

Motor Controller

2-Phase and 3-Phase Scroll Compressor Softstarter

Types RSBD48..CV. (2-Phase), RSBT48..CV. (3-Phase)

CARLO GAVAZZI



- Soft starting of 3-phase Scroll Compressors up to 95 Amp
- Patented auto-adaptive algorithm for optimum inrush current reduction (No user-settings required)
- Integrated bypass relays
- 2- (RSBD) and 3-phase (RSBT) controlled solutions
- Multi-voltage operation (220 – 480VAC, 50/60Hz)
- Rated operational current: 55, 70, 95AAC
- Phase sequence and undervoltage monitoring
- Overtemperature, Overcurrent, Locked Rotor protection
- Changeover relay outputs for bypass and alarm indication
- UL, cUL, CE, RoHS compliant

Product Description

RSBD and RSBT are easy to use softstarters for scroll compressors up to 95Amp nominal current. The units are equipped with a patented auto-adaptive algorithm that automatically adapts itself to the specific compressor it is controlling ensuring that an optimum inrush current reduction is achieved. RSBD is a 2-phase controlled and RSBT is a 3-phase controlled solution with integrated bypass relays for bypassing of the semicon-

ductors after ramp-up.

The unit is supplied inside housing and can be DIN or panel mounted (accessories included). RSB. softstarters include also 2 changeover relays for bypass and alarm indication. The units have a maximum operating temperature of 60°C (with derating from 40°C).

Ordering Code

RSB T 48 55 C V0

Compressor Softstarter _____
 Controlled phases _____
 Operational Voltage _____
 Rated Operational Current _____
 Control Voltage _____
 Version _____

Type Selection

Type	Rated operational voltage U_e	Rated operational Current I_e	Control voltage U_c	Versions
RSBD	48: 220 - 480VAC	55: 55Arms	C: 24VAC/DC $\pm 10\%$	V0 : 2x Changeover relay outputs
RSBT	-15%, + 10%	70: 70Arms 95: 95Arms	and 110 - 400VAC -15%, +10%	

Selection Guide

No. of Controlled Phases	Type	Operational Voltage	Control voltage	Version	Rated Operational Current		
					55AAC	70AAC	95AAC
2	RSBD	220 - 480VAC	24VAC/DC	2 Changeover	RSBD4855CV0	RSBD4870CV0	RSBD4895CV0
3	RSBT		& 110 - 400VAC	Relay Outputs	RSBT4855CV0	RSBT4870CV0	RSBT4895CV0

General Specifications

Starting method	Current limit-auto adaptive
Ramp-up time	1 sec
Ramp-down time	0 sec
Initial Torque	Initial torque will vary indirectly through the variation of the current limit through the auto-adaptive algorithm.
Undervoltage/Overvoltage protection	
Undervoltage RSBx48xx	175VACrms (+/- 5%)
Overvoltage RSBx48xx	560VACrms (+/-5%)
Recovery from Undervoltage	200VACrms
Recovery from Overvoltage	500VACrms
Status Indication LEDs	
Power Supply ON	Green LED
Recovery mode (alarm condition)	Flashing Red LED
Alarm	Red LED
Form Designation	1
Vibration	Acc. to IEC60068-2-26
Frequency 1	2 [+3/ -0]Hz to 25Hz displacement +/- 1.6mm
Frequency 2	25Hz to 100Hz @ 2g (19.96m/s ²)

Input Specifications (Control Input)

