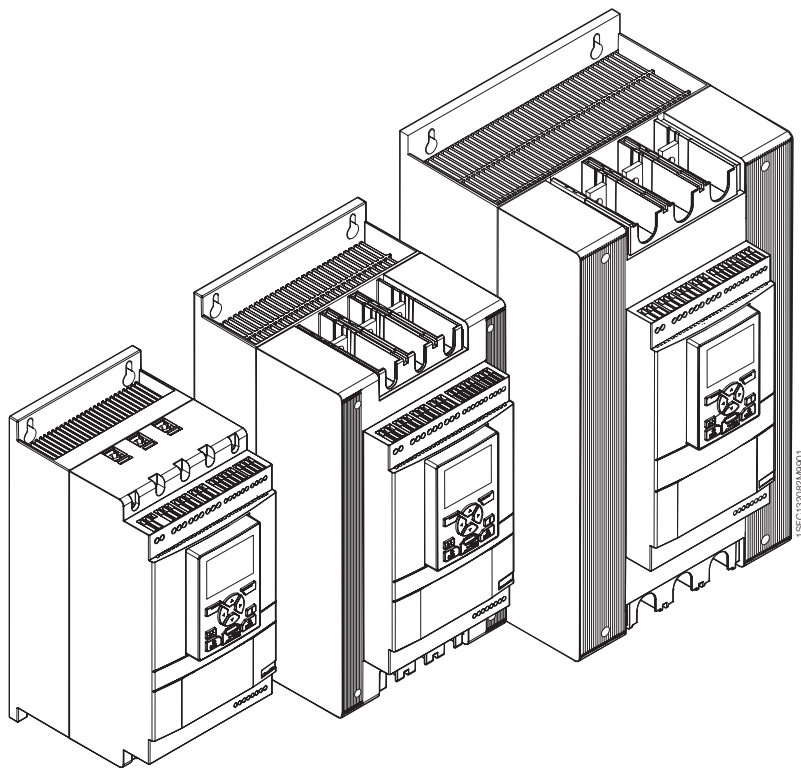


Softstarters Type PSTX30...PSTX370

User Manual short form


















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1 Read this first

Thank you for selecting this ABB PSTX softstarter. Read carefully and make sure you understand all instructions before you mount, connect and configure the softstarter.

This manual is a short form manual intended for quick and easy installation of the PSTX softstarter. For complete information, see 1SFC132081M0201 - Softstarters Type PSTX30...PSTX370, Installation and Commissioning Manual available on: <http://www.abb.com/lowvoltage>

When this manual refers to <http://www.abb.com/lowvoltage>: Select the link **Control Products**, continue to **Softstarters** and type in the specified reference in the search field.

- The softstarter shall be installed by authorized personnel only.
- ABB personnel must obey the ABB CISE 15.4 instructions.
- This manual is a part of the PSTX softstarter and must always be available to personnel that works with this material.
- Always read the full manual before you use the softstarter.

In the User Manual, these symbols are used:



The **caution** symbol in the left margin: if you don't obey this instruction there is a risk for personal injury.



The **warning** symbol in the left margin: if you don't obey this instruction there is a risk for damage to equipment or property



The **information** symbol in the left margin: tells the reader about relevant facts and conditions



The **graphics** symbol in the right margin: refers to graphical information.



Approved personnel are allowed to install and make the electrical connection of the softstarter in accordance with existing laws and regulations.



Examine the softstarter and the package when you unpack your new PSTX softstarter. If there are damages, please speak to the transportation company or the ABB reseller/office immediately.



Do not lift the softstarter by the connection bars, because it can do damage to the softstarter.



Only approved personnel are allowed to do service and repair.
Note: not approved repair can effect the warranty.


Modifications to data in this manual can be applied without notice.


2 Description

The PSTX softstarter has the latest technology for soft starting and soft stopping of standard squirrel cage motors.

