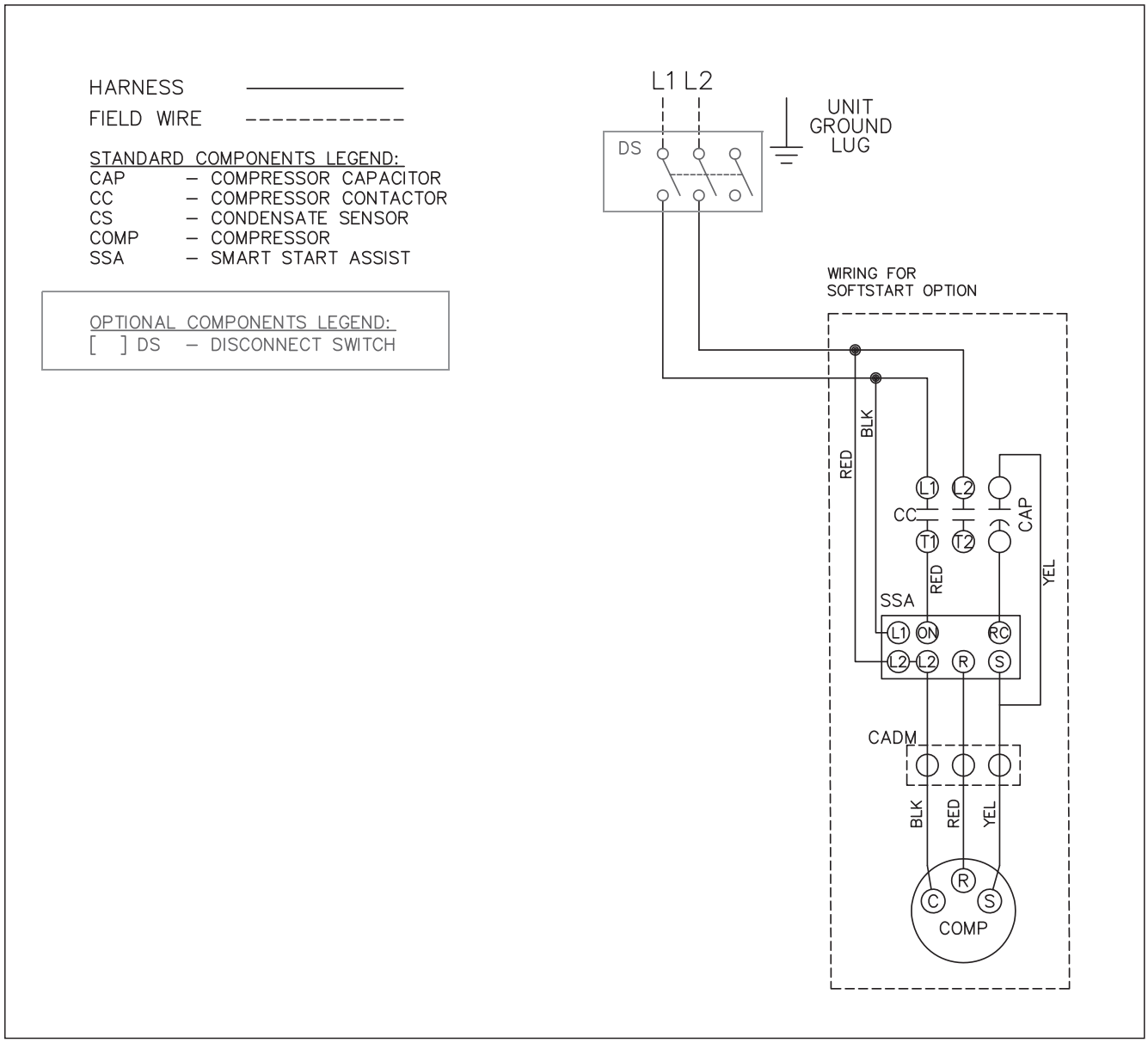

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Fig. 6 — Smart Start Assist Wiring Schematic