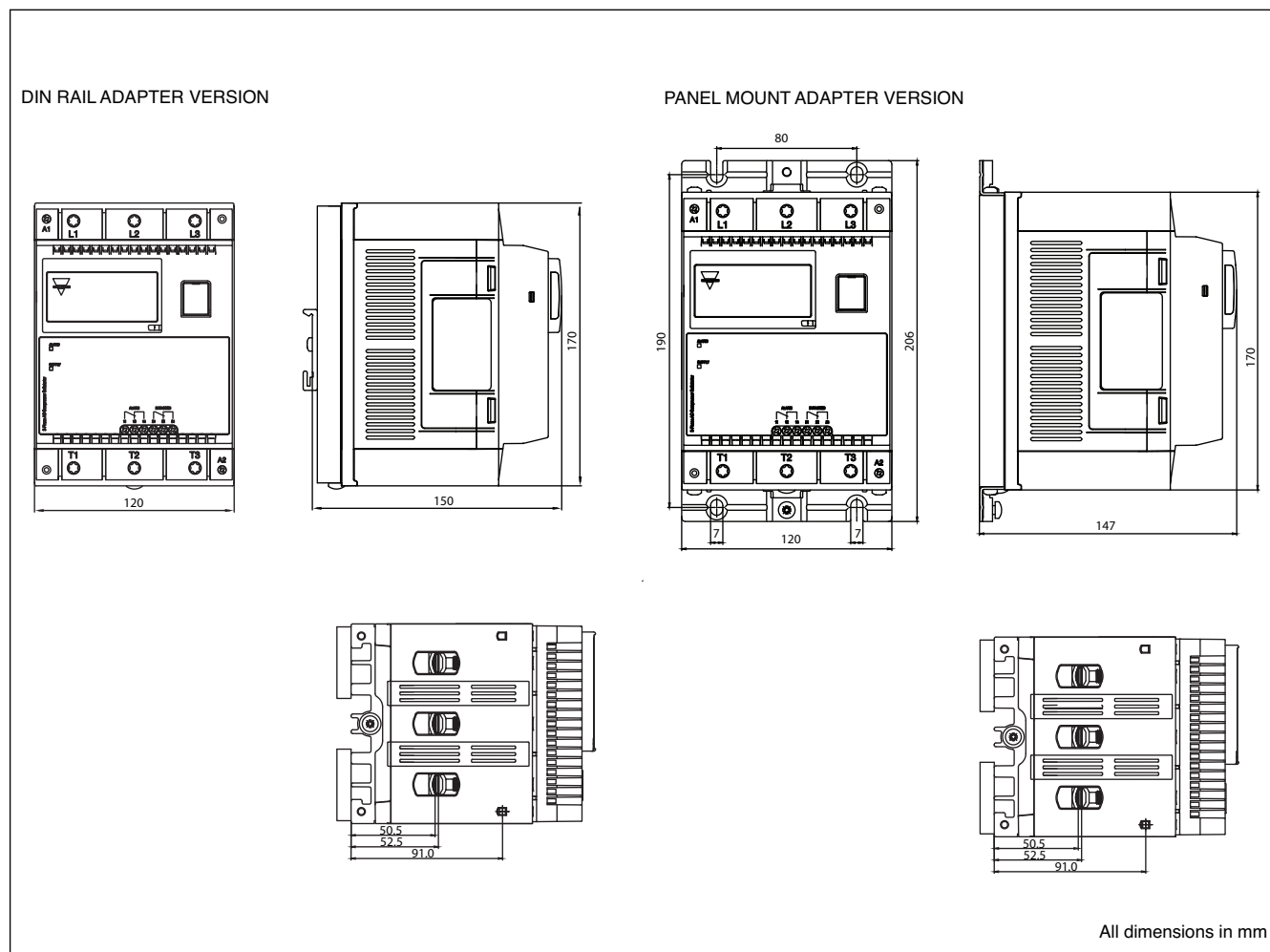
Control Voltage Uc, A1-A2 ¹	24VAC/DC (-10%, +10%) & 110 - 400 VAC (-15% / +10%)
Max. Pick up Voltage (for 24VAC/DC input)	20.4VAC/DC
Drop Out Voltage Min. (for 24VAC/DC input)	5VAC/DC
Control Voltage Range Uc, A1-A2 (for 110 – 400VAC input)	93.5 - 440VACrms
Rated AC frequency	50/60Hz +/- 10%
Rated insulation voltage (Ui)	690VAC
Dielectric strength	
Dielectric withstand voltage	
Input to Heatsink	3.5kVrms
Rated impulse withstand volt.	6 kV (1.2/50µs)
Min. Control input current	0.4mA
Max. Control input current	5mA
Input to output response time	<300ms
Integrated varistor	Yes

* Note 1: For the Canadian application, the control terminals A1, A2 of the RSB devices shall be supplied by a secondary circuit where power is limited by a transformer, rectifier, voltage divider, or similar device that derives power from a primary circuit, and where the short-circuit limit between conductors of the secondary circuit or between conductors and ground is 1500 VA or less. The short-circuit volt ampere limit is the product of the open circuit voltage and the short circuit ampere

