Installation and Commissioning Manual
PST30...PSTB1050

1 General

This is the Installation and commissioning manual for Softstarters PST30...PSTB1050 based on software version CU 05.02.xx (see STATUS INFORMATION menu)

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This document has been carefully checked. If the user nevertheless detects any errors, he is kindly asked to notify us as soon as possible.

The data contained in this manual is intended solely for the product description and is not to be deemed to be a statement of guaranteed properties. In the interests of our customers, we constantly seek to ensure that our products are developed to the latest technological standards.

As a result, there may be some differences between the softstarter and the information in this manual.

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2 Safety

This chapter describes warning and information signs used in this manual, which the user should pay attention to.
The softstarter shall be installed by authorized personnel only.
This manual is a part of the softstarter and should always be accessible to personnel working with this product.
The manual shall always be read through before performing any installation or commissioning tasks.

3 Safety signs

3.1 Use of Caution, Warning, and Information

Caution!
Caution icon indicates the presence of a hazard which could result in personal injury.

Warning!
Warning icon indicates the presence of a hazard which could result in corruption of software or damage to equipment/property.

Information sign alerts the reader to pertinent facts and conditions.
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Chapter 1  Introduction

1:1  About the complete set of documentation for a softstarter

For the softstarter, the following documents are available:

PST30...PSTB1050 Softstarters
Installation and Commissioning Manual
Document ID: 1SFC132003M0201
1SFC132003M2001 (Chinese)
1SFC132003M3101 (Dutch)
1SFC132003M1801 (Finnish)
1SFC132003M0301 (French)
1SFC132003M0101 (German)
1SFC132003M0901 (Italian)
1SFC132003M4001 (Polish)
1SFC132003M1601 (Portuguese)
1SFC132003M1101 (Russian)
1SFC132003M0701 (Spanish)
1SFC132003M3401 (Swedish)
1SFC132003M6501 (Thai)
1SFC132003M1901 (Turkish)
1SFC132003M2201 (US version)

Catalog Softstarters
Document ID: 1SFC132004C0201

For other documents related to the PST Softstarters, see home page www.abb.com/lowvoltage

1:2  About the installation and commissioning manual

This manual contains instructions on how to install and commission the softstarter. The manual covers procedures for mechanical and electrical installation, and installation of communication devices. It also covers energizing, setting, and configuration and verifying settings.
For quickest possible start read Chapter 2 “Quickstart”.

1:2.1  Intended audiences

1:2.1.1 General

The installation and commissioning manual is intended for the installation, commissioning, and maintenance personnel responsible for putting the softstarter into normal service and out of service.
1:2.1.2 Requirements

The installation personnel must have a basic knowledge in handling electric equipment. The commissioning and maintenance personnel must be well experienced in using this kind of equipment.

1:2.2 Chapters included

- **Introduction** introduces the reader to this manual.
- **Quickstart** contains information on how to, in the quickest way, install the softstarter and put it into operation. This chapter is intended for the experienced user.
- **Description** describes the softstarter in general, its functions and specifications.
- **Mounting** contains information on receiving, unpacking and mounting the softstarter.
- **Connection** contains instructions on how to make the electrical connections as well as connections for communication devices.
- **Human-Machine Interface** describes the local Human-Machine Interface, how it works, and what it contains.
- **Settings and configuration** describes all possible settings and how to navigate in the menu system.
- **Fieldbus communication** describes how to install and set up the fieldbus communication.
- **Maintenance** describes what maintenance is needed.
- **Functions** describes all functions included in the softstarter, as well as the available minimum and maximum values and default values used.
- **Trouble shooting** contains instructions on how to quickly find and correct the most common faults.
- **Diagrams** contain a number of electrical diagrams for the softstarter itself, and also some typical application diagrams.

1:2.3 Revision notes

Please check home page [www.abb.com/lowvoltage](http://www.abb.com/lowvoltage) for latest information on revisions.
1:2.4 Acronyms and abbreviations

The following acronyms and abbreviations are used in this manual.

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<tr>
<th>Acronym/abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BP</td>
<td>By-pass</td>
</tr>
<tr>
<td>DOL</td>
<td>Direct-on-line</td>
</tr>
<tr>
<td>FB</td>
<td>Fieldbus</td>
</tr>
<tr>
<td>FBP</td>
<td>Fieldbusplug</td>
</tr>
<tr>
<td>HMI</td>
<td>Human-Machine Interface</td>
</tr>
<tr>
<td>IT</td>
<td>Information Technology</td>
</tr>
<tr>
<td>LCD</td>
<td>Liquid Crystal Display</td>
</tr>
<tr>
<td>LED</td>
<td>Light Emitting Diode</td>
</tr>
<tr>
<td>PCB</td>
<td>Printed Circuit Board</td>
</tr>
<tr>
<td>PLC</td>
<td>Programmable Logic Controller</td>
</tr>
<tr>
<td>PTC</td>
<td>Positive Temperature Coefficient</td>
</tr>
<tr>
<td>SC</td>
<td>Short Circuit</td>
</tr>
<tr>
<td>SCR</td>
<td>Silicon Controlled Rectifier</td>
</tr>
<tr>
<td>TOR</td>
<td>Top Of Ramp (full voltage)</td>
</tr>
</tbody>
</table>
Chapter 2  Quickstart

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Chapter 2 Quickstart

This chapter is a short guide to how to connect, do the configuration and start the soft starter in the easiest way.

**Warning!**

Mounting, electrical connection and settings of the soft starter shall be made in accordance with existing laws and regulations and be performed by authorized personnel. Do not change any parameters in the Service Settings menu.

### 2:1 Connection

1. Mount the soft starter according to Chapter 4 “Mounting”.
2. Be aware of the ambient temperature. Derating is required above 40 °C (104 °F).
3. Connect the main circuit: terminals 1L1 - 3L2 - 5L3 to the line side and terminals 2T1 - 4T2 - 6T3 to the motor side.
4. Connect the supply voltage: terminal 1 and 2 (100-250V 50/60Hz).
5. Connect the functional ground: terminal 3.
6. Connect the start/stop circuits: terminal 4, 5, 8, 9, and 10 according to the diagram, with 24V DC.

**Warning!**

Terminal 4, 5, 6, 7, 8, 9, 10, and 11 should be connected using 24V DC only. Other voltages may damage the soft starter and the warranty may no longer be valid.

7. Check that the main and supply voltage corresponds to the soft starter ratings.
8. Switch on the supply voltage.
9. The green "Power on" LED is on and the LCD shall appear as in Figure 3.


**2:2 Configuration**

1. Enter the Application Setting by pressing left selection key twice. Press *Select* using the left selection key. Figure 4.

2. Select the appropriate type of load using navigation keys. Figure 5.

3. Press *Store Set* and *Next* to continue or *Back* to previous parameter using the selection keys. Figure 6.

4. Set the Setting Ie using the navigation keys. In Line connected = rated motor current inside Delta connected = 58% (1/√3) of the rated motor Icurrent. Figure 7.

5. Press *Store* and *Next* to continue or *Back* to previous parameter using the selection keys. Figure 8.

6. Set the required overload class using the navigation keys. Figure 9.

7. Press *Store* and *Next* to continue or *Back* to previous parameter using the selection keys. Figure 10.

8. If an external by-pass contactor is used set *Ext ByPass* to *Yes* using the navigation keys. (PST30...300 only). Figure 11.

9. Press *Store* and *Next* to continue or *Back* to return to previous parameter using the selection keys. Figure 12.

10. Select *Yes* if ready or *Tune Set* if start/stop mode, ramp types, initial/end voltage, current limits etc. needs to be adjusted using selection keys. Figure 13.

11. To change presentation language, see section 7:2.5.

**2:3 Start of the motor**

1. Switch on the main voltage.

2. Give start command to the softstarter. (To start the softstarter from the keypad, enter the LOCAL CONTROL menu, select Start/Stop, and press Start. The motor must be stopped before leaving this menu.)
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Chapter 3  Description

This chapter describes the softstarter in general, specifications as well as available accessories and spare parts.

3:1  Overview

The PST softstarter is a microprocessor-based softstarter designed with the latest technology for soft start and soft stop of squirrel cage motors. The softstarter has several advanced motor protection features as standard.

The softstarter is designed to be used with or without a by-pass contactor except for the larger sizes, PSTB370...1050 where the by-pass contactor is integrated. In an emergency case, it is possible to start the motor DOL with this contactor (mind the ratings).

The keypad on the front is designed to be as user-friendly as possible, with a clear text display. It is possible to choose between 13 user languages.

The softstarter can be controlled in four ways:

- Hardware inputs control
- Keypad control (local)
- Fieldbus communication interface
- External keypad (option)

The integrated fans for cooling are operated only during ramping (start/stop) and when the temperature of the heat sink is too high. The temperature is monitored by a thermistor.

Only one type of control method can be enabled simultaneously. Default selection is hardware inputs control.

Keypad control has the highest priority and overrides the other control methods.
Chapter 3
Description

3:2 Functions

The PST softstarter has several integrated protection and warning functions. Almost any type of fault can also be detected and displayed. All available protections, warnings, and fault indications are listed below.

Start/Stop functions

- Start ramp
- Stop ramp (soft stop)
- Initial voltage
- End voltage
- Step down voltage
- Current limit
- Kick Start
- Extended start range
- Extended stop range
- Sequence start
- Torque control

Protection functions

- Motor overload protection
- Locked rotor protection
- Motor underload protection
- High current protection
- Phase imbalance protection
- Phase reversal protection
- Thyristor overload protection
- PTC input for motor protection

Warning functions

- High current warning
- Low current warning
- Motor overload warning
- Thyristor overload warning
Fault Supervision functions

- Phase loss
- Fieldbus communication
- Frequency out of range
- Heat sink over-temperature
- Thyristor short circuit
- By-pass doesn’t open
- By-pass doesn’t close
- Connection fault
- Non conducting thyristor
- Line side fault
- Kick-current fault
- Internal softstarter fault

Other functions

- Jog
- Real time clock
- Event log
- Keypad password
3:3 Markings and connections

Figure 1: Markings and connections
3:4 Type designation

PSTB370-600-70

Supply Voltage
70 = 100 - 250 V 50/60 Hz

Main Voltage
600 = 208 - 600V 50/60 Hz
690 = 400 - 690V 50/60 Hz

Current rating
370 = 370A
720 = 720A etc.

By-pass contactor
B = integrated
(No marking = non integrated)

Softstarter range

3:5 Industrial IT

Thanks to ABB's broad program of product standardization, today's Industrial IT components are - whether they are products or systems, hardware or software - the building blocks of larger solutions, incorporating functionalities that will allow seamless interactions in real-time automation and information systems.

At the product level, ABB's Industrial IT enabled symbol ensures that all the products can intercorporate perfectly. All product information pertaining to these products is available in electronic format, based on Aspect Object™ technology. The Industrial IT commitment from ABB ensures that every product is equipped with the tools necessary to install, operate, and maintain it efficiently throughout the product's life cycle.

The PST softstarters is an Industrial IT enabled product. Documentation such as brochures, catalogs, certificates, and drawings included can be found at www.abb.com/lowvoltage.
3:6 Environmental influence

The product is designed to minimize the environmental affects during manufacturing and use of the product. Most of the materials used, are of recycle type and shall be handled and recycled according to existing laws.

Further information regarding used material and recycling of the product can be found at:

www.abb.com/lowvoltage

3:7 Specifications

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
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<td>Degree of protection (Main circuit)</td>
<td>IP 10 for PST30...72</td>
</tr>
<tr>
<td></td>
<td>IP 00 for PST85...1050</td>
</tr>
<tr>
<td>Operating position</td>
<td>Vertical at ± 10°</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>Storage: -25 °C to +70 °C (-13 °F to 158 °F)</td>
</tr>
<tr>
<td></td>
<td>Operation: 0 °C to +40 °C (32 °F to 104 °F)</td>
</tr>
<tr>
<td></td>
<td>without derating</td>
</tr>
<tr>
<td></td>
<td>+40 °C to +50 °C (104 °F to 122 °F) with derating 0.8% / °C (0.8%/ 33.8°F)</td>
</tr>
<tr>
<td>Altitude</td>
<td>1000 m (3281 ft.) above sea level without derating</td>
</tr>
<tr>
<td></td>
<td>1000 - 4000 m (3281 - 13123 ft.) with derating 0.007% /m</td>
</tr>
<tr>
<td>Pollution degree</td>
<td>3</td>
</tr>
<tr>
<td>Relative humidity</td>
<td>5 - 95% (non condensing)</td>
</tr>
<tr>
<td>Standards</td>
<td>IEC 60947-1</td>
</tr>
<tr>
<td></td>
<td>IEC 60947-4-2</td>
</tr>
<tr>
<td></td>
<td>EN 60947-1</td>
</tr>
<tr>
<td></td>
<td>EN 60947-4-2</td>
</tr>
<tr>
<td>Standards UL</td>
<td>UL508</td>
</tr>
<tr>
<td>PTC input</td>
<td>IEC 60947-8 Mark A detectors</td>
</tr>
<tr>
<td></td>
<td>DIN 44081 and DIN 44082</td>
</tr>
<tr>
<td>Marine approvals</td>
<td>Contact your ABB sales office</td>
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3:8 Technical data

3:8.1 General

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<th>General data</th>
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</tr>
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<tbody>
<tr>
<td>Rated insulation voltage, $U_i$</td>
<td>690 V</td>
</tr>
<tr>
<td>Rated operational voltage, $U_e$</td>
<td>208 - 600 V / 400 - 690 V</td>
</tr>
<tr>
<td>Rated supply voltage, $U_s$</td>
<td>100 - 250 V 50/60 Hz</td>
</tr>
<tr>
<td>Rated frequency</td>
<td>50 / 60 Hz</td>
</tr>
<tr>
<td>Voltage tolerances</td>
<td>+10% to -15%</td>
</tr>
<tr>
<td>Frequency tolerances</td>
<td>± 5%</td>
</tr>
<tr>
<td>Rated impulse withstand voltage</td>
<td>2 kV</td>
</tr>
<tr>
<td>Number of controlled phases</td>
<td>3</td>
</tr>
<tr>
<td>Programmable inputs</td>
<td>24 V DC, 10mA</td>
</tr>
<tr>
<td>Output relays</td>
<td>250 V AC, $I_{th} = 5$ A, $I_{e} = 1.5$ A (AC-15)</td>
</tr>
<tr>
<td>Back-up battery D20mm</td>
<td>Lithium 3V CR2032</td>
</tr>
<tr>
<td>PTC input</td>
<td>2825 ohm ± 20% switch off resistance 1200 ohm ± 20% switch on resistance</td>
</tr>
<tr>
<td>Cooling system</td>
<td>Fan</td>
</tr>
<tr>
<td>Recommended fuse supply circuit</td>
<td>6A Delayed MCB use C characteristics</td>
</tr>
<tr>
<td>Service factor</td>
<td>115% (100% for PSTB1050)</td>
</tr>
<tr>
<td>Communication protocols</td>
<td>AS-Interface / DeviceNet / Profibus DP / Modbus</td>
</tr>
</tbody>
</table>

3:8.2 Semi-conductor fuses

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<th>Bussmann fuses</th>
<th>Holders</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>Type</td>
</tr>
<tr>
<td>PST30</td>
<td>80</td>
<td>170M1366</td>
</tr>
<tr>
<td>PST37</td>
<td>125</td>
<td>170M1368</td>
</tr>
<tr>
<td>PST44</td>
<td>160</td>
<td>170M1369</td>
</tr>
<tr>
<td>PST50</td>
<td>160</td>
<td>170M1369</td>
</tr>
<tr>
<td>PST60</td>
<td>200</td>
<td>170M1370</td>
</tr>
<tr>
<td>PST72</td>
<td>250</td>
<td>170M1371</td>
</tr>
<tr>
<td>PST85</td>
<td>315</td>
<td>170M1372</td>
</tr>
<tr>
<td>PST105</td>
<td>400</td>
<td>170M3019</td>
</tr>
<tr>
<td>PST142</td>
<td>450</td>
<td>170M3020</td>
</tr>
<tr>
<td>PST175</td>
<td>500</td>
<td>170M3021</td>
</tr>
<tr>
<td>PST210</td>
<td>630</td>
<td>170M5012</td>
</tr>
<tr>
<td>PST250</td>
<td>700</td>
<td>170M5013</td>
</tr>
<tr>
<td>PST300</td>
<td>900</td>
<td>170M5015</td>
</tr>
<tr>
<td>PSTB370</td>
<td>700</td>
<td>170M5013</td>
</tr>
</tbody>
</table>
### 3:8.3 Softstarter types

<table>
<thead>
<tr>
<th>Softstarter type, 600 V and 690 V</th>
<th>Bussmann fuses</th>
<th>Holders</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A Type</td>
<td></td>
</tr>
<tr>
<td>PSTB470</td>
<td>900 170M5015</td>
<td>170H3004</td>
</tr>
<tr>
<td>PSTB570</td>
<td>900 170M5015</td>
<td>170H3004</td>
</tr>
<tr>
<td>PSTB720</td>
<td>1250 170M5018</td>
<td>170H3004</td>
</tr>
<tr>
<td>PSTB840</td>
<td>1500 170M6018</td>
<td>170H3004</td>
</tr>
<tr>
<td>PSTB1050 xxx-600-70</td>
<td>1800 170M6020</td>
<td>170H3004</td>
</tr>
<tr>
<td>PSTB1050 xxx-690-70</td>
<td>1800 170M6019</td>
<td>170H3004</td>
</tr>
</tbody>
</table>

#### Type PST30 | PST37 | PST44 | PST50
---|---|---|---
Connection type | Line Delta | Line Delta | Line Delta | Line Delta
Rated current $I_e$ (A) | 30 52 | 37 64 | 44 76 | 50 85
Motor size 380 - 415V (kW) | 15 30 | 18.5 30 | 22 37 | 25 45
Motor size 480V (hp) | 20 30 | 25 40 | 30 50 | 40 60
Motor size 600V (hp) | 25 40 | 30 50 | 40 60 | 50 75
AC-3 rating built in by-pass 400V (A) | - | - | - | -
Power loss at rated current (W) | 100 | 120 | 140 | 160
Power supply requirements (VA) | 5 | 5 | 5 | 5