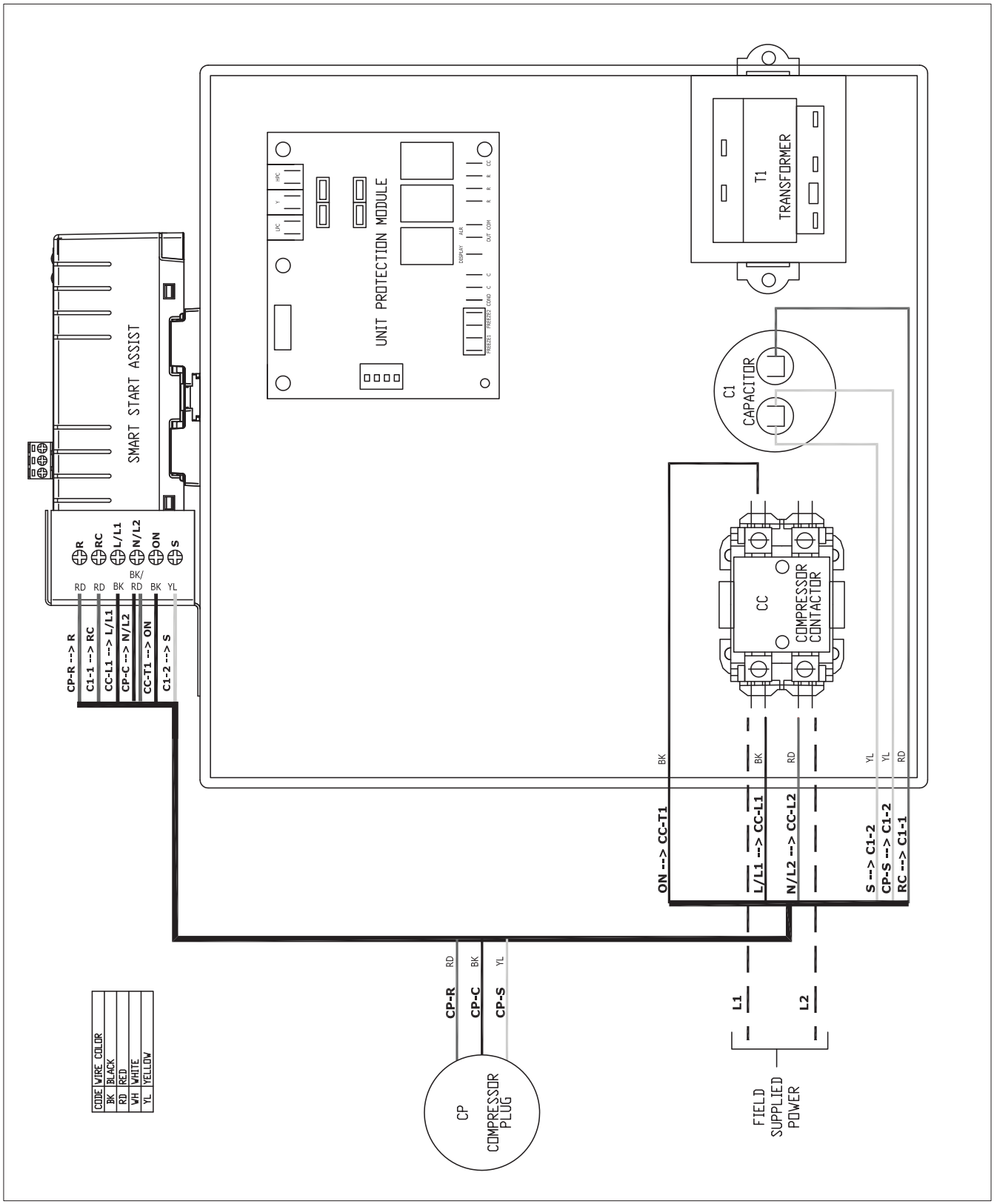

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