



Catalog

Softstarters

Type PSR, PSS, PSE, PST and PSTB

Efficient PSE range – world's first compact softstarter with torque control

The latest addition to ABB's softstarter family is the efficient PSE range. This softstarter has been equipped with all the most important features making it a very efficient choice. During the development process, great focus has been put into making sure that both the softstarter and the process are even more reliable. Furthermore, the softstarter has been equipped with built-in by-pass to reduce wiring and a back-lit display to provide a hassle free and easy setup and monitoring.

The complete range of softstarters

ABB's softstarter portfolio now consists of four different ranges making it possible to find a suitable softstarter for almost any possible application and motor size all the way up to 1800 A. The softstarter family consists of the compact PSR, the flexible PSS, the efficient PSE and the advanced PST(B) range.

Semiconductor fuses changed to knife type

The Bussmann semiconductor fuses, recommended to be used together with PSS, PSE and PST(B) softstarters, have been changed from screw fixing (DIN43 653) to knife fixing (DIN43 620). This will make it possible to use the standard OS type switch fuses from ABB.



Softstarters

From the moment the first electric motor was developed, engineers have tried to come up with ways of avoiding the electrical and mechanical problems that usually occur when starting a motor. High inrush currents, current spikes and excessive mechanical wear are some of the problems that need to be avoided. One way is to use a Star-Delta starter. This method is for many applications an insufficient solution since it handles neither problems with current spikes or torque peaks nor provides a way to perform a soft stop. A softstarter on the other hand, will provide far better performance during the start and allows for soft stops of the motor.

ABB has been producing softstarters since the beginning of the 1980's. Over 30 years' experience has been incorporated into the design of today's product ranges. Modern power electronics matched with smart circuitry and software gives users of ABB's softstarters, with several state-of-the-art design features, superior control of current and voltage levels during motor start and stop.

The solution to both mechanical and electrical problems

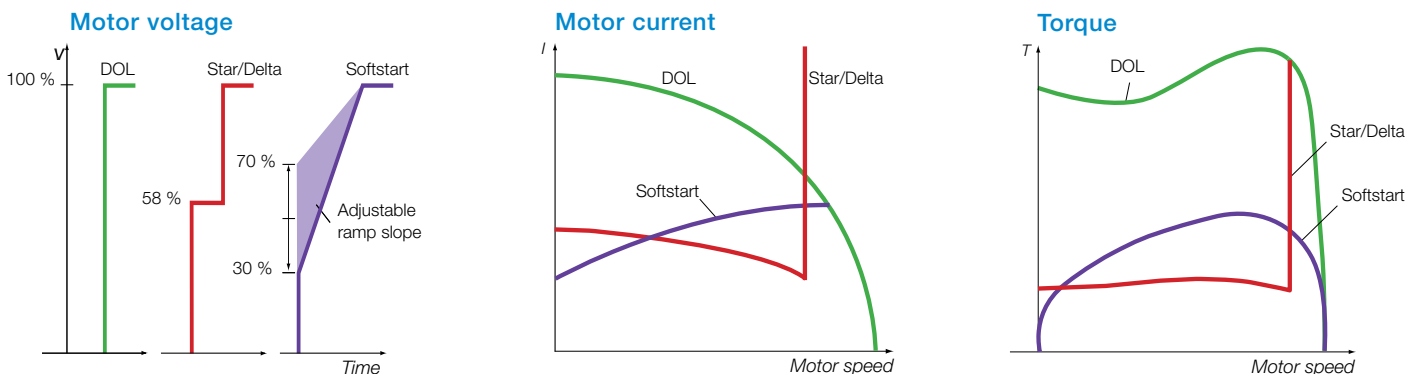
AC motors, "the workhorses of the industry", are used to drive fans, crushers, agitators, pumps, conveyors and more. Depending on the motor installation, torque and current peaks occur. These peaks are everyday reality for production plants

all over the world, causing problems in several ways:

- Electrical problems due to voltage and current transients arising from Direct-On-Line or Star-Delta starts. The transients may overload the local supply network and cause unacceptable voltage variations that interfere with other electrical equipment connected to the network.
- Mechanical problems that address the entire drive chain, from motor to driven equipment, causing a big need for service and repair work.
- Operational problems, such as damage to products on conveyor belts.
- Water hammering and pressure surges in pipe systems when starting and stopping pumps.

