

ABB Softstarters Type PSE



Product description

- Wide rated operational voltage 208 – 600 V AC
- Wide rated control supply voltage 100 – 250 V, 50/60 Hz
- Rated operational current 18 to 370 A
- Wide ambient temperature range, -25 to +60 °C (-13 to 140 °F)
- Coated circuit boards for reliable operation in harsh environment
- Built-in by-pass on all sizes, saving energy and reducing installation time
- User friendly HMI with illuminated language neutral display and four button keypad
- Optional external keypad, IP66
- Torque control for excellent control of pumps
- Current limit, adjustable between $1.5 - 7 \times I_e$
- Motor overload protection with classes 10A, 10, 20 and 30
- Motor underload protection to detect pumps running dry
- Locked rotor protection, detecting jammed pumps
- Kick start to start jammed pumps or conveyor belts
- Analog output showing operational current, 4 – 20 mA
- Optional fieldbus communication using Profibus, Modbus, Devicenet or CANopen
- Sophisticated algorithm eliminating the DC-component and thereby providing excellent starting performance.

PSE – The efficient range

Description

The PSE softstarter range is the world's first compact softstarters with Torque Control. This makes the PSE range an excellent choice for pumping application where water hammering normally is a big problem. With its compact design and advanced functionality, the PSE is also a very efficient solution for other common applications such as compressors and fans.

Torque control

The most important function when stopping pumps is torque control. Since the PSE softstarter is optimized for controlling pumps, this feature is a must.

Built-in by-pass for energy saving

Using the built-in by-pass after reaching full voltage will greatly reduce the power loss and thereby save energy. In the PSE softstarter range, the by-pass is built-in on all sizes, which will give the most compact starting solution and reduce the need for wiring during installation.

Coated circuit boards

All circuit boards in the new PSE softstarter have a protective coating to ensure a reliable operation even in tough environments like wastewater plants, where corrosive gases and acids may exist.

Motor protection

The PSE softstarter is equipped with built-in electronic overload protection, protecting the motor from overheating. Since no additional overload device is needed, our efficient design saves both space, installation time, and ultimately money.

Analog output

The analog output terminals can be connected to an analog current meter to show the current during operation and thereby eliminating the need for an additional current transformer.

The analog output signal can also be used as an analog input to a PLC.

Display and keypad

The set-up of the PSE softstarter is done by using the four button keypad and the illuminated display, providing a quick and easy set-up. While operating, the display will also provide important status information such as current and voltage.

External keypad

As an option the PSE softstarter can be equipped with an external keypad for easy set-up and monitoring of the unit without opening the enclosure door. The keypad can also be used to copy parameters between different softstarters.