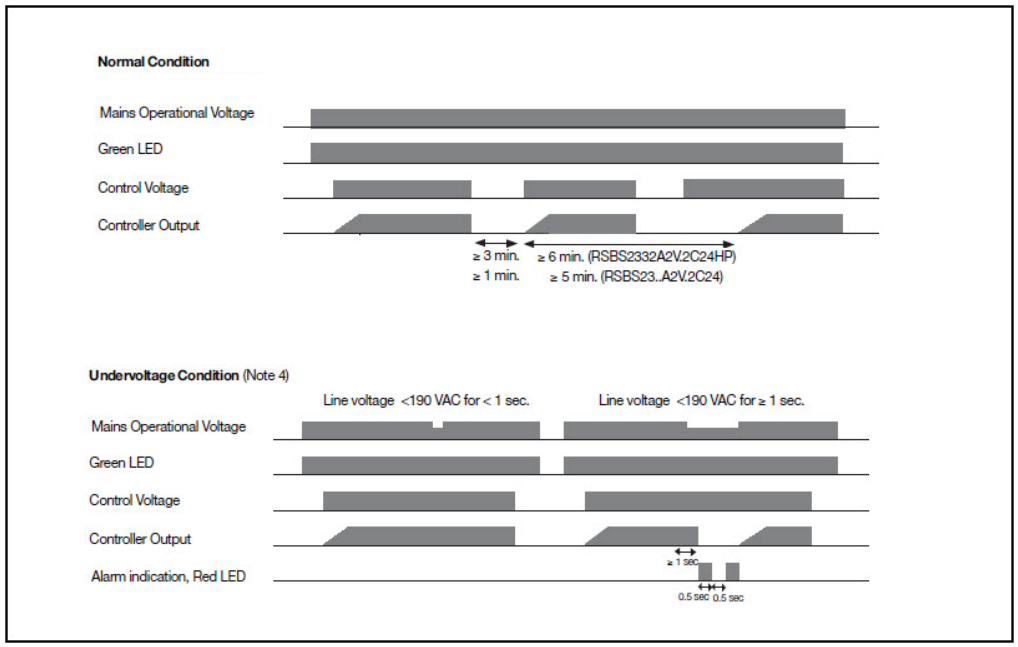
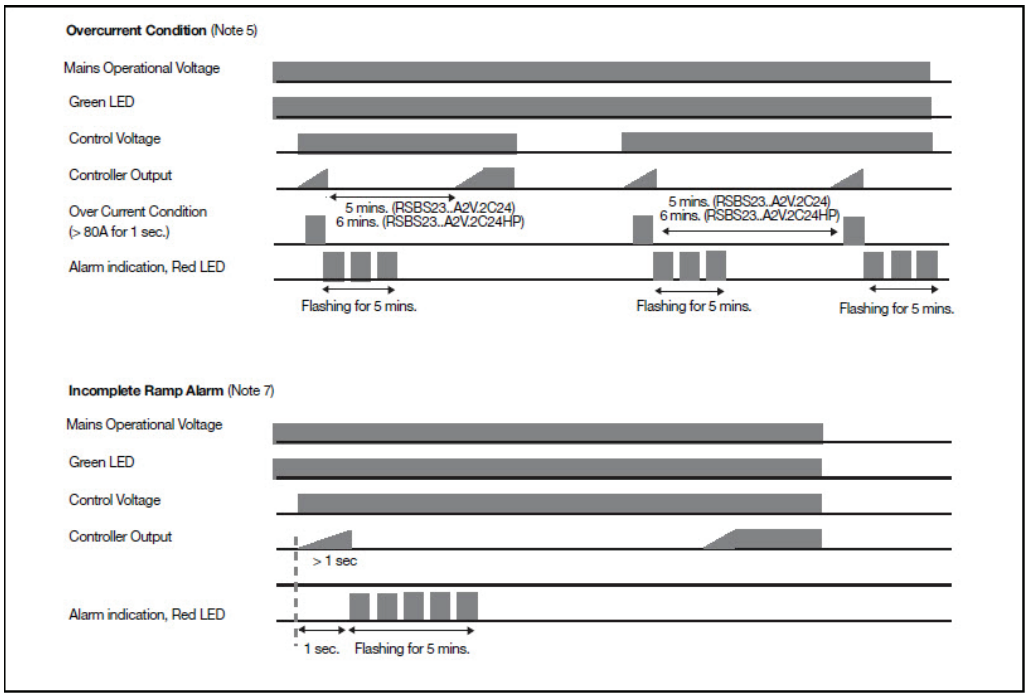
Fig. 7 — Smart Start Harness Wiring Guide





