CARLO GAVAZZI
Automation Components

CARLO GAVAZZI

Scroll compressor soft starter series

Switches

RSBS, RSBD & RSBT
Scroll compressor soft starter series

Where does the need for Scroll Compressor Softstarters come from?

Scroll compressors have earned a strong reputation in HVAC applications by proving to be a more reliable and efficient solution than other categories of compressors. Scroll compressors are generally 10 to 15% more efficient than piston compressors. Worldwide initiatives promoting energy efficiency in the building sector are generating a growing interest for more cost saving and efficient HVAC solutions, making the use of scroll compressors more and more a necessity.

A complete range of scroll compressor soft starters

Scroll Compressor High Starting Currents

Starting scroll compressors via direct on line (DOL) methods results in a high inrush current typically 6 to 8 times the rated compressor current.

Such levels of current inevitably cause a number of undesirable effects including

- Light flickering
- Triggering of protection equipment
- Increased compressor noise and vibration
- Excessive stresses on compressor
- Voltage fluctuations and disturbances on neighboring equipment

Benefits of Soft Starting Solutions

Carlo Gavazzi's line of dedicated scroll compressor soft starters RSBS, RSBD and RSBT is the result of an extensive study of scroll compressor systems together with a continuous communication with our customers.

RSBS, RSBD and RSBT soft starters are equipped with specific algorithms to reduce the high starting currents thereby resulting in

- Elimination of light flickering
- Reduction in voltage disturbances
- Increased compressor lifetime

Additionally, by limiting starting current to more than 50%* with respect to DOL start, additional benefits can be achieved such as

- lower-rating protection devices and cabling
- less expensive contracts with utility companies

* typical for RSBS, RSBT

A complete range of solutions to suit your needs

RSBD & RSBT (45 mm) - Three phase soft starters

- Patented auto-adaptive algorithm
- No user settings required
- 2-phase (RSBD) and 3-phase (RSBT) controlled solutions
- Internally bypassed for less heat dissipation
- Class B (residential) performance for EMC*
- HP algorithm for multi-compressor systems
- Compact dimensions
- Integrated diagnostic functions
  - Phase Sequence, Under-voltage, Locked-rotor
- Connection to plug-in additional modules
  - RFPM* - 1 relay output module
  - RFILT – EMC filter module
  - RSPM* - 1 O.C., 1 relay output module
- Operational current: Up to 45 AAC (RSBD), 32 AAC (RSBT)

* Applies for RSBT models only

RSBS Single phase soft starters

- No user settings required
- HP algorithm for high pressure starts
- Current limiting strategy
- Optional relay output for alarm indication
- User-friendly alarm indication
- Integrated start capacitor
- Integrated diagnostic functions
- Class B (residential) performance for EMC
- Operational current: Up to 32 AAC

RSBD & RSBT (120mm) Three phase soft starters

- Patented auto-adaptive algorithm
- 2-phase (RSBD) and 3-phase (RSBT) controlled solutions
- Internally bypassed for less heat dissipation
- No user settings required
- HP algorithm for high pressure starts
- Relay indication for alarms and top of ramp
- User-friendly alarm indication
- Integrated diagnostic functions
- Operational current: Up to 95 AAC
- RS485 Serial Communication (MODBUS RTU) optional

RSBS, RSBD & RSBT
Scroll compressor soft starter series

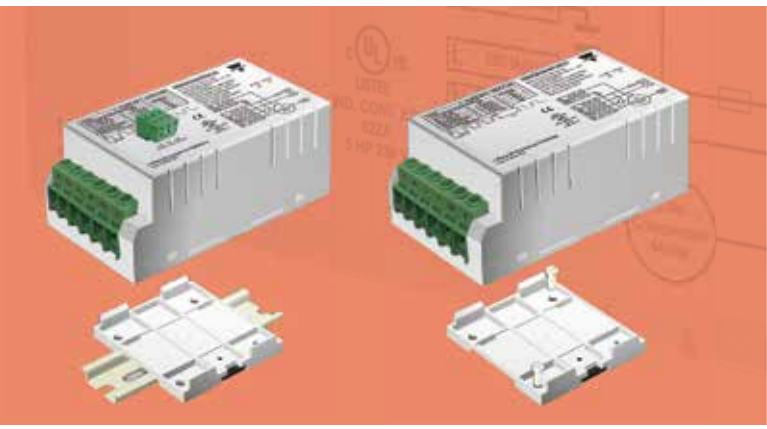
RSBS is a single-phase soft starter that reduces compressor starting currents and hence limits the peak energy demand. RSBS provides a one-package solution for compressor softstarting and starting capacitor control. Driven by local utility regulations, single phase heat pumps need to respect specific current limits during start so as not to disturb the electrical network and/or neighboring equipment.

