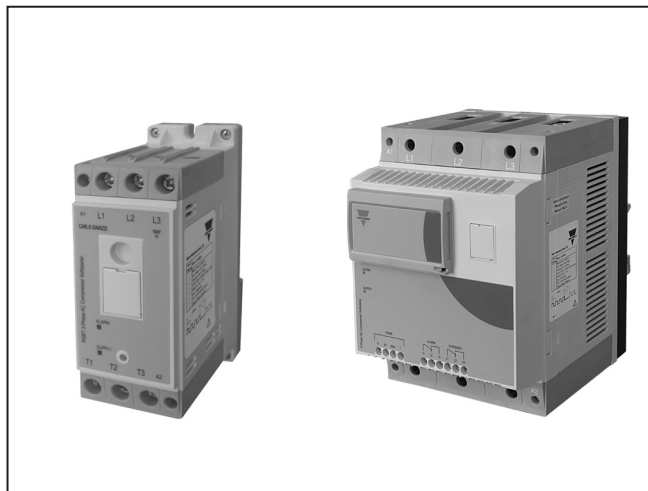


Soft Starter Three-Phase Scroll Compressor Soft Starter Types RSBT

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)
 - 3-Phase controlled solution
 - Integrated bypass relays
 - Internally supplied
 - Short ramp up time: <600 ms
 - Rated operational voltage:
RSBT22: 220 VAC
RSBT40: 400 VAC
RSBT48: 220 - 480 VAC
 - Rated operational current: 16, 25, 32, 55, 70, 95 AAC
 - Over-temperature, Overcurrent, Locked Rotor protection
 - cULus, CE, CCC, RoHS compliant
 - HP version for multi-compressor systems
 - VDE approved (up to 32 AAC) - for RSBT...HPV models
- Note: Other models (RSBT22/RSBT40) only VDE approved up to 15Arms

Product Description

RSBT is an easy to use soft starter 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.

RSBT is a 3-phase controlled solution and is 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 H P V

Compressor Soft Starter

Controlled Phases

Operational Voltage

Rated Operational Current

Control Voltage

Version

Note: above ordering code applies to RSBT models up to 32A

Ordering Key

RSB T 48 55 C V0

Compressor Soft Starter

Controlled Phases

Operational Voltage

Rated Operational Current

Control Voltage

Version

Note: above ordering code applies to RSBT models from 55 - 95A

Approvals



Type Selection

| Type | Operational Voltage U _e | Rated Operational Current I _e @40°C | Control Voltage U _c | Version |
|------|--------------------------------------------------|------------------------------------------------|-----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| RSBT | 22: 220 VAC, +10% -15% 40: 400 VAC, +10% -15% | 16: 16 Arms 25: 25 Arms 32: 32 Arms | E: 110 - 400 VAC +10% -15% | V11: DIN Mount, V51: DIN Mount (UL approved) V21: DIN Mount & RFPMV00 module V61: DIN Mount & RFPMV00 module (UL approved) V..HP: Optimised algorithm for multi-compressor systems & high pressure starts V..HPV: VDE approved (up to 32 AAC) VC: RS485 MODBUS serial communication + Relay VC1HP: RS485 MODBUS serial communication outputs |
| | 48: 220 - 480 VAC, +10% -15% | 55: 55 Arms 70: 70 Arms 95: 95 Arms | C: 24 VAC/DC ±10% and 110 - 400 VAC +10% -15% | V0: Relay outputs |

Selection Guide

| Operational Voltage Ue | Control Voltage Uc | Options | Rated Operational Current Ie | | |
|------------------------|---------------------------|----------------------------|------------------------------|-----------------|-----------------|
| Housing 1 (45mm) | | | 16 Arms | 25 Arms | 32 Arms |
| 220 VAC | 110 - 400 VAC | HP | RSBT2216EV11HP | RSBT2225EV11HP | RSBT2232EV11HP |
| | | HP + Relay outputs | RSBT2216EV61HP | RSBT2225EV61HP | RSBT2232EV61HP |
| | | HPV | RSBT2216EV11HPV | RSBT2225EV11HPV | RSBT2232EV11HPV |
| 400 VAC | 110 - 400 VAC | No options | RSBT4016EV11 | RSBT4025EV11 | RSBT4032EV11 |
| | | HP | RSBT4016EV11HP | RSBT4025EV11HP | RSBT4032EV11HP |
| | | HP + Relay outputs | RSBT4016EV21HP | RSBT4025EV21HP | RSBT4032EV21HP |
| | | HP | RSBT4016EV51HP | RSBT4025EV51HP | RSBT4032EV51HP |
| | | HP + Relay outputs | RSBT4016EV61HP | RSBT4025EV61HP | RSBT4032EV61HP |
| | | HPV | RSBT4016EV11HPV | RSBT4025EV11HPV | RSBT4032EV11HPV |
| | | HPV + Relay outputs | RSBT4016EV21HPV | RSBT4025EV21HPV | RSBT4032EV21HPV |
| Housing 2 (120mm) | | | 55 Arms | 70 Arms | 95 Arms |
| 220 - 480 VAC | 24 VAC/DC & 110 - 400 VAC | Relay outputs | RSBT4855CV0 | RSBT4870CV0 | RSBT4895CV0 |
| | | RS485 + Relay outputs | RSBT4855CVC | RSBT4870CVC | RSBT4895CVC |
| Housing 1 (45mm) | | | 16 Arms | 25 Arms | 32 Arms |
| 220 - 400 VAC | 110-400VAC (or Modbus) | RS485 Modbus communication | RSBT4016EVC1HP | RSBT4025EVC1HP | RSBT4032EVC1HP |

General Specifications

| | | | | | |
|-------------------------------------|-------------------------------------------------------------------------------------------------------------------|--|--|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| Starting Method | Current limit, auto-adaptive | | | Status Indication LEDs | Green LED Flashing Red LED Red LED Green LED OFF and Red LED ON |
| Ramp-up time | < 1s | | | Power Supply ON | |
| Ramp-down time | 0s | | | Recovery Mode (alarm condition) | |
| Initial Torque | Initial torque will vary indirectly through the variation of the current limit through the autoadaptive algorithm | | | Alarm | |
| Under/Overvoltage protection | RSBT22 RSBT40 RSBT48 | | | Special Alarm ¹ | Acc. to IEC60068-2-6 2 [+3/-0] Hz to 25 Hz Displacement +/- 1.6mm 25 Hz to 100 Hz @ 2g (19.96m/s ²) |
| | Recovery from Undervoltage | | | Vibration | |
| | Recovery from Overvoltage | | | Frequency 1 | |
| | 187VAC 330VAC 200VAC | | | Frequency 2 | |
| | 250VAC 470VAC 500VAC | | | | |