Output Specifications

IEC rated operational current Ie (AC-53b) @ 40°C	
RSB.4855CV.	55 A ACrms
RSB.4870CV.	70 A ACrms
RSB.4895CV.	95 A ACrms
Note: For higher operating temp derating is as follows. RSB.4855CV. (0.8% per °C) RSB.4870CV. (1.2% per °C) RSB.4895CV. (0.8% per °C) up to a maximum of 60°C	
Overload cycle according to EN/IEC 60947-4-2 @ 40°C surrounding temperature	
RSB.4855CV.	55: AC-53b:3.5-1:299
RSB.4870CV.	70: AC-53b:3.5-1:299
RSB.4895CV.	95: AC-53b:3.5-1:299
Max Number of starts per hour @ 40°C	12
Minimum full load current	5 A ACrms

Dimensions



Environmental Specifications

Operating temperature	-20°C to +60°C (-4°F to +140°F)
Storage temperature	-30°C to +85°C (-22°F to 185°F)
Relative humidity	<95% non-condensing @ 40°C
Pollution Degree	3
Degree of Protection	IP20 – Housing IP00 – Terminal block
Installation Category	III
Installation Altitude	1000m

Supply Specifications

Operational Voltage Range	L1-L3	187 – 528VACrms 50/60Hz
Supply current at standby		<40mA
Blocking Voltage		1600Vp
Rated AC Frequency		50/60Hz +/- 10%
Rated insulation voltage		690Vrms, acc to EN60947-1
Dielectric Strength		2kVrms
Supply to heatsink		2kVrms
Rated impulse withstand voltage		6kV (1.2/50µs)
Integrated varistor		Yes (across controlled phases) Across L1 - L3

Conductor Data

Line conductors:

L1, L2, L3, T1, T2, T3

according to EN 60947-1

rigid (solid or stranded)	2 x (10 ... 50mm ²)
flexible with end sleeve (ferrule)	2 x (10 ... 50mm ²)

UL/cUL rated data

Rigid (solid or stranded)	2 x (AWG8 ... 1/0)
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Terminal screws	M8
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Max. Tightening torque	12 Nm
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Stripping length	16mm
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Secondary conductors:

A1, A2

according to EN 60998

rigid (solid or stranded)	0.5 ... 2.5mm ²
flexible with end sleeve (ferrule)	0.5 ... 1.5mm ²

UL/cUL rated data

rigid (solid or stranded)	AWG18...10
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Terminal screws	M3
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Max. Tightening torque	0.6 Nm
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Stripping length	6mm
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Auxiliary conductors:

11, 12,14, 21, 22, 24

according to EN 60998

rigid (solid or stranded)	0.05 ... 2.5mm ²
flexible with end sleeve (ferrule)	0.05 ... 1.5mm ²

UL/cUL rated data

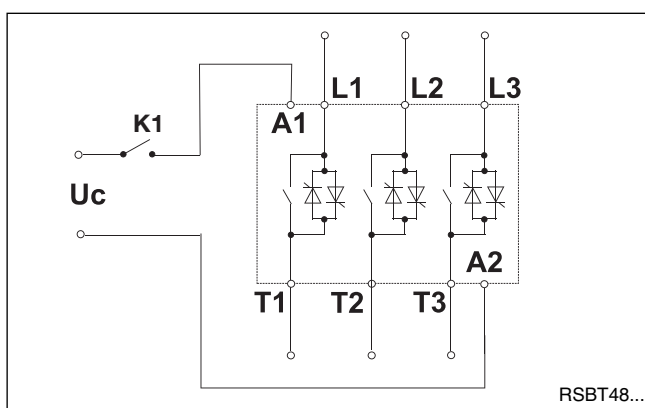
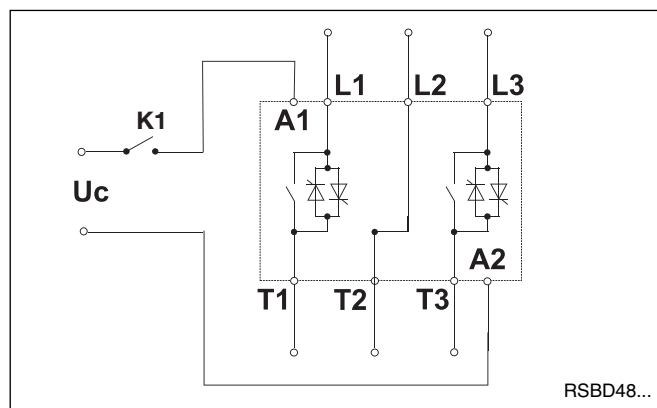
rigid (solid or stranded)	AWG30...12
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Terminal screws	M3
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Max. Tightening torque	0.8 Nm
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Stripping length	6mm
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Connection Diagram