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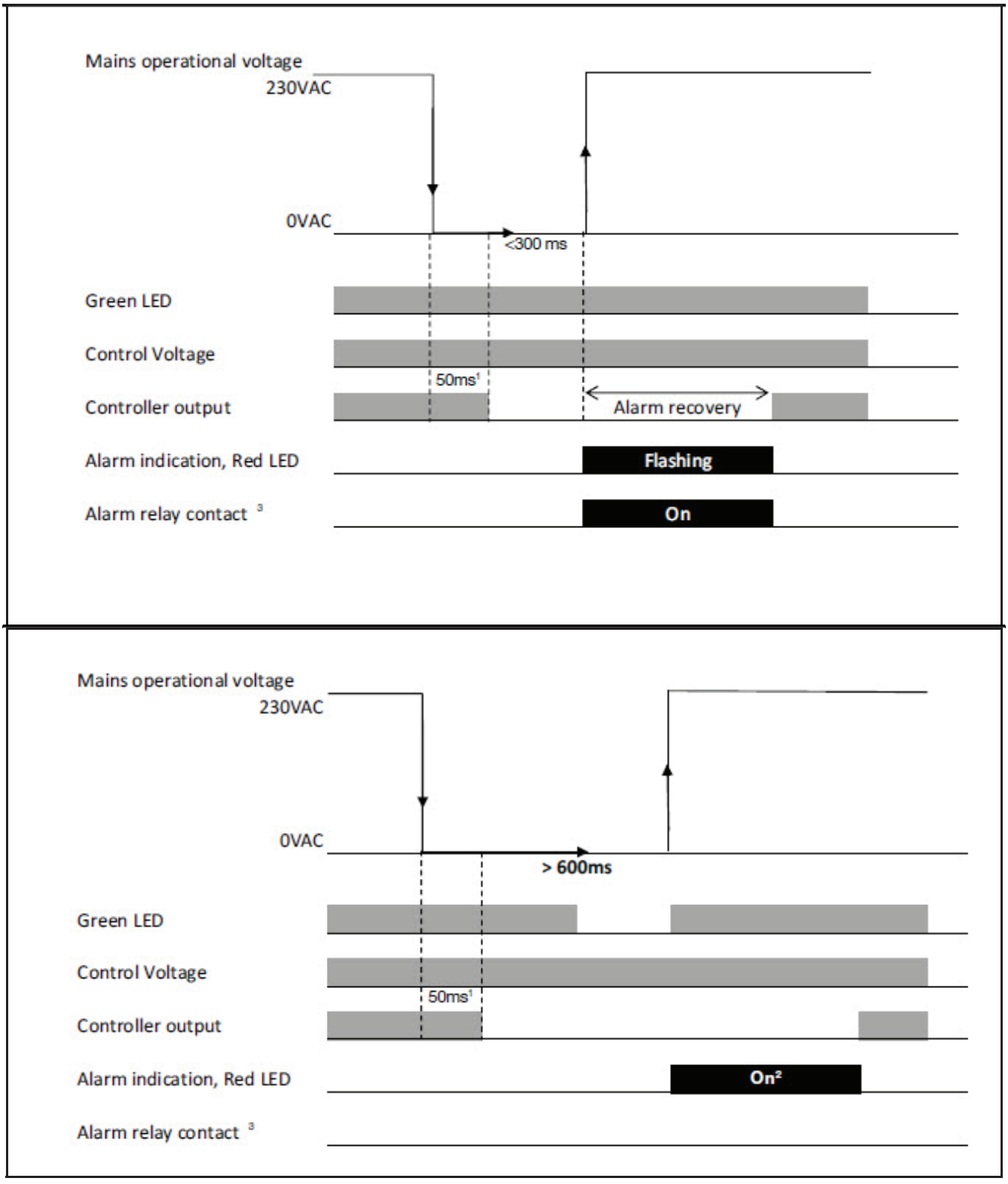
1. The Smart Start Assist has 2 indication LEDs on board. The green LED indicates the status fo the on-board power supply while the red LED indicates an alarm condition or the recovery time between starts[1]
2. Once the mains voltage is present, the green LED will be fully ON. In case the mains voltage is less than the stated pickup voltage alarm value, the green LED will be flashing. In case the mains voltage is higher than the stated pickup voltage and the green LED is flashing, this may indicate that the on-board power supply is faulty. (Power Supply Alarm)
3. Upon closing K1, the Smart Start Assist will start ramping for duration of <1 second provided that the minimum time from stop to start is respected. When opening the K1, the Smart Start Assist will stop without any ramp down.
4. In case of an under-voltage, the Smart Start Assist will shut down and the red LED will flash 2 times as long as the under-voltage is present. Once the mains voltage is restored, the red LED will continue flashing for 5 minutes (6 minutes for HP versions). Following these 5 minutes, the Smart Start Assist 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 over–current (>80A for 1 second) is sensed, the Smart Start Assist will shut down and the red LED will flash 3 times indicating an over–current situation. This continues for 5 minutes. In the case that the over–current is still present at the second attempt, user intervention is required to meet 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. Smart Start Assist will check the status of the starting capacitor EMR before attempting a ramping function (in the case K1 is closed). If, at the second attempt, the starting capacitor EMR is found to be faulty, user intervention is required to reset the controller by cycle power for the device.
7. In the case of incomplete ramping of the soft starter, the red LED will flash 5 times. The 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 the controller.
8. During recovery from under–voltage, over–current and incomplete ramp alarms, the red LED will flash twice the normal flashing frequency using the same number of flashes. The figure shows the flashing in case of a recovery from an under–voltage alarm.
9. During the recovery time between starts, the Smart Start Assist will be continuously ON until the necessary recovery time elapses[1]
10. If supply on Smart Start Assist 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), when supply is restored, the alarm will be rest and the Smart Start Assist will only wait for the respective delays between starts and/or stop to start to elapse before attempting another start (assuming K1 is closed).