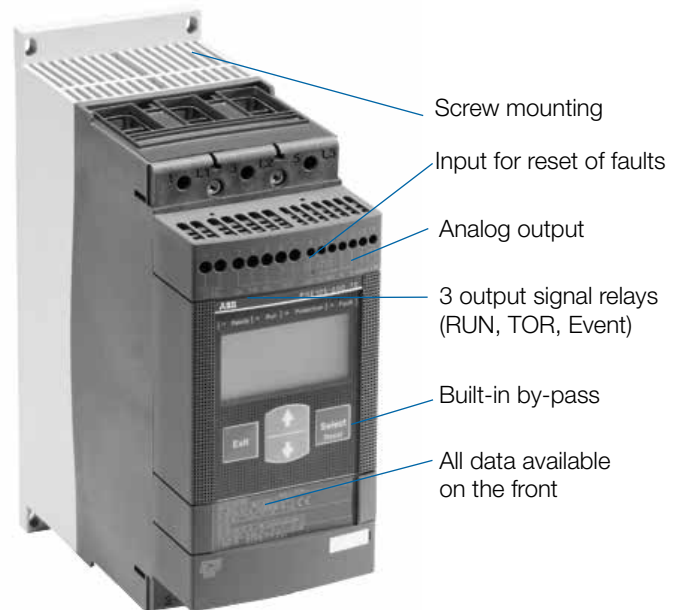
PSE – The efficient range

Description

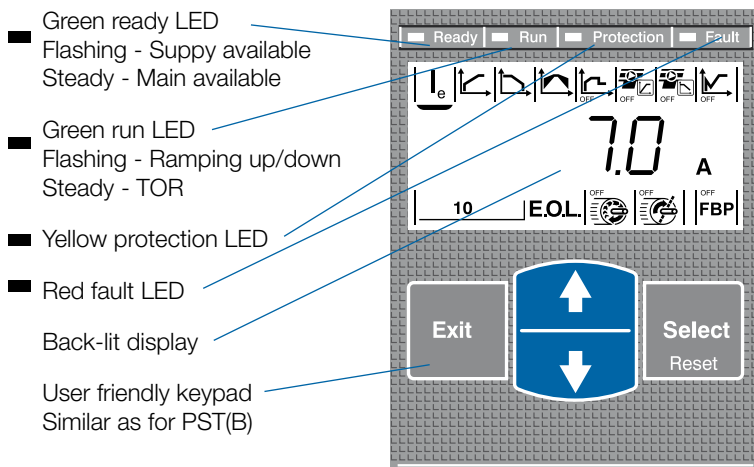
Softstarters
Type PSE

The PSE Softstarter can be selected according to the rated motor power in normal duty applications like pumps, compressors, elevators, escalators, short conveyor belts and bow thrusters. See page 5.20.

For heavy duty applications like centrifugal fans, crushers, mixers, mills, stirrers and long conveyor belts, select a softstarter from page 5.21. The softstarter selection tool prosoft can also be used for a more optimized selection.



Settings



PSE – The efficient range

Overview



PSE18 ... PSE105

Normal start In-line connected (480 V) hp (600 V) hp UL/CSA, Max FLA	Softstarter								
	PSE18	PSE25	PSE30	PSE37	PSE45	PSE60	PSE72	PSE85	PSE105
	10	15	20	25	30	40	50	60	75
	15	20	25	30	40	50	60	75	100
	18	25	28	34	42	60	68	80	104
Using MCCB only, type 1 coordination will be achieved	MCCB (25 kA/600V, 35 kA/480V, 40°C)								
	T3S070TW	T3S100TW		T3S125TW	T3S150TW	T3S225TW	T4S250TW	T5S300TW	
Using J fuses, type 1 coordination will be achieved	J type fuse protection (85 kA)								
175 % rating	30 A	40 A	45 A	50 A	70 A	100 A	110 A	125 A	175 A
Max rating	40 A	50 A	60 A	80 A	100 A	125 A	150 A	175 A	225 A
Minimum enclosure size ¹⁾	600 x 500 x 300 mm / 24 x 20 x 12 in								
Fusible disconnect switch for the above J fuses	Fusible disconnect switch								
	OS30	OS60			OS100		OS200		
The line contactor is not required for the softstarter itself but often used to open if OL trips	Line contactor								
	AF26		AF30	AF50		AF63	AF75	AF95	AF110
Overload protection is used to protect the motor from over heating	Electronic overload relay								
	Built-in								
The by-pass will reduce the power loss of the softstarter	By-pass								
	Built-in								

¹⁾ Enclosure that has two latching points minimum. For use in pollution degree 2 environment.

PSE – The efficient range

Overview

Softstarters
Type PSE



PSE142 ... PSE170



PSE210 ... PSE370

	Softstarter						
Normal start In-line connected	PSE142	PSE170	PSE210	PSE250	PSE300	PSE370	
	(480 V) hp	100	125	150	200	250	300
	(600 V) hp	125	150	200	250	300	350
	UL/CSA, Max FLA	130	169	192	248	302	361
Using MCCB only, type 1 coordination will be achieved							
	MCCB (25 kA/600V, 35 kA/480V, 40°C)			MCCB (25 kA/600V, 50 kA/480V, 40°C)			
Max rating	T5S400BW	T6S600BW		T6S800BW			
Using J fuses, type 1 coordination will be achieved							
175 % rating	J type fuse protection (85 kA)						
	225 A	250 A	300 A	400 A	500 A	600 A	
Max rating	300 A	350 A	450 A	500 A	600 A	700 A	
Minimum enclosure size ¹⁾	900 x 760 x 300 mm / 36 x 30 x 12 in		1200 x 900 x 300 mm / 48 x 36 x 12 in				
Fusible disconnect switch for the above J fuses							
	Fusible disconnect switch						
	OS400			OS600			
The line contactor is not required for the softstarter itself but often used to open if OL trips							
	Line contactor						
	AF145	AF185	AF210	AF260	AF300	AF400	
Overload protection is used to protect the motor from over heating							
	Electronic overload relay						
	Built-in						
The by-pass will reduce the power loss of the softstarter							
	By-pass						
	Built-in						

Quick guide for selection	
Normal start Class 10	Heavy duty start class 30
Ordering - see page 5.20	Ordering - see page 5.21
Typical applications	
• Bow thruster	• Centrifugal pump
• Compressor	• Conveyor belt (short)
• Elevator	• Escalator
• Centrifugal fan	• Conveyor belt (long)
• Crusher	• Mill
• Mixer	• Stirrer
If more than 10 starts/h	
Select one size larger than the standard selection	

¹⁾ Enclosure that has two latching points minimum. For use in pollution degree 2 environment.