¹ Only for RSBT...HPV models

Input Specifications

| | RSBT..EV.. | RSBT..CV.. |
|---------------------------------|-------------------------------------|-------------------------------------------------------------------------------------|
| Control Voltage Uc* | A1 - A2: 110 - 400 VAC (+10%, -15%) | A1 - A2: 24 VAC/DC (-10%, +10%) & 110 - 400 VAC (-15%, +10%) |
| Control Voltage Range Uc | 93.5 - 440 VAC | 21.6 - 26.4 VAC/DC (for 24 VAC/DC input) & 93.5 - 440 VAC (for 110 - 400 VAC input) |
| Max. Pick Up Voltage | 80 VAC | 20.4 VAC/DC (for 24 VAC/DC input) |
| Min. Drop Out Voltage | 20 VAC | 5 VAC/DC (for 24 VAC/DC input) |
| Rated AC frequency | 50/60 Hz +/- 10% | 50/60 Hz +/- 10% |
| Rated Insulation Voltage Ui | 630 VAC | 690 VAC |
| Dielectric Strength | | |
| Dielectric withstand voltage | 2 kVrms | / |
| Rated Impulse withstand voltage | 4 kVrms | 6kVrms |
| Input to Heatsink | / | 3.5kVrms |
| Control Input Current | 3...6 mAAC | 0.4...5 mAAC |
| Input to Output response time | < 100 ms | < 300 ms |
| Integrated varistor | Yes | Yes |

*** Note 1:** For the Canadian application, the control terminals A1, A2 of the RSBT 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 1500VA or less. The short-circuit volt ampere limit is the product of the open circuit voltage and the short circuit ampere.

Output Specifications

| | RSBT..16.... | RSBT..25.... | RSBT..32.... |
|------------------------------------------------------------------------------|----------------|----------------|----------------|
| Overload cycle acc. to EN/IEC 60947-4-2 @ 40°C surrounding temperature | AC53b:2.5-1:60 | AC53b:3.6-1:60 | AC53b:3.4-1:60 |
| Maximum number of starts per hour @ 40°C @ rated overload cycle | 12 | 12 | 12 |
| Rated operational current @ 40°C | 16 AAC | 25 AAC | 32 AAC |
| Rated operational current @ 50°C | 16 AAC | 25 AAC | 25 AAC |
| Minimum time between stop and start | 1 sec | 1 sec | 1 sec |
| Minimum time between starts | 300 sec | 300 sec | 300 sec |
| Minimum load current | 2 AAC | 2 AAC | 2 AAC |

| | RSBT..55.... | RSBT..70.... | RSBT..95.... |
|------------------------------------------------------------------------------|-----------------|-----------------|-----------------|
| Overload cycle acc. to EN/IEC 60947-4-2 @ 40°C surrounding temperature | AC53b:3.5-1:299 | AC53b:3.5-1:299 | AC53b:3.5-1:299 |
| Maximum number of starts per hour @ 40°C @ rated overload cycle | 12 | 12 | 12 |
| Rated operational current @ 40°C | 55 AAC | 70 AAC | 95 AAC |
| Rated operational current @ 50°C | 50 AAC | 62 AAC | 87 AAC |
| Minimum time between stop and start | 1 sec | 1 sec | 1 sec |
| Minimum time between starts | 300 sec | 300 sec | 300 sec |
| Minimum load current | 5 AAC | 5 AAC | 5 AAC |

Note: The overload cycle describes the switching capability of the soft starter at a surrounding temperature of 40°C as described in EN/IEC 60947-4-2. An overload cycle AC53b:3.5-1:299 means that the soft starter can handle a starting current of 3.5xI_e for 1 second followed by an OFF time of 299 seconds.

Supply Specifications

| | RSBT22.... | RSBT40.... | RSBT48.... |
|---------------------------------|------------------|------------------|-------------------|
| Operational Voltage Range | 187 – 253 VACrms | 340 – 440 VACrms | 187 – 528 VAC rms |
| Supply Current at idle | < 30 mAAC | < 30 mAAC | < 40 mAAC |
| Blocking Voltage | 800 Vp | 1200 Vp | 1600 Vp |
| Rated AC frequency | 50/60 Hz +/-10% | | |
| Rated Insulation Voltage | 630 VAC | 630 VAC | 690 VAC |
| Dielectric Strength | | | |
| Dielectric withstand voltage | / | / | 2kVrms |
| Supply to Input | 2.5kVrms | 2.5kVrms | / |
| Supply to Heatsink | 2.5kVrms | 2.5kVrms | 2kVrms |
| Rated Impulse withstand voltage | / | / | 6kV (1.2/50 µs) |
| Integrated Varistor | | Yes | |