Auxiliary Relays

Auxiliary relays contact capacity	3A,250VAC/3A,30VDC
Bypassed (21,22,24)	Normally Open (NO)/ Normally Closed (NC) - Changeover relay contact
Alarm (11,12,14)	Normally Open (NO)/ Normally Closed (NC) - Changeover relay contact

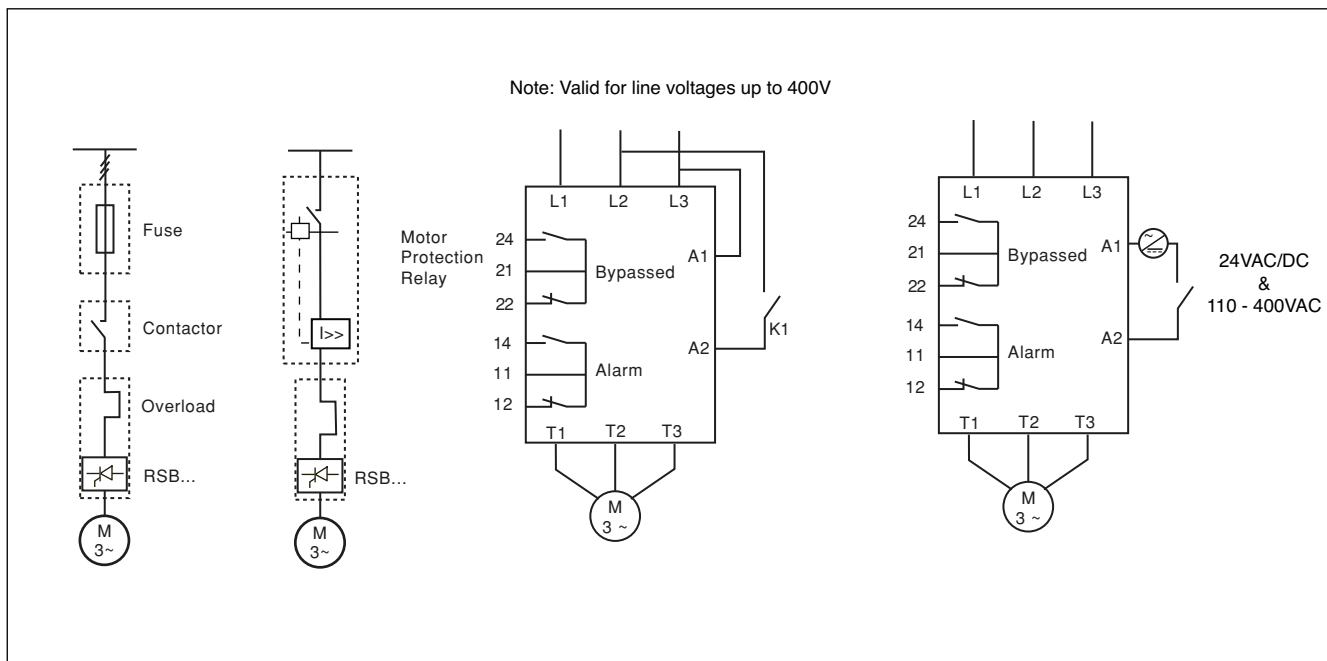
Note:

- When the RSBx softstarter goes in bypass state, relay status will change from 21-22 to 21-24
- When the RSBx softstarter is in alarm mode, relay status will change from 11-12 to 11-14 until the alarm recovers or alarm is cleared.

