

PSE – The efficient range

Description



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.

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

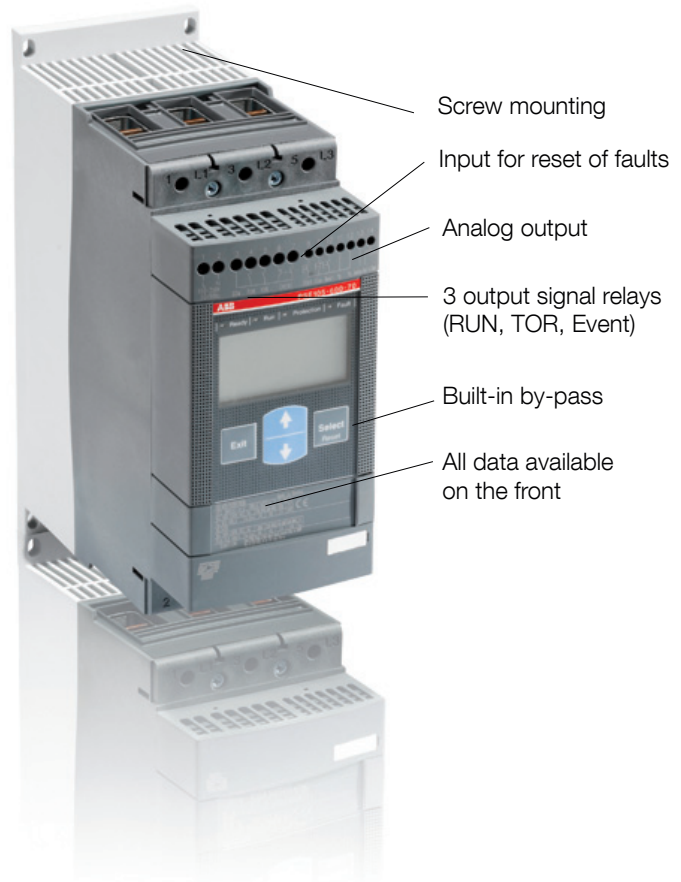
As an option the PSE softstarter can be equipped with an external keypad for easy set-up and monitoring of the unit without opening the enclosure door. The keypad can also be used to copy parameters between different softstarters.

PSE – The efficient range

Description

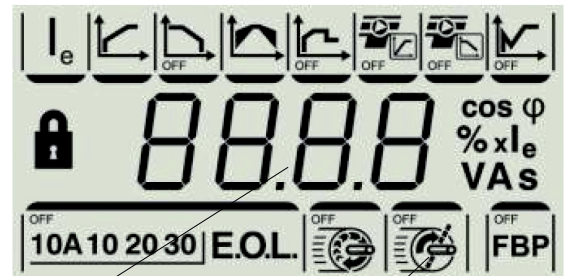
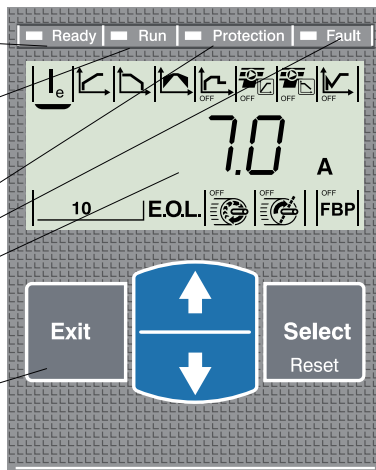
The PSE Softstarter can be selected according to the rated motor power in normal duty applications like pumps, compressors, elevators, escalators, short conveyor belts and bow thrusters. See page 18.

For heavy duty applications like centrifugal fans, crushers, mixers, mills, stirrers and long conveyor belts, select a softstarter from page 19. The softstarter selection tool prosoft can also be used for a more optimized selection.



Settings

- Green ready LED
Flashing - Supply available
Steady - Main available
- Green run LED
Flashing - Ramping up/down
Steady - TOR
- Yellow protection LED
- Red fault LED
- Back-lit display
- User friendly keypad
Similar as for PST(B)



Four digits showing values and messages

Icon's for showing functions. Language neutral

PSE – The efficient range

Overview



PSE18 ... PSE105

		Softstarter								
Normal start In-line connected		PSE18	PSE25	PSE30	PSE37	PSE45	PSE60	PSE72	PSE85	PSE105
	(480 V) hp	10	15	20	25	30	40	50	60	75
	(600 V) hp	15	20	25	30	40	50	60	75	100
	UL/CSA, Max FLA	18	25	28	34	42	60	68	80	104
Using MCCB only, type 1 coordination will be achieved		MCCB (25 kA/600 V, 35 kA/480 V, 40 °C)								
Max rating		Ts3L070TW	Ts3L100TW	Ts3L125TW	Ts3L150TW	Ts3L150TW	T4S250TW	T5S300TW	T5S300BW	
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⁾		610 x 508 x 305 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