General data	Description
Rated insulation voltage, U_i	600 V / 690 V
Rated operational voltage, U_e	208-600 / 690 V, 50 / 60 Hz
Rated control supply voltage, U_s	100-250 V, 50 / 60 Hz
Voltage tolerance	+10% to -15%
Frequency tolerance	$\pm 10\%$
Rated impulse withstand voltage	6 kV operational circuit / 4 kV control supply circuit
Inputs	Start, stop, 3 programmable inputs, temperature sensor input
24 V output	24 V DC $\pm 5\%$ Max 250 mA
Analog output	4-20 mA, 0-20 mA, 0-10 V, 0-10 mA
Relay outputs	3 programmable
Communication	3 Fieldbus ports, Extension I/O
EMC	IEC 60947-4-2 Class A ①
Recommended fuse Control supply circuit	6 A Delayed MCB use C characteristics


① The softstarter is designed for class A equipment. Use of the product in domestic environments can cause radio interference. If so, it can be necessary to use more mitigation procedures.

 For more detailed electrical data and specifications, see 1SFC132081M0201 - Softstarters Type PSTX30...PSTX370, Installation and Commissioning Manual available on: <http://www.abb.com/lowvoltage>.

 Suitable For Use On A Circuit Capable Of Delivering Not More Than ___ Symmetrical Amperes, ___ Volts Maximum When Protected by ___ J Class Time Delay Fuses or RK5 class Fuses or circuit breaker. Refer to table 8.1 for corresponding current and voltage level for any given device.




For complete short circuit protection recommendations see <http://www.abb.com/lowvoltage>.

 The product should only be used within the specified ratings. Be aware of the ambient temperature and altitude above sea level. Derating is required above 40 °C (104 °F) and above 1000 m (3281 ft). For more details, see 1SFC132081M0201 - Softstarters Type PSTX30...PSTX370, Installation and Commissioning Manual available on: <http://www.abb.com/lowvoltage>.



3 Mounting

The PSTX softstarters has 3 different sizes that you can install with M6 bolts, or bolts with the same dimension and strength.

1. Find the correct drawing with dimensions for your softstarter and make sure that you have the correct drilling plan. Drilling plan is also printed on the box.
2. If the softstarter is installed in an enclosure, make sure that the enclosure size is not smaller than the minimum recommended. Select the size from the applicable table for IEC or  .
3. Make sure that the distance to the wall and the front, and the installation angle meet the requirements.
4. Make sure that there is free flow of air through the product.
5. You can remove the HMI and use it as a remote control. Drill a hole where you want to install the HMI. Use RJ45 cable between the HMI and the softstarter. The maximum cable length is 3 m. Roll together the remaining cable to prevent blockage of the door.



Risk of damage to property. Make sure that no liquids, dust or conductive parts can go into the softstarter.



If you do not obey these instructions, this can cause the softstarter to become overheated or not operate correctly.

4 Connection

This product is carefully manufactured and tested but there is a risk that damage can occur from such as shipment and incorrect operation. Obey to the procedure below during initial installation:



Hazardous voltage: Will cause death or serious injury. Turn off and lock out all power that supply this device before you start work on the equipment.



Mounting and electrical connection of the softstarter must be made by authorized personnel and in accordance with existing laws and regulations.



Apply the control supply voltage to make sure that the by-pass relays are in open position before you connect the softstarters PSTX30... PSTX170 to operational voltage for the first time. If not, the equipment can start accidentally.



ABB personnel must obey to the ABB CISE 15.4 instructions.

1. To mount the softstarter, refer to Chapter 3 “Mounting”.
2. Connect the main circuit: terminals 1L1 - 3L2 - 5L3 to the line side and terminals 2T1 - 4T2 - 6T3 to the motor side. Use wire connection for PSTX30...105, see Figure ❶ in graphics 7, and terminal connection for PSTX142...370, see Figure ❷, in graphics 7.
PSTX softstarters can be connected both “In Line” and “Inside Delta” see figure 1.



Note: Use only wires of same dimension when you connect 2 wires on each terminal. (PSTX30...105 only).

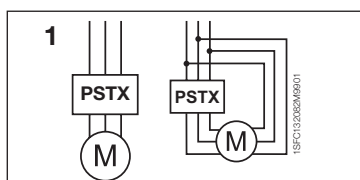


Figure 1: In Line, Inside Delta



Capacitors for power factor compensation are not allowed between the softstarter and the motor, since this can cause current peaks which can damage the thyristors in the softstarter. If you use such capacitors, they must be connected on the line side of the softstarter.

3. Connect control supply voltage to terminals 1 and 2.



4. Connect terminal 22 to the functional earth.



The earthing is not a protective earth, it is a functional earth.
The earthing cable must be as short as possible. Maximum length 0.5 m. The earthing cable must be connected to the mounting plate, which must also be earthed.

