

# 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
- 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 x I<sub>e</sub>
- 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 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 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.

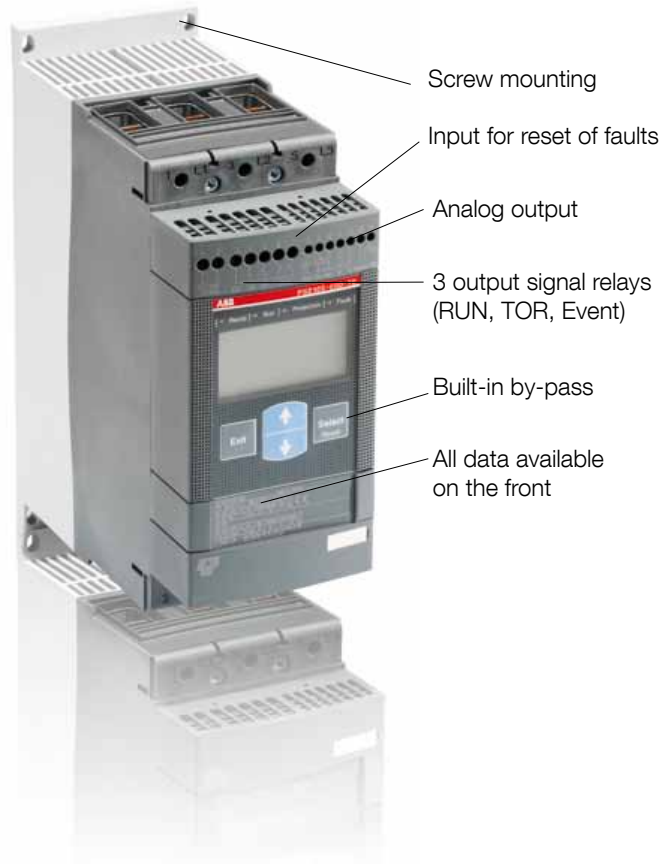
### External keypad

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.

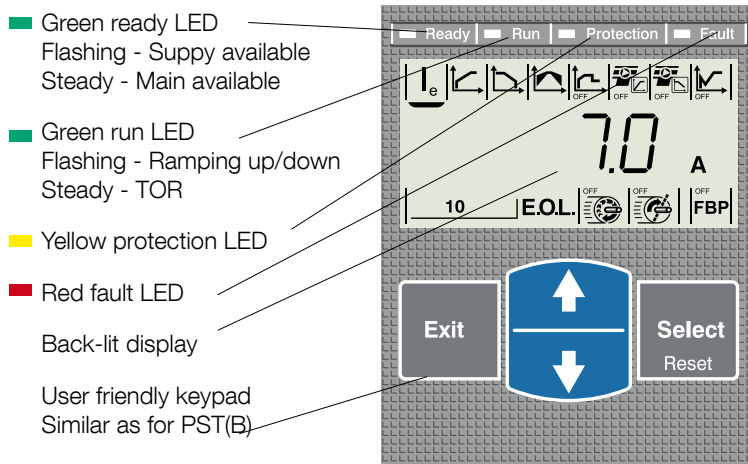
# PSE – The efficient range

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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 30.  
For heavy duty applications like centrifugal fans, crushers, mixers, mills, stirrers and long conveyor belts, select a softstarter from page 31.



## Settings



Four digits showing values and messages

Icon's for showing functions. Language neutral

# PSE – The efficient range

## Overview



PSE18 ... PSE105

Normal start  
In-line connected

(400 V) kW

IEC, Max. A

(440-480 V) hp

UL, Max FLA

### Softstarter. Type

PSE18	PSE25	PSE30	PSE37	PSE45	PSE60	PSE72	PSE85	PSE105
7.5	11	15	18.5	22	30	37	45	55
18	25	30	37	45	60	72	85	106
10	15	20	25	30	40	50	60	75
18	25	28	34	42	60	68	80	104