PSE142 ... PSE170



PSE210 ... PSE370

		PSE142 ... PSE170			PSE210 ... PSE370		
Normal start In-line connected	Softstarter	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/600 V, 35 kA/480 V, 40 °C)	MCCB (25 kA/600 V, 50 kA/480 V, 40 °C)					
Max rating	T5S400BW			T6S600BW	T6S800BW		
Using J fuses, type 1 coordination will be achieved	J type fuse protection (85 kA)						
175% rating	225 A	250 A	300 A	400 A	500 A	600 A	
Max rating	300 A	350 A	450 A	500 A	600 A	600 A	
Minimum enclosure size ¹⁾	915 x 762 x 305 mm / 36 x 30 x 12 in			1220 x 915 x 407 mm / 48 x 36 x 16 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			

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

How to select correct size

By using the guide here, you can quickly select a suitable softstarter for the most common applications.

Quick guide for selection			
Normal start Class 10		Heavy duty start class 30	
Ordering - see page 18		Ordering - see page 19	
Typical applications			
• Bow thruster	• Centrifugal pump	• Centrifugal fan	• Conveyor belt (long)
• Compressor	• Conveyor belt (short)	• Crusher	• Mill
• Elevator	• Escalator	• Mixer	• Stirrer
! If more than 10 starts/h Select one size larger than the standard selection			

PSE – The efficient range

Normal starts, class 10, In-Line, ordering details



PSE18 ... PSE370

Rated operational voltage, U_o , 208 - 600 V AC

Rated control supply voltage, U_c , 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	Part number	Weight kg (lb)
4	7.5	11	5	5	10	15	18	PSE18-600-70	2.4 (5.29)
5.5	11	15	7.5	7.5	15	20	25	PSE25-600-70	2.4 (5.29)
7.5	15	18.5	7.5	10	20	25	28	PSE30-600-70	2.4 (5.29)
9	18.5	22	10	10	25	30	34	PSE37-600-70	2.4 (5.29)
11	22	30	10	15	30	40	42	PSE45-600-70	2.4 (5.29)
15	30	37	20	20	40	50	60	PSE60-600-70	2.4 (5.29)
18.5	37	45	20	25	50	60	68	PSE72-600-70	2.5 (5.51)
22	45	55	25	30	60	75	80	PSE85-600-70	2.5 (5.51)
30	55	75	30	40	75	100	104	PSE105-600-70	2.5 (5.51)
40	75	90	40	50	100	125	130	PSE142-600-70	4.2 (9.26)
45	90	110	60	60	125	150	169	PSE170-600-70	4.2 (9.26)
59	110	132	60	75	150	200	192	PSE210-600-70	12.4 (27.34)
75	132	160	75	100	200	250	248	PSE250-600-70	13.9 (30.64)
90	160	200	100	100	250	300	302	PSE300-600-70	13.9 (30.64)
110	200	250	125	150	300	350	361	PSE370-600-70	13.9 (30.64)

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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_c , 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	Part number	Weight kg (lb)
3	5.5	7.5	3	3	7.5	10	11	PSE18-600-70	2.4 (5.29)
4	7.5	11	5	5	10	15	18	PSE25-600-70	2.4 (5.29)
5.5	11	15	7.5	7.5	15	20	25	PSE30-600-70	2.4 (5.29)
7.5	15	18.5	7.5	7.5	20	25	28	PSE37-600-70	2.4 (5.29)
9	18.5	22	10	10	25	30	34	PSE45-600-70	2.4 (5.29)
11	22	30	15	15	30	40	42	PSE60-600-70	2.4 (5.29)
15	30	37	20	20	40	50	60	PSE72-600-70	2.5 (5.51)
18.5	37	45	25	25	50	60	68	PSE85-600-70	2.5 (5.51)
22	45	55	30	30	60	75	80	PSE105-600-70	2.5 (5.51)
30	55	75	40	40	75	100	104	PSE142-600-70	4.2 (9.26)
40	75	90	50	50	100	125	130	PSE170-600-70	4.2 (9.26)
45	90	110	60	60	125	150	169	PSE210-600-70	12.4 (27.34)
59	110	132	75	75	150	200	192	PSE250-600-70	13.9 (30.64)
75	132	160	75	75	200	250	248	PSE300-600-70	13.9 (30.64)
90	160	200	125	125	250	300	302	PSE370-600-70	13.9 (30.64)

PSE – The efficient range

Accessories

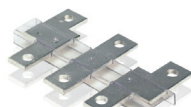
Cable connectors for Al and Cu cables



ATK...

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

Terminal enlargements



LW...