The financial consequences of the problems above are considerable. Every technical problem and every breakdown costs money in repairs and lost production.

By choosing ABB's softstarter, all of these problems could be avoided. Whether the choice is the PSR, PSS, PSE or the PST(B), ABB's softstarters all allow smooth start and stops while keeping mechanical and electrical stresses to a minimum.

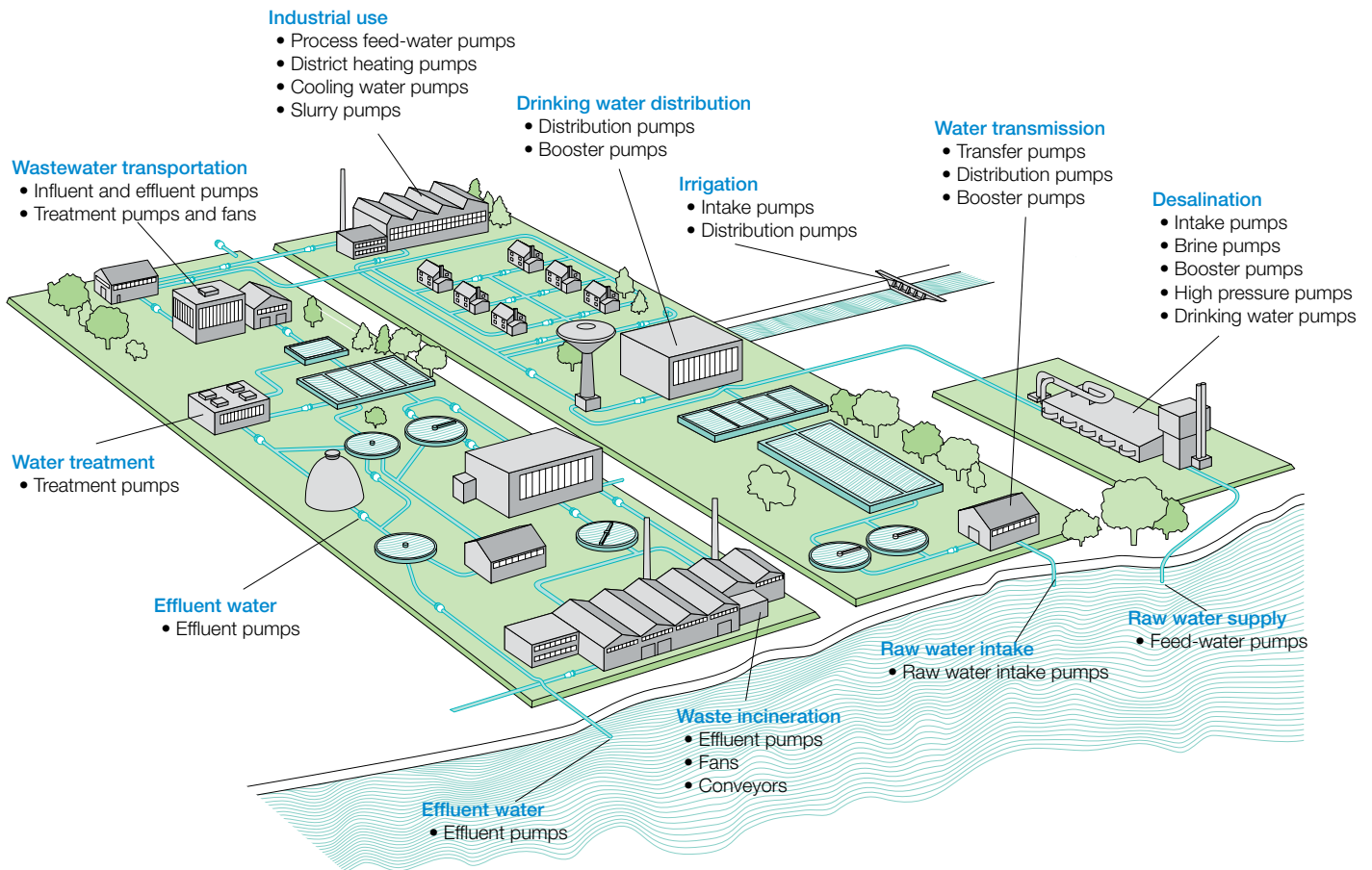


Graphs showing the basic differences between Direct-On-Line starting (DOL), Star-Delta starting and soft starting in terms of the motor voltage (V), motor current (I) and motor torque (T).

Applications

Pumps

Water is the most important resource in the world and water facilities can be found everywhere. Examples of water applications are freshwater and wastewater systems, circulating water for heating, cooling and irrigation.



Common questions:

- How to avoid voltage drops when starting?
- ABB's softstarter will reduce the starting current and thereby avoid the voltage drops.
- How to avoid water hammering when stopping?
- Use our softstarters equipped with an optimized stop ramp. Or even better, with torque control.
- How to ensure high reliability in harsh environments?
- Use our softstarters equipped with coated circuit boards to better withstand those environments.
- How to protect my pumping equipment in the best possible way?
- Use ABB's softstarters equipped with our special designed protections such as overload, underload, and locked rotor protection.

PSR – The compact range

Description



Product description

- Wide rated operational voltage 208–600 V
- Rated control supply voltage 24 V AC/DC or 100–240 V AC
- Rated operational current 3–105 A