Environmental Specifications

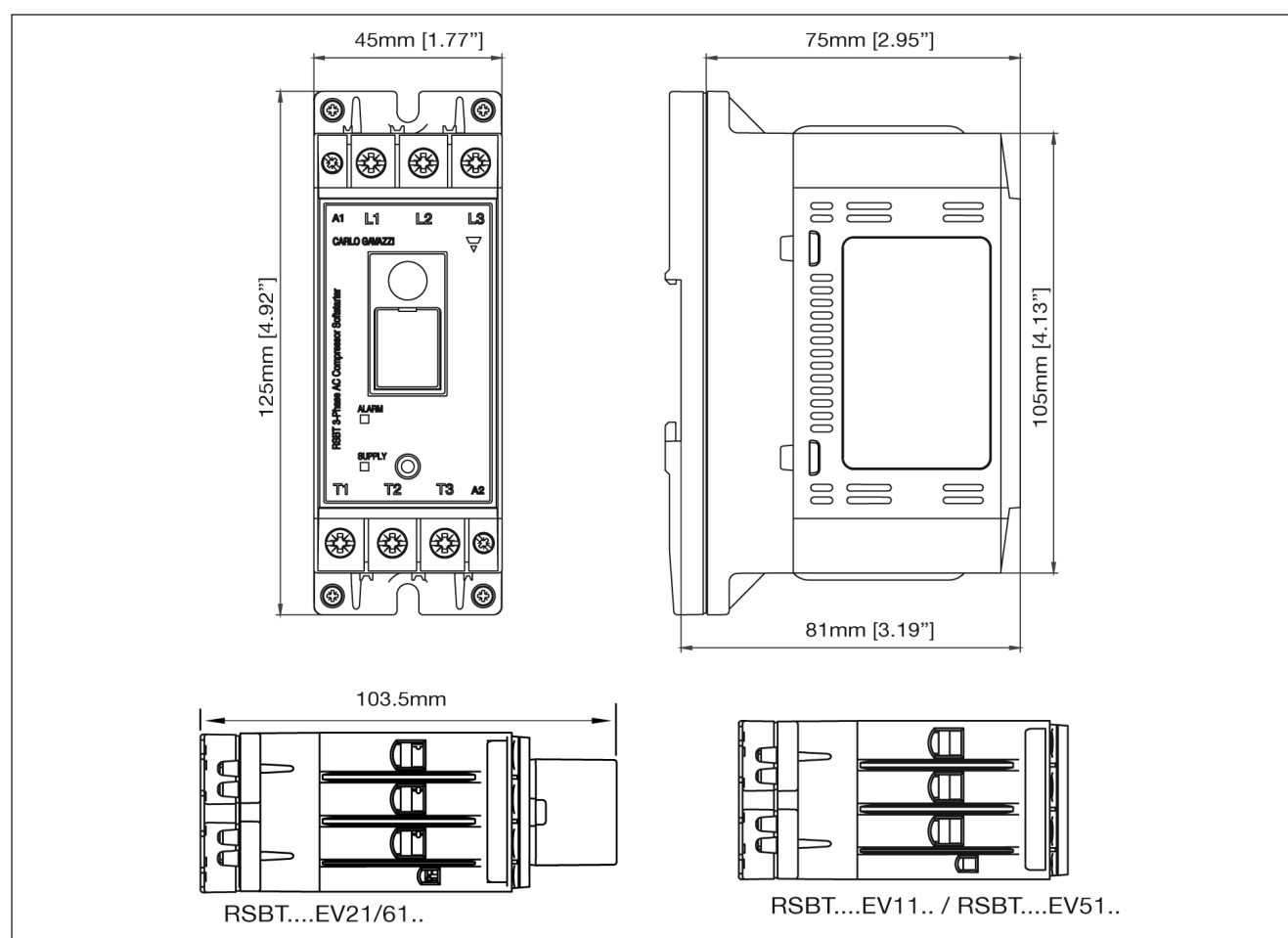
| | | | |
|-------------------------------------|---------------------------------|-----------------------------------------------|-----------------------|
| Operating Temperature | | Pollution Degree | |
| RSBT..16EV.. I _e ≤16 AAC | -20°C to +60°C (-4°F to +140°F) | RSBT22... | 2 |
| RSBT..25EV.. I _e ≤25 AAC | -20°C to +55°C (-4°F to +131°F) | RSBT40... | 2 |
| RSBT..32EV.. I _e ≤32 AAC | -20°C to +50°C (-4°F to +122°F) | RSBT48... | 3 |
| RSBT48... | -20°C to +60°C (-4°F to +140°F) | | |
| Storage Temperature | | Degree of Protection (control circuit) | |
| RSBT22... | -40°C to +80°C (-40°F to 176°F) | RSBT22... | IP20 (EN/IEC 60529) |
| RSBT40... | -40°C to +80°C (-40°F to 176°F) | RSBT40... | IP20 (EN/IEC 60529) |
| RSBT48... | -30°C to +85°C (-22°F to 185°F) | RSBT48... | IP20 – Housing |
| Relative Humidity | | | IP00 – Terminal Block |
| | <95% non-condensing @ 40°C | Installation Category | III |
| | | Installation altitude | 1000m |

