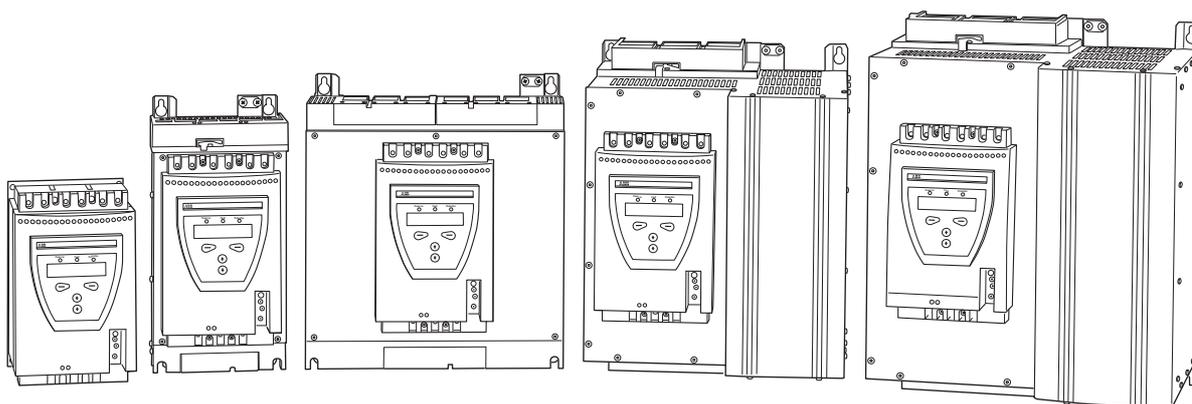


# Softstarters

Type PST30...PSTB1050

Installation and Commissioning Manual

Manual 1SFC132003M0201 June 2007



**ABB**

**This manual belongs to:**

---

# Softstarters

Type PST30...PSTB1050  
Installation and Commissioning Manual

Manual 1SFC132003M0201 June 2007



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# 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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<http://www.abb.com/lowvoltage>

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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

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# Introduction

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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)

1SFC132034M6501 (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](http://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.

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



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## Chapter 2 Quickstart

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# Chapter 2 Quickstart

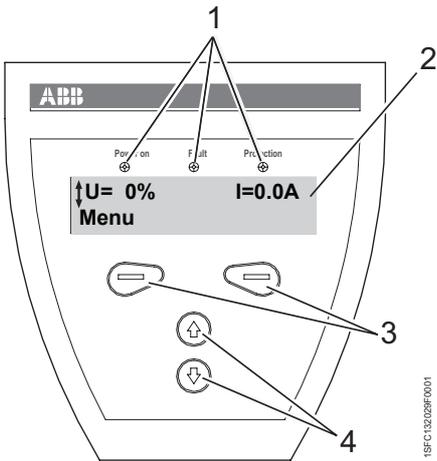


Figure 1:

- 1 Status indication LEDs
  - 2 LCD display
  - 3 Selection keys for selecting, changing and storing parameters
  - 4 Navigation keys for navigating in the menus
- Arrows shown in the display indicates that the value/menu is possible to change or scroll

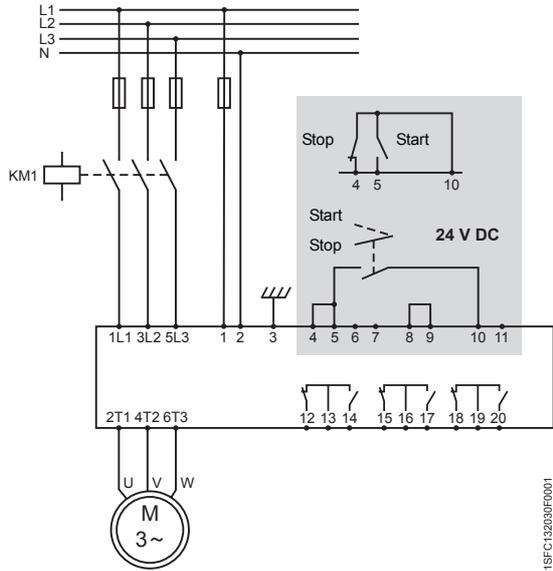


Figure 2: Standard connection PST

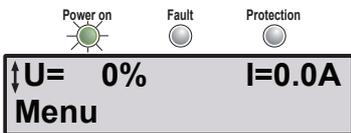


Figure 3: Top level

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



**Warning!**

*Mounting, electrical connection and settings of the softstarter 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 softstarter 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.



*The wire shall be as short as possible, and be connected to the mounting plate. The mounting plate should also be earthed.*

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 softstarter and the warranty may no longer be valid.*

7. Check that the main and supply voltage corresponds to the softstarter 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



Figure 4: Application setting menu



Figure 5: Centrifugal pump



Figure 6: Centrifugal pump stored

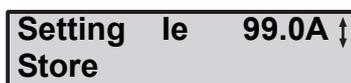


Figure 7: Setting Ie

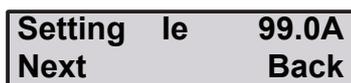


Figure 8: Setting Ie stored



Figure 9: OL Class



Figure 10: OL class stored

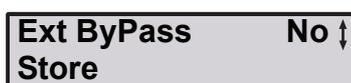


Figure 11: External Bypass

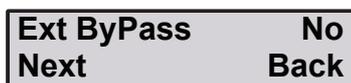


Figure 12: External Bypass stored



Figure 13: Ready / Tune Set

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% (  $1/\sqrt{3}$  ) 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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## Description

---

## 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.*

## 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

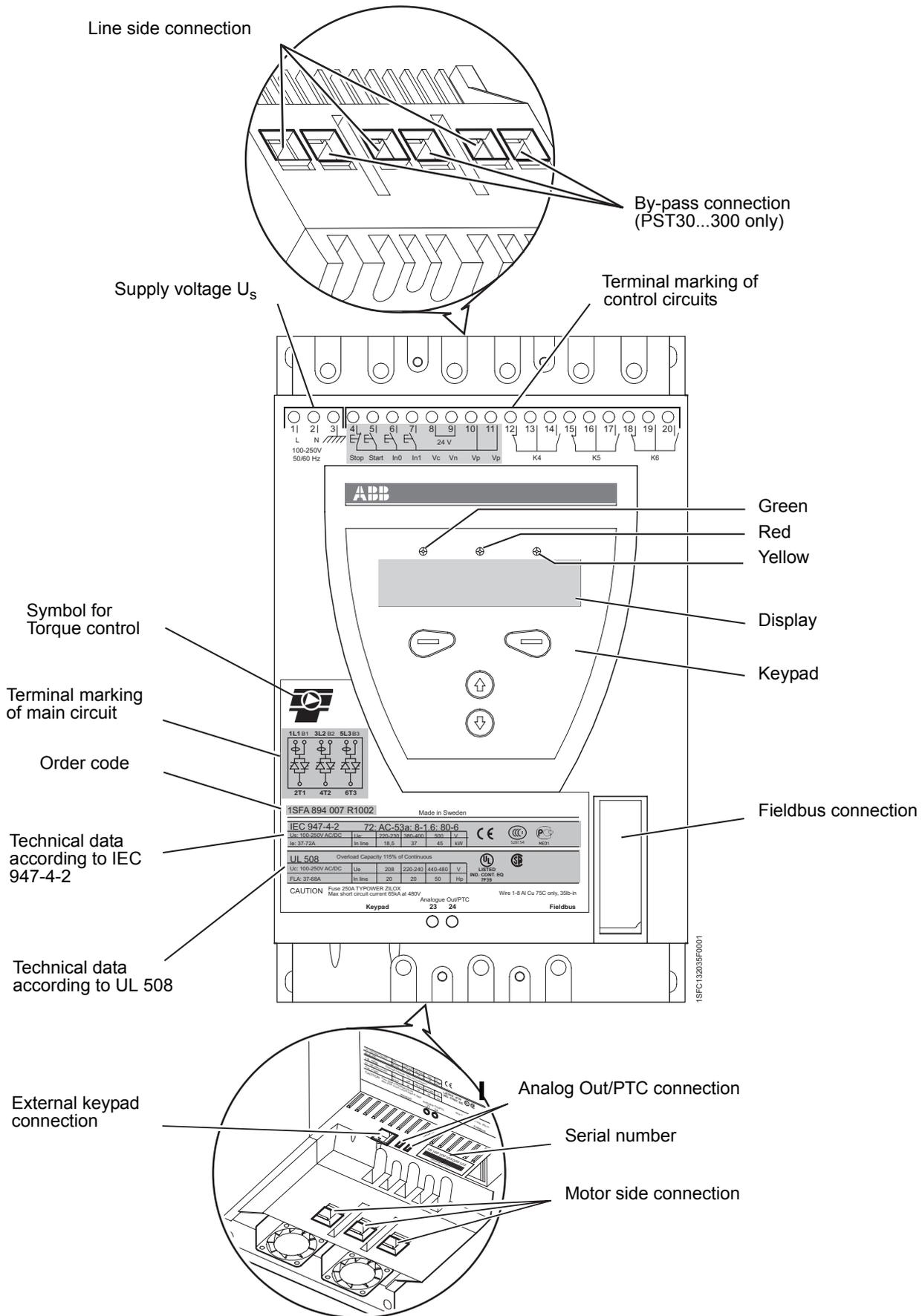
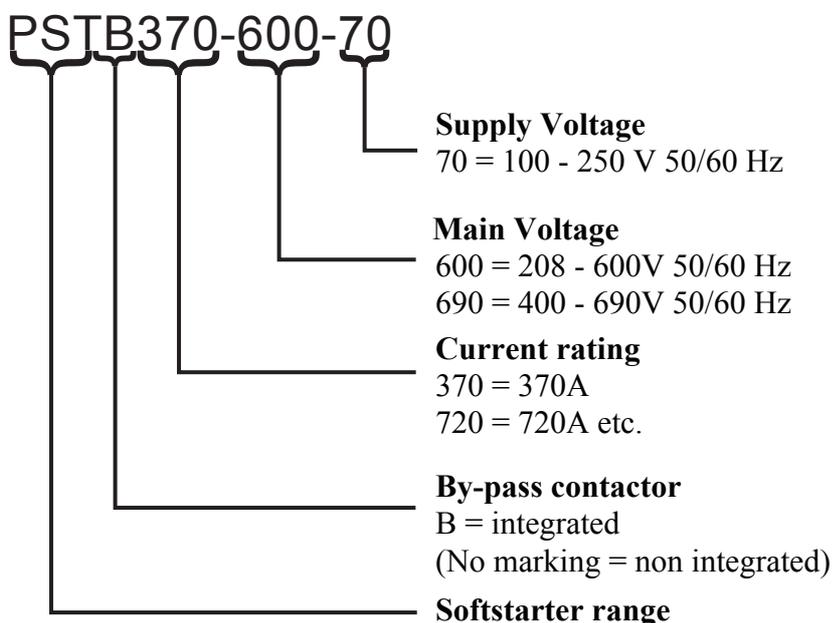


Figure 1: Markings and connections

## 3:4 Type designation



## 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](http://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](http://www.abb.com/lowvoltage)

### 3:7 Specifications

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

## 3:8 Technical data

### 3:8.1 General

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

### 3:8.2 Semi-conductor fuses

Softstarter type, 600 V and 690 V	Bussmann fuses		Holders
	A	Type	
PST30	80	170M1366	170H1007
PST37	125	170M1368	170H1007
PST44	160	170M1369	170H1007
PST50	160	170M1369	170H1007
PST60	200	170M1370	170H1007
PST72	250	170M1371	170H1007
PST85	315	170M1372	170H1007
PST105	400	170M3019	170H3004
PST142	450	170M3020	170H3004
PST175	500	170M3021	170H3004
PST210	630	170M5012	170H3004
PST250	700	170M5013	170H3004
PST300	900	170M5015	170H3004
PSTB370	700	170M5013	170H3004

Softstarter type, 600 V and 690 V	Bussmann fuses		Holders
	A	Type	
PSTB470	900	170M5015	170H3004
PSTB570	900	170M5015	170H3004
PSTB720	1250	170M5018	170H3004
PSTB840	1500	170M6018	170H3004
PSTB1050 xxx-600-70	1800	170M6020	170H3004
PSTB1050 xxx-690-70	1600	170M6019	170H3004

### 3:8.3 Softstarter types

Type	PST30		PST37		PST44		PST50	
	Line	Delta	Line	Delta	Line	Delta	Line	Delta
Connection type								
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	
	Line	Delta	Line	Delta	Line	Delta	Line	Delta
Connection type								
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	

Type	PST142		PST175		PST210		PST250	
	Line	Delta	Line	Delta	Line	Delta	Line	Delta
Connection type								
Rated current $I_e$ (A)	142	245	175	300	210	360	250	430
Motor size 380 - 415V (kW)	75	132	90	160	110	184	132	220
Motor size 480V (hp)	100	150	125	200	150	250	200	300
Motor size 600V (hp)	125	200	150	250	200	300	250	350
AC-3 rating built in by-pass 400V (A)	-		-		-		-	
Power loss at rated current (W)	435		540		645		765	
Power supply requirements (VA)	10		15		15		15	

Type	PST300		PSTB370		PSTB470		PSTB570	
	Line	Delta	Line	Delta	Line	Delta	Line	Delta
Connection type								
Rated current $I_e$ (A)	300	515	370	640	470	814	570	987
Motor size 380 - 415V (kW)	160	257	200	355	250	450	315	475
Motor size 480V (hp)	250	400	300	500	400	600	500	700
Motor size 600V (hp)	300	500	350	600	500	700	600	800
Contact type	-		AF300		AF300		AF460	
AC-3 rating built in by-pass 400V (A)	-		305		305		460	
Power loss at rated current (W)	920		90		110		105	
Power supply requirements (VA) / pull in (VA)	15		20/480		20/480		25/900	

Type	PSTB720		PSTB840		PSTB1050	
	Line	Delta	Line	Delta	Line	Delta
Connection type						
Rated current $I_e$ (A)	720	1247	840	1455	1050	1810
Motor size 380 - 415V (kW)	400	670	450	780	560	875
Motor size 480V (hp)	600	1000	700	1200	900	1500
Motor size 600V (hp)	700	1200	800	1500	1000	1800
Contact type	AF580		AF750		AF750	
AC-3 rating built in by-pass 400V (A)	580		750		750	
Power loss at rated current (W)	110		170		170	
Power supply requirements (VA) / pull in (VA)	25/860		25/860		25/860	

### 3:8.4 Weights

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

### 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.

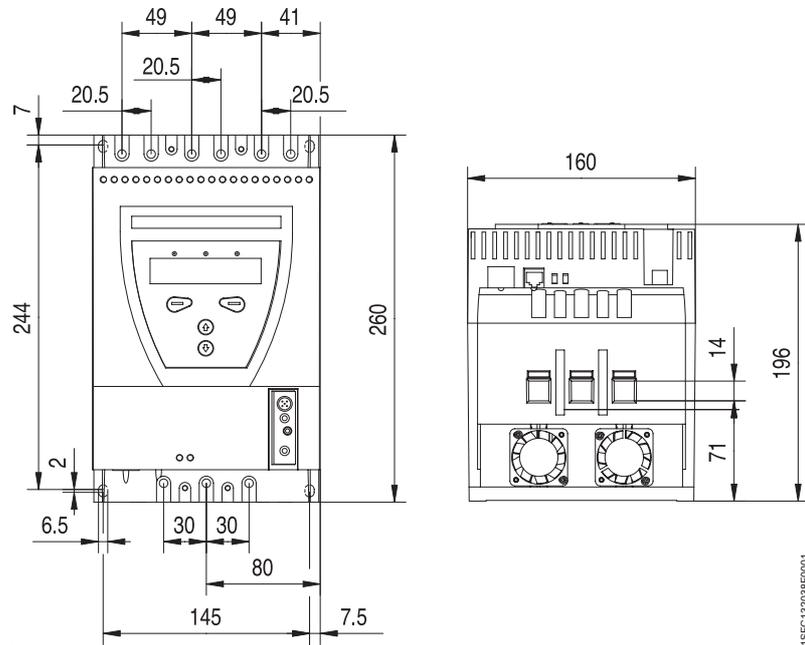
#### Softstarter short circuit rating

Model	Rating (kA)	Max V	Fuse (A)	MCCB (A)
	1)	2)	3)	4)
PST30...142	10	600	Any UL-listed	Any UL-listed
PST175...300	18	600	Any UL-listed	Any UL-listed
PSTB370...570	30	600	Any UL-listed	Any UL-listed
PSTB720	42	600	1200/L	1200
PSTB840	42	600	1200/L	1200
PSTB1050	85	480	--	1200
PSTB1050	85	600	1200/L	--
PSTB1050	42	600	--	1200
PST30...300 PSTB370...1050	65	600	TYPOWER ZILO **)	--

\*\*) Fuses size per softstarter - please see table in Chapter 3.8.2 - Semiconductor fuses.

### 3:8.6 Dimensions

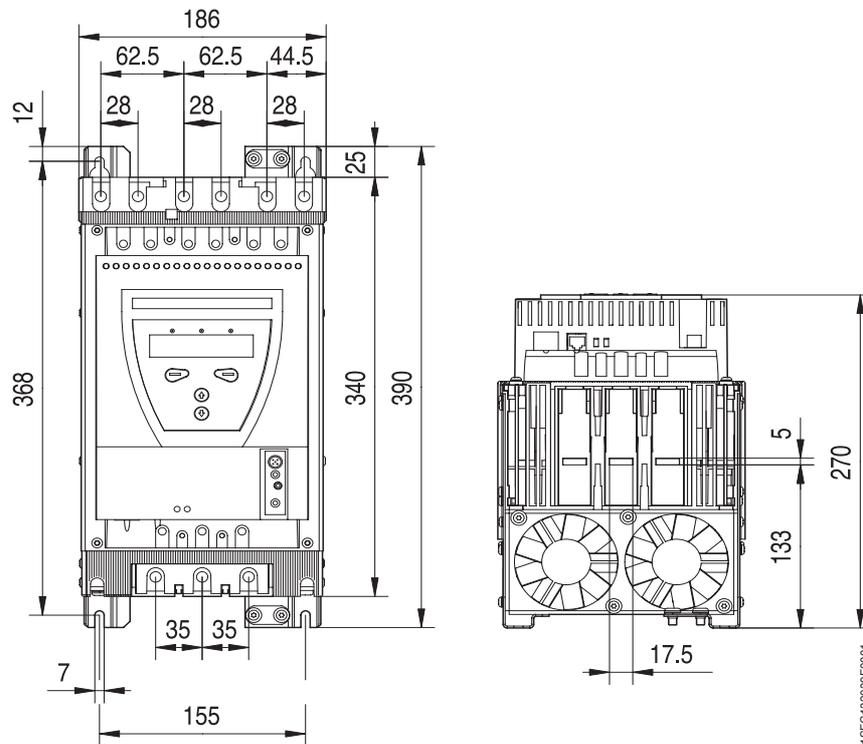
#### PST30...72



1SFC132038F0001

Figure 2: Dimensions PST30...72 (mm) (1 mm = 0.0394 in)

#### PST85...142



1SFC132039F0001

Figure 3: Dimensions PST85...142 (mm) (1 mm = 0.0394 in)

**PST85...142 with marine pack**

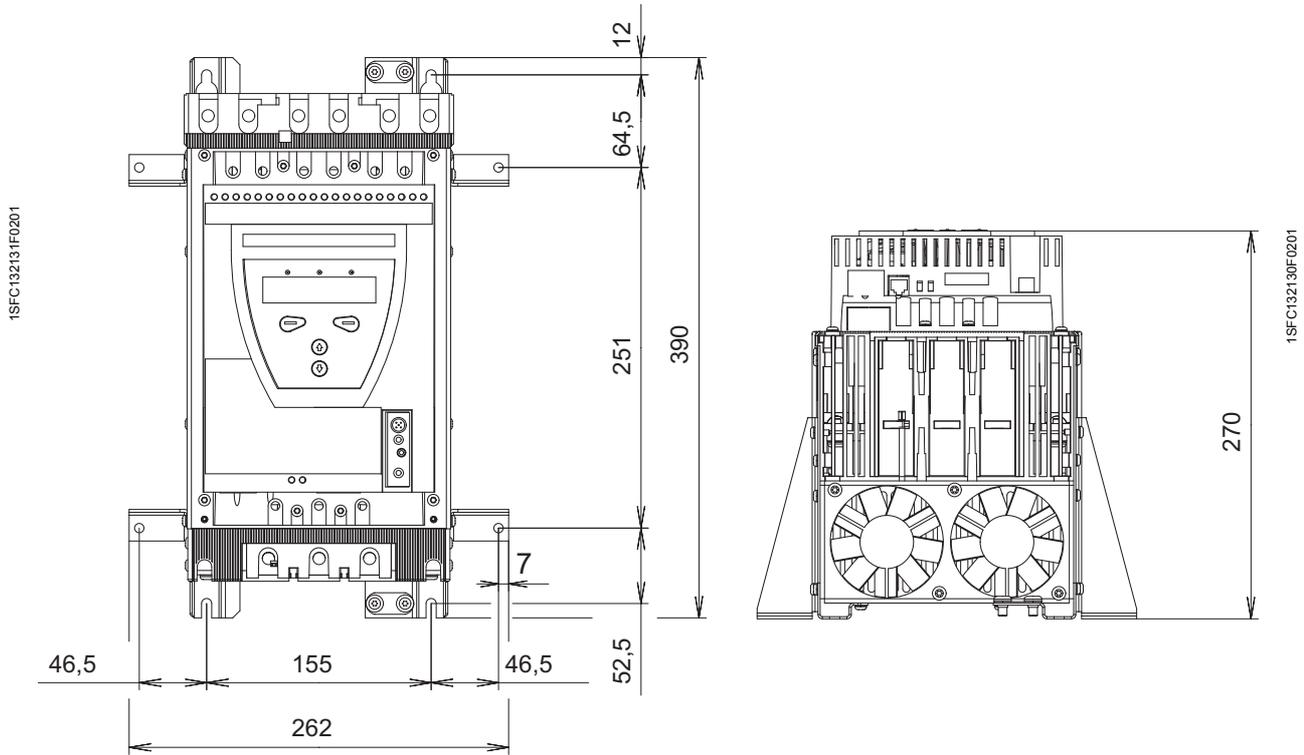


Figure 4: Dimensions PST85..142 with marine kit (mm) (1 mm = 0.0394 in)