PSE – The efficient range

Normal starts, class 10, in-line, ordering details

PSE18 ... PSE370

Rated operational voltage, U_e , 208 - 600 V ACRated control supply voltage, U_s , 100 - 250 V AC, 50/60 Hz

PSE18 ... PSE105



PSE142 ... PSE170



PSE210 ... PSE370

230 V kW	400 V kW	500 V kW	208 V hp	230 V hp	480 V hp	600 V hp	UL/CSA Max rated operational current I_e A	Weight kg (lb)	Catalog number
4	7.5	11	5	5	10	15	18	2.4 (5.29)	PSE18-600-70
5.5	11	15	7.5	7.5	15	20	25	2.4 (5.29)	PSE25-600-70
7.5	15	18.5	7.5	10	20	25	28	2.4 (5.29)	PSE30-600-70
9	18.5	22	10	10	25	30	34	2.4 (5.29)	PSE37-600-70
11	22	30	10	15	30	40	42	2.4 (5.29)	PSE45-600-70
15	30	37	20	20	40	50	60	2.4 (5.29)	PSE60-600-70
18.5	37	45	20	25	50	60	68	2.5 (5.51)	PSE72-600-70
22	45	55	25	30	60	75	80	2.5 (5.51)	PSE85-600-70
30	55	75	30	40	75	100	104	2.5 (5.51)	PSE105-600-70
40	75	90	40	50	100	125	130	4.2 (9.26)	PSE142-600-70
45	90	110	60	60	125	150	169	4.2 (9.26)	PSE170-600-70
59	110	132	60	75	150	200	192	12.4 (27.34)	PSE210-600-70
75	132	160	75	100	200	250	248	13.9 (30.64)	PSE250-600-70
90	160	200	100	100	250	300	302	13.9 (30.64)	PSE300-600-70
110	200	250	125	150	300	350	361	13.9 (30.64)	PSE370-600-70

PSE – The efficient range

Heavy duty starts, class 30, in-line, ordering details

PSE18 ... PSE370

Rated operational voltage, U_e , 208 - 600 V AC

Rated control supply voltage, U_s , 100 - 250 V AC, 50/60 Hz



PSE18 ... PSE105



PSE142 ... PSE170



PSE210 ... PSE370

230 V kW	400 V kW	500 V kW	208 V hp	230 V hp	480 V hp	600 V hp	UL/CSA Max rated operational current I_e A	Weight kg (lb)	Catalog number
3	5.5	7.5	3	3	7.5	10	11	2.4 (5.29)	PSE18-600-70
4	7.5	11	5	5	10	15	18	2.4 (5.29)	PSE25-600-70
5.5	11	15	7.5	7.5	15	20	25	2.4 (5.29)	PSE30-600-70
7.5	15	18.5	7.5	7.5	20	25	28	2.4 (5.29)	PSE37-600-70
9	18.5	22	10	10	25	30	34	2.4 (5.29)	PSE45-600-70
11	22	30	15	15	30	40	42	2.4 (5.29)	PSE60-600-70
15	30	37	20	20	40	50	60	2.5 (5.51)	PSE72-600-70
18.5	37	45	25	25	50	60	68	2.5 (5.51)	PSE85-600-70
22	45	55	30	30	60	75	80	2.5 (5.51)	PSE105-600-70
30	55	75	40	40	75	100	104	4.2 (9.26)	PSE142-600-70
40	75	90	50	50	100	125	130	4.2 (9.26)	PSE170-600-70
45	90	110	60	60	125	150	169	12.4 (27.34)	PSE210-600-70
59	110	132	75	75	150	200	192	13.9 (30.64)	PSE250-600-70
75	132	160	75	75	200	250	248	13.9 (30.64)	PSE300-600-70
90	160	200	125	125	250	300	302	13.9 (30.64)	PSE370-600-70

PSE – The efficient range

Accessories



ATK...

Cable connectors for Al and Cu cables

For softstarter type	Wire range mm ² (AWG)	Tightening torque max. Nm (lb-in)	Packing piece	Weight kg (lb) 1 piece	Catalog number
PSE142 ...170	25-150 (4 AWG - 300 MCM)	13.5 (275 lb-in)	3	0.100 (0.220)	ATK185
PSE210 ... 370	25-185 (4 AWG - 400 MCM)	43 (375 lb-in)	3	0.168 (0.370)	ATK300
PSE210 ... 370	2 x 25-240 (2 x 4 AWG - 500 MCM)	43 (375 lb-in)	3	0.434 (0.957)	ATK300/2



LW...



