



## Scroll compressor soft starter series

# Switches

# RSBS, RSBD & RSBT

## Scroll compressor soft starter series

### Where does the need for scroll compressor soft starters 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

## Applications

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<sub>2</sub> 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:

- 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:

- 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



### Roof tops

#### Benefits:

- 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: -20°C to +60°C (-4°F to +140°F)
- Optimised algorithm for multi-compressor systems



# RSBS, RSBD & RSBT

## Scroll compressor soft starter series

### RSBS compact single phase compressor soft starter

RSBS is single phase soft starter that reduces the scroll compressor starting current to 45A AC limiting the peak energy demand and reducing voltage disturbances as well as light flickering. 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.

### RSBS Single phase soft starters up to 32A AC

#### Features

- Current limiting strategy
- No user setting required
- Integrated diagnostic functions
- High pressure (HP) algorithm
- Conforms to Class B limits for EMC
- Alarm relay output

#### Benefits

- Reduces light flickering and voltage disturbance
- Tamper-proof design
- Quicker diagnosis of problems in the heat pump
- Algorithm self-adjust the maximum starting current in case of high pressure starts
- No need for additional EMC filters
- Easier fault diagnostics



### 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.

### RSBD 2-phase controlled soft starters up to 95A AC

#### Features

- No user settings required
- Self-learning algorithm for start current reduction
- Current balancing strategy
- 45A in 45mm wide housing
- 95A in 75mm wide housing
- Internally bypassed solution
- Integrated diagnostic functions
- HP algorithm for multi-compressor systems
- Two (RSBD 45mm) or 3 (RSBD 75mm) auxiliary relay outputs

#### Benefits

- The most easy to use soft starter
- Reduces compressor start current by an average of 40% vs Direct on line
- Ensures compressor starts with lowest current within less than 1 second
- Easy replacement of existing mechanical contactors
- Less heat dissipation inside the electrical panel
- Increased protection for scroll compressor
- HP algorithm ensures that compressor starts even at high pressure difference
- Increases installation flexibility



## RSBT 3-phase controlled soft starters up to 95A AC

### Features

- Patented self-learning algorithm for compressor start current reduction
- No user settings required
- Compliance with EMC class B (residential) limits
- Internally bypassed solution
- Up to 32Arms in 45mm wide housing
- User-friendly alarm indication
- Serial communication (RS485)
- HP algorithm for multi-compressor systems
- Additional plug-in modules available

### Benefits

- >50% Start current reduction vs Direct on Line
- Reduces heavily any light flickering
- Less vibrations in the pipes and joints
- Meets the most demanding limits for emissions – hence no need for additional filters
- Easier fault-finding in case of abnormal conditions
- Communication with machine controller for energy consumption, soft start status, ON/OFF control and alarms
- Installation flexibility with different configurations



## Modularity

The RSBT compact installation flexibility can be enhanced through the additional accessories such as the RFPM and RSPM auxiliary relay modules.

For those systems where EMC emissions need to be reduced further we also provide an optional plug-in filter (RFILT) than be mounted directly on top of RSBT to further reduce the EMC noise.

Furthermore, through the interconnecting clip (RTPM) further time-saving for the connection to manual motor starters is achieved.



### RFILT \*

Plug-in EMC filter

- Noise attenuation: 5 dB
- Operational current: up to 32Arms
- Ordering code: **RFILT4032V00**



### RFPM \*\*

Plug-in alarm relay output

- Changeover (NO, NC) contact
- Ordering code: **RFPMV00**



### RSPM \*\*

Side-mount alarm relay output

- Version V110: Transistor output
- Version V120: Transistor and relay output
- Ordering code: **RSMPV120, RSPMV110**



### RTPM \*

Interconnecting clip for manual motor starters

- No additional tools required
- Facilitates connection to manual motor starters
- Ordering code: **RTPMGMS32SL, RTPMGMS32HL**



### RFCG \*\*\*

Finger guards

- Provide increased protection for maintenance personnel
- Ordering Code: **RFCGX6**