[1] - Applicable to HP versions only

Fig. 8 — Mode of Operation



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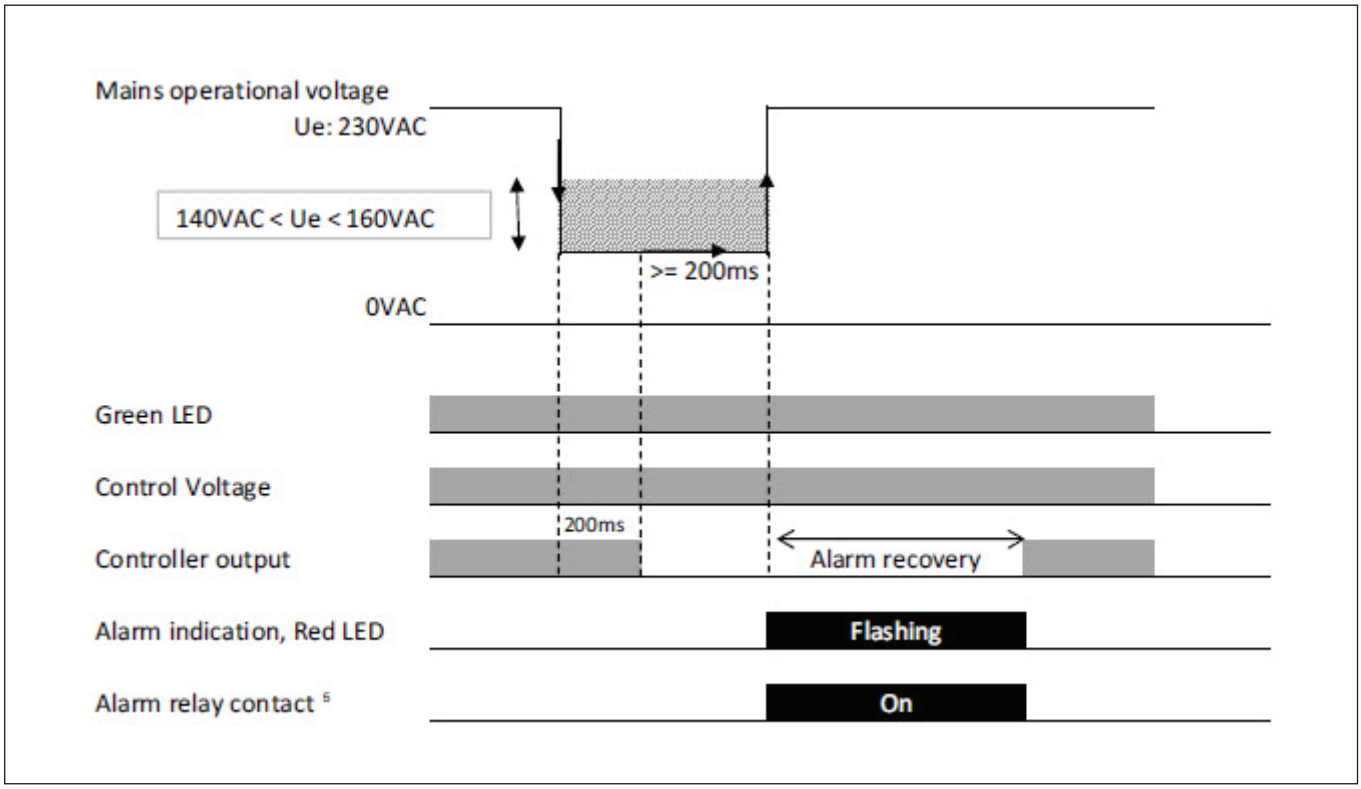
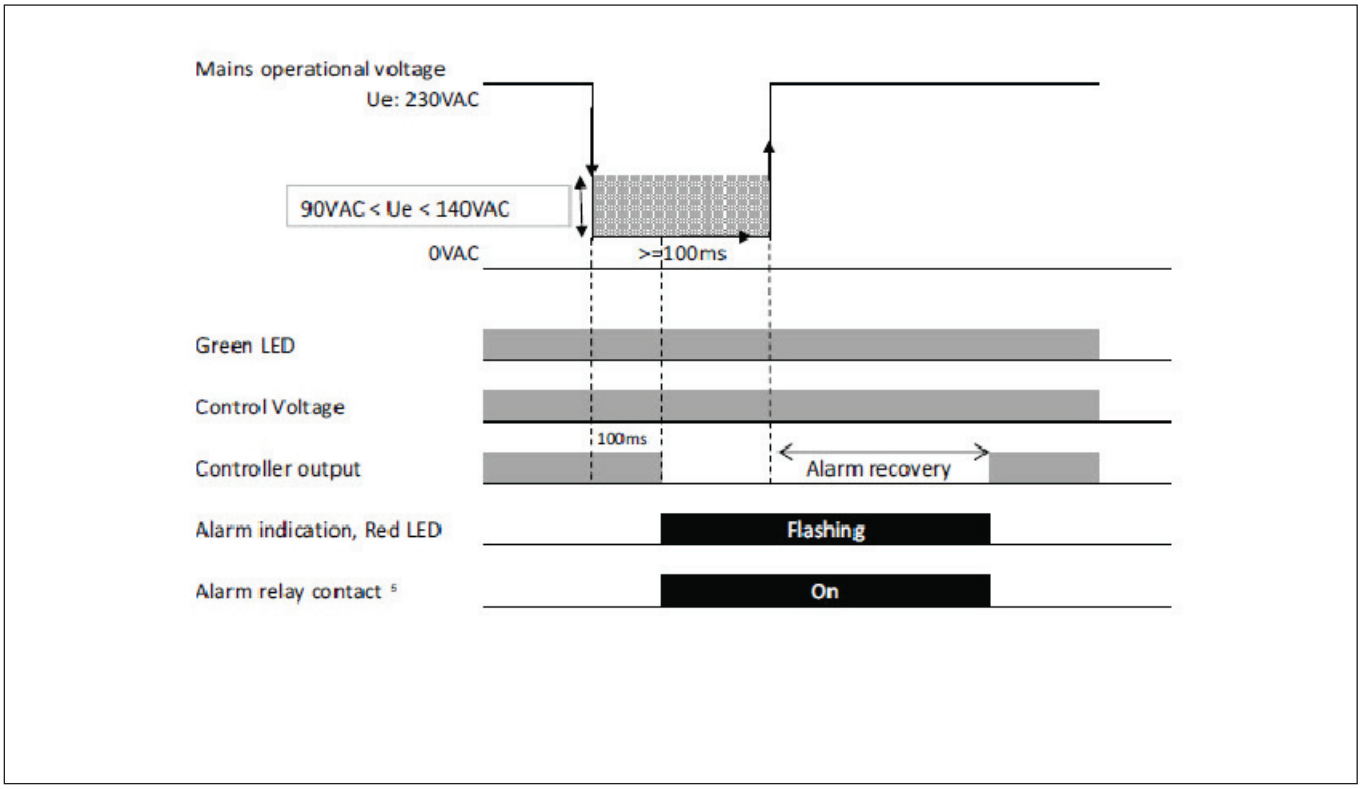
1. For a 50Hz supply, minimum interruption detection is of 50ms (+20ms / −0ms).
2. Red LED will be ON (for HP versions only) if the time between starts and/or time from stop to start has not elapsed.
3. Applicable to RSBS23..A2V22C24…versions.