LE185



LT ... -AL



PSEK



PS-FBPA

Terminal enlargements

For softstarter type	Dimensions hole ø mm (in)	Bar mm (in)	Packing piece	Weight kg (lb) 1 piece	Catalog number
PSE142...170	10.5 (0.413)	20 x 5 (0.787 x 0.197)	1	0.450 (0.992)	LW185
PSE210...370	13 (0.512)	40 x 6 (1.575 x 0.236)	1	1.230 (2.712)	LW300

Terminal nut washer kits ¹⁾

For softstarter type	Req. qty	Packing piece	Weight kg (lb) 1 piece	Catalog number
PSE142...170	2	2	0.200 (0.441)	LE185
PSE210...370	2	2	0.300 (0.661)	LE300

Terminal shrouds

For softstarter type	Suitable for	Req. qty	Packing piece	Weight kg (lb) 1 piece	Catalog number
PSE142...170	Compression lugs	2	2	0.220 (0.485)	LT185-AL
PSE210...370	Compression lugs	2	2	0.280 (0.617)	LT300-AL ²⁾

External keypad including a 3m cable

For softstarter type	Packing piece	Weight kg (lb) 1 piece	Catalog number
PSE18...370	1	–	PSEK

Fieldbus plug connection accessory

For softstarter type	Packing piece	Weight kg (lb) 1 piece	Catalog number
The same accessory for all sizes	1	0.060 (0.132)	PS-FBPA

ABB Field Bus Plug suitable for all sizes. See page 5.40 - 5.43

¹⁾ The terminal nut washer kits come standard with the PSE unit.
²⁾ The LT300-AL is not compatible with ATK300/2 cable connector.

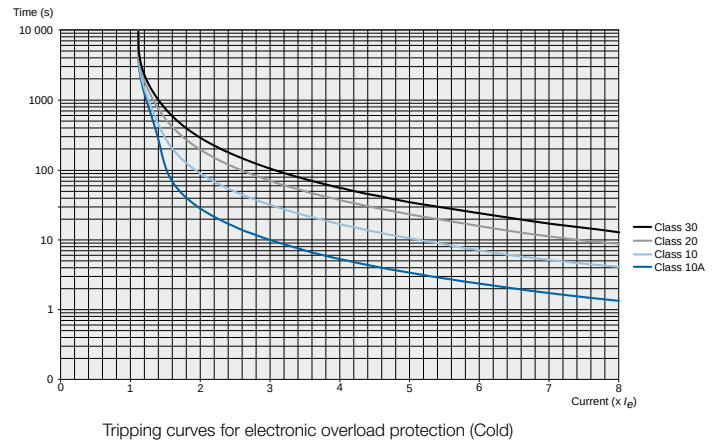
PSE – The efficient range

Technical data

Softstarters
Type PSE

Rated insulation voltage U_i	600 V
Rated operational voltage U_o	208 ... 600 V +10 %/-15 %
Rated control supply voltage U_s	100 ... 250 V +10 %/-15 %, 50/60 Hz ± 5 %
Rated control circuit voltage U_c	Internal 24 V DC
Starting capacity	$4xI_o$ for 10 sec.
Number of starts per hour	10^{-1}
Overload capability, Overload Class	10
Ambient temperature	
During operation	-25 ... +60 °C (-13 to 140 °F) ²⁾
During storage	-40 ... +70 °C (-40 to 158 °F)
Maximum Altitude	4000 m (13123 ft) ³⁾
Degree of protection	
Main circuit	IP00
Supply and Control circuit	IP20
Main circuit	
Built-in By-pass	Yes
Cooling system - Fan cooled (thermostat controlled)	Yes
HMI for settings	
Display	4 7-segments and icons. Illuminated
Keypad	2 selection keys and 2 navigation keys
Main settings	
Setting current	Size dependent
Ramp time during start	1-30 sec
Ramp time during stop	0-30 sec
Initial / end voltage	30-70%
Current limit	$1,5-7xI_o$
Torque control for start	Yes / No
Torque control for stop	Yes / No
Kick start	Off, 30-100%
Signal relays	
Number of signal relays	3
K2	Run signal
K3	TOR (By-pass) signal
K1	Event signal
Rated operational voltage U_o	250 V AC / 24 V DC ⁴⁾
Rated thermal current I_{th}	3 A
Rated operational current I_o at AC-15 ($U_o = 250$ V)	1.5 A

