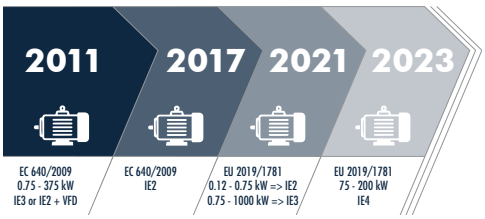
CARLO GAVAZZI
Automation Components

CARLO GAVAZZI

Self-learning soft starters for AC motors

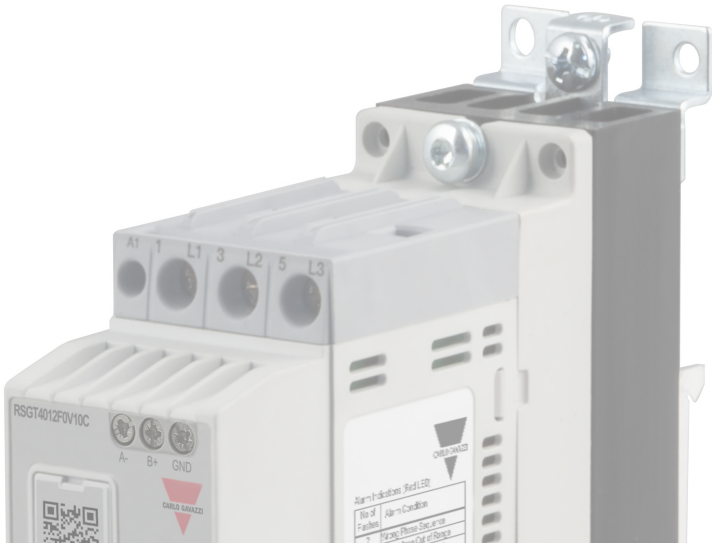
Switches

RSGT / RSGD
AC Motor Soft Starters



The EU Ecodesign regulation 2019/1781 requires that motors with rated output power from 0,75 kW to 1000 kW must comply with the IE3 premium efficiency class.

Carlo Gavazzi soft starters are compatible with IE3 motors and can provide 50% reduction with respect to a direct on line (DOL) start. A lower starting current avoids nuisance trips of protection devices and reduces mechanical shocks during motor starts. This results in less machine stoppages and a longer lifetime for your motor.



RSGD

RSGT

Self-learning soft starters

Self-Learning

RSGT and RSGD integrate intelligent algorithms that adapt to the load requirements at every single start

Current Balancing

The current imbalance is minimised to reduce motor vibrations during start and avoid nuisance tripping of protecion devices

Motor Torque Control

Eliminates water hammering when stopping pumps and prolongs pump lifetime

Real-Time Monitoring

The built-in Modbus facilitates integration with PLCs for real time load condition monitoring

Easy Configuration

RSGT and RSGD can be fully configured via 3 rotary selector switches saving considerable time during commissioning

Applications

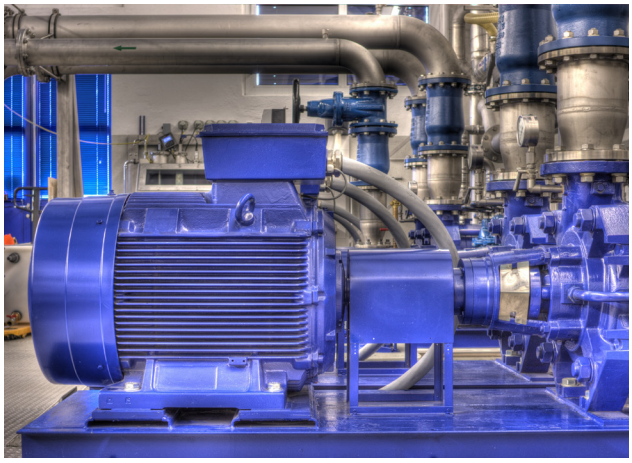
Water and wastewater pumps

Water hammering, pump cavitation and dry running are three main phenomena that shorten pump lifetime. RSGD and RSGT provide the following features to minimise the effects of such issues:

Automatic adjustment of starting profile to match load requirements. This results in smoother ramping to full speed avoid over-acceleration

Torque control at ramp down eliminates water hammering by smoothing the deceleration profile in such a way to obtain an almost constant deceleration

Built-in dry run protection in RSGT protects the pump from overheating in case there is no water flowing



Blowers and ventilators

High inertia loads require a robust control strategy to lower the starting current and sustain the overload current for an extended period of time.

