

# Soft Starter Three-Phase Scroll Compressor Soft Starter Types RSBD, RSBT

CARLO GAVAZZI



- Soft starting of 3-phase scroll compressors up to 45Amp
- Patented auto-adaptive algorithm for optimum inrush current reduction (No user settings required)
- 2- (RSBD) and 3-Phase (RSBT) controlled solutions
- Current balancing strategy (RSBD models)
- Integrated bypass relays
- Internally supplied
- Short ramp up time: <600ms
- Rated operational voltage: 220VAC, 400VACrms, 50/60Hz
- Rated operational current: 12<sup>1</sup>, 16, 25, 32, 37<sup>1</sup>, 45<sup>1</sup> AAC
- Over-temperature, Overcurrent, Locked Rotor protection
- cULus, CE, RoHS compliant, CCC<sup>1</sup>
- HP version for multi-compressor systems
- VDE approved (Up to 32AAC) - for RSBT...HPV models

Note: Other models (RSBT) only VDE approved up to 15Arms

## Product Description

RSBD and RSBT are easy to use soft starters for scroll compressors up to 45Amp (RSBD) and 32Amp (RSBT) 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 solution and RSBT is a 3-phase controlled solution. RSBD and RSBT are internally bypassed resulting in less heat dissipation inside the panel.

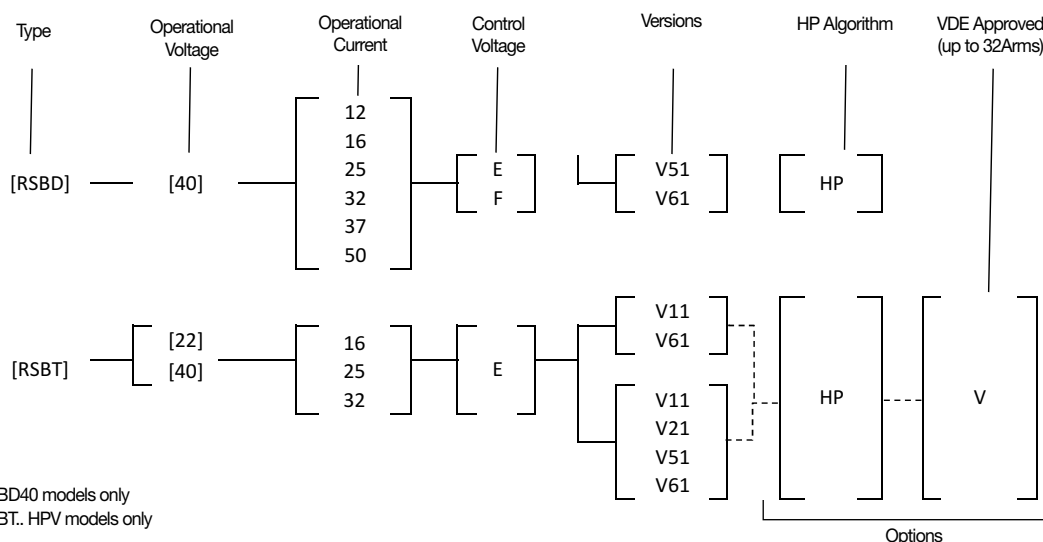
Short Circuit and Overload protection are not provided with the controller and must be procured separately.

## Ordering Key RSB T 40 16 E V 11 HP V

Compressor Soft Starter  
Controlled Phases  
Operational Voltage  
Rated Operational Current  
Control Voltage  
Version  
Optimised algorithm for multi-compressor systems and high pressure starts  
VDE approved versions (up to 32Arms)<sup>2</sup>

## Type Selection

| Type                        | Operational Voltage Ue                         | Rated Operational Current Ie @ 40°C   | Control Voltage Uc  | Version  |
|-----------------------------|--|---|---|--|
| RSBD<br>2-Controlled phases | 40: 220 – 400 VAC<br>+10% -15%                 | 12: 12 Arms <sup>1</sup><br>16: 16 Arms<br>25: 25 Arms<br>32: 32 Arms<br>37: 37 Arms <sup>1</sup><br>50: 45 Arms <sup>1</sup> | E: 110 – 400 VAC<br>+10% -15%<br><br>F <sup>1</sup> : 24VAC/DC<br>+10% -15% | V11: DIN Mount <sup>2</sup><br>V21: DIN Mount & RFPMV00 module ready mounted <sup>2</sup><br>V51: DIN Mount (UL approved) <sup>2</sup><br>V61: DIN Mount & RFPMV00 module ready mounted (UL approved) <sup>2</sup><br>V..HP: Optimised algorithm for multi-compressor systems & high pressure starts<br>V..HPV: VDE approved (up to 32AAC) |
| RSBT<br>3-Controlled phases | 22: 220VAC, +10% -15%<br>40: 400VAC, +10% -15% |   |   |  |



<sup>1</sup> Applies to RSBD40 models only

<sup>2</sup> Applies to RSBT.. HPV models only

## Selection Guide: RSBD (2-phase controlled)

| Control Voltage | Version        | Rated Operational Current        |                                  |                                  |                                  |                                  |                                  |
|-----------------|----------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|
|                 |                | 12 Arms                          | 16 Arms                          | 25 Arms                          | 32 Arms                          | 37 Arms                          | 45 Arms                          |
| 110 – 400 VAC   | V51HP<br>V61HP | RSBD4012EV51HP<br>RSBD4012EV61HP | RSBD4016EV51HP<br>RSBD4016EV61HP | RSBD4025EV51HP<br>RSBD4025EV61HP | RSBD4032EV51HP<br>RSBD4032EV61HP | RSBD4037EV51HP<br>RSBD4037EV61HP | RSBD4050EV51HP<br>RSBD4050EV61HP |
| 24VAC/DC        |                | RSBD4012FV51HP<br>RSBD4012FV61HP | RSBD4016FV51HP<br>RSBD4016FV61HP | RSBD4025FV51HP<br>RSBD4025FV61HP | RSBD4032FV51HP<br>RSBD4032FV61HP | RSBD4037FV51HP<br>RSBD4037FV61HP | RSBD4050FV51HP<br>RSBD4050FV61HP |

## Selection Guide: RSBT (3-Phase Controlled)

| Operational Voltage | Approvals    | Version            | Rated Operational Current                        |  |  |
|---------------------|--------------|--------------------|--|--|--|
|                     |              |                    | 16 Arms  | 25 Arms  | 32 Arms  |
| 220 VAC             | CE           | V11/V11HP<br>V21HP | RSBT2216EV11HP                                   | RSBT2225EV11HP                                   | RSBT2232EV11HP                                   |
| 400 VAC             |              |                    | RSBT4016EV11<br>RSBT4016EV11HP<br>RSBT4016EV21HP | RSBT4025EV11<br>RSBT4025EV11HP<br>RSBT4025EV21HP | RSBT4032EV11<br>RSBT4032EV11HP<br>RSBT4032EV21HP |
| 220 VAC             | CE,<br>cULus | V51HP<br>V61HP     | RSBT2216EV61HP                                   | RSBT2225EV61HP                                   | RSBT2232EV61HP                                   |
| 400 VAC             |              |                    | RSBT4016EV51HP<br>RSBT4016EV61HP                 | RSBT4025EV51HP<br>RSBT4025EV61HP                 | RSBT4032EV51HP<br>RSBT4032EV61HP                 |
| 220 VAC             | CE           | V11/V11HP<br>V21HP | RSBT2216EV11HPV                                  | RSBT2225EV11HPV                                  | RSBT2232EV11HPV                                  |
| 400 VAC             |              |                    | RSBT4016EV11HPV<br>RSBT4016EV21HPV               | RSBT4025EV11HPV<br>RSBT4025EV21HPV               | RSBT4032EV11HPV<br>RSBT4032EV21HPV               |
| 220 VAC             | CE,<br>cULus | V51HP<br>V61HP     | RSBT2216EV61HPV                                  | RSBT2225EV61HPV                                  | RSBT2232EV61HPV                                  |
| 400 VAC             |              |                    | RSBT4016EV51HPV<br>RSBT4016EV61HPV               | RSBT4025EV51HPV<br>RSBT4025EV61HPV               | RSBT4032EV51HPV<br>RSBT4032EV61HPV               |