**PST175...300**

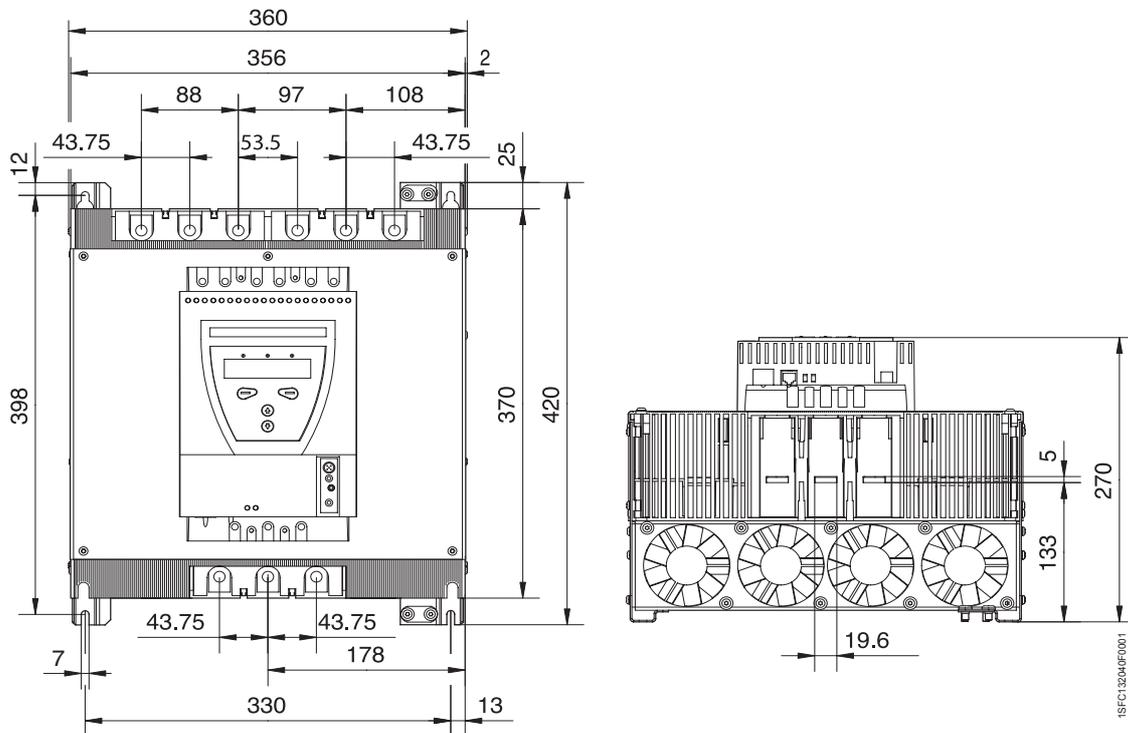


Figure 5: Dimensions PST175..300 (mm) (1 mm = 0.0394 in)

**PSTB370...470**

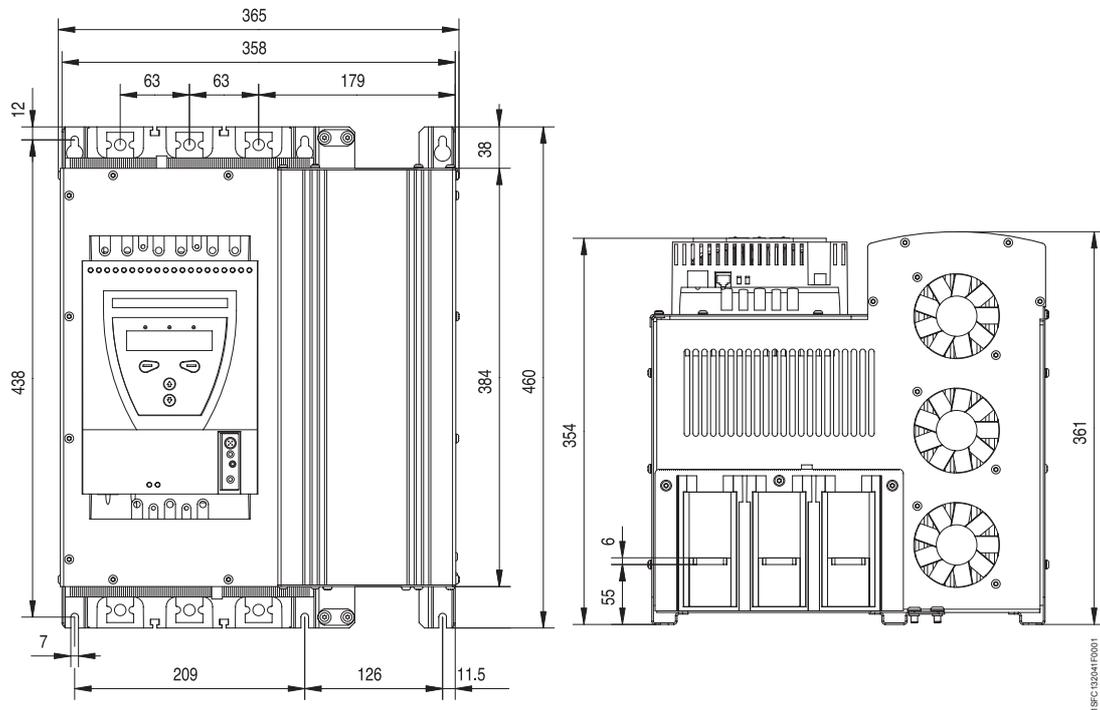


Figure 6: Dimensions PSTB370...470 (mm) (1 mm = 0.0394 in)

**PSTB570...1050**

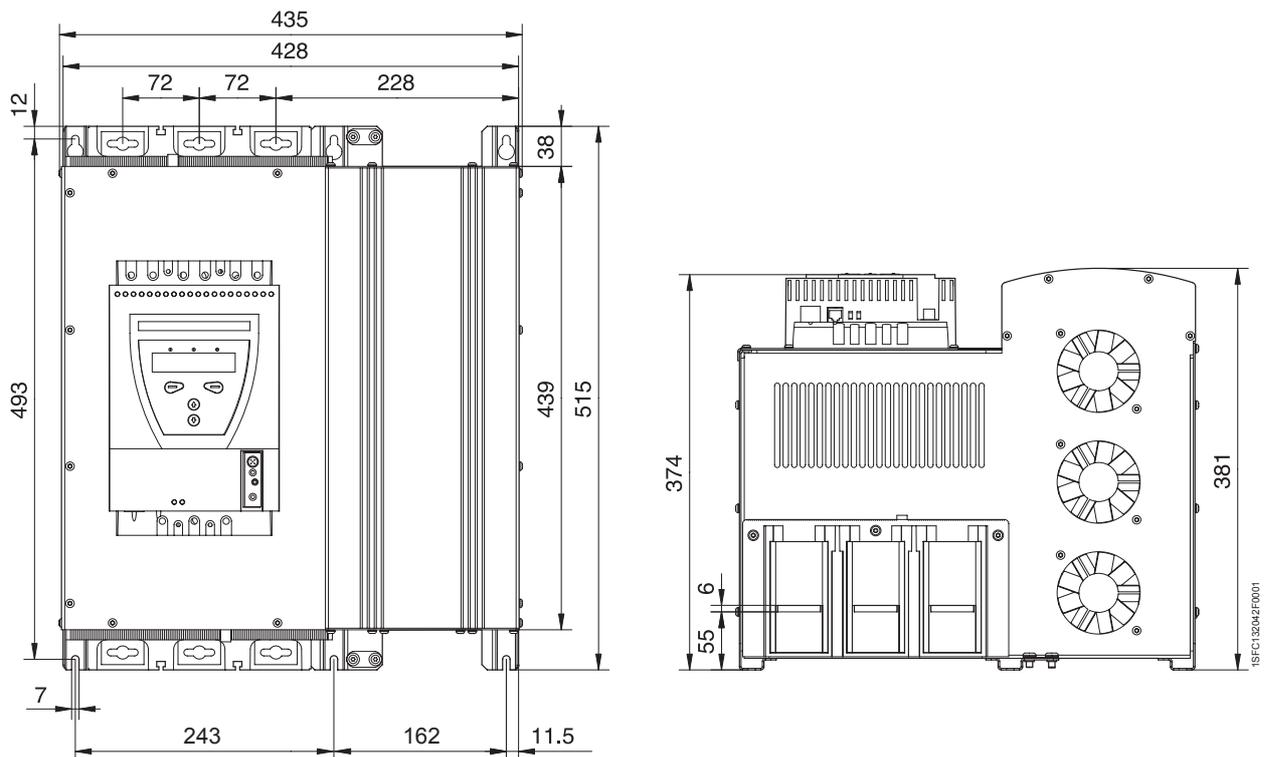


Figure 7: Dimensions PSTB570...1050 (mm) (1 mm = 0.0394 in)



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## Chapter 4 Mounting

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# Mounting

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## 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

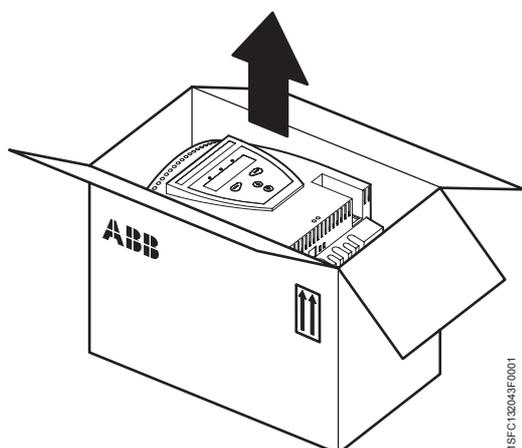


Figure 1: Package

- 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.*

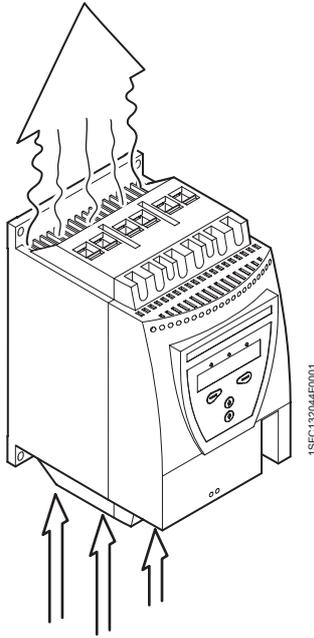


Figure 2: Airways

### 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.*

Softstarter type	A (mm)	B (mm)	C (mm)
PST30...72	100	10	20
PST85...300	100	10	20
PST175...300	100	10	20
PSTB370...470	150	15	20
PSTB570...1050	150	15	20

(1mm = 0.0394 in)

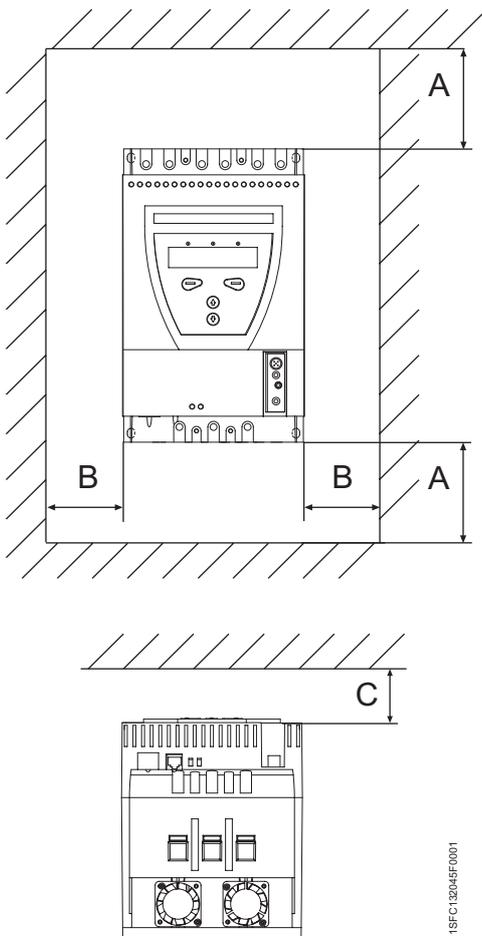


Figure 2: Minimum distances, wall/front

## 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.

Softstarter type	Minimum enclosure dimensions			Fan capacity
	W	H	D	
PST30...72	300	400	250	42 m <sup>3</sup> /h
PST85...142	400	500	300	95 m <sup>3</sup> /h
PST175...300	500	600	300	210 m <sup>3</sup> /h
PSTB370...470	600	600	400	210 m <sup>3</sup> /h
PSTB570...1050	750	900	400	210 m <sup>3</sup> /h

(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.



## Chapter 5 Connection

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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.

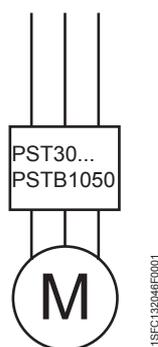


Figure 1: In Line connection

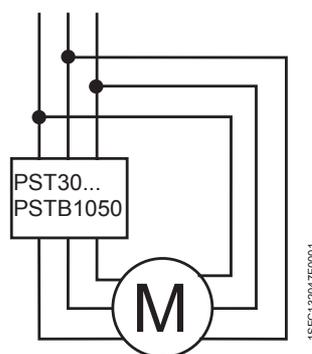


Figure 2: Inside Delta connection

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.*

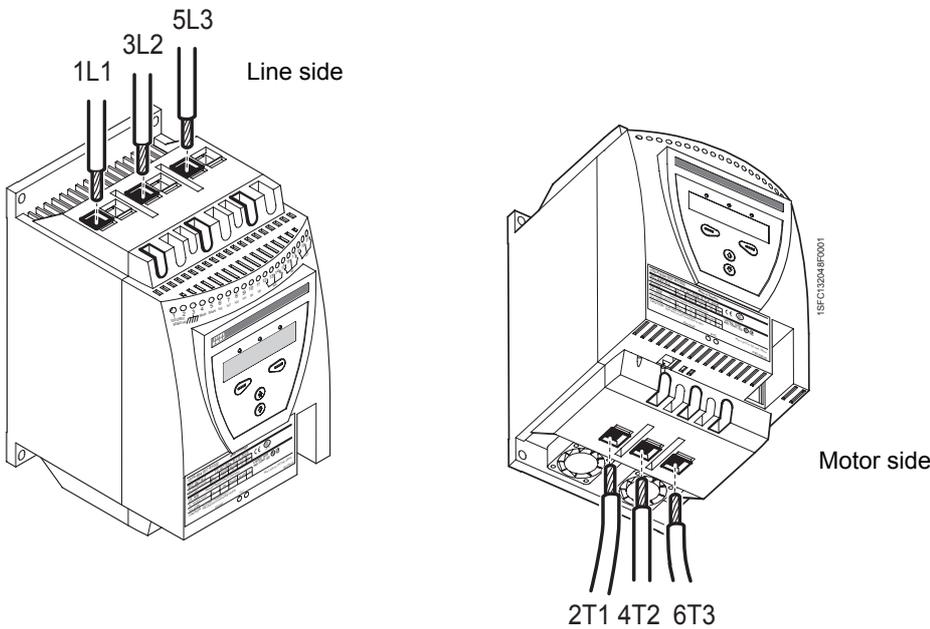


Figure 3: Connection of line side and motor side

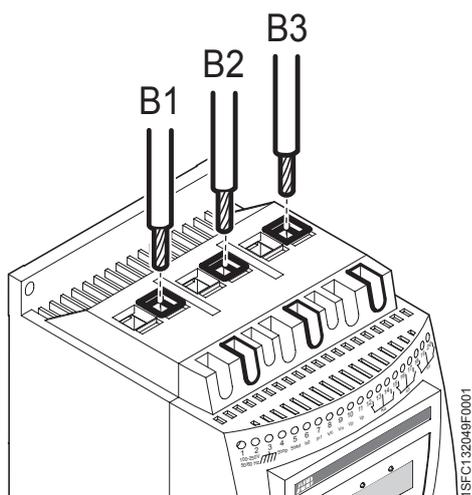


Figure 4: Connection of external by-pass contactor

### 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  $1.2 \times I_e$  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).

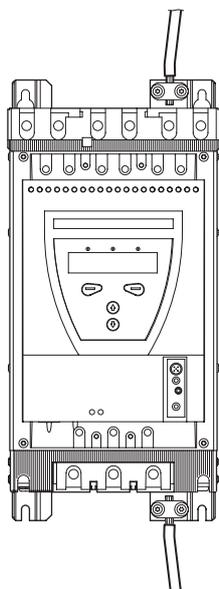


Figure 5: Protective earthing



#### Warning!

*Do not operate machine with the grounding wire disconnected.*

# Chapter 5 Connection

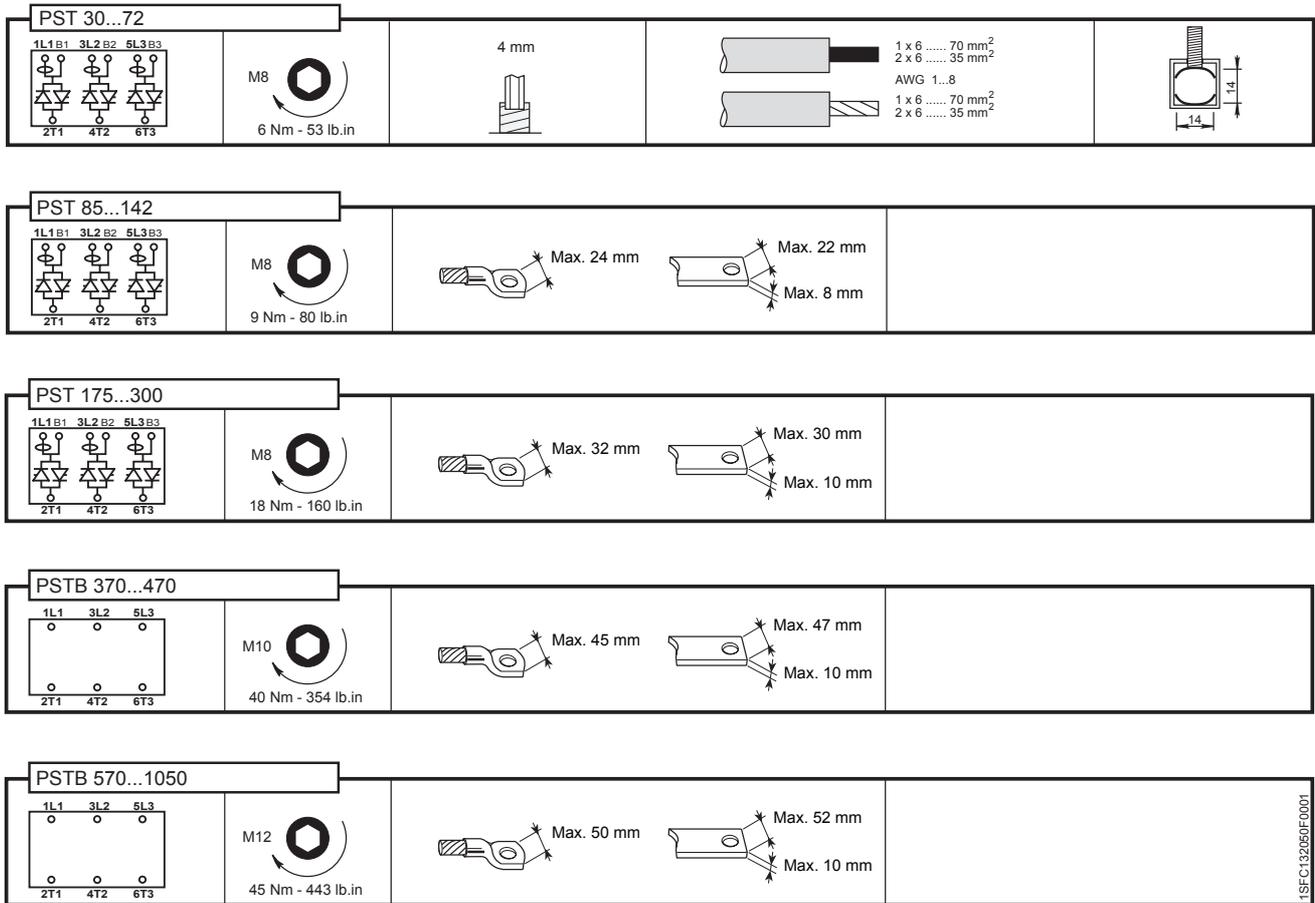


Figure 6: Tightening torques and cable dimensions (1 mm=0.0394 in)

## 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.

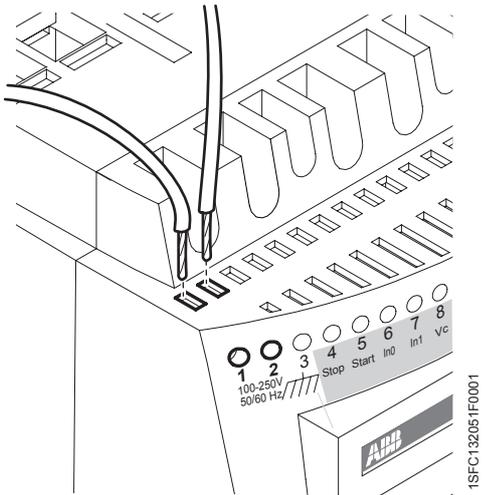


Figure 7: Supply voltage

### 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.*

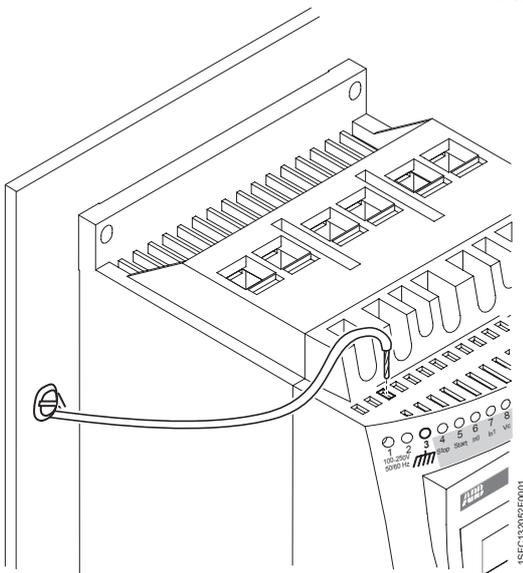


Figure 8: Function earth

	<p>M3</p> <p>0,5 Nm - 4,3 lb.in</p>	<p>3,5x0,6</p>	<p>0,14 ... 2,5 mm<sup>2</sup> AWG 12 ... 22 0,14 ... 2,5 mm<sup>2</sup></p>
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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

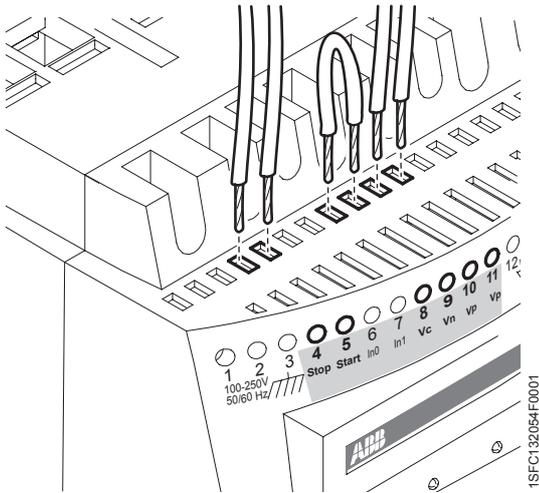


Figure 10: Terminals 4, 5, 8, 9, 10, 11

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.