RSGD and RSGT use a hybrid current ramp and current limiting control for loads that require a longer start time. Starting current is reduced to about 2.5 times the rated motor current and mechanical stress is also minimized

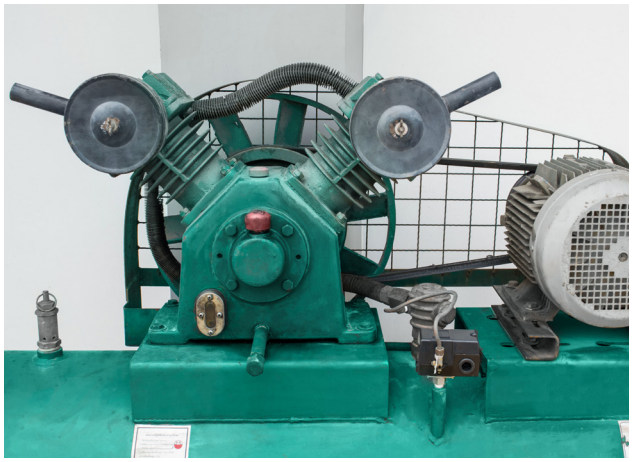
The dry run function in RSGT can also be used to detect broken belts in case of belt-driven fans. For the versions with Modbus, the parameters of this function can also be modified for full flexibility

Compressors

Compressors need a high starting torque that varies according to the level of starting pressures.

The specially designed HP algorithm in RSGD and RSGT, automatically increases the level of torque applied to the motor during ramp-up as required. The self-learning algorithm then adjusts the start current limit for the successive starts. This ensures that the ramp-up time set by the user is respected

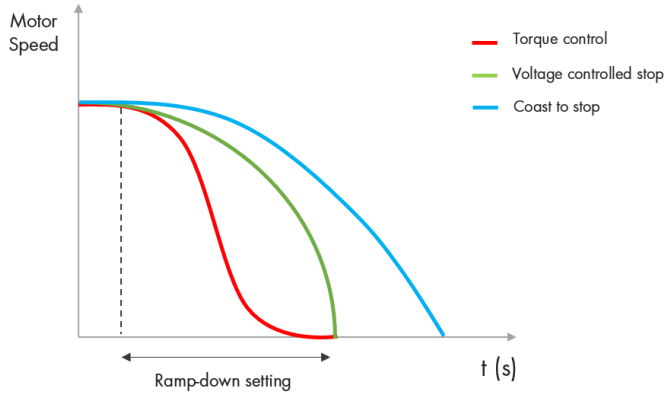
For scroll compressors, the ramp-up setting can be adjusted at 1 second to make sure the compressor starts within this time. Start current reduction will be 40 – 50 % vs DOL start.