RSBS has a dedicated algorithm and inbuilt current limit settings specifically for scroll compressor starting. To limit the peak energy demand resulting in expensive utility contracts by the end-users.

RSBS complies with Class B (residential) limits for conducted and radiated emissions which ensures that neighbouring equipment is not negatively affected by any interference generated by the softstarter switching.

RSBS HP provides a dynamic current limit that ensures compressor starting even at higher starting pressures with a maximum current limit of 80 AACrms.

Long term reliability through dedicated algorithm
By limiting the starting current to specified limits, RSBS not only eliminates the annoying issue of light flickering but most importantly it increases the compressor's lifetime by reducing the mechanical stresses resulting from high starting current.



RSBS compact single phase compressor soft starter

More protection
RSBS has a number of built-in diagnostic functions to highlight abnormal conditions which could damage the compressor.

RSBS alarms include:

- Under-voltage protection (in bypass mode)
- Locked rotor protection
- Ramp-up time > 1second
- Welded relay protection
- Over-current in bypass mode

Easy to fit

- Compact dimensions
- DIN or panel mounting
- Integrated starting capacitor
- Internally supplied

RSBS technical specifications

Housing (H x W x D)	60.4 x 76 x 137.2 mm
Number of starts per hour @ 40°C	12 (for RSBS23..A2V.2C24) 10 (for RSBS23..A2V.2C24HP)
Operational voltage	230 VAC ± 15%
Operational frequency	50/60 Hz ± 5Hz
Rated operational current	25/32 AAC
Internally bypassed	Yes
Integrated starting capacitor	Yes
Approvals	CE, UL, cUL, EN 60335-2-40
Protection degree	IP20
Integrated protection against short cycling	Yes

Benefits for your HVAC Systems

It is estimated that around 40% of electrical energy is consumed in buildings mainly for heating, ventilation and air-conditioning systems. Initiatives aimed at reducing CO_2 emissions by using more efficient and renewable energy systems are contributing to innovative designs for more energy-saving products and technologies both in the residential and the industrial sectors.

Carlo Gavazzi offers a comprehensive range of softstarting solutions specifically designed for scroll compressor applications so as to reduce such negative effects whilst prolonging the system lifetime.

Heat pumps

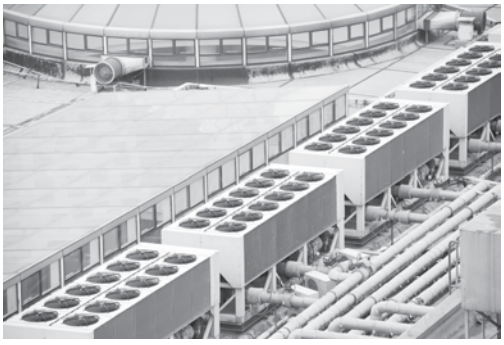
Benefits of Carlo Gavazzi scroll compressor soft starters:

- Patented algorithm optimised for scroll compressors
- No external settings required
- Unmatched inrush current reduction
- Compact design
- Compliance to residential (Class B) EMC requirements for RSBS and RSBT series (up to 15 kW)

Chillers

Benefits of Carlo Gavazzi scroll compressor soft starters:

- Typical inrush current reduction vs direct on line >50%
- Reduction in system vibrations
- Longer compressor lifetime
- Tamper proof design with no external settings
- Optimised control through serial communication on RSB...CVC series



Roof tops

Benefits of RSBD and RSBT soft starters:

- Auto-adaptive algorithm ensures that starting parameters are automatically adjusted to optimize inrush current reduction
- Integrated diagnostic functions for increased system protection and reduced downtime
- Operating temperature range: -20ºC to +60ºC (-4ºF to +140ºF)
- Optimised algorithm for multi-compressor systems

RSBD & RSBT
Scroll compressor soft starter series

Dedicated Soft Starting Solutions for 3 Phase Scroll Compressors

The RSBD and RSBT range of three phase soft starters is specifically designed and optimized for three phase scroll compressors incorporating a patented, auto-adaptive algorithm that continuously measures system parameters to optimize the starting performance of the scroll compressor.