RS485 Communication Specifications

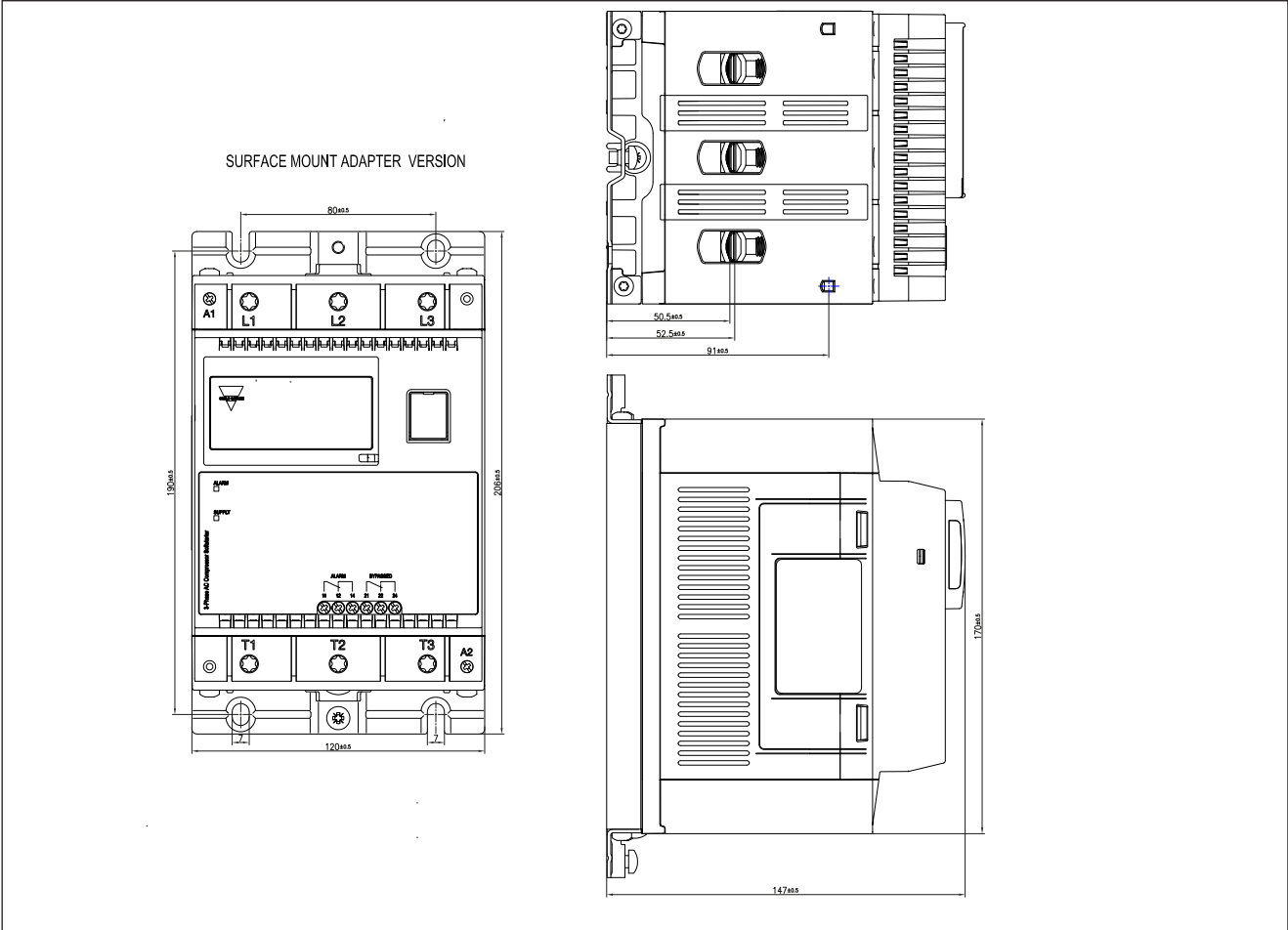
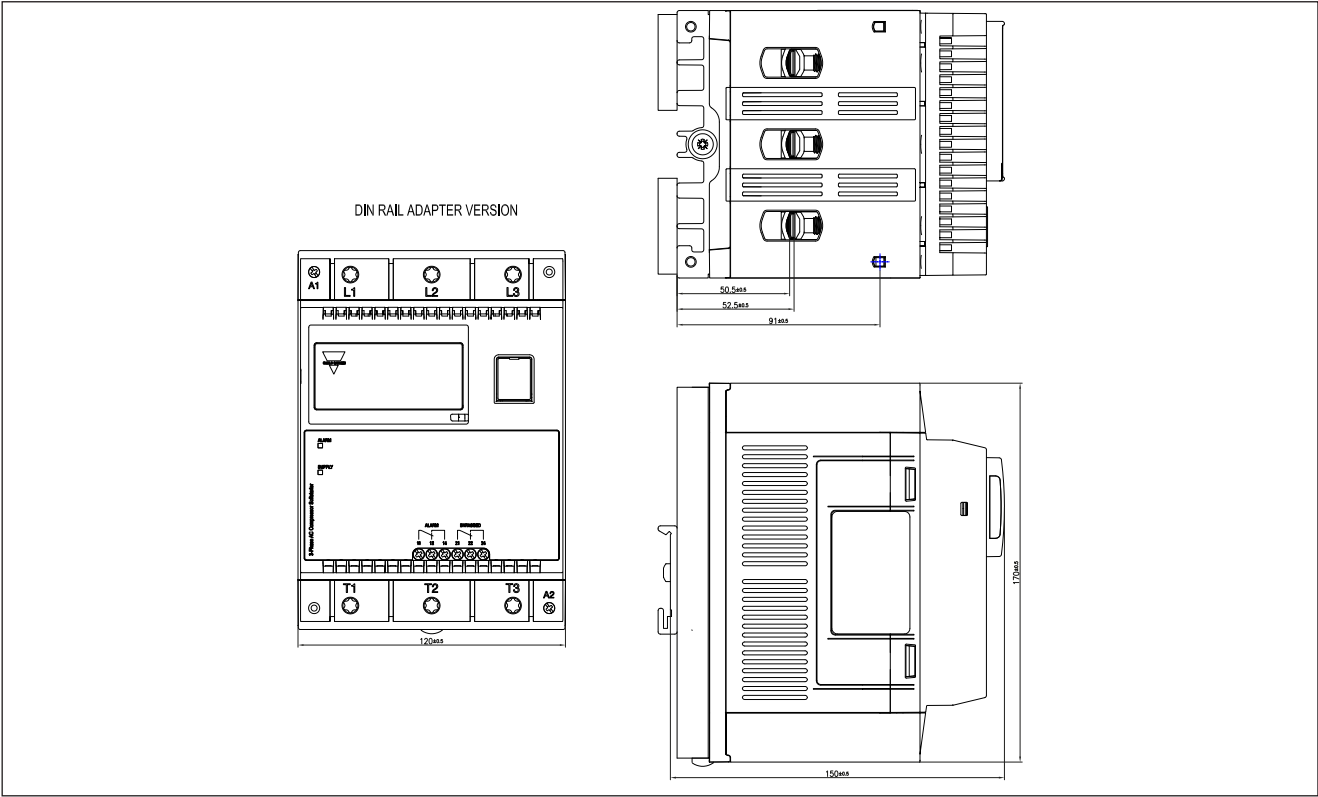
| | | | |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| Type | Bi-directional (static and dynamic variables and parameters) | Protocol | MODBUS (RTU) |
| Functions | Configuring the device Start/Stop Modifying set-point parameters Monitoring of measured variables | Factory defined data format | Data bits "8", parity "none", stop bit "1" Selectable by software: Parity: None, Odd, Even |
| Connection | 2-wires (to reduce the noise use a shielded cable and connect the shield to GND terminal and to the ground at the same point. | Baud Rate | Default: 9.6k bits/s Selectable by software: 4.8k, 9.6k, 19.2k, 38.4k |
| Address | Default: 1 1-247, selectable via software | Insulation | RS485 port to power 1.9kV RS485 port to aux. relays 1.5kV RS485 port to control 1.8kV RS485 port to heatsink 0.5kV |

Note: In the RSBT Modbus versions, the default control mode is A1 - A2. If the user wants to control the RSBT via Modbus, then the respective register must be updated first.