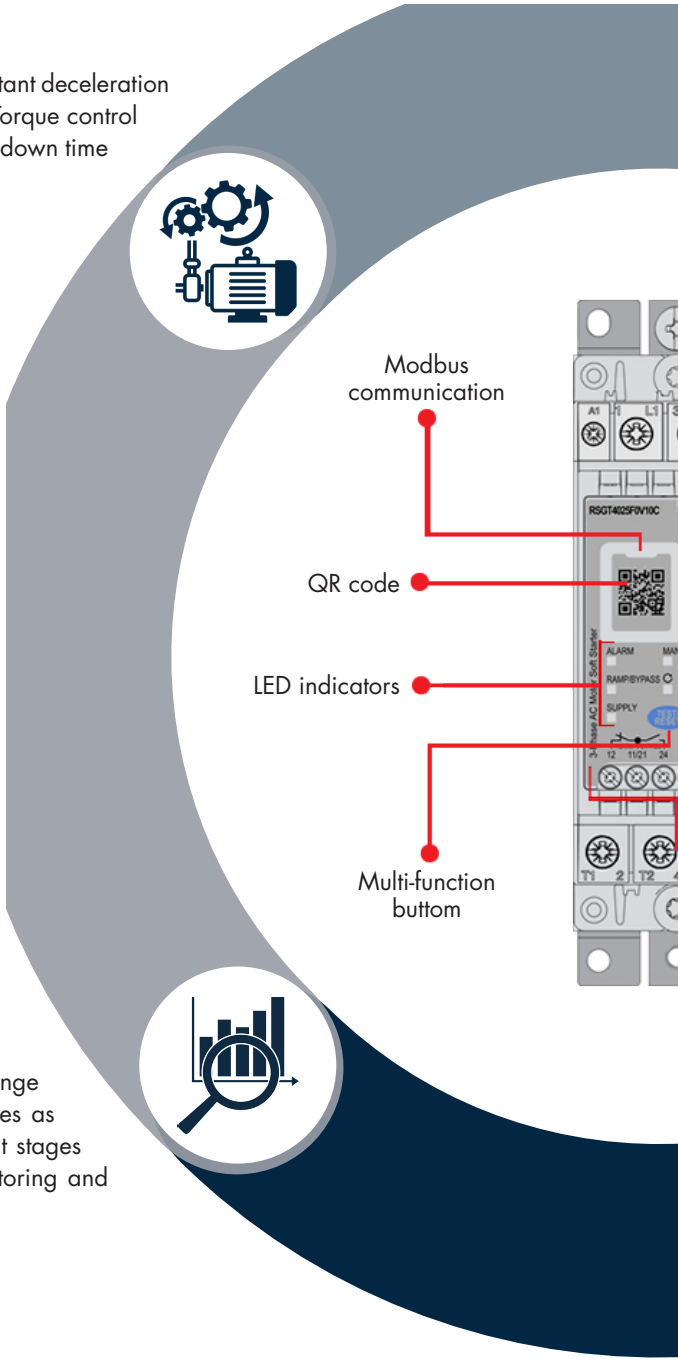


AC Motor Soft Starters

Motor torque control

Torque control is the method used for the motor soft stop. It results in a constant deceleration that eliminates pressure shocks and avoids water hammering in pumps. Torque control is an advanced control that is very suitable for water pumps. When ramp-down time is set to 0 the motor will coast to stop.



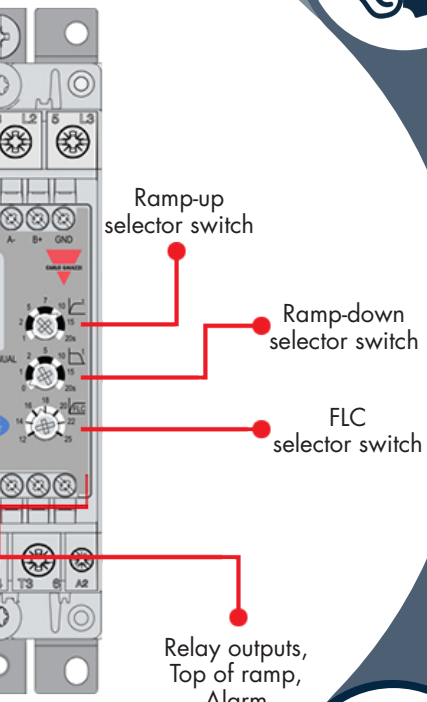


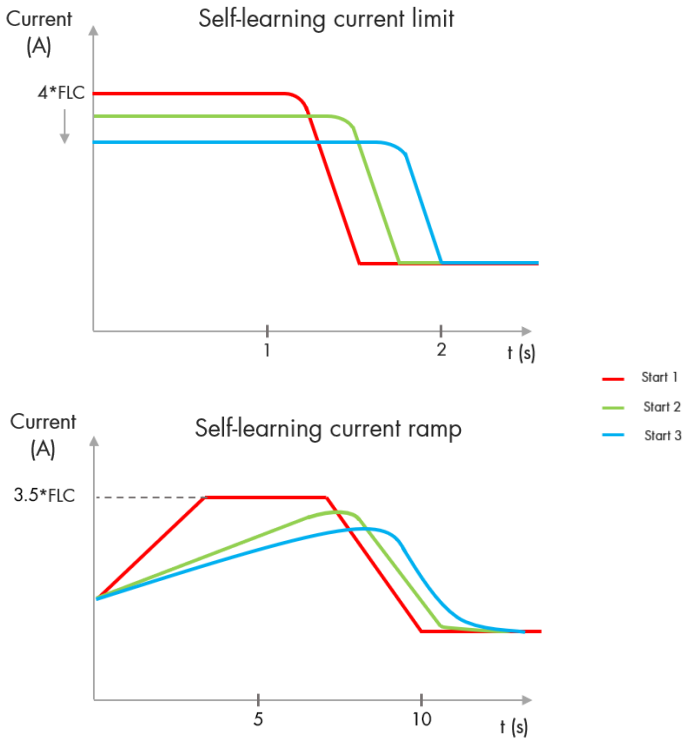
Load condition monitoring

The integration of Modbus RTU protocol allows RSGD and RSGT to exchange data in real-time with the machine PLC. Data includes electrical variables as well as status indication. More information is now available for different stages of the product use cycle including commissioning, load condition monitoring and troubleshooting.