\* Applies to RSBD and RSBT compact models

\*\* Applies to RSBT compact models only

\*\*\* Applies to RSBD 75mm and RSBT 120mm models only



# RSBS, RSBD & RSBT

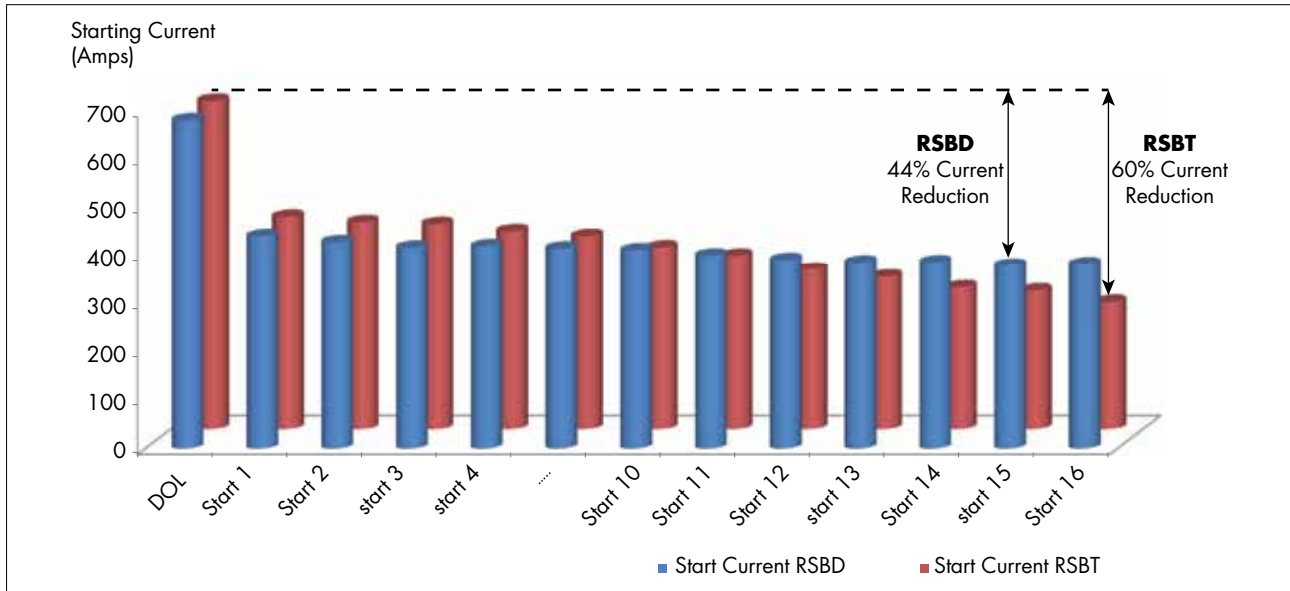
## Scroll compressor soft starter series