Dimensions

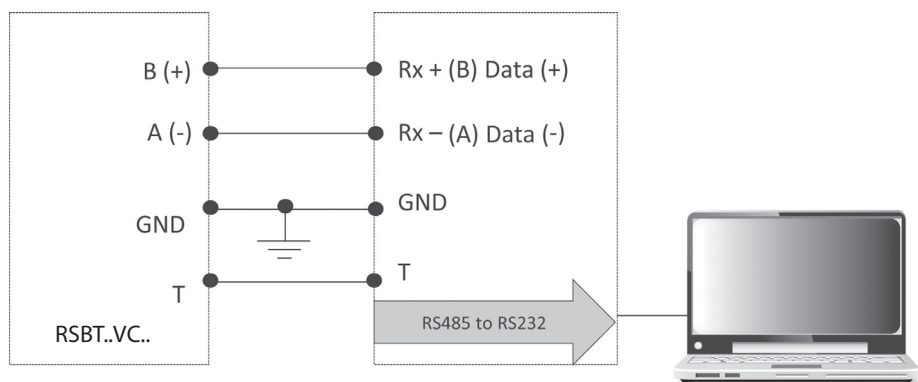


Dimensions



Connection Specifications

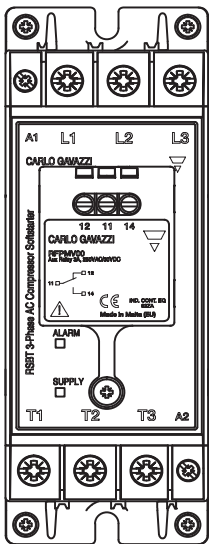
| | RSBT22... / RSBT40... | RSBT48... |
|------------------------------------|--------------------------------------------------------|---------------------------------------------------|
| Line conductors | | |
| L1, L2, L3, T1, T2, T3 | | |
| Acc. to EN60947-1 | | |
| Flexible | 2.5 10 mm ² | - |
| | 2.5 2 x 4 mm ² | - |
| Rigid (solid or stranded) | 2.5 10 mm ² | 2 x (10...50 mm ²) |
| Flexible with end sleeve (ferrule) | 2.5 10 mm ² | 2 x (10...50 mm ²) |
| UL/cUL rated data | | |
| Rigid (stranded) | AWG 6...14 | - |
| Rigid (solid) | AWG 10...14 | - |
| Rigid (solid or stranded) | AWG 2x10...2x14 | 2 x (AWG 8...1/0) |
| Terminal screws | 6 x M4 | M8 |
| Max. tightening torque | 2.5 Nm (22 lb.in) with Posidrive bit 2 | 12 Nm (106 lb.in) with Torx TT40 bit |
| Stripping length | 8.0 mm | 20 mm |
| Secondary conductors | | |
| A1, A2 | | |
| Acc. to EN60998 | | |
| Flexible | 0.05 ... 1.5 mm ² | - |
| Rigid (solid or stranded) | 0.05 ... 2.5 mm ² | 0.05 ... 1.5 mm ² |
| Flexible with end sleeve (ferrule) | 0.05 ... 1.5 mm ² | 0.05 ... 2.5 mm ² |
| UL/cUL rated data | | |
| Rigid (solid or stranded) | AWG 10...18 | AWG 10...18 |
| Terminal screws | 9 x M3 | M3 |
| Max tightening torque | 0.6Nm (5.3lb.in) with Posidrive bit 0 | 0.6Nm (5.3lb.in) with Posidrive bit 0 |
| Stripping length | 6.0 mm | 6.0 mm |
| Auxiliary conductors | RSBT...V2.../V6...: 11, 12, 14, A(-), B(+), GND | 11, 12, 14, 21, 22, 24, A(-), B(+), GND, T |
| Rigid (solid or stranded) | 0.2 ... 4 mm ² | 0.05 ... 2.5 mm ² |
| Flexible with end sleeve (ferrule) | 0.2 ... 2.5 mm ² | 0.05 ... 1.5 mm ² |
| UL/cUL rated data | | |
| Rigid (solid or stranded) | AWG 24...12 | AWG 30...12 |
| Terminal screws | M2.5 | M3 |
| Max. tightening torque | 0.8 Nm (7.0 lb.in) | 0.8 Nm (7.0 lb.in) |
| Stripping length | 6 mm | 6 mm |



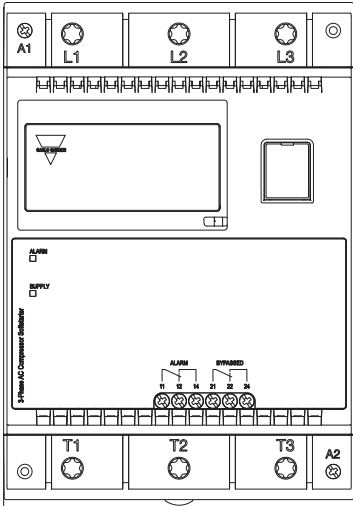
Note: To minimize the reflections from the end of the RS485 cable it is required to place a line termination near each of the 2 ends of the bus by a proper resistor.



Terminal Markings



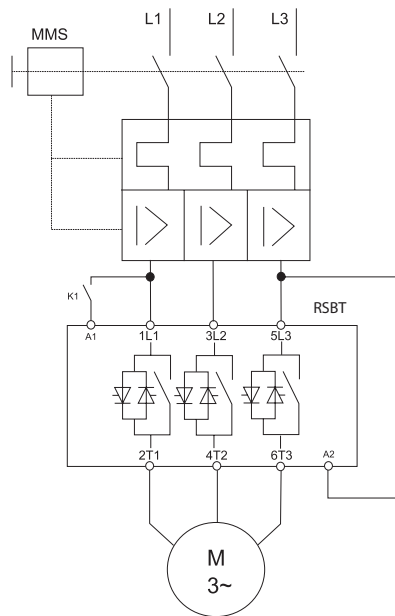
| | RSBT..V11.. RSBT..V51.. | RSBT..V21.. RSBT..V61.. | RSBT..VC1HP |
|------------------|----------------------------|------------------------------------------|------------------------------------------|
| L1, L2, L3 | Line connections | Line connections | Line connections |
| T1, T2, T3 | Load connections | Load connections | Load connections |
| A1, A2 | Control voltage | Control voltage | Control voltage |
| 11, 12, 14 | - | Alarm indication (Changeover contact) | Alarm indication (Changeover contact) |
| A (-), B(+), GND | - | - | Serial communication connections |