## General Specifications

|  |  |                               |   |
|--|--|-------------------------------|---|
| <b>Starting Method</b>                     | Current limit, auto-adaptive   | <b>Status Indication LEDs</b> |   |
| <b>Ramp-up time</b>                        | < 600 msec   |                               |   |
| <b>Ramp-down time</b>                      | 0 sec  |                               |   |
| <b>Initial Torque</b>                      | Initial torque will vary indirectly through the variation of the current limit through the auto-adaptive algorithm |                               |   |
| <b>Undervoltage/Overvoltage protection</b> |  | <b>Form Designation</b>       | 1   |
| Recovery from Undervoltage                 |  | <b>Vibration</b>              | Acc. To IEC60068-2-26   |
| RSBD40...                                  | 174 VAC  | Frequency 1                   | 2 [+3/-0]Hz to 25Hz<br>Displacement +/- 1.6mm                           |
| RSBT22...                                  | 190 VAC  |                               |   |
| RSBT40...                                  | 330 VAC  | Frequency 2                   | Acc. To IEC60068-2-26<br>25Hz to 100Hz @ 2g<br>(19.96m/s <sup>2</sup> ) |
| Recovery from Overvoltage                  |  |                               |   |
| RSBD40...                                  | 470 VAC  |                               |   |
| RSBT22...                                  | 250 VAC  |                               |   |
| RSBT40...                                  | 470 VAC  |                               |   |

<sup>1</sup> Applies to RSBD models only<sup>2</sup> Applies to RSBT models only<sup>3</sup> Applies to RSBT...HPV models only

## Input Specifications

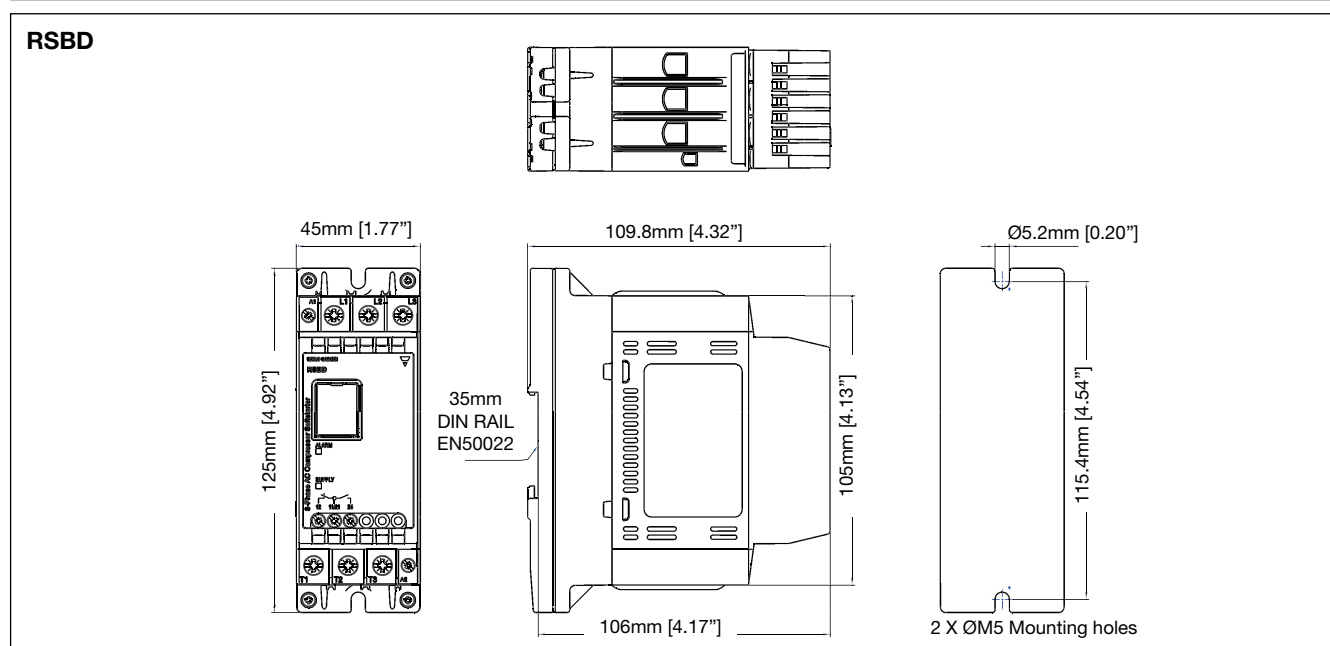
|  | RSBD40..FV..       | RSBD40..EV..   | RSBT..EV..     |
|--|--------------------|----------------|----------------|
| Control Voltage $U_c$ , A1-A2 <sup>1</sup> | 21.6 - 26.4 VAC/DC | 93.5 - 440 VAC | 93.5 - 440 VAC |
| Max. Pick Up Voltage                       | 20.4 VAC/DC        | 80 VAC         | 80 VAC         |
| Min. Drop Out Voltage                      | 5 VAC/DC           | 20 VAC         | 20 VAC         |
| Rated AC frequency                         | 50/60Hz +/-10%     | 50/60Hz +/-10% | 50/60Hz +/-10% |
| Rated Insulation Voltage $U_i$             | 500 VAC            | 500 VAC        | 630 VAC        |
| Dielectric Strength                        |                    |                |                |
| Dielectric withstand voltage               | 2 kVrms            | 2 kVrms        | 2 kVrms        |
| Rated Impulse                              |                    |                |                |
| Withstand Voltage                          | 4 kVrms            | 4 kVrms        | 4 kVrms        |
| Control Input Current                      | 0.4 ... 1 mAAC     | 0.5 ... 5 mAAC | 3...6 mAAC     |
| Input to Output response time              | < 100 msec*        | < 100 msec*    | < 100 msec*    |
| Integrated varistor                        | Yes                | Yes            | Yes            |

\* If supply is not already present, when control is applied, Response time is 1500msec

## Output Specifications

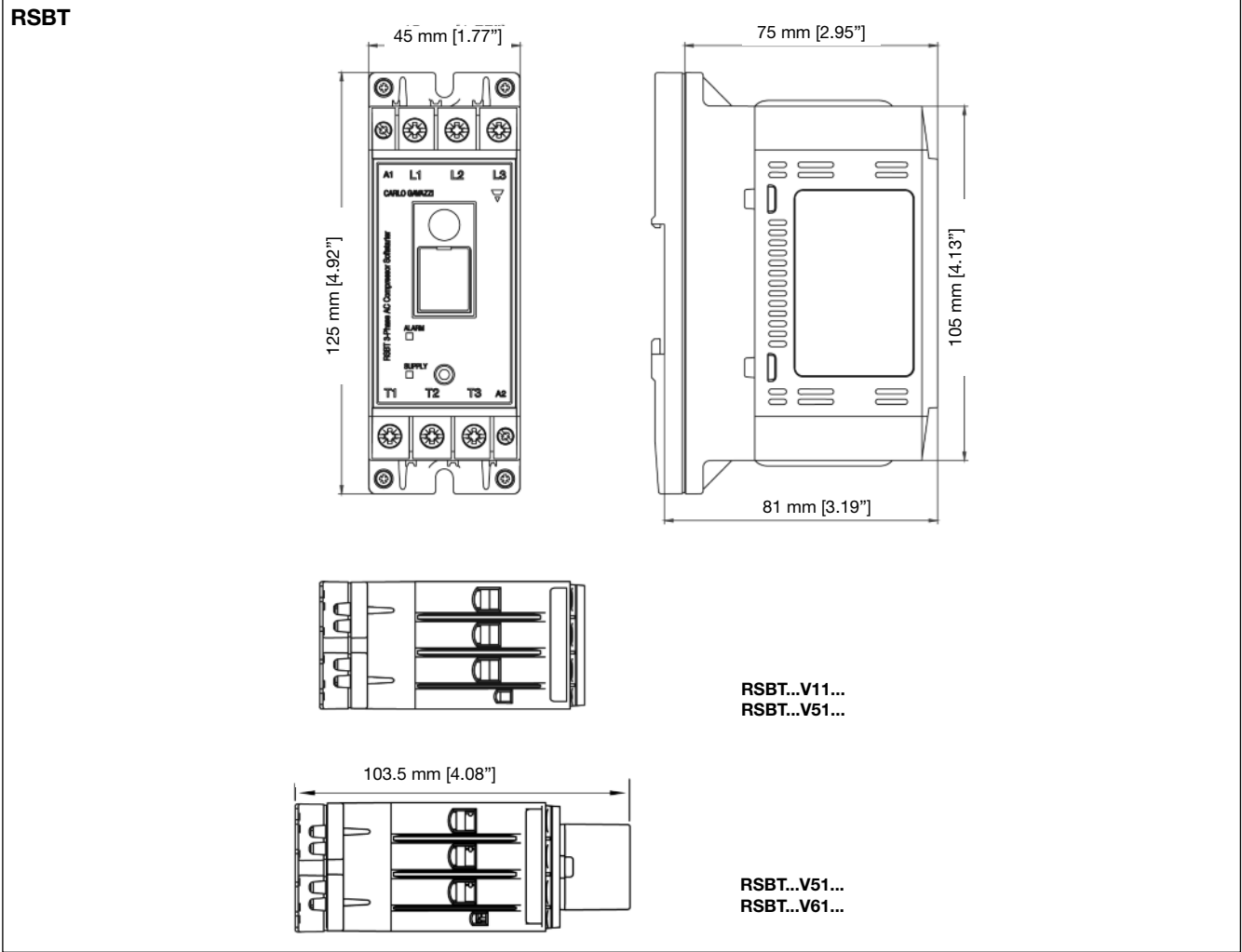
|  | RSBD   | RSBT  |
|--|--|---|
| IEC rated operational current $I_e$<br>(AC-53b) @ 40°C                       | 12 AACrms<br>16 AACrms<br>25 AACrms<br>32 AACrms<br>37 AACrms<br>45 AACrms | -<br>RSBT..16..<br>RSBT..25..<br>RSBT..32..<br>-<br>-       |
| Overload Cycle<br>acc. to EN/IEC 60947-4-2<br>@ 40°C surrounding temperature | AC53b: 3.5-1:299   | 16:AC53b:2.5-1:60<br>25:AC53b:3.6-1:60<br>32:AC53b:3.4-1:60 |
| Max. Number of starts per hour @ 40°C  | 12   | 12  |
| Minimum time between stop and start  | 1 sec.   | 60 sec.   |
| Minimum time between starts  | 300 sec.   | 300 sec.  |
| Minimum load current   | 1AAC (RSBD4012... - RSBD4016)<br>5AAC (RSBD4025... - RSBD4050)             | 2AAC  |