5. Look at the diagram and connect the start/stop circuits: terminal 13, 14, 18, 19 and 20/21, with the internal 24V DC terminal. When using internal 24 V DC (terminals 20 or 21), the terminals 18 and 19 should be connected to each other.



Terminal 15, 16 and 17 are programmable inputs for purposes such as reset, slow speed forward, slow speed reverse, stand still brake etc.



For usage of external supply see 1SFC132081M0201 - Softstarters Type PSTX30...PSTX370, Installation and Commissioning Manual available on: <http://www.abb.com/lowvoltage>



Use 24V DC only when you connect terminal 13, 14, 15, 16 and 17. Other voltages can cause damage to the softstarter and the warranty will no longer be valid.

6. Connect terminals 4, 5, 6, 7, 8, 9, 10, 11 and 12 to use the signal output relays. These are potential free contacts for maximum 250 V AC, 1.5 A AC-15 and 30 V DC, 5 A DC-12.



7. Check that the operational voltage and control supply voltage correspond to the softstarter ratings.
8. Switch ON the control supply voltage, terminals 1 and 2.
9. Configure applicable parameters given in chapter 6, Softstarter settings.

10. Switch the operational voltage to ON.

You can be flexible when you connect the PSTX softstarter, but following the previous steps will enable operation of the PSTX softstarter. You can find an example of a full installation in the graphics section. The first one uses fuses and contactors and the second one uses a circuit breaker.



Refer to the timing diagram graphics 13 for the basic behaviour of PSTX softstarter.



Built in Modbus RTU

The PSTX softstarter has an RS485 physical interface (terminals 23 and 24), that can be connected to external devices which have support for RS485 based communication. Through this interface it is possible to control the softstarter, retrieve status information and upload and download parameters. The softstarter has a Modbus RTU slave implemented via the RS485 interface. See **Figure 1**.

PTC/PT100 temperature sensor input

The softstarter has input terminals for PTC and PT100 elements (terminals 25, 26 and 27). Please note that both PTC and PT100 cannot be used at the same time. See **Figure 1**.

Analogue output

The softstarter has one output for a configurable analog output signal (terminals 29 and 30). The load resistance is maximum 500 ohm for current output and minimum 500 ohm for voltage output. See **Figure 1**.

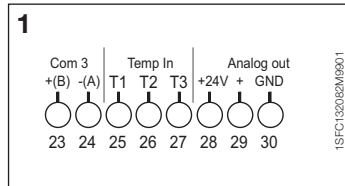


Figure 1: Terminal connection



For instructions and programming see
1SFC132081M0201 - Softstarters Type PSTX30...PSTX370, Installation and Commissioning Manual available on: <http://www.abb.com/lowvoltage>.

5 Human machine interface (HMI)

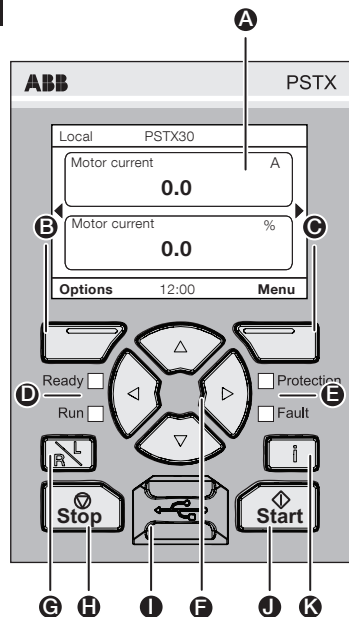


Figure 1: HMI

Refer to **figure 1** for the HMI parts:

- A** Display for information.
- B** Left selection soft key. The function is showed to the left in the display above the key.
- C** Right selection soft key. The function is showed to the right in the display above the key.
- D** Left LED indicators. Ready (green) and Run (green).
- E** Right LED indicators. Protection (yellow) and Fault (red)
- F** Navigation keys. To navigate in the menu and change the parameter values. Highlighted black board on numbers or text shown in the display indicates that the menu/value can be changed or scrolled
- G** Remote/local-key. Switch between local control from the HMI and remote control from hardwire input or fieldbus.
- H** Stop-key. Stop-switch for the softstarter. To stop the motor according to the set parameters. (Only active in local control mode).
- I** Mini USB port. For communication with external devices, eg. a PC.
- J** Start-key. Start-switch for the softstarter. To start the motor and operate it according to the set parameters. (Only active in local control mode).
- K** Information-key. For context-sensitive information about the softstarter status and settings.