#### Type PST60 | PST72 | PST85 | PST105
---|---|---|---
Connection type | Line Delta | Line Delta | Line Delta | Line Delta
Rated current $I_e$ (A) | 60 105 | 72 124 | 85 147 | 105 181
Motor size 380 - 415V (kW) | 30 55 | 37 59 | 45 75 | 55 90
Motor size 480V (hp) | (40) (60) | 50 75 | 60 100 | 75 125
Motor size 600V (hp) | (50) (75) | 60 100 | 75 125 | 100 150
AC-3 rating built in by-pass 400V (A) | - | - | - | -
Power loss at rated current (W) | 190 | 230 | 270 | 325
Power supply requirements (VA) | 5 | 5 | 10 | 10
<table>
<thead>
<tr>
<th>Type</th>
<th>PST142</th>
<th>PST175</th>
<th>PST210</th>
<th>PST250</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connection type</td>
<td>Line</td>
<td>Delta</td>
<td>Line</td>
<td>Delta</td>
</tr>
<tr>
<td>Rated current $I_e$ (A)</td>
<td>142</td>
<td>245</td>
<td>175</td>
<td>300</td>
</tr>
<tr>
<td>Motor size 380 - 415V (kW)</td>
<td>75</td>
<td>132</td>
<td>90</td>
<td>160</td>
</tr>
<tr>
<td>Motor size 480V (hp)</td>
<td>100</td>
<td>150</td>
<td>125</td>
<td>200</td>
</tr>
<tr>
<td>Motor size 600V (hp)</td>
<td>125</td>
<td>200</td>
<td>150</td>
<td>250</td>
</tr>
<tr>
<td>AC-3 rating built in by-pass 400V (A)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Power loss at rated current (W)</td>
<td>435</td>
<td>540</td>
<td>645</td>
<td>765</td>
</tr>
<tr>
<td>Power supply requirements (VA)</td>
<td>10</td>
<td>15</td>
<td>15</td>
<td>15</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type</th>
<th>PST300</th>
<th>PSTB370</th>
<th>PSTB470</th>
<th>PSTB570</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connection type</td>
<td>Line</td>
<td>Delta</td>
<td>Line</td>
<td>Delta</td>
</tr>
<tr>
<td>Rated current $I_e$ (A)</td>
<td>300</td>
<td>515</td>
<td>370</td>
<td>640</td>
</tr>
<tr>
<td>Motor size 380 - 415V (kW)</td>
<td>160</td>
<td>257</td>
<td>200</td>
<td>355</td>
</tr>
<tr>
<td>Motor size 480V (hp)</td>
<td>250</td>
<td>400</td>
<td>300</td>
<td>500</td>
</tr>
<tr>
<td>Motor size 600V (hp)</td>
<td>300</td>
<td>500</td>
<td>350</td>
<td>600</td>
</tr>
<tr>
<td>Contactor type</td>
<td>-</td>
<td>AF300</td>
<td>AF300</td>
<td>AF460</td>
</tr>
<tr>
<td>AC-3 rating built in by-pass 400V (A)</td>
<td>-</td>
<td>305</td>
<td>305</td>
<td>460</td>
</tr>
<tr>
<td>Power loss at rated current (W)</td>
<td>920</td>
<td>90</td>
<td>110</td>
<td>105</td>
</tr>
<tr>
<td>Power supply requirements (VA) / pull in (VA)</td>
<td>15</td>
<td>20/480</td>
<td>20/480</td>
<td>25/900</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type</th>
<th>PSTB720</th>
<th>PSTB840</th>
<th>PSTB1050</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connection type</td>
<td>Line</td>
<td>Delta</td>
<td>Line</td>
</tr>
<tr>
<td>Rated current $I_e$ (A)</td>
<td>720</td>
<td>1247</td>
<td>840</td>
</tr>
<tr>
<td>Motor size 380 - 415V (kW)</td>
<td>400</td>
<td>670</td>
<td>450</td>
</tr>
<tr>
<td>Motor size 480V (hp)</td>
<td>600</td>
<td>1000</td>
<td>700</td>
</tr>
<tr>
<td>Motor size 600V (hp)</td>
<td>700</td>
<td>1200</td>
<td>800</td>
</tr>
<tr>
<td>Contactor type</td>
<td>AF580</td>
<td>AF750</td>
<td>AF750</td>
</tr>
<tr>
<td>AC-3 rating built in by-pass 400V (A)</td>
<td>580</td>
<td>750</td>
<td>750</td>
</tr>
<tr>
<td>Power loss at rated current (W)</td>
<td>110</td>
<td>170</td>
<td>170</td>
</tr>
<tr>
<td>Power supply requirements (VA) / pull in (VA)</td>
<td>25/860</td>
<td>25/860</td>
<td>25/860</td>
</tr>
</tbody>
</table>
3:8.4 Weights

<table>
<thead>
<tr>
<th>Type</th>
<th>Weight in kg</th>
<th>Weight in lbs</th>
</tr>
</thead>
<tbody>
<tr>
<td>PST30...50</td>
<td>4.8</td>
<td>10.6</td>
</tr>
<tr>
<td>PST60...72</td>
<td>5.0</td>
<td>11.0</td>
</tr>
<tr>
<td>PST85</td>
<td>11.2</td>
<td>24.7</td>
</tr>
<tr>
<td>PST105...142</td>
<td>13.0</td>
<td>28.7</td>
</tr>
<tr>
<td>PST175...210</td>
<td>21.5</td>
<td>47.4</td>
</tr>
<tr>
<td>PST250...300</td>
<td>23.0</td>
<td>50.7</td>
</tr>
<tr>
<td>PST370...470</td>
<td>31.0</td>
<td>68.3</td>
</tr>
<tr>
<td>PSTB570</td>
<td>52.0</td>
<td>114.6</td>
</tr>
<tr>
<td>PSTB720</td>
<td>55.0</td>
<td>121.3</td>
</tr>
<tr>
<td>PSTB840...1050</td>
<td>60.0</td>
<td>132.3</td>
</tr>
</tbody>
</table>

3:8.5 UL information

Equipment suitable for use in a circuit with maximum available fault current as shown when protected by devices indicated.

Suitable for use on a circuit capable of delivering not more than 1) rms symmetrical Amperes, 2) Volts maximum when protected by 3) class fuse or by a circuit breaker having an interrupting rating not less than 4) rms symmetrical Amperes, 2) Volts maximum.

Softstarter short circuit rating

<table>
<thead>
<tr>
<th>Model</th>
<th>Rating (kA) 1)</th>
<th>Max V 2)</th>
<th>Fuse (A) 3)</th>
<th>MCCB (A) 4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PST30...142</td>
<td>10</td>
<td>600</td>
<td>Any UL-listed</td>
<td>Any UL-listed</td>
</tr>
<tr>
<td>PSTT75...300</td>
<td>18</td>
<td>600</td>
<td>Any UL-listed</td>
<td>Any UL-listed</td>
</tr>
<tr>
<td>PSTB370...570</td>
<td>30</td>
<td>600</td>
<td>Any UL-listed</td>
<td>Any UL-listed</td>
</tr>
<tr>
<td>PSTB720</td>
<td>42</td>
<td>600</td>
<td>1200/L</td>
<td>1200</td>
</tr>
<tr>
<td>PSTB840</td>
<td>42</td>
<td>600</td>
<td>1200/L</td>
<td>--</td>
</tr>
<tr>
<td>PSTB1050</td>
<td>85</td>
<td>480</td>
<td>--</td>
<td>1200</td>
</tr>
<tr>
<td>PSTB1050</td>
<td>85</td>
<td>600</td>
<td>1200/L</td>
<td>--</td>
</tr>
<tr>
<td>PSTB1050</td>
<td>42</td>
<td>600</td>
<td>--</td>
<td>1200</td>
</tr>
<tr>
<td>PST30...300</td>
<td>65</td>
<td>600</td>
<td>TYPOWER ZILO **)</td>
<td>--</td>
</tr>
<tr>
<td>PST30...1050</td>
<td>65</td>
<td>600</td>
<td>TYPOWER ZILO **)</td>
<td>--</td>
</tr>
</tbody>
</table>

**) Fuses size per softstarter - please see table in Chapter 3.8.2 - Semiconductor fuses.
3:8.6 Dimensions

PST30...72

![Dimensions PST30...72 (mm) (1 mm = 0.0394 in)]

PST85...142

![Dimensions PST85...142 (mm) (1 mm = 0.0394 in)]
Chapter 3
Description

PST85...142 with marine pack

Figure 4: Dimensions PST85..142 with marine kit (mm) (1 mm = 0.0394 in)

PST175...300

Figure 5: Dimensions PST175..300 (mm) (1 mm = 0.0394 in)
Figure 6: Dimensions PSTB370...470 (mm) (1 mm = 0.0394 in)

Figure 7: Dimensions PSTB570...1050 (mm) (1 mm = 0.0394 in)
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Mounting
Chapter 4  Mounting

This chapter describes instructions on how to receive the softstarter and how to mount it in a proper way.

4:1  Receiving, unpacking and checking

• Check that the package is turned with the correct side up, figure 1.
• Check for transport damages.
• Remove the transport casing.
• Visually inspect the softstarter.
• Check that the serial number corresponds with the delivery documents.
• Check that all items are included, according to the delivery note.
• Check the softstarter as well as the package. If you find any damages, please contact the transport company or the supplier immediately.

4:1.1  Intermediate storage

Until the softstarter is mounted it should be stored in its package.

4:2  Mounting

4:2.1  Handling when mounting

The softstarter is available in five physical sizes. The models PST30 to PST300 can be taken out of the packages and be mounted without lifting equipment. For mounting of models PSTB370 to PSTB1050, lifting equipment is recommended due to the weight. See Chapter 3 “Description”, for weights.

Warning!
Do not lift the softstarter in the connection bars, since it may cause damage to the product.
4:2.2 Requirements

See Chapter 3 “Description” for environmental requirements.

4:2.3 Minimum distance to wall/front

To have a suitable cooling, the softstarter has to be mounted vertically, and in such a way that the airways are not blocked, see figure 2.

Follow the minimum distances to wall/front, figure 2 and the table below.

*The values are minimum distances.*

<table>
<thead>
<tr>
<th>Softstarter type</th>
<th>A (mm)</th>
<th>B (mm)</th>
<th>C (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PST30...72</td>
<td>100</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>PST85...300</td>
<td>100</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>PST175...300</td>
<td>100</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>PSTB370...470</td>
<td>150</td>
<td>15</td>
<td>20</td>
</tr>
<tr>
<td>PSTB570...1050</td>
<td>150</td>
<td>15</td>
<td>20</td>
</tr>
</tbody>
</table>

(1mm = 0.0394 in)
4:2.4 Minimum enclosure sizes

In applications where the softstarter is installed in an enclosure, the following minimum enclosure sizes and fan capacities are recommended.

<table>
<thead>
<tr>
<th>Softstarter type</th>
<th>Minimum enclosure dimensions</th>
<th>Fan capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>PST30...72</td>
<td>300 400 250</td>
<td>42 m³/h</td>
</tr>
<tr>
<td>PST85...142</td>
<td>400 500 300</td>
<td>95 m³/h</td>
</tr>
<tr>
<td>PST175...300</td>
<td>500 600 300</td>
<td>210 m³/h</td>
</tr>
<tr>
<td>PSTB370...470</td>
<td>600 600 400</td>
<td>210 m³/h</td>
</tr>
<tr>
<td>PSTB570...1050</td>
<td>750 900 400</td>
<td>210 m³/h</td>
</tr>
</tbody>
</table>

(1mm = 0.0394 in)

Dimensions and drilling plan

See Chapter 3 “Description”.

4:2.5 Addings for marine applications

In order to be used in marine applications, the softstarter has to be installed in a sheet steel enclosure. For the allowed dimensions, see chapter 4:2.4.

For softstarters PST85...142 use the Marine kit 1SFA899004R1000.
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Chapter 5  Connection

This chapter describes the electrical connections as well as connections for communication devices that have to be made before you can use the softstarter.

5:1  General

Caution!
All wiring and connection must be carried out by a qualified electrician, and in accordance with installation standards and safety regulations.

For quickly minimized connection, see Chapter 2 “Quickstart”

5:2  Electrical connection

5:2.1  Main circuit

Softstarters PST30...PSTB1050 can be connected both “In Line”, see Figure 1, and “Inside Delta”, see Figure 2.

Figure 1: In Line connection

Figure 2: Inside Delta connection

Connect the line side to terminals 1L1, 3L2, 5L3.

Connect the motor to terminals 2T1, 4T2, 6T3 on the motor side.
The terminal marking is printed on the front label.
Tightening torques and cable thickness, see Figure 6.
When used for marine applications, please use standard installation cables with concentric conductors for earth. This earth conductor shall be 360 degree connected to earth in the cable glands or in the near of the gland.

**Warning!**

*Capacitors for power factor compensation are not allowed in between the softstarter and the motor, since this can cause current peaks which can burn the thyristors in the softstarter. If such capacitors are to be used, they should be connected on the line side of the softstarter.*

---

*Figure 3: Connection of line side and motor side*
5:2.1.1 External By-Pass contactor

An external by-pass contactor can be used for softstarters size PST30...300 (built in for size PSTB370...1050).

Connect the contactor to terminals B1, B2, and B3 on the line side and terminals 2T1, 4T2, and 6T3 on the motor side.

The terminal marking is printed on the front label.

If an external By-pass contactor is used an output relay should be configured as TOR and be connected to the contactor. The by-pass contactor is then activated when the voltage reaches 100% and the current has been below 1.2 x Ie continuously for 1 s or after a 3 s timeout.

Do not use terminals B1, B2 or B3 for the “Inside Delta” connection. The current measurement will be wrong.

5:2.1.2 Protective earthing

Softstarters type PST85...PSTB1050 should be earthed using the terminals as shown in Figure 5 (one connection is sufficient).

Warning!

Do not operate machine with the grounding wire disconnected.
Figure 6: Tightening torques and cable dimensions (1 mm = 0.0394 in)
5:2.2 Supply voltage and control circuit

When used for marine applications, and if feeding from the outside of the enclosure, then please use a standard cable for feeding the supply voltage and for the control circuit, with an auxiliary bare conductor (earth conductor) and make a 360 degree connection to earth in the glands, or close to the glands. As long as these cables / wires are only internal wiring, inside the enclosure, there is no need for the 360 degree earth connections / protections.

5:2.2.1 Supply voltage, terminals 1 and 2

Connect neutral and phase to terminal 1 and 2.

Check that you have the correct supply voltage $U_s$.

5:2.2.2 Earthing, terminal 3

Connect the cable to a earthing point close to the softstarter. The cable should be as short as possible. A suitable earthing point would be next to the softstarter on the mounting plate, see Figure 8. The mounting plate should also be earthed.

This is not a protective earth, it is a function earth. The earthing cable should be as short as possible. Maximum length 0.5 m.

Figure 7: Supply voltage

Figure 8: Function earth

Figure 9: Tightening torques and cable dimensions (1 mm=0.0394 in)
### 5:2.2.3 Start and Stop, terminals 4, 5, 8, 9, 10, 11

#### Internal control voltage

The softstarter has a built-in holding circuit which does not require any external power source for start and stop, see Figure 11. A conventional circuit with auxiliary relay is also possible, see Figure 12.

---

**Figure 10:** Terminals 4, 5, 8, 9, 10, 11

---

**Figure 11:** Holding circuit (pulse for start is enough)

---

**Figure 12:** Conventional circuit (maintained start signal required)

---

**Figure 13:** Tightening torques and cable dimensions (1 mm=0.0394 in)
External control voltage

The softstarter can, if required, also be used with an external 24 V DC source from a PLC or similar.

Connect the cables according to Figure 14 or Figure 15 depending on which type of control method is used.

**Warning!**

*Terminal 4, 5, 6, 7, 8, 9, 10, and 11 should be connected using 24V DC only. Other voltages may damage the softstarter and the warranty may no longer be valid.*
5:2.2.4 Programmable inputs, terminals 6 and 7

The softstarter has two programmable inputs.
In0, default reset event.
In1, default reset event.
See Chapter 7 “Settings and configuration” for programming.

1. Connect the cables according to Figure 18 or Figure 19 depending on whether internal or external source is used.

Warning!
Terminal 4, 5, 6, 7, 8, 9, 10, and 11 should be connected using 24V DC only. Other voltages may damage the softstarter and the warranty may no longer be valid.

Wiring for sequence start, see next page.

Figure 17: Terminals 6, 7

Figure 18: Internal control voltage

Figure 19: External control voltage

Figure 20: Tightening torques and cable dimensions (1 mm=0.0394 in)
Programmable inputs (Sequence start)

When sequence start is going to be used, the wiring should be according to Figure 21 or Figure 22.

The start command (terminal 5, 6, and 7) must be maintained during the complete start sequence and run otherwise a direct stop will be performed.

Soft stop can only be performed for the motor currently fed by the softstarter and will be achieved by open the Stop command (terminal 4).

![Figure 21: Internal control voltage](image1)

![Figure 22: External control voltage](image2)

![Figure 23: Tightening torques and cable dimensions (1 mm=0.0394 in)](image3)
5:2.2.5 Programmable output relay K4, terminals 12, 13, and 14

The output relay gives signal depending on the selected function.
Default: Run
See Chapter 7 “Settings and configuration” for programming.

1. Connect the cables to terminal 12, 13, and 14.

5:2.2.6 Programmable output relay K5, terminals 15, 16, and 17

The output relay gives signal depending on the selected function.
Default: Top of ramp
See Chapter 7 “Settings and configuration” for programming.

Connect the cables to terminal 15, 16, and 17.

Figure 24: Terminals 12, 13, 14

Figure 25: Terminals 15, 16, 17

Figure 26: Tightening torques and cable dimensions (1 mm = 0.0394 in)
5:2.2.7 Programmable output relay K6, terminals 18, 19, and 20

The output relay gives signal depending on the selected function.
Default: Event
See Chapter 7 “Settings and configuration” for programming.

1. Connect the cables to terminal 18, 19, and 20.

5:2.2.8 PTC input

If the motor is protected by PTC elements, the cables shall be connected to terminals 23 and 24, see Figure 28.
See Chapter 7 “Settings and configuration” for programming.

*The PTC input uses the same terminals as the Analog output and only one of these functions can be used at any given time.*

---

Figure 27: Terminals 18, 19, 20

Figure 28: PTC connection

Figure 29: Tightening torques and cable dimensions (1 mm=0.0394 in)
5:2.2.9 Analog output

If the analog output is used, the cables shall be connected to terminals 23 and 24, see Figure 30. See Chapter 7 "Settings and configuration" for programming.

The PTC input uses the same terminals as the Analog output and only one of these functions can be used at any given time.

5:2.3 Emergency closing of contactor
(PSTB370...1050 only)

If the softstarter for some reason malfunctions (shorted or non conducting thyristors, burnt PCB etc) it is possible to close the integrated by-pass contactor and start the motor using some other starting equipment. Manual closing of the contactor is done using terminals 30 to 33.

Figure 32 shows how terminals 30 to 33 are connected during normal operation. If there is a need for an emergency closing of the contactor, the two bridges between 30, 31 and 32, 33 should be removed and an external power source should be connected between terminals 31 and 32. See Figure 33. This will cause the by-pass contactor to close and it will be possible to start the motor using some other starting equipment, connected on the line side of the softstarter.

Figure 31: Tightening torques and cable dimensions (1 mm=0.0394 in)
Figure 32: Connection when the contactor is operated from the keypad (factory wiring)

Figure 33: Connection when the by-pass contactor is operated separately (emergency DOL)

Figure 34: Tightening torques and cable dimensions (1 mm=0.0394 in)
5:3 Connection of communication devices (optional)

5:3.1 Fieldbus communication

The fieldbus communication plug shall be connected to the communication interface on the front of the PST, see Figure 35.

Make sure that the plug is in correct position and tighten the screw with 0.8 Nm (7.1 lb in) and additional 1/4 turn.

For programming and other information, see Chapter 7 “Settings and configuration” and Chapter 8 “Fieldbus communication (option)”.

Figure 35: Fieldbus plug

Figure 36: Principle of a fieldbus network with PST softstarters connected
5:3.2 External keypad

An external keypad for door mounting can be connected to the softstarter. A 3-meter cable including both the serial communication and the power supply to the keypad makes the connection. The cable shall be connected to the external keypad connection at the bottom of the softstarter.