## Dimensions





Dimensions



Environmental Specifications

|                       |            |   |
|-----------------------|------------|---|
| Operating Temperature |            |   |
|                       | RSBD..     | -20°C to +60°C (-4°F to +140°F)<br>Note: For operating temp.<br>>40°C derating applies* |
| RSBT..16EV..          | Ie<=16 AAC | -20°C to +60°C (-4°F to +140°F)   |
| RSBT..25EV..          | Ie<=25 AAC | -20°C to +55°C (-4°F to +131°F)   |
|                       | Ie<=16 AAC | -20°C to +60°C (-4°F to +140°F)   |
| RSBT..32EV..          | Ie<=32 AAC | -20°C to +50°C (-4°F to +122°F)   |
|                       | Ie<=25 AAC | -20°C to +55°C (-4°F to +131°F)   |
|                       | Ie<=16 AAC | -20°C to +60°C (-4°F to +140°F)   |
| Storage Temperature   |            | -40°C to +80°C (-40°F to 176°F)   |
| Relative Humidity     |            | <95% non-condensing @ 40°C  |
| Pollution Degree      |            | 2   |
| Degree of Protection  |            | IP20 (EN/IEC 60529)   |
| Installation Category |            | III   |
| Installation Altitude |            | 1000 m  |

\* RSBD4012/16/25/37 - 0.8% per °C  
RSBD4032/50 - 1.2% per °C up to a maximum of 60°C

Supply Specifications

|                                      |                              |                                |
|--------------------------------------|------------------------------|--------------------------------|
| Operational Voltage Range<br>L1 – L3 |                              |                                |
|                                      | RSBD40...                    | 187 – 440 VACrms 50/60 Hz      |
|                                      | RSBT22...                    | 187 – 253 VACrms 50/60 Hz      |
|                                      | RSBT40...                    | 340 – 440 VACrms 50/60 Hz      |
| Supply Current at standby            |                              | <30 mAAC                       |
| Blocking voltage                     |                              |                                |
|                                      | RSBD                         | 1200 Vp                        |
|                                      | RSBT22..EV..                 | 800Vp                          |
|                                      | RSBT40..EV..                 | 1200Vp                         |
| Rated AC frequency                   |                              | 50/60 Hz +/- 10%               |
| Rated insulation voltage             |                              |                                |
|                                      | RSBD                         | 500VAC                         |
|                                      | RSBT                         | 630VAC                         |
| Dielectric strength                  |                              |                                |
|                                      | Dielectric withstand voltage |                                |
|                                      | Supply to input              | 2.5 kVms                       |
|                                      | Supply to heatsink           | 2.5kVms                        |
| Integrated varistor                  |                              | Yes (across controlled phases) |

## Connection Specifications

### Line conductors

L1, L2, L3, T1, T2, T3

Acc. to EN60947-1

flexible

2.5 ..... 10 mm<sup>2</sup>2.5 ..... 2 x 4 mm<sup>2</sup>

rigid (solid or stranded)

2.5 ..... 10 mm<sup>2</sup>

flexible with end sleeve

(ferrule)

2.5 ..... 10 mm<sup>2</sup>

UL/cUL rated data

Rigid (stranded)

AWG 6...14

Rigid (solid)

AWG 10...14

Rigid (solid or stranded)

AWG 2 x 10...2 x 14

### Terminal screws

6 x M4

### Max. tightening torque

2.5 Nm (22 lb.in) with  
Posidrive bit 2

### Stripping length

8.0 mm

### Secondary conductors

A1, A2

Acc. to EN60998

flexible

0.5 ..... 1.5 mm<sup>2</sup>

rigid (solid or stranded)

0.5 ..... 2.5 mm<sup>2</sup>

flexible with end sleeve

(ferrule)

0.5 ..... 1.5 mm<sup>2</sup>

UL/cUL rated data

rigid (solid or stranded)

AWG 10...18

### Terminal screws

9 x M3

### Max. tightening torque

0.6Nm (5.3lb.in) with  
Posidrive bit 0

### Stripping length

6.0 mm

### Auxiliary conductors

RSBD: 11, 12, 21, 24

rigid (solid or stranded)

0.05...2.5mm<sup>2</sup>

flexible with end sleeve

(ferrule)

0.05...1.5mm<sup>2</sup>

RSBT...V2.../V6...: 11, 12, 14

rigid (solid or stranded)

0.2...4mm<sup>2</sup>

flexible with end sleeve

(ferrule)

0.2...2.5mm<sup>2</sup>

UL/cUL rated data

RSBD: 11, 12, 21, 24

rigid (solid or stranded)

AWG30...12

RSBT...V2.../V6...: 11, 12, 14

rigid (solid or stranded)

AWG24...12

### Terminal screws

RSBD: 11, 12, 21, 24

M3

RSBT...V2.../V6...: 11, 12, 14

M2.5

### Max. tightening torque

RSBD: 11, 12, 21, 24

0.45 Nm (4.0 lb.in)

RSBT: ...V2.../V6...: 11, 12, 14

0.8 Nm (7.0 lb.in)

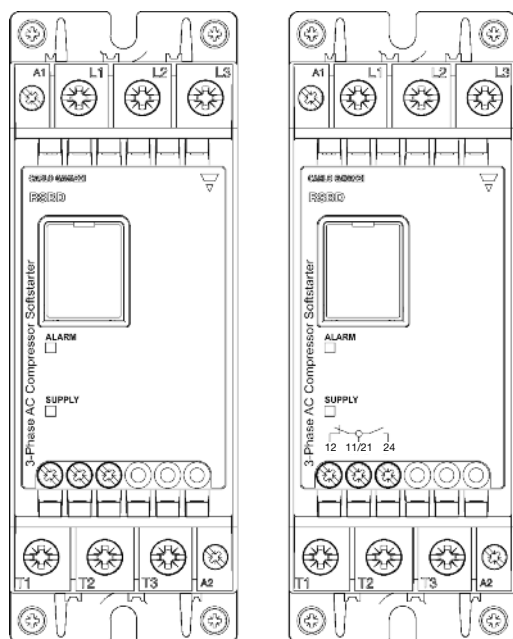
### Stripping length

6 mm

## Terminal Markings

RSBD40...V51HP

RSBD40...V61HP



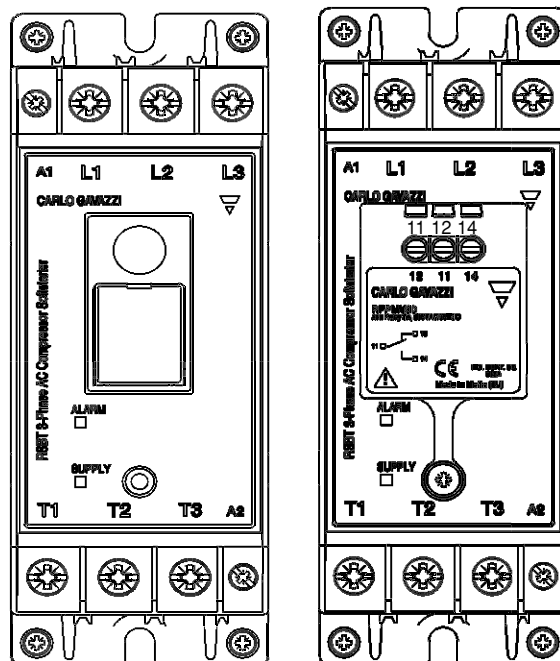
L1, L2, L3: Line connections

T1, T2, T3: Load connections

A1, A2: Control voltage

11, 12: Alarm indication (Normally Closed, NC)

21, 24: Top of Ramp indication (Normally Open, NO)

RSBT...V11...  
RSBT...V51...RSBT...V21...  
RSBT...V61...

