



### Starting motors with traditional methods

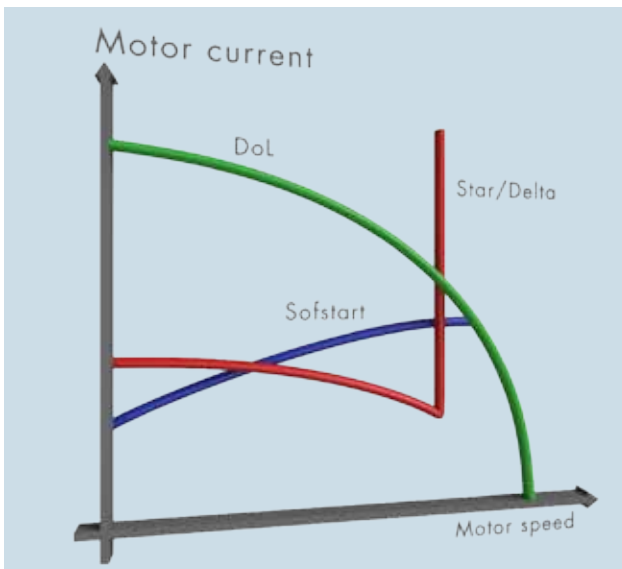
When starting an AC motor, the instantaneous (inrush) current can reach a level of 5 to 8 times the motor rated current. With high efficiency motors (IE2, IE3, IE4) the inrush current can also reach 15 times the motor rated current.

#### Direct on Line (D.O.L.) start results in:

- High starting current causing severe torque oscillations as well as belt slippage
- Possibility of light flickering and electrical disturbance on voltage network

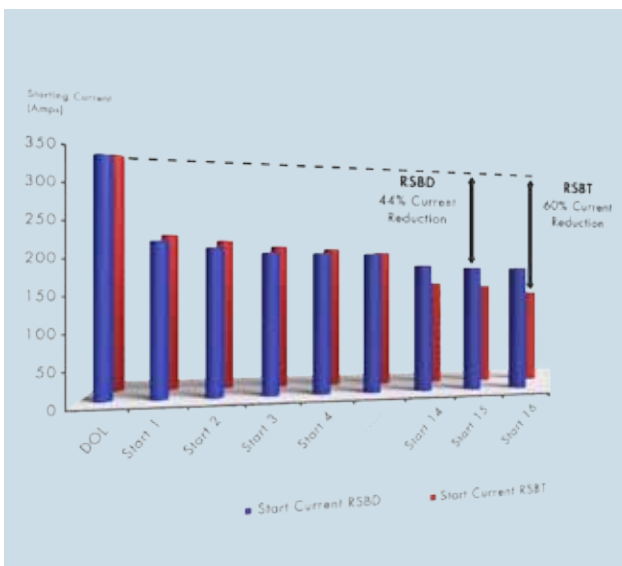
#### Star-delta starters result in:

- Severe torque oscillations during transition from star to delta
- More wiring costs and less space in the electrical cabinet
- Possibility of water hammering in centrifugal pumps since no soft stop is possible



### Mechanical and electrical stresses on your machines

- Water hammering and cavitation in pumps reduces pump lifetime
- Increased wear and tear on joints and shafts increases maintenance costs
- Light flickering and voltage sags may interfere with other electrical equipment
- Vibrations on the motor during start and stop can result in excessive noise levels



### The benefits of Carlo Gavazzi soft starters

If you have experienced any of the above problems, we can provide you with self-learning and easy to use soft starters that can also be customised to your specific needs.

The soft starters are designed to:

- Limit the motor inrush current
- Start and stop the motors in a smoother way

This results in:

- Lower maintenance costs
- Less disturbance on the electrical network
- Longer motor lifetime

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## Overview

# Soft starters

# Overview

## Soft starters

### RSWT – Centrifugal pump soft starters

Carlo Gavazzi's RSWT series is an intelligent 3-phase controlled soft starting solution: the self-learning algorithm ensures optimal pump starts and stops even under different load conditions.

- Designed specifically for 3-phase centrifugal pumps
- Self-learning algorithm to reduce water hammering at start and stop
- Quick and easy to set-up
- Three phase controlled with internal bypass
- Integrated overload protection (Class 10)
- Compact dimensions
- Diagnostic functions



### RSBS, RSBD, RSBT – Scroll compressor soft starters

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.

- Designed specifically for 1-phase (RSBS) and 3-phase (RSBD, RSBT) scroll compressors
- Patented self-learning algorithm to reduce compressor inrush current
- No user settings required
- Compact dimensions
- Eliminates light flickering
- Conforms to EMC residential requirements (RSBS, RSBT - up to 32 A)
- Internally bypassed solutions



### RSGD - General purpose soft starters

RSGD soft starters are designed in an extremely compact housing and are suitable for 3-phase induction motors up to 100 A, providing an easy fit in the electrical panel.