The external keypad can also be used for transferring parameters from one softstarter to another during commissioning (temporarily handheld). Note that IP66 cannot be achieved when the keypad is not mounted.

When the external keypad is used, both keypads will work in parallel but the softstarter keypad has always the highest priority if the keys on both units are pressed simultaneously.
Chapter 5
Connection

5:3.3 Transferring of parameters

To transfer(copy) parameters from one softstarter to another, connect the keypad to the chosen softstarter and follow the sequence below.

5:3.3.1 Uploading of parameters

Enter the menu Transfer par. Select To Keypad and confirm by pressing Select. A text Load to keypad will be displayed. Continue by pressing Execute and then Yes when the text Are you sure is displayed. Transfer OK will now be displayed if the transmission was successful, otherwise Transfer NOT OK.

Figure 39: Upload

5:3.3.2 Downloading of parameters

To download the parameters, connect the keypad to the chosen softstarter and select To Starter. A text Load to Start will be displayed. Continue by pressing Execute and then Yes when the text Are you sure is displayed. Transfer OK will now be displayed if the transmission was successful, otherwise Transfer NOT OK. Set the parameter Setting Ie and confirm by pressing Next.

Figure 40: Download

The parameters in the menu Service Settings will not be transferred.

How to operate the keypad, see Chapter 6 “Human-Machine Interface (HMI)".
### 5:3.3.3 Technical data

<table>
<thead>
<tr>
<th>General data</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Display</td>
<td>LCD type</td>
</tr>
<tr>
<td>Signal indication LEDs</td>
<td></td>
</tr>
<tr>
<td>Power on: Green</td>
<td></td>
</tr>
<tr>
<td>Protection: Yellow</td>
<td></td>
</tr>
<tr>
<td>Fault: Red</td>
<td></td>
</tr>
<tr>
<td>Ambient temperature</td>
<td></td>
</tr>
<tr>
<td>Storage: -25 °C to +70 °C (-13 °F to 158 °F)</td>
<td></td>
</tr>
<tr>
<td>Operation: 0 °C to +50 °C (32 °F to 122 °F)</td>
<td></td>
</tr>
<tr>
<td>Degree of protection</td>
<td>IP66</td>
</tr>
<tr>
<td>UL approval</td>
<td></td>
</tr>
<tr>
<td>Type 1</td>
<td></td>
</tr>
<tr>
<td>Type 4X Indoor</td>
<td></td>
</tr>
<tr>
<td>Type 12</td>
<td></td>
</tr>
<tr>
<td>Marine approvals</td>
<td></td>
</tr>
<tr>
<td>Contact your ABB sales office</td>
<td></td>
</tr>
</tbody>
</table>
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Chapter 6 Human-Machine Interface (HMI)

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Human-Machine Interface (HMI)
Chapter 6 Human-Machine Interface (HMI)

This chapter describes how the human-machine interface (keypad and display) works.

6:1 Overview

6:1.1 Application

The Human-Machine Interface is used for several purposes such as programming the softstarter, i.e. setting up inputs and outputs, protection functions, warning levels, fieldbus communication etc. The HMI is also used for monitoring, local control and status information of the softstarter.
6:1.2 Design

The HMI consists of:
- Status indication LED indicators
- LCD display
- Selection and Navigation keys

The LED indicators work as follows:

<table>
<thead>
<tr>
<th>LED</th>
<th>Color</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power on</td>
<td>Green</td>
<td>Supply voltage connected.</td>
</tr>
<tr>
<td>Fault</td>
<td>Red</td>
<td>Indicates faults.</td>
</tr>
<tr>
<td>Protection</td>
<td>Yellow</td>
<td>Indicates that protections are activated.</td>
</tr>
</tbody>
</table>

When Fault or Protection LED is activated, the LCD display displays the actual fault or protection.

The keypad is based on the same user concept as today’s mobile phones.
The LCD display contains two rows which allow 20 characters each.
On the top row various information is presented, depending on state. On the bottom row there are labels indicating which function the selection keys currently have.

A scrolling icon indicates what parameter or setting value is possible to change at the position.

The Selection keys normally have more than one function, such as selecting, changing and storing, depending on present dialogue, see text on the bottom row of the LCD display.

The Navigation keys are used for navigating in the menus to the desired setting.
When selecting from a list, the scrolling is done in a closed loop.
The functionality of the keypad is illustrated by the following example:

**Changing the Rated motor current (Setting Ie).**

1. You will find the setting as well as a short explanation and the path to it in Chapter 10 “Functions”.

**Path in menu:**
Menu/SETTINGS/Functional Settings/
Start/Stop/Setting Ie

2. The top level of the softstarter start menu looks as in figure 3. Press the left selection key to enter the menu. The display now appears as in figure 4.

3. Press the left selection key to select SETTINGS. The display appears as in figure 5.

4. Press the lower navigation key until the display appears as in figure 6.

5. Press the left selection key to select Functional settings. Press the left selection key to select Start/Stop, figure 7.

6. Press the left selection key to Change the Setting Ie setting, figure 8. The display now appears as in figure 9.

7. Use the navigation keys to set the rated current. If you want to quit, you select Cancel, using the right selection key. Or else, you store the new setting by selecting Store with the left selection key. The display should now appear as in figure 10.

8. Press the right selection key four times to return to top level.
6:1.3 Password

To lock the keypad from control and change of settings, a password can be set. When the keypad is locked, all menus are available but no changes can be done nor any actions can be taken.

6:1.3.1 Setting password

The password at delivery is always 1.

1. Press the upper navigation key once to enter the parameter Change Password.
2. Select Change Password, figure 11.
3. Set the new password (No or 1...255) using the navigation keys.
   Select Store and Next, figure 12 and figure 13.
   Select Back to return to top level.

6:1.3.2 Wrong password

If wrong password is set, the text “Wrong Password” will show up, figure 14.

A support code will be given, figure 15. The code can be ignored and an unlimited number of try-outs can be made. If you are unable to unlock the keypad, note the support code and contact your local ABB sales office.
6:1.4 Locking/unlocking the keypad

1. Press the upper navigation key twice to enter the parameter Keypad is, figure 16.

2. The keypad is unlocked if the display is indicating Active in the upper right corner.

3. Lock the keypad.

4. Select Lock. Enter the correct password. Select Enter. Keypad is now locked. Select Back to return to top level.

5. Unlock the keypad.

6. Select Unlock. Enter the correct password. Select Enter. The keypad is now active. Select Back to return to top level.
6:2 Menu tree

6:2.1 Overview

The menu tree includes menus for

- Settings
- Local Control
- Event Log
- Status information
- Reset events

Figure 18: Menu tree
6:2.2 Top level

Top Level contains general softstarter information, and the menus can be reached from here. The selections are presented one by one on the top row. Use navigation keys to present all selections. Press Select to enter a function. Press Back to return to previous state.

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Settings</td>
<td>Set up softstarter parameters.</td>
</tr>
<tr>
<td>Local Control</td>
<td>Control the softstarter.</td>
</tr>
<tr>
<td>Event Log</td>
<td>Present the Event Log, faults, protections, warnings.</td>
</tr>
<tr>
<td>Status Information</td>
<td>Present various information.</td>
</tr>
<tr>
<td>Reset Events</td>
<td>Reset of events.</td>
</tr>
</tbody>
</table>

6:2.3 Settings menu

The settings menu is used to set up the softstarter with parameters for the current application.

The types of settings are presented one by one on the top line. Use navigation keys to present all selections.

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application Setting</td>
<td>Use predefined parameters for type of applications.</td>
</tr>
<tr>
<td>Basic settings</td>
<td>The basic and most used settings.</td>
</tr>
<tr>
<td>Functional settings</td>
<td>Settings are arranged after functions.</td>
</tr>
<tr>
<td>Presentation settings</td>
<td>Language, date, time etc.</td>
</tr>
<tr>
<td>Service settings</td>
<td>Settings for use during service and repair.</td>
</tr>
<tr>
<td>All settings</td>
<td>A list with all possible settings.</td>
</tr>
<tr>
<td>Changed settings</td>
<td>A list with all changed settings.</td>
</tr>
<tr>
<td>Reset all settings</td>
<td>Reset all settings to factory default settings.</td>
</tr>
<tr>
<td>Operation Mode</td>
<td>Test mode for the softstarter.</td>
</tr>
</tbody>
</table>
6:2:4 Local Control menu

The Local Control menu is used to start or stop the motor from the keypad. When a type of local control is selected the softstarter can only be controlled by the keypad. The softstarter operation state (stopped/running) remains when selecting local control until it is changed there. Previous type of control is activated again when the local control is exited.

Three different selections are possible (see the table below). Press navigation keys to view different types of control.

The LOCAL CONTROL menu can not be entered if Sequence start is selected.

Once the motor has been started in this menu, it must first be stopped before you leave the menu. If the motor is already running when the menu is entered it is possible to leave immediately without stopping the motor.

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start/stop</td>
<td>To start and stop the motor with the keypad.</td>
</tr>
<tr>
<td>Jog</td>
<td>To run the motor as long as Jog is pressed.</td>
</tr>
<tr>
<td>DOL start</td>
<td>To start and stop the motor with the built-in by-pass contactor.</td>
</tr>
<tr>
<td>(PSTB370...PSTB1050 only)</td>
<td></td>
</tr>
</tbody>
</table>

6:2:4.1 Start/Stop the motor

Start

Enter the Start/Stop menu, figure 22. Select Start. The motor will now start and run according to the set parameters.

Stop

Select Stop. The motor will stop according to the set parameters. It is possible to press stop command during the start ramp if required.
6:2.4.2 Jog

Enter the Jog menu, figure 23. Select Jog. The motor will start and accelerate to rated speed according to the set parameters as long as the Jog command is activated. The motor stops immediately as soon as the command is released.

6:2.4.3 DOL start

(PSTB370...1050 only)

Start from the softstarter

If required, the motor can be started DOL (Direct On Line) with the integrated by-pass contactor.
Select the DOL start menu, figure 24. Select DOL start to close the integrated by-pass contactor. Select Stop to open the contactor. This menu is available only if the parameter Setting $I_e$ is equal or lower than the AC-3 rating of the by-pass contactor.

⚠️ Warning!

The rated motor current must never exceed the AC-3 rating of the integrated by-pass contactor. See Chapter 3 “Description” for details.
6:2.5 Event Log menu

The Event Log menu is used to check the event log in the softstarter. When entering this menu the 21 latest events in the log are presented, in chronological order with the latest event as No. 1, the second latest as No. 2 etc. The events are presented with “type of event”, date and time. Use navigation keys to view all entries in the event log.

6:2.6 Status Information menu

The Status Information menu is used to present various information.
The information is presented one by one on the top row. Use navigation keys to present all information.
Displayed phase currents L1, L2, and L3 are the delta currents if unit is connected inside delta, otherwise line current.

<table>
<thead>
<tr>
<th>Display text</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>Measured frequency.</td>
</tr>
<tr>
<td>Phase seq.</td>
<td>Phase sequence indication.</td>
</tr>
<tr>
<td>Connection</td>
<td>Type of connection, In Line/Inside Delta.</td>
</tr>
<tr>
<td>Phase L1</td>
<td>Phase current L1.</td>
</tr>
<tr>
<td>Phase L2</td>
<td>Phase current L2.</td>
</tr>
<tr>
<td>Phase L3</td>
<td>Phase current L3.</td>
</tr>
<tr>
<td>Line Voltage</td>
<td>The incoming line voltage [U].</td>
</tr>
<tr>
<td>cosPhi</td>
<td>Power factor.</td>
</tr>
<tr>
<td>P kW</td>
<td>Active power [kW].</td>
</tr>
<tr>
<td>P hp</td>
<td>Active power [hp]</td>
</tr>
<tr>
<td>Q kVAR</td>
<td>Reactive power [kVAR]</td>
</tr>
<tr>
<td>S kVA</td>
<td>Apparent power [kVA]</td>
</tr>
<tr>
<td>Run Time</td>
<td>Total run time of the motor.</td>
</tr>
<tr>
<td>No. Of Starts</td>
<td>Counted number of starts.</td>
</tr>
<tr>
<td>SW Ver. CU</td>
<td>Software version CU.</td>
</tr>
<tr>
<td>SW Ver. FU</td>
<td>Software version FU.</td>
</tr>
<tr>
<td>SW Ver. KP¹</td>
<td>Software version Ext. keypad.</td>
</tr>
<tr>
<td>DB version</td>
<td>Database version</td>
</tr>
<tr>
<td>MAC Address</td>
<td>Internal addressing.</td>
</tr>
<tr>
<td>LV Board No</td>
<td>Serial No of the LV PCB.</td>
</tr>
</tbody>
</table>

¹ only if connected
6:2.7 Reset Events menu

The Reset Events menu is entered automatically when a fault has occurred or a protection is activated. It can also be entered via the main menu. Use navigation keys to view if there are several events to reset.

*Figure 27: Reset Events menu*
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Setting and configuration
Chapter 7  Settings and configuration

7:1  Settings

Settings can be done in three different ways:

- Keypad
- Fieldbus communication
- External keypad (option)

With the keypad, settings can be done as individual parameter setting or selection of predefined parameters for different applications.

The unit has one complete set of parameters but some parameters have extra sets for sequence start. The default parameter set is stored in the unit for a possible reset to default values. When the fieldbus communication is selected, most parameters can also be modified from this interface.

Caution!

*The motor may start unexpectedly if there is a start signal present when doing any of the actions listed below.*

- Switching from one type of control to another (fieldbus control / hardwire control)
- Re-programming of the programmable inputs
- Reset all Settings (programmable input set to Enable)
### 7:1.1 Overview of all accessible settings
(different menus)

<table>
<thead>
<tr>
<th>Setting/parameter</th>
<th>Top level</th>
<th>Application Setting</th>
<th>Basic Settings</th>
<th>Functional Settings</th>
<th>Presentation Settings</th>
<th>All Settings</th>
<th>Reset all Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Password</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Keypad lock/unlock</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reset to factory default setting</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Application type</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Setting current</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overload protection class</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>External by-pass</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start mode</td>
<td>Tune Set</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stop mode</td>
<td>Tune Set</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start ramp</td>
<td>Tune Set</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stop ramp</td>
<td>Tune Set</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initial voltage</td>
<td>Tune Set</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>End voltage</td>
<td>Tune Set</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Step down voltage</td>
<td>Tune Set</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current limit</td>
<td>Tune Set</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Torque limit</td>
<td>Tune Set</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kick start</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kick start level</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kick start time</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start ramp range</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stop ramp range</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tune torque control</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overload protection type</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overload protection, dual type, start class</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overload protection, dual type, run class</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overload protection, type of operation</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Locked rotor protection</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Locked rotor protection level</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Locked rotor protection time</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Locked rotor protection, type of operation</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Underload protection</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Underload protection level</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Underload protection time</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Underload protection, type of operation</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phase imbalance protection</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phase imbalance protection level</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phase imbalance protection, type of operation</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High current protection</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High current protection, type of operation</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phase reversal protection</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phase reversal protection, type of operation</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PTC protection</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PTC protection, type of operation</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High current warning</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High current warning level</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Setting/parameter</td>
<td>Top level</td>
<td>Application Setting</td>
<td>Basic Settings</td>
<td>Functional Settings</td>
<td>Presentation Settings</td>
<td>All Settings</td>
<td>Reset all Settings</td>
</tr>
<tr>
<td>--------------------------------------------------------</td>
<td>-----------</td>
<td>---------------------</td>
<td>----------------</td>
<td>---------------------</td>
<td>-----------------------</td>
<td>--------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>Low current warning</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low current warning level</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overload warning</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overload warning level</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thyristor (SCR) overload warning</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phase loss fault, type of operation</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fieldbus fault, type of operation</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency fault, type of operation</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heat sink over-temperature fault, type of operation</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thyristor short circuit fault, type of operation</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
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# Chapter 7

## Settings and configuration

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<tr>
<th>Setting/parameter</th>
<th>Top level</th>
<th>Application Setting</th>
<th>Basic Settings</th>
<th>Functional Settings</th>
<th>Presentation Settings</th>
<th>All Settings</th>
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# 7:1.2 Parameter list

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<td>0.9...1207A</td>
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<td>Start Ramp</td>
<td>1...30s, 1...120s</td>
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<td>3</td>
<td>Stop ramp</td>
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<td>K4 PTC</td>
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<td>K4 Phase Rev</td>
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<td>Fault event of relay K5</td>
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<td>K5 High I</td>
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<td>No</td>
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<td>K5 Lock Rot</td>
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<td>Sequence start, number of sequences</td>
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<td>Start Ramp 1</td>
<td>1...30s, 1...120s</td>
<td>10s</td>
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<td>Initial voltage, first sequence</td>
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<td>Current limit, first sequence</td>
<td>Curr Lim 1</td>
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<td>4.0xle</td>
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<td>Start ramp, second sequence</td>
<td>Start Ramp 2</td>
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<td>10s</td>
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<td>10s</td>
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<td>LCD Auto Off</td>
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<td>Day</td>
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<td>Time Min</td>
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<td>BP Closed Op</td>
<td>Stop-M, Stop-A</td>
<td>Stop-M</td>
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<td>By-pass doesn’t close fault, type of operation</td>
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<td>Stop-M, Stop-A</td>
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<td>C Lim Y Time</td>
<td>0...120 s</td>
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<td>Dual current limit level</td>
<td>C Lim Y Level</td>
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<td>Volt, Torque</td>
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<td>20...200%</td>
<td>150%</td>
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<td>Tune T-Ctrl</td>
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<td>100%</td>
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<td>Analog Out</td>
<td>Yes, No</td>
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<td>Anl Ref</td>
<td>0...10V, 0...20mA, 4...20mA</td>
<td>4...20mA</td>
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<td>Analog output, type of value</td>
<td>Anl Type</td>
<td>1 Amp, U Volt, P kW, P hp, Q kVAR, S kVA, Tmp-Mot, TmpSCR, cosPhi</td>
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<td>I Range Max</td>
<td>10...20000A</td>
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<td>PST(B) size dependent</td>
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### Chapter 7
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<tr>
<th>Param. number</th>
<th>Description</th>
<th>Display text</th>
<th>Setting range</th>
<th>Default value</th>
<th>Actual setting</th>
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<td>U Range Max</td>
<td>10...1000V</td>
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<td>kW Range Max</td>
<td>1...3000kW</td>
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<td>hp Range Max</td>
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<td>Q Range Max</td>
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<td>S Range Max</td>
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</tbody>
</table>
7:2 Description of menus

For detailed description of each function, see Chapter 10 “Functions”.

7:2.1 Top level

This level contains information about output voltage and current, heat sink temperature, real time clock and more. From this menu, the keypad can be locked/unlocked and a password for this can be set. It is also possible to enter the other menus.

Display at start up

When switching on the supply voltage the LCD will first display the text “Hello”, and after a few seconds switch into displaying Top Level, figure 2. The displayed current is the actual motor current.

$U_{in}$ status

The softstarter checks and displays the status of the input voltage (line side).

Motor temperature

The used thermal capacity of the motor is displayed. 0% means that the motor is in cold state. 50% means that half the capacity is used etc.