L1, L2, L3: Line connections

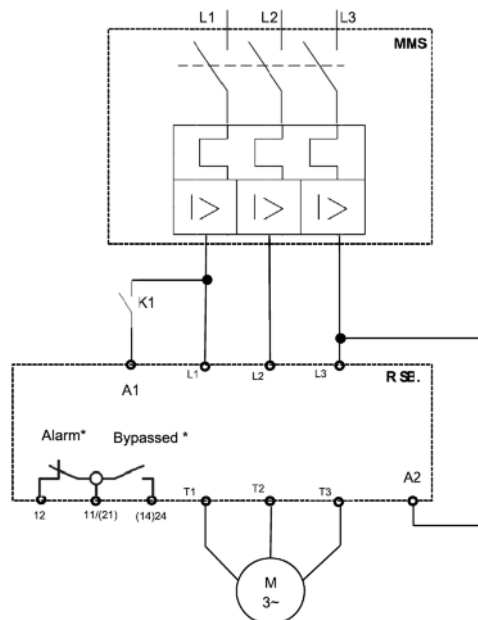
T1, T2, T3: Load connections

A1, A2: Control voltage

11, 12, 14: Alarm indication (Normally Open, Normally Closed, Changeover contact)

## Wiring Diagram

### RSBD and RSBT models with Control Voltage Option "E"

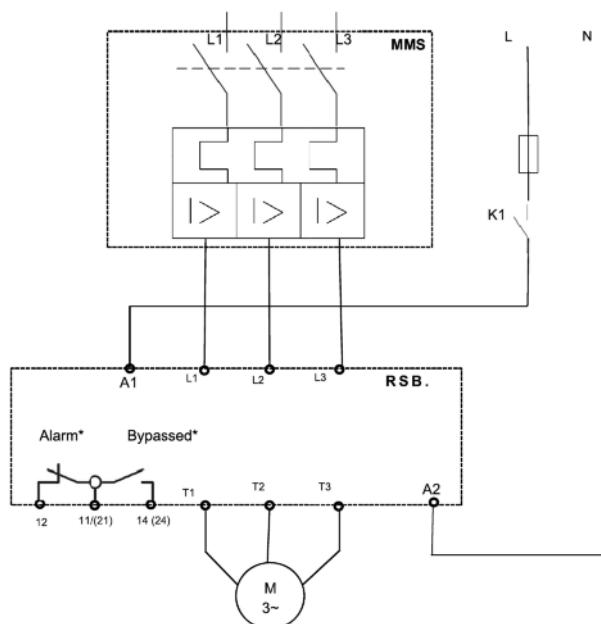


Note: Control signal may be applied across any of the three supply lines (L1, L2, L3) as long as the control voltage range is respected.

\* RSBD aux. relay connections: 11,12,21,24 (Alarm and Bypass status indication)

\* RSBT aux. relay connections: 11,12,14 (Alarm indication only)

### RSBD and RSBT models with Control Voltage Option "E"



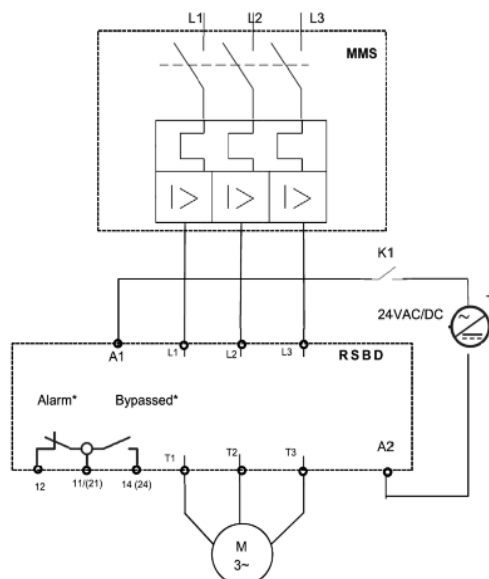
Note:

\* RSBD aux. relay connections: 11,12,21,24 (Alarm and Bypass status indication)

\* RSBT aux. relay connections: 11,12,14 (Alarm indication only)

## Wiring Diagram

RSBD models with Control Voltage Option "F"



Note: In case of 24VDC control, apply the 24VDC signal to A1 and the 0V to A2. An incorrect connection may damage the soft starter.

\* RSBD aux. relay connections: 11,12,21,24 (Alarm and Bypass status indication)

\* RSBT aux. relay connections: 11,12,14 (Alarm indication only)

## Auxiliary Relays

|  |  |
|--|--|
| <b>Auxiliary relays contact rating</b>   | 3A, 250 VAC<br>3A, 30VDC   |
| <b>Bypassed<sup>1</sup> (21,24)</b>      | Normally Open (NO)   |
| <b>Alarm</b>                             |  |
| <b>RSBD (11,12)</b>                      | Normally Closed (NC)   |
| <b>RSBT.....EV2.../6... (11, 12, 14)</b> | Normally Open (NO)/Normally Closed (NC) – Changeover relay contact |

<sup>1</sup> Applies to RSBD models only

## Housing Specifications

|                        |              |
|------------------------|--------------|
| <b>Weight</b>          |              |
| RSBD.....V51HP         | 430 g        |
| RSBD.....V61HP         | 430 g        |
| RSBT.....V11.../V51..  | 425 g        |
| RSBT.....V21.../V61..  | 460 g        |
| <b>Material</b>        | PA66         |
| <b>Material colour</b> | RAL7035      |
| <b>Terminal colour</b> | RAL7040      |
| <b>Mounting</b>        | DIN or Panel |

## Electromagnetic Compatibility






|   |                        |   |   |
|---|------------------------|---|---|
| <b>Immunity</b>                                   | IEC/EN 60947-4-2       | <b>Rated radio frequency Immunity</b>                   | IEC/EN 61000-4-3                            |
| <b>Electrostatic discharge (ESD) Immunity</b>     | EC/EN 61000-4-2        | 3V/m, 0.15 - 80 MHz                                     | Performance Criteria 1                      |
| Air discharge: 8kV                                | Performance Criteria 2 | <b>Conducted Radio Frequency Immunity</b>               | IEC/EN 61000-4-6                            |
| Contact: 4kV                                      | Performance Criteria 2 | 10V/m, 0.15 - 80 MHz                                    | Performance Criteria 1                      |
| <b>Electrical Fast Transient (Burst) Immunity</b> | IEC/EN 61000-4-4       | <b>Emission</b>   | IEC/EN 60947-4-2                            |
| Output: 2kV                                       | Performance Criteria 2 | <b>Radio interference field emissions (radiated)</b>    |   |
| Input: 1kV  | Performance Criteria 2 | <b>RSBT</b>   | CISPR 11 IEC/EN 55011, Class B              |
| <b>Electrical surge immunity</b>                  | IEC/EN 61000-4-5       | <b>RSBD</b>   | CISPR 11 IEC/EN 55011, Class A (Industrial) |
| Output, line to line, 1kV                         | Performance Criteria 2 | <b>Radio interference voltage emissions (conducted)</b> |   |
| Output, line to earth, 2kV                        | Performance Criteria 2 | <b>RSBT</b>   | CISPR 11 IEC/EN 55011, Class B              |
| Input, line to line, 1kV                          | Performance Criteria 2 | <b>RSBD</b>   | CISPR 11 IEC/EN 55011, Class A (Industrial) |
| Input, line to earth, 2kV                         | Performance Criteria 2 | <b>Voltage dips &amp; interruptions</b>                 | <b>RSBD/T</b> <b>RSBT..HPV</b>              |
|   |                        | 0% U <sub>e</sub> & U <sub>c</sub> , 5000 ms            | PC2              PC 3                       |
|   |                        | 40% U <sub>e</sub> & U <sub>c</sub> , 100/1000 ms       | PC2 / PC2      PC2 / PC3                    |
|   |                        | 70% U <sub>e</sub> & U <sub>c</sub> , 10 ms             | PC2              PC 2                       |
|   |                        | <b>Harmonics</b>  | IEC/EN 61000-3-2 <sup>2</sup>               |
|   |                        | <b>Flicker*</b>   | IEC/EN 61000-3-3 <sup>2</sup>               |

\*Applies to RSBT..16EV ... models only

<sup>1</sup> Applies to RSBD40 models only

<sup>2</sup> Applies to RSBT.. models only

## Agency Approvals and Conformances

|   |   |
|---|---|
| <b>RSBD..</b><br>EN/IEC60947-4-2<br>UL508 Listed (E172877)<br>cUL Listed (E172877)  | <b>RSBT..</b><br>EN/IEC60947-4-2<br>UL508 Listed (E172877)*<br>cUL Listed (E172877) *<br>VDE (EN60335-1, EN60335-2-40)**/**   |
|   |    |

\* Applies to RSBT...EV5.../EV6... versions only

\*\* Applicable up to operational current of 15Arms

\*\*\* Applicable up to operational current of 32Arms (for RSBT..HPV versions only)

## Mode of Operation

### Auto Adaptive Algorithm (Patented)

RSBD and RSBT series of soft starters includes an innovative auto-adaptive algorithm (Patented) such that an optimum starting current performance is achieved at every compressor start. This feature is active at every compressor start. Appropriate parameters are automatically set by the soft starter in order to achieve an optimum inrush current reduction whilst maintaining a ramp-up time < 1sec.