Housing Specifications

Weight	
RSBD4855...	2.5kg
RSBD4870...	2.5kg
RSBD4895...	2.7kg
RSBT4855...	2.8kg
RSBT4870...	2.8kg
RSBT4895...	3.0kg
Material	PA66
Material colour	RAL7035
Terminal colour	RAL7040
Mounting	DIN or Panel

Wiring Diagrams



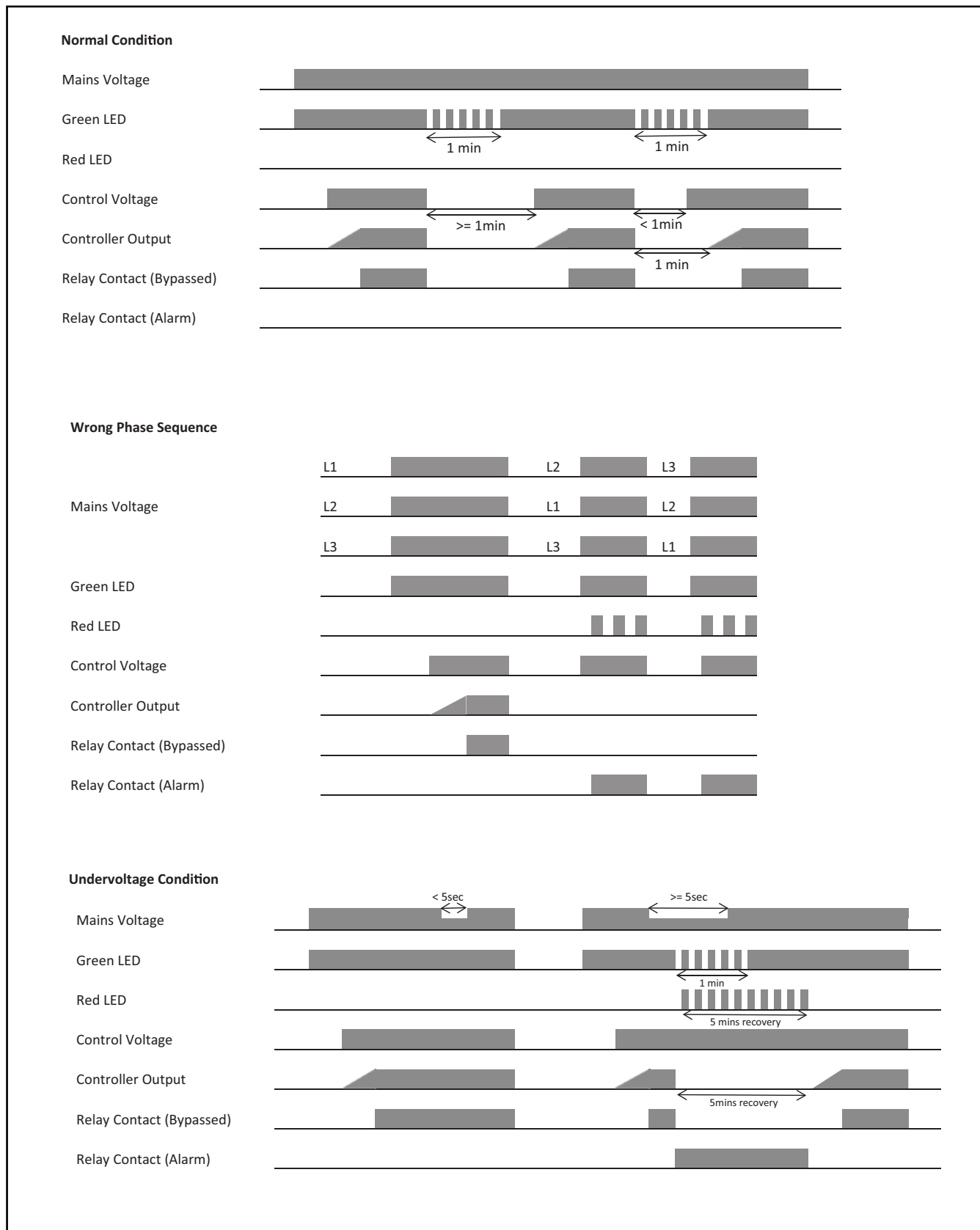
EMC Standards

Immunity	IEC/ EN 61000-6-2	Radiated Radio Frequency Immunity	EN 61000-4-3;10V/m, PC1
Electrostatic Discharge ESD Immunity	IEC/EN 61000-4-2 8kV air discharge, PC1 4kV contact, PC2	Conducted Radio Frequency Immunity	EN61000-4-6; 140dBuV,PC1
Electrical fast transient/ Burst Immunity	EN 61000-4-3 2kV,PC1 (4kV PC2) 2kV,PC1	Voltage dips & interruptions	EN 61000-4-11 0% Ue & Uc, 20ms, PC2 40% Ue & Uc, 200ms, PC2 70% Ue & Uc, 5000ms, PC2
Electrical Surge Immunity	IEC/ EN 61000-4-5, 1kV, PC1 2kV, PC1 1kV, PC1 1kV, PC1	Radio interference field emissions (radiated)	EN60947-4-2 Class A
Output, line to line		Radio interference voltage emissions (conducted)	EN60947-4-2 Class A
Output, line to earth			
Input, line to line			
Input, line to earth			