Analog output	
Output signal reference	4 ... 20 mA
Type of output signal	I Amp
Scaling	Fixed at $1.2 \times I_o$
Control circuit	
Number of inputs	3 (start, stop, reset of faults)
Signal indication LED's	
On / Ready	Green flashing / steady
Run / TOR	Green flashing / steady
Protection	Yellow
Fault	Red
Protections	
Electronic overload	Yes (Class 10A, 10, 20, 30)
Locked rotor protection	Yes
Underload protection	Yes
Field bus connection	
Connection for ABB FieldBusPlug	Yes (option)
External keypad	
Display LCD type	
Ambient temperature	
during operation	-25 ... +60 °C (-13 to 140 °F)
during storage	-40 ... +70 °C (-40 to 158 °F)
Degree of protection	IP66



¹⁾ Valid for 50 % on time and 50 % off time, with $3.5 \times I_o$ for 7 seconds. If other data is required, please contact your sales office

²⁾ Above 40 °C (104 °F) up to max. 60 °C (140 °F) reduce the rated current with 0.6 % per °C (0.33 % per °F).

³⁾ When used at high altitudes above 1000 meters (3281 ft) up to 4000 meters (13123 ft) you need to derate the rated current using the following formula.

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

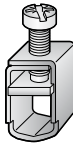
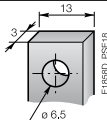
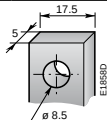
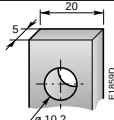
$$[\% \text{ of } I_o = 100 - \frac{x - 3280}{497}] \quad x = \text{actual altitude for the softstarter in feet}$$

⁴⁾ A common voltage needs to be used for all 3 signal relays.

PSE – The efficient range

Technical data

Cross section of connection cables

Softstarter PSE18 ... PSE105			PSE142 ... PSE170	PSE210 ... PSE370
Main circuit				
Connection clamp				
				
Solid/stranded	1 x mm ² (AWG)	2.5 – 70 (14-1/0)	See accessories	
Solid/stranded	2 x mm ² (AWG)	2.5 – 70 (14-1/0)	See accessories	
Tightening torque (recommended)	Nm (lb-in)	9 (79.66)	See accessories	
Connection bar				
				
Width and thickness	mm (in)	13 (0.512) x 3 (0.118)	17.5 (0.689) x 5 (0.197)	20 (0.787) x 5 (0.197)
Hole diameter	mm (in)	6.5 (0.256)	8.5 (0.335)	10.2 (0.402)
Tightening torque (recommended)	Nm (lb-in)	9 (79.66)	18 (159.31)	28 (247.82)
Supply and control circuit				
Connection clamp				
Solid/stranded	1 x mm ² (AWG)	2.5 (14)	2.5 (14)	2.5 (14)
Solid/stranded	2 x mm ² (AWG)	1.5 (16)	1.5 (16)	1.5 (16)
Tightening torque (recommended)	Nm (lb-in)	0.5 (4.43)	0.5 (4.43)	0.5 (4.43)

Semi-conductor fuse ratings and power losses

For Softstarter	Overload protection		Max power loss at rated I _o (Internal by-pass)	Max semi-conductor fuse rating - main circuit Coordination type 2 (85 kA)			Supply circuit power requirements ¹⁾
	Type	Current range		Bussman Fuses, DIN43 620			
				Type	A	Type	Size
PSE							
PSE18	Integrated	5.4-18	0.2	40	170M1563	000	16
PSE25	Integrated	7.5-25	0.4	50	170M1564	000	16
PSE30	Integrated	9-30	0.5	80	170M1566	000	16
PSE37	Integrated	11.1-37	0.8	100	170M1567	000	16
PSE45	Integrated	13.5-45	1.2	125	170M1568	000	16
PSE60	Integrated	18-60	2.2	160	170M1569	000	16
PSE72	Integrated	21.6-72	3.1	250	170M1571	000	16
PSE85	Integrated	25.5-85	4.3	315	170M1572	000	16
PSE105	Integrated	31.8-106	6.6	400	170M3819	1	16
PSE142	Integrated	42.9-143	12.1	450	170M5809	2	16
PSE170	Integrated	51.3-171	17.6	500	170M5810	2	16
PSE210	Integrated	63-210	8.8	630	170M5812	2	23/350
PSE250	Integrated	75-250	12.5	700	170M5813	2	23/350
PSE300	Integrated	90.6-302	18	800	170M6812	3	23/350
PSE370	Integrated	111-370	27.4	900	170M6813	3	23/350

¹⁾ For the supply circuit use a maximum 6 A time-delay fuse or an MCB with type C characteristics.