SCR temperature

The temperature of the SCRs in the softstarter is displayed as a percentage of the max. value.
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**Start mode**
The start mode of the motor is displayed. The possible options are:
- Volt
- Torque

**Stop mode**
The stop mode of the motor is displayed. The possible options are:
- Volt
- Torque

**Status of inputs/outputs**
The status of the Programmable inputs and outputs is displayed with “0” for not activated or “1” for activated. The figures have following function:

- In=0100 Start signal high
- In=1000 Stop signal high
- In=0010 In0 high
- In=0001 In1 high
- Out=1000 Relay K4 activated
- Out=0100 Relay K5 activated
- Out=0010 Relay K6 activated
- Out=0001 SW V7 activated

**Real time clock**
The real time clock shows present date and time. How to set date, time and display type see “Presentation Settings”.

**Keypad status**
Information on whether the keypad is locked or unlocked. How to operate, see Chapter 6 “Human-Machine Interface (HMI)”.

**Change Password**
Menu for changing the password. How to operate, see Chapter 6 “Human-Machine Interface (HMI)”.
7:2.2 Application Setting

The Application setting menu consists of predefined parameters for the selected application and should be used if an easy and quick set-up is required. Only a few parameters have to be set before start of the motor is possible. All necessary input data will show up in an automatic loop.

After selecting an application and performing the desired tuning, the application should not be selected again. If this is done, all the tuning will be reset to the default settings for the selected application.

Enter the Application setting

Enter the menu by selecting Application Setting.

Select what type of application the softstarter is used for by pressing Store Set. If the used application is not listed, select the one closest and choose Tune Set (see below). Possible applications are:

- Centrifugal Pump
- Hydraulic Pump
- Centrifugal Fan
- Axial Fan
- Compressor
- Conveyor
- Crusher
- Mixer
- Bow Thruster

Confirm the selected application by pressing Next. If wrong application type was selected, press Back and select the correct type.
Chapter 7
Settings and configuration

Setting I_e

Set the current that the softstarter will be exposed to i.e. rated motor current if the unit is connected In Line.

For units connected Inside Delta the Setting I_e must be set according to the current in the delta circuit = 58% (\(\sqrt[3]{3}\)) of the rated motor current.

Press Store to save the data after setting the current.

Confirm the Setting I_e by pressing Next. If wrong Setting I_e was set, press Back and set the correct value.

Overload class (OL Class)

Select the class for the overload relay for the used application type. Available classes:

- 10A
- 10
- 20
- 30

Press Store to save the selected class.

Confirm the selected overload class by pressing Next. If wrong overload class was selected, press Back and select the correct class.

External By-Pass contactor (Ext ByPass)

If an external by-pass contactor is used, set the parameter to Yes, otherwise No.

Press Store to save the data.

Confirm the selection of external by-pass by pressing Next. If wrong selection was made, press Back and correct the selection.

Tune Set

The configuration of the application setting menu is now completed. If no tuning of the settings is wanted, it is possible to return to the top level by pressing Yes. If tuning of some main parameters is wanted, select Tune Set.
Tuning parameters

Nine parameters can be tuned individually if a more specific adjustment is required. Each parameter is described in Chapter 10 “Functions”.

- Start mode
- Stop mode
- Start ramp
- Stop ramp
- Initial voltage
- End voltage
- Step down voltage (Not available if Stop mode is set to Torque)
- Current limit level
- Torque limit (Not available if Start mode is set to Volt)

When all tuning parameters have been passed, following information will be displayed, figure 23. Select Yes if all necessary parameters are tuned. If a new tuning is required select Back and follow the step Tune Set above.
7:2.3 Basic Settings

The Basic settings menu consists of the most common start/stop parameters required for the set-up. Each parameter can be adjusted separately. For a deep description of each parameter, see Chapter 10 “Functions”.

Enter the Basic settings

Enter the menu by selecting Basic Settings.

Setting $I_e$

Set the current that the softstarter will be exposed to i.e. rated motor current, if the unit is connected In Line.

*For units connected Inside Delta the Setting $I_e$ must be set according to the current in the delta circuit = 58% ($\frac{1}{\sqrt{3}}$) of the rated motor current.*

Press Store to save the data after setting the current.

External By-Pass contactor (Ext ByPass)

Set the parameter to Yes if an external by-pass contactor is used, or else No. This parameter is not available on PSTB370...1050 since these have an integrated by-pass contactor.

Press Store to save the data.

Start mode

Select the type of ramp that will be used during start. The possible options are:

- Volt
- Torque

Press Store to save the data after setting the start ramp type.

Stop mode

Select the type of ramp that will be used during stop. The possible options are:

- Volt
- Torque

Press Store to save the data after setting the stop ramp type.
Start ramp

Set the ramp time for start.

Press Store to save the time for the start ramp.

Stop ramp

Set the ramp time for stop (softstop). Note that this function shall only be used for applications with small flywheel masses, for example pumps and conveyors (in case fragile material is transported).

Press Store to save the time for the stop ramp.

Initial voltage (Init Volt)

Set the initial voltage level.

Press Store to save the initial voltage.

End voltage (End Volt)

Set the end voltage level.

Press Store to save the end voltage.

Step down

Set the level of the step down voltage. This function is only working if softstop is selected and stop mode is set to volt.

Press Store to save the step down level.

Current limit (Current Lim)

Set the current limit level for the start.

Press Store to save the current limit.

Torque limit (Torque Lim)

Select the torque limit as percentage of the calculated nominal torque. This parameter is not available if start mode is set to volt.

Press Store to save the data after setting the torque limit.

Overload Class (OL Class)

Select the class for the overload protection.

Press Store to save the overload class.

The configuration of the basic setting menu is now completed. It is possible to return to the top level by pressing Back 3 times.
7:2.4 Functional Settings

The Functional setting menu consists of groups with parameters arranged by function such as protection, warning, fault, fieldbus communication etc. This menu should be used if a more advanced set-up is required. For a detailed description of each parameter, see Chapter 10 “Functions”.

Enter the Functional settings

Enter the menu by selecting Functional Settings.

7:2.4.1 Start/Stop

To set parameters related to start and stop, enter the Start/Stop group. Following parameters are available in this group:

- Setting \( I_e \)
- External By-Pass
- Start mode
- Stop mode
- Start ramp
- Stop ramp
- Initial voltage
- End voltage
- Step down voltage
- Current limit level
- Torque limit
- Kick start
- Kick level
- Kick time
- Start range
- Stop range

Setting of parameters from Setting \( I_e \) to Torque limit above, see “Basic Settings”.

Figure 25: Functional Settings menu

Figure 26: Start/Stop group
Kick Start

Activate the *Kick Start* function by entering this menu. Press *Store* to save the selection.

Kick Level

Set the required level of the Kick Start. Press *Store* to save the data.
This menu will only be visual if Kick Start is activated.

Kick Time

Set the required time for the kick start. Press *Store* to save the data.
This menu will only be visual if Kick Start is activated.

Start Range

The ramp time for start can be set between 1 and 30 seconds as default. If required, the range can be extended up to 120 seconds by entering this menu. Press *Store* to save the data.

Stop Range

The ramp time for stop can be set between 0 and 30 seconds as default. If required, the range can be extended up to 120 seconds by entering this menu. Press *Store* to save the data.

The configuration of the parameters in the Start/Stop group is now completed. It is possible to return to top level by pressing Back three times. To configure the protection, proceed to that menu.
7:2.4.2 Torque control

To set parameters related to torque control, enter the Torque control group.

Start mode
Select which type of ramp that shall be used during start. The possible options are:
- Volt
- Torque

Press Store to save the selected start mode.

Stop mode
Select which type of ramp that shall be used during stop. The possible options are:
- Volt
- Torque

Press Store to save the selected stop mode.

Tune torque control (Tune T-Ctrl)
With this parameter it is possible to fine-tune the behavior of the torque ramps. This parameter should usually be set to its default value 100%.

Press Store to save the selected level.

Torque limit
Select the torque limit of the softstarter.

Press Store to save the selected torque limit level.
### 7:2.4.3 Protections

To set parameters related to the protections, enter the Protections group.

**Caution!**

*The motor may start unexpectedly if there is a start signal present when the softstarter has tripped for a protection and a reset is performed. This reset can be either manual (Stop-M) or automatic (Stop-A)*

**Overload protection (Overload)**

Select the required overload type for the application. Following selections are available:

- No
- Normal
- Dual

Press *Store* to save the selected type.

If overload “Normal” is selected, the following settings will be available:

**Overload class (OL Class)**

Select the class for the overload relay. Following classes are available:

- 10A
- 10
- 20
- 30

Press *Store* to save the selected class.

**Overload type of operation (OL Op)**

Select what operation shall be asserted if the overload relay is activated:

- Stop–M The motor will stop and a manual reset is required.
- Stop–A The motor will stop and automatic reset is performed.
- Ind Only indication will be given.

Press *Store* to save the selected operation.
If overload “Dual” is selected, the following settings will be available:

**Overload start class (OL Class S)**

Select the required class for overload relay during start condition. Following classes are available:

- 10A
- 10
- 20
- 30

Press *Store* to save the selected class.

**Overload run class (OL Class R)**

Select the required class for overload relay during continuous run. Following classes are available:

- 10A
- 10
- 20
- 30

Press *Store* to save the selected class.
Locked rotor protection (Locked Rotor)

Activate the protection if required by changing to Yes.

If “Yes” is selected, the following settings will be available:

Locked rotor level (Lock R Lev)

Set the level of the locked rotor protection. Available only if the protection is selected.

Locked rotor time (Lock R Time)

Set the time for the locked rotor protection. Available only if the protection is selected.

Locked rotor type of operation (Lock R Op)

Select what operation shall be asserted if the locked rotor protection is activated:

- Stop–M: The motor will stop and a manual reset is required.
- Stop–A: The motor will stop and automatic reset is performed.
- Ind: Only indication will be given.

Press Store to save the selected operation.
Underload protection (Underload)

Activate the protection if required by changing to Yes.

If “Yes” is selected, the following settings will be available:

Underload level (Underl Lev)

Set the level of the underload protection. Available only if the protection is selected.

Underload time (Underl Time)

Set the time for the underload protection. Available only if the protection is selected.

Underload type of operation (Underl Op)

Select what operation shall be asserted if the underload protection is activated:

- **Stop–M**: The motor will stop and a manual reset is required.
- **Stop–A**: The motor will stop and automatic reset is performed.
- **Ind**: Only indication will be given.

Press Store to save the selected operation.
Phase imbalance protection (Phase Imb)

Activate the protection if required by changing to Yes.

If “Yes” is selected, the following settings will be available:

Phase imbalance level (Ph Imb Lev)

Set the level of the phase imbalance protection. Available only if the protection is selected.

Phase imbalance type of operation (Ph Imb Op)

Select what operation shall be asserted if the phase imbalance protection is activated:

- Stop–M The motor will stop and a manual reset is required.
- Stop–A The motor will stop and automatic reset is performed.
- Ind Only indication will be given.

Press Store to save the selected operation.

High current protection (High I)

Activate the high current protection if required by changing to Yes.

If “Yes” is selected, the following setting will be available:

High current type of operation (High I Op)

Select what operation shall be asserted if the high current protection is activated:

- Stop–M The motor will stop and a manual reset is required.
- Stop–A The motor will stop and automatic reset is performed.
- Ind Only indication will be given.

Press Store to save the selected operation.
Phase reversal protection (Phase Rev)

Activate the phase reversal protection if required by changing to Yes.

If “Yes” is selected, the following setting will be available:

Phase reversal type of operation (Ph Rev Op)

Select what operation shall be asserted if the phase reversal protection is activated:

- Stop–M The motor will stop and a manual reset is required.
- Stop–A The motor will stop and automatic reset is performed.
- Ind Only indication will be given.

Press Store to save the selected operation.

PTC protection (PTC)

Activate the PTC protection if required by changing to Yes.

Since the PTC protection uses the same terminals as the analog output, it is not possible to use both of these functions at the same time. If the analog output is enabled when activating the PTC protection, the question “Turn off anl Output?” will be prompted. Answer Yes to activate PTC protection and disable the analog output.

If “Yes” is selected, the following setting will be available:

PTC type of operation (PTC Op)

Select what operation shall be asserted if the PTC protection is activated:

- Stop–M The motor will stop and a manual reset is required.
- Stop–A The motor will stop and automatic reset is performed.
- Ind Only indication will be given.

Press Store to save the selected operation.

Thyristor overload protection

Selected operation for thyristor overload protection is always:

- Stop–M The motor will stop and a manual reset is required.
7:2.4.4 Warnings

To set parameters related to the warnings, enter the Warnings group:

**High current warning (Warn I=High)**

Activate the warning function if required by changing to Yes. Press *Store* to save the selected operation.

**High current warning level (Wa I=H Lev)**

Set the level of the high current warning. Available only if the function is selected. Press *Store* to save the selected operation.

**Low current warning (Warn I=Low)**

Activate the warning function if required by changing to Yes. Press *Store* to save the selected operation.

**Low current warning level (Wa I=L Lev)**

Set the level of the low current warning. Available only if the function is selected. Press *Store* to save the selected operation.

**Overload warning (Warn OL)**

Activate the warning function if required by changing to Yes. Press *Store* to save the selected operation.

**Overload warning level (Wa OL Lev)**

Set the level of the overload warning. Available only if the function is selected. Press *Store* to save the selected operation.

**Thyristor overload warning (Warn SCR OL)**

Activate the warning function if required by changing to Yes. Press *Store* to save the selected operation.
7:2.4.5 Faults

Caution!
The motor may start unexpectedly if there is a start signal present when the softstarter has tripped for a fault and a reset is performed. This reset can be either manual (Stop-M) or automatic (Stop-A).

Phase loss fault, type of operation (Ph Loss Op)
Select what operation shall be asserted if a phase loss fault occurs:

- Stop–M The motor will stop and a manual reset is required.
- Stop–A The motor will stop and an automatic reset is performed.

Press \textit{Store} to save the selected operation.

Fieldbus fault, type of operation (FB Fault Op)
Select what operation shall be asserted if a fieldbus communication fault occurs:

- Stop–M The motor will stop and a manual reset is required.
- Stop–A The motor will stop and an automatic reset is performed.

Press \textit{Store} to save the selected operation.

Frequency fault, type of operation (Freq F Op)
Select what operation shall be asserted if the frequency fault occurs (out of range):

- Stop–M The motor will stop and a manual reset is required.
- Stop–A The motor will stop and an automatic reset is performed.

Press \textit{Store} to save the selected operation.

Heat sink over-temperature fault, type of operation (HS Temp Op)
Select what operation shall be asserted if an over-temperature occurs:

- Stop–M The motor will stop and a manual reset is required.
Stop–A  The motor will stop and an automatic reset is performed.

Press Store to save the selected operation.

**Thyristor short circuit fault, type of operation (SCR SC Op)**

Select what operation shall be asserted if a fault occurs with shorted thyristor:

Stop–M  The motor will stop and a manual reset is required.

Stop–A  The motor will stop and an automatic reset is performed.

Press Store to save the selected operation.

**By-pass doesn't open, type of operation (BP Closed Op)**

Select what operation shall be asserted if the contactor does not open:

Stop–M  The motor will stop and a manual reset is required.

Stop–A  The motor will stop and an automatic reset is performed.

Press Store to save the selected operation.

**By-pass doesn't close, type of operation (BP Open Op)**

Select what operation shall be asserted if the contactor does not close:

Stop–M  The motor will stop and a manual reset is required.

Stop–A  The motor will stop and an automatic reset is performed.

Press Store to save the selected operation.

**Connection fault, Non conduction thyristor fault, Line side fault, Kick-current fault, and Internal fault**

Selected operation for the faults listed above is always:

Stop–M  The motor will stop and a manual reset is required.
7:2.4.6 Inputs

To set parameters related to the programmable inputs, enter the Inputs group.

**First programmable input (In0)**

Select the required function for the input In0. Press *Store* to save/activate the selected function.

One of the following functions can be selected:

- **None** No specific function (not activated).
- **Reset** Reset of an event.
- **Enable** When In0=0 the softstarter stops immediately. When In0=1 the softstarter is in normal operation. Overrides all other inputs, except LOCAL CONTROL.
- **Jog** Performs a start ramp until command is released, then the motor stops immediately.
- **DOL** Open/close of the by-pass contactor (PSTB370...PSTB1050). Only if Setting $I_e$ is equal or lower than AC-3 rating.
- **Start2** Start signal for 2nd parameter set-up.
- **FB-Dis** Disable of the fieldbus communication. The softstarter can be controlled by the hard wire inputs instead.

Press *Store* to save/activate the selected function.

⚠️ **Caution!**

*The motor may start unexpectedly if there is a start signal present when doing any of the actions listed below.*

- Switching from one type of control to another (fieldbus control / hardwire control)
- Re-programming of the programmable inputs
- Reset all Settings (programmable input set to Enable)
Second programmable input (In1)

Select the required function for the input In1. One of the following functions can be selected:

- **None**: No specific function (not activated).
- **Reset**: Reset of an event.
- **Enable**: When In1=0 the soft starter stops immediately.
  When In1=1 the soft starter is in normal operation.
  Overrides all other inputs, except LOCAL CONTROL.
- **Jog**: Performs a start ramp until command is released, then the motor stops immediately.
- **DOL**: Open/close of the by-pass contactor (PSTB370...PSTB1050).
  Only if Setting $I_e$ is equal or lower than AC-3 rating.
- **Start3**: Start signal for 3rd parameter set-up.
- **FB-Dis**: Disable of the fieldbus communication. The soft starter can be controlled by the hard wire inputs instead.

Press **Store** to save/activate the selected function.

**Caution!**

*The motor may start unexpectedly if there is a start signal present when doing any of the actions listed below.*

- **Switching from one type of control to another (fieldbus control / hardwire control)**
- **Re-programming of the programmable inputs**
- **Reset all Settings (programmable input set to Enable)**
7:2.4.7 Outputs

To set parameters related to the programmable outputs, enter the Outputs group.

Output relay K4 (Relay K4)

Select the required function for the output relay K4.
One of the following functions can be selected:
- Run Run indication.
- TOR Top of ramp indication.
- Event Indication of selected event(s) where following functions can be selected individually:
  - Overload protection
  - Fault
  - High current protection
  - Thyristor overload protection
  - Locked rotor protection
  - Underload protection
  - Phase imbalance protection
  - PTC protection
  - Phase reversal protection
  - Overload warning
  - Thyristor overload warning
  - High current warning
  - Low current warning
  - Shunt Fault

Press Store to save/activate the selected function.

Output relay K5 (Relay K5)

Select the required function for the output relay K5.
One of the following functions can be selected:
- Run Run indication.
- TOR Top of ramp indication.
- Event Indication of selected event(s), see relay K4.

Press Store to save/activate the selected function.
Output relay K6 (Relay K6)

Select the required function for the output relay K6. One of the following functions can be selected:

Run Run indication.
TOR Top of ramp indication.
Event Indication of selected event(s), see relay K4.

Press Store to save/activate the selected function.

Software output V7 (SW Outp V7)

Select the required function for the fieldbus communication output SW Outp V7. One of the following functions can be selected:

Run Run indication.
TOR Top of ramp indication.
Event Indication of selected event(s), see relay K4.

Press Store to save/activate the selected function.
**7:2.4.8 Analog output**

To set parameters related to the analog output, enter the Analog output group.

**Analog output (Analog Out)**

Activate the analog output by changing to Yes.