In case of Locked rotor/ramp-up time alarm, default parameter settings are restored automatically. During the subsequent compressor starts, the auto-adaptive function will start optimising such parameters automatically once again.

### RSB....V..HP Specific Mode of Operation

The RSB....V..HP shall try to start the compressor at the set current limit. Depending on the load requirement, the current limit will be gradually increased up to a maximum of the default current limit, after which the RSB..HP will switch in bypass mode.

If ramping is not achieved after a maximum of 1 second, the Incomplete Ramp alarm (5 flashes on red LED) will be triggered and the RSB....HP will enter into a recovery mode for 5mins. If, at the second consecutive attempt the RSB....HP raises again the Incomplete Ramp alarm, then a manual user intervention to reset power on the RSB...HP shall be required, as this might indicate a real locked rotor condition.

### Auto-adaptive current balancing (applies to RSBD models)

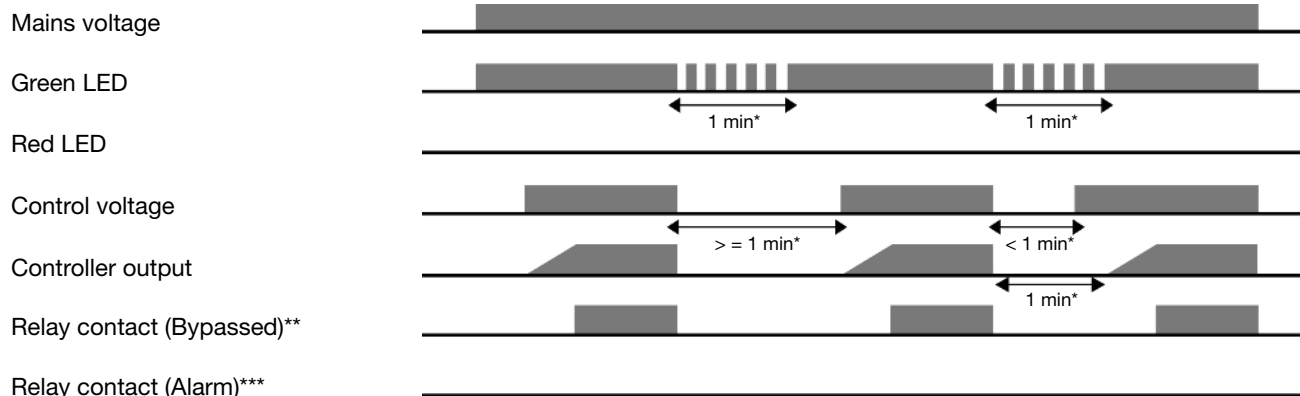
RSBD soft starters use a two-phase control strategy with two anti-parallel thyristors across L1-T1 and L3-T3. Phase L2-T2 is the uncontrolled phase.

During every start, the RSBD soft starter measures a number of parameters and dynamically adjusts the starting parameters to minimise the current unbalance in the phase L2-T2 resulting in a smoother starting performance of the motor.