400 V, 40 °C

Using MCCB only, type 1  
coordination will be achieved

### MCCB (35 kA), type

T2N160

T3N250

### MCCB (50 kA), type

T2S160

T3S250

To achieve type 2 coordina-  
tion, semi-conductor fuses  
must be used

### Fuse protection (85 kA), Semiconductor fuses, Bussmann, type

170M1563	170M1564	170M1566	170M1567	170M1568	170M1569	170M1571	170M1572	170M3819
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Suitable switch fuse for re-  
commended semi-conductor  
fuses

### Switch fuse, type

OS32GD03P

OS63GD03P

OS125GD03P

OS250D03P

The line contactor is not  
required for the softstarter  
itself but often used to open  
if OL trips

### Line contactor, type

AF26

AF30

AF38

A50

A63

A75

A95

A110

Overload protection is used  
to protect the motor from  
over heating

### Electronic overload relay, type

Built-in

The by-pass will reduce the  
power loss of the softstarter.

### By-pass, type

Built-in

A50 ... A300 might be replaced by AF50 ... AF300

The table above is an overview of possible combinations of devices.

Complete coordination tables are available at [www.abb.com/lowvoltage](http://www.abb.com/lowvoltage)

# PSE – The efficient range

## Overview



PSE142 ... PSE170

PSE210 ... PSE370

Normal start  
In-line connected

(400 V) kW  
IEC, Max. A  
(440-480 V) hp  
UL, Max FLA

**Softstarter. Type**

PSE142	PSE170	PSE210	PSE250	PSE300	PSE370
75	90	110	132	160	200
143	171	210	250	300	370
100	125	150	200	250	300
130	169	192	248	302	361

400 V, 40 °C

Using MCCB only, type 1 coordination will be achieved

**MCCB (35 kA), type**

T3N250	T4N320	T5N400	T5N630
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**MCCB (50 kA), type**

T3S250	T4S320	T5S400	T5S630
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To achieve type 2 coordination, semi-conductor fuses must be used

**Fuse protection (85kA), Semiconductor fuses, Bussmann, type**

170M5809	170M5810	170M5812	170M5813	170M6812	170M6813
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Suitable switch fuse for recommended semi-conductor fuses

**Switch fuse, type**

OS400D03P	OS630D03P
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The line contactor is not required for the softstarter itself but often used to open if OL trips

**Line contactor, type**

A145	A185	A210	A260	A300	AF400
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Overload protection is used to protect the motor from over heating

**Electronic overload relay, type**

Built-in
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The by-pass will reduce the power loss of the softstarter.

**By-pass, type**

Built-in
----------

**How to select correct size**

By using the guide here, you can quickly select a suitable softstarter for the most common applications.  
If a more precise selection is required, you can use Prosoft, a selection software available at [www.abb.com/lowvoltage](http://www.abb.com/lowvoltage)

Quick guide for selection	
Normal start Class 10	Heavy duty start class 30
Ordering - see page 30	Ordering - see page 31
<b>Typical applications</b>	
<ul style="list-style-type: none"> <li>• Bow thruster</li> <li>• Compressor</li> <li>• Elevator</li> </ul>	<ul style="list-style-type: none"> <li>• Centrifugal pump</li> <li>• Conveyor belt (short)</li> <li>• Escalator</li> <li>• Centrifugal fan</li> <li>• Crusher</li> <li>• Mixer</li> <li>• Conveyor belt (long)</li> <li>• Mill</li> <li>• Stirrer</li> </ul>
<p><b>!</b> If more than 10 starts/h Select <u>one</u> size larger than the standard selection</p>	