Since the analog output uses the same terminals as the PTC protection, it is not possible to use both of these functions at the same time. If the PTC protection is enabled when activating the analog output, the question “Turn off PTC?” will be prompted. Answer Yes to activate the analog output and disable the PTC protection.

*When sequence start is used, the analog output is only active for the last started motor.*

**Analog output, reference**

With this parameter it is possible to set the unit and the range of the signal to output. This selected range will be the physical output from the softstarter. This range should be selected to suit the analog meter or the PLC that uses this signal as its input. The possible options are:

- 0-10 V
- 0-20 mA
- 4-20 mA

Press *Store* to save the type of signal.

If for instance 4-20 mA is selected, then this range will represent 0-100% of the output signal, for instance the current of the motor.

**Analog output, type of value (Anl Type)**

Select which type of value to output. The possible options are:
• Current of the motor (I Amp)
• Main voltage (U Volt)
• Active power kW (P kW)
• Active power hp (P hp)
• Reactive power (Q kVAr)
• Apparent power (S kVA)
• Calculated temperature of the motor (TmpMot)
• Calculated temperature of the SCR (TmpSCR)
• Power factor (cosPhi)

Press Store to save the type of value to output.

**Analog output, range (I/U/kW/hp/Q/S Range Max)**

With this parameter it is possible to set the value that will be represented as the maximum value by an analog meter or by a PLC. If for instance this parameter is set to 20000A, then 0-20000A will be represented by 0-100% by a PLC or an analog meter.

*If the actual value happens to be greater than the selected maximum value then the actual value will still only be represented as the selected maximum value. This can be useful if for instance very large currents occur during start and only the currents during continuous run are of interest.*

The possible range and the unit depend on which type of output is selected. The range for the different output types are listed below:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Range Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current of the motor</td>
<td>10...20000 A</td>
</tr>
<tr>
<td>Main voltage</td>
<td>10...1000 V</td>
</tr>
<tr>
<td>Active power kW</td>
<td>1...3000 kW</td>
</tr>
<tr>
<td>Active power hp</td>
<td>1...4000 hp</td>
</tr>
<tr>
<td>Reactive power Q</td>
<td>1...3000 kVAr</td>
</tr>
<tr>
<td>Apparent power S</td>
<td>1...3000 kVA</td>
</tr>
</tbody>
</table>

Only the valid parameter is displayed. If for instance I Amp is selected as output type, then only I Range Max will appear. If TmpMot, TmpSCR, or cosPhi is selected as output type, this range parameter will not appear at all. When selecting TmpMot or TmpSCR the range will always be 0-100% and when selecting cosPhi the range will be 0-1.

Press Store to save the range of output.
7:2.4.9 Fieldbus

To set parameters related to the fieldbus communication, enter the Fieldbus group.

**Fieldbus control (Fieldb Ctrl)**

Activate the fieldbus control of the softstarter by changing to Yes. Press Store to save the selected function.

**Fieldbus type (Fieldb Type)**

Select what fieldbus type is used.

- AS-Interface Used for AS-Interface protocol.
- Other Used for other protocols than AS-Interface.

Press Store to save/activate the selected function.

**Fieldbus address (Fieldb Addr)**

Set a unique address number between 0 and 1000 for fieldbus communication. Press Store to save the selected function.

**Fieldbus auto disable (FB Auto Dis)**

Select whether fieldbus auto disable should be activated or not.

Press Store to save the selected function.

⚠️ **Caution!**

The motor may start unexpectedly if there is a start signal present when doing any of the actions listed below.

- Switching from one type of control to another (fieldbus control / hardwire control). Remember that when Fieldbus auto disable is active, this switch can be done automatically.
- Re-programming of the programmable inputs
- Reset all Settings (programmable input set to Enable)
7:2.4.10 Sequence start

The sequence start function can be used for starting several motors or multiple speed motors with different parameter sets such as individual ramp times, initial voltages, current limits etc. Up to three individual parameter sets can be used simultaneously.

The LOCAL CONTROL menu can not be entered if Sequence start is selected.

Number of sequences (No of Seq)

To set parameters related to a sequence start, enter the Seq Start group.
Select the required number of parameter sets for the application.
The following selections are available:

No Sequence start is not activated.
The softstarter is in normal operation.

2 Two different parameter sets will be used.

3 Three different parameter sets will be used.

Press Store to save/activate the selected function.

First sequence setting current (1st Set Ie)

Set the current for the first parameter group and press Store to save the value.
This parameter will only be displayed if parameter No of Seq is set to 2 or 3.

Second sequence setting current (2nd Set Ie)

Set the current for the second parameter group.
Press Store to save the value.
This parameter will only be displayed if parameter No of Seq is set to 2 or 3.

If sequence start was used and the parameter No of Seq is changed to No, the overload protection will automatically be set to Normal independent of earlier setting.
Third sequence setting current (3rd Set Ie)

Set the current for the third parameter group. Press Store to save the value.

This parameter will only be displayed if parameter No of Seq is set to 3.

Function of first programmable input (In0)

This parameter will automatically be set as Start2.

Function of second programmable input (In1)

This parameter will automatically be set as Start3.

Overload

The overload protection is not activated when sequence start is selected. To activate the motor overload protection enter this group and change to required function.

The overload protection can normally not be used when starting several motors since the total starting time will become too long and the protection will trip.

First sequence parameters (1st Seq. Param.)

To set parameters related to the first sequence, enter the 1st Seq. Param. group. Following parameters can be adjusted:

1st Set Ie  Setting current.
Start Ramp1  Ramp time for start
Init Volt1  Initial voltage.
Curr Lim1  Current limit level.

Press Store to save the selected parameter.
Second sequence parameters (2nd Seq. Param.)

To set parameters related to the second sequence, enter the 2nd Seq. Param. group. Following parameters can be adjusted:

- **2nd Set Ie** Setting current.
- **Start Ramp2** Ramp time for start.
- **Init Volt2** Initial voltage.
- **Curr Lim2** Current limit.

Press **Store** to save the selected parameter.

Third sequence parameters (3rd Seq. Param.)

To set parameters related to the third sequence, enter the 3rd Seq. Param. group. Following parameters can be adjusted:

- **3rd Set Ie** Setting current.
- **Start Ramp3** Ramp time for start.
- **Init Volt3** Initial voltage.
- **Curr Lim3** Current limit.

Press **Store** to save the selected parameter.

*For wiring and operation of the start/stop signals, see Chapter 5 “Connection” under programmable inputs.*
7:2.5 Presentation Settings

The Presentation setting menu consists of parameters for the LCD set-up. The presentation language can be chosen among 13 different languages. The real-time clock for the softstarter can be set in this menu.

Enter the Presentation settings

Enter the menu by selecting Presentation Set.

Presentation language

To set the wanted presentation language on the LCD, press Change and Store the selected language. Country codes are based on ISO 3166.

Available languages are:

<table>
<thead>
<tr>
<th>Language</th>
<th>Abbreviation in LCD</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>US/UK</td>
</tr>
<tr>
<td>Polish</td>
<td>PL</td>
</tr>
<tr>
<td>Turkish</td>
<td>TR</td>
</tr>
<tr>
<td>Russian</td>
<td>RU</td>
</tr>
<tr>
<td>Chinese</td>
<td>CN</td>
</tr>
<tr>
<td>German</td>
<td>DE</td>
</tr>
<tr>
<td>Spanish</td>
<td>ES</td>
</tr>
<tr>
<td>French</td>
<td>FR</td>
</tr>
<tr>
<td>Italian</td>
<td>IT</td>
</tr>
<tr>
<td>Dutch</td>
<td>NL</td>
</tr>
<tr>
<td>Portuguese</td>
<td>PT</td>
</tr>
<tr>
<td>Swedish</td>
<td>SE</td>
</tr>
<tr>
<td>Finnish</td>
<td>FI</td>
</tr>
</tbody>
</table>

In case wrong language (not understandable) is selected, follow the “emergency instructions” below to reach this parameter (start from top level):

Press left selection key twice.
Press lower navigation key three times.
Press left selection key twice.
Use the navigation keys to find the required language abbreviation.
Press left selection key to save the parameter.
LCD Auto Off

The LCD will be switched off automatically by a pre-set time between 1 - 255 minutes. If the display has switched off, a touch on any of the keys will switch it on again.

Date Type

The date can be presented in three different ways. Depending on the selected type, the following will be displayed at top level:

<table>
<thead>
<tr>
<th>Date type</th>
<th>Display on the LCD</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISO</td>
<td>Year – Month – Day</td>
</tr>
<tr>
<td>US</td>
<td>Month – Day - Year</td>
</tr>
<tr>
<td>CE</td>
<td>Day – Month - Year</td>
</tr>
</tbody>
</table>

Date Year

To set the year in the real time clock, press Change to enter the setting level. Press Store to save the set value.

Date Month

To set the month in the real time clock, press Change to enter the setting level. Press Store to save the set value.

Date Day

To set the day in the real time clock, press Change to enter the setting level. Press Store to save the set value.

Time Hour

To set the hours in the real time clock, press Change to enter the setting level. Press Store to save the set value.

Time Min

To set the minutes in the real time clock, press Change to enter the setting level. Press Store to save the set value.

The configuration of the presentation setting menu is now completed. It is possible to return to the top level by pressing Back 3 times.
Chapter 7
Settings and configuration

7:2.6 Service Settings

The service setting menu consists of parameters used for maintenance and repair. This menu shall never be used by anybody but authorized service personnel.

⚠️ Warning!

*If parameters are changed the consequences can be malfunction but also damage to the softstarter and the warranty may not be valid any longer.*

Figure 37: Service Settings menu (for authorized personnel only)

7:2.7 All Settings

The All setting menu consists of all the available settings listed. Each parameter can be adjusted separately from this menu. For a detailed description of each parameter, see Chapter 10 “Functions”.

Enter the All settings

Enter the menu by selecting All Settings.

Figure 38: All Settings menu
### 7:2.7.1 Changed Settings

The Changed settings menu consists of the parameters that have been changed in contrast to the factory default setting. If no parameters have been changed, the LCD will display *No Changed Settings*.

---

### 7:2.7.2 Reset all Settings

To reset all the changed parameters back to factory default setting, enter this menu. Confirmation of reset will be displayed as *Done* on the LCD. The supply voltage should also be disconnected and reconnected.

The real time clock, the hour run meter, the number of starts and the presentation language will not be affected by the reset.

**Caution!**

*The motor may start unexpectedly if there is a start signal present when doing any of the actions listed below.*

- Switching from one type of control to another (fieldbus control / hardwire control)
- Re-programming of the programmable inputs
- Reset all Settings (programmable input set to Enable)
7:2.7.3 Operation mode

The Operation mode makes it possible to switch between two different modes in the softstarter, a demo mode and the regular operation mode. By entering the demo mode, programmable inputs/outputs, start and stop circuits, by-pass contactor etc. can be tested before the unit is taken into operation. As long as the unit is in demo mode, the color on the display is inverted (not on external keypad).

Caution!

Never enter the demo mode with the main voltage connected. The by-pass contactor will close at TOR and may start the motor.

The total run time of the motor and the total number of starts will be counted also during demo mode. When exit demo mode these values will be reset to previous value. Parameters changed and the Event Log will be kept when exit demo mode.
Chapter 8  Fieldbus communication (option)

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Fieldbus communication (option)
Chapter 8 Fieldbus communication (option)

8:1 Overview

The PST softstarter has an interface on the front for connecting the ABB fieldbus plug used for fieldbus communication. Through this interface it is possible to control the softstarter, achieve status information, as well as up and down-load of parameters.

The interface between the softstarter and the fieldbus plug is always the same. Independent of softstarter size or delivery date it is possible to connect any fieldbus protocol later on since this is defined in the fieldbus plug itself.

Following fieldbus protocols are available

- AS-Interface
- DeviceNet
- Profinet DP
- Modbus

8:1.1 Required accessories

To connect the softstarter to a fieldbus system, following accessories are required:

- Fieldbus plug for present fieldbus protocol (check that the cable length is sufficient).
- Connectors for bus connection.
- End plug (some protocols).
- Software for PLC set-up.

Figure 1: Principle of a fieldbus network with PST softstarters connected
8:1.2 Instructions

To do the set-up of input/output telegrams, parameter settings etc. following instructions are available at www.abb.com/lowvoltage:

- AS-Interface 1SFC132011M0201
- DeviceNet 1SFC132045M0201
- Profibus DP 1SFC132044M0201
- Modbus 1SFC132046M0201
Chapter 9  Maintenance

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Chapter 9  Maintenance

This chapter describes the maintenance required for the softstarter. In principle, the product is maintenance free but some items should be checked regularly.

Caution!
*Do not open the softstarter or touch any live parts when the main and supply voltage is connected.*

9:1 Regular maintenance

- Check that all mounting bolts/screws are fastened. Tighten if necessary.
- Check that all connections of main, control- and supply circuits are fastened. Tighten the terminal screws and bolts on the connection bars, if necessary.
- Check that the cooling airways are free from dirt and dust. If required, use pressurized air to clean.
- Check external filters. Clean, if necessary.
- Check that the fan is working and rotating freely. The blades shall rotate without any resistance and this can be checked at voltage free state.
- Check the real time clock and adjust if necessary.

In case of a fault or if a fault can not be reset, see Chapter 11 “Trouble shooting”.

9:2 Service and repair

In case the softstarter has to be repaired, a spare parts list and necessary instructions are available at www.abb.com/lowvoltage.

*Service and repair should be performed by authorized personnel only. Note that unauthorized repair may affect the warranty.*

- Spare part list 1SFC132005M0201
- Changing PCB 1SFC132009M0201
- Changing of SCR (PSS/PST) 5309 705-1
- Changing of SCR (PSTB) 1SFC132006M0201
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<tr>
<td>High current warning</td>
<td>152</td>
</tr>
<tr>
<td>High current warning level</td>
<td>152</td>
</tr>
<tr>
<td>Low current warning</td>
<td>152</td>
</tr>
<tr>
<td>Low current warning level</td>
<td>152</td>
</tr>
<tr>
<td>Overload warning</td>
<td>153</td>
</tr>
<tr>
<td>Overload warning level</td>
<td>153</td>
</tr>
<tr>
<td>Thyristor (SCR) overload warning</td>
<td>154</td>
</tr>
<tr>
<td>Phase loss fault, type of operation</td>
<td>154</td>
</tr>
<tr>
<td>Fieldbus fault, type of operation</td>
<td>154</td>
</tr>
<tr>
<td>Frequency fault, type of operation</td>
<td>155</td>
</tr>
<tr>
<td>Heat sink over-temperature fault, type of operation</td>
<td>155</td>
</tr>
<tr>
<td>Thyristor short circuit fault, type of operation</td>
<td>156</td>
</tr>
<tr>
<td>By-pass doesn't open fault, type of operation</td>
<td>156</td>
</tr>
<tr>
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</tr>
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<td>Analog output, reference</td>
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<tr>
<td>Analog output, type of value</td>
<td>162</td>
</tr>
<tr>
<td>Analog output, range max</td>
<td>163</td>
</tr>
<tr>
<td>Fieldbus control</td>
<td>164</td>
</tr>
<tr>
<td>Fieldbus type</td>
<td>165</td>
</tr>
<tr>
<td>Fieldbus address</td>
<td>166</td>
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<tr>
<td>Fieldbus auto disable</td>
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<td>167</td>
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<td>167</td>
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<tr>
<td>Initial voltage, first sequence</td>
<td>168</td>
</tr>
<tr>
<td>Current limit, first sequence</td>
<td>168</td>
</tr>
<tr>
<td>Setting current, first sequence</td>
<td>168</td>
</tr>
<tr>
<td>Start ramp, second sequence</td>
<td>169</td>
</tr>
<tr>
<td>Initial voltage, second sequence</td>
<td>169</td>
</tr>
<tr>
<td>Current limit, second sequence</td>
<td>169</td>
</tr>
<tr>
<td>Setting current, second sequence</td>
<td>170</td>
</tr>
<tr>
<td>Start ramp, third sequence</td>
<td>170</td>
</tr>
<tr>
<td>Initial voltage, third sequence</td>
<td>170</td>
</tr>
<tr>
<td>Current limit, third sequence</td>
<td>171</td>
</tr>
<tr>
<td>Setting current, third sequence</td>
<td>171</td>
</tr>
<tr>
<td>Language</td>
<td>172</td>
</tr>
</tbody>
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132003M0201

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Chapter 10 Functions

This chapter describes all settings and functions possible in the softstarter, as well as the easiest way of finding them. The respective default values, setting ranges and parameter texts shown in the display are also stated.

10:1 Setting current

Path in menu:
Menu/SETTINGS/Functional Settings/
Start/Stop / Setting Ie

The setting of this parameter shall be according to the current the softstarter is exposed to. If the motor is connected In Line, set the rated motor current (see rating plate on the motor).

If the motor is connected Inside Delta, set the current in the Delta circuit calculated by rated motor current divided by \(1/(\sqrt{3}) = 58\%\) of the rated motor current.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting Ie</td>
<td>Individual (size related)</td>
<td>9...1207A divided into 19 overlapping ranges</td>
<td>Rated motor current</td>
</tr>
</tbody>
</table>
10:2 Start mode

Path in menu:
Menu/SETTINGS/Functional Settings/
Torque control/ Start Mode

Using the PST softstarter it is possible to choose between two different types of start ramps. These are voltage ramp and torque ramp.

Voltage ramp When using the voltage ramp, the voltage is increased linearly from the start level to full voltage during start. Since the torque depends on both the voltage and the current, the torque curve does not always follow the voltage curve. This has the effect that the torque curve will not increase or decrease linearly.

Torque ramp When using the torque ramp, the output voltage to the motor is controlled so that the torque will follow a predefined optimal curve from the start level to full voltage during start. This has the benefit that the mechanical starting behavior of the equipment driven by the motor will be much softer than when using voltage ramp.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start Mode</td>
<td>Volt</td>
<td>Volt, Torque</td>
<td>Type of start ramp</td>
</tr>
</tbody>
</table>

Figure 1: Voltage ramp

Figure 2: Torque ramp
### 10:3 Stop mode

Path in menu:
Menu/SETTINGS/Functional Settings/
Torque control/ Stop Mode

Using the PST softstarter it is possible to choose between two different types of stop ramps. These are voltage ramp and torque ramp.

**Voltage ramp**
When using the voltage ramp, the voltage is decreased linearly from full voltage to the end voltage during stop. Since the torque depends on both the voltage and the current, the torque curve does not always follow the voltage curve. This has the effect that the torque curve will not increase or decrease linearly.