Self-learning

RSGT and RSGD use a patented algorithm that adjusts the soft starter internal parameters according to the load requirements. Whether it is a high starting torque or high inertia load, RSGD and RSGT will adjust the current ramp and limit the starting current for a smoother start with minimal shocks or vibrations.





Easy configuration

There are only 3 user adjustments that are required to configure RSGT and RSGD.

1. FLC

Full Load Current

Full load current (FLC) is used for the motor overload protection and as a reference for the maximum start current allowed by the soft starters.

2. t

Ramp-Up

Ramp-up selector switch adjustment sets the motor starting time. The soft starters will adjust the ramp profile to match the ramp-up time setting.

3. t

Ramp-Down

Ramp-down selector switch adjustment sets the length of the motor deceleration during ramp-down. A longer ramp-down time will result in a slower deceleration of the motor shaft.

RSGT / RSGD
AC Motor Soft Starters

How to select the right soft starter for your application

In addition to the electrical parameters such as line voltage and control voltage, there are other important factors to consider when selecting the right soft starter for your application.

1. Application type

Low torque and/or low inertia loads such as centrifugal pumps and compressors do not require soft starter over-sizing. However applications such as large diameter fans and crushers might require an over-sized soft starter due to their longer start time.

2. Level of current reduction

Three phase soft starters are designed with control on 2 or 3 phases. A 3 phase controlled soft starter will result in a lower starting current and practically no current imbalance during start as shown below.

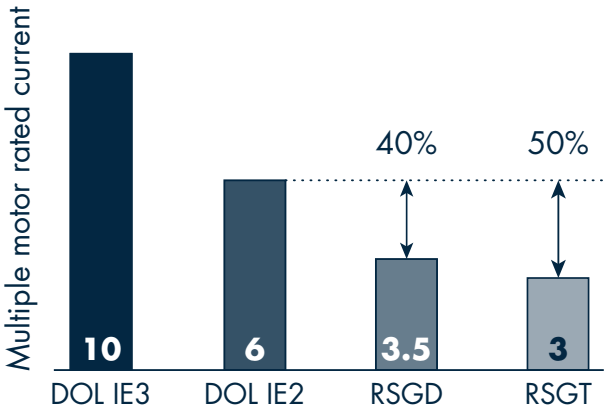
3. Starts per hour

Soft starters are designed for 10 starts up to 20 starts per hour, typically. If your application requires a higher frequency of starts, then over-rating of the soft starter might be required.

4. Operating temperature

When the operating temperature inside the electrical panel is higher than the soft starter rated temperature, typically 40°C (104°F), the soft starter needs to be derated to a lower than rated operating current.

Motor starting current



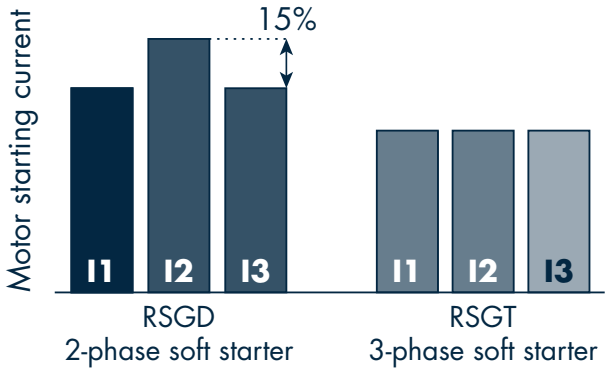
RSGT reduces motor starting current by 50% compared to a direct-on-line (DOL) start.

This result is possible thanks to the control on the 3 phases. Compared to a 2-phase control, like RSGD, there is a typical 10% additional start current reduction.

In critical applications and/or off-grid loads, RSGT will decrease the maximum power drawn from the electrical grid or generator.

With higher efficiency motors, with start currents exceeding 10 times the motor rated current, a 10% improvement may not be so negligible.

Current imbalance at start



Related to the maximum starting current is the issue of current imbalance at start.

Since 2 phase controlled soft starters have one of the phases that is not controlled, there is always some imbalance during motor starts.

This imbalance might be enough to cause trips on protection devices such as fuses and miniature circuit breakers.

Conversely, RSGT controls all the 3 phases resulting in < 2% current imbalance.