Fig. 9 — Voltage Interruptions





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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 (Ie) is <2.5AACms for Ue> = 190VAC, 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 RSB23.A2V22C24…versions.

Fig. 10 — Voltage Dips

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 tie elapses.
2 flashes	11/14	Under–voltage &Ue < 190VAC)****	Auto reset with 5 min. recovery**
3 flashes	11/14	Over–current (>80A for ≥1 sec.)	Auto reset with 5 min. recovery
4 flashes	11/14	Relay protection	Auto reset with 5 min. recovery***
5 flashes	11/14	Incomplete ramp	Auto reset with 5 min. 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	Replace Smart Start device
Fully ON	11/12	Idle state	RSBS waiting for control signal to start

Notes:

1 Applicable to RSBS2332A2V.2C24HP For other models, no indication on the Red LED is provided

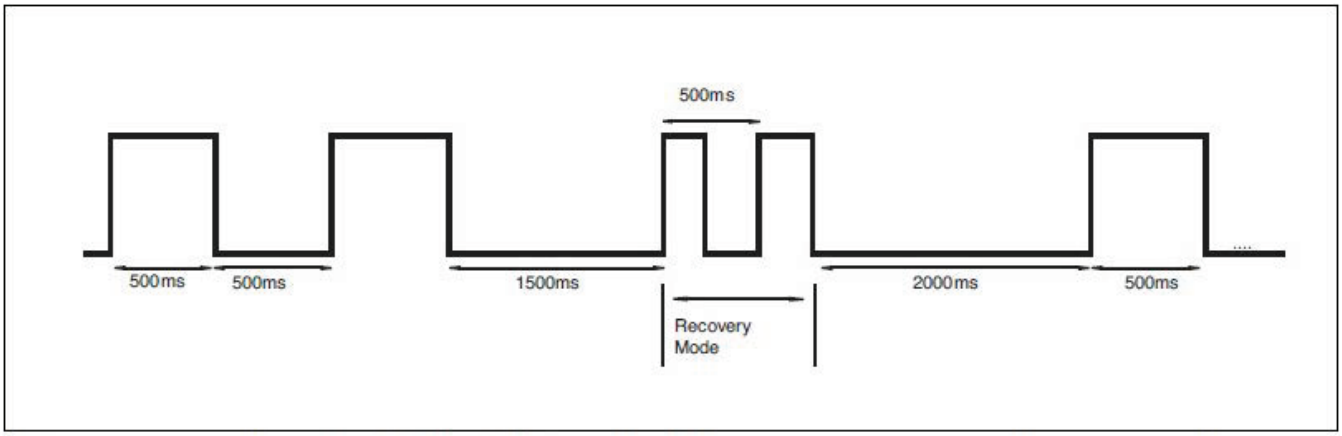
* Applies only to RSBS23XXA2V22C24 models

** Monitored during idle and bypass

*** Refer to note 6 in Mode of Operation section in Smart Assist Installation Instruction.

**** Refer to voltage dips and interruptions section in Smart Assist Installation Instruction 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

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NOTES:

Edition Date: 06/14

Catalog No: IIK-8733934497-01

Replaces: New