**Torque ramp**
When using the torque ramp, the output voltage to the motor is controlled so that the torque will follow a predefined optimal curve from full voltage to end voltage during stop. This has the benefit that the mechanical stopping behavior of the equipment driven by the motor will be much softer than when using voltage ramp. This can be especially useful in pump applications where a sudden stop can cause water hammering and pressure surges.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stop Mode</td>
<td>Volt</td>
<td>Volt, Torque</td>
<td>Type of stop ramp</td>
</tr>
</tbody>
</table>
10:4  Tune torque control

Path in menu:
Menu/SETTINGS/Functional Settings/Torque control/
Tune T-Ctrl

With this parameter it is possible to change the speed of the regulator that regulates the voltage so that the torque will follow a predefined torque curve. In most cases, this parameter will not have to be changed from its default value which is 100%. If a dip occurs in the torque curve during stop, increasing this parameter can solve the problem. This parameter should not be set too high though, since this can cause the torque of the motor to oscillate around the predefined torque curve. If this is the case, decrease this parameter.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tune T-Ctrl</td>
<td>100%</td>
<td>30...300%</td>
<td>The speed of the regulator</td>
</tr>
</tbody>
</table>

10:5  Start ramp

Path in menu:
Menu/SETTINGS/Functional Settings/
Start/Stop / Start Ramp

When a start signal is given the softstarter performs a start ramp by controlling the output voltage to the motor so that either the voltage or the torque increases from the start level to full voltage, depending on which ramp type is selected. The start ramp continues until full voltage is applied to the motor.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start Ramp</td>
<td>10 s</td>
<td>1...30s, 1...120s (Range depends on Start Range)</td>
<td>Time for start ramp</td>
</tr>
</tbody>
</table>
10:6 Stop ramp

Path in menu:
Menu/SETTINGS/Functional Settings/
Start/Stop / Stop Ramp

When a stop signal is given, the softstarter performs a stop ramp by controlling the output voltage to the motor so that either the voltage or the torque decreases from full voltage to end voltage, depending on which ramp type is selected. If the ramp time is set to 0, the softstarter will cut the voltage directly when the stop command is given.

This parameter shall be set to 0 for applications with big flywheel mass involved!

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stop Ramp</td>
<td>0 s</td>
<td>0...30s, 0...120s (Range depends on Stop Range)</td>
<td>Time for stop ramp</td>
</tr>
</tbody>
</table>

10:7 Initial voltage

Path in menu:
Menu/SETTINGS/Functional Settings/
Start/Stop / Init Volt

This parameter makes it possible to set the voltage level where the start ramp begins. The voltage or the torque will then increase from this level to full voltage. If the initial voltage is set too low, it will only cause longer starting time and unnecessary heating of the motor.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Init Volt</td>
<td>30%</td>
<td>30...70%</td>
<td>Initial voltage for start ramp</td>
</tr>
</tbody>
</table>
10:8 End voltage

Path in menu:
Menu/SETTINGS/Functional Settings/
Start/Stop / End Volt

This parameter makes it possible to set the voltage level where the stop ramp ends. The voltage or the torque will decrease from full voltage to this level and then cut the power to the motor. This function will be active only if parameter Stop ramp is used.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>End Volt</td>
<td>30%</td>
<td>30...70%</td>
<td>End voltage for stop ramp</td>
</tr>
</tbody>
</table>

10:9 Step down voltage

Path in menu:
Menu/SETTINGS/Functional Settings/
Start/Stop / Step Down

When stopping a motor using the stop ramp, the speed will not decrease immediately. The step down voltage function makes it possible to set a level where the motor speed decreases as soon as the stop ramp begins. By this, a more optimized stopping of the motor is achieved. This function is not available when the stop mode is set to “torque”.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step Down</td>
<td>100%</td>
<td>30...100%</td>
<td>Voltage value to which the soft-starter shall step down at stop and where it shall commence the stop ramp.</td>
</tr>
</tbody>
</table>
10:10 Current limit

Path in menu:
Menu/SETTINGS/Functional Settings/
Start/Stop / Current Lim

It is possible to limit the starting current by using this function. When the current limit is reached, the output voltage stays stable until the current level falls below the limit, then the ramping continues.

- **Fixed voltage**
- **Reached set level of current limit**
- **Set level of current limit**

Figure 10: Current limit

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Lim</td>
<td>4.0 x Ie</td>
<td>2.0...7.0x Ie</td>
<td>Level of the current limit</td>
</tr>
</tbody>
</table>

10:11 Torque limit

Path in menu:
Menu/SETTINGS/Functional Settings/
Torque control / Torque Limit

It is possible to limit the starting torque by setting this parameter. When the torque limit is reached, the output voltage stays stable until the torque falls below the limit, then the ramping continues.

- **Available torque**
- **Torque during DOL start**
- **Torque limit reached**

Torque limit is only available when start mode is set to torque.

Figure 11: Torque limit

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Torque Limit</td>
<td>150 %</td>
<td>20...200%</td>
<td>Level of the torque limit compared to the nominal torque of the motor</td>
</tr>
</tbody>
</table>
10:12 Kick start

Path in menu:
Menu/SETTINGS/Functional Settings/
Start/Stop / Kick Start

In some applications it can be necessary to kick loose the motor i.e. initial friction, and therefore a kick start can be used. With this function a selectable fix voltage is applied during a settable time. Note that the current limit function is not working during kick start.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kick Start</td>
<td>No</td>
<td>Yes, No</td>
<td>Selection of Kick</td>
</tr>
</tbody>
</table>

10:13 Kick start level

Path in menu:
Menu/SETTINGS/Functional Settings/
Start/Stop / Kick Level

With this parameter it is possible to set the level of the kick start. It is active only if kick start is selected.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kick Level</td>
<td>50%</td>
<td>50...100%</td>
<td>Level of Kick Start</td>
</tr>
</tbody>
</table>

10:14 Kick start time

Path in menu:
Menu/SETTINGS/Functional Settings/
Start/Stop / Kick Time

This parameter makes it possible to set the time of the kick start. It is active only if kick start is selected.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kick Time</td>
<td>0.2 s</td>
<td>0.1...1.5 s</td>
<td>Time for Kick Start</td>
</tr>
</tbody>
</table>
10:15 Start ramp range

Path in menu:
Menu/SETTINGS/Functional Settings/
Start/Stop / Start Range

The time of the start ramp is settable up to 30 seconds as default, but if required the range could be extended up to 120 seconds by this parameter.

A too long ramp time will increase the risk of tripping the overload protection.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start Range</td>
<td>1-30 s</td>
<td>1-30 s, 1-120 s</td>
<td>Selectable range for start ramp</td>
</tr>
</tbody>
</table>

10:16 Stop ramp range

Path in menu:
Menu/SETTINGS/Functional Settings/
Start/Stop / Stop Range

The time for the stop ramp is settable up to 30 seconds as default, but if required the range could be extended up to 120 seconds by this parameter.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stop Range</td>
<td>0-30 s</td>
<td>0-30 s, 0-120 s</td>
<td>Selectable range for stop ramp</td>
</tr>
</tbody>
</table>
10:17 Overload protection type

**Path in menu:**
Menu/SETTINGS/Functional Settings/
Protections/Overload

This parameter makes it possible to set the required function of the integrated motor overload protection. Too high motor temperature causes a stop of the motor and a reset is necessary before a restart is possible. The motor overload protection has three different modes:

- **No** The protection is not activated.
- **Normal** The protection is in normal operation.
- **Dual** The protection has two classes, one during start and another during continuous run.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overload</td>
<td>Normal</td>
<td>No, Normal, Dual</td>
<td>Overload protection</td>
</tr>
</tbody>
</table>

*The motor temperature with time marking is stored for two hours after power loss.*

10:18 Overload protection class

**Path in menu:**
Menu/SETTINGS/Functional Settings/
Protections/Overload/OL Class

This parameter makes it possible to set the required class of the motor overload protection. Four different classes are available according to figure 13.

- Class 10A
- Class 10
- Class 20
- Class 30

![Figure 13: Tripping curves for the electronic overload](image)

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OL Class</td>
<td>10</td>
<td>10A, 10, 20, 30</td>
<td>Overload class</td>
</tr>
</tbody>
</table>

A Class 30
B Class 20
C Class 10
D Class 10A
10:19 Overload protection, dual type, start class

Path in menu:
Menu/SETTINGS/Functional Settings/
Protections/Overload/Dual Class S

This parameter makes it possible to set the required class of the overload protection during start. When full voltage is reached there will be a switch-over to run class after 30 seconds. (see below).

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OL Class S</td>
<td>10</td>
<td>10A, 10, 20, 30</td>
<td>Overload class, Dual type, Start Class</td>
</tr>
</tbody>
</table>

10:20 Overload protection, dual type, run class

Path in menu:
Menu/SETTINGS/Functional Settings/
Protections/Overload/Dual Class R

This parameter makes it possible to set the required class of the overload protection for continuous run. The run class is activated 30 seconds after full voltage has been reached.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OL Class R</td>
<td>10</td>
<td>10A, 10, 20, 30</td>
<td>Overload class, Dual type, Run Class</td>
</tr>
</tbody>
</table>
10:21 Overload protection, type of operation

Path in menu:
Menu/SETTINGS/Functional Settings/
Protections/Overload/OL Op

This parameter makes it possible to select between three different actions by the softstarter when the protection is activated. It is active only if the motor overload protection is selected.

Stop–M The motor stops and a manual reset is required before restart.

Stop–A The motor stops and an automatic reset is performed when the fault disappears (motor temp. <80%)

Ind The motor continues to run but a fault indication is given.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OL Op</td>
<td>Stop–M</td>
<td>Stop–M, Stop–A, Ind</td>
<td>Type of operation for overload protection</td>
</tr>
</tbody>
</table>
10:22 Locked rotor protection

Path in menu:
Menu/SETTINGS/Functional Settings/
Protections/Locked Rotor

If the motor current exceeds the set level and the set time when the motor is running at full voltage, this protection is activated. The protection starts monitoring when full voltage is applied to the motor.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Locked Rotor</td>
<td>No</td>
<td>Yes, No</td>
<td>Locked rotor protection</td>
</tr>
</tbody>
</table>

10:23 Locked rotor protection level

Path in menu:
Menu/SETTINGS/Functional Settings/
Protections/Locked Rotor/Lock R Lev

This function makes it possible to set the level of the locked rotor protection. It is active only if Locked rotor protection is selected.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lock R Lev</td>
<td>4.0 x Ie</td>
<td>0.5...8.0 x Ie</td>
<td>Trip level for locked rotor protection</td>
</tr>
</tbody>
</table>
10:24 Locked rotor protection time

Path in menu:
Menu/SETTINGS/Functional Settings/
Protections/Locked Rotor/Lock R Time

This parameter makes it possible to set the delay time from
detection until activation of the protection.
It is active only if Locked rotor protection is selected.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lock R Time</td>
<td>1.0 s</td>
<td>0.2...10.0 s</td>
<td>Trip time for locked rotor protec-</td>
</tr>
</tbody>
</table>

10:25 Locked rotor protection, type of operation

Path in menu:
Menu/SETTINGS/Functional Settings/
Protections/Locked Rotor/Lock R Op

This parameter makes it possible to select between three
different actions of the softstarter when the protection is
activated. It is active only if the Locked rotor protection is
selected.

Stop–M The motor stops and a manual reset is required
before restart.

Stop–A The motor stops and an automatic reset is
performed when the fault disappears.

Ind The motor continues to run but a fault indication
is given.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lock R Op</td>
<td>Stop–M</td>
<td>Stop–M, Stop–A, Ind</td>
<td>Type of operation for locked rotor protection</td>
</tr>
</tbody>
</table>
10:26 Underload protection

Path in menu:
Menu/SETTINGS/Functional Settings/
Protections/Underload

If the motor current falls below the set level and the set time when the motor is running at full voltage, the protection is activated. The protection starts monitoring when full voltage is applied to the motor.

This protection could be used to avoid for example a pump running dry, detect a broken belt or similar.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underload</td>
<td>No</td>
<td>Yes, No</td>
<td>Underload protection</td>
</tr>
</tbody>
</table>

10:27 Underload protection level

Path in menu:
Menu/SETTINGS/Functional Settings/
Protections/Underload/Underl Lev

This parameter makes it possible to set the level of the underload protection. It is active only if the underload protection is selected.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underl Lev</td>
<td>0.5 ( x \ I_e )</td>
<td>0.4...0.8 ( x \ I_e )</td>
<td>Trip level for Underload protection</td>
</tr>
</tbody>
</table>
10:28 Underload protection time

Path in menu:
Menu/SETTINGS/Functional Settings/
Protections/Underload/Underl Time

This parameter makes it possible to set the delay time from
detection until the protection is activated. It is active only if
underload protection is selected.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underl Time</td>
<td>10 s</td>
<td>1...30 s</td>
<td>Trip time for Underload protection</td>
</tr>
</tbody>
</table>

10:29 Underload protection, type of operation

Path in menu:
Menu/SETTINGS/Functional Settings/
Protections/Underload/Underl Op

This parameter makes it possible to select between three
different actions of the softstarter when the protection is
activated. It is active only if the underload protection is
selected.

Stop–M The motor stops and a manual reset is required
before restart.

Stop–A The motor stops and an automatic reset is
performed when the fault disappears.

Ind The motor continues to run but a fault indication
is given.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underl Op</td>
<td>Stop–M</td>
<td>Stop–M, Stop–A, Ind</td>
<td>Type of operation for Underload protection</td>
</tr>
</tbody>
</table>
10:30 Phase imbalance protection

Path in menu:
Menu/SETTINGS/Functional Settings/
Protections/Phase Imb

If the current in one phase differs from another phase with
more than the set level the protection is activated.
The protection starts monitoring 30 seconds after full voltage,
and trips after 10 seconds of imbalance.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase Imb</td>
<td>No</td>
<td>Yes, No</td>
<td>Phase imbalance protection</td>
</tr>
</tbody>
</table>

10:31 Phase imbalance protection level

Path in menu:
Menu/SETTINGS/Functional Settings/
Protections/Phase Imb/Ph Imb Lev

This parameter makes it possible to set the level of the phase
imbalance protection. It is active only if the Phase imbalance
protection is selected.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
</table>
| Ph Imb Lev     | 80%           | 10...80%      | Trip level for Phase imbal-
                        |   ance protection         |
10:32 Phase imbalance protection, type of operation

Path in menu:
Menu/SETTINGS/Functional Settings/
Protections/Phase Imb/Phase Imb Op

This parameter makes it possible to select between three different actions of the softstarter when the protection is activated. It is active only if the phase imbalance protection is selected.

- **Stop–M**: The motor stops and a manual reset is required before restart.
- **Stop–A**: The motor stops and an automatic reset is performed when the fault disappears.
- **Ind**: The motor continues to run but a fault indication is given.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ph Imb Op</td>
<td>Stop–M</td>
<td>Stop–M, Stop–A, Ind</td>
<td>Type of operation for Phase imbalance protection</td>
</tr>
</tbody>
</table>

10:33 High current protection

Path in menu:
Menu/SETTINGS/Functional Settings/
Protections/High I

This is a current protection with a fixed level of 8 x Ie during 200 ms. The protection is activated if the current exceeds this level and time.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>High I</td>
<td>No</td>
<td>Yes, No</td>
<td>High current protection</td>
</tr>
</tbody>
</table>
10:34 High current protection, type of operation

Path in menu:
Menu/SETTINGS/Functional Settings/
Protections/High I/High I Op

This parameter makes it possible to select between three different actions of the softstarter when the protection is activated. It is active only if the high current protection is selected.

- Stop–M: The motor stops and a manual reset is required before restart.
- Stop–A: The motor stops and an automatic reset is performed when the fault disappears.
- Ind: The motor continues to run but a fault indication is given.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>High I Op</td>
<td>Stop–M</td>
<td>Stop–M, Stop–A, Ind</td>
<td>Type of operation for high current protection</td>
</tr>
</tbody>
</table>

10:35 Phase reversal protection

Path in menu:
Menu/SETTINGS/Functional Settings/
Protections/Phase Rev

The softstarter accepts any phase sequence but if this protection is selected, the phase sequence must be L1, L2, L3, or else the protection is activated.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase Rev</td>
<td>No</td>
<td>Yes, No</td>
<td>Phase reversal protection</td>
</tr>
</tbody>
</table>
10:36 Phase reversal protection, type of operation

Path in menu:
Menu/SETTINGS/Functional Settings/
Protections/Phase Rev/Ph Rev Op

This parameter makes it possible to select between three different actions of the softstarter when the protection is activated. It is active only if the phase reversal protection is selected.

Stop–M The motor stops and a manual reset is required before restart.

Stop–A The motor stops and an automatic reset is performed when the fault disappears.

Ind The motor continues to run but a fault indication is given.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ph Rev Op</td>
<td>Stop–M</td>
<td>Stop–M, Stop–A, Ind</td>
<td>Type of operation for phase reversal protection</td>
</tr>
</tbody>
</table>

10:37 PTC protection

Path in menu:
Menu/SETTINGS/Functional Settings/
Protections/PTC

The softstarter has an input for an external PTC thermistor that can be used independent of the built-in electronic overload protection status.

The terminals used for the PTC input are also used for the analog output, so only one of these functions can be used.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTC</td>
<td>No</td>
<td>Yes, No</td>
<td>PTC protection</td>
</tr>
</tbody>
</table>
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10:38 PTC protection, type of operation

Path in menu:
Menu/SETTINGS/Functional Settings/
Protections/PTC/PTC Op

This parameter makes it possible to select between three different actions of the softstarter when the protection is activated. It is active only if the PTC protection is selected.

- Stop–M The motor stops and a manual reset is required before restart.
- Stop–A The motor stops and an automatic reset is performed when the fault disappears.
- Ind The motor continues to run but a fault indication is given.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTC Op</td>
<td>Stop M</td>
<td>Stop–M, Stop–A, Ind</td>
<td>Type of operation for PTC protection</td>
</tr>
</tbody>
</table>

10:39 External by-pass

Path in menu:
Menu/SETTINGS/Functional Settings/
Start/Stop/Ext ByPass

This parameter defines whether an external By-Pass contactor is used or not.

If an external By-pass contactor is used, an output relay should be configured as TOR and be connected to the contactor. The by-pass contactor is then activated when the voltage reaches 100% and the current has been below 1.2 \times I_e continuously for 1 s or after a 3 s timeout.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ext ByPass</td>
<td>No</td>
<td>Yes, No</td>
<td>An external Bypass contactor is used</td>
</tr>
</tbody>
</table>
10:40 High current warning

Path in menu:
Menu/SETTINGS/Functional Settings/
Warnings/Warn I=High

If the function is selected, a warning signal will be given provided that the current during full voltage is higher than the set value. The measurement starts 30 seconds after full voltage is reached.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warn I=High</td>
<td>No</td>
<td>Yes, No</td>
<td>High current warning</td>
</tr>
</tbody>
</table>

10:41 High current warning level

Path in menu:
Menu/SETTINGS/Functional Settings/
Warnings/Warn I=High/Wa I=H Lev

This parameter makes it possible to set the indication level of the high current warning function.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>WA I=H Lev</td>
<td>1.2 x I_e</td>
<td>0.5...5.0 x I_e</td>
<td>Trip level for high current warning</td>
</tr>
</tbody>
</table>

10:42 Low current warning

Path in menu:
Menu/SETTINGS/Functional Settings/
Warnings/Warn I=Low

If the function is selected, a warning signal will be given provided that the current during full voltage is lower than the set value. The measurement starts 30 seconds after full voltage is reached.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wa I=Low</td>
<td>No</td>
<td>Yes, No</td>
<td>Low current warning</td>
</tr>
</tbody>
</table>
### 10:43 Low current warning level

Path in menu:
Menu/SETTINGS/Functional Settings/
Warnings/Warn I=Low/Wa I=L Lev

This parameter makes it possible to set the indication level of the low current warning function.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wa I = L Lev</td>
<td>0.8 x Ie</td>
<td>0.4...1.0 x Ie</td>
<td>Trip level for low current warning</td>
</tr>
</tbody>
</table>

### 10:44 Overload warning

Path in menu:
Menu/SETTINGS/Functional Settings/
Warnings/Warn OL

If the function is selected a warning signal will be given that the overload protection will be activated, if the motor load does not decrease.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warn OL</td>
<td>No</td>
<td>Yes, No</td>
<td>Overload warning</td>
</tr>
</tbody>
</table>

### 10:45 Overload warning level

Path in menu:
Menu/SETTINGS/Functional Settings/
Warnings/Warn OL/Wa OL Lev

This parameter makes it possible to set the indication level of the motor overload protection. The actual trip level of the protection is represented by 100%.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wa OL Lev</td>
<td>90%</td>
<td>40...99%</td>
<td>Trip level for overload warning</td>
</tr>
</tbody>
</table>
10:46 Thyristor (SCR) overload warning

Path in menu:
Menu/SETTINGS/Functional Settings/
Warnings/Warn SCR OL

If this function is selected, a warning signal will be given that
the thyristor overload protection will be activated, if the
current does not decrease. The warning level is 90%.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warn SCR OL</td>
<td>No</td>
<td>Yes, No</td>
<td>Thyristor overload warning</td>
</tr>
</tbody>
</table>

10:47 Phase loss fault, type of operation

Path in menu:
Menu/SETTINGS/Functional Settings/
Faults/Ph Loss Op

This parameter makes it possible to select between two
different actions of the softstarter if a phase loss fault occurs.