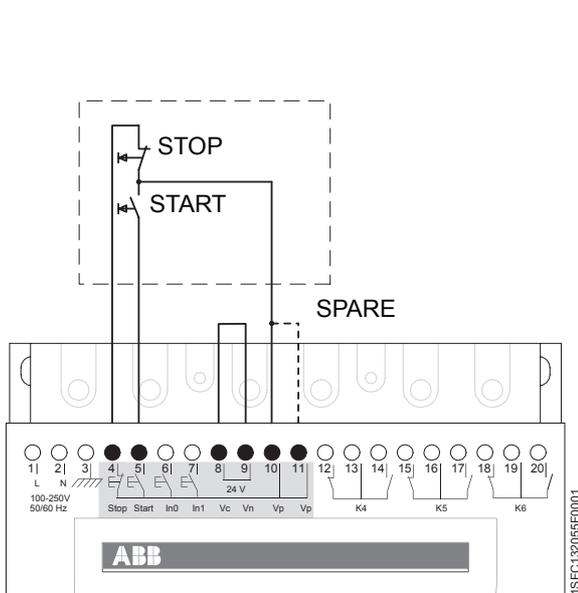


Figure 11: Holding circuit (pulse for start is enough)

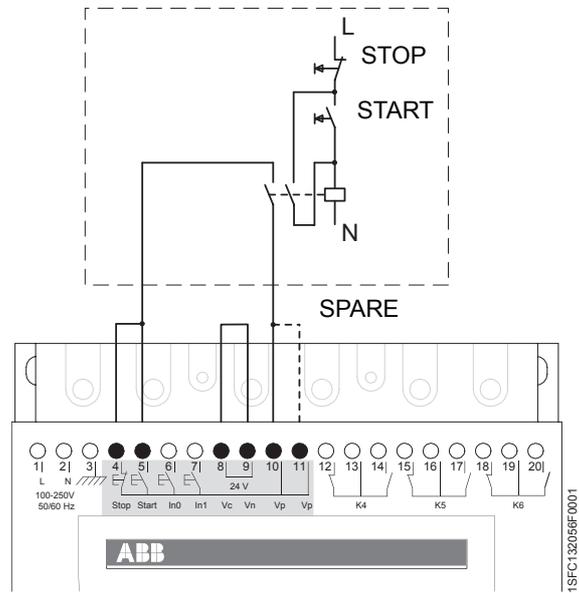


Figure 12: Conventional circuit (maintained start signal required)

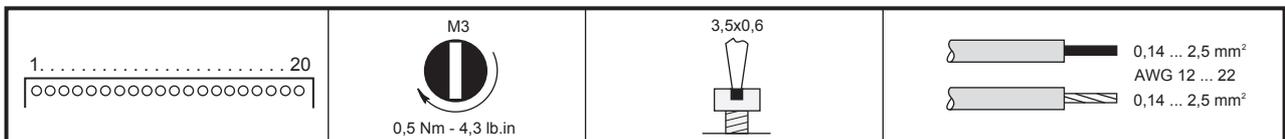


Figure 13: Tightening torques and cable dimensions (1 mm=0.0394 in)

### 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.**

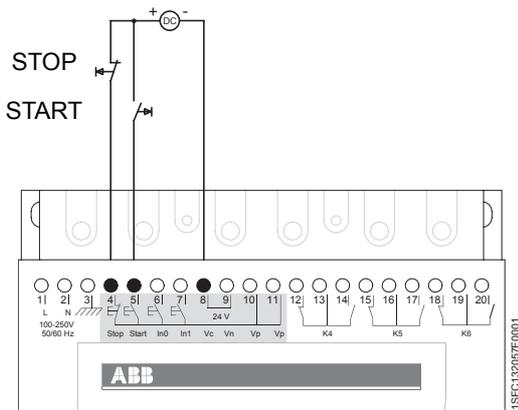


Figure 14: Holding circuit with external control voltage (pulse for start is enough)

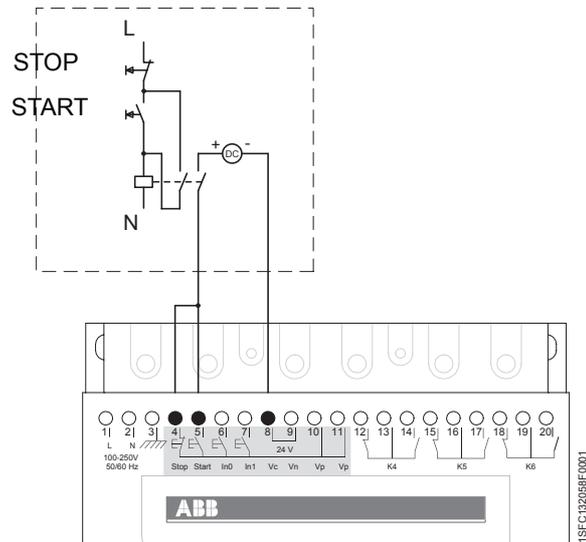


Figure 15: Conventional circuit with external control voltage (maintained start signal is required)

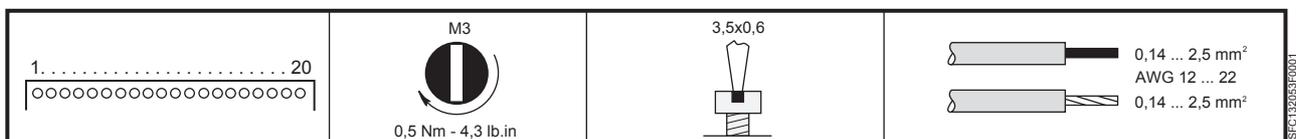


Figure 16: Tightening torques and cable dimensions (1 mm=0.0394 in)

### 5:2.2.4 Programmable inputs, terminals 6 and 7

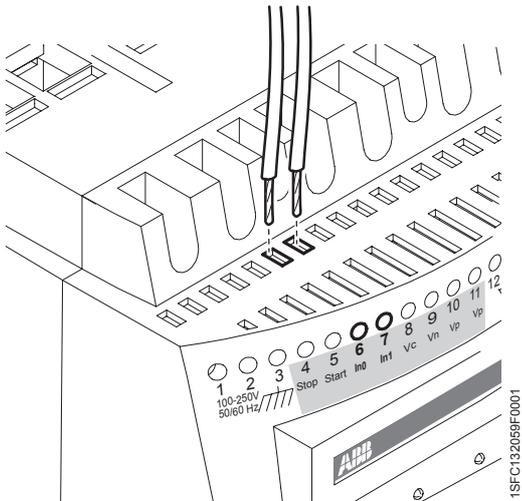


Figure 17: Terminals 6, 7

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.



Wiring for sequence start, see next page.



#### 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.**

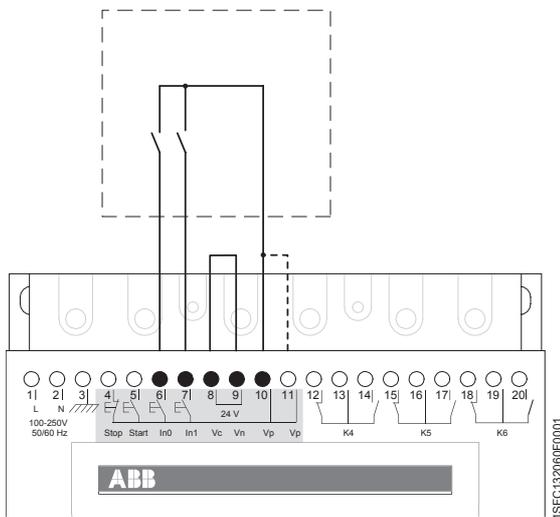


Figure 18: Internal control voltage

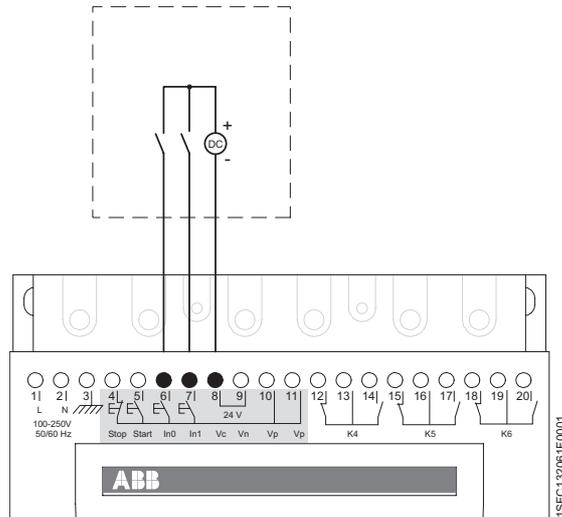


Figure 19: External control voltage

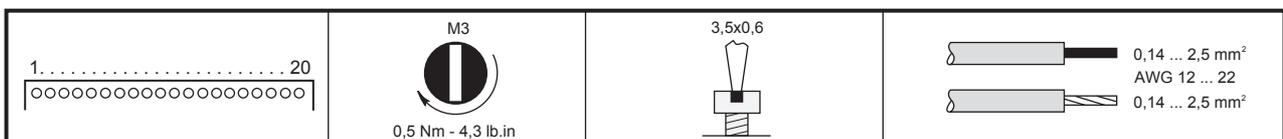


Figure 20: Tightening torques and cable dimensions (1 mm=0.0394 in)

**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).

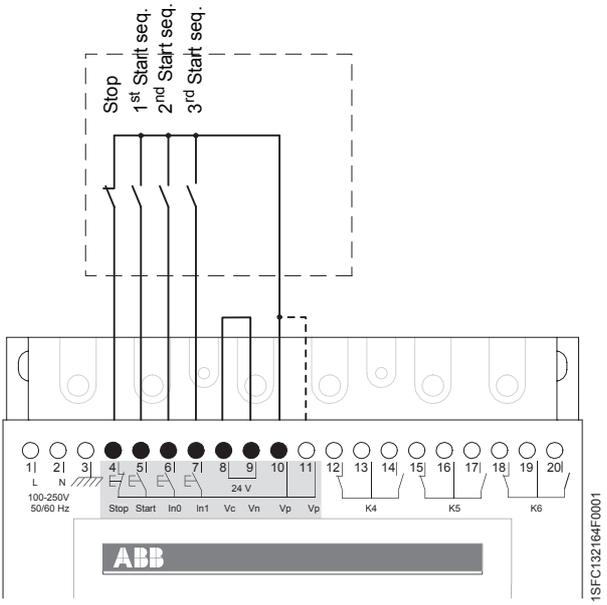


Figure 21: Internal control voltage

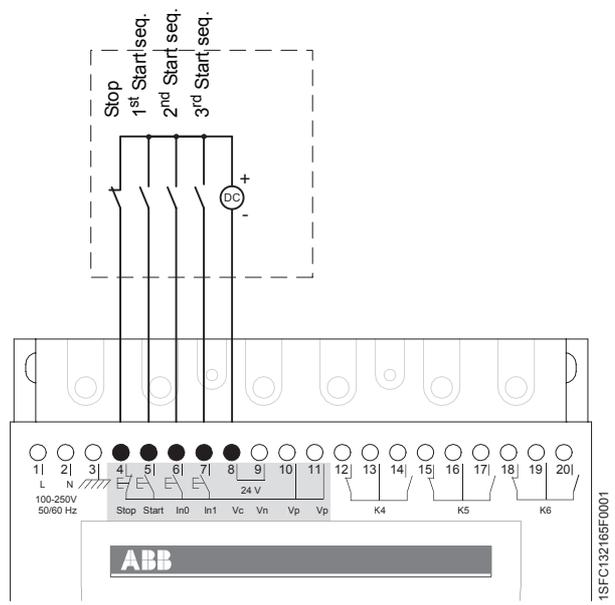


Figure 22: External control voltage



Figure 23: Tightening torques and cable dimensions (1 mm=0.0394 in)

### 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.

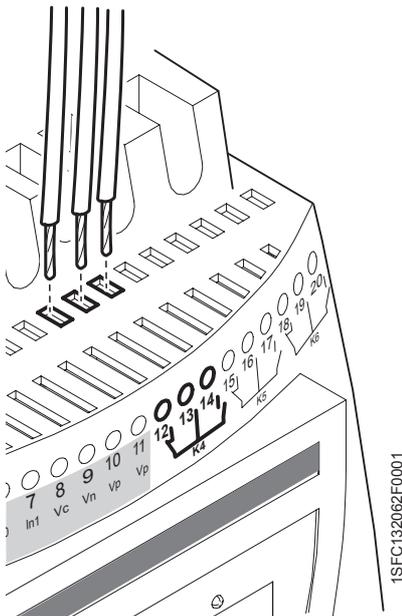


Figure 24: Terminals 12, 13, 14

### 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.

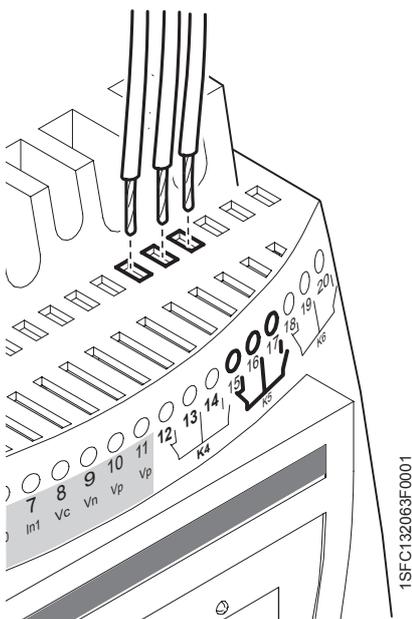
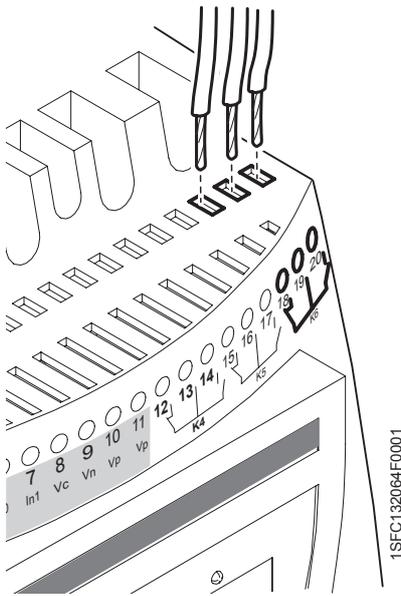


Figure 25: Terminals 15, 16, 17

	<p>M3</p> <p>0,5 Nm - 4,3 lb.in</p>	<p>3,5x0,6</p>	<p>0,14 ... 2,5 mm<sup>2</sup> AWG 12 ... 22 0,14 ... 2,5 mm<sup>2</sup></p>
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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

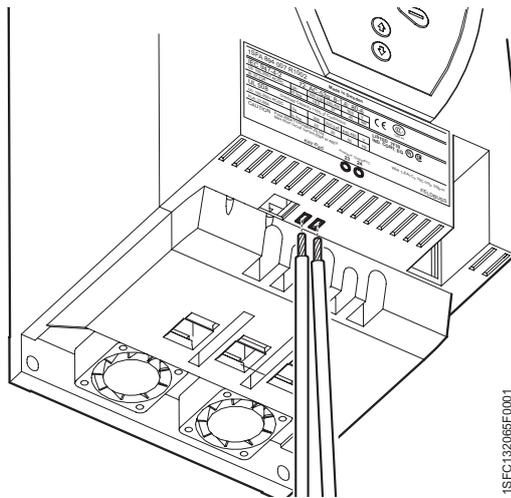


The output relay gives signal depending on the selected function.  
Default: Event  
See Chapter 7 “Settings and configuration” for programming.

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

Figure 27: Terminals 18, 19, 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 28: PTC connection

<p>1.....20</p>	<p>M3</p> <p>0,5 Nm - 4,3 lb.in</p>	<p>3,5x0,6</p>	<p>0,14 ... 2,5 mm<sup>2</sup> AWG 12 ... 22 0,14 ... 2,5 mm<sup>2</sup></p>
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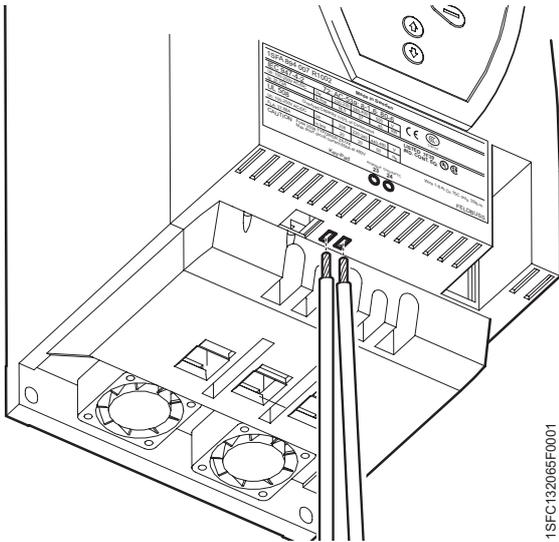
Figure 29: Tightening torques and cable dimensions (1 mm=0.0394 in)

### 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.*



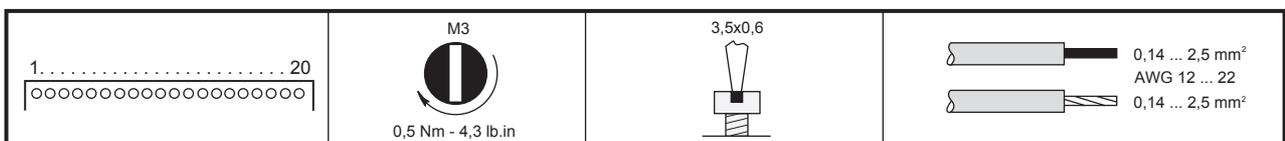
1SFC132065F0001

Figure 30: Analog output connection

### 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.



1SFC132065F0001

Figure 31: Tightening torques and cable dimensions (1 mm=0.0394 in)

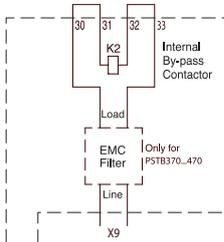


Figure 32: Connection when the contactor is operated from the keypad (factory wiring)

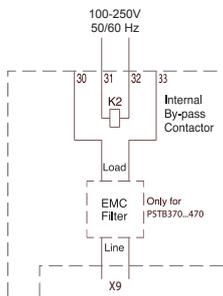
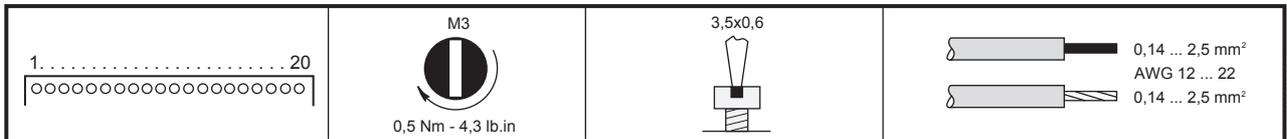


Figure 33: Connection when the by-pass contactor is operated separately (emergency DOL)



1SFC132003P0001

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)” .

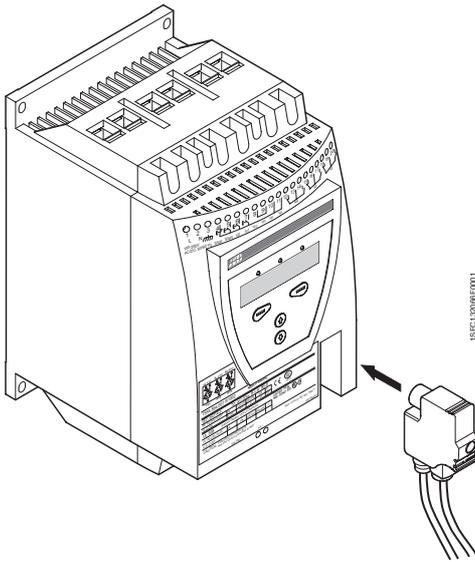


Figure 35: Fieldbusplug

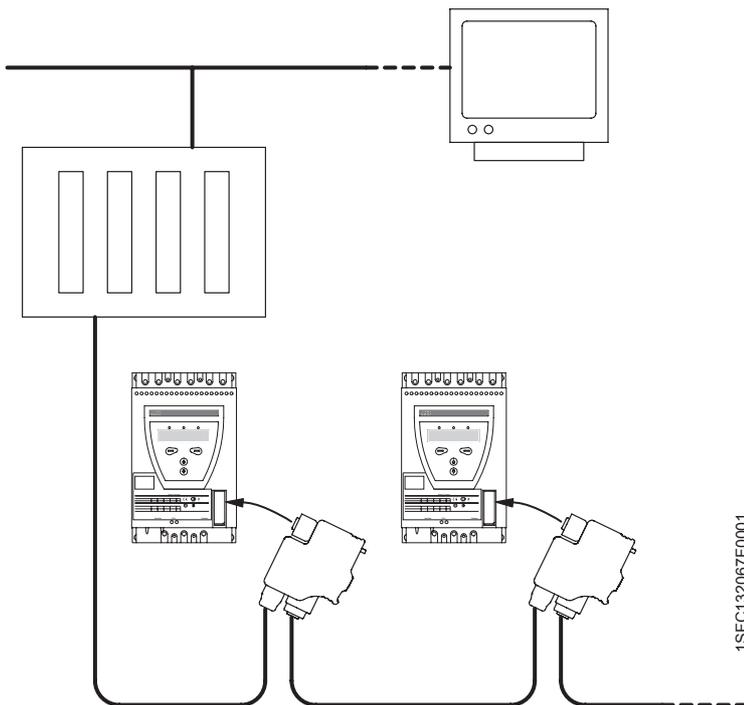


Figure 36: Principle of a fieldbus network with PST softstarters connected

### 5:3.2 External keypad

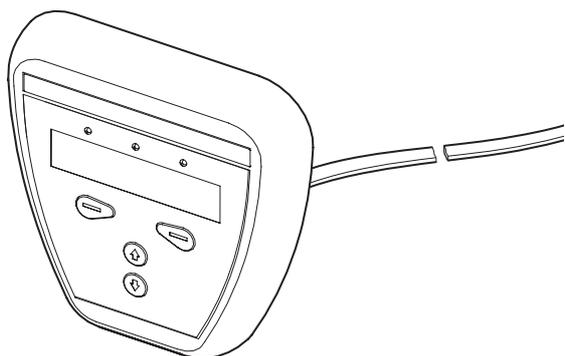
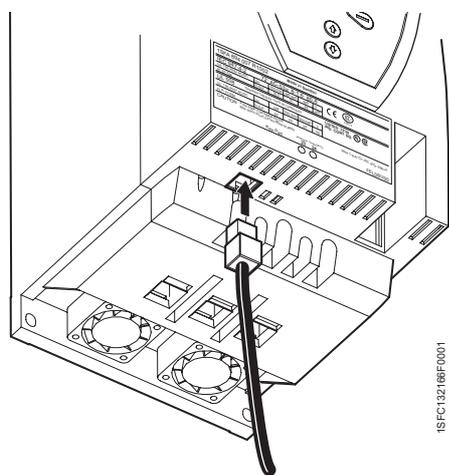


Figure 37: External keypad

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.