- Designed for 3-phase AC motors
- Current balancing algorithm for smoother motor starts and stops
- Reduces mechanical shocks to motors and couplings
- Minimal user settings required
- Compact dimensions
- Diagnostic functions
- Internally bypassed



# Overview

## Soft starters

### RSWT - Centrifugal pump soft starters



	RSWT 45 mm	RSWT 75 mm	RSWT 120 mm
Housing (H x W x D)	150 x 45 x 105 mm	180 x 75 x 221 mm	180 x 120 x 221 mm
Operational voltage	RSWT40: 220 - 400 VAC, RSWT60: 220 - 600 VAC (+10%, -15%)		
Operational current	12/16/25 AAC	32/37/45/55 AAC	70/90 AAC
Power range 240 VAC	3 kW to 5.5 kW (3 HP to 7.5 HP)	9 kW to 15 kW (10 HP to 20 HP)	20 kW to 30 kW (25 HP to 30 HP)
Power range 415 VAC	5.5 kW to 11 kW (5 HP to 10 HP)	15 kW to 30 kW (15 HP to 30 HP)	37 kW to 45 kW (40 HP to 50 HP)
Power range 480 VAC	5.5 kW to 11 kW (7.5 HP to 15 HP)	18.5 kW to 30 kW (20 HP to 40 HP)	45 kW to 55 kW (50 HP to 60 HP)
Power range 600 VAC	9 kW to 20 kW (10 HP to 20 HP)	22 kW to 45 kW (30 HP to 50 HP)	55 kW to 75 kW (60 HP to 75 HP)
Starts per hour	20	20	20
Controlled phases	3	3	3
Internally bypassed	Yes	Yes	Yes
Relay outputs	2	3	3
PTC input	No	Yes	Yes
Integrated overload protection (Class 10)	V10 models	V011/V111 models	V111 models
Approvals		CE - cULus Listed	



### RSWT 3-phase soft starter series up to 45 kW

#### Features

- Self-learning algorithm
- Simple user interface
- True three phase control
- Integrated overload protection
- 20 starts per hour
- Compact footprint
- Internal bypass

#### Benefits

- Ensures smoother pump starts and stops
- Reduces installation time
- Results in better current reduction
- More protection for your pumps
- Higher installation flexibility
- Facilitates replacement of DOL starters
- Reduces total installation cost

# Soft starters

## RSBS, RSBD – Scroll compressor soft starters



	<b>RSBS (1-phase)</b>	<b>RSBD Compact</b>	<b>RSBD 75 mm</b>
Housing (H x W x D)	60.4 x 76 x 137.2 mm	125 x 45 x 105 mm	170 x 75 x 150 mm
Operational voltage	230 VAC	220 - 400 VAC	220- 600 VAC
Operational current	25/32 AAC	12/16/25/32/37/45 AAC	55/70/95 AAC
Power range 220 - 240 VAC	4.4 kW (5 HP)	3 kW to 11 kW (3 HP to 15 HP)	15 kW to 22 kW (20 HP to 30 HP)
Power range 380 - 415 VAC	-	5.5 kW to 22 kW (5 HP to 25 HP)	30 kW to 45 kW (30 HP to 50 HP)
Power range 440 - 480 VAC	-	-	30 kW to 55 kW (40 HP to 60 HP)
Power range 550 - 600 VAC	-	-	45 kW to 75 kW (50 HP to 75 HP)
Maximum starts per hour @40°C	"12 (for RSBS23..A2V.2C24) 10 (for RSBS23..A2V.2C24HP)"	12	12
Controlled phases	1	2	2
Internally bypassed	Yes	Yes	Yes
Relay outputs	1 (option V22 model)	2 (option V61HP model)	3
Approvals	CE - cULus	CE - cULus - CCC	CE - cULus - CCC



### RSBS Single phase soft starters up to 32 AAC

#### Features

- Current limiting algorithm
- No user settings 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-adjusts the maximum starting current in case of high pressure starts
- No need for additional EMC filters
- Easier fault diagnostics

### RSBD 2-phase controlled soft starters up to 95 AAC

#### Features

- No user settings required
- Self-learning algorithm for start current reduction
- Current balancing algorithm
- 45 A in 45 mm wide housing
- 95 A in 75 mm wide housing
- Internally bypassed solution
- HP algorithm for multi-compressor systems