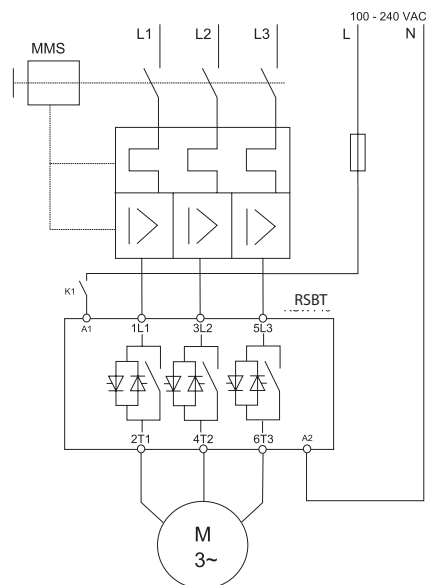
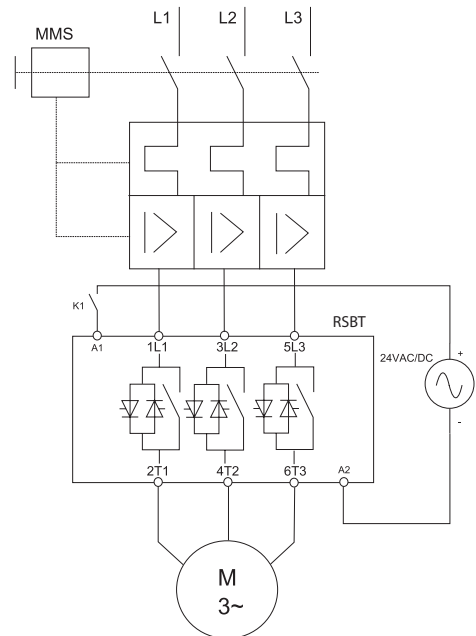
| | RSBT48..CV0 | RSBT48..CVC |
|---------------------|------------------------------------------------|------------------------------------------------|
| L1, L2, L3 | Line connections | Line connections |
| T1, T2, T3 | Load connections | Load connections |
| A1, A2 | Control voltage | Control voltage |
| 11, 12, 14 | Alarm indication (Changeover contact) | Alarm indication (Changeover contact) |
| 21, 22, 24 | Top of ramp indication (Changeover contact) | Top of ramp indication (Changeover contact) |
| A (-), B(+), GND, T | - | Serial communication connections |

Wiring Diagrams

Note: Valid up to 400VAC



Note: applies only to RSBT48 models



Auxiliary Relays

| | RSBT22... / RSBT40... | RSBT48... |
|-----------------------------------------------------------|-------------------------|-------------------------|
| Rated operational voltage | 250 VAC/ 30 VDC | 250 VAC/ 30 VDC |
| Rated insulation voltage | 250 | 250 |
| Dielectric withstand voltage (Coil to contacts) | 2.5kV | 2.5kV |
| Overvoltage category | II | II |
| Number of output relays | 1 | 1 |
| Fault | | |
| Terminal markings | 11/12/14 | 11/12/14 |
| Type of control circuit | Electromechanical relay | Electromechanical relay |
| Number of contacts | 2 | 2 |
| Type of contacts | Changeover (NO, NC) | Changeover (NO, NC) |
| Type of current | AC/DC | AC/DC |
| Rated operational current | 3A, 250VAC 3A, 30VDC | 3A, 250VAC 3A, 30VDC |
| Bypassed (Top of ramp) | | |
| Terminal markings | - | 21/22/24 |
| Type of control circuit | - | Electromechanical relay |
| Number of contacts | - | 2 |
| Type of contacts | - | Changeover (NO, NC) |
| Type of current | - | AC/DC |
| Rated operational current | - | 3A, 250VAC 3A, 30VDC |

Electromagnetic Compatibility

| | RSBT22... / RSBT40... | RSBT48... |
|------------------------------------------------|--------------------------------|------------------------|
| Immunity | IEC/EN 61000-6-2 | IEC/EN 61000-6-2 |
| Electrostatic Discharge (ESD) | | |
| Immunity | IEC/EN 61000-4-2 | IEC/EN 61000-4-2 |
| Air discharge: 8 kV | Performance Criteria 2 | Performance Criteria 1 |
| Contact: 4 kV | Performance Criteria 2 | Performance Criteria 2 |
| Electrical Fast Transient (Burst) | | |
| Immunity | IEC/EN 61000-4-4 | IEC/EN 61000-4-4 |
| Output: 2 kV | Performance Criteria 2 | Performance Criteria 1 |
| Output: 4 kV | - | Performance Criteria 2 |
| Input: 1 kV | Performance Criteria 2 | - |
| Input: 2 kV | - | Performance Criteria 1 |
| Electrical Surge Immunity | IEC/EN 61000-4-5 | IEC/EN 61000-4-5 |
| Output, line to line, 1 kV | Performance Criteria 2 | Performance Criteria 1 |
| Output, line to earth, 2 kV | Performance Criteria 2 | Performance Criteria 1 |
| Input, line to line, 1 kV | Performance Criteria 2 | Performance Criteria 1 |
| Input, line to earth, 1 kV | - | Performance Criteria 1 |
| Input, line to earth, 2 kV | Performance Criteria 2 | - |
| Rated Radio Frequency Immunity | IEC/EN 61000-4-3 | IEC/EN 61000-4-3 |
| 3 V/m, 0.15 - 80 MHz | Performance Criteria 1 | - |
| 10 V/m, Frequency Range | - | Performance Criteria 1 |
| Conducted Radio Frequency Immunity | IEC/EN 61000-4-3 | IEC/EN 61000-4-3 |
| 10 V/m, 0.15 - 80 MHz | Performance Criteria 1 | - |
| 140 dBuV, Frequency Range | - | Performance Criteria 1 |
| Conducted Radio Frequency Immunity | IEC/EN 61000-4-6 | IEC/EN 61000-4-6 |
| 10 V/m, 0.15 - 80 MHz | Performance Criteria 1 | - |
| 140 dBuV, Frequency Range | - | Performance Criteria 1 |
| Emission | IEC/EN 60947-4-2 | IEC/EN 60947-4-2 |
| Radio Interference Field Emissions (Radiated) | CISPR 11 IEC/EN 55011, Class B | Class A |
| Radio Interference Field Emissions (Conducted) | CISPR 11 IEC/EN 55011, Class B | Class A |
| Voltage Dips & Interruptions | IEC/EN 61000-4-11 | IEC/EN 61000-4-11 |
| | RSBT RSBT...HPV | |
| 0% Ue & Uc 5000 ms | PC2 PC 3 | 20 ms, PC2 |
| 40% Ue & Uc 100/1000 ms | PC2 PC2 / PC3 | 200 ms, PC2 |
| 0% Ue & Uc 10 ms | PC2 PC2 | 5000 ms, PC2 |
| Harmonics | IEC/EN 61000-3-2 ¹ | - |
| Flicker | IEC/EN 61000-3-3 ¹ | - |