# PSE – The efficient range

## Normal starts, class 10, 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

Motor power



1SFC132311F0002

PSE18 ... PSE105



1SFC132312F0001

PSE142 ... PSE170



1SFC132310F0001

PSE210 ... PSE370

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
4	7.5	11	18	PSE18-600-70	1SFA897 101 R7000	2.4
5.5	11	15	25	PSE25-600-70	1SFA897 102 R7000	2.4
7.5	15	18.5	30	PSE30-600-70	1SFA897 103 R7000	2.4
9	18.5	22	37	PSE37-600-70	1SFA897 104 R7000	2.4
11	22	30	45	PSE45-600-70	1SFA897 105 R7000	2.4
15	30	37	60	PSE60-600-70	1SFA897 106 R7000	2.4
18.5	37	45	72	PSE72-600-70	1SFA897 107 R7000	2.5
22	45	55	85	PSE85-600-70	1SFA897 108 R7000	2.5
30	55	75	106	PSE105-600-70	1SFA897 109 R7000	2.5
40	75	90	143	PSE142-600-70	1SFA897 110 R7000	4.2
45	90	110	171	PSE170-600-70	1SFA897 111 R7000	4.2
59	110	132	210	PSE210-600-70	1SFA897 112 R7000	12.4
75	132	160	250	PSE250-600-70	1SFA897 113 R7000	13.9
90	160	200	300	PSE300-600-70	1SFA897 114 R7000	13.9
110	200	250	370	PSE370-600-70	1SFA897 115 R7000	13.9

# PSE – The efficient range

## Heavy duty starts, class 30, In-Line, ordering details



### PSE18 ... PSE370

Rated operational voltage,  $U_s$ , 208 - 600 V AC

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

Motor power



PSE18 ... PSE105



PSE142 ... PSE170



PSE210 ... PSE370

230 V P kW	400 V P kW	500 V P kW	IEC Max rated operational current $I_e$ A	Type	Order code	Weight kg 1 piece
3	5.5	7.5	12	PSE18-600-70	1SFA897 101 R7000	2.4
4	7.5	11	18	PSE25-600-70	1SFA897 102 R7000	2.4
5.5	11	15	25	PSE30-600-70	1SFA897 103 R7000	2.4
7.5	15	18.5	30	PSE37-600-70	1SFA897 104 R7000	2.4
9	18.5	22	37	PSE45-600-70	1SFA897 105 R7000	2.4
11	22	30	45	PSE60-600-70	1SFA897 106 R7000	2.4
15	30	37	60	PSE72-600-70	1SFA897 107 R7000	2.5
18.5	37	45	72	PSE85-600-70	1SFA897 108 R7000	2.5
22	45	55	85	PSE105-600-70	1SFA897 109 R7000	2.5
30	55	75	106	PSE142-600-70	1SFA897 110 R7000	4.2
40	75	90	143	PSE170-600-70	1SFA897 111 R7000	4.2
45	90	110	171	PSE210-600-70	1SFA897 112 R7000	12.4
59	110	132	210	PSE250-600-70	1SFA897 113 R7000	13.9
75	132	160	250	PSE300-600-70	1SFA897 114 R7000	13.9
90	160	200	300	PSE370-600-70	1SFA897 115 R7000	13.9

# PSE – The efficient range

## Accessories

### Cable connectors for Cu cables

For softstarter type	Wire range mm <sup>2</sup>	Tightening torque max. Nm	Type	Order code	Pack <sup>ing</sup> piece	Weight kg 1 piece
PSE142 ...170	6-185	16	–	1SDA 023 354 R0001	3	0.200
PSE142 ...170	2 x (50-120)	16	LZ185-2C/120	1SFN 074 709 R1000	3	0.300
PSE210 ... 370	16-240	25	–	1SDA 023 368 R0001	3	0.400

### Cable connectors for Al and Cu cables

For softstarter type	Wire range mm <sup>2</sup>	Tightening torque max. Nm	Type	Order code	Pack <sup>ing</sup> piece	Weight kg 1 piece
PSE142 ...170	35-95	13.5	–	1SDA 023 356 R0001	3	0.100
PSE142 ...170	25-150	31	–	1SDA 023 357 R0001	3	0.100
PSE210 ... 370	120-240	43	–	1SDA 023 370 R0001	3	0.100

### Terminal enlargements

For softstarter type	Dimensions hole ø mm <sup>2</sup>	bar mm	Type	Order code	Pack <sup>ing</sup> piece	Weight kg 1 piece
PSE18...105	10.5	17.5 x 5	LW110	1SFN 074 307 R1000	1	0.100
PSE142...170	10.5	20 x 5	LW185	1SFN 074 707 R1000	1	0.450
PSE210...370	13	40 x 6	LW300	1SFN 075 107 R1000	1	1.230