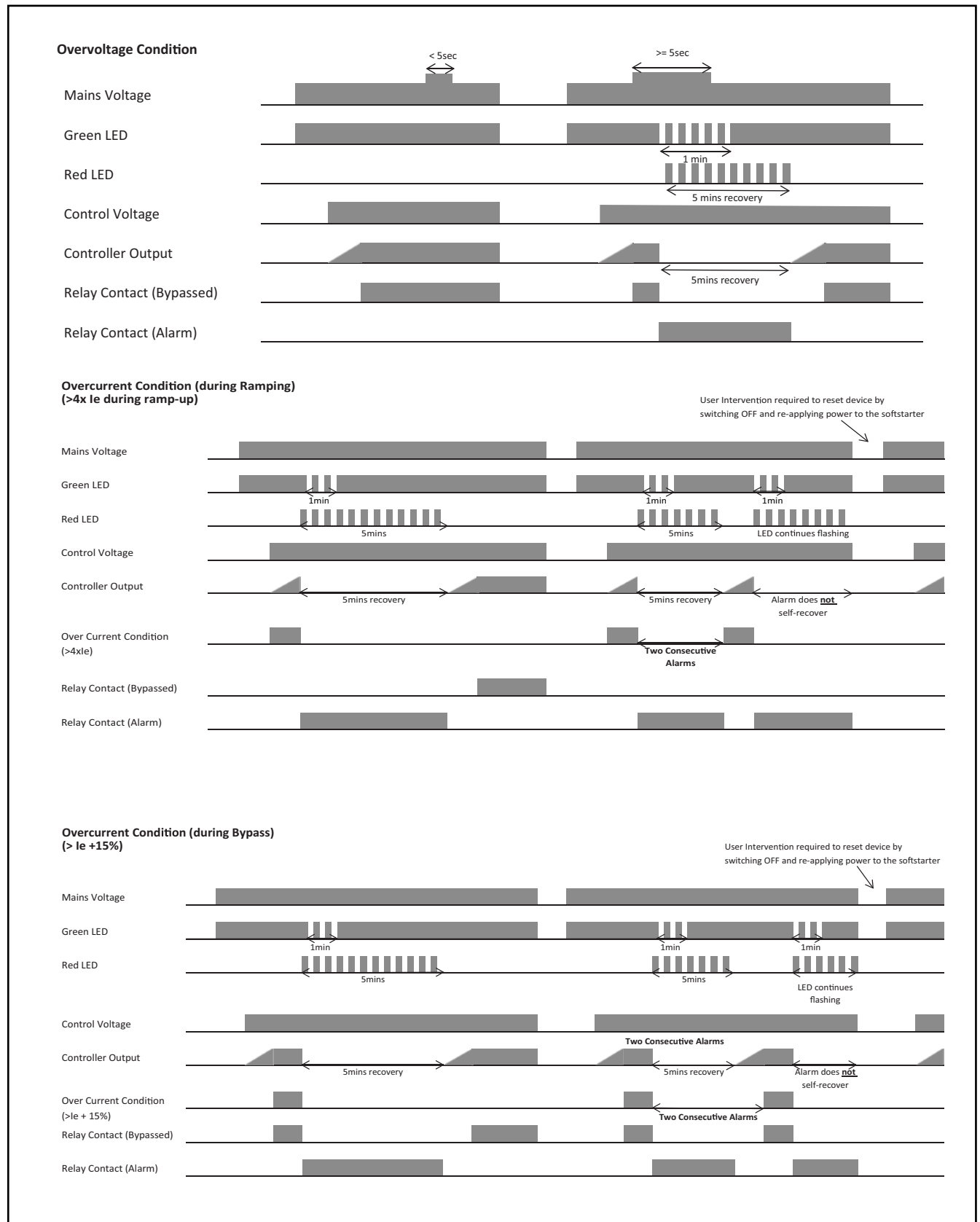
Approvals

UL, cUL Listed	Yes
Restriction of Hazardous Substances (RoHs)	Yes
CE Marking	Yes
LVD	Acc to EN60947-4-2

Mode of Operation

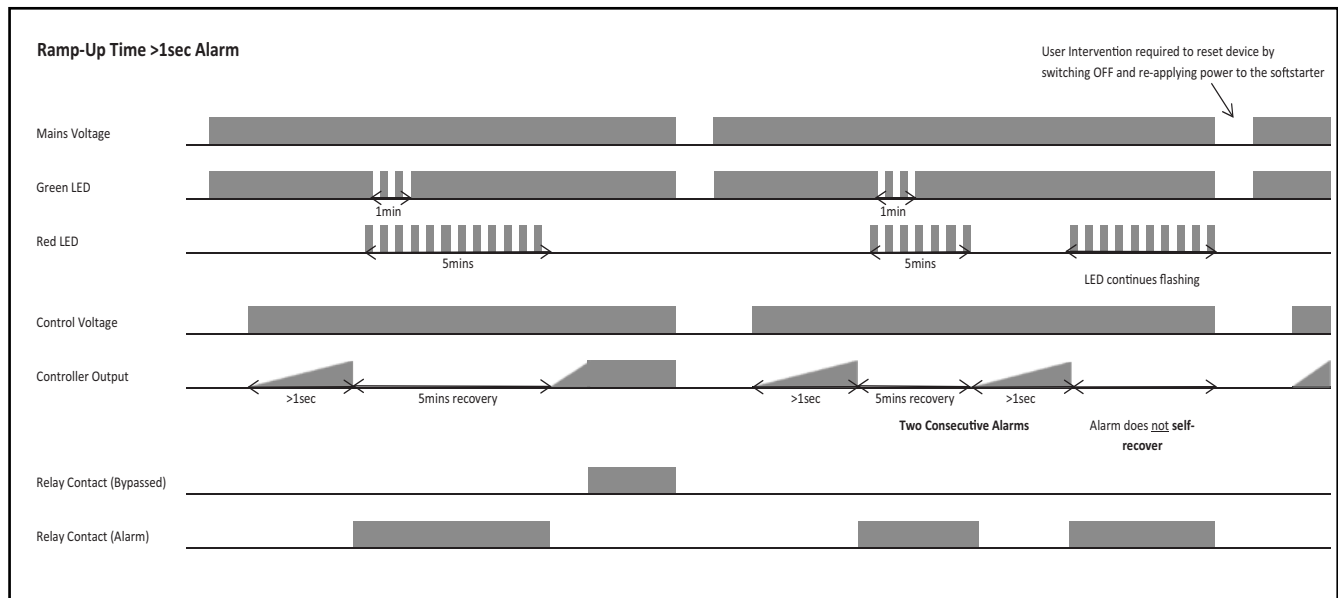


Mode of Operation





Mode of Operation





Alarms

No. of Flashes Red LED	Alarm Description	Action
2	Wrong Phase sequence	User intervention (Physical change)
3	Line Voltage Out of Range	Auto Reset with 5 minutes recovery
4	Frequency Out of Range	Auto Reset with 5 minutes recovery
5	Over Current (during Ramping)	Auto Reset with 5 minutes recovery ¹
6	Ramp Up Time > 1 sec	Auto Reset with 5 minutes recovery ¹
7	Over Temperature	Auto Reset with 5 minutes recovery
8	Over Current (during Bypass) ²	Auto Reset with 5 minutes recovery
9	Supply Voltage Unbalance ²	Auto Reset with 5 minutes recovery

