Installation and
Maintenance manual

Softstarters
PST / PSTB

ABB

PST30... PST1050
Installation and maintenance manual

1 General

This is the Installation and maintenance manual for Softstarters PST30... PSTB1050

Document number: 1SXU 132 021 M0201

Edition: 01

Revision: 01

Issue Date: April 11, 2005

1

Date subject to change without notice.

This document has been carefully checked. If the user nevertheless detects any errors, please 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, it is possible that there may be some differences between the softstarter and the information in this manual.

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2 Safety

This section describes warning and information signs used in this manual.

The user should pay close attention to these signs.

The softstarter should 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 should always be read 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!

Alerts the reader to pertinent facts and conditions.

Chapter 1
Introduction

1

Chapter 1
Introduction

1:1 About the documentation for the softstarter

For the softstarter, the following documents are available:

PST30/PSTB1050 Softstarters
Installation and Maintenance manual
Document ID: 1SXU 132 021 M0201 - English
1SFC132003M0101 (German)
1SFC132003M0101 (German)
1SFC132003M3401 (Swedish)
1SFC132003M0301 (French)
1SFC132003M0901 (Italian)
1SFC132003M0701 (Spanish)
1SFC132003M3101 (Dutch)
1SFC132003M1601 (Portuguese)
1SFC132003M1801 (Finnish)
1SFC132003M1101 (Russian)
1SFC132003M2001 (Chinese
1SFC132003M1901 (Turkish)

Soft Starter Catalog
Document ID: 1SXU 132 019 C0201

For other documents related to the PST Softstarters, see www.abb-control.com/products/softstarters.htm#type_pst

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 how to energize, set, configure and verify settings.
For the quickest possible start, read Chapter 2 “ Quickstart” .

1:2.1 Intended audience

1:2.1.1 General

The installation and commissioning manual is intended for personnel responsible for installing, commissioning and maintaining the softstarter.

1:2.1.2 Requirements

All personnel who interact with the softstarter 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 install the softstarter and put it into operation in the quickest and safest way. 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 required.
- *Functions* describes all functions included in the softstarter. This chapter also describes parameter ranges and default values.
- *Trouble shooting* contains instructions on how to quickly find and correct the most common faults.
- *Diagrams* contains a number of electrical diagrams for the softstarter itself. It also contains some typical application diagrams.

1:2.3 Revision notes

Please check www.abb-control.com/products/softstarters.htm#type_pst for latest information on revisions.

1.2.4 Acronyms and abbreviations

The following acronyms and abbreviations are used in this manual.

Acronym/abbreviation	Description
LED	Light Emitting Diode
LCD	Liquid Crystal Display
SCR	Silicon Controlled Rectifier
IT	Information Technology
HMI	Human-Machine Interface
FBP	Fieldbusplug
PLC	Programmable Logic Controller
PCB	Printed Circuit Board
TOR	Top of Ramp (full voltage)

Notes

Chapter 2
Quickstart

2

Chapter 2
Quickstart

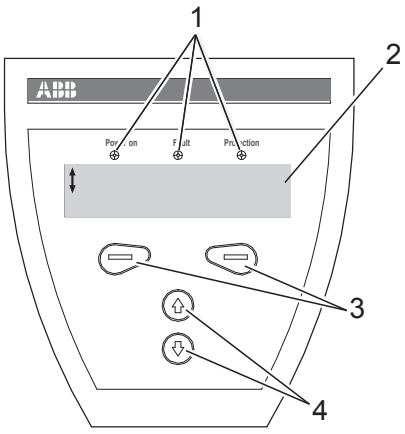
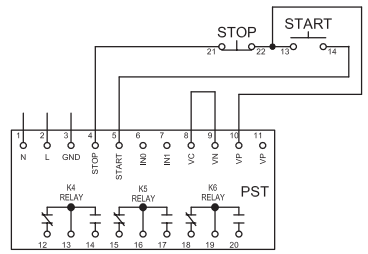


Figure 1:

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 indicate that the value/menu is possible to change or scroll



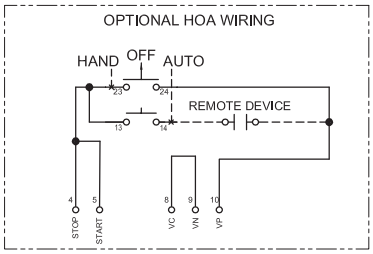


Figure 2: Standard connection PST

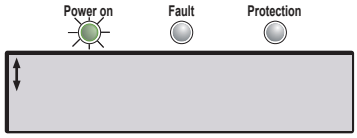


Figure 3: Top level

This chapter is a short guide on how to connect, configure and start the softstarter in the quickest and safest way.

Warning!

Mounting and installing the softstarter shall be done in accordance with local laws and regulations and must be performed by authorized personnel only.
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). See Chapter 3 for more information.
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 control voltage: terminals 1 and 2 (100-250V 50/60Hz).
5. Connect the functional ground: terminal 3.

Information!
The wire shall be as short as possible, and be connected to the mounting plate.The mounting plate should also be grounded.

6. Connect the start/stop circuits: terminal 4, 5, 8, 9 and 10 according to Figure 2. **24 VDC only!**
7. Verify that the main and control voltage corresponds to the softstarter ratings.
8. Switch on the control voltage.
9. The green "Power on" LED should be lit and the LCD should appear as shown in Figure 3.

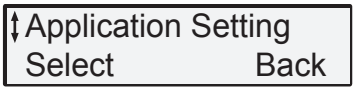


Figure 4: Application setting menu

Figure 5: Centrifugal pump

Figure 6: Centrifugal pump stored

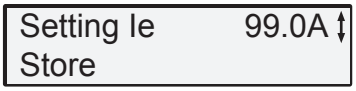


Figure 7: Setting Ie

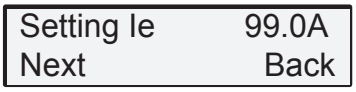


Figure 8: Setting Ie stored

Figure 9: OL Class

Figure 10: OL Class stored

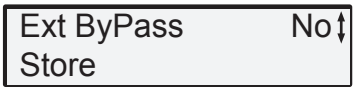


Figure 11: External Bypass

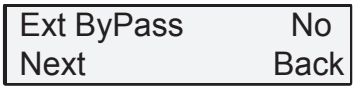


Figure 12: External Bypass stored

Figure 13: Ready / Tune Set

2:2 Configuration

1. Enter the Application Setting by pressing the left selection key twice. Press *Select* using the left selection key. See Figure 4.
2. Select the appropriate type of load by using the navigation keys. See Figure 5.
3. Press *Store Set* and *Next* to continue or *Back* to previous parameter using the selection keys. See Figure 6.
4. Set Ie (motor FLA) using the navigation keys.
   In Line connected = rated motor current
   Inside Delta connected = 58% (1/(√3)) of the rated motor current. For example, if the soft starter is connected in line with a 100A motor, Ie = 100A. If the softstarter is connected inside the delta of a 100A motor, Ie = 58A. See Figure 7.
5. Press *Store* and *Next* to continue or press *Back* to access the previous parameter. See Figure 8.
6. Set the required overload class using the navigation keys. See Figure 9.
7. Press *Store* and *Next* to continue or press *Back* to access the previous parameter. See Figure 10.
8. If an external by-pass contactor is used set *Ext ByPass* to *Yes* using the navigation keys. (PST30...300 only). See Figure 11.
9. Press *Store* and *Next* to continue or *Back* to previous parameter using the selection keys. See Figure 12.
10. Select *Yes* if ready or *Tune Set* if ramp times, initial voltage, current limit etc. need to be adjusted. See Figure 13.
11. To change language, see Section 7:2.5.

2:3 Start of the motor

1. Switch on the main voltage.
2. Give a 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.)

Notes

Chapter 3
Description

3

Chapter 3 - Description

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

3:1 Overview

The PST softstarter is a microprocessor-based softstarter designed with the latest technology for the 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 bypass contactor is integrated. In an emergency, it is possible to start the motor across the line with the integrated bypass contactor. See Section 3:8.4 for AC3 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 twelve different languages (default is English).

The softstarter can be controlled in four ways:

- Hardware inputs
- Keypad control (local)
- Fieldbus communication interface
- Remote 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.

Information!
Keypad control has the highest priority and overrides all other control methods.

3:2 Functions

The PST softstarter has several integrated protection and warning functions. Almost any type of fault can be detected and displayed.

All available protections, warnings and fault indications are listed below.

Start/Stop functions

- Start ramp
- Stop ramp (also called soft stop or decel)
- Initial voltage
- Step down voltage
- Current limit
- Kick Start
- Extended start range
- Extended stop range
- Sequence start

Protection functions

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

Warning functions
- Warning high current
- Warning low current
- Warning motor overload
- Warning SCR overload

Fault Supervision functions
- Internal softstarter faults
- Shorted SCR
- Non conducting SCR
- Open circuit motor side
- Over-temperature heat sink
- Phase loss
- Frequency out of range
- Fieldbus communication
- Non-closing by-pass contactor
- Non-opening by-pass contactor

Other functions
- Jog
- Real time clock
- Event log
- Keypad password

3:3 Markings and connections

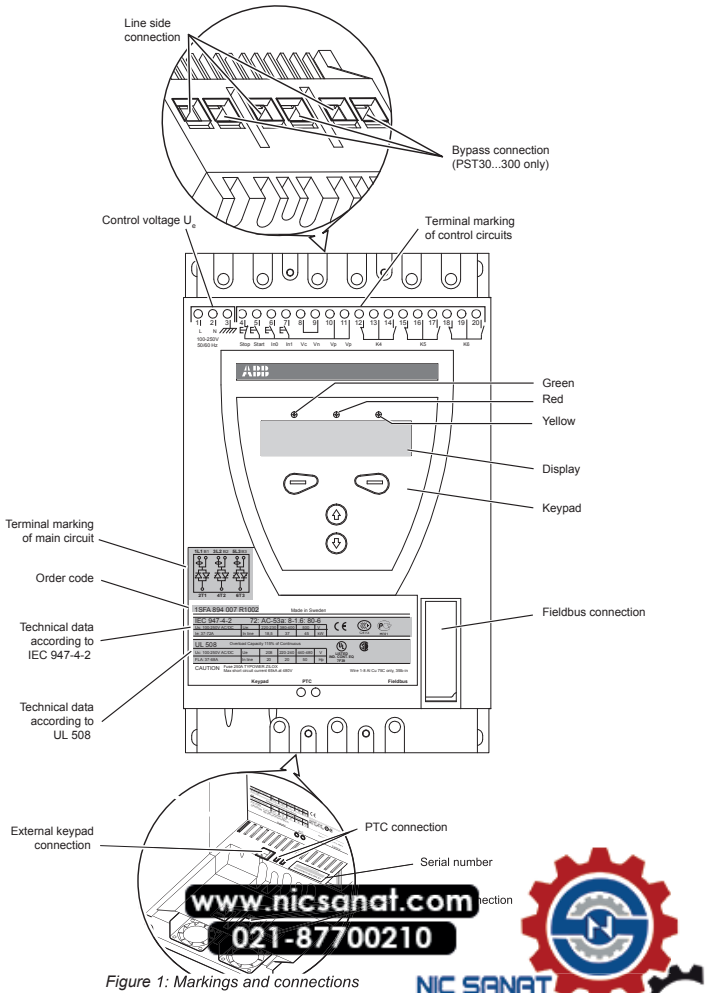


Figure 1: Markings and connections

3:4 Type designation

PST B 370-600 -70

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

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

Current Rating
600 = 208 - 600V 50/60 Hz
690 = 400 - 690V 50/60 Hz

Bypass contactor
600 = 208 - 600V 50/60 Hz
690 = 400 - 690V 50/60 Hz

Softstarter type

3:4 Industrial IT

Thanks to ABB's broad program of product standardisation, 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 fully interact. 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, catalogues, certificates and drawings can be found at : www.abb-control.com/products/softstarters.htm#type_pst.

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 recyclable.

3:7 Specifications

Item	Specification
Degree of protection (main circuit)	IP 10 for PST30...72; IP 00 for PST85...1050
Operating position	Vertical at ± 10°
Ambient temperature	Storage: -25°C to +70°C (-13°C to 158°F)
Operation Without derating With derating	 0°C to +40°C (32°F to 104°F) +40° C to +50°C (104°F to 122°F) of 0.8% / °C (1.8%/°F)
Altitude	1000 m (3281 ft.) above sea level without derating 1000 - 4000 m (3281 - 13,123 ft.) by derating 1% for each 333 ft above 3300 ft.
Pollution degree	3
Relative humidity	5 - 95% (non-condensing)
Standards	UL508 IEC 60947-1 IEC 60947-4-2 EN 60947--1
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

Item	Technical data
Rated insulation voltage, Ui	690V
Rated operational voltage, Ue	208-690 V (in two modes)
Rated control voltage, Us	100 - 250 V 50/60 Hz
Rated frequency	50 / 60 Hz
Voltage tolerances	+10% to -15%
Frequency tolerances	±5%
Rated impulse withstand voltage	2 kV
Number of controlled phases	3
Programmable inputs	24 VDC, 10 mA
Output relays	250 VAC, Ith = 5A, Ie = 1.5A (AC-15)
Battery back-up D20mm	Lithium 3V CR2032
PTC input	2825 ohm ±20% switch off resistance 1200 ohm ±20% switch on resistance
Cooling system	Fan
Recommended fuse for control 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	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

3:8.3 Softstarter types

Type	PST30		PST37		PST44		PST50	
Connection method	Inline	Delta	Inline	Delta	Inline	Delta	Inline	Delta
Rated Current Ie (A)	30	52	37	64	44	76	50	85
Motor rating at 480V (HP)	20	30	25	40	30	50	40	60
Motor rating 380-415V (KW)	15	25	18.5	30	22	37	25	45
AC-3 Rating with integrated Bypass (A)	–		–		–		–	
Power loss at rated current (W)	100		120		140		160	
Control power requirements (VA)	5		5		5		5	

Type	PST60		PST72		PST85		PST105	
Connection method	Inline	Delta	Inline	Delta	Inline	Delta	Inline	Delta
Rated Current Ie (A)	60	105	72	124	85	147	105	181
Motor rating at 480V (HP)	40	75	50	75	60	100	75	150
Motor rating 380-415V (KW)	30	55	37	59	45	75	55	90
AC-3 Rating with integrated Bypass (A)	–		–		–		–	
Power loss at rated current (W)	190		230		270		325	
Control power requirements (VA)	5		5		10		10	

Type	PST142		PST175		PST210		PST250	
Connection method	Inline	Delta	Inline	Delta	Inline	Delta	Inline	Delta
Rated Current Ie (A)	142	245	175	300	210	360	250	430
Motor rating at 480V (HP)	100	150	125	200	150	250	200	350
Motor rating 380-415V (KW)	75	132	90	160	110	184	132	220
AC-3 Rating with integrated Bypass (A)	–		–		–		–	
Power loss at rated current (W)	435		540		645		765	
Control power requirements (VA)	10		15		15		15	

Type	PST300		PSTB370		PSTB470		PSTB570	
Connection method	Inline	Delta	Inline	Delta	Inline	Delta	Inline	Delta
Rated Current Ie (A)	300	515	370	640	470	814	570	987
Motor rating at 480V (HP)	250	400	300	500	400	600	500	700
Motor rating 380-415V (KW)	160	257	200	355	250	450	315	475
Contactor type	–		AF302		AF302		AF480	
AC-3 Rating with integrated Bypass (A)	–		302		302		480	
Power loss at rated current (W)	920		90		110		110	
Control power requirements (VA)	15		20/480		20/480		25/900	

Type	PSTB720		PSTB840		PSTB1050	
Connection method	Inline	Delta	Inline	Delta	Inline	Delta
Rated Current Ie (A)	720	1247	840	1455	1050	1810
Motor rating at 480V (HP)	600	1000	700	1200	900	1500
Motor rating 380-415V (KW)	400	670	450	780	560	875
Contactor type	AF580		AF750		AF750	
AC-3 Rating with integrated Bypass (A)	590		720		720	
Power loss at rated current (W)	110		170		170	
Control power requirements (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 PSTB AC3 Integrated contactor ratings

PST type	PSTB370	PSTB470	PSTB570	PSTB720	PSTB840	PSTB1050
Contactor type	AF300	AF300	AF460	AF580	AF750	AF750
AC3 Rating @ 480V HP	250	250	400	500	600	600
AC3 Rating A	302	302	480	590	720	720

3:8.6 UL information

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

Model	Rating (kA)	Max V	Fuse (A)	MCCB (A)
PST30...142	10	600	Any UL Listed	Any UL Listed
PST175...300	18	600	Any UL Listed	Any UL Listed
PSTB370...470	30	600	Any UL Listed	Any UL Listed
PSTB570	30	600	Any UL Listed	Any UL Listed
PSTB720	42	600	1200/L	1200
PSTB840	42	600	1200/L	1200
PSTB1050	85	480	-	800
PSTB1050	85	600	1200/L	-
PSTB1050	42	600	-	1200

00.00 [00.00] Inches Millimeters

3:8.7 Dimensions

PST30...72

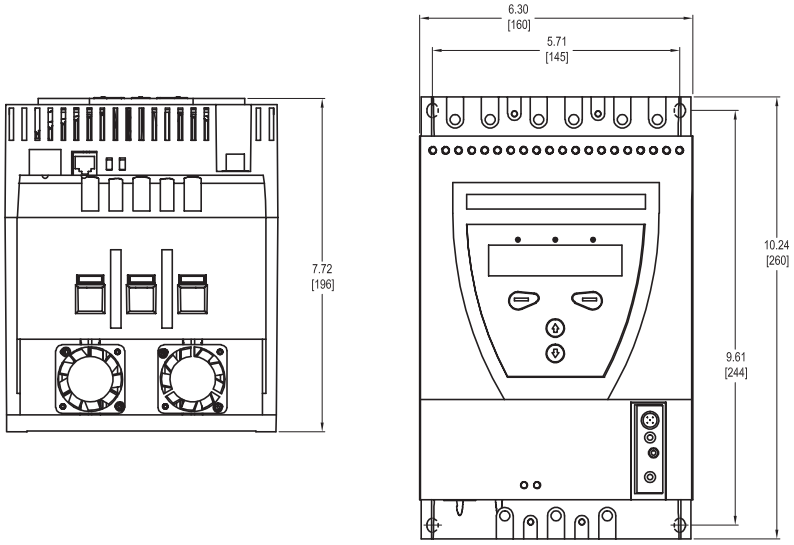


Figure 1: Dimensions PST30...72

PST85...142

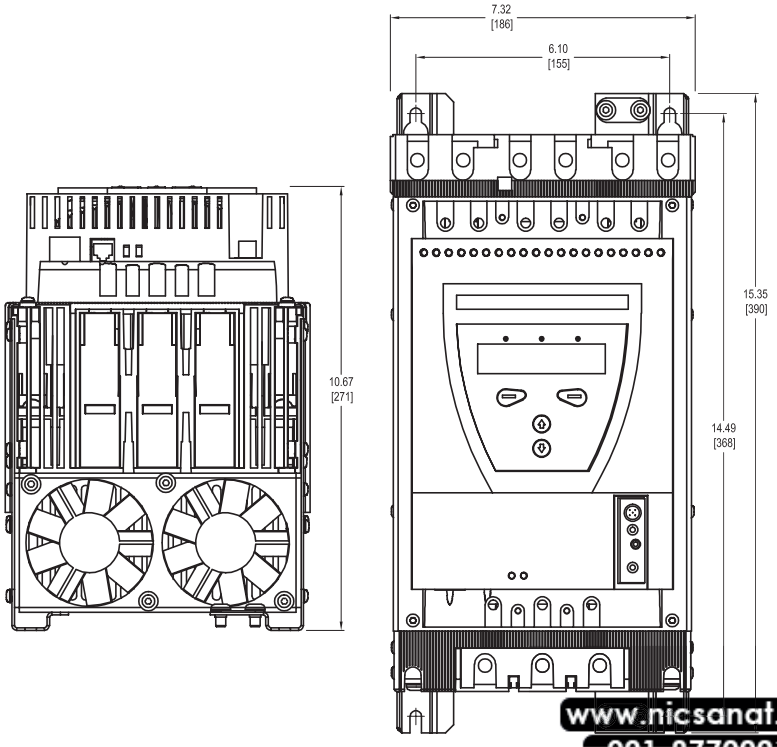


Figure 2: Dimensions PST85...142

00.00 [00.00] Inches Millimeters

PSTB175...300

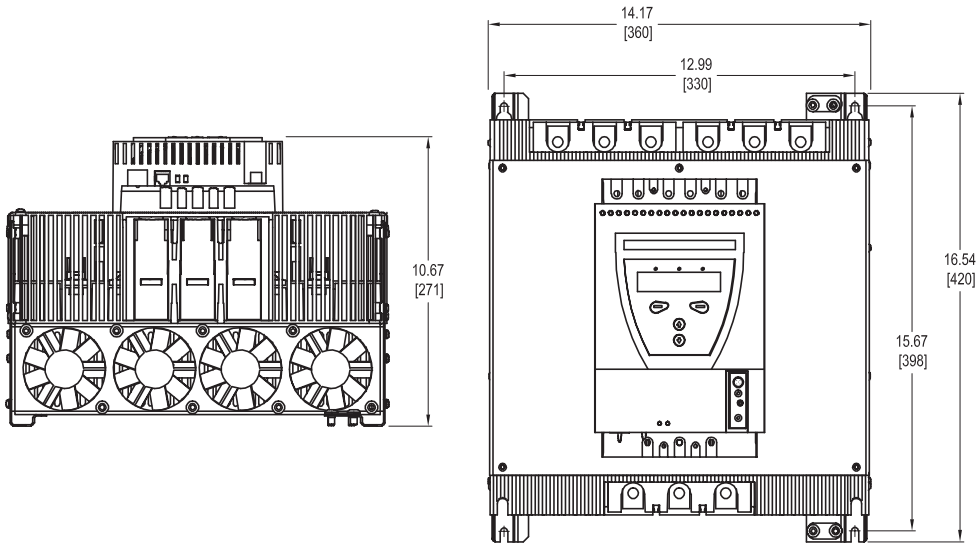


Figure 3: Dimensions PST175...300

PSTB370...470

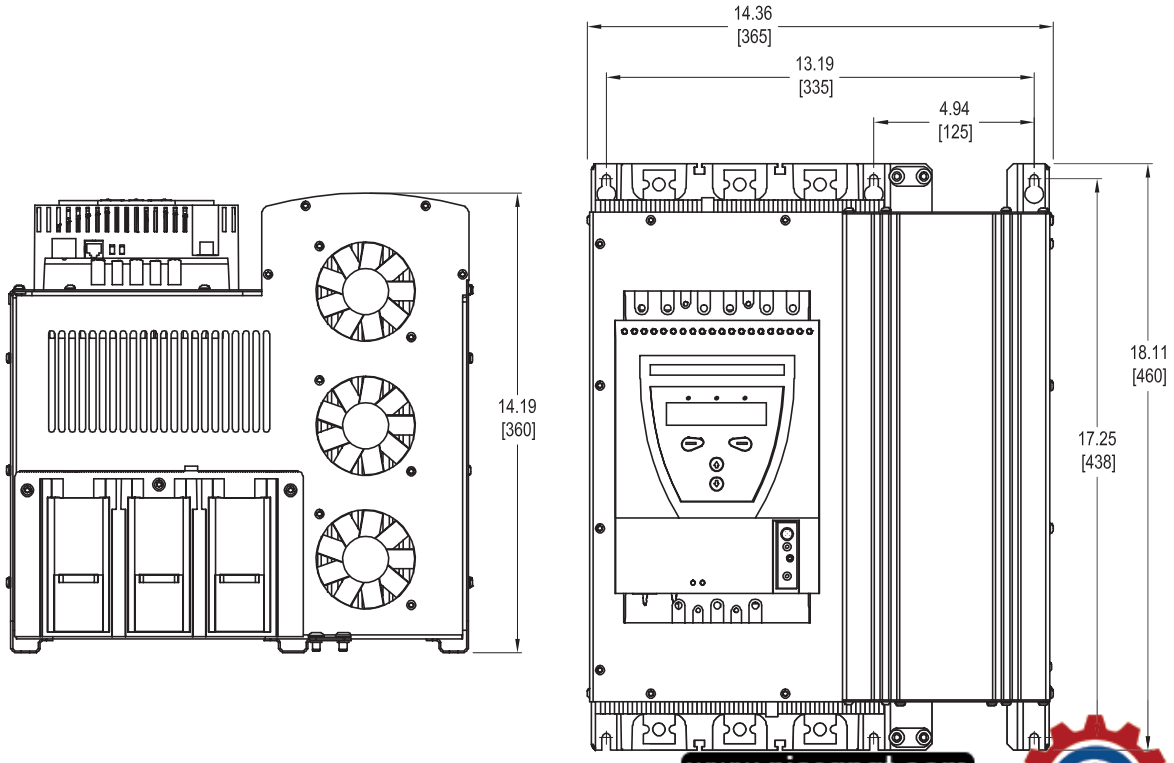


Figure 4: Dimensions PSTB370...470

00.00 Inches
[00.00] Millimeters

PSTB570...1050