Housing Specifications

Weight (approx)

| | |
|----------------------|-------|
| RSBT.....V11../V51.. | 425g |
| RSBT.....V21../V61 | 460g |
| RSBT4855... | 2.8kg |
| RSBT4870... | 2.8kg |
| RSBT4895... | 3.0kg |

Material

| | |
|-----------------|--------------------------------------|
| Material colour | PA66 |
| Terminal Colour | RAL7035 |
| Mounting | RAL7040 |
| | DIN or Panel (accessory included) |

Agency Approvals and Conformances

| | RSBT..VC1HP | RSBT..V11.. RSBT..V21HP | RSBT..V51HP RSBT..V61HP | RSBT..V..HPV | RSBT48.. |
|-------------------------|------------------|---------------------------------------------------------|---------------------------------------------------------|---------------------------------------------------------|----------------------|
| Conformance | IEC/EN 60947-4-2 | IEC/EN 60947-4-2 | IEC/EN 60947-4-2 | IEC/EN 60947-4-2 | IEC/EN 60947-4-2 |
| Agency Approvals | - | - | UL Listed (E172877) | UL Listed (E172877)* | UL Listed (E172877) |
| | - | - | cUL Listed (E172877) | cUL Listed (E172877)* | cUL Listed (E172877) |
| | CCC | CCC | CCC | CCC | CCC |
| | - | VDE: acc. to EN60335-1, EN60335-2-40 (Up to 15 Arms) | VDE: acc. to EN60335-1, EN60335-2-40 (Up to 15 Arms) | VDE: acc. to EN60335-1, EN60335-2-40 (Up to 32 Arms) | - |

* **Note:** applies to RSBT.V51HPV versions only

Mode of Operation

Auto Adaptive Algorithm (Patented)

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.

HP Mode of Operation

The RSBT 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 RSBT 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 RSBT 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 RSBT shall be required, as this might indicate a real locked rotor condition.

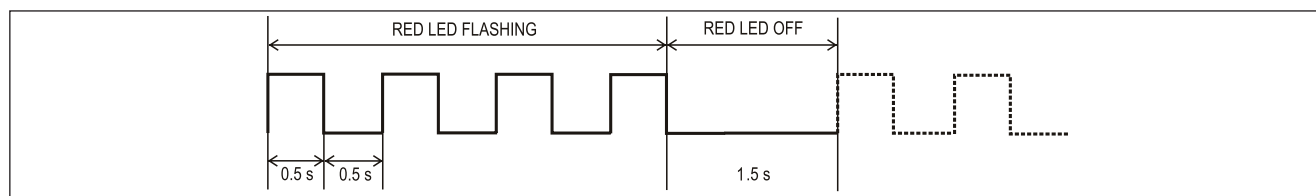
Alarm LED Indications (Red LED)

| Flashes | Description of Fault | Action |
|----------|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2 | Wrong Phase Sequence | Physical Change |
| 3 | Line Voltage Out of Range | Auto reset with 5 mins recovery |
| 4 | Frequency Out of Range | Auto reset with 5 mins recovery |
| 5 | Over Current (during RAMPING) | Auto reset with 5 mins recovery |
| 6 | Ramp Up Time > 1 sec | Auto reset with 5 mins recovery |
| 7 | Over Temperature | Auto reset with 5 mins recovery |
| 8 | Over Current (during BYPASS) | Auto reset with 5 mins recovery |
| 9 | Supply Voltage Unbalance | Auto reset with 5mins recovery assuming all phases (L1, L2, L3) are connected |
| Fully ON | Internal Fault | Reset power (L1,L2,L3). If fault is not cleared upon reset, please contact your Carlo Gavazzi representative. Note: This alarm applies to RSBT...HPV models only) |

LED and relay status indications

| Status | Green LED (Supply) | Red LED (Alarm) | Relay contact position | | Relay Contact Position | |
|---------------------------------|-----------------------|--------------------|------------------------|------------------------------|---------------------------------|----------------------------------|
| | | | RSBT..V21/V61 | RSBT..V21HP/ RSBT..V61HP. | RSBT48 Alarm (11, 12, 14) | RSBT48 Bypass (21, 22, 24) |
| Idle | ON | OFF | 11/14 | 11/14 | 11/12 | 21/22 |
| Ramping | ON | OFF | 11/12 | 11/14 | 11/12 | 21/22 |
| Bypass | ON | OFF | 11/14 | 11/14 | 11/12 | 21/24 |
| Recovery time between starts | Flashing | OFF | 11/14 | 11/14 | 11/12 | 21/22 |
| Alarm | ON | Flashing | 11/12 | 11/12 | 11/14 | 21/22 |

Flashing sequence



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 5,000Arms (or 10,000Arms for RSBT..55 - RSBT..95) Symmetrical Amperes, 400Volts (or 480V for RSBT48 models) maximum when protected by fuses.

Tests at 5,000Arms (or 10,000Arms for RSBT..55 - RSBT..95) were performed with Class Class RK5 fuses (or Class J for RSBT..55, RSBT..70), fast acting; please refer to the table below for maximum allowed ampere rating of the fuse. Use fuses only.

| Co-ordination Type 1 (UL508) | | | | |
|----------------------------------|--------------------|-------|--------------|--------------------|
| | Max. Fuse Size [A] | Class | Current [kA] | Max. Voltage [VAC] |
| RSBT..16EV5... RSBT..16EV6... | 40 | RK5 | 5 | 400 |
| RSBT..25EV5... RSBT..25EV6... | 40 | RK5 | 5 | 400 |
| RSBT..32EV5... RSBT..32EV6... | 40 | RK5 | 5 | 400 |

Co-ordination Type 2 (IEC/EN 60947-4-2)

| | Ferraz Shawmut/ MERSEN | | Current [kA] | Max. Voltage [VAC] |
|----------------|------------------------|-------------------------------------------|--------------|--------------------|
| 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 |

| | 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. 6.900CP URD22 x 58 / 100 | 10 kA when protected by semiconductor fuses 100A, class URD.Art. no. 6.900CP URD22 x 58 / 100 | 10 kA when protected by semiconductor fuses 160A, Class URS/URQ, Art.No. 160Ac660VAC 27 x 601/ 6.9xxCPURQ 27 x 60 / 160 |

Current / Power Ratings

| Assigned compressor rating @ 40°C UL rating @ 40°C | 220 - 240 VAC | 380 - 415 VAC | 440 - 480 VAC | Max. Current limit level Irms |
|----------------------------------------------------|-----------------|-----------------|---------------|-------------------------------|
| RSBT2216EV.... | 4 kW (5 HP) | - | - | 40 Arms |
| RSBT2225EV.... | 5.5 kW (7.5 HP) | - | - | 90 Arms |
| RSBT2232EV.... | 9 kW (10 HP) | - | - | 110 Arms |
| RSBT4016EV.... | - | 7.5 kW (7.5 HP) | - | 40 Arms |
| RSBT4025EV.... | - | 11 kW (10 HP) | - | 90 Arms |
| RSBT4032EV.... | - | 15 kW (15 HP) | - | 110 Arms |
| RSBT4855CV. | 15 kW (20 HP) | 22 kW (30 HP) | 30 kW (40 HP) | 192.5 Arms |
| RSBT4870CV. | 20 kW (25 HP) | 30 kW (40 HP) | 37 kW (50 HP) | 245.0 Arms |
| RSBT4895CV. | 22 kW (30 HP) | 45 kW (60 HP) | 55 kW (75 HP) | 332.5 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.