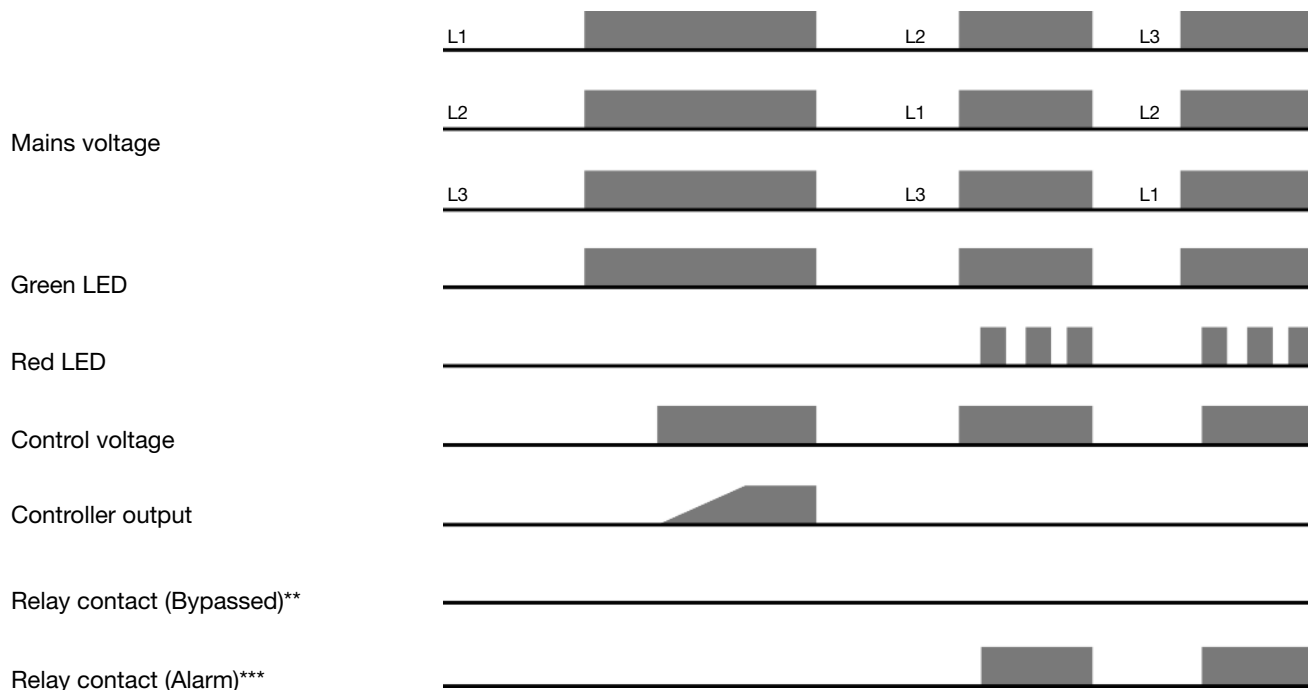


## Mode of Operation

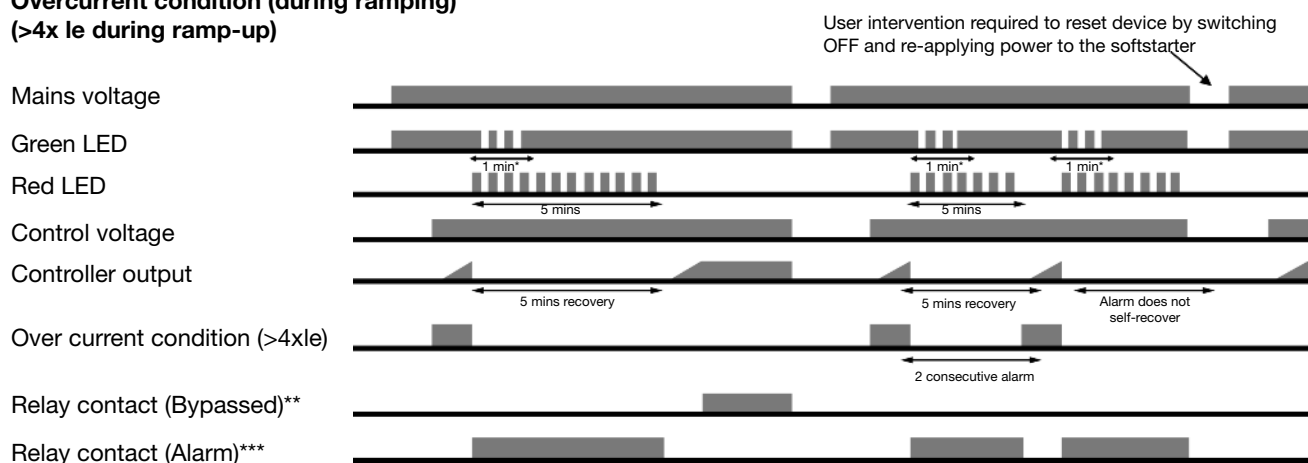
### Normal condition



### Wrong Phases sequence

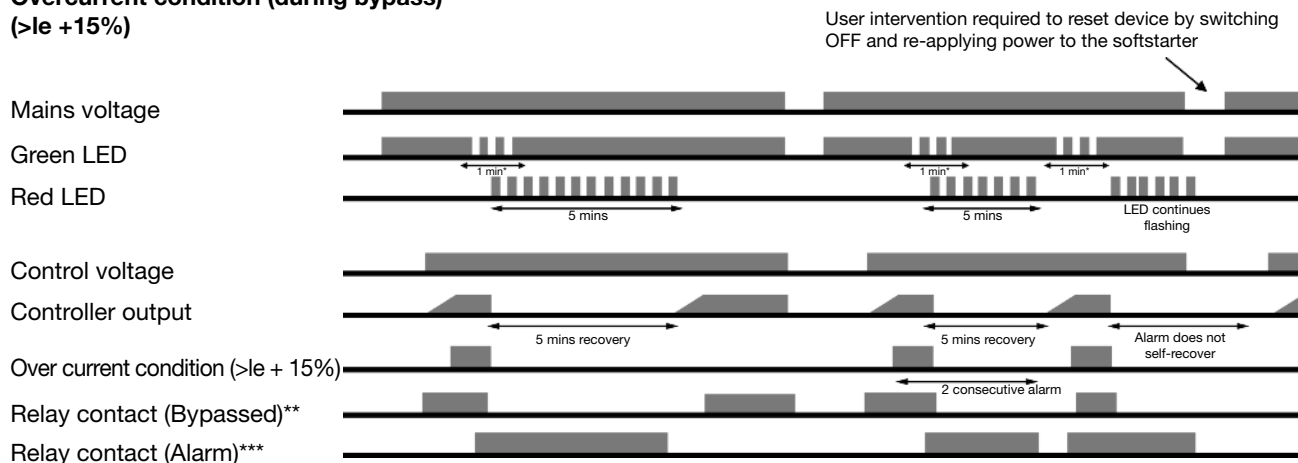


### Overcurrent condition (during ramping) ( $> 4 \times I_e$ during ramp-up)

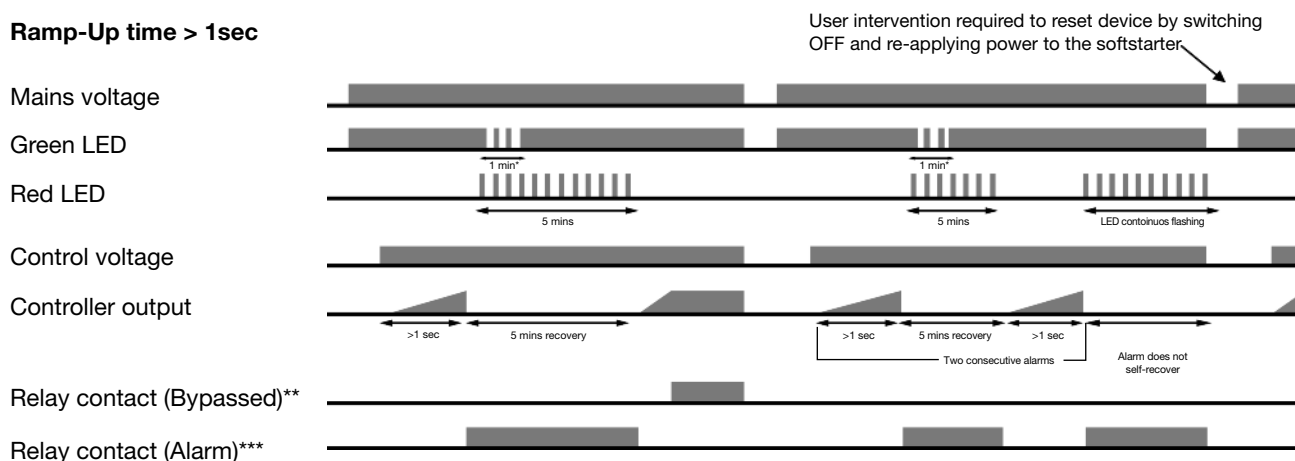


## Mode of Operation

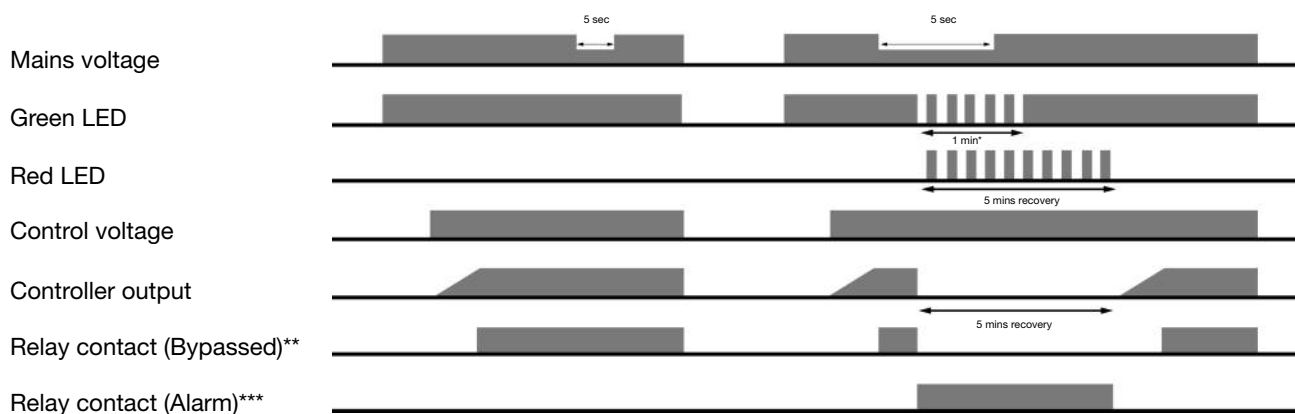
### Overcurrent condition (during bypass) ( $>I_e + 15\%$ )



### Ramp-Up time $> 1\text{sec}$



### Undervoltage Condition



\*\* Applies to RSBD40... models only

\*\*\* Applies to RSBD40...V61HP and RSBT...EV2.../EV6.... Models only and when RSBT is used with RSPMV120 accessory

## Alarm LED Indications (Red LED)

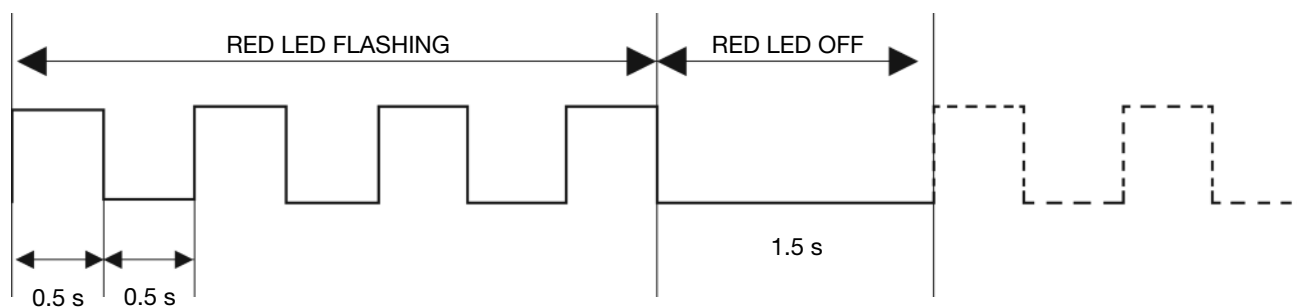
| Flashes                     | Description of Fault             | Relay Contact Position |       |            | Action  |
|-----------------------------|----------------------------------|------------------------|-------|------------|---|
|                             |                                  | RSBD<br>(11, 12)       | RSBT  | RSBT...HP. |   |
| 2                           | Wrong Phase Sequence             | Open                   | 11/12 | 11/12      | Physical Change   |
| 3                           | Line Voltage Out of Range        | Open                   | 11/12 | 11/12      | Auto reset with 5mins recovery  |
| 4                           | Frequency Out of Range           | Open                   | 11/12 | 11/12      | Auto reset with 5mins recovery  |
| 5                           | Over Current<br>(during RAMPING) | Open                   | 11/12 | 11/12      | Auto reset with 5mins recovery  |
| 6                           | Ramp Up Time > 1 sec             | Open                   | 11/12 | 11/12      | Auto reset with 5mins recovery  |
| 7                           | Over Temperature                 | Open                   | 11/12 | 11/12      | Auto reset with 5mins recovery  |
| 8                           | Over Current<br>(during BYPASS)  | Open                   | 11/12 | 11/12      | Auto reset with 5mins recovery  |
| 9                           | Supply Voltage Unbalance         | Open                   | 11/12 | 11/12      | Auto reset with 5mins recovery assuming all phases (L1, L2, L3) are connected                   |
| Fully ON<br>(Green LED OFF) | Special (Internal) alarm         | N/A                    | N/A   | 11/12      | Reset power (L1-L3). If fault is not cleared upon reset, please contact your CG representative. |