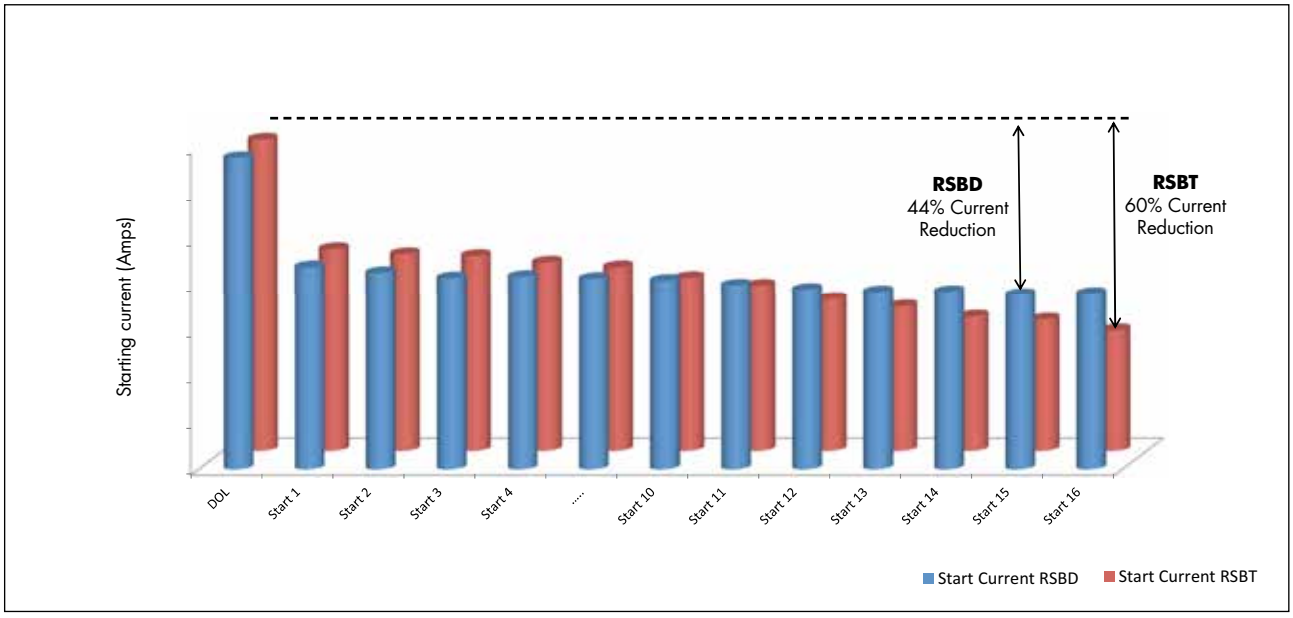
RSBD and RSBT compact series is fitted in a "contactor-like" housing of just 45 mm width to facilitate installation and replacement of existing components.

Panel space saving is also enhanced through the incorporation of a number of diagnostic functions designed to protect your system in abnormal conditions.

Patented Auto-Adaptive function to reduce starting current

Through the auto-adaptive function, the RSBD and RSBT achieve a considerable inrush current reduction without the need to adjust any settings. During every start the algorithm measures relevant data and modifies the starting parameters to ensure a consistent inrush current reduction.

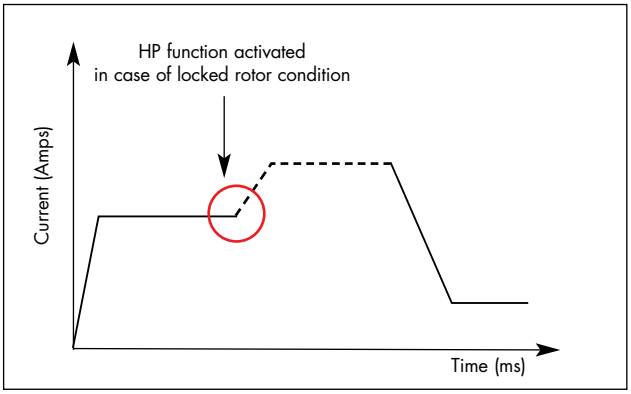
RSBD & RSBT Inrush Current Reduction



A dedicated algorithm for Multi-compressor systems

As a further enhancement to the auto-adaptive algorithm, the RSBD and RSBT family includes a specific algorithm (HP algorithm) which has been designed to detect a locked rotor condition and automatically update the starting parameters to ensure that the compressor is soft-started within 1 second.

This feature is particularly suited for multi-compressor systems where starting pressures can vary considerably from start to start thus requiring a different level of starting current. With the HP algorithm, the RSBD and RSBT soft starters automatically adjust the current limit level, upon detection of locked rotor condition, ensuring the system is not stopped unnecessarily.