- Wide ambient temperature range, -25 to +60 °C
- Built-in by-pass on all sizes, saving energy and reducing installation time
- Potentiometer settings
- Run signal relay on all devices
- TOR signal relay on PSR25 ... PSR105
- Optional fieldbus communication using Profibus, Modbus, Devicenet or CANopen
- DIN rail mounting on PSR3 ... PSR45
- Screw mounting on all sizes
- Connection kits for easy connection with ABB's manual motor starters
- Sophisticated algorithm eliminating the DC-component and thereby providing excellent starting performance

The PSR range is the most compact of all ABB's softstarter ranges. The compact PSR range makes it possible to fit many devices into the same enclosure. A PSR together with a MMS (manual motor starter) makes up a far more compact starting solution than a Star-Delta starter, for instance.

Flexible mounting

PSR softstarters from 3 to 45 A are possible to mount on a DIN-rail, ensuring quick and easy mounting. Naturally, all sizes can be screw mounted.

Few settings

The setup of the PSR is easily done and confirmed using the three clearly marked potentiometers on the front.

Built-in by-pass for energy saving

The built-in by-pass on all sizes does not only save energy; it will also ensure the most compact ABB's softstarter design and reduce the installation time. Thanks to the reduced heat generation, the softstarter can be mounted inside high IP class enclosures.

Suitable for stopping pumps

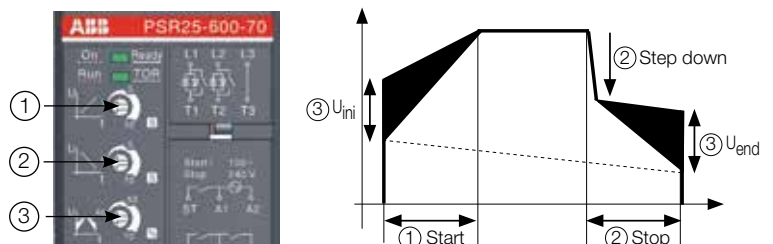
Even without using torque control, the PSR range is designed to reduce water hammering. Compared to the direct stops of a Star-Delta starter or a DOL starter the PSR is superior. See the stop ramp with step-down voltage below.