## LED Status Indications (Green LED)

| Status   | Condition                    | Relay Contact Position |                  |       |           | Action |
|----------|------------------------------|------------------------|------------------|-------|-----------|--------|
|          |                              | RSBD<br>(11, 12)       | RSBD<br>(21, 24) | RSBT  | RSBT...HP |        |
| Flashing | Recovery time between starts | Closed                 | Open             | 11/14 | 11/14     | N/A    |
| Fully ON | Idle State                   | Closed                 | Open             | 11/14 | 11/14     | N/A    |
| Fully ON | Ramping                      | Closed                 | Open             | 11/12 | 11/14     | N/A    |
| Fully ON | Bypassed                     | Closed                 | Closed           | 11/14 | 11/14     | N/A    |

## Flashing Sequence

### Alarm Condition



Note: For RSBT...HPV models - if a safety-related alarm is triggered in bypass mode, the RSBT will keep the load/output ON. It is up to the system controller/safety device to switch OFF the load.

## Short Circuit Protection

### Protection Co-ordination, Type 1 vs Type 2

Type 1 protection implies that after a short circuit, the device under test will no longer be in a functioning state.

In Type 2 co-ordination the device under test will still be functional after the short circuit. In both cases, however the short circuit has to be interrupted. The fuse between enclosure and supply shall not open. The door or cover of the enclosure shall not be blown open. There shall be no damage to conductors or terminals and the conductors shall not separate from terminals. There shall be no breakage or cracking of insulating bases to the extent that the integrity of the mounting of live parts is impaired. Discharge of parts or any risk of fire shall not occur.

The product variants listed in the table hereunder are suitable for use on a circuit capable of delivering not more than 5,000A rms Symmetrical Amperes, 400 Volts maximum when protected by fuses. Tests at 5,000A were performed with Class RK5 fuses, fast acting; please refer to the table below for maximum allowed ampere rating of the fuse. Use fuses only.

Products rated 12A and 16A, protected with manual motor starters must be wired with a minimum length of 15m of Cu wire conductor with a minimum cross sectional area of 2.5mm<sup>2</sup>. Products rated 25A or higher, protected with manual motor starters must be wired with a minimum length of 10m of Cu wire conductor. \*

\*The length includes the conductors from the voltage source to the manual motor starter, from the manual motor starter to the soft starter and from the soft starter to the load.

| Co-ordination Type 1 (UL508) – RSBD               |                        |   |              |                    |
|---|------------------------|---|--------------|--------------------|
| Part. No.   | Max. Fuse Size [A]     | Class   | Current [kA] | Max. Voltage [VAC] |
| RSBD4012.V....                                    | 20                     | RK5   | 5            | 400                |
| RSBD4016.V....                                    | 20                     | RK5   | 5            | 400                |
| RSBD4025.V....                                    | 25                     | RK5   | 5            | 400                |
| RSBD4032.V....                                    | 35                     | RK5   | 5            | 400                |
| RSBD4037.V....                                    | 50                     | RK5   | 5            | 400                |
| RSBD4050.V....                                    | 50                     | RK5   | 5            | 400                |
| Co-ordination Type 1 Manual Motor Starters - RSBD |                        |   |              |                    |
|   | Model No.              |   | Current [kA] | Max. Voltage [VAC] |
| RSBD4012.V....                                    | GMS32S-17 / GMS32H-17  |   | 10           | 400                |
| RSBD4016.V....                                    | GMS32S-17 / GMS32H-17  |   | 10           | 400                |
| RSBD4025.V....                                    | GMS32H-32              |   | 10           | 400                |
| RSBD4032.V....                                    | GMS32H-32              |   | 10           | 400                |
| RSBD4037.V....                                    | GMS63S-50 / GMS63H-50  |   | 10           | 400                |
| RSBD4050.V....                                    | GMS63S-50 / GMS63H-50  |   | 10           | 400                |
| Co-ordination Type 1 (UL508) – RSBT               |                        |   |              |                    |
| Part. No.   | Max. Size [A]          | Class   | Current [kA] | Max. Voltage [VAC] |
| RSBT..16EV5...                                    | 40                     | RK5   | 5            | 400                |
| RSBT..16EV6...                                    | 40                     | RK5   | 5            | 400                |
| RSBT..25EV5...                                    | 40                     | RK5   | 5            | 400                |
| RSBT..25EV6...                                    | 40                     | RK5   | 5            | 400                |
| RSBT..32EV5...                                    | 40                     | RK5   | 5            | 400                |
| RSBT..32EV6...                                    | 40                     | RK5   | 5            | 400                |
| Co-ordination Type 2 (IEC/EN 60947-4-2) – RSBD    |                        |   |              |                    |
|   | Max. Size [A]          | Class   | Current [kA] | Max. Voltage [VAC] |
| RSBD4012.V....                                    | 35                     | A70 QS 35-4   | 5            | 400                |
| RSBD4016.V....                                    | 35                     | A70 QS 35-4   | 5            | 400                |
| RSBD4025.V....                                    | 50 / 63                | A70 QS 60-4 / 6.9xx CP URD 22 x 58/63 (xx = 00 or 21) | 5            | 400                |
| RSBD4032.V....                                    | 60                     | A70 QS 60-4   | 5            | 400                |
| RSBD4037.V....                                    | 125                    | A70 QS 125-4  | 5            | 400                |
| RSBD4050.V....                                    | 125                    | A70 QS 125-4  | 5            | 400                |
| Co-ordination Type 2 (IEC/EN 60947-4-2) – RSBT    |                        |   |              |                    |
|   | Ferraz Shawmut/ MERSEN |   | Current [kA] | Max. Voltage [VAC] |
|   | Max. Size [A]          | Part Number   | 5            | 400                |
| RSBT..16EV....                                    | 50                     | 6.9xx CP gRC 14.51 50 (xx = 00 or 231)                | 5            | 400                |
| RSBT..25EV....                                    | 50                     | 6.9xx CP gRC 14.51 50 (xx = 00 or 21)                 | 5            | 400                |
| RSBT..32EV....                                    | 50                     | 6.9xx CP gRC 14.51 50 (xx = 00 or 21)                 | 5            | 400                |

## Current / Power Ratings

| Current / Power Ratings - RSBD                        |                 |                 |  |
|---|-----------------|-----------------|--|
| Assigned compressor rating @ 40°C<br>UL rating @ 40°C | 220V            | 400V            | Max. Current limit level<br>I <sub>rms</sub> |
| RSBD4012.V....  | 3 kW (3 HP)     | 5.5 kW (5 HP)   | 42 Arms                                      |
| RSBD4016.V....  | 4 kW (5 HP)     | 7.5 kW (7.5 HP) | 56 Arms                                      |
| RSBD4025.V....  | 5.5 kW (7.5 HP) | 11 kW (10 HP)   | 87.5 Arms                                    |
| RSBD4032.V....  | 9 kW (10 HP)    | 15 kW (15 HP)   | 112 Arms                                     |
| RSBD4037.V....  | 9 kW (10 HP)    | 18.5 kW (20 HP) | 129.5 Arms                                   |
| RSBD4050.V....  | 11 kW (15 HP)   | 22 kW (25 HP)   | 175 Arms                                     |

| Current / Power Ratings - RSBT                        |                  |                   |  |
|---|------------------|-------------------|--|
| Assigned compressor rating @ 40°C<br>UL rating @ 40°C | 220V             | 400V              | Max. Current limit level<br>I <sub>rms</sub> |
| RSBT2216EV....  | 4.0 kW (5.0 HP)  | -                 | 40 Arms                                      |
| RSBT2225EV....  | 5.5 kW (7.5 HP)  | -                 | 90 Arms                                      |
| RSBT2232EV....  | 9.0 kW (10.0 HP) | -                 | 110 Arms                                     |
| RSBT4016EV....  | -                | 7.5 kW (7.5 HP)   | 40 Arms                                      |
| RSBT4025EV....  | -                | 11.0 kW (10.0 HP) | 90 Arms                                      |
| RSBT4032EV....  | -                | 15.0 kW (15.0 HP) | 110 Arms                                     |

Note: 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.