Refer to the timing diagram in **graphics 13** for the basic behaviour of PSTX softstarter.



6 Softstarter settings

The PSTX softstarter provides a number of basic start functions, such as:

- Voltage ramp
- Torque ramp
- Full voltage start



All PSTX softstarters must be configured to the rated current of the motor. If the motor is connected In Line, set the parameter "01.01 Motor rated current Ie" to the value found on the rating plate of the motor. If the motor is connected Inside Delta, set the parameter "01.01 Motor rated current Ie" to $(1/\sqrt{3})=58\%$ of the rated motor current.

In the **menu screen**, you can set parameters individually or select a set of predefined parameters for different applications. You can find the application settings and the most common parameters in table **6.2** and **6.3**. Do the procedure that follows to set the parameters:

Menu

Push the right Selection soft-key to go to the menu and then use the Navigation keypad Up and Down to select parameter and Left and Right to change menu. The selected parameter is then highlighted with a black board. Push the Selection key to make your selection, see **figure 1, graphics 14**. The parameters can be set with numerical setting, switch setting or selection lists.



The numerical setting

Use the numerical setting when a numerical value is to be set in the softstarter. Use Left and Right key on the Navigation keypad to select number, a black board highlights the selected number. Then push Up or Down to change the value of the selected number. Push Save key to save. See **figure 2, graphics 14**.

On/off switch

With the switch you can select 1 or 0 (on or off). Use Up and Down on the Navigation keypad, a black board highlights the selected switch. Then push Left or Right to change the value of the selected switch. Push Save key to save. See **figure 3, graphics 14**.

Selection list

Use the Navigation keypad to navigate up and down in the lists. The selected option is highlighted with a black board. Push Save key to save. See **figure 4, graphics 14**.



6.1: Options settings

In the **Options screen**, it is possible to change the appearance of the home view of the softstarter and go to active faults/active warnings.
See figure 5, graphics 14.



Add information screens to Home view.

Push softkey Options and then select Edit home view. In Edit home view-mode you can add information screen to the Home view. Push Left or Right on the Navigation keypad and push the Selection softkey "Add" to add more data to the Home view.

Edit information screens in Home view

Push softkey Options and then select Edit home view. Push Up or Down on the Navigation keypad and push the Selection softkey "Edit" and enter the **Display slot**-menu. Refer to these options to set the new screen in the Display slot-menu:

Display slot table	
Settings	Description
Parameter	Select which parameter to show on the Home view.
Display style	Select the display style for the Home view. Select between numeric, gauge or graph data.
Display decimals	Set the number of decimals to be shown in the Home view.
Display name	Type in a name for the information screen in the Home view.
Signal min	Set the minimum value to be shown in the Home view.
Signal max	Set the maximum value to be shown in the Home view.
Scale value range	Tick the Scale value range -square, to illuminate three more options in the display slot-menu: Display signal : Display signal min as - Set the scaled minimum value. Display signal max as - Set the scaled maximum value. Display unit - Set unit.

Active faults/warnings/protections are also found in the options menu. They give information about faults and warnings that have occurred during operation. For fault solution see **chapter 7 Troubleshooting**.



The motor can start unexpectedly if there is a start signal present, while you do any of the procedures below:

- Change from one type of control to a different one (i.e. fieldbus control to hardwire control or local to remote control)
- Reset events
- If you use automatic event reset
- If you use Auto restart