System concept with manual motor starters

All PSR softstarter sizes can easily be connected to the corresponding manual motor starters from ABB by using the special designed connection kits. This makes both the mounting and the connection easier and will provide a very compact starting solution containing short circuit and thermal protection, isolation function and soft starter - everything that you need.

Settings

- ① Start = 1 ... 20 sec
Stop = 0 ... 20 sec - including the step down voltage.
- ② Step down = 2% reduction for each second increased stop ramp
Stop ramp 10 sec -> step down 80% (20% reduction)
- ③ U_{ini} = 40 ... 70% results in end voltage = 30 ... 60%



PSR – The compact range

Ordering details



PSR3 ... PSR105

Rated operational voltage U_e , 208-600 V AC

Rated control supply voltage, U_s , 100-240 V AC

Motor power

230 V P_e kW	400 V P_e kW	500 V P_e kW	IEC Max rated operational current I_e A	Type	Order code	Weight kg 1 piece
0.75	1.5	2.2	3.9	PSR3-600-70	1SFA896103R7000	0.450
1.5	3	4	6.8	PSR6-600-70	1SFA896104R7000	0.450
2.2	4	4	9	PSR9-600-70	1SFA896105R7000	0.450
3	5.5	5.5	12	PSR12-600-70	1SFA896106R7000	0.450
4	7.5	7.5	16	PSR16-600-70	1SFA896107R7000	0.450
5.5	11	15	25	PSR25-600-70	1SFA896108R7000	0.650
7.5	15	18.5	30	PSR30-600-70	1SFA896109R7000	0.650
7.5	18.5	22	37	PSR37-600-70	1SFA896110R7000	1.000
11	22	30	45	PSR45-600-70	1SFA896111R7000	1.000
15	30	37	60	PSR60-600-70	1SFA896112R7000	2.200
22	37	45	72	PSR72-600-70	1SFA896113R7000	2.270
22	45	55	85	PSR85-600-70	1SFA896114R7000	2.270
30	55	55	105	PSR105-600-70	1SFA896115R7000	2.270



PSR3 ... PSR16



PSR25 ... PSR30



PSR37 ... PSR45



PSR60 ... PSR105

Rated operational voltage U_e , 208-600 V AC

Rated control supply voltage, U_s , 24 V AC/DC

0.75	1.5	2.2	3.9	PSR3-600-11	1SFA896103R1100	0.450
1.5	3	4	6.8	PSR6-600-11	1SFA896104R1100	0.450
2.2	4	4	9	PSR9-600-11	1SFA896105R1100	0.450
3	5.5	5.5	12	PSR12-600-11	1SFA896106R1100	0.450
4	7.5	7.5	16	PSR16-600-11	1SFA896107R1100	0.450
5.5	11	15	25	PSR25-600-11	1SFA896108R1100	0.650
7.5	15	18.5	30	PSR30-600-11	1SFA896109R1100	0.650
7.5	18.5	22	37	PSR37-600-11	1SFA896110R1100	1.000
11	22	30	45	PSR45-600-11	1SFA896111R1100	1.000
15	30	37	60	PSR60-600-11	1SFA896112R1100	2.200
22	37	45	72	PSR72-600-11	1SFA896113R1100	2.270
22	45	55	85	PSR85-600-11	1SFA896114R1100	2.270
30	55	55	105	PSR105-600-11	1SFA896115R1100	2.270