### Terminal nut washer

For softstarter type	Req. qty	Type	Order code	Pack <sup>ing</sup> piece	Weight kg 1 piece
PSE142...170	2	LE185	1SFN 074 716 R1000	2	0.200
PSE210...370	2	LE300	1SFN 075 116 R1000	2	0.300

### Terminal shrouds

For softstarter type	Suitable for	Req. qty	Type	Order code	Pack <sup>ing</sup> piece	Weight kg 1 piece
PSE142...170	Cable connectors	2	LT185-AC	1SFN 124 701 R1000	2	0.050
PSE142...170	Compression lugs	2	LT185-AL	1SFN 124 703 R1000	2	0.220
PSE210...370	Cable connectors	2	LT300-AC	1SFN 125 101 R1000	2	0.070
PSE210...370	Compression lugs	2	LT300-AL	1SFN 125 103 R1000	2	0.280

### External keypad including a 3m cable

For softstarter type	Type	Order code	Pack <sup>ing</sup> piece	Weight kg 1 piece
PSE18...370	PSEEK	1SFA 897 100 R1001	1	–

### Fieldbus plug connection accessory

For softstarter type	Type	Order code	Pack <sup>ing</sup> piece	Weight kg 1 piece
The same accessory for all sizes	PS-FBPA	1SFA 896 312 R1002	1	0.060

ABB Field Bus Plug suitable for all sizes. See page 50-53



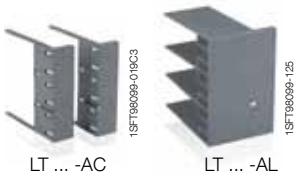
LZ...



LW...



LE185



LT ... -AC



LT ... -AL



PSEEK

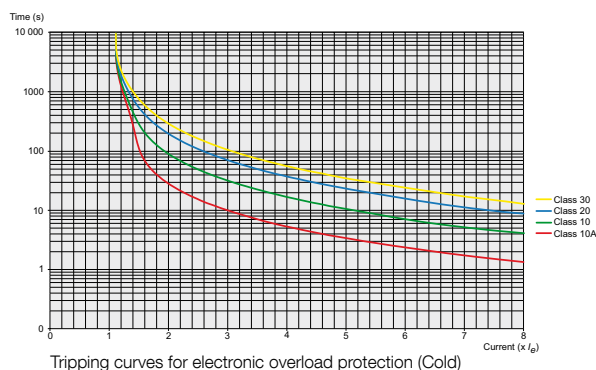


PS-FBPA

# PSE – The efficient range

## Technical data

<b>Rated insulation voltage <math>U_i</math></b>	600 V	<b>Analog output</b>	
<b>Rated operational voltage <math>U_e</math></b>	208 ... 600 V +10 %/-15 %	Output signal reference	4 ... 20 mA
<b>Rated control supply voltage <math>U_s</math></b>	100 ... 250 V +10 %/-15 %, 50/60 Hz $\pm$ 5 %	Type of output signal	1 Amp
<b>Rated control circuit voltage <math>U_c</math></b>	Internal 24 V DC	Scaling	Fixed at $1.2 \times I_e$
<b>Starting capacity at <math>I_e</math></b>	$4 \times I_e$ for 10 sec.	<b>Control circuit</b>	
<b>Number of starts per hour</b>	10 <sup>1)</sup>	Number of inputs	3 (start, stop, reset of faults)
<b>Overload capability,</b>		<b>Signal indication LED's</b>	
Overload Class	10	On / Ready	Green flashing / steady
<b>Ambient temperature</b>		Run / TOR	Green flashing / steady
During operation	-25 ... +60 °C <sup>2)</sup>	Protection	Yellow
During storage	-40 ... +70 °C	Fault	Red
<b>Maximum Altitude</b>	4000 m <sup>3)</sup>	<b>Protections</b>	
<b>Degree of protection</b>		Electronic overload	Yes (Class 10A, 10, 20, 30)
Main circuit	IP00	Locked rotor protection	Yes
Supply and Control circuit	IP20	Underload protection	Yes
<b>Main circuit</b>		<b>Field bus connection</b>	
Built-in By-pass	Yes	Connection for ABB FieldBusPlug	Yes (option)
Cooling system - Fan cooled (thermostat controlled)	Yes	<b>External keypad</b>	
<b>HMI for settings</b>		Display LCD type	
Display	4 7-segments and icons. Illuminated	Ambient temperature	
Keypad	2 selection keys and 2 navigation keys	during operation	-25 ... +60 °C
<b>Main settings</b>		during storage	-40 ... +70 °C
Setting current	Size dependent	Degree of protection	IP66
Ramp time during start	1-30 sec		
Ramp time during stop	0-30 sec		
Initial / end voltage	30-70%		
Current limit	$1.5-7 \times I_e$		
Torque control for start	Yes / No		
Torque control for stop	Yes / No		
Kick start	Off, 30-100%		
<b>Signal relays</b>			
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 <sup>4)</sup>		
Rated thermal current $I_{th}$	3 A		
Rated operational current $I_e$ at AC-15 ( $U_e = 250$ V)	1.5 A		



<sup>1)</sup> 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

<sup>2)</sup> Above 40 °C up to max. 60 °C reduce the rated current with 0.6 % per °C.

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

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

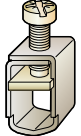
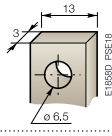
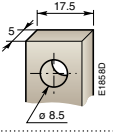
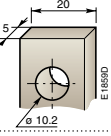
<sup>4)</sup> A common voltage needs to be used for all 3 signal relays



# PSE – The efficient range

## Technical data

### Cross section of connection cables

		Type of softstarter PSE18 ... PSE105		PSE142 ... PSE170	PSE210 ... PSE370		
<b>Main circuit</b>							
Connection clamp							
							
Solid/stranded	1 x mm <sup>2</sup>	2.5 – 70		See accessories			
Solid/stranded	2 x mm <sup>2</sup>	2.5 – 70		See accessories			
Tightening torque (recommended)	Nm	9		See accessories			
<b>Connection bar</b>							
							
Width and thickness	mm						
Hole diameter	mm						
Tightening torque (recommended)	Nm	9	18	28			
<b>Supply and control circuit</b>							
Connection clamp							
Solid/stranded	1 x mm <sup>2</sup>	2.5	2.5	2.5			
Solid/stranded	2 x mm <sup>2</sup>	1.5	1.5	1.5			
Tightening torque (recommended)	Nm	0.5	0.5	0.5			

### Fuse ratings and power losses

For Softstarter	Recommended ABB Overload protection		Max power loss at rated I <sub>e</sub> (Internal by-pass)	Max fuse rating - main circuit <sup>1)</sup>			Power requirements supply circuit
	Type	Current range		Bussman Fuses, DIN43 620		VA/VA pull in	
Type	Type	A	W	A	Type	Size	VA/VA pull in
<b>PSE</b>							
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

<sup>1)</sup>For the supply circuit 6 A delayed, for MCB use C characteristics.

# PSE – The efficient range

## UL ratings

### 3-phase motor rating – In-Line

Softstarters	Motor power P (hp) and full load current FLA, (A)				
	Max FLA A	U <sub>e</sub> 200V / 208V hp	U <sub>e</sub> 220V / 240V hp	U <sub>e</sub> 440V / 480V hp	U <sub>e</sub> 550V / 600V hp
Type					
PSE18	18	5	5	10	15
PSE25	25	7.5	7.5	15	20
PSE30	28	7.5	10	20	25
PSE37	34	10	10	25	30
PSE45	42	10	15	30	40
PSE60	60	20	20	40	50
PSE72	68	20	25	50	60
PSE85	80	25	30	60	75
PSE105	104	30	40	75	100
PSE142	130	40	50	100	125
PSE170	169	60	60	125	150
PSE210	192	60	75	150	200
PSE250	248	75	100	200	250
PSE300	302	100	100	250	300
PSE370	361	125	150	300	350