Table 6.2: Application settings

		Recommended basic setting						
		Start ramp time	Stop ramp time	Start ramp initial level	Stop ramp end level	Current limit level	Start mode	Stop mode
Normal start (class 10)	Band saw	10	-	30	30	4	Voltage ramp	No ramp
	Bow thruster	10	-	30	30	3	Voltage ramp	No ramp
	Centrifugal pump	10	10	30	30	4	Voltage ramp	Torque ramp
	Circular saw	10	-	30	30	4	Voltage ramp	No ramp
	Conveyor belt short	10	-	40	30	3,5	Voltage ramp	No ramp
	Cutter	10	-	30	30	4	Voltage ramp	No ramp
	Escalator	10	-	30	30	3,5	Voltage ramp	No ramp
	High pressure pump	10	10	40	30	4,5	Voltage ramp	Torque ramp
	Hydraulic pump	10	-	30	30	3	Voltage ramp	No ramp
	Lift/Elevator	10	-	30	30	3,5	Voltage ramp	No ramp
	Piston compressor	5	-	50	30	3	Voltage ramp	No ramp
	Scroll compressor	2	-	50	30	3	Voltage ramp	No ramp
Heavy duty start (class 30)	Axial fan	10	-	30	30	4	Voltage ramp	No ramp
	Conveyor belt long	10	-	40	30	3,5	Voltage ramp	No ramp
	Crusher	10	-	30	30	4	Voltage ramp	No ramp
	Centrifugal fan	10	-	30	30	4	Voltage ramp	No ramp
	Grinder	10	-	30	30	4	Voltage ramp	No ramp
	Mixer	10	-	30	30	3,5	Voltage ramp	No ramp

Assistants menu**Menu ► Assistants**

Push the right selection key, **Menu**, to enter the menu. Use **Up** or **Down** key on the navigation keypad to Assistants and then push **Select**.

Note: use the parameter values above as guidance only. Additional tuning can be necessary because of variations in load conditions.

Table 6.3: Parameter list for operational function

This is a selection of the most commonly used parameters.

For complete parameter list and setting range, see:

1SFC132081M0201 - Softstarters type PSTX30...PSTX370, Installation and Commissioning Manual
available on: <http://www.abb.com/lowvoltage>

Operation functions		
Parameter name	Setting range	Default value
Motor rated current I _e	PSTX30: 9 ... 30 A ❶	30 A
Start mode	Voltage ramp, Torque ramp, Full voltage start	Voltage ramp
Stop mode	Voltage ramp, Torque ramp, No ramp	No ramp
Start ramp initial level	10 ... 99 %	30%
Start time	1 ... 120s	10s
Stop ramp end level	10 ... 99%	30%
Current limit type	Off, Normal, Dual, Ramp	Normal
Current limit level	1.5 ... 7.5 xI _e	4.0 xI _e
Kick start	On/Off	Off
Kick start level	50 ... 100%	70%
Kick start time	0,2s ... 2,0s	0,2s
Step down level	10 ... 100%	80%
Motor heating ❶		
Sequence start ❶		
Internal faults ❶		
External faults ❶		
System mode	Normal, Demo, Small motor	Normal
Mains connection	Auto, In line, Inside delta UI, Inside delta IU, Two phase (L1 Shorted), Two phase (L2 Shorted), Two phase (L3 Shorted)	Auto
Limp mode	On/Off	Off

❶ For full parameter list, see 1SFC132081M0201
- Softstarters Type PSTX30...PSTX370, Installation and Commissioning Manual
available on: <http://www.abb.com/lowvoltage>

Protections		
Parameter name	Setting range	Default value
EOL mode	Normal/Dual	Normal
EOL class	10 A, 10, 20, 30	10
EOL dual class	10 A, 10, 20, 30	20
EOL operation	Off, Stop-Manual, Stop-Automatic, Indication	Stop-Manual
Locked rotor operation	Off, Stop-Manual, Stop-Automatic, Indication	Off
Current underload operation	Off, Stop-Manual, Stop-Automatic, Indication	Off
Over voltage operation	Off, Stop-Manual, Stop-Automatic, Indication	Off
Under voltage operation	Off, Stop-Manual, Stop-Automatic, Indication	Off
Phase reversal operation	Off, Stop-Manual, Stop-Automatic, Indication	Off
By-pass open operation	Off, Stop-Manual, Stop-Automatic, Indication	Off
Earth fault trip time	0,1s ... 1,0s	0,5s
Earth fault operation	Off, Stop-Manual, Stop-Automatic, Indication	Off
Faulty connection operation	Off, Stop-Manual, Stop-Automatic, Indication	Off
Warnings		
Parameter name	Setting range	Default value
EOL level	40 ... 99%	90%
EOL	On/Off	Off
Locked rotor	On/Off	Off
Thyristor overload	On/Off	Off
Current underload	On/Off	Off
Over voltage	On/Off	Off
Under voltage	On/Off	Off
EOL time-to-trip	On/Off	Off
THD(U) level	1...10%	10%
THD(U)	On/Off	Off
Number of starts limit	1 ... 65535	65535
Number of starts	On/Off	Off
Short circuit	On/Off	Off

7 Troubleshooting

Depending on PSTX Softstarter configuration, different events may be signalled on the display. See Event list Table 7.1.