PSR – The compact range

Technical data

Rated insulation voltage U_i	600 V												
Rated operational voltage U_o	208...600 V +10%/-15%, 50/60 Hz \pm 5%												
Rated control supply voltage U_c	100...240 V AC, 50/60Hz \pm 5% or 24 V AC/DC, +10%/-15%,												
Power consumption	PSR3	PSR6	PSR9	PSR12	PSR16	PSR25	PSR30	PSR37	PSR45	PSR60	PSR72	PSR85	PSR105
Supply circuit	12 VA						10 VA						
at 100-240 V AC	12 VA						10 VA						
at 24 V AC/DC	5 W												
Max. Power loss at rated I_o	PSR3	PSR6	PSR9	PSR12	PSR16	PSR25	PSR30	PSR37	PSR45	PSR60	PSR72	PSR85	PSR105
	0.7 W	2.9 W	6.5 W	11.5 W	20.5 W	25 W	36 W	5.5 W	8.1 W	3.6 W	5.2 W	7.2 W	6.6 W
Starting capacity at I_o	4 x I_e for 6 sec.												
Number of starts per hour	See table below for details												
standard	10 ¹⁾												
with aux. fan	20 ¹⁾												
Service factor	100%												
Ambient temperature													
during operation	-25 °C to +60 °C ²⁾												
during storage	-40 °C to +70 °C												
Maximum altitude	4000 m ³⁾												
Degree of protection	PSR3	PSR6	PSR9	PSR12	PSR16	PSR25	PSR30	PSR37	PSR45	PSR60	PSR72	PSR85	PSR105
main circuit	IP20						IP10						
control circuit	IP20						IP10						
Connectable cable area	PSR3-PSR16			PSR25-PSR30			PSR37-PSR45			PSR60-PSR105			
main circuit	1 x 0.75-2.5mm ²			1 x 2.5-10mm ²			1 x 6-35mm ²			1 x 10-95mm ²			
	2 x 0.75-2.5mm ²			2 x 2.5-10mm ²			2 x 6-16mm ²			2 x 6-35mm ²			
control circuit	PSR3-PSR16			PSR25-PSR105			PSR25-PSR105			PSR25-PSR105			
	1 x 0.75-2.5mm ²			1 x 0.75-2.5mm ²			1 x 0.75-2.5mm ²			1 x 0.75-2.5mm ²			
	2 x 0.75-2.5mm ²			2 x 0.75-1.5mm ²			2 x 0.75-1.5mm ²			2 x 0.75-1.5mm ²			
Signal relays	PSR3-PSR16						PSR25-PSR105						
for run signal													
resistive load	240 V AC, 3 A/24 V DC, 3 A						240 V AC, 3 A/24 V DC, 3 A						
AC-15 (contactor)	240 V AC, 0.5 A/24 V DC, 0.5 A						240 V AC, 0.5 A/24 V DC, 0.5 A						
for top ramp signal													
resistive load	-						240 V AC, 3 A/24 V DC, 3 A						
AC-15 (contactor)	-						240 V AC, 0.5 A/24 V DC, 0.5 A						
LED													
for On/Ready	green												
for Run/Top of ramp	green												
Settings													
Ramp time during start	1-20 sec.												
Ramp time during stop	0-20 sec.												
Initial- and end voltage	40-70%												

¹⁾ Valid for 50% on time and 50% off time. If other data is required, contact your sales office.

²⁾ Above 40 °C up to max. 60 °C reduce the rated current with 0.8% per °C.

³⁾ When used at high altitudes above 1000 meters up to 4000 meters you need to derate the rated current using the following formula.

$$[\% \text{ of } I_o = 100 - \frac{x-1000}{150}] \quad x = \text{actual altitude for the softstarter}$$

Number of starts per hour using PSR softstarters

Motor current I_o	Starts/hour without auxiliary fan							Starts/hour with auxiliary fan							
	10	20	30	40	50	60	80	100	10	20	30	40	50	60	80
3 A	PSR3							PSR6							
6 A	PSR6							PSR9							
9 A	PSR9							PSR12							
12 A	PSR12							PSR16							
16 A	PSR16							PSR25							
25 A	PSR25							PSR30							
30 A	PSR30							PSR37							
37 A	PSR37							PSR45							
45 A	PSR45							PSR60							
60 A	PSR60							PSR72							
72 A	PSR72							PSR85							
85 A	PSR85							PSR105							
105 A	PSR105							-							

Data based on an ambient temperature of 40°, starting current of 4 x I_o and ramp time 6 seconds.

For more optimized selections, or to use PSR for heavy-duty starts, please use the softstarter selection tool.

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