### 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.

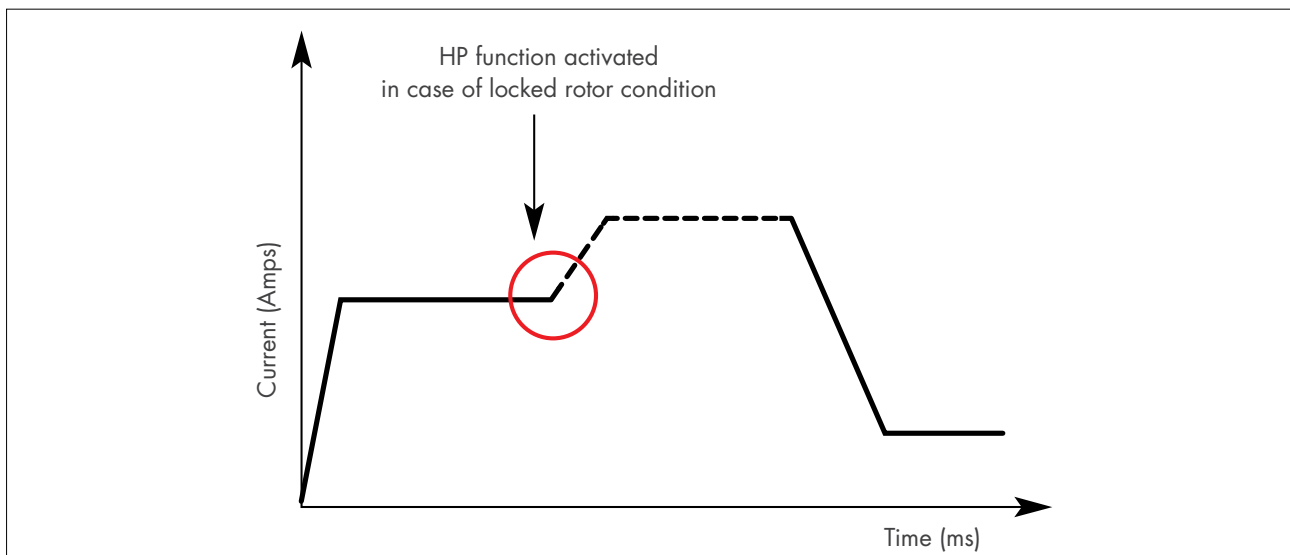
#### RSBD & RSBT inrush current reduction








### 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	RSBS	RSBD Compact	RSBT Compact	RSBD 75 mm	RSBT 120 mm
					
Housing (H x W x D)	60.4 x 76 x 137.2 mm	125 x 45 x 105mm	125 x 45 x 81mm	170 x 75 x 150mm	170 x 120 x 150mm
Number of starts per hour @40°C	12 (for RSBS23..A2V.2C24) 10 (for RSBS23..A2V.2C24HP)	12	12	12	12
Operational voltage	230 VAC ± 15%	220- 400 VAC	220- 400 VAC	220- 600 VAC	220- 480 VAC
Operational current	25/32 AAC	12/16/25/32/37/45 AAC	12/25/32 AAC	55/70/95 AAC	55/70/95 AAC
Control voltage	230 VAC ± 15%	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	1	2	3	2	3
Internally bypassed	Yes	Yes	Yes	Yes	Yes
Approvals	CE, UL, cUL, EN 60335-2-40	CE - cULus - CCC	CE - cULus - VDE	CE - cULus	CE - cULus
Protection degree	IP20	IP20	IP20	IP20	IP20

## Selection guide

Operational voltage (Ue)	Rated operational current (Ie)	Supply voltage (Us)	RSBS	RSBD	RSBT	
230VAC	25A	Internally supplied	RSBS2325A2V12C24			
			RSBS2325A2V22C24			
	32A		RSBS2332A2V12C24			
			RSBS2332A2V12C24HP			
			RSBS2332A2V22C24			
			RSBS2332A2V22C24HP			
220 - 400VAC (220 - 480VAC)*	12A				RSBD4016XVY1HP	-
	16A				RSBD4016XVY1HP	RSBT4016EVY1HPZ
	25A				RSBD4025XVY1HP	RSBT4025EVY1HPZ
	32A				RSBD4032XVY1HP	RSBT4032EVY1HPZ
	37A				RSBD4037XVY1HP	-
	45A				RSBD4050XVY1HP	-
	55A			RSBD4055XV61HP	RSBT4855CVW	
	70A			RSBD4070XV61HP	RSBT4870CVW	
220 - 600VAC	55A	100 - 240VAC		RSBD6055GGV61HP	-	
	70A			RSBD6070GGV61HP	-	
	95A			RSBD6095GGV61HP	-	

W = "C" for versions with Modbus RS485 communication

X = "E" for 110 - 400 VAC, "F" for 24 VAC/DC control voltage versions

Y = "1" No relay output (CE approval only), "2" = with relay output (CE approval only), "5" No relay output (CE & cULus approved), "6" = with relay output (CE & cULus approved)

Z = "V" for VDE approved versions

\* Applicable to RSBT models from 55A to 95A only

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