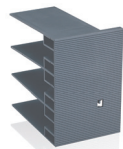
For softstarter type	Dimensions hole ø mm (in)	bar mm (in)	Part number	Pack ^{ing} piece	Weight kg (lb) 1 piece
PSE142...170	10.5 (0.413)	20 x 5 (0.787 x 0.197)	LW185	1	0.450 (0.992)
PSE210...370	13 (0.512)	40 x 6 (1.575 x 0.236)	LW300	1	1.230 (2.712)



LE185

Terminal nut washer kits ¹⁾

For softstarter type	Req. qty	Part number	Pack ^{ing} piece	Weight kg (lb) 1 piece
PSE142...170	2	LE185	2	0.200 (0.441)
PSE210...370	2	LE300	2	0.300 (0.661)



LT ... -AL

Terminal shrouds

For softstarter type	Suitable for	Req. qty	Part number ³⁾	Pack ^{ing} piece	Weight kg (lb) 1 piece
PSE142...170	Compression lugs	2	LT185-AL	2	0.220 (0.485)
PSE210...370	Compression lugs	2	LT300-AL	2	0.280 (0.617)

External keypad including a 3m cable



PSEEK

For softstarter type	Part number	Pack ^{ing} piece	Weight kg (lb) 1 piece
PSE18...370	PSEEK	1	-

Fieldbus plug connection accessory



PS-FBPA

For softstarter type	Part number	Pack ^{ing} piece	Weight kg (lb) 1 piece
The same accessory for all sizes	PS-FBPA	1	0.060 (0.132)

ABB Field Bus Plug suitable for all sizes. See page 38-41

¹⁾ The terminal nut washer kits come standard with the PSE unit.

²⁾ Two lug sets are needed per PSE.

³⁾ The LT300-AL is not compatible with ATK300/2 cable connector.

PSE – The efficient range

Technical data

Rated insulation voltage U_i	600 V
Rated operational voltage U_e	208 ... 600 V +10 %/-15 %
Rated control supply voltage U_s	100 ... 250 V +10 %/-15 %, 50/60 Hz \pm 5 %
Rated control circuit voltage U_c	Internal 24 V DC
Starting capacity	$4xI_e$ 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 _e
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_e	250 V AC / 24 V DC ⁴⁾
Rated thermal current I_{th}	3 A
Rated operational current I_e at AC-15 ($U_e = 250$ V)	1.5 A

¹⁾ Valid for 50 % on time and 50 % off time, with $3.5 \times I_e$ 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).

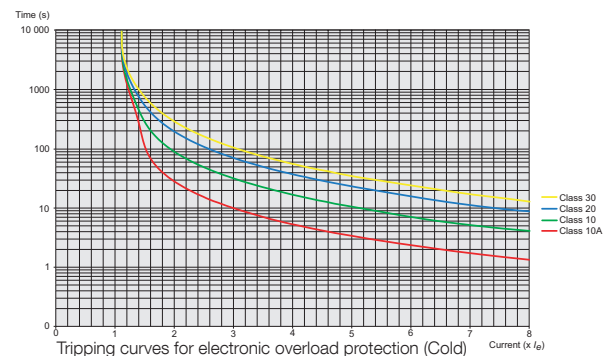
³⁾ When used at high altitudes above 1000 meters (3281 ft) up to 4000 meters (13123 ft) you need to derate the rated current using the following formula.

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

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

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

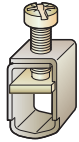
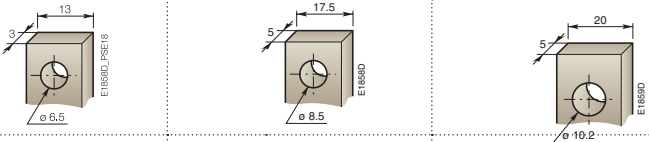
Analog output	
Output signal reference	4 ... 20 mA
Type of output signal	I Amp
Scaling	Fixed at $1.2 \times I_e$
Control circuit	
Number of inputs	3 (start, stop, reset of faults)
Signal indication LED's	
On / Ready	Green flashing / steady
Run / TOR	Green flashing / steady
Protection	Yellow
Fault	Red
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



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 (12...2/0)		See accessories	
Solid/stranded	2 x mm ² (AWG)	2.5...70 (12...2/0)		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)	0.2...2.5 (24...14)		0.2...2.5 (24...14)	0.2...2.5 (24...14)
Solid/stranded	2 x mm ² (AWG)	0.2...1.5 (24...16)		0.2...1.5 (24...16)	0.2...1.5 (24...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 _e (Internal by-pass)	Max semi-conductor fuse rating - main circuit Coordination type 2 (85 kA) Bussman Fuses, DIN43 620		Supply circuit power requirements ¹⁾ VA/VA pull in	
	Type	Current range	W		A	Type		Size
	Type	A	W		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.