1SFC132166F0001

Figure 38: Connection of external keypad

### 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

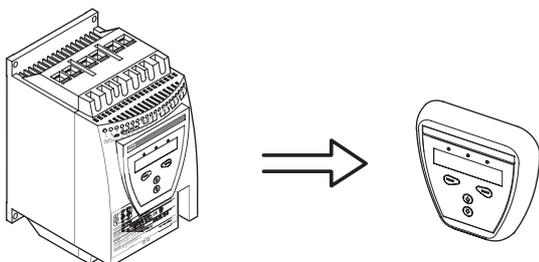


Figure 39: Upload

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*.

#### 5:3.3.2 Downloading of parameters

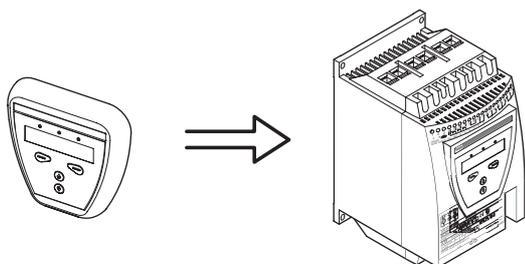


Figure 40: Download

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 le* and confirm by pressing *Next*.



*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

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



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## Chapter 6 Human-Machine Interface (HMI)

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## 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

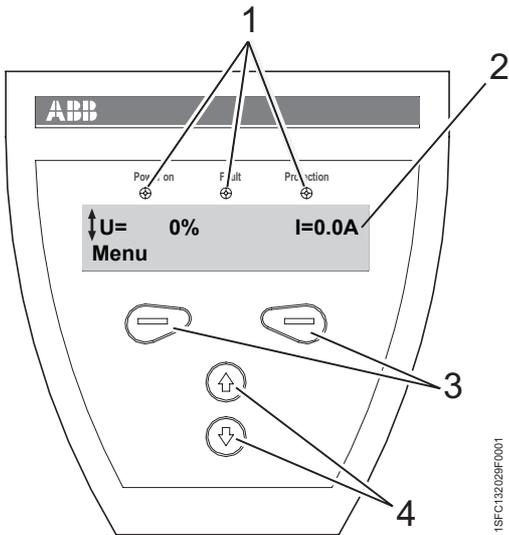


Figure 1: Human-Machine Interface

- 1 Status indication LEDs
- 2 LCD display
- 3 Selection keys
- 4 Navigation keys

The HMI consists of:

- Status indication LED indicators
- LCD display
- Selection and Navigation keys

The LED indicators work as follows:

LED	Color	Description
Power on	Green	Supply voltage connected.
Fault	Red	Indicates faults.
Protection	Yellow	Indicates that protections are activated.

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.

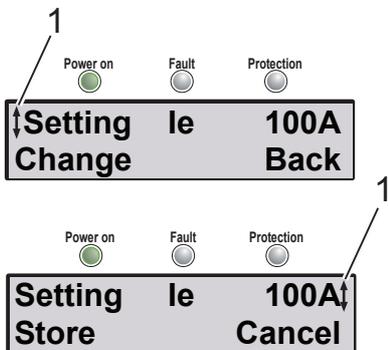


Figure 2: Menu examples

- 1 Scrolling icons

The functionality of the keypad is illustrated by the following example:

### Changing the Rated motor current (Setting $I_e$ ).

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  $I_e$**

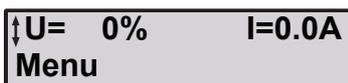


Figure 3: Top level



Figure 4: SETTINGS menu



Figure 5: Application Setting menu



Figure 6: Functional settings menu



Figure 7: Start/Stop menu



Figure 8: Setting  $I_e$  menu



Figure 9: Setting  $I_e$ , changing menu



Figure 10: Setting  $I_e$  menu, changed setting

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  $I_e$*  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.



Figure 11: Change password



Figure 12: New password



Figure 13: New password stored

#### 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.



Figure 14: Wrong password



Figure 15: Support code

## 6:1.4 Locking/unlocking the keypad



Figure 16: Keypad is menu



Figure 17: Locked keypad menu

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

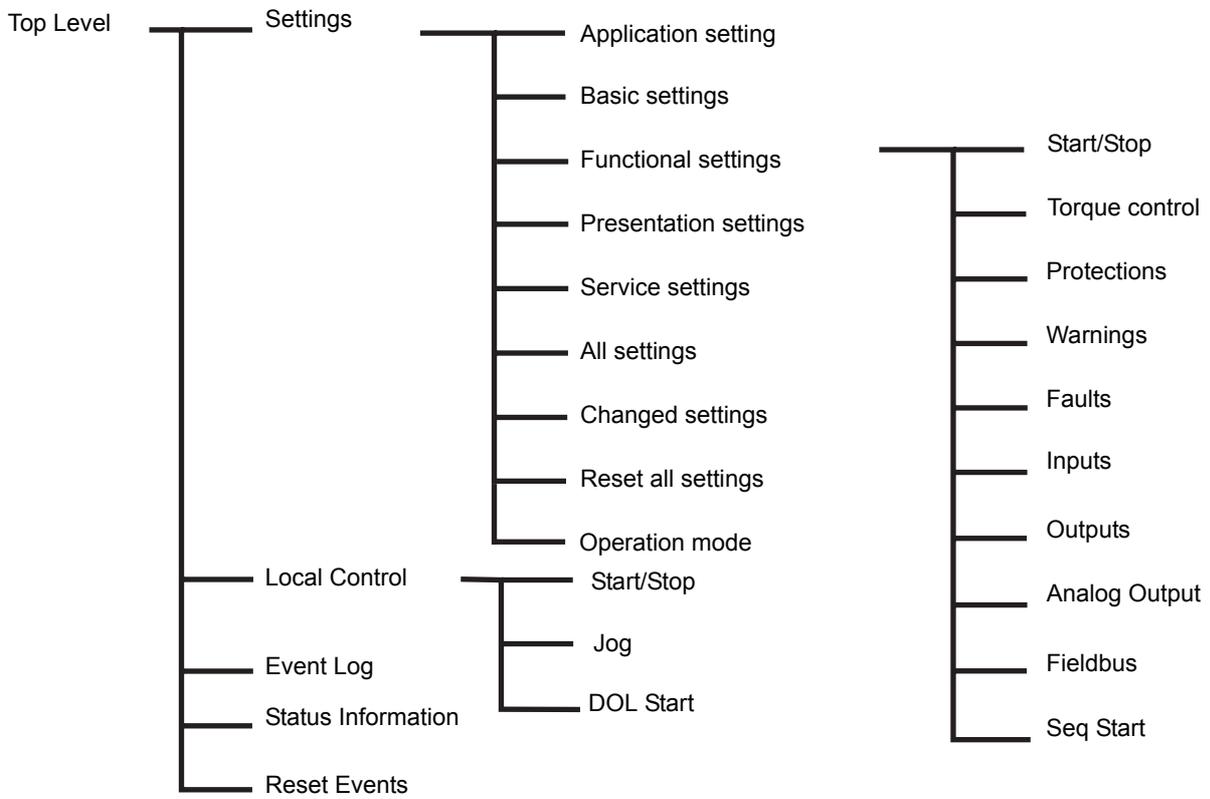


Figure 18: Menu tree

## 6:2.2 Top level

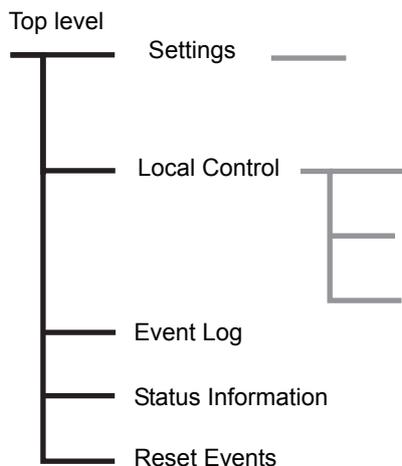


Figure 19: Top level

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.

Function	Description
Settings	Set up softstarter parameters.
Local Control	Control the softstarter.
Event Log	Present the Event Log, faults, protections, warnings.
Status Information	Present various information.
Reset Events	Reset of events.

## 6:2.3 Settings menu

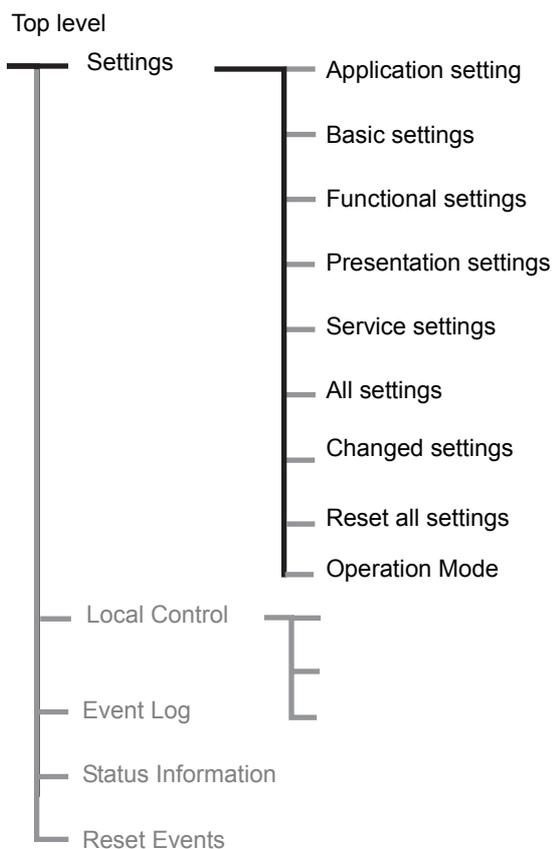


Figure 20: Settings menu

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.

Function	Description
Application Setting	Use predefined parameters for type of applications.
Basic settings	The basic and most used settings.
Functional settings	Settings are arranged after functions.
Presentation settings	Language, date, time etc.
Service settings	Settings for use during service and repair.
All settings	A list with all possible settings.
Changed settings	A list with all changed settings.
Reset all settings	Reset all settings to factory default settings.
Operation Mode	Test mode for the softstarter.

## 6:2.4 Local Control menu

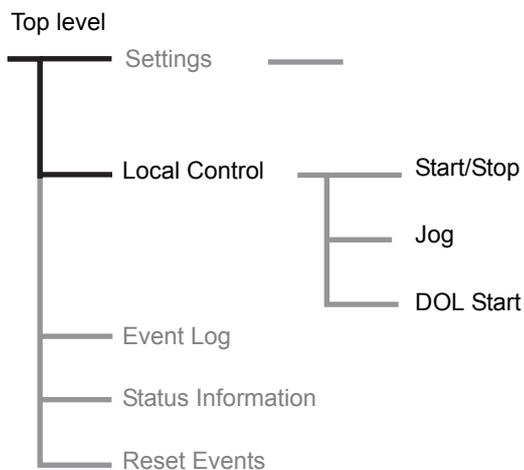


Figure 21: Local control menu

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.

Function	Description
Start/stop	To start and stop the motor with the keypad.
Jog	To run the motor as long as Jog is pressed.
DOL start (PSTB370...PSTB1050 only)	To start and stop the motor with the built-in by-pass contactor.

### 6:2.4.1 Start/Stop the motor

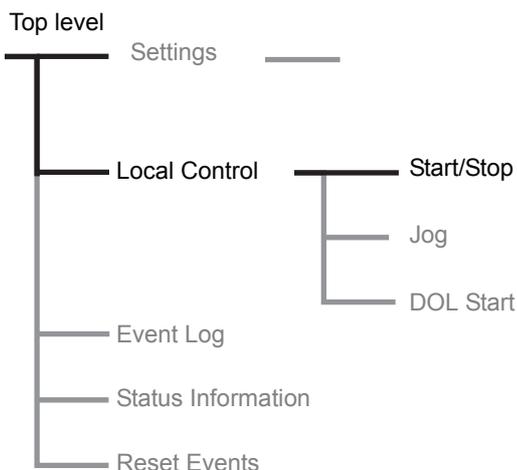


Figure 22: Start/Stop menu

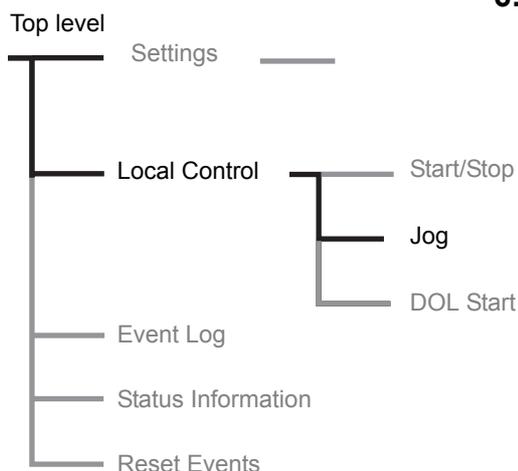
#### Start

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



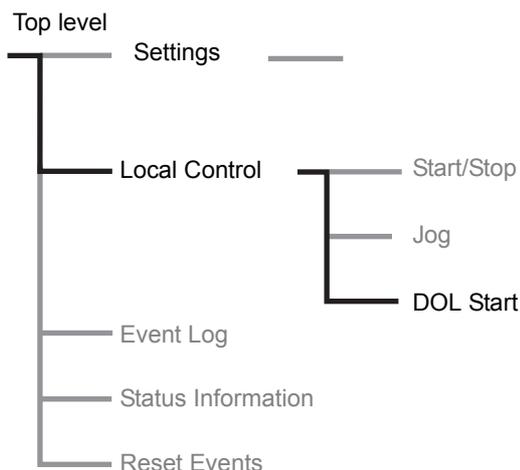
Enter the Jog menu, figure 23.  
Select *Jog*. The motor will start and accelerate to rated speed according to the set parameters as long as the Jog command is activated.  
The motor stops immediately as soon as the command is released.

Figure 23: Jog menu

### 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<sub>e</sub>* 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.*

Figure 24: DOL start menu

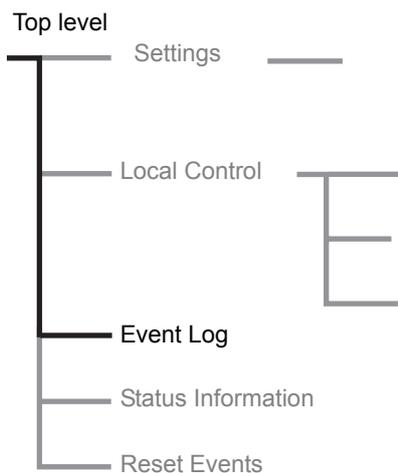


Figure 25: Event Log menu

### 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.

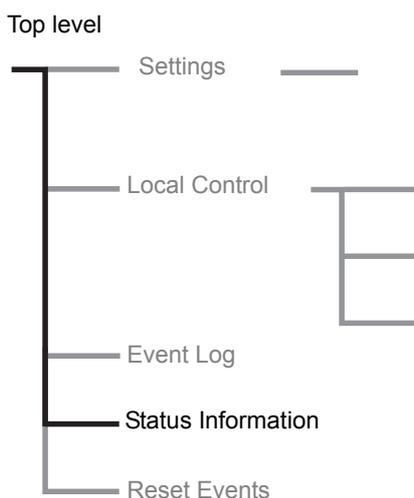
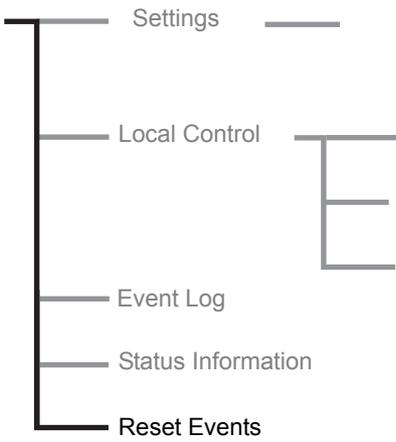


Figure 26: Event Log menu

Display text	Function
Frequency	Measured frequency.
Phase seq.	Phase sequence indication.
Connection	Type of connection, In Line/Inside Delta.
Phase L1	Phase current L1.
Phase L2	Phase current L2.
Phase L3	Phase current L3.
Line Voltage	The incoming line voltage [U].
cosPhi	Power factor.
P kW	Active power [kW].
P hp	Active power [hp]
Q kVAr	Reactive power [kVAr]
S kVA	Apparent power [kVA]
Run Time	Total run time of the motor.
No. Of Starts	Counted number of starts.
SW Ver. CU	Software version CU.
SW Ver. FU	Software version FU.
SW Ver. KP <sup>1</sup>	Software version Ext. keypad.
DB version	Database version
MAC Address	Internal addressing.
LV Board No	Serial No of the LV PCB.

1) only if connected

Top level



## 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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## 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)

Setting/parameter	Top level	Application Setting	Basic Settings	Functional Settings	Presentation Settings	All Settings	Reset all Settings
Password	X						
Keypad lock/unlock	X						
Reset to factory default setting							X
Application type		X					
Setting current		X	X	X		X	
Overload protection class		X	X	X		X	
External by-pass		X	X	X		X	
Start mode		Tune Set	X	X		X	
Stop mode		Tune Set	X	X		X	
Start ramp		Tune Set	X	X		X	
Stop ramp		Tune Set	X	X		X	
Initial voltage		Tune Set	X	X		X	
End voltage		Tune Set	X	X		X	
Step down voltage		Tune Set	X	X		X	
Current limit		Tune Set	X	X		X	
Torque limit		Tune Set	X	X		X	
Kick start				X		X	
Kick start level				X		X	
Kick start time				X		X	
Start ramp range				X		X	
Stop ramp range				X		X	
Tune torque control				X		X	
Overload protection type				X		X	
Overload protection, dual type, start class				X		X	
Overload protection, dual type, run class				X		X	
Overload protection, type of operation				X		X	
Locked rotor protection				X		X	
Locked rotor protection level				X		X	
Locked rotor protection time				X		X	
Locked rotor protection, type of operation				X		X	
Underload protection				X		X	
Underload protection level				X		X	
Underload protection time				X		X	
Underload protection, type of operation				X		X	
Phase imbalance protection				X		X	
Phase imbalance protection level				X		X	
Phase imbalance protection, type of operation				X		X	
High current protection				X		X	
High current protection, type of operation				X		X	
Phase reversal protection				X		X	
Phase reversal protection, type of operation				X		X	
PTC protection				X		X	
PTC protection, type of operation				X		X	
High current warning				X		X	
High current warning level				X		X	

Setting/parameter	Top level	Application Setting	Basic Settings	Functional Settings	Presentation Settings	All Settings	Reset all Settings
Low current warning				X		X	
Low current warning level				X		X	
Overload warning				X		X	
Overload warning level				X		X	
Thyristor (SCR) overload warning				X		X	
Phase loss fault, type of operation				X		X	
Fieldbus fault, type of operation				X		X	
Frequency fault, type of operation				X		X	
Heat sink over-temperature fault, type of operation				X		X	
Thyristor short circuit fault, type of operation				X		X	
By-pass doesn't open fault, type of operation				X		X	
By-pass doesn't close fault, type of operation				X		X	
Programmable input In0				X		X	
Programmable input In1				X		X	
Programmable output relay K4				X		X	
Programmable output relay K5				X		X	
Programmable output relay K6				X		X	
Programmable software output V7				X		X	
Event for relay K4				X		X	
Event for relay K5				X		X	
Event for relay K6				X		X	
Event for software output V7				X		X	
Analog output				X		X	
Analog output, reference				X		X	
Analog output, type of value				X		X	
Analog output, range max				X		X	
Fieldbus control				X		X	
Fieldbus type				X		X	
Fieldbus address				X		X	
Fieldbus auto disable				X		X	
Sequence start, number of sequences				X		X	
Start ramp, first sequence				X		X	
Initial voltage, first sequence				X		X	
Current limit, first sequence				X		X	
Setting current, first sequence				X		X	
Start ramp, second sequence				X		X	
Initial voltage, second sequence				X		X	
Current limit, second sequence				X		X	
Setting current, second sequence				X		X	
Start ramp, third sequence				X		X	
Initial voltage, third sequence				X		X	
Current limit, third sequence				X		X	
Setting current, third sequence				X		X	
Language					X	X	
LCD automatic switch-off					X	X	
Date type					X	X	
Year					X	X	
Month					X	X	
Day					X	X	
Hour					X	X	
Minutes					X	X	

**Chapter 7**  
**Settings and configuration**

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<b>Setting/parameter</b>	<b>Top level</b>	<b>Application Setting</b>	<b>Basic Settings</b>	<b>Functional Settings</b>	<b>Presentation Settings</b>	<b>All Settings</b>	<b>Reset all Settings</b>
Dual current limit time						X	
Dual current limit level						X	

## 7:1.2 Parameter list

Param. number	Description	Display text	Setting range	Default value	Actual setting
1	Setting current	Setting le	9.0...1207A	Individual	
2	Start ramp	Start Ramp	1...30s, 1...120s	10s	
3	Stop ramp	Stop Ramp	0...30s, 0...120s	0s	
4	Initial voltage	Init Volt	30...70%	30%	
5	End voltage	End volt	30...70%	30%	
6	Step down voltage	Step down	30...100%	100%	
7	Current limit	Current Lim	2.0...7.0xle	4.0xle	
8	Kick start	Kick Start	Yes, No	No	
9	Kick start level	Kick Level	50...100%	50%	
10	Kick start time	Kick Time	0.1...1.5s	0.2s	
11	Start ramp range	Start Range	1-30s, 1-120s	1-30s	
12	Stop ramp range	Stop Range	0-30s, 0-120s	0-30s	
13	Overload protection type	Overload	No, Normal, Dual	Normal	
14	Overload protection class	OL Class	10A, 10, 20, 30	10	
15	Overload class, dual type, start class	OL Class S	10A, 10, 20, 30	10	
16	Overload class, dual type, run class	OL Class R	10A, 10, 20, 30	10	
17	Overload protection, type of operation	OL Op	Stop-M, Stop-A, Ind	Stop-M	
18	Locked rotor protection	Locked Rotor	Yes, No	No	
19	Locked rotor protection level	Lock R Lev	0.5...8.0xle	4.0xle	
20	Locked rotor protection time	Lock R Time	0.2...10s	1.0s	
21	Locked rotor protection, type of operation	Lock R Op	Stop-M, Stop-A, Ind	Stop-M	
22	Underload protection	Underload	Yes, No	No	
23	Underload protection level	Underl Lev	0.4...0.8xle	0.5xle	
24	Underload protection time	Underl Time	1...30s	10s	
25	Underload protection, type of operation	Underl Op	Stop-M, Stop-A, Ind	Stop-M	
26	Phase imbalance protection	Phase Imb	Yes, No	No	
27	Phase imbalance protection level	Ph Imb Lev	10...80%	80%	
28	Phase imbalance protection, type of operation	Ph Imb Op	Stop-M, Stop-A, Ind	Stop-M	
29	High current protection	High I	Yes, No	No	
30	High current protection, type of operation	High I Op	Stop-M, Stop-A, Ind	Stop-M	
31	Phase reversal protection	Phase Rev	Yes, No	No	
32	Phase reversal protection, type of operation	Ph Rev Op	Stop-M, Stop-A, Ind	Stop-M	
33	PTC protection	PTC	Yes, No	No	
34	PTC protection, type of operation	PTC Op	Stop-M, Stop-A, Ind	Stop-M	
35	External by-pass	Ext ByPass	Yes, No	No	
37	High current warning	Warn I=High	Yes, No	No	
38	High current warning level	Wa I=H Lev	0.5...5.0xle	1.2xle	
39	Low current warning	Warn I=Low	Yes, No	No	
40	Low current warning level	Wa I=L Lev	0.4...1.0xle	0.8xle	
41	Overload warning	Warn OL	Yes, No	No	
42	Overload warning level	Wa OL Lev	40...99%	90%	
43	Thyristor (SRC) overload warning	Warn SCR OL	Yes, No	No	
44	Phase loss fault, type of operation	Ph Loss Op	Stop- M, Stop-A	Stop-M	
45	Fieldbus fault, type of operation	FB Fault Op	Stop- M, Stop-A	Stop-M	
46	Frequency fault, type of operation	Freq F Op	Stop- M, Stop-A	Stop-M	
47	Heat sink over-temperature fault, type of operation	HS Temp Op	Stop- M, Stop-A	Stop-M	
48	Thyristor short circuit fault, type of operation	SCR SC Op	Stop- M, Stop-A	Stop-M	
49	Function of programmable input In0	In0	None, Reset, Enable Jog, DOL, Start 2, FB-Dis	Reset	