#### Benefits

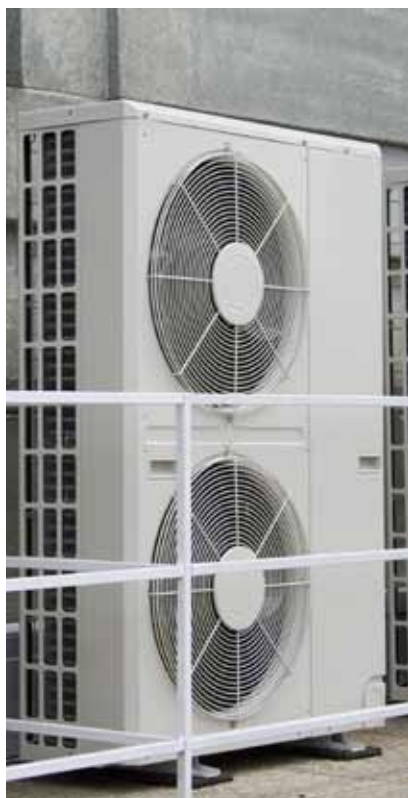
- The easiest soft starter to use
- Reduces compressor start current by an average of 40% vs Direct on line
- Ensures compressor starts with lowest current within less than 1 second
- Less heat dissipation inside the electrical panel
- HP algorithm ensures that compressor starts even at high pressure difference

# Soft starters

## RSBT – Scroll compressor soft starters



	<b>RSBT Compact</b>	<b>RSBT 120 mm</b>
Housing (H x W x D)	125 x 45 x 81 mm	170 x 120 x 150 mm
Operational voltage	220- 400 VAC	220- 480 VAC
Operational current	16/25/32 AAC	55/70/95 AAC
Power range 220 - 240 VAC	4 kW to 9 kW (5 HP to 10 HP)	15 kW to 22 kW (20 HP to 30 HP)
Power range 380 - 415 VAC	7.5 kW to 15 kW (7.5 HP to 15 HP)	30 kW to 45 kW (30 HP to 50 HP)
Power range 440 - 480 VAC	-	30 kW to 55 kW (40 HP to 60 HP)
Maximum starts per hour @40°C	12	12
Controlled phases	3	3
Internally bypassed	Yes	Yes
Relay outputs	1 (optional with RFPM module)	2
Approvals	CE - cULus - VDE - CCC	CE - cULus - CCC



### RSBT 3-phase controlled soft starters up to 95 AAC

#### 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 32 Arms in 45 mm 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
- Greatly reduces any light flickering
- Fewer 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

# Soft starters

## RSGD - General purpose soft starters



	RSGD (Up to 32 A)	RSGD (37 A to 45 A)	RSGD (55 A to 100 A)
Housing (H x W x D)	125 x 45 x 105 mm	125 x 45 x 150 mm	180 x 75 x 221 mm
Operational voltage	RSGD40: 220 - 400 VAC, RSGD60: 220 - 600 VAC (+10%, -15%)		
Operational current	12/16/25/32 AAC	37/45 AAC	55/70/85/100 AAC
Motor power @ 220 - 240 VAC	3 kW to 9 kW (3 HP to 10 HP)	9 kW to 11 kW (10 HP to 15 HP)	15 kW to 30 kW (20 HP to 30 HP)
Motor power @ 380 - 415 VAC	5.5 kW to 15 kW (5 HP to 15 HP)	18.5 kW to 22 kW (20 HP to 25 HP)	30 kW to 45 kW (30 HP to 50 HP)
Motor power @ 440 - 480 VAC	5.5 kW to 18.5 kW (7.5 HP to 20 HP)	22 kW (25 HP to 30 HP)	30 kW to 55 kW (40 HP to 60 HP)
Motor power @ 550 - 600 VAC	9 kW to 22 kW (10 HP to 30 HP)	30 kW to 37 kW (30 HP to 40 HP)	45 kW to 75 kW (50 HP to 75 HP)
Maximum starts per hour @ 40°C	20/20/20/10	10/10	10/10/10/10
Controlled phases	2	2	2
Internally bypassed	Yes	Yes	Yes
Relay Outputs	2	2	3
Integrated overload protection (Class 10)	No	No	Yes
PTC Input	No	No	Yes
Approvals	CE - cULus - CCC		



### RSGD 3-phase compact soft starters up to 45 AAC

#### Features

- Compact 45 mm wide housing up to 45 AAC
- Current balancing algorithm
- HP Algorithm
- Multi-voltage operation
- Integrated phase sequence protection
- Improved inrush current reduction

#### Benefits

- Facilitates replacement of mechanical contactors
- Extended motor lifetime through lower current unbalance
- Results in fewer alarms in case of load fluctuations
- Less inventory
- Increased motor protection in case of abnormal conditions
- Increases installation flexibility and reduces wiring time

### RSGD 3-phase compact soft starters from 55 AAC to 100 AAC

#### Features

- Compact 75 mm wide housing up to 100 AAC
- Self-learning algorithm
- Integrated overload protection (Class 10)
- Built-in Modbus RTU (RS485 2-wire)
- Only 3 adjustments required
- 3 signal relays for alarm, top of ramp, run indication and PTC input

#### Benefits

- Less panel space required
- Optimises motor starting in different load conditions
- Protects the motor in case of anomalous working conditions
- Facilitates diagnostics and energy monitoring
- Extremely easy to use and quick to set up
- Increased installation flexibility