Stop–M  The motor stops and a manual reset is required
before restart.

Stop–A  The motor stops and an automatic reset is
performed when the fault disappears.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ph Loss Op</td>
<td>Stop–M</td>
<td>Stop–M, Stop–A</td>
<td>Type of operation for phase loss fault</td>
</tr>
</tbody>
</table>

10:48 Fieldbus fault, type of operation

Path in menu:
Menu/SETTINGS/Functional Settings/
Faults/FB Fault Op

This parameter makes it possible to select between two
different actions of the softstarter if a fault occurs in the
fieldbus communication.

Stop–M  The motor stops and a manual reset is required
before restart.

Stop–A  The motor stops and an automatic reset is
performed when the fault disappears.
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10:49 Frequency fault, type of operation

Path in menu:
Menu/SETTINGS/Functional Settings/
Faults/Freq F Op

This parameter makes it possible to select between two
different actions of the softstarter if the frequency is out of
range (frequency fault).

Stop–M  The motor stops and a manual reset is required
before restart.

Stop–A  The motor stops and an automatic reset is
performed when the fault disappears.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FB Fault Op</td>
<td>Stop–M</td>
<td>Stop–M, Stop–A</td>
<td>Type of operation for fieldbus fault</td>
</tr>
<tr>
<td>Freq F Op</td>
<td>Stop–M</td>
<td>Stop–M, Stop–A</td>
<td>Type of operation for frequency fault</td>
</tr>
</tbody>
</table>

10:50 Heat sink over-temperature fault, type of operation

Path in menu:
Menu/SETTINGS/Functional Settings/
Faults/HS Temp Op

This parameter makes it possible to select between two
different actions if the heat sink temperature of the softstarter
is too high.

Stop–M  The motor stops and a manual reset is required
before restart.

Stop–A  The motor stops and an automatic reset is
performed when the fault disappears.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>HS Temp Op</td>
<td>Stop–M</td>
<td>Stop–M, Stop–A</td>
<td>Type of operation for heat sink over temperature fault</td>
</tr>
</tbody>
</table>
10:51 Thyristor short circuit fault, type of operation

Path in menu:
Menu/SETTINGS/Functional Settings/Faults/SCR SC Op

If one or several thyristors are shorted, this parameter makes it possible to select between two different actions of the softstarter.

Stop–M  The motor stops and a manual reset is required before restart.

Stop–A  The motor stops and an automatic reset is performed when the fault disappears.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCR SC Op</td>
<td>Stop–M</td>
<td>Stop–M, Stop–A</td>
<td>Type of operation for thyristor short circuit fault</td>
</tr>
</tbody>
</table>

10:52 By-pass doesn’t open fault, type of operation

Path in menu:
Menu/SETTINGS/Functional Settings/Faults/ BP Closed Op

This parameter makes it possible to select between two different actions of the softstarter if the by-pass contactor does not open in a proper way.

Stop-M  The motor stops and a manual reset is required before restart.

Stop-A  The motor stops and an automatic reset is performed when the fault disappears.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BP Closed Op</td>
<td>Stop–M</td>
<td>Stop–M, Stop–A</td>
<td>Type of operation if the by-pass does not open</td>
</tr>
</tbody>
</table>
10:53 By-pass doesn't close fault, type of operation

Path in menu:
Menu/SETTINGS/Functional Settings/Faults/BP Open Op

This parameter makes it possible to select between two different actions of the softstarter if the by-pass contactor does not close in a proper way.

Stop-M The motor stops and a manual reset is required before restart.

Stop-A The motor stops and an automatic reset is performed when the fault disappears.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BP Open Op</td>
<td>Stop-M</td>
<td>Stop-M, Stop-A</td>
<td>Type of operation if the by-pass does not close</td>
</tr>
</tbody>
</table>

10:54 Programmable inputs, In0 and In1

Path in menu:
Menu/SETTINGS/Functional Settings/Inputs/In0 / In1

The softstarter has two programmable inputs, In0 and In1. They can be used for different purposes depending on the selected function, independently of each other.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>In0</td>
<td>Reset</td>
<td>None, Reset, Enable, Jog, DOL, Start2, FB-Dis</td>
<td>Function of programmable input In0</td>
</tr>
<tr>
<td>In1</td>
<td>Reset</td>
<td>None, Reset, Enable, Jog, DOL, Start3, FB-Dis</td>
<td>Function of programmable input In1</td>
</tr>
</tbody>
</table>

Caution!

The motor may start unexpectedly if there is a start signal present when doing any of the actions listed below.
• Switching from one type of control to another (fieldbus control / hardwire control)
• Re-programming of the programmable inputs
• Reset all Settings (programmable input set to Enable)

**Warning!**

*Terminal 4, 5, 6, 7, 8, 9, 10, and 11 should be connected using 24V DC only. Other voltages may damage the softstarter and the warranty may no longer be valid.*

*Figure 14: Internal control voltage*  
*Figure 15: External control voltage*
10:55 Programmable output relays, K4, K5, and K6

Path in menu:
Menu/SETTINGS/Functional Settings/
Outputs/Relay K4 / K5 / K6

Switch over relays

The softstarter has three programmable output relays that can be used for different purposes depending on the selected function, independently of each other:
Relay K4 has default setting Run, relay K5 has default setting Top of Ramp and relay K6 has default setting Event.

Run signal is given during start ramp, running, and stop ramp if used. Can be used to control the line contactor.

Top of Ramp signal is given when full voltage to the motor is applied. Can be used to control an external by-pass contactor.

The event function has several alternatives that can be switched On/Off as required.

One, several or all indications can be used individually, independently of each other at the same time for each output relay.

• Overload Protection
• Fault group
• High current protection
• Thyristor overload protection
• Locked rotor protection
• Underload protection
• Phase imbalance protection
• PTC protection
• Phase reversal protection
• Overload warning
• Thyristor overload warning
• High current warning
• Low current warning
• Shunt fault group
Description

2 fault groups can be selected. If any of the faults in a fault group occurs, a fault signal is given.

Fault group consists of:

• Phase loss fault
• Fieldbus fault
• Frequency fault
• Heat sink over-temperature fault
• By-pass doesn’t open fault
• Connection fault
• Non conducting thyristor fault
• Line side fault
• Kick-current fault
• Internal fault
• Fault Line/Delta

Shunt fault group consists of:

• Thyristor short circuit fault
• By-pass doesn’t open fault

The shunt fault signal can be used to trip an upstream breaker in case the softstarter is not able to stop the motor.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relay K4</td>
<td>Run</td>
<td>Run, TOR, Event</td>
<td>Function of programmable relay output K4.</td>
</tr>
<tr>
<td>Relay K5</td>
<td>TOR</td>
<td>Run, TOR, Event</td>
<td>Function of programmable relay output K5.</td>
</tr>
</tbody>
</table>
10:56 Programmable software output V7

Path in menu:
Menu/SETTINGS/Functional Settings/
Outputs/SW Outp V7

If the softstarter is used with fieldbus communication, a fourth output is available. This is a software output only and the signal can be taken only through the fieldbus interface. (See 50 “Programmable output relays, K4, K5, and K6” for further explanations.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SW Outp V7</td>
<td>Event</td>
<td>Run, TOR, Event</td>
<td>Function of programmable software output V7.</td>
</tr>
</tbody>
</table>

10:57 Analog output

Path in menu:
Menu/SETTINGS/Functional Settings/
Analog Output /Analog Out

With this parameter it is possible to enable the analog output.

The softstarter has one analog output. The terminals used for the analog output are also used for the PTC protection though, so only one of these functions can be used at any given time.

*When sequence start is used, the analog output is only active for the last started motor.*

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analog Out</td>
<td>No</td>
<td>Yes, No</td>
<td>Enable analog output</td>
</tr>
</tbody>
</table>
10:58 Analog output, reference

Path in menu:
Menu/SETTINGS/Functional Settings/
Analog Output /Anl Ref

With this parameter it is possible to set the unit and the range of the signal to output. This selected range will be the physical output from the softstarter. This range should be selected to suit the analog meter or the PLC that uses this signal as its input. The possible options are:

- 0-10 V
- 0-20 mA
- 4-20 mA

If for instance 4-20 mA is selected, then this range will represent 0-100% of the output signal, for instance the current of the motor.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anl Ref</td>
<td>4...20 mA</td>
<td>0...10V, 0...20mA, 4...20mA</td>
<td>The type of the output signal of the analog output</td>
</tr>
</tbody>
</table>

10:59 Analog output, type of value

Path in menu:
Menu/SETTINGS/Functional Settings/
Analog Output /Anl Type

With this parameter it is possible to set which type of value that should be the output of the analog output. The possible types of values are:

I Amp    Current of the motor
U Volt   Main voltage
P kW     Active power kW
P hp     Active power hp
Q kVAR   Reactive power
S kVA    Apparent power
TmpMot   Calculated temperature of the motor
TmpSCR   Calculated temperature of the SCR
cosPhi   Power factor
With this parameter it is possible to set the value that will be represented as the maximum value by an analog meter or by a PLC. If for instance this parameter is set to 20000A, then 0-20000A will be represented by 0-100% by a PLC or an analog meter.

If the actual value happens to be greater than the selected maximum value then the actual value will still only be represented as the selected maximum value. This can be useful if for instance very large currents occur during start and only the currents during continuous run are of interest.

The possible range and the unit depend on which type of output is selected. The range for the different output types are listed below:

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anl Type</td>
<td>I Amp</td>
<td>I Amp, U Volt, P kW, P hp, Q kVar, S kVA, TmpMot, TmpSCR, cosPhi</td>
<td>The type of value to output from the analog output</td>
</tr>
</tbody>
</table>

10:60 Analog output, range max

Path in menu:
Menu/SETTINGS/Functional Settings/Analog Output/ I/U/P/Q/S Range Max

Current of the motor | I Range Max | 10-20000A
Main voltage        | U Range Max | 10-1000 V
Active power kW     | kW Range Max | 1-3000 kW
Active power hp     | hp Range Max | 1-4000 hp
Reactive power      | Q Range Max | 1-3000 kVar
Apparent power      | S Range Max | 1-3000 kVA

Only the valid parameter is displayed. If for instance I Amp is selected as output type, then only I Range Max will appear. If TmpMot, TmpSCR or cosPhi is selected as output type, this range parameter will not appear at all. When selecting TmpMot or TmpSCR the range will always be 0-100% and when selecting cosPhi the range will be 0-1.
10:61 Fieldbus control

Path in menu:
Menu/SETTINGS/Functional Settings/
Fieldbus/Fieldb Ctrl

If the softstarter is going to be used with fieldbus communication, the fieldbus interface must be activated before any action can be taken.

Caution!

The motor may start unexpectedly if there is a start signal present when doing any of the actions listed below.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>I Range Max</td>
<td>PST(B) size dependent</td>
<td>10...20000 A</td>
<td>Upper limit for the current for the analog output</td>
</tr>
<tr>
<td>U Range Max</td>
<td>600 V</td>
<td>10...1000 V</td>
<td>Upper limit for the voltage for the analog output</td>
</tr>
<tr>
<td>kW Range Max</td>
<td>PST(B) size dependent</td>
<td>1...3000 kW</td>
<td>Upper limit for the active power for the analog output</td>
</tr>
<tr>
<td>hp Range Max</td>
<td>PST(B) size dependent</td>
<td>1...4000 hp</td>
<td>Upper limit for the active power for the analog output</td>
</tr>
<tr>
<td>Q Range Max</td>
<td>PST(B) size dependent</td>
<td>1...3000 kVAr</td>
<td>Upper limit for the reactive power for the analog output</td>
</tr>
<tr>
<td>S Range Max</td>
<td>PST(B) size dependent</td>
<td>1...3000 kVA</td>
<td>Upper limit for the apparent power for the analog output</td>
</tr>
</tbody>
</table>
• Switching from one type of control to another (fieldbus control / hardwire control)
• Re-programming of the programmable inputs
• Reset all Settings (programmable input set to Enable)

### Parameter

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fieldb Ctrl</td>
<td>No</td>
<td>Yes, No</td>
<td>Control of the softstarter with fieldbus.</td>
</tr>
</tbody>
</table>

#### 10:62 Fieldbus type

**Path in menu:**
Menu/SETTINGS/Functional Settings/Fieldbus/Fieldb Ctrl/Fieldb Type

When the fieldbus communication is used, the present type of fieldbus must be selected.
The following fieldbus types are available in the softstarter:

- AS-Interface
- DeviceNet
- Profibus DP
- Modbus

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fieldb Type</td>
<td>Other</td>
<td>AS-Int, Other</td>
<td>Type of fieldbus, AS-Interface=short protocol. Other=long protocol.</td>
</tr>
</tbody>
</table>
10:63 Fieldbus address

Path in menu:
Menu/SETTINGS/Functional Settings/
Fieldbus/Fieldb Addr

With this parameter it is possible to set a fieldbus address for the softstarter. Select a suitable, not occupied number as the address.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fieldb Addr</td>
<td>0</td>
<td>0...1000</td>
<td>Fieldbus address</td>
</tr>
</tbody>
</table>

10:64 Fieldbus auto disable

Path in menu:
Menu/SETTINGS/Functional Settings/
Fieldbus/FB Auto Dis

This parameter enables the function fieldbus auto disable. With this function enabled, the control of the softstarter will automatically switch over from the fieldbus to the hard wire inputs if the fieldbus malfunctions for instance due to power loss or broken cable. When the fieldbus starts working again the control is automatically switched back to the fieldbus.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FB Auto Dis</td>
<td>No</td>
<td>Yes, No</td>
<td>Enable fieldbus auto disable</td>
</tr>
</tbody>
</table>

Caution!

The motor may start unexpectedly if there is a start signal present when doing any of the actions listed below.

- Switching from one type of control to another (fieldbus control / hardwire control). Remember that when Fieldbus auto disable is active, this switch can be done automatically.
- Re-programming of the programmable inputs
- Reset all Settings (programmable input set to Enable)
10:65 Sequence start, number of sequences

Path in menu:
Menu/SETTINGS/Functional Settings/
Seq Start/No of Seq

The softstarter can start motors with up to three different parameter sets (1st parameter set, 2nd parameter set and 3rd parameter set). This function can be used for starting motors in a sequence (one by one) and also for starting two or three speed motors where different starting parameters are required for each speed.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>No of Seq</td>
<td>No</td>
<td>No, 2, 3</td>
<td>Number of sequences for sequence start.</td>
</tr>
</tbody>
</table>

The LOCAL CONTROL menu can not be entered if Sequence start is selected.

10:66 Start ramp, first sequence

Path in menu:
Menu/SETTINGS/Functional Settings/
Seq Start/1st Seq. Param./Start Ramp1

This parameter makes it possible to set the start ramp time for the first parameter set.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start Ramp1</td>
<td>10 s</td>
<td>1...30s, 1...120s</td>
<td>First sequence, time for start ramp</td>
</tr>
</tbody>
</table>
10:67 Initial voltage, first sequence

Path in menu:
Menu/SETTINGS/Functional Settings/
Seq Start/1st Seq. Param./Init Volt1

This parameter makes it possible to set the initial voltage for the first parameter set

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Init Volt1</td>
<td>30%</td>
<td>30...70%</td>
<td>First sequence, initial voltage for start ramp</td>
</tr>
</tbody>
</table>

10:68 Current limit, first sequence

Path in menu:
Menu/SETTINGS/Functional Settings/
Seq Start/1st Seq. Param./Curr Lim1

This parameter makes it possible to set the current limit level for the first parameter set.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Curr Lim1</td>
<td>4 x Iₑ</td>
<td>2.0...7.0 x Iₑ</td>
<td>First sequence, current limit</td>
</tr>
</tbody>
</table>

10:69 Setting current, first sequence

Path in menu:
Menu/SETTINGS/Functional Settings/
Seq Start/1st Seq. Param./1st Set Iₑ

This parameter makes it possible to set the rated motor current for the first parameter set

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Set Iₑ</td>
<td>Iₑ</td>
<td>9...1207A divided into 19 overlapping ranges</td>
<td>First sequence, motor rated current</td>
</tr>
</tbody>
</table>
10:70 Start ramp, second sequence

Path in menu:
Menu/SETTINGS/Functional Settings/
Seq Start/2nd Seq. Param./Start Ramp2

This parameter makes it possible to set the start ramp time for the second parameter set.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start Ramp2</td>
<td>10 s</td>
<td>1...30s, 1...120s</td>
<td>Second sequence, time for start ramp</td>
</tr>
</tbody>
</table>

10:71 Initial voltage, second sequence

Path in menu:
Menu/SETTINGS/Functional Settings/
Seq Start/2nd Seq. Param./Init Volt2

This parameter makes it possible to set the initial voltage for the second parameter set.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Init Volt2</td>
<td>30%</td>
<td>30...70%</td>
<td>Second sequence, initial voltage for start ramp</td>
</tr>
</tbody>
</table>

10:72 Current limit, second sequence

Path in menu:
Menu/SETTINGS/Functional Settings/
Seq Start/2nd Seq. Param./Curr Lim2

This parameter makes it possible to set the current limit level for the second parameter set.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Curr Lim2</td>
<td>4 x Ie</td>
<td>2.0...7.0 x Ie</td>
<td>Second sequence, current limit</td>
</tr>
</tbody>
</table>
10:73 Setting current, second sequence

Path in menu:
Menu/SETTINGS/Functional Settings/
Seq Start/2nd Seq. Param./2nd Set Ie

This parameter makes it possible to set the rated motor current for the second parameter set.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2nd Set Ie</td>
<td>Ir</td>
<td>9...1207A divided into 19 overlapping ranges</td>
<td>Second sequence, motor rated current</td>
</tr>
</tbody>
</table>

10:74 Start ramp, third sequence

Path in menu:
Menu/SETTINGS/Functional Settings/
Seq Start/3rd Seq. Param./Start Ramp3

This parameter makes it possible to set the start ramp time for the third parameter set.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start Ramp3</td>
<td>10 s</td>
<td>1...30s, 1...120s</td>
<td>Third sequence, time for start ramp</td>
</tr>
</tbody>
</table>

10:75 Initial voltage, third sequence

Path in menu:
Menu/SETTINGS/Functional Settings/
Seq Start/3rd Seq. Param./Init Volt3

This parameter makes it possible to set the initial voltage for the third parameter set.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Init Volt3</td>
<td>30%</td>
<td>30...70%</td>
<td>Third sequence, initial voltage for start ramp</td>
</tr>
</tbody>
</table>
10:76 Current limit, third sequence

Path in menu:
Menu/SETTINGS/Functional Settings/
Seq Start/3rd Seq. Param./Curr Lim3

This parameter makes it possible to set the current limit level for the third parameter set.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Curr Lim3</td>
<td>4 x Ie</td>
<td>2.0...7.0 x Ie</td>
<td>Third sequence, current limit</td>
</tr>
</tbody>
</table>

10:77 Setting current, third sequence

Path in menu:
Menu/SETTINGS/Functional Settings/
Seq. Start/3rd Seq. Param./3rd Set le

This parameter makes it possible to set the rated motor current for the third parameter set.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3rd Set le</td>
<td>Ir</td>
<td>9...1207A divided into 19 overlapping ranges</td>
<td>Third sequence, motor rated current</td>
</tr>
</tbody>
</table>
10:78 Language

Path in menu:
Menu/SETTINGS/Presentation Set./Language

The text on the LCD display can be presented in 13 different languages. This parameter makes it possible to select among the following languages:

- English
- Polish
- Turkish
- Russian
- Chinese
- German
- Spanish
- French
- Italian
- Dutch
- Portuguese
- Swedish
- Finnish

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language</td>
<td>Individual</td>
<td>US/UK, PL, TR, RU, CN, DE, ES, FR, IT, NL, PT, SE, FI</td>
<td>Language to use on display</td>
</tr>
</tbody>
</table>

10:79 LCD automatic switch-off

Path in menu:
Menu/SETTINGS/Presentation Set./LCD Auto Off

The LCD display on the softstarter will be automatically switched off by a pre-set time. This time is always calculated from the last key pressure.
With this parameter it is possible to set this time.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCD Auto Off</td>
<td>15 min</td>
<td>1...255 min</td>
<td>Time for display automatic turn off</td>
</tr>
</tbody>
</table>
10:80 Password

Path in menu: Top level
Press Upper navigation key once.