Main specifications





	RSGT 45 mm	RSGT 75 mm	RSGT 120 mm	RSGD 45 mm	RSGD 75 mm
Operational current	12 A to 25 A	32 A to 55 A	70 A to 90 A	12 A to 45 A	55 A to 100 A
Operational voltage	RSGX40: 220 - 400 VAC, RSGX60: 220 - 600 VAC				
Dimensions (DxWxH)	106x45x125 mm	177x75x206 mm	177x120x270 mm	106x45x125 mm	180x75x170 mm

X: T or D

RSGT Selection guide

		Operational voltage: 400 VAC		Operational voltage: 600 VAC	
Rated operational current (Ie)	Modbus	Control voltage 110 - 400 VAC	Control voltage 24 VAC/DC	Control/supply voltage 100 - 240 VAC	Control/supply voltage 24 VAC/DC
12 Arms	No	RSGT4012E0V10	RSGT4012F0V10	RSGT6012GGV10	RSGT6012FFV10
16 Arms		RSGT4016E0V10	RSGT4016F0V10	RSGT6016GGV10	RSGT6016FFV10
25 Arms		RSGT4025E0V10	RSGT4025F0V10	RSGT6025GGV10	RSGT6025FFV10
12 Arms	Yes	RSGT4012E0V10C	RSGT4012F0V10C	RSGT6012GGV10C	RSGT6012FFV10C
16 Arms		RSGT4016E0V10C	RSGT4016F0V10C	RSGT6016GGV10C	RSGT6016FFV10C
25 Arms		RSGT4025E0V10C	RSGT4025F0V10C	RSGT6025GGV10C	RSGT6025FFV10C
32 Arms		RSGT4032E0V110C	RSGT4032F0V110C	RSGT6032GGV110C	RSGT6032FFV110C
45 Arms		RSGT4045E0V111C	RSGT4045F0V111C	RSGT6045GGV111C	RSGT6045FFV111C
55 Arms		RSGT4055E0V111C	RSGT4055F0V111C	RSGT6055GGV111C	RSGT6055FFV111C
70 Arms		RSGT4070E0V111C	RSGT4070F0V111C	RSGT6070GGV111C	RSGT6070FFV111C
90 Arms		RSGT4090E0V111C	RSGT4090F0V111C	RSGT6090GGV111C	RSGT6090FFV111C

RSGD Selection Guide

		Operational voltage: 400 VAC		Operational voltage: 600 VAC	
Rated operational current (Ie)	Modbus	Control voltage 110 - 400 VAC	Control voltage 24 VAC/DC	Control/supply voltage 100 - 240 VAC	Control/supply voltage 24 VAC/DC
12 Arms	No	RSGD4012E0VD200 RSGD4012E0VD210	RSGD4012F0VD200 RSGD4012F0VD210	RSGD6012GGVD210	-
16 Arms		RSGD4016E0VD200 RSGD4016E0VD210	RSGD4016F0VD200 RSGD4016F0VD210	RSGD6016GGVD210	-
25 Arms		RSGD4025E0VD200 RSGD4025E0VX210	RSGD4025F0VD200 RSGD4025F0VX210	RSGD6025GGVX210	-
32 Arms		RSGD4032E0VD200 RSGD4032E0VX210	RSGD4032F0VD200 RSGD4032F0VX210	RSGD6032GGVX210	-
45 Arms		RSGD4045E0VX200 RSGD4045E0VX210	RSGD4045F0VX200 RSGD4045F0VX210	RSGD6045GGVX210	-
12 Arms	Yes	RSGD4012E0VD210C	RSGD4012F0VD210C	RSGD6012GGVD210C	-
16 Arms		RSGD4016E0VD210C	RSGD4016F0VD210C	RSGD6016GGVD210C	-
25 Arms		RSGD4025E0VX210C	RSGD4025F0VX210C	RSGD6025GGVX210C	-
32 Arms		RSGD4032E0VX210C	RSGD4032F0VX210C	RSGD6032GGVX210C	-
45 Arms		RSGD4045E0VX210C	RSGD4045F0VX210C	RSGD6045GGVX210C	-
55 Arms		RSGD4055E0VX310C	RSGD4055F0VX310C	RSGD6055GGVX310C	RSGD6055FFVX310C
70 Arms		RSGD4070E0VX310C	RSGD4070F0VX310C	RSGD6070GGVX310C	RSGD6070FFVX310C
85 Arms		RSGD4085E0VX310C	RSGD4085F0VX310C	RSGD6085GGVX310C	RSGD6085FFVX310C
100 Arms		RSGD40100E0VX311C	RSGD40100F0VX311C	RSGD60100GGVX311C	RSGD60100FFVX311C

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