Main Specifications

Types	RSBD Compact	RSBT Compact	RSBD 120 mm	RSBT 120 mm
				
Housing (H x W x D)	125 x 45 x 105mm	125 x 45 x 81mm	170 x 120 x 150mm	170 x 120 x 150mm
Number of starts per hour @40°C	12	12	12	12
Operational Voltage	220- 400 VAC	220- 400 VAC	220- 480 VAC	220- 480 VAC
Operational Current	12/16/25/32/37/45 AAC	12/25/32 AAC	55/70/95 AAC	55/70/95 AAC
Control Voltage	24 VAC/DC or 110 - 400 VAC	110 - 400 VAC	24 VAC/DC or 110 - 400 VAC	24 VAC/DC or 110 - 400 VAC
Controlled Phases	2	3	2	3
Internally Bypassed	Yes	Yes	Yes	Yes
Approvals	CE - cULus - CCC (pending)	CE - cULus - VDE	CE - cULus	CE - cULus
Protection Degree	IP20	IP20	IP20	IP20

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	No relay output: V51HP	RSBD4012EV51HP RSBD4012EV61HP	RSBD4016EV51HP RSBD4016EV61HP	RSBD4025EV51HP RSBD4025EV61HP	RSBD4032EV51HP RSBD4032EV61HP	RSBD4037EV51HP RSBD4037EV61HP	RSBD4050EV51HP RSBD4050EV61HP
24 VAC/DC	2 relay output: V61HP	RSBD4012FV51HP RSBD4012FV61HP	RSBD4016FV51HP RSBD4016FV61HP	RSBD4025FV51HP RSBD4025FV61HP	RSBD4032FV51HP RSBD4032FV61HP	RSBD4037FV51HP RSBD4037FV61HP	RSBD4050FV51HP RSBD4050FV61HP

Selection Guide - RSBT (3-phase controlled)

Operational Voltage	Approvals	Version	Rated Operational Current		
			16 Arms	25 Arms	32 Arms
220 VAC	CE	No relay output: V10/V10HP V11/V11HP	RSBT2216EV10/V10HP RSBT2216EV11/V11HP RSBT2216EV20/V20HP RSBT2216EV21/V21HP	RSBT2225EV10/V10HP RSBT2225EV11/V11HP RSBT2225EV20/V20HP RSBT2216EV21/V21HP	RSBT2232EV10/V10HP RSBT2232EV11/V11HP RSBT2232EV20/V20HP RSBT2232EV21/V21HP
400 VAC		1 relay output: V20/V20HP V21/V21HP	RSBT4016EV10/V10HP RSBT4016EV11/V11HP RSBT4016EV20/V20HP RSBT4016EV21/V21HP	RSBT4025EV10/V10HP RSBT4025EV11/V11HP RSBT4025EV20/V20HP RSBT4025EV21/V21HP	RSBT4032EV10/V10HP RSBT4032EV11/V11HP RSBT4032EV20/V20HP RSBT4032EV21/V21HP
220 VAC	CE, cULus	No relay output: V50	RSBT2216EV50 RSBT2216EV51/V51HP RSBT2216EV60 RSBT2216EV61/V61HP	RSBT2225EV50 RSBT2225EV51/V51HP RSBT2225EV60 RSBT2225EV61/V61HP	RSBT2232EV50 RSBT2232EV51/V51HP RSBT2232EV60 RSBT2232EV61/V61HP
400 VAC		1 relay output: V51/ V51HP V60 V61/ V61HP	RSBT4016EV50 RSBT4016EV51/V51HP RSBT4016EV60 RSBT4016EV61/V61HP	RSBT4025EV50 RSBT4025EV51/V51HP RSBT4025EV60 RSBT4025EV61/V61HP	RSBT4032EV50 RSBT4032EV51/V51HP RSBT4032EV60 RSBT4032EV61/V61HP

Selection Guide - RSBD/T 120 mm

No. of Controlled Phases	Type	Operational Voltage	Control Voltage	Version	Rated Operational Current		
					55 AAC	70 AAC	95 AAC
2	RSBD	220 - 480 VAC	24 VAC/DC & 110 - 400 VAC	2 changeover relay outputs	RSBD4855CV0	RSBD4870CV0	RSBD4895CV0
					RSBT4855CV0	RSBT4870CV0	RSBT4895CV0
3	RSBT			RS485 Serial Communication	RSBD4855CVC	RSBD4870CVC	RSBD4895CVC
					RSBT4855CVC	RSBT4870CVC	RSBT4895CVC

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