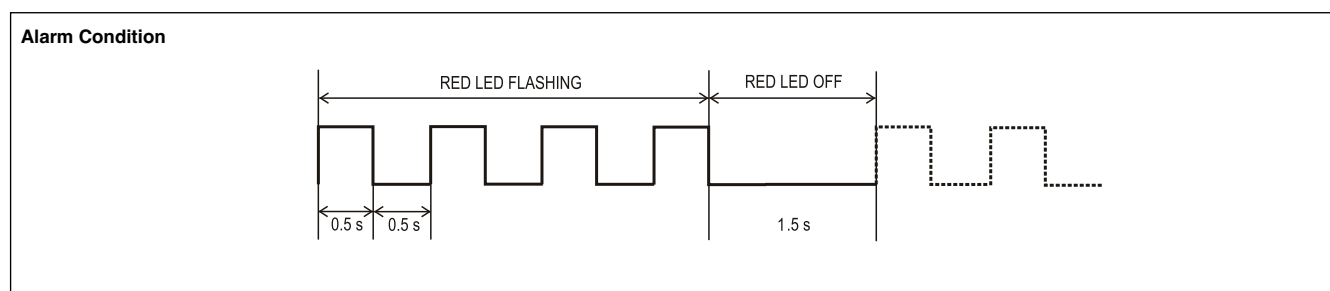
Notes:

1. If alarm is triggered at two consecutive starts, user intervention is required to reset the device. Resetting of the RSBx softstarter is achieved by removing supply to the softstarter.
2. Only active in bypass mode

LED Status Indication

State	Idle	Bypass	Alarm	Recovery from Alarm	Recovery time between starts
Green LED	ON	ON	ON	ON	Flashing
Red LED	OFF	OFF	Flashing (acc. to alarm)	Flashing	OFF

Flashing Sequence





Short circuit Protection (according to EN/IEC 60947-4-2) & UL508

	RSB.4855CV.	RSB.4870CV.	RSB.4895CV.
Type of coordination: 1 Rated short circuit current	10 kA when protected with J class fuses up to 60A	10 kA when protected with J class fuses up to 70A	10 kA when protected with RK5 fuses up to 100A
Type of coordination: 2 Rated short circuit current	10 kA when protected by semiconductor fuses 100A, class URD. Art. no. 6.900 CP URD 22 x 58 / 100	10 kA when protected by semiconductor fuses 100A, class URD. Art. no. 6.900 CP URD 22 x 58 / 100	10 kA when protected by semiconductor fuses 160A, Class URS/URQ, Art. No. 160Ac660VAC 27 x 601/ 6.9xxCP URQ 27 x 60 / 160

Current/Power Ratings

Assigned compressor rating @ 40°C/UL rating @ 40°C³

	220-240VAC	380-415VAC	440-480VAC
RSB.4855CV.	20.0 HP (15 kW)	30.0 HP (22 kW)	40.0 HP (30 kW)
RSB.4870CV.	25.0 HP (20 kW)	40.0 HP (30 kW)	50.0 HP (37 kW)
RSB.4895CV.	30.0 HP (22 kW)	50.0 HP (45 kW)	75.0 HP (55 kW)

Assigned compressor rating @ 50°C/UL rating @ 50°C³

	220-240VAC	380-415VAC	440-480VAC
RSB.4855CV.	15.0 HP (11 kW)	30.0 HP (22 kW)	30.0 HP (22 kW)
RSB.4870CV.	20.0 HP (15 kW)	30.0 HP (30 kW)	40.0 HP (37 kW)
RSB.4895CV.	30.0 HP (22 kW)	50.0 HP (37 kW)	60.0 HP (45 kW)

Assigned compressor rating @ 60°C/UL rating @ 60°C³

	220-240VAC	380-415VAC	440-480VAC
RSB.4855CV.	15.0 HP (11 kW)	25.0 HP (22 kW)	30.0 HP (22 kW)
RSB.4870CV.	20.0 HP (15 kW)	30.0 HP (22 kW)	40.0 HP (30 kW)
RSB.4895CV.	25.0 HP (20 kW)	40.0 HP (37 kW)	50.0 HP (37 kW)

Note:
3. Motor kW ratings are provided as a reference. User shall always ensure that compressor operational current and overload current of the compressor during starting does not exceed the rating of the softstarter being used.