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**Settings and configuration**

Param. number	Description	Display text	Setting range	Default value	Actual setting
50	Function of programmable input In1	In1	None, Reset, Enable Jog, DOL, Start 3, FB-Dis	Reset	
51	Function of programmable output relay K4	Relay K4	Run, TOR, Event	Run	
52	Function of programmable output relay K5	Relay K5	Run, TOR, Event	TOR	
53	Function of programmable output relay K6	Relay K6	Run, TOR, Event	Event	
54	Function of programmable software relay V7	SW Outp V7	Run, TOR, Event	Event	
55(0)	Overload event of relay K4	K4 Overload	Yes, No	No	
55(1)	Fault event of relay K4	K4 Fault	Yes, No	No	
55(2)	High current event of relay K4	K4 High I	Yes, No	No	
55(3)	Thyristor overload event of relay K4	K4 SCR OL	Yes, No	No	
55(4)	Locked rotor event of relay K4	K4 Lock Rot	Yes, No	No	
55(5)	Underload event of relay K4	K4 Underload	Yes, No	No	
55(6)	Phase imbalance event of relay K4	K4 Phase Imb	Yes, No	No	
55(7)	PTC event of relay K4	K4 PTC	Yes, No	No	
55(8)	Phase reversal event of relay K4	K4 Phase Rev	Yes, No	No	
55(9)	Overload warning event of relay K4	K4 Warn OL	Yes, No	No	
55(10)	Thyristor overload warning event of relay K4	K4 Wa SCR OL	Yes, No	No	
55(11)	High current warning event of relay K4	K4 Wa I=High	Yes, No	No	
55(12)	Low current warning event of relay K4	K4 Wa I=Low	Yes, No	No	
55(13)	Shunt fault event of relay K4	K4 Shunt Fault	Yes, No	No	
56(0)	Overload event of relay K5	K5 Overload	Yes, No	No	
56(1)	Fault event of relay K5	K5 Fault	Yes, No	No	
56(2)	High current event of relay K5	K5 High I	Yes, No	No	
56(3)	Thyristor overload event of relay K5	K5 SCR OL	Yes, No	No	
56(4)	Locked rotor event of relay K5	K5 Lock Rot	Yes, No	No	
56(5)	Underload event of relay K5	K5 Underload	Yes, No	No	
56(6)	Phase imbalance event of relay K5	K5 Phase Imb	Yes, No	No	
56(7)	PTC event of relay K5	K5 PTC	Yes, No	No	
56(8)	Phase reversal event of relay K5	K5 Phase Rev	Yes, No	No	
56(9)	Overload warning event of relay K5	K5 Warn OL	Yes, No	No	
56(10)	Thyristor overload warning event of relay K5	K5 Wa SCR OL	Yes, No	No	
56(11)	High current warning event of relay K5	K5 Wa I=High	Yes, No	No	
56(12)	Low current warning event of relay K5	K5 Wa I=Low	Yes, No	No	
56(13)	Shunt fault event of relay K5	K5 Shunt Fault	Yes, No	No	
57(0)	Overload event of relay K6	K6 Overload	Yes, No	Yes	
57(1)	Fault event of relay K6	K6 Fault	Yes, No	Yes	
57(2)	High current event of relay K6	K6 High I	Yes, No	Yes	
57(3)	Thyristor overload event of relay K6	K6 SCR OL	Yes, No	No	
57(4)	Locked rotor event of relay K6	K6 Lock Rot	Yes, No	No	
57(5)	Underload event of relay K6	K6 Underload	Yes, No	No	
57(6)	Phase imbalance event of relay K6	K6 Phase Imb	Yes, No	No	
57(7)	PTC event of relay K6	K6 PTC	Yes, No	No	
57(8)	Phase reversal event of relay K6	K6 Phase Rev	Yes, No	No	
57(9)	Overload warning event of relay K6	K6 Warn OL	Yes, No	No	
57(10)	Thyristor overload warning event of relay K6	K6 Wa SCR OL	Yes, No	No	
57(11)	High current warning event of relay K6	K6 Wa I=High	Yes, No	No	
57(12)	Low current warning event of relay K6	K6 Wa I=Low	Yes, No	No	
57(13)	Shunt fault event of relay K6	K6 Shunt Fault	Yes, No	Yes	
58(0)	Overload event of relay V7	V7 Overload	Yes, No	Yes	
58(1)	Fault event of relay V7	V7 Fault	Yes, No	Yes	
58(2)	High current event of relay V7	V7 High I	Yes, No	Yes	
58(3)	Thyristor overload event of relay V7	V7 SCR OL	Yes, No	No	

Param. number	Description	Display text	Setting range	Default value	Actual setting
58(4)	Locked rotor event of relay V7	V7 Lock Rot	Yes, No	No	
58(5)	Underload event of relay V7	V7 Underload	Yes, No	No	
58(6)	Phase imbalance event of relay V7	V7 Phase Imb	Yes, No	No	
58(7)	PTC event of relay V7	V7 PTC	Yes, No	No	
58(8)	Phase reversal event of relay V7	V7 Phase Rev	Yes, No	No	
58(9)	Overload warning event of relay V7	V7 Warn OL	Yes, No	No	
58(10)	Thyristor overload warning event of relay V7	V7 Wa SCR OL	Yes, No	No	
58(11)	High current warning event of relay V7	V7 Wa I=High	Yes, No	No	
58(12)	Low current warning event of relay V7	V7 Wa I=Low	Yes, No	No	
58(13)	Shunt fault event of relay K7	K7 Shunt Fault	Yes, No	Yes	
59	Fieldbus control	Fieldb Ctrl	Yes, No	No	
60	Fieldbus type	Fieldb Type	AS-Int, Other	Other	
61	Fieldbus address	Fieldb Addr	0...1000	0	
62	Sequence start, number of sequences	No of Seq	No, 2, 3	No	
63	Start ramp, first sequence	Start Ramp 1	1...30s, 1...120s	10s	
64	Initial voltage, first sequence	Init Volt 1	30...70%	30%	
65	Current limit, first sequence	Curr Lim 1	2.0...7.0xle	4.0xle	
66	Setting current, first sequence	1st Set le	9.0...1207A	Individual	
67	Start ramp, second sequence	Start Ramp 2	1...30s, 1...120s	10s	
68	Initial voltage, second sequence	Init Volt 2	30...70%	30%	
69	Current limit, second sequence	Curr Lim 2	2.0...7.0xle	4.0xle	
70	Setting current, second sequence	2st Set le	9.0...1207A	Individual	
71	Start ramp, third sequence	Start Ramp 3	1...30s, 1...120s	10s	
72	Initial voltage, third sequence	Init Volt 3	30...70%	30%	
73	Current limit, third sequence	Curr Lim 3	2.0...7.0xle	4.0xle	
74	Setting current, third sequence	3st Set le	9.0...1207A	Individual	
75	Language	Language	US/UK, PL, TR, RU, CN, DE, ES, FR, IT, NL, PT, SE, FI	Individual	
77	LCD automatic switch-off	LCD Auto Off	1...255min	15min	
78	Password	Password	0...255	0	
79	Date type	Date Type	ISO, CE, US	ISO	
80	Year	Date Year	1901...2038	Individual	
81	Month	Date Month	1...12	Individual	
82	Day	Date Day	1...31	Individual	
83	Hour	Time Hour	0...23	Individual	
84	Minutes	Time Min	0...59	Individual	
97	By-pass doesn't open fault, type of operation	BP Closed Op	Stop-M, Stop-A	Stop-M	
98	By-pass doesn't close fault, type of operation	BP Open Op	Stop-M, Stop-A	Stop-M	
111	Dual current limit time	C Lim Y Time	0...120 s	0 s	
112	Dual current limit level	C Lim Y Level	2.0...7.0 x le	4.0 x le	
113	Fieldbus auto disable	FB Auto Dis	Yes, No	No	
114	Start mode	Start Mode	Volt, Torque	Volt	
115	Stop mode	Stop Mode	Volt, Torque	Volt	
116	Torque limit	Torque Limit	20...200%	150%	
117	Tune torque control	Tune T-Ctrl	30...300%	100%	
123	Analog output	Analog Out	Yes, No	No	
124	Analog output, reference	Anl Ref	0...10V, 0...20mA, 4...20mA	4...20mA	
125	Analog output, type of value	Anl Type	I Amp, U Volt, P kW, P hp, Q kVAr, S kVA, Tmp-Mot, TmpSCR, cosPhi	I Amp	
126	Analog output, current range max	I Range Max	10...20000A	PST(B) size dependent	

**Chapter 7**  
**Settings and configuration**

<b>Param. number</b>	<b>Description</b>	<b>Display text</b>	<b>Setting range</b>	<b>Default value</b>	<b>Actual setting</b>
127	Analog output, voltage range max	U Range Max	10...1000V	600V	
128	Analog output, active power range max kW	kW Range Max	1...3000kW	PST(B) size dependent	
129	Analog output, active power range max hp	hp Range Max	1...4000hp	PST(B) size dependent	
130	Analog output, reactive power range max	Q Range Max	1...3000kVAr	PST(B) size dependent	
131	Analog output, apparent power range max	S Range Max	1...3000kVA	PST(B) size dependent	

## 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.

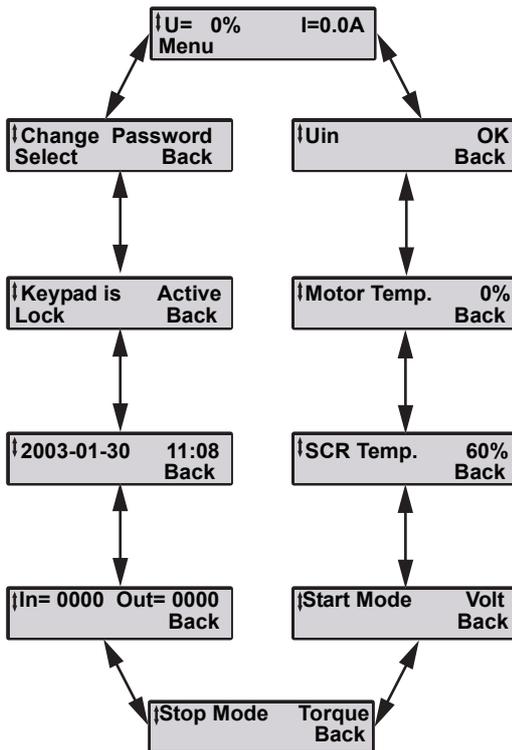


Figure 1: Top level display loop

#### 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.

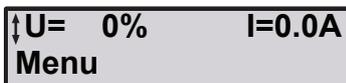


Figure 2: Top level (start position)

#### $U_{in}$ status

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



Figure 3:  $U_{in}$  status

#### 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.



Figure 4: Motor temperature

#### SCR temperature

The temperature of the SCRs in the softstarter is displayed as a percentage of the max. value.



Figure 5: SCR temperature



Figure 6: Start mode



Figure 7: Stop mode

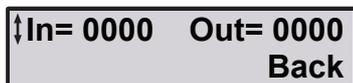


Figure 8: Input/outputs

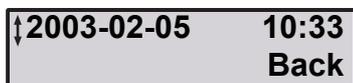


Figure 9: Real time clock



Figure 10: Keypad status



Figure 11: Change Password

### 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

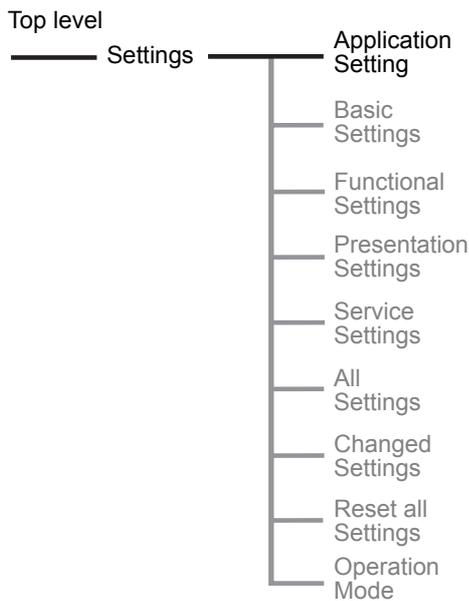


Figure 12: Application Setting menu

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.



Figure 13: Application Setting menu



Figure 14: Application type



Figure 15: Confirming Application type



Figure 16: Setting Ie menu



Figure 17: Confirming Setting Ie



Figure 18: Overload class



Figure 19: Confirming OL Class



Figure 20: External ByPass



Figure 21: Confirming Ext ByPass



Figure 22: Ready?/Tune Set menu

### Setting I<sub>e</sub>

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<sub>e</sub> must be set according to the current in the delta circuit = 58% ( $1/(\sqrt{3})$ ) of the rated motor current.

Press *Store* to save the data after setting the current.

Confirm the *Setting I<sub>e</sub>* by pressing *Next*. If wrong *Setting I<sub>e</sub>* 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*.

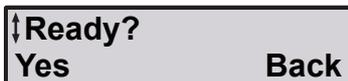
If tuning of some main parameters is wanted, select *Tune Set*.

### 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 is 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.



*Figure 23: All tuning parameters  
have been passed*

## 7:2.3 Basic Settings

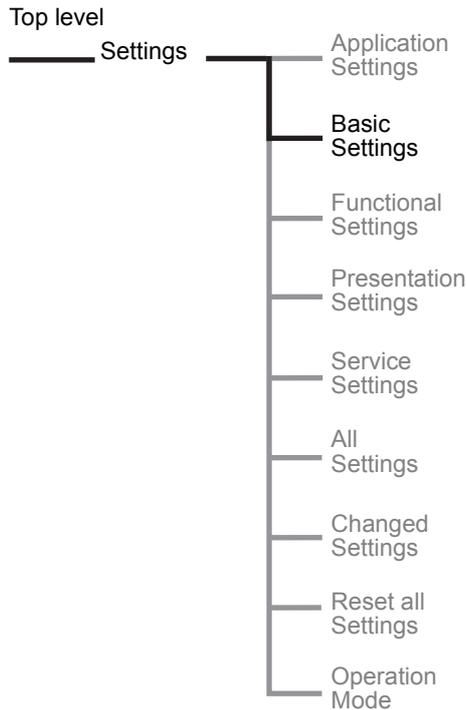


Figure 24: Basic Settings menu

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 =  $58\% (1/(\sqrt{3}))$  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.

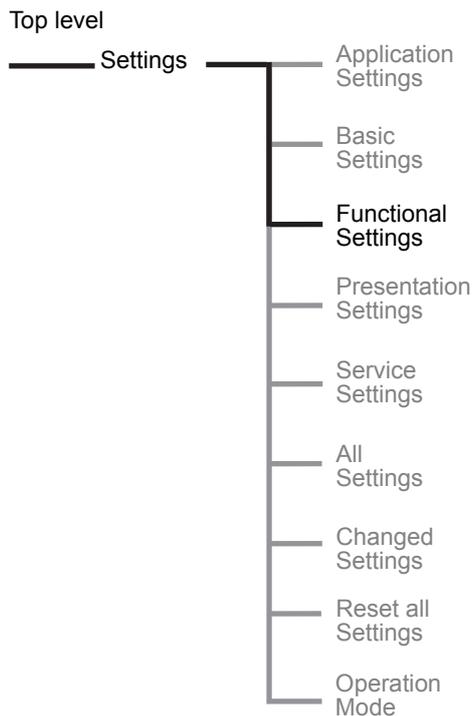
### **Overload Class (OL Class)**

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



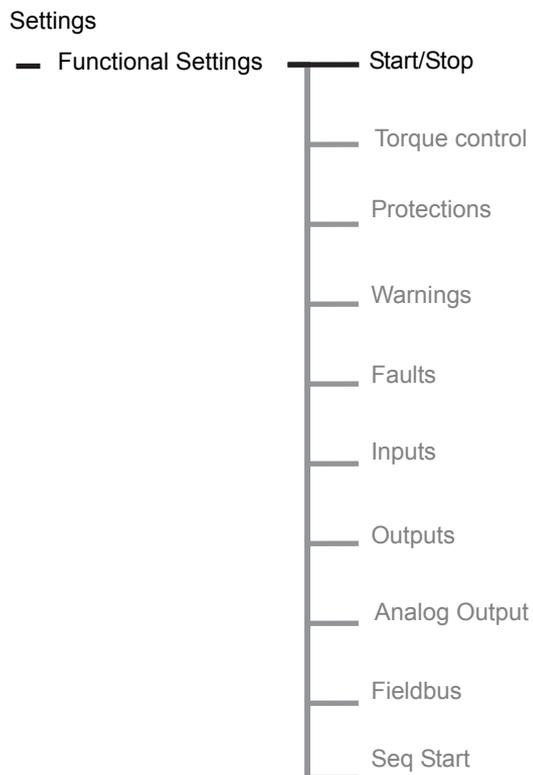
The Functional setting menu consists of groups with parameters arranged by function such as protection, warning, fault, fieldbus communication etc. This menu should be used if a more advanced set-up is required. For a detailed description of each parameter, see Chapter 10 “Functions” .

### Enter the Functional settings

Enter the menu by selecting *Functional Settings*.

Figure 25: Functional Settings menu

### 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 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**

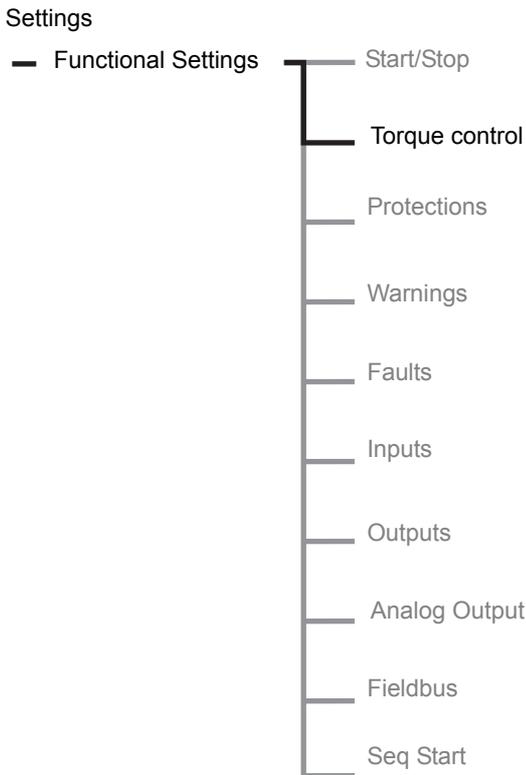
The ramp time for start can be set between 1 and 30 seconds as default. If required, the range can be extended up to 120 seconds by entering this menu. Press *Store* to save the data.

### **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.

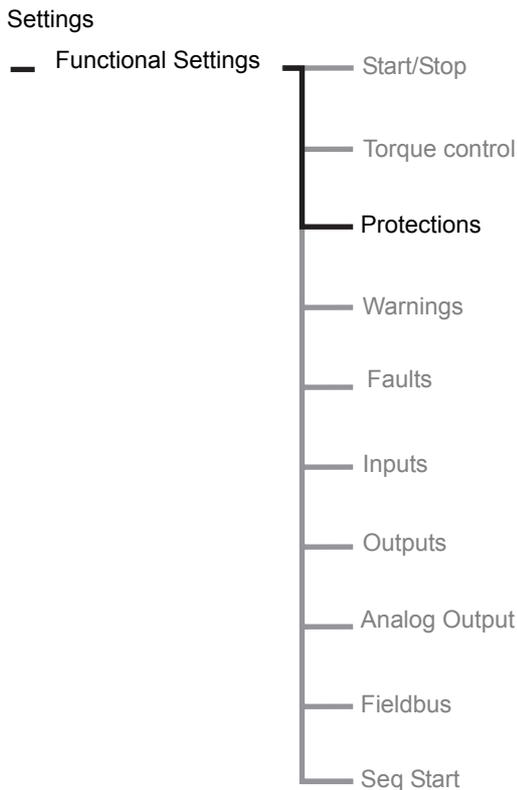
#### Torque limit

Select the torque limit of the softstarter.

Press *Store* to save the selected torque limit level.

Figure 27: Torque control group

### 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.

Figure 28: Protections group

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 analog 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.

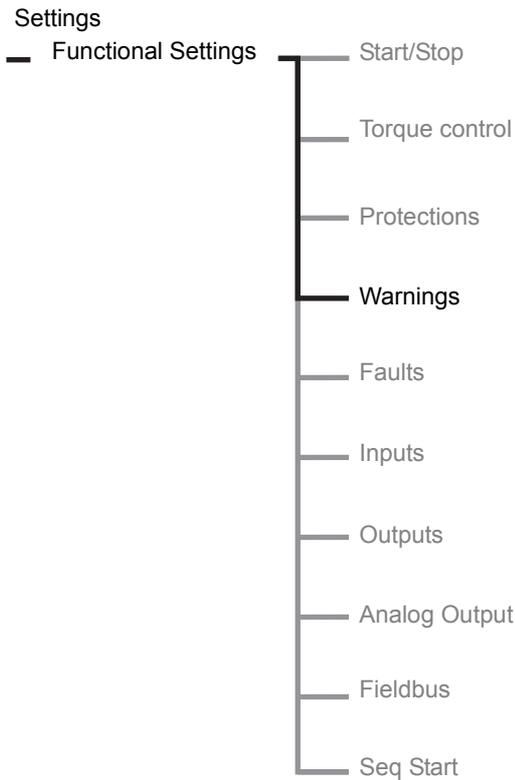
Press *Store* to save the selected operation.

### 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.

Figure 29: Warnings group

### 7:2.4.5 Faults

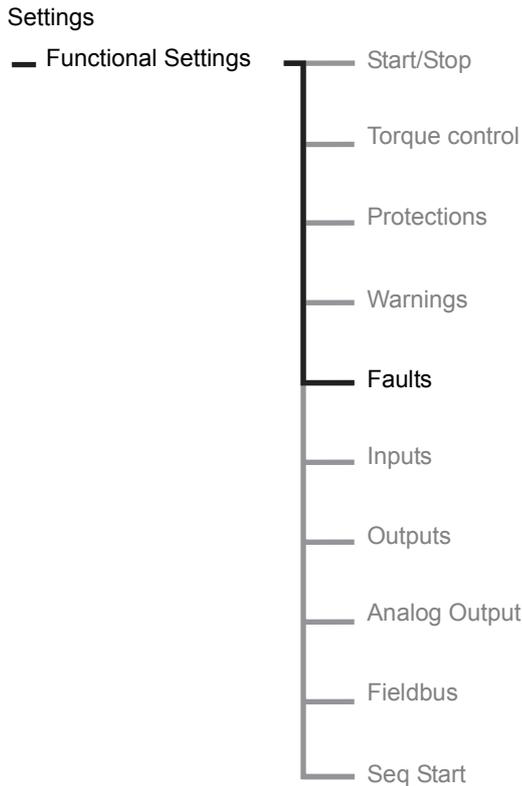


Figure 30: Faults group



#### 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 *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 *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 *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

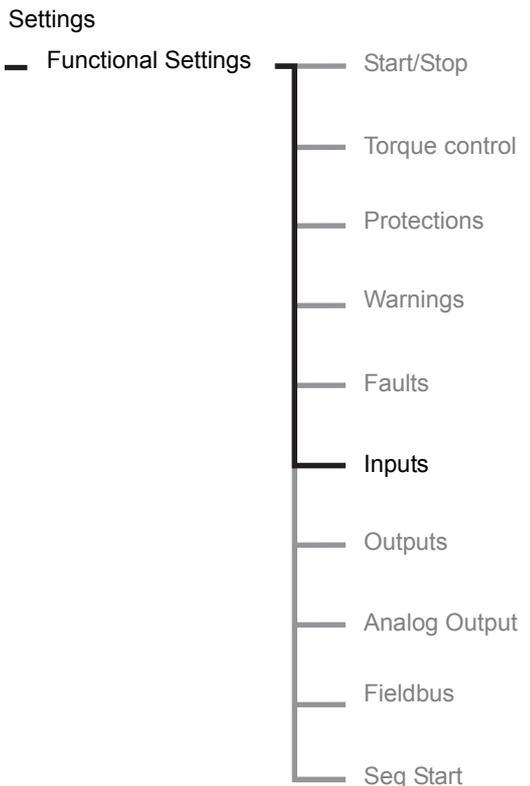


Figure 31: Inputs groups

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 <i>Setting</i> $I_e$ 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 the In1=0 the softstarter stops immediately. When In1=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 <i>Setting</i> $I_e$ is equal or lower than AC-3 rating.
Start3	Start signal for 3rd parameter set-up.
FB-Dis	Disable of the fieldbus communication. The softstarter can be controlled by the hard wire inputs instead.

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

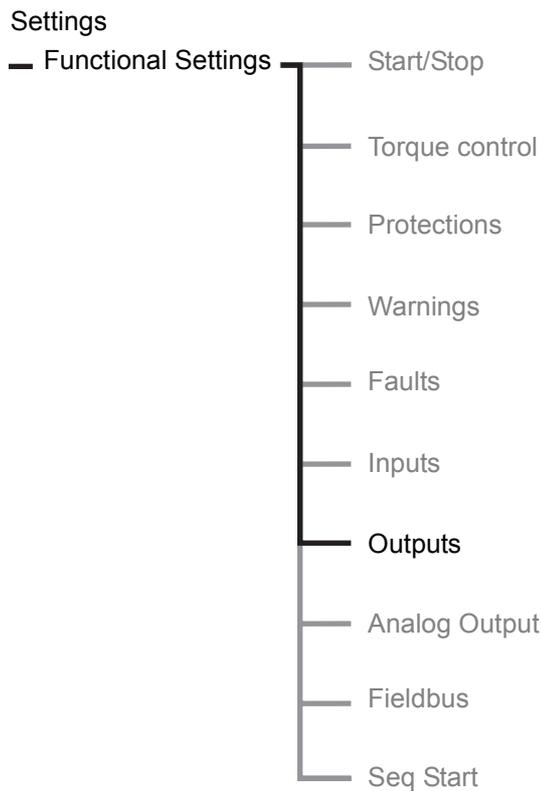


### Caution!

*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)*

### 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.

Figure 32: Outputs groups

### 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

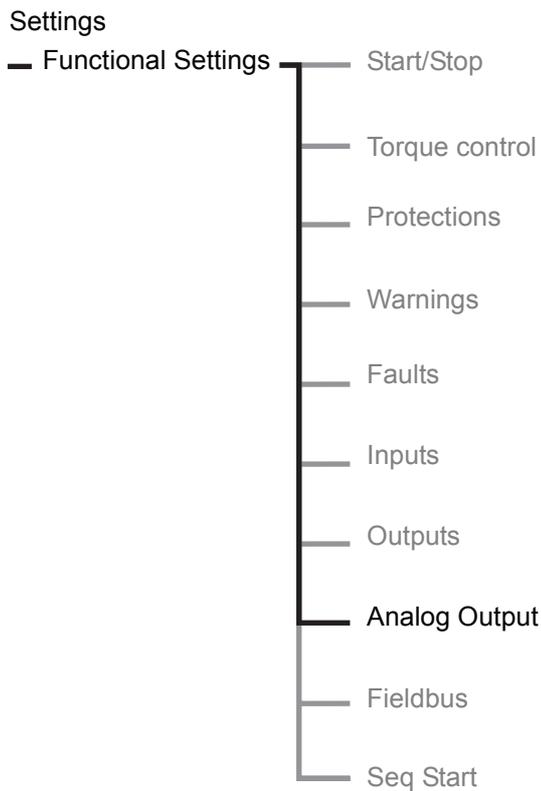


Figure 33: Analog output group

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 (AnI 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:

Current of the motor	I Range Max	10...20000 A
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.

Press *Store* to save the range of output.

### 7:2.4.9 Fieldbus

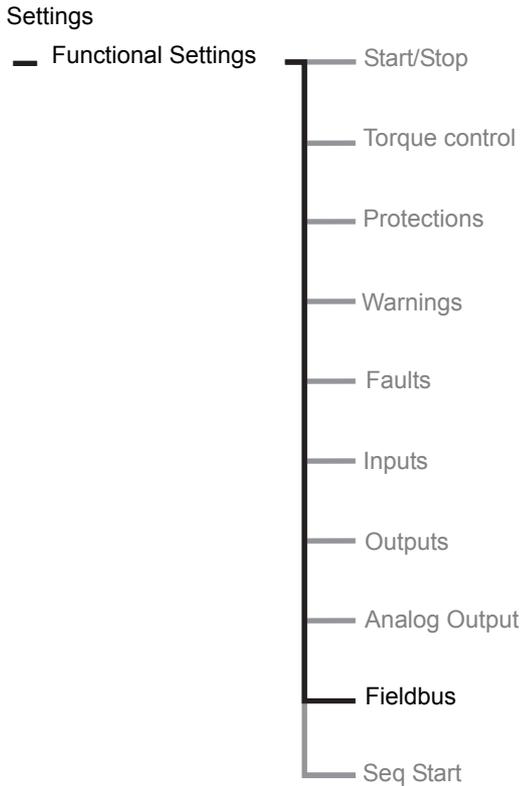


Figure 34: Fieldbus group

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.

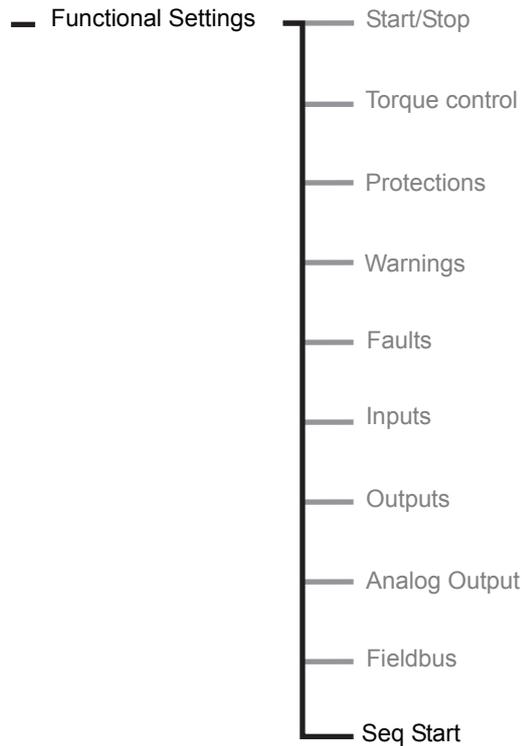


#### Caution!

*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)*

Settings



### 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.*

Figure 35: Sequence start group

### 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

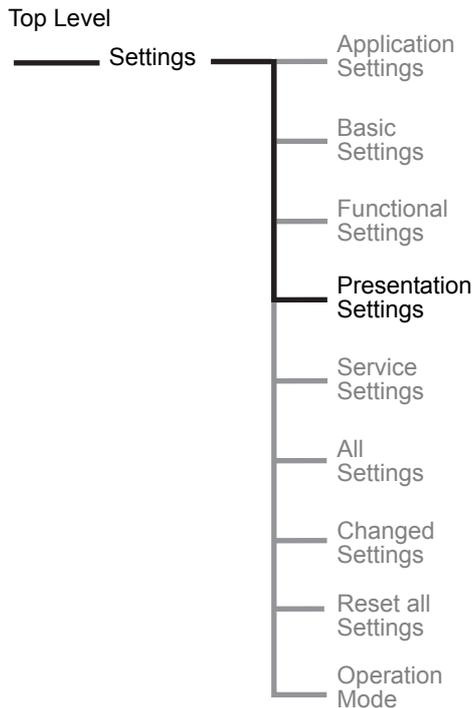


Figure 36: Presentation Settings menu

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:

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



*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:

Date type	Display on the LCD
ISO	Year – Month – Day
US	Month – Day - Year
CE	Day – Month - Year

### 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

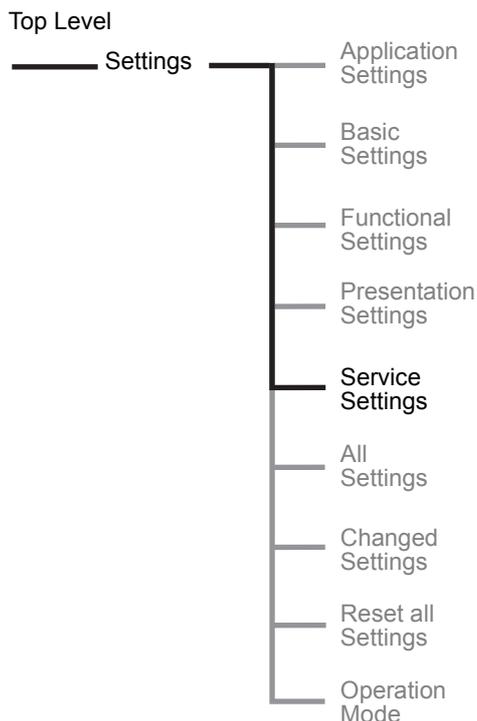
To set the hours in the real time clock, press *Change* to enter the setting level. Press *Store* to save the set value.

### 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.

## 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.**

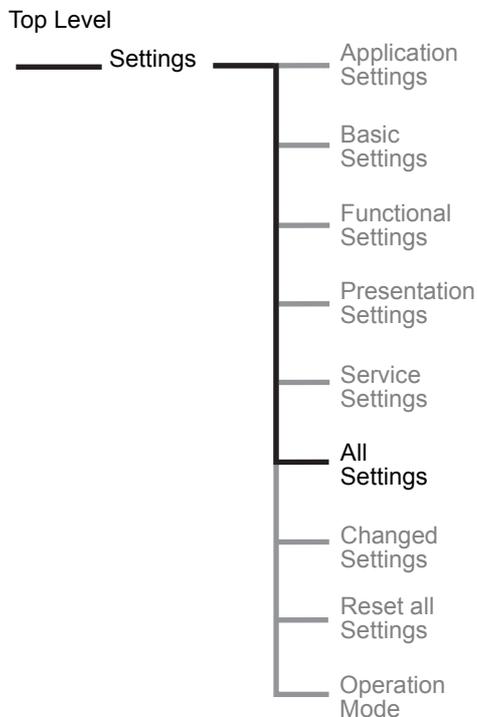


### Warning!

*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



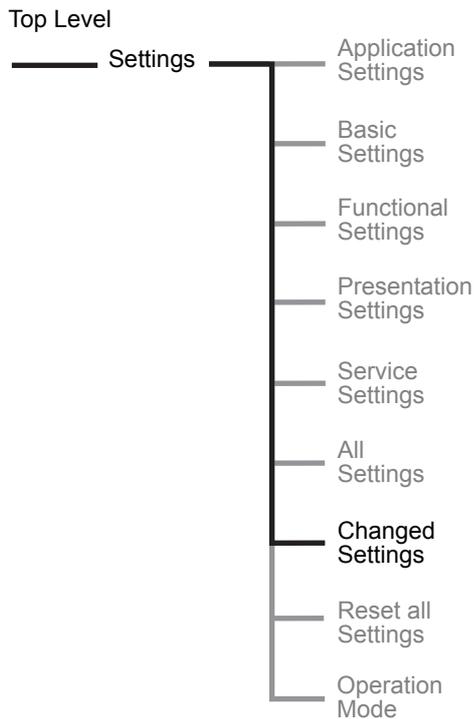
The All setting menu consists of all the available settings listed. Each parameter can be adjusted separately from this menu. For a detailed description of each parameter, see Chapter 10 "Functions" .

### Enter the All settings

Enter the menu by selecting *All Settings*.

Figure 38: All Settings menu

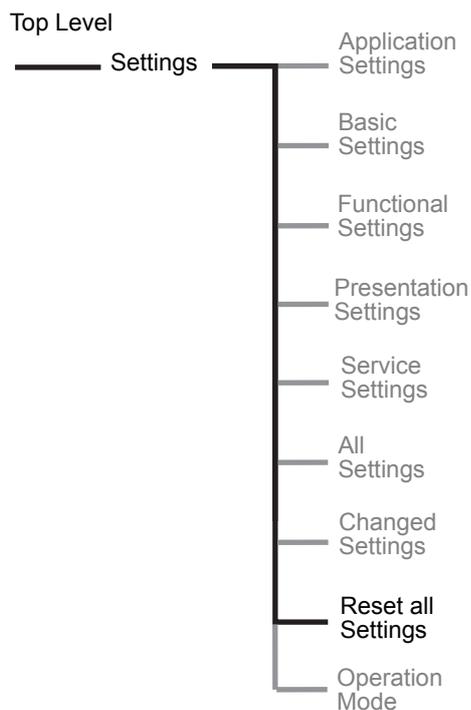
### 7:2.7.1 Changed Settings



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*.

Figure 39: Changed Settings menu

### 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)*

Figure 40: Reset all Settings menu

### 7:2.7.3 Operation mode

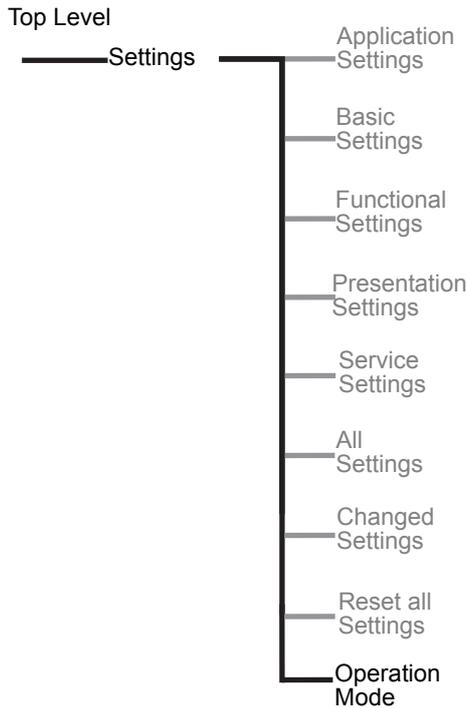


Figure 41: Reset all Settings menu

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.*



Figure 42: Display appearance in normal mode



Figure 43: Display appearance in demo mode

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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
- Profibus DP
- Modbus

#### 8:1.1 Required accessories

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

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

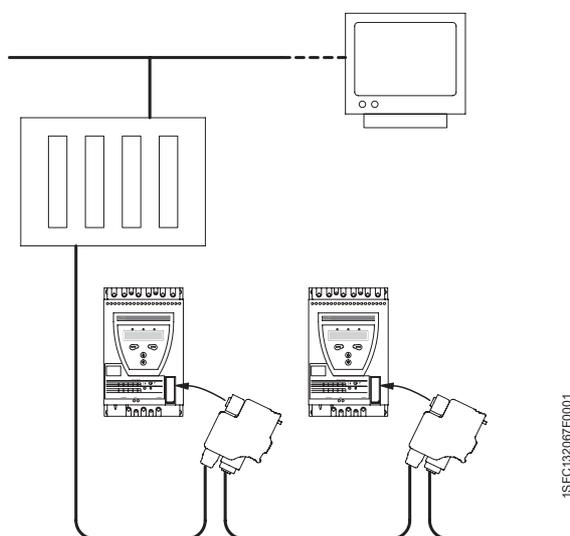


Figure 1: Principle of a fieldbus network with PST softstarters connected

## 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](http://www.abb.com/lowvoltage):

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

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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](http://www.abb.com/lowvoltage).



*Service and repair should be performed buy 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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## 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.*

Parameter text	Default value	Setting range	Description
Setting Ie	Individual (size related)	9...1207A divided into 19 overlapping ranges	Rated motor current

## 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.

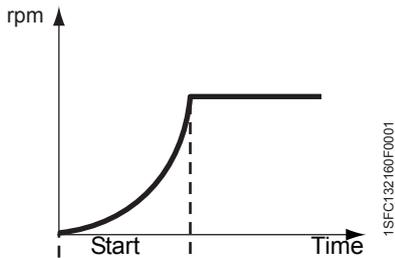
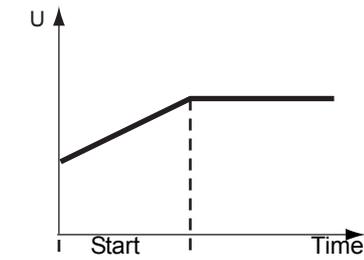


Figure 1: Voltage ramp

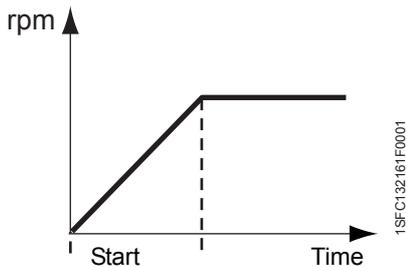
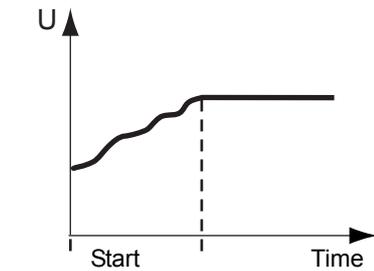


Figure 2: Torque ramp

Parameter text	Default value	Setting range	Description
Start Mode	Volt	Volt, Torque	Type of start 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.

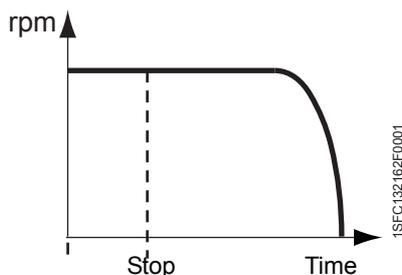
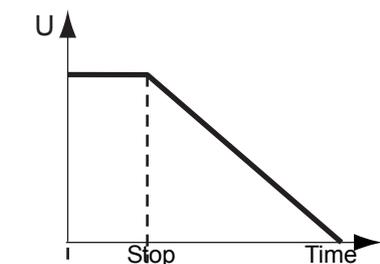


Figure 3: Voltage ramp

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.

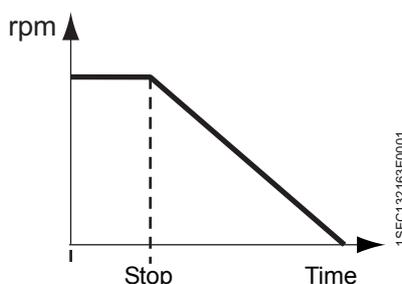
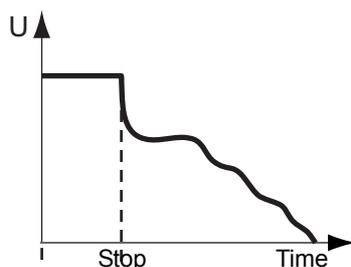


Figure 4: Torque ramp

Parameter text	Default value	Setting range	Description
Stop Mode	Volt	Volt, Torque	Type of stop ramp

## 10:4 Tune torque control

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

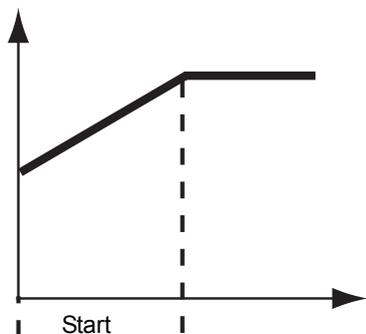
With this parameter it is possible to change the speed of the regulator that regulates the voltage so that the torque will follow a predefined torque curve. In most cases, this parameter will not have to be changed from its default value which is 100%. If a dip occurs in the torque curve during stop, 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.

Parameter text	Default value	Setting range	Description
Tune T-Ctrl	100%	30...300%	The speed of the regulator

## 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.



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Figure 5: Start ramp

Parameter text	Default value	Setting range	Description
Start Ramp	10 s	1...30s, 1...120s (Range depends on Start Range)	Time for start ramp

## 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!*

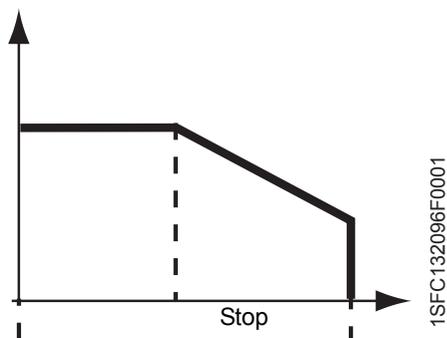


Figure 6: Stop ramp

Parameter text	Default value	Setting range	Description
Stop Ramp	0 s	0...30s, 0...120s (Range depends on Stop Range)	Time for stop ramp

## 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.

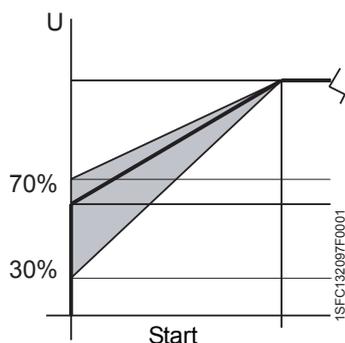


Figure 7: Initial voltage for Start ramp

Parameter text	Default value	Setting range	Description
Init Volt	30%	30...70%	Initial voltage for start ramp

## 10:8 End voltage

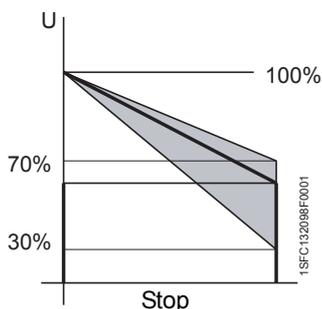


Figure 8: End voltage for Stop ramp

**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.

Parameter text	Default value	Setting range	Description
End Volt	30%	30...70%	End voltage for stop ramp

## 10:9 Step down voltage

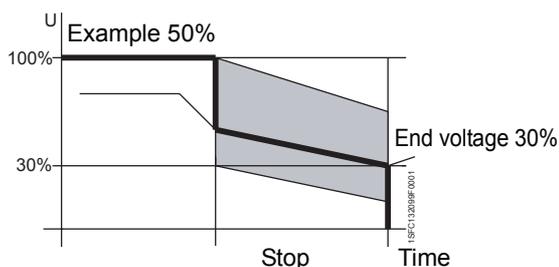


Figure 9: Step down voltage for Stop ramp

**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".

Parameter text	Default value	Setting range	Description
Step Down	100%	30...100%	Voltage value to which the soft-starter shall step down at stop and where it shall commence the stop ramp.

## 10:10 Current limit

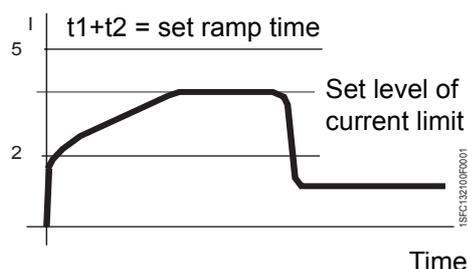
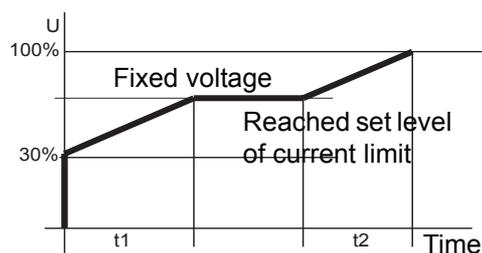


Figure 10: Current limit

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.



*The starting current must be high enough to make it possible for the motor to reach the rated speed. The lowest possible current depends on the performance of the motor and the characteristics of the load.*

Parameter text	Default value	Setting range	Description
Current Lim	$4.0 \times I_e$	$2.0 \dots 7.0 \times I_e$	Level of the current limit

## 10:11 Torque limit

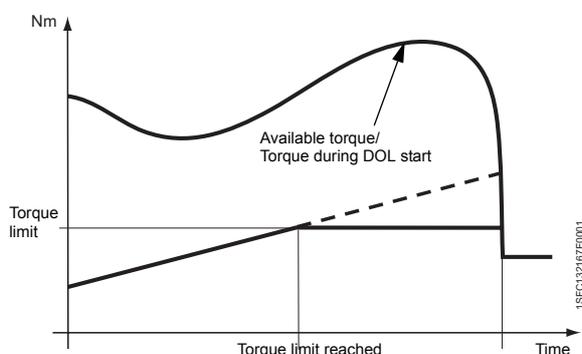


Figure 11: Torque limit

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.



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

Parameter text	Default value	Setting range	Description
Torque Limit	150 %	20...200%	Level of the torque limit compared to the nominal torque of the motor

## 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.

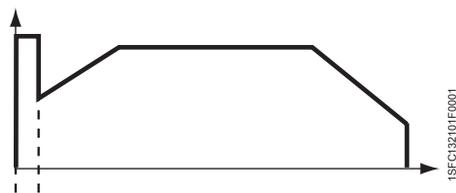


Figure 12: Kick start

Parameter text	Default value	Setting range	Description
Kick Start	No	Yes, No	Selection of Kick Start

## 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.

Parameter text	Default value	Setting range	Description
Kick Level	50%	50...100%	Level of Kick Start

## 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.

Parameter text	Default value	Setting range	Description
Kick Time	0.2 s	0.1... 1.5 s	Time for Kick Start

## 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.*

Parameter text	Default value	Setting range	Description
Start Range	1-30 s	1-30 s, 1-120 s	Selectable range for start ramp

## 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.

Parameter text	Default value	Setting range	Description
Stop Range	0-30 s	0-30 s, 0-120 s	Selectable range for stop ramp

## 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.

Parameter text	Default value	Setting range	Description
Overload	Normal	No, Normal, Dual	Overload protection



*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

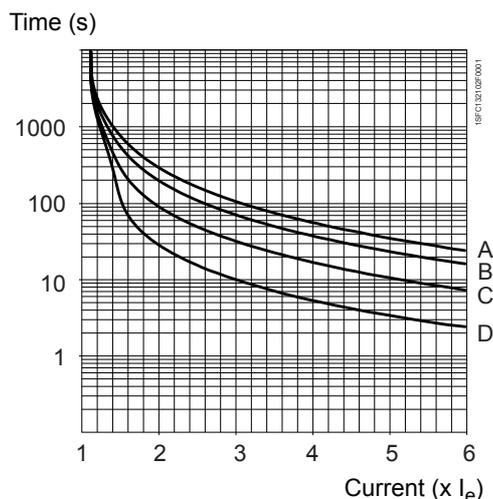


Figure 13: Tripping curves for the electronic overload

- A Class 30
- B Class 20
- C Class 10
- D Class 10A

Parameter text	Default value	Setting range	Description
OL Class	10	10A, 10, 20, 30	Overload class

## 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).

Parameter text	Default value	Setting range	Description
OL Class S	10	10A, 10, 20, 30	Overload class, Dual type, Start Class

## 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.

Parameter text	Default value	Setting range	Description
OL Class R	10	10A, 10, 20, 30	Overload class, Dual type, Run Class

## 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.

Parameter text	Default value	Setting range	Description
OL Op	Stop-M	Stop-M, Stop-A, Ind	Type of operation for overload protection

## 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.

Parameter text	Default value	Setting range	Description
Locked Rotor	No	Yes, No	Locked rotor protection

## 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.

Parameter text	Default value	Setting range	Description
Lock R Lev	$4.0 \times I_e$	$0.5 \dots 8.0 \times I_e$	Trip level for locked rotor protection

## 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.

Parameter text	Default value	Setting range	Description
Lock R Time	1.0 s	0.2...10.0 s	Trip time for locked rotor protection

## 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.

Parameter text	Default value	Setting range	Description
Lock R Op	Stop-M	Stop-M, Stop-A, Ind	Type of operation for locked rotor protection

## 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.*

Parameter text	Default value	Setting range	Description
Underload	No	Yes, No	Underload protection

## 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.

Parameter text	Default value	Setting range	Description
Underl Lev	$0.5 \times I_e$	$0.4 \dots 0.8 \times I_e$	Trip level for Underload protection

## 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.

Parameter text	Default value	Setting range	Description
Underl Time	10 s	1...30 s	Trip time for Underload protection

## 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.

Parameter text	Default value	Setting range	Description
Underl Op	Stop-M	Stop-M, Stop-A, Ind	Type of operation for Underload protection

## 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.

Parameter text	Default value	Setting range	Description
Phase Imb	No	Yes, No	Phase imbalance protection

## 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.

Parameter text	Default value	Setting range	Description
Ph Imb Lev	80%	10...80%	Trip level for Phase imbalance 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.

Parameter text	Default value	Setting range	Description
Ph Imb Op	Stop–M	Stop–M, Stop–A, Ind	Type of operation for Phase imbalance protection

## 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  $8 \times I_e$  during 200 ms. The protection is activated if the current exceeds this level and time.

Parameter text	Default value	Setting range	Description
High I	No	Yes, No	High current protection

## 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.

Parameter text	Default value	Setting range	Description
High I Op	Stop-M	Stop-M, Stop-A, Ind	Type of operation for high current protection

## 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.

Parameter text	Default value	Setting range	Description
Phase Rev	No	Yes, No	Phase reversal protection

## 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.

Parameter text	Default value	Setting range	Description
Ph Rev Op	Stop–M	Stop–M, Stop–A, Ind	Type of operation for phase reversal protection

## 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.

Parameter text	Default value	Setting range	Description
PTC	No	Yes, No	PTC protection

## 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.

Parameter text	Default value	Setting range	Description
PTC Op	Stop M	Stop-M, Stop-A, Ind	Type of operation for PTC protection

## 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.*

Parameter text	Default value	Setting range	Description
Ext ByPass	No	Yes, No	An external Bypass contactor is used

## 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.

Parameter text	Default value	Setting range	Description
Warn I=High	No	Yes, No	High current warning

## 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.

Parameter text	Default value	Setting range	Description
WA I=H Lev	$1.2 \times I_e$	$0.5 \dots 5.0 \times I_e$	Trip level for high current warning

## 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.

Parameter text	Default value	Setting range	Description
Wa I=Low	No	Yes, No	Low current warning

## 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.

Parameter text	Default value	Setting range	Description
Wa I = L Lev	$0.8 \times I_e$	$0.4 \dots 1.0 \times I_e$	Trip level for low current warning

## 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.

Parameter text	Default value	Setting range	Description
Warn OL	No	Yes, No	Overload warning

## 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%.

Parameter text	Default value	Setting range	Description
Wa OL Lev	90%	40...99%	Trip level for overload warning

## 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%.

Parameter text	Default value	Setting range	Description
Warn SCR OL	No	Yes, No	Thyristor overload warning

## 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.

Parameter text	Default value	Setting range	Description
Ph Loss Op	Stop–M	Stop–M, Stop–A	Type of operation for phase loss fault

## 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.

Parameter text	Default value	Setting range	Description
FB Fault Op	Stop-M	Stop-M, Stop-A	Type of operation for fieldbus fault

## 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.

Parameter text	Default value	Setting range	Description
Freq F Op	Stop-M	Stop-M, Stop-A	Type of operation for frequency fault

## 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.

Parameter text	Default value	Setting range	Description
HS Temp Op	Stop-M	Stop-M, Stop-A	Type of operation for heat sink overtemperature fault

## 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.

Parameter text	Default value	Setting range	Description
SCR SC Op	Stop-M	Stop-M, Stop-A	Type of operation for thyristor short circuit fault

## 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.

Parameter text	Default value	Setting range	Description
BP Closed Op	Stop-M	Stop-M, Stop-A	Type of operation if the by-pass does not open

## 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.

Parameter text	Default value	Setting range	Description
BP Open Op	Stop-M	Stop-M, Stop-A	Type of operation if the by-pass does not close

## 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.

Parameter text	Default value	Setting range	Description
In0	Reset	None, Reset, Enable, Jog, DOL, Start2, FB-Dis	Function of programmable input In0
In1	Reset	None, Reset, Enable, Jog, DOL, Start3, FB-Dis	Function of programmable input In1



### 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.*

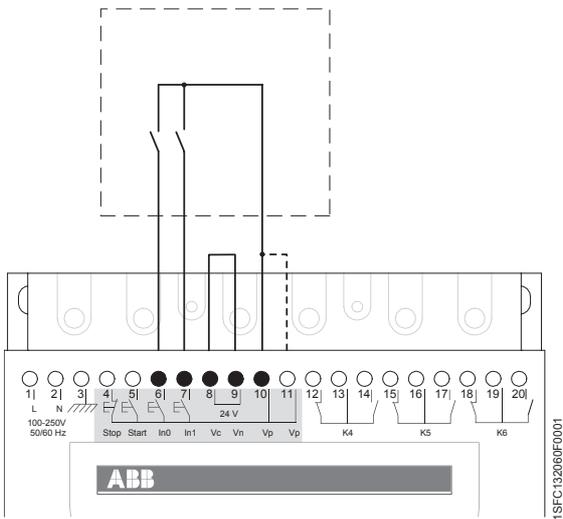


Figure 14: Internal control voltage

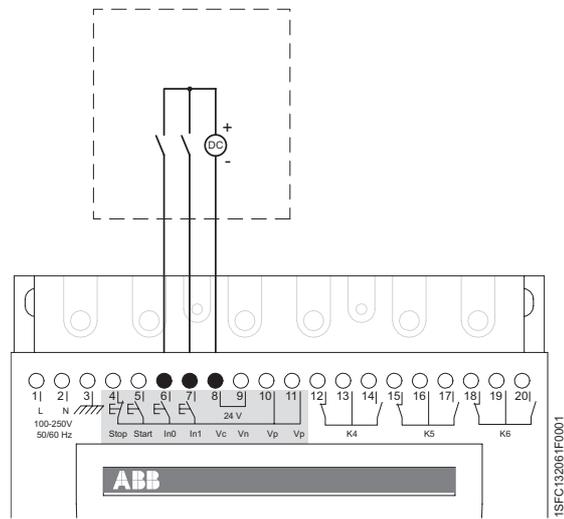


Figure 15: External control voltage

## 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.

<b>Parameter text</b>	<b>Default value</b>	<b>Setting range</b>	<b>Description</b>
Relay K4	Run	Run, TOR, Event	Function of programmable relay output K4.
Relay K5	TOR	Run, TOR, Event	Function of programmable relay output K5.
Relay K6	Event	Run, TOR, Event	Function of programmable relay output K6.

## 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.

Parameter text	Default value	Setting range	Description
SW Outp V7	Event	Run, TOR, Event	Function of programmable software output V7.

## 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.*

Parameter text	Default value	Setting range	Description
Analog Out	No	Yes, No	Enable analog output

## 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.

Parameter text	Default value	Setting range	Description
Anl Ref	4...20 mA	0...10V, 0...20mA, 4...20mA	The type of the output signal of the analog output

## 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 kVA      Reactive power
- S kVA      Apparent power
- TmpMot     Calculated temperature of the motor
- TmpSCR    Calculated temperature of the SCR
- cosPhi     Power factor

Parameter text	Default value	Setting range	Description
Anl Type	I Amp	I Amp, U Volt, P kW, P hp, Q kVA, S kVA, TmpMot, TmpSCR, cosPhi	The type of value to output from the analog output

## 10:60 Analog output, range max

**Path in menu:**  
**Menu/SETTINGS/Functional Settings/  
 Analog Output/ I/U/P/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:

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 kVA
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.

Parameter text	Default value	Setting range	Description
I Range Max	PST(B) size dependent	10...20000 A	Upper limit for the current for the analog output
U Range Max	600 V	10...1000 V	Upper limit for the voltage for the analog output
kW Range Max	PST(B) size dependent	1...3000 kW	Upper limit for the active power for the analog output
hp Range Max	PST(B) size dependent	1...4000 hp	Upper limit for the active power for the analog output
Q Range Max	PST(B) size dependent	1...3000 kVAr	Upper limit for the reactive power for the analog output
S Range Max	PST(B) size dependent	1...3000 kVA	Upper limit for the apparent power for the analog output

## 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.*

- *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 text	Default value	Setting range	Description
Fieldb Ctrl	No	Yes, No	Control of the softstarter with fieldbus.

## 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

Parameter text	Default value	Setting range	Description
Fieldb Type	Other	AS-Int, Other	Type of fieldbus, AS-Interface=short protocol. Other=long protocol.

## 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.

Parameter text	Default value	Setting range	Description
Fieldb Addr	0	0...1000	Fieldbus address

## 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.

Parameter text	Default value	Setting range	Description
FB Auto Dis	No	Yes, No	Enable fieldbus auto disable



### 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.

Parameter text	Default value	Setting range	Description
No of Seq	No	No, 2, 3	Number of sequences for sequence start.



*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.

Parameter text	Default value	Setting range	Description
Start Ramp1	10 s	1...30s, 1...120s	First sequence, time for start ramp

## 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

Parameter text	Default value	Setting range	Description
Init Volt1	30%	30...70%	First sequence, initial voltage for start ramp

## 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.

Parameter text	Default value	Setting range	Description
Curr Lim1	$4 \times I_e$	$2.0...7.0 \times I_e$	First sequence, current limit

## 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

Parameter text	Default value	Setting range	Description
1st Set Ie	$I_r$	9...1207A divided into 19 overlapping ranges	First sequence, motor rated current

## 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.

Parameter text	Default value	Setting range	Description
Start Ramp2	10 s	1...30s, 1...120s	Second sequence, time for start ramp

## 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.

Parameter text	Default value	Setting range	Description
Init Volt2	30%	30...70%	Second sequence, initial voltage for start ramp

## 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.

Parameter text	Default value	Setting range	Description
Curr Lim2	4 x I <sub>e</sub>	2.0...7.0 x I <sub>e</sub>	Second sequence, current limit

## 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.

Parameter text	Default value	Setting range	Description
2nd Set Ie	I <sub>r</sub>	9...1207A divided into 19 overlapping ranges	Second sequence, motor rated current

## 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.

Parameter text	Default value	Setting range	Description
Start Ramp3	10 s	1...30s, 1...120s	Third sequence, time for start ramp

## 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.

Parameter text	Default value	Setting range	Description
Init Volt3	30%	30...70%	Third sequence, initial voltage for start ramp

## 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.

Parameter text	Default value	Setting range	Description
Curr Lim3	$4 \times I_e$	$2.0 \dots 7.0 \times I_e$	Third sequence, current limit

## 10:77 Setting current, third sequence

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

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

Parameter text	Default value	Setting range	Description
3rd Set $I_e$	$I_r$	9...1207A divided into 19 overlapping ranges	Third sequence, motor rated current

## 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

Parameter text	Default value	Setting range	Description
Language	Individual	US/UK, PL, TR, RU, CN, DE, ES, FR, IT, NL, PT, SE, FI	Language to use on display

## 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.

Parameter text	Default value	Setting range	Description
LCD Auto Off	15 min	1...255 min	Time for display automatic turn off

## 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.

Parameter text	Default value	Setting range	Description
Change Password	No	No, 1...255	Password for display

## 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

Parameter text	Default value	Setting range	Description
Date Type	ISO	ISO, CE US	Type of date presentation

## 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.

Parameter text	Default value	Setting range	Description
Date Year	Individual	1901...2038	Year

## 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.

Parameter text	Default value	Setting range	Description
Date Month	Individual	1...12	Month

## 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.

Parameter text	Default value	Setting range	Description
Date Day	Individual	1...31	Day

## 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.

Parameter text	Default value	Setting range	Description
Time Hour	Individual	0...23	Hour

## 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.

Parameter text	Default value	Setting range	Description
Time Min	Individual	0...59	Minutes

### 10:87 Dual current limit time

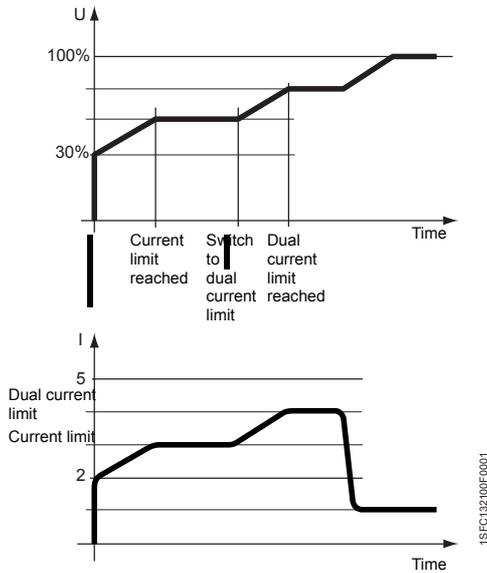


Figure 16: Dual current limit

**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.

Parameter text	Default value	Setting range	Description
C Lim Y Time	0 s	0...120 s	Time until the second current limit will be used instead of the normal current limit

### 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.

Parameter text	Default value	Setting range	Description
C Lim Y Lev	4.0 x Ie	2.0...7.0 x Ie	Level of the second current limit

## 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.

LCD indication	Active when selected								Always active										Active when selected					
	Overload protection	Underload protection	Locked rotor protection	High current protection	Phase imbalance protection	Phase reversal protection	PTC protection	Thyristor overload protection	Phsae loss fault	Connection fault	Frequency fault	Line side fault	Heat sink over-temperature fault	Kick-current fault	Thyristor short circuit fault	Non conducting thyristor	Fieldbus fault	By-pass doesn't open fault	By-pass doesn't close fault	Fault Line/Delta	Overload warning	Thyristor overload warning	High current warning	Low current warning
Stand by	X	-	-	X	-	-	X	X	-	-	-	-	X	-	-	-	X <sup>1</sup>	-	-	-	X	X	-	-
At start signal	X	-	-	X	-	X	X	X	X	X	X	X	X	-	X	-	X <sup>1</sup>	-	-	-	X	X	-	-
Ramp up	X	-	-	X	-	-	X	X	X	-	-	-	X	X <sup>2</sup>	-	X	X <sup>1</sup>	-	-	X	X	X	-	-
TOR	X	X	X	X	X	-	X	X	X	-	-	-	X	-	-	X	X <sup>1</sup>	-	X <sup>3</sup>	-	X	X	X	X
At stop signal	X	-	-	X	-	-	X	X	X	-	-	-	X	-	X <sup>4</sup>	X	X <sup>1</sup>	X <sup>3</sup>	-	-	X	X	-	-
Ramp down	X	-	-	X	-	-	X	X	X	-	-	-	X	-	X	X	X <sup>1</sup>	-	-	-	X	X	-	-

1) Only if Fieldbus control is selected

2) Only if Kick-start is selected

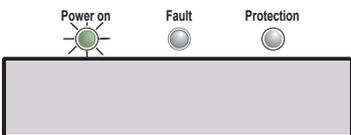
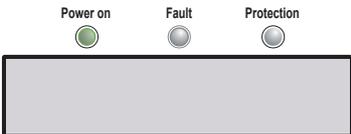
3) Only if by-pass is used

4) Only if by-pass is not used

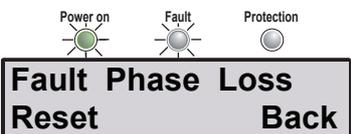
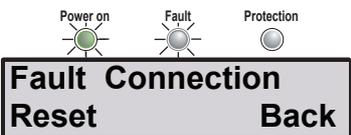
## 11:3 General problems and faults