This parameter makes it possible to set a password when locking the keypad from controlling and changing the settings. All menus are available when the keypad is locked but no changes or actions can be done.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change Password</td>
<td>No</td>
<td>No, 1...255</td>
<td>Password for display</td>
</tr>
</tbody>
</table>

10:81 Date type

Path in menu:
Menu/SETTINGS/Presentation Set./Date Type

This parameter makes it possible to select the required type of date presentation on the LCD display. The following three options are available:

- ISO Year - Month - Day
- CE Day - Month - Year
- US Month - Day - Year

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date Type</td>
<td>ISO</td>
<td>ISO, CE US</td>
<td>Type of date presentation</td>
</tr>
</tbody>
</table>
10:82 Year

Path in menu:
Menu/SETTINGS/Presentation Set./Date Year

This parameter makes it possible to set the current year for the real time clock.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date Year</td>
<td>Individual</td>
<td>1901...2038</td>
<td>Year</td>
</tr>
</tbody>
</table>

10:83 Month

Path in menu:
Menu/SETTINGS/Presentation Set./Date Month

This parameter makes it possible to set the current month for the real time clock.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date Month</td>
<td>Individual</td>
<td>1...12</td>
<td>Month</td>
</tr>
</tbody>
</table>

10:84 Day

Path in menu:
Menu/SETTINGS/Presentation Set.Date Day

This parameter makes it possible to set the current day for the real time clock.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date Day</td>
<td>Individual</td>
<td>1...31</td>
<td>Day</td>
</tr>
</tbody>
</table>
10:85 Hour

Path in menu:
Menu/SETTINGS/Presentation Set./Time Hour

This parameter makes it possible to set the current hour for the real time clock.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time Hour</td>
<td>Individual</td>
<td>0...23</td>
<td>Hour</td>
</tr>
</tbody>
</table>

10:86 Minutes

Path in menu:
Menu/SETTINGS/Presentation Set./Time Min

This parameter makes it possible to set the current minutes for the real time clock.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time Min</td>
<td>Individual</td>
<td>0...59</td>
<td>Minutes</td>
</tr>
</tbody>
</table>


### 10:87 Dual current limit time

#### Path in menu:
Menu/SETTINGS/All Settings/C Lim Y Time

With this softstarter it is possible to use two different current limits: one which is active initially and a second one which is controlled by a timer and goes active when the timer runs out. This variable makes it possible to set the timer and thereby decide after how long time the current limit should switch from the normal current limit to the second current limit. The second current limit is only active when this variable is set to any value other than zero. This functionality is not available when sequence start is used.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>C Lim Y Time</td>
<td>0 s</td>
<td>0...120 s</td>
<td>Time until the second current limit will be used instead of the normal current limit</td>
</tr>
</tbody>
</table>

![Figure 16: Dual current limit](image.png)

### 10:88 Dual current limit level

#### Path in menu:
Menu/SETTINGS/All Settings/C Lim Y Lev

When the second current limit is activated, this parameter specifies the level of the dual current limit. This functionality is not available when sequence start is used.

<table>
<thead>
<tr>
<th>Parameter text</th>
<th>Default value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>C Lim Y Lev</td>
<td>4.0 x Ie</td>
<td>2.0...7.0 x Ie</td>
<td>Level of the second current limit</td>
</tr>
</tbody>
</table>
Chapter 11 Trouble shooting

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Chapter 11 Trouble shooting

11:1 General

This chapter is a guide that can be used in case problems should arise with the softstarter or the application.

The softstarter normally indicates a fault with LED Fault, and the LCD displays what type of fault it is. When a protection is activated it will be indicated with LED Protection and the LCD displays what type of protection is active.

Faults not displayed in the softstarter can also be found in this chapter.

11:2 Overview of indications

This table shows in which state the different indications for protections, faults, and warnings may show up.

<table>
<thead>
<tr>
<th>LCD indication</th>
<th>Active when selected</th>
<th>Always active</th>
<th>Active when selected</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Overload protection</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Underload protection</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Locked rotor protection</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>High current protection</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Phase imbalance protection</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Phase reversal protection</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PTC protection</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Thyristor overload protection</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Thyristor loss fault</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Connection fault</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Frequency fault</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Line side fault</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Kick-current fault</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Thyristor short circuit fault</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Non conducting thyristor</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>By-pass doesn't open fault</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>By-pass doesn't close fault</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fault Line/Delta</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Overload warning</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Thyristor overload warning</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>High current warning</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Low current warning</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1) Only if Fieldbus control is selected
2) Only if Kick-start is selected
3) Only if by-pass is used
4) Only if by-pass is not used
## 11:3 General problems and faults

<table>
<thead>
<tr>
<th>Status</th>
<th>Possible cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor humming / starts without given start signal.</td>
<td>Shorted thyristor.</td>
<td>• Check and replace.</td>
</tr>
<tr>
<td></td>
<td>By-pass contactor stuck in closed position.</td>
<td>• Check and correct the reason.</td>
</tr>
<tr>
<td>Bad motor sound during start and operation.</td>
<td>Inside Delta connection wrong.</td>
<td>• Check and correct the wiring.</td>
</tr>
<tr>
<td>Bad motor sound during stop.</td>
<td>Wrong ramp time for stop.</td>
<td>• Try different ramp times (some adjustments can be necessary for best result).</td>
</tr>
<tr>
<td>Motor does not start when giving start command using the hardware inputs.</td>
<td>Control wiring not correct Start and stop command given at the same time. Keypad is in Local Control menu.</td>
<td>• Check connections for start and stop.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check that start and stop command is not given at the same time.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check that the keypad is not in Local Control menu.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check that parameter Fieldbus Ctrl is set to No.</td>
</tr>
<tr>
<td>Motor does not start when giving start command using the fieldbus communication.</td>
<td>Setting of fieldbus parameter wrong.</td>
<td>• Check that parameter Fieldbus Ctrl is set to Yes.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check that bit &quot;Enable&quot; is used.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check that programmable inputs have correct settings.</td>
</tr>
<tr>
<td>Displayed current in LCD does not correspond to motor current.</td>
<td>Inside Delta connection.</td>
<td>• If the softstarter is connected Inside Delta, the current displayed is 58% (1/√3) of the motor current.</td>
</tr>
<tr>
<td>Displayed current in LCD is not stable.</td>
<td>The motor is too small. The load on the motor is too small. (current is out of measuring range).</td>
<td>• Check that the softstarter corresponds to the motor size.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Increase the load if possible.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check that softstarter and motor sizes correspond.</td>
</tr>
<tr>
<td>Loading of parameters does not work properly.</td>
<td>Fieldbus settings.</td>
<td>• See chapter Fieldbus for actual fieldbus type.</td>
</tr>
</tbody>
</table>
## 11:4 Start up faults

<table>
<thead>
<tr>
<th>Status</th>
<th>Possible cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCD Auto shut off the keypad.</td>
<td>• Touch any key on the keypad.</td>
<td></td>
</tr>
<tr>
<td>Supply voltage is not connected.</td>
<td>• Connect the Supply voltage according to the circuit diagram.</td>
<td></td>
</tr>
</tbody>
</table>

### Phase loss fault
- The main contactor or circuit breaker is open
- Fuse blown.
- Any external device open / tripped.
- Main contactor opens too quickly
  - • Check and close contactor / breaker or any external switching device.
  - • Check and replace the fuse in all three (3) phases.
  - • Add a time delay before opening.

### Connection fault
- The motor connection is not correct.
- Shorted thyristor at start.
- **In Line connected**
  - • Check that there are no connections missing to the motor.
  - • Check that the connections are carried out correctly.
  - • Check and replace.
- **Inside Delta connected**
  - • Check that there are no connections missing to the motor.
  - • Check that the circuits are closed and correspond to the circuit diagram.
  - • Check and replace.
## Frequency fault

The frequency is out of range. (47.5 - 52.5Hz or 57 - 63Hz)

- Check and correct the frequency.

## Line side fault

The main voltage is not correct on the line side.

- Check and correct voltage on the line side.

## Heat sink over-temperature fault

Temperature too high on the heat sink. If the fault remains after reset, the heat sink temperature is too warm.

- Check that the fans are working in a proper way.
- Check that cooling airways are free from dirt and dust.
- Check that the ambient temperature is not too high.

## Kick-current fault

Parameter Setting $I_e$ is set too low.

**In Line connected**

- Set the value according to the rated motor current.

**Inside Delta**

- Set the value according to 58% ($\frac{1}{\sqrt{3}}$) of the rated motor current.

## Thyristor short circuit fault

One or several SCRs are shorted.

- Check and replace. Contact your ABB sales office for replacement kit.

## Non conducting thyristor

One or several SCRs are not conducting.

- Check and replace. Contact your ABB sales office for replacement kit.

### Status Table

<table>
<thead>
<tr>
<th>Status</th>
<th>Possible cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency fault</td>
<td>The frequency is out of range. (47.5 - 52.5Hz or 57 - 63Hz)</td>
<td>Check and correct the frequency.</td>
</tr>
<tr>
<td>Line side fault</td>
<td>The main voltage is not correct on the line side.</td>
<td>Check and correct voltage on the line side.</td>
</tr>
<tr>
<td>Heat sink over-temperature fault</td>
<td>Temperature too high on the heat sink. If the fault remains after reset, the heat sink temperature is too warm.</td>
<td>Check that the fans are working in a proper way.</td>
</tr>
<tr>
<td>Kick-current fault</td>
<td>Parameter Setting $I_e$ is set too low.</td>
<td><strong>In Line connected</strong></td>
</tr>
<tr>
<td>Thyristor short circuit fault</td>
<td>One or several SCRs are shorted.</td>
<td>Check and replace. Contact your ABB sales office for replacement kit.</td>
</tr>
<tr>
<td>Non conducting thyristor</td>
<td>One or several SCRs are not conducting.</td>
<td>Check and replace. Contact your ABB sales office for replacement kit.</td>
</tr>
</tbody>
</table>
## Trouble Shooting

### Chapter 11

**Fieldbus fault**
The fieldbus communication is not working.
- Check that the fieldbusplug is connected correctly.
- Check that correct type of fieldbusplug is used.
- Check that the parameter *Fieldbus Type* is set according to the present fieldbus type.

**By-pass doesn't open fault**
The by-pass contactor is not opening properly.

**Without by-pass**
- Check that the parameter *Ext ByPass* is set to No.

**With by-pass**
- Check why the contactor is not opening and make necessary actions.
- Check that the parameter *Ext ByPass* is set to Yes

**By-pass doesn't close fault**
The by-pass contactor is not closing properly.

**Without by-pass**
- Check that the parameter *Ext ByPass* is set to No.

**With by-pass**
- Check why the contactor is not closing and make necessary actions.
- Check that the parameter *Ext ByPass* is set to Yes

**Fault Line/Delta**
The softstarter is not able to accurately detect whether it is connected in line or inside delta. This is most likely due to unstable line side power supply.
- Restart the softstarter. If the same error occurs again, try to reduce the disturbances in the feeding network.

### Status and Possible Cause Table

<table>
<thead>
<tr>
<th>Status</th>
<th>Possible cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fieldbus fault</td>
<td>The fieldbus communication is not working.</td>
<td>- Check that the fieldbusplug is connected correctly.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Check that correct type of fieldbusplug is used.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Check that the parameter <em>Fieldbus Type</em> is set according to the present fieldbus type.</td>
</tr>
<tr>
<td>By-pass doesn't open fault</td>
<td>The by-pass contactor is not opening properly.</td>
<td><strong>Without by-pass</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Check that the parameter <em>Ext ByPass</em> is set to No.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>With by-pass</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Check why the contactor is not opening and make necessary actions.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Check that the parameter <em>Ext ByPass</em> is set to Yes</td>
</tr>
<tr>
<td>By-pass doesn't close fault</td>
<td>The by-pass contactor is not closing properly.</td>
<td><strong>Without by-pass</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Check that the parameter <em>Ext ByPass</em> is set to No.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>With by-pass</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Check why the contactor is not closing and make necessary actions.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Check that the parameter <em>Ext ByPass</em> is set to Yes</td>
</tr>
<tr>
<td>Fault Line/Delta</td>
<td>The softstarter is not able to accurately detect whether it is connected in line or inside delta. This is most likely due to unstable line side power supply.</td>
<td><strong>Solution</strong></td>
</tr>
</tbody>
</table>
## Internal faults

An internal communication fault of the softstarter has occurred.

- Disconnect and reconnect the supply voltage ($U_s$) and make a restart.
- If same fault remains, contact your ABB sales office.

<table>
<thead>
<tr>
<th>Status</th>
<th>Possible cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Internal faults</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fault Intern 1</td>
<td></td>
<td>• Disconnect and reconnect the supply voltage ($U_s$) and make a restart.</td>
</tr>
<tr>
<td>Reset Back</td>
<td></td>
<td>• If same fault remains, contact your ABB sales office.</td>
</tr>
<tr>
<td>Fault Intern 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reset Back</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fault Intern 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reset Back</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fault Intern 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reset Back</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fault Intern 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reset Back</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## 11:6 Protection indication

<table>
<thead>
<tr>
<th>Status</th>
<th>Possible cause</th>
<th>Solution</th>
</tr>
</thead>
</table>
| Overload protection   | The motor has been exposed to an overload condition because the current over a certain time is too high. (The load on the motor shaft is too high) | **In Line**  
**At start**  
• Check and correct the reason for the overload. Check that current limit level is not set too low.  
• Check that the ramp time for start is not too long.  
• Check that correct overload class is used.  
• Check that parameter Setting Ie is correct.  
**Continuous run**  
• Check and correct the reason for the overload.  

**Inside Delta**  
**At start**  
• Check and correct the reason for the overload.  
• Check that current limit level is not set too low.  
• Check that the ramp time for start is not too long.  
• Check that correct overload class is used.  
• Check that parameter Setting Ie is set to $58\% (1/\sqrt{3})$ of the rated motor current.  
**Continuous run**  
• Check and correct the reason for the overload
## Trouble shooting

### Chapter 11

#### Underload protection

- The motor current is below set level and time.
- Check and correct the reason for the underload.
- Check that the settings are according to the operation conditions.

#### Locked rotor protection

- The motor is running stiff by some reason.
- A damaged bearing or a stucked load could be possible causes.
- Check the bearings of the motor and load.
- Check that the load is not running stiff.

#### High current protection

- A fault current, higher than 8 times the softstarter ratings, has occurred.
- Check the circuits including the motor for any insulation fault phase to phase or earth fault.

#### Phase imbalance protection

- Unbalance in the phase currents.
- Check the main voltage and the motor circuit.
- Restart the motor and check the phase currents

#### Phase reversal protection

- The phase sequence is not correct.
- Change the phase sequence on the line side to (L1-L2-L3).

<table>
<thead>
<tr>
<th>Status</th>
<th>Possible cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underload protection</td>
<td>The motor current is below set level and time.</td>
<td>- Check and correct the reason for the underload.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Check that the settings are according to the operation conditions.</td>
</tr>
<tr>
<td>Locked rotor protection</td>
<td>The motor is running stiff by some reason.</td>
<td>- Check the bearings of the motor and load.</td>
</tr>
<tr>
<td></td>
<td>A damaged bearing or a stucked load could be possible causes.</td>
<td>- Check that the load is not running stiff.</td>
</tr>
<tr>
<td>High current protection</td>
<td>A fault current, higher than 8 times the softstarter ratings, has occurred.</td>
<td>- Check the circuits including the motor for any insulation fault phase to phase or earth fault.</td>
</tr>
<tr>
<td>Phase imbalance protection</td>
<td>Unbalance in the phase currents.</td>
<td>- Check the main voltage and the motor circuit.</td>
</tr>
<tr>
<td>Phase reversal protection</td>
<td>The phase sequence is not correct.</td>
<td>- Change the phase sequence on the line side to (L1-L2-L3).</td>
</tr>
</tbody>
</table>
### PTC protection

- An over-temperature is detected by the PTC thermistors in the motor.
  - Check that the PTC circuit is closed and that the inputs are connected.
  - Check and correct the reason for the overheating.
  - Wait for the motor to cool sufficiently and restart.

### Thyristor overload protection

- The softstarter is too small.
  - Too many starts / hour.
  - The ramp time for start is too long.
  - Check and replace the softstarter with one of a suitable size.
  - Check and decrease number of starts / hour.
  - Check that current limit level is not set too low.
  - Check that the ramp time for start is not too long.
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Chapter 12 Diagrams

12:1 Circuit diagram PST30...PST300

Figure 1: Circuit diagram PST30...300 (IEC version)

Terminal 3 is a function earth, it is not a protection earth. It shall be connected to the mounting plate.

Figure 2: Circuit diagram PST30...300 (UL version)
12:2 Circuit diagram

**PSTB370...PSTB1050**

Figure 3: Circuit diagram PSTB370...PSTB1050 (IEC version)

Terminal 3 is a function earth, it is not a protection earth. It shall be connected to the mounting plate.

Figure 4: Circuit diagram PSTB370...1050 (UL version)
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