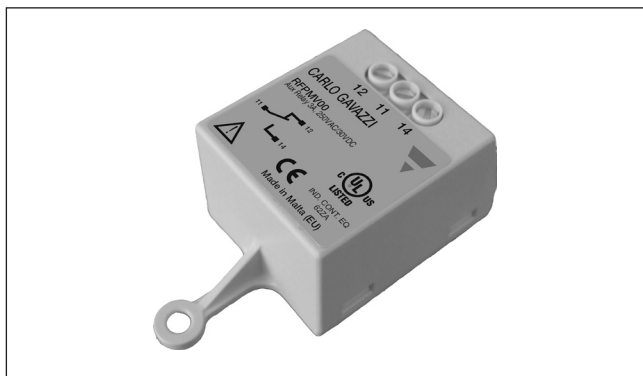
Accessories

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)

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)

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

Variable List

| | Read | Write | Monitor | Description | Scaling Factor |
|---------------------------------------|------|-------|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| Device Properties | | | | | |
| Device address | Yes | Yes | Yes | Set/read the device address | No |
| Baud rate | Yes | Yes | Yes | Set/read the device baud rate (4800, 9600, 19200, 38400) | No |
| Parity | Yes | Yes | Yes | Set/read the device parity (No, Even, Odd) | No |
| Inputs | | | | | |
| Control input status – MODBUS | Yes | No | Yes | Status of control input - MODBUS | No |
| Control input status – A1,A2 | Yes | No | Yes | Status of control input – A1,A2 terminals | No |
| Control Mode | Yes | Yes | Yes | Set/read the control mode setting - either via MODBUS or via A1,A2 terminals | No |
| Start/stop command | Yes | Yes | Yes | Set/read the status of start and stop command | No |
| Soft reset | No | Yes | Yes | Reset alarms | No |
| Refresh interval | Yes | Yes | Yes | Set/read the refresh interval for the start/stop command | No |
| “Heartbeat” signal (Refresh Signal) | No | Yes | Yes | Signal to be sent within refresh interval to keep softstarter ON (if ‘heartbeat’ signal option is enabled) | No |
| “Heartbeat” signal Enable/Disable | Yes | Yes | Yes | Enables/disables the “heartbeat” signal requirement. If enabled, the device will wait for a refresh start/stop signal within the refresh interval (as set by the user) | No |
| Delays | | | | | |
| Minimum stop to start delay | Yes | Yes | Yes | Set/read the minimum time between stop to start in secs | No |
| Minimum start to start delay | Yes | Yes | Yes | Set/read the minimum time between start in secs | No |
| Time from last start | Yes | No | Yes | Read the time elapsed from the last start in secs | No |
| Protection settings | | | | | |
| Supply voltage unbalance | Yes | Yes | Yes | Set/read the supply voltage unbalance setting (%) | [x10] |
| Over voltage alarm | Yes | Yes | Yes | Set/read the over-voltage alarm setting (VAC) | [x10] |
| Under voltage alarm | Yes | Yes | Yes | Set/read the under-voltage alarm setting (VAC) | [x10] |
| IMin bypass | Yes | No | Yes | Read the value of the minimum bypass current setting (ARMS) | [x10] |
| IMAX bypass | Yes | No | Yes | Read the value of the maximum bypass current setting (ARMS) | [x10] |
| IMAX | Yes | Yes | Yes | Set/read the setting of the maximum current limit (ARMS) | [x10] |
| Auto-adapt | Yes | Yes | Yes | Set/read the status of the auto-adapt function | No |
| Counters | | | | | |
| Number of ramps | Yes | No | Yes | Counter for the number of starts performed | No |
| Over-flow counter for number of ramps | Yes | No | Yes | If the number of starts is >65535 the Number of ramps counter will be full, hence this counter will start incrementing. The value read in this counter has to be multiplied by 65535 and the results is decremented by 1 and added to the value read from Number of ramps counter. | No |
| Instantaneous variables | | | | | |
| VL1-L3 | Yes | No | Yes | Line voltage across L1-L3 (VAC) | [x10] |
| VL2-L3 | Yes | No | Yes | Line voltage across L2-L3 (VAC) | [x10] |
| VL1-L2 | Yes | No | Yes | Line voltage across L1-L2 (VAC) | [x10] |
| VT1-T3 | Yes | No | Yes | Line voltage across T1-T3 (VAC) | [x10] |
| VT2-T3 | Yes | No | Yes | Line voltage across T2-T3 (VAC) | [x10] |
| VT1-T2 | Yes | No | Yes | Line voltage across T1-T2 (VAC) | [x10] |
| AL1 | Yes | No | Yes | Current across L1-T1 (ARMS) | [x10] |
| AL2 | Yes | No | Yes | Current across L2-T2 (ARMS) | [x10] |
| AL3 | Yes | No | Yes | Current across L3-T3 (ARMS) | [x10] |
| WTotal | Yes | No | Yes | Total instantaneous power (Watts) | No |
| VATotal | Yes | No | Yes | Total instantaneous apparent power (VA) | No |
| PFTotal | Yes | No | Yes | Power factor | [x100] |
| Hz | Yes | No | Yes | Supply frequency (Hz) | [x10] |
| kWh | Yes | No | Yes | Active energy (kWh) | No |
| Alarm indication | | | | | |
| Alarm type | Yes | No | Yes | Instantaneous alarm indication | No |

Note: For the complete reference of the Modbus register map please visit our website www.gavazziautomation.com/nsc/hq/soft_starters

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