Status	Possible cause	Solution
Motor humming / starts without given start signal.	Shorted thyristor. By-pass contactor stuck in closed position.	<ul style="list-style-type: none"> <li>• Check and replace.</li> <li>• Check and correct the reason.</li> </ul>
Bad motor sound during start and operation.	Inside Delta connection wrong.	<ul style="list-style-type: none"> <li>• Check and correct the wiring.</li> </ul>
Bad motor sound during stop.	Wrong ramp time for stop.	<ul style="list-style-type: none"> <li>• Try different ramp times (some adjustments can be necessary for best result).</li> </ul>
Motor does not start when giving start command using the hardware inputs.	Control wiring not correct Start and stop command given at the same time. Keypad is in Local Control menu.	<ul style="list-style-type: none"> <li>• Check connections for start and stop.</li> <li>• Check that start and stop command is not given at the same time.</li> <li>• Check that the keypad is not in Local Control menu.</li> <li>• Check that parameter Fieldbus Ctrl is set to No.</li> </ul>
Motor does not start when giving start command using the fieldbus communication.	Setting of fieldbus parameter wrong.	<ul style="list-style-type: none"> <li>• Check that parameter Fieldbus Ctrl is set to Yes.</li> <li>• Check that bit "Enable" is used.</li> <li>• Check that programmable inputs have correct settings.</li> </ul>
Displayed current in LCD does not correspond to motor current.	Inside Delta connection.	<ul style="list-style-type: none"> <li>• If the softstarter is connected Inside Delta, the current displayed is 58% (<math>1/\sqrt{3}</math>) of the motor current.</li> </ul>
Displayed current in LCD is not stable.	The motor is too small. The load on the motor is too small. (current is out of measuring range).	<ul style="list-style-type: none"> <li>• Check that the softstarter corresponds to the motor size.</li> <li>• Increase the load if possible.</li> <li>• Check that softstarter and motor sizes correspond.</li> </ul>
Loading of parameters does not work properly.	Fieldbus settings.	<ul style="list-style-type: none"> <li>• See chapter Fieldbus for actual fieldbus type.</li> </ul>

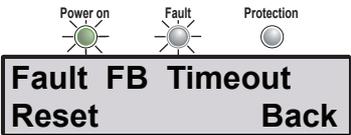
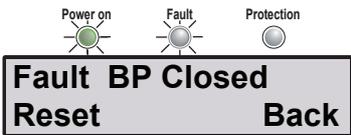
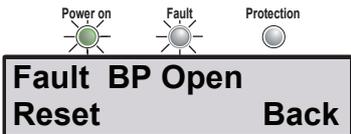
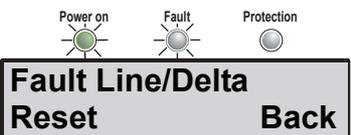
## 11:4 Start up faults

Status	Possible cause	Solution
	LCD Auto shut off the keypad.	<ul style="list-style-type: none"> <li>• Touch any key on the keypad.</li> </ul>
	Supply voltage is not connected.	<ul style="list-style-type: none"> <li>• Connect the Supply voltage according to the circuit diagram.</li> </ul>

## 11:5 Fault indication

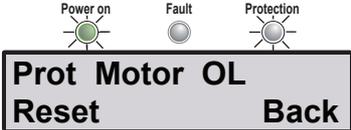
Status	Possible cause	Solution
<p><b>Phase loss fault</b></p> 	<p>The main contactor or circuit breaker is open</p> <p>Fuse blown.</p> <p>Any external device open / tripped.</p> <p>Main contactor opens too quickly</p>	<ul style="list-style-type: none"> <li>• Check and close contactor / breaker or any external switching device.</li> <li>• Check and replace the fuse in all three (3) phases.</li> <li>• Add a time delay before opening.</li> </ul>
<p><b>Connection fault</b></p> 	<p>The motor connection is not correct.</p> <p>Shorted thyristor at start.</p>	<p><b>In Line connected</b></p> <ul style="list-style-type: none"> <li>• Check that there are no connections missing to the motor.</li> <li>• Check that the connections are carried out correctly.</li> <li>• Check and replace.</li> </ul> <p><b>Inside Delta connected</b></p> <ul style="list-style-type: none"> <li>• Check that there are no connections missing to the motor.</li> <li>• Check that the circuits are closed and correspond to the circuit diagram.</li> <li>• Check and replace.</li> </ul>

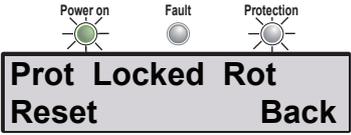
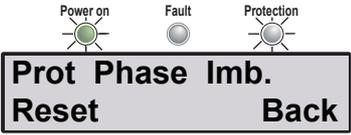
Status	Possible cause	Solution
<p><b>Frequency fault</b></p> <p><b>Fault Wrong Freq</b> Reset Back</p>	<p>The frequency is out of range. (47.5 - 52.5Hz or 57 - 63Hz)</p>	<ul style="list-style-type: none"> <li>Check and correct the frequency.</li> </ul>
<p><b>Line side fault</b></p> <p><b>Fault Line Side</b> Reset Back</p>	<p>The main voltage is not correct on the line side.</p>	<ul style="list-style-type: none"> <li>Check and correct voltage on the line side.</li> </ul>
<p><b>Heat sink over-temperature fault</b></p> <p><b>Fault HS Temp</b> Reset Back</p>	<p>Temperature too high on the heat sink. If the fault remains after reset, the heat sink temperature is too warm.</p>	<ul style="list-style-type: none"> <li>Check that the fans are working in a proper way.</li> <li>Check that cooling airways are free from dirt and dust.</li> <li>Check that the ambient temperature is not too high.</li> </ul>
<p><b>Kick-current fault</b></p> <p><b>Fault Kick-Cur</b> Reset Back</p>	<p>Parameter <i>Setting I<sub>e</sub></i> is set too low.</p>	<p><b>In Line connected</b></p> <ul style="list-style-type: none"> <li>Set the value according to the rated motor current.</li> </ul> <p><b>Inside Delta</b></p> <ul style="list-style-type: none"> <li>Set the value according to 58% (<math>1/\sqrt{3}</math>) of the rated motor current.</li> </ul>
<p><b>Thyristor short circuit fault</b></p> <p><b>Fault SC SCR</b> Reset Back</p>	<p>One or several SCRs are shorted.</p>	<ul style="list-style-type: none"> <li>Check and replace. Contact your ABB sales office for replacement kit.</li> </ul>
<p><b>Non conducting thyristor</b></p> <p><b>Fault Open SCR</b> Reset Back</p>	<p>One or several SCRs are not conducting.</p>	<ul style="list-style-type: none"> <li>Check and replace. Contact your ABB sales office for replacement kit.</li> </ul>

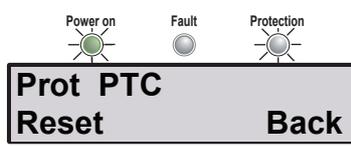
Status	Possible cause	Solution
<b>Fieldbus fault</b> 	The fieldbus communication is not working.	<ul style="list-style-type: none"> <li>• Check that the fieldbusplug is connected correctly.</li> <li>• Check that correct type of fieldbusplug is used.</li> <li>• Check that the parameter <i>Fieldbus Type</i> is set according to the present fieldbus type.</li> </ul>
<b>By-pass doesn't open fault</b> 	The by-pass contactor is not opening properly.	<b>Without by-pass</b> <ul style="list-style-type: none"> <li>• Check that the parameter <i>Ext ByPass</i> is set to No.</li> </ul> <b>With by-pass</b> <ul style="list-style-type: none"> <li>• Check why the contactor is not opening and make necessary actions.</li> <li>• Check that the parameter <i>Ext ByPass</i> is set to Yes</li> </ul>
<b>By-pass doesn't close fault</b> 	The by-pass contactor is not closing properly.	<b>Without by-pass</b> <ul style="list-style-type: none"> <li>• Check that the parameter <i>Ext ByPass</i> is set to No.</li> </ul> <b>With by-pass</b> <ul style="list-style-type: none"> <li>• Check why the contactor is not closing and make necessary actions.</li> <li>• Check that the parameter <i>Ext ByPass</i> is set to Yes</li> </ul>
<b>Fault Line/Delta</b> 	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.	<ul style="list-style-type: none"> <li>• Restart the softstarter. If the same error occurs again, try to reduce the disturbances in the feeding network.</li> </ul>

Status	Possible cause	Solution
<b>Internal faults</b>   <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span data-bbox="140 416 352 450"><b>Fault Intern 1</b></span> <span data-bbox="392 454 472 488"><b>Back</b></span> </div> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span data-bbox="140 454 236 488"><b>Reset</b></span> </div>  <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span data-bbox="140 589 352 622"><b>Fault Intern 2</b></span> <span data-bbox="392 627 472 660"><b>Back</b></span> </div> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span data-bbox="140 627 236 660"><b>Reset</b></span> </div>  <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span data-bbox="140 761 352 795"><b>Fault Intern 3</b></span> <span data-bbox="392 799 472 833"><b>Back</b></span> </div> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span data-bbox="140 799 236 833"><b>Reset</b></span> </div>  <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span data-bbox="140 929 352 963"><b>Fault Intern 4</b></span> <span data-bbox="392 967 472 1001"><b>Back</b></span> </div> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span data-bbox="140 967 236 1001"><b>Reset</b></span> </div>  <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span data-bbox="140 1086 352 1120"><b>Fault Intern 5</b></span> <span data-bbox="392 1124 472 1158"><b>Back</b></span> </div> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span data-bbox="140 1124 236 1158"><b>Reset</b></span> </div>	An internal communication fault of the softstarter has occurred.	<ul style="list-style-type: none"> <li>• Disconnect and reconnect the supply voltage (<math>U_s</math>) and make a restart.</li> <li>• If same fault remains, contact your ABB sales office.</li> </ul>

## 11:6 Protection indication

Status	Possible cause	Solution
<b>Overload protection</b>  	<p>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)</p>	<p><b>In Line</b></p> <p><b>At start</b></p> <ul style="list-style-type: none"> <li>• Check and correct the reason for the overload. Check that current limit level is not set too low.</li> <li>• Check that the ramp time for start is not too long.</li> <li>• Check that correct overload class is used.</li> <li>• Check that parameter Setting <math>I_e</math> is correct.</li> </ul> <p><b>Continuous run</b></p> <ul style="list-style-type: none"> <li>• Check and correct the reason for the overload.</li> </ul> <p><b>Inside Delta</b></p> <p><b>At start</b></p> <ul style="list-style-type: none"> <li>• Check and correct the reason for the overload.</li> <li>• Check that current limit level is not set too low.</li> <li>• Check that the ramp time for start is not too long.</li> <li>• Check that correct overload class is used.</li> <li>• Check that parameter Setting <math>I_e</math> is set to <math>58\% ( 1/(\sqrt{3}) )</math> of the rated motor current.</li> </ul> <p><b>Continuous run</b></p> <ul style="list-style-type: none"> <li>• Check and correct the reason for the overload</li> </ul>

Status	Possible cause	Solution
<p><b>Underload protection</b></p> 	<p>The motor current is below set level and time.</p>	<ul style="list-style-type: none"> <li>• Check and correct the reason for the underload.</li> <li>• Check that the settings are according to the operation conditions.</li> </ul>
<p><b>Locked rotor protection</b></p> 	<p>The motor is running stiff by some reason. A damaged bearing or a stucked load could be possible causes.</p>	<ul style="list-style-type: none"> <li>• Check the bearings of the motor and load.</li> <li>• Check that the load is not running stiff.</li> </ul>
<p><b>High current protection</b></p> 	<p>A fault current, higher than 8 times the softstarter ratings, has occurred.</p>	<ul style="list-style-type: none"> <li>• Check the circuits including the motor for any insulation fault phase to phase or earth fault.</li> </ul>
<p><b>Phase imbalance protection</b></p> 	<p>Unbalance in the phase currents.</p>	<ul style="list-style-type: none"> <li>• Check the main voltage and the motor circuit.</li> <li>• Restart the motor and check the phase currents</li> </ul>
<p><b>Phase reversal protection</b></p> 	<p>The phase sequence is not correct.</p>	<ul style="list-style-type: none"> <li>• Change the phase sequence on the line side to (L1-L2-L3).</li> </ul>

Status	Possible cause	Solution
<p><b>PTC protection</b></p> 	<p>An over-temperature is detected by the PTC thermistors in the motor.</p>	<ul style="list-style-type: none"> <li>• Check that the PTC circuit is closed and that the inputs are connected.</li> <li>• Check and correct the reason for the overheating.</li> <li>• Wait for the motor to cool sufficiently and restart.</li> </ul>
<p><b>Thyristor overload protection</b></p> 	<p>The softstarter is too small. Too many starts / hour. The ramp time for start is too long.</p>	<ul style="list-style-type: none"> <li>• Check and replace the softstarter with one of a suitable size.</li> <li>• Check and decrease number of starts / hour.</li> <li>• Check that current limit level is not set too low.</li> <li>• Check that the ramp time for start is not too long.</li> </ul>



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# Chapter 12 Diagrams

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# Diagrams

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## Chapter 12 Diagrams

### 12:1 Circuit diagram PST30..PST300

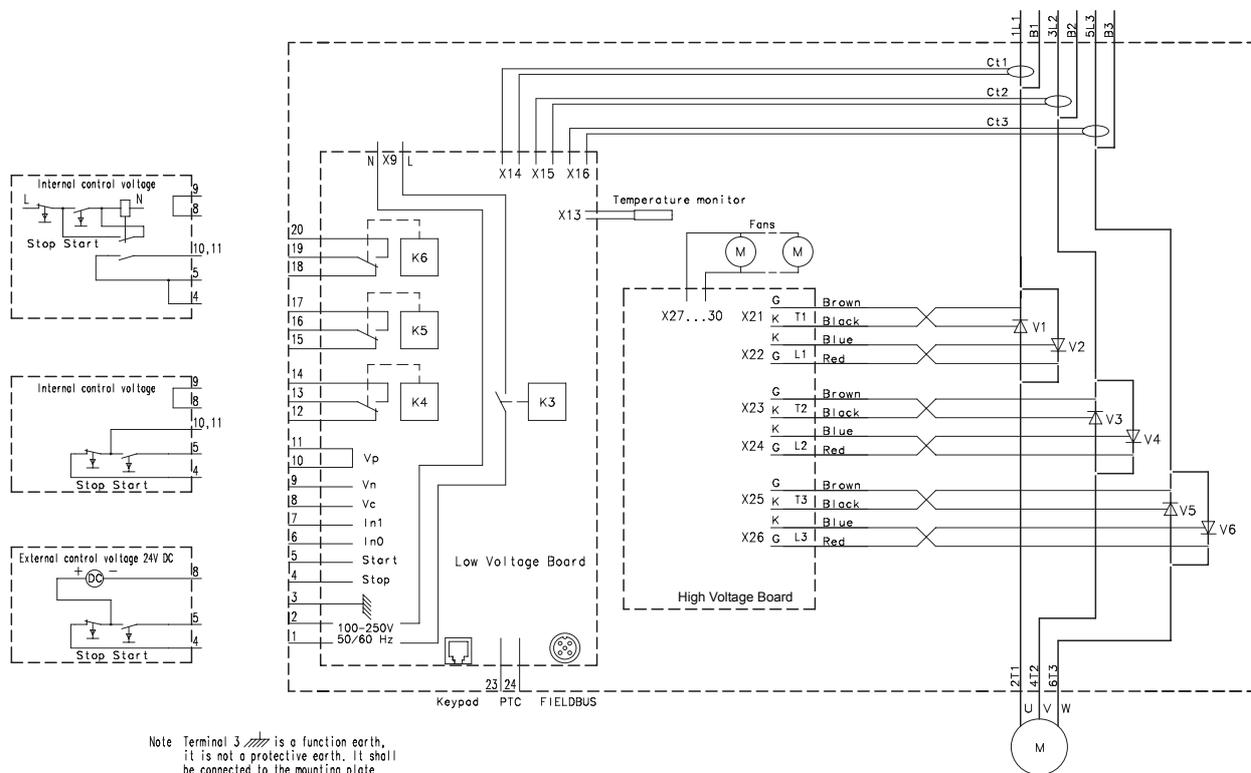


Figure 1: Circuit diagram PST30...300 (IEC version)



Terminal 3 is a function earth, it is not a protection earth. It shall be connected to the mounting plate.

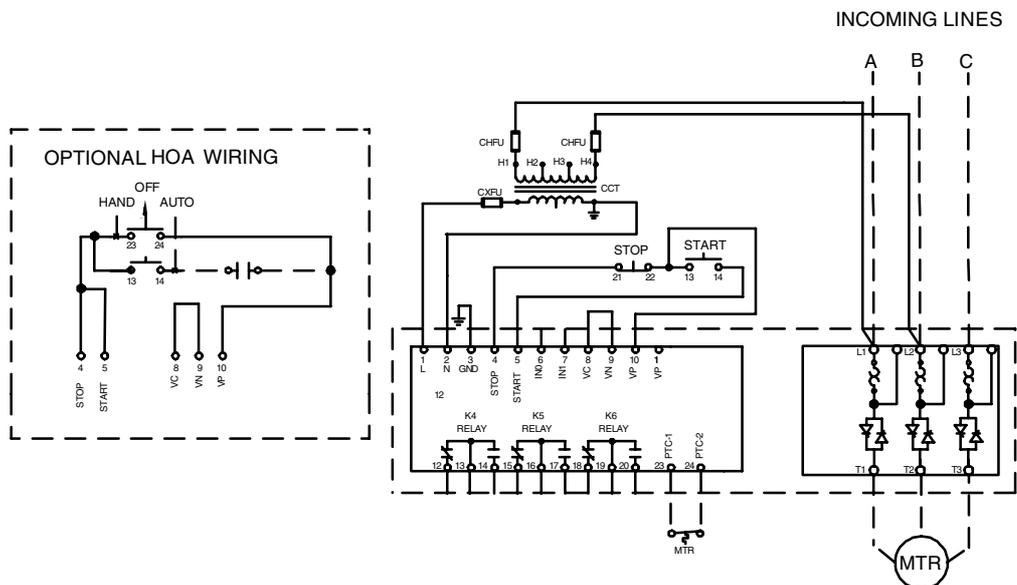


Figure 2: Circuit diagram PST30...300 (UL version)

## 12:2 Circuit diagram PSTB370...PSTB1050

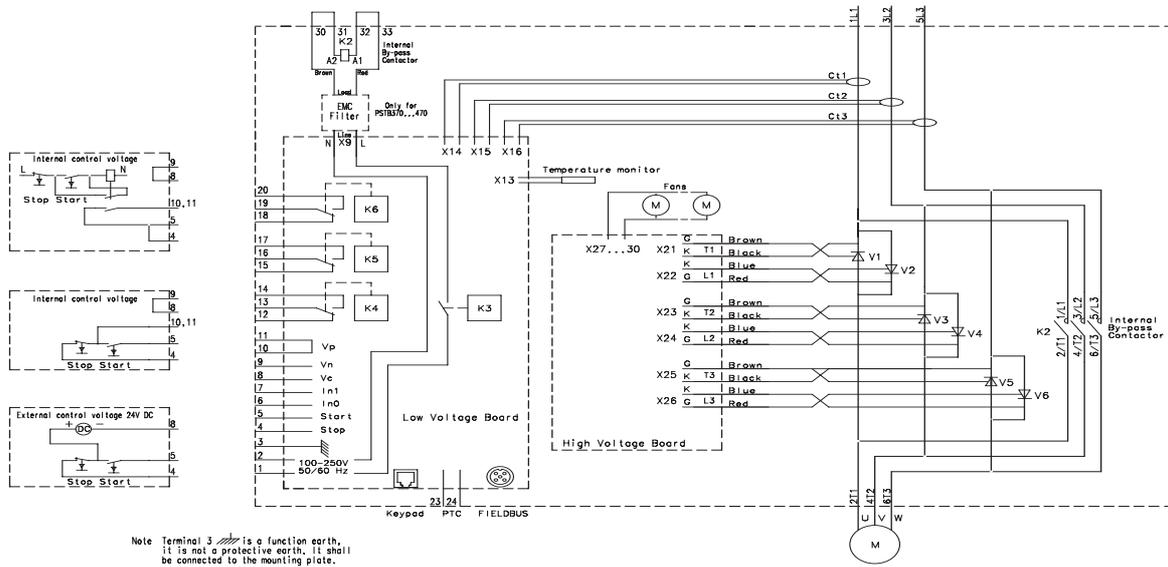


Figure 3: Circuit diagram PSTB370...PSTB1050 (IEC version)



Terminal 3 is a function earth, it is not a protection earth. It shall be connected to the mounting plate.

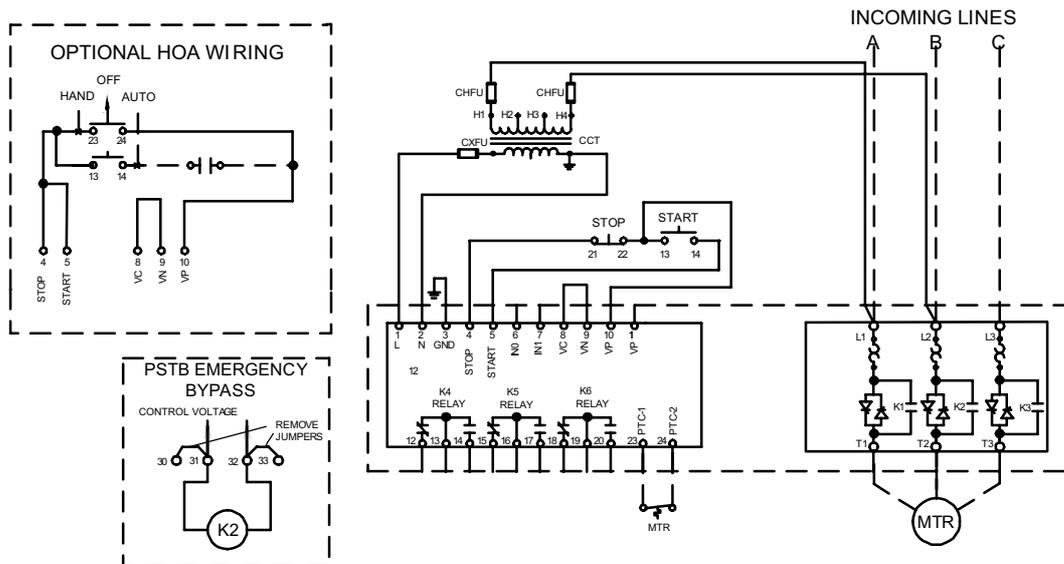


Figure 4: Circuit diagram PSTB370...1050 (UL version)

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# Customer feedback report

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Usability	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Functionality	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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Comments: \_\_\_\_\_

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## How do you grade the quality of the documentation?

	Excellent			Poor
Total impression	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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