## Accessories

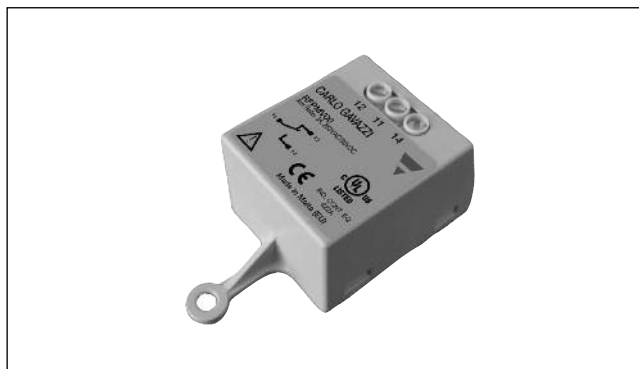
### Auxiliary Output Module



- 17.5mm DIN rail housing
- LED indication for supply ON
- Plug'n'play design
- Output (1): 100mA, Open collector, Normally Open (NO)
- Output (2): 3A SPDT relay \*
- RoHS compliant
- Ordering code: RSPMV110 (1-output) / RSPMV120 (2-output)
- CE, cULus (Accessory of listed RSBT)

\* Only applicable to RSPMV120

### Auxiliary Relay Alarm Output



- Normally open (NO) or Normally Closed (NC) configuration
- Contact rating: 3A, 250 VAC / 3A, 30VDC
- 1-Relay Output for alarms generated by softstarter
- Ordering code: RFPMV00
- UL, cUL Listed (Accessory of Listed RSBT)

## Accessories

### EMC/ RFI Filter



- Insertion loss 5dB
- Lightweight and compact design
- Operational current: Max. 32A @ 60°C
- Rated operational voltage: 220/ 440 VAC  $\pm$  15%
- Ordering code: RFILT4032V00
- UL, cUL Listed (Accessory of Listed RSBT)

### RTPM (Interconnecting Clip)



#### Ordering Key

Interconnecting clip for  
GMS-32-H motor starter

**RTPMGMS32HL**

- Qty: 10pcs per bag

Interconnecting clip for  
GMS-32-S motor starter

**RTPMGMS32SL**

- Qty: 10pcs per bag

### GMS (Manual Motor Starter)



#### Ordering Key

**GMS-32S-13**

Type \_\_\_\_\_  
S: Standard, H: High breaking capacity  
Rated operational current \_\_\_\_\_

- Overload and short-circuit protection
- Operational current range: 0.16 up to 32AAC
- Magnetic release 13xle max
- Adjustable thermal release
- Ambient temperature compensation
- Trip Class 10
- CE, cULus

#### Ordering Key

**GMS-63H-13**

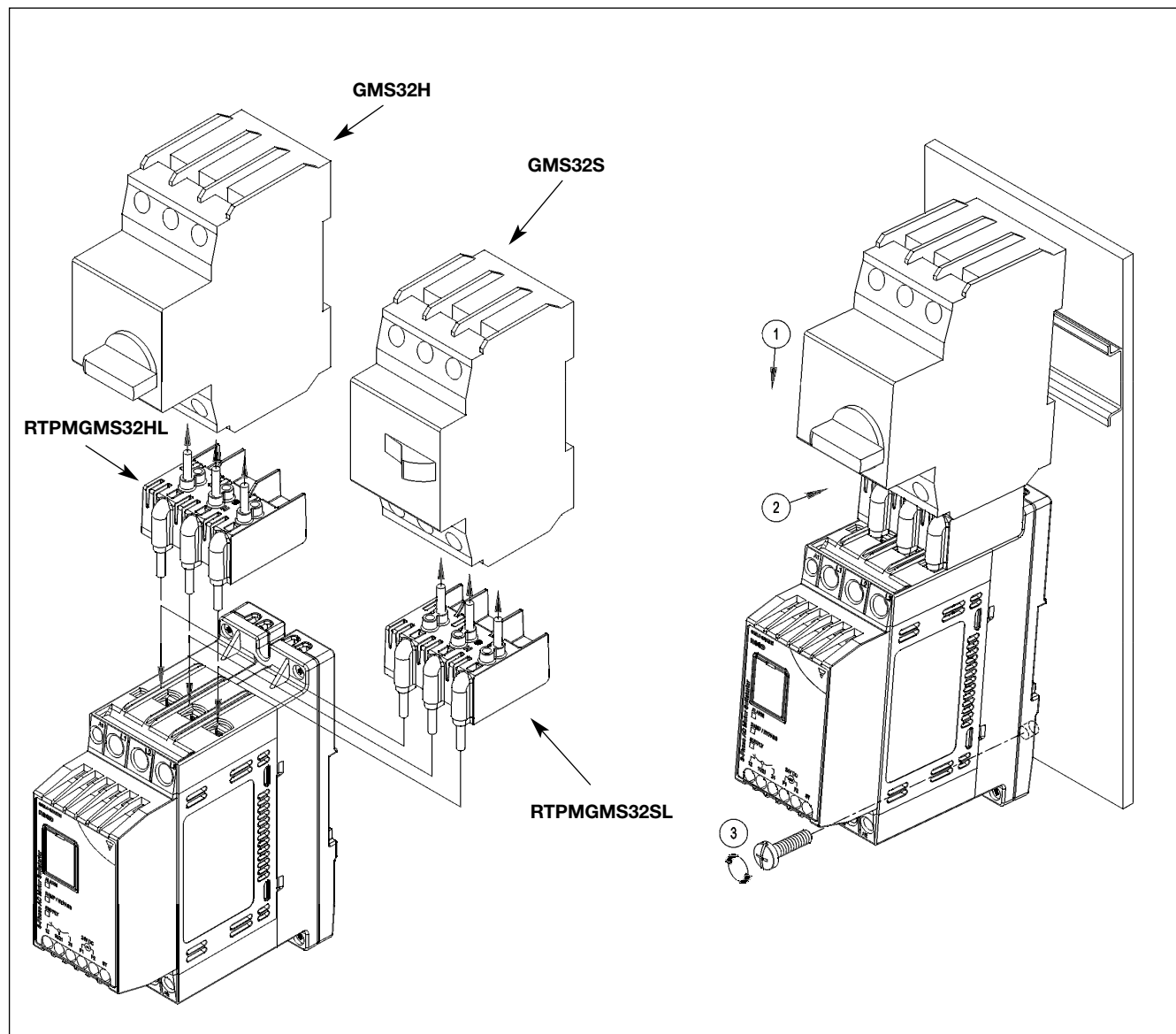
Type \_\_\_\_\_  
S: Standard, H: High breaking capacity  
Rated operational current \_\_\_\_\_

- Overload and short-circuit protection
- Operational current range: 10 up to 63AAC
- Magnetic release 13xle max
- Adjustable thermal release
- Ambient temperature compensation
- Trip Class 10
- CE, cULus

Note: For higher trip classes please contact your Carlo Gavazzi representative

## Accessories

### GMS Mounting Instructions



The following procedure should be followed when mounting the GMS motor starter onto the RSB. soft starter:-

**Step 1:** Unscrew the terminals on the RSB. and GMS units and insert the proper RTPM clip in the respective terminals.

**Step 2:** Tighten the screws on the GMS and RSB. units respecting the maximum torque specified.

**Step 3:** Mount the complete assembly to the DIN rail and screw the RSB. to the panel as shown in the diagram.

Note: Always mount the GMS motor starter on the supply side (L1, L2, L3) of the RSB. soft starter.

**Important:** Make sure that the handle on the GMS starter is in the OFF position before installing and uninstalling.

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[RSBT2216EV61HP](#) [RSBT4016EV61HP](#) [RSBT2225EV51HP](#) [RSBT2216EV51HP](#) [RSBT2232EV61HP](#)  
[RSBT2225EV61HP](#) [RSBT4016EVC1HP](#) [RSBT4025EV11HP](#) [RSBT4025EV51HP](#) [RSBT4025EV61HP](#)  
[RSBT4032EV21HP](#) [RSBT4025EV21HP](#) [RSBT4032EV11HP](#) [RSBT4025EVC1HP](#) [RSBT4032EV61HP](#)  
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[RSBT2225EV50](#) [RSBT2225EV51](#) [RSBT4032EV61](#) [RSBT4016EV51](#) [RSBT4016EV61](#) [RSBT4025EV50](#)  
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