	Table 7.1: Event list	Description
Protections	EOL protection	The motor has been overloaded because of too high current over a certain time. Check starting conditions and EOL settings.
	Locked rotor protection	The motor is running stiff. A damaged bearing or a stucked load could be possible causes. Check the load and the motor.
	Phase reversal protection	The phase sequence is not correct. Change the phase sequence on the line side to L1-L2-L3.
	Current imbalance protection	Current imbalance between the phases. Restart the motor and check the main currents and voltage.
	Over voltage protection	The main voltage is too high. Check the main voltage.
	Under voltage protection	The main voltage is too low. Check the main voltage.
	Earth fault protection	Equipment protection. In a symmetrical three phase system, the sum of the instantaneous line currents is equal to zero. Earth fault indicates if the sum differs more than a settable value. This can indicate a serious condition of the motor.
	Voltage imbalance protection	Voltage imbalance between the phases. Check the main voltage and restart the motor.
	Voltage outputs protection	The 24V voltage outputs has been overloaded or shorted. Check the connections
	External thermal sensor - PT100 protection	The external thermal sensor has detected a temperature higher than the trip level. Check the root cause of the over heating.
	External thermal sensor - PTC protection	The external thermal sensor has detected a temperature higher than the trip level. Check the root cause of the over heating.
	Power factor underload protection	The power factor has fallen below the normal level.
	Current underload protection	The motor current has fallen below the settable value. Check that the motor current parameter (Ie) is set correctly.
	Customer defined protection	Programmable digital input can be used in combination with external device/sensor to provide to the customer the possibility of handling own defined protection.
	Too long current limit protection	The time at current limit has exceeded the set value. The starting condition is too heavy for the set current limit. Check starting conditions and parameters.
	By-pass open protection	By pass contactor or relay does not close when reached TOR. Contact ABB sales office for service.
	Fieldbus failure protection	There is a communication disturbance between the softstarter and PLC.
	Extension IO failure protection	There is communication disturbance between the softstarter and the extension I/O module.
	HMI failure protection	There is communication disturbance between the softstarter and the HMI.

Faults	Phase loss fault	Voltage to one or more phases missing. Check that the mains are connected and that no line contactor or breaker is open.
	High current fault	A fault current, higher than 8 times the softstarter rated current, has occurred. Check the circuits including the motor for any insulation fault phase to phase or earth fault.
	Low supply voltage fault	Too low control supply voltage on terminals 1 and 2. Check for voltage dips or interruptions.
	Bad network fault	Excessive disturbances in the operational supplying network. Check for harmonics or frequency disturbance in the supply network.
	Thyristor overload fault	The thyristors are overheated. Check the starting conditions and the fans. Increase current limit if needed. Let the thyristors cool down before restart.
	Short circuit fault	A thyristor is shorted. Contact ABB sales office for service.
	Shunt fault	The softstarter cannot stop the motor due to internal short circuit. Contact ABB sales office for service.
Warnings	Current imbalance warning	Current imbalance between the phases has exceeded. Restart the motor and check the main currents and voltage.
	Over voltage warning	The main voltage has exceeded the warning level. Check the main voltage.
	Under voltage warning	The main voltage has fallen below the warning level. Check the main voltage.
	EOL time-to-trip warning	The predicted time before EOL trip has fallen below the warning level.
	EOL warning	The calculated motor temperature has exceeded the warning level.
	THD(U) warning	THD has exceeded the warning level. Check the quality of the network.
	Voltage imbalance warning	Voltage imbalance between the phases has exceeded the warning level. Check the main voltage.
	Power factor underload warning	The power factor has fallen below the warning level.
	Current underload warning	The motor current has fallen below the warning level. Check that the motor current parameter (Ie) is set correctly.
	Fan failure warning	The fans are not working properly. Risk of overheating. Contact ABB sales office for service.
	Locked rotor warning	The motorcurrent has exceeded the warning level. The motor is running stiff. A damaged bearing or a stucked load could be possible causes. Check the load and the motor.
	Thyristor overload warning	The calculated thyristor temperature has exceeded the warning level. Check the starting conditions and the fans. Increase current limit if needed.
	Short circuit warning	There is an internal short circuit and the softstarter is running in limp mode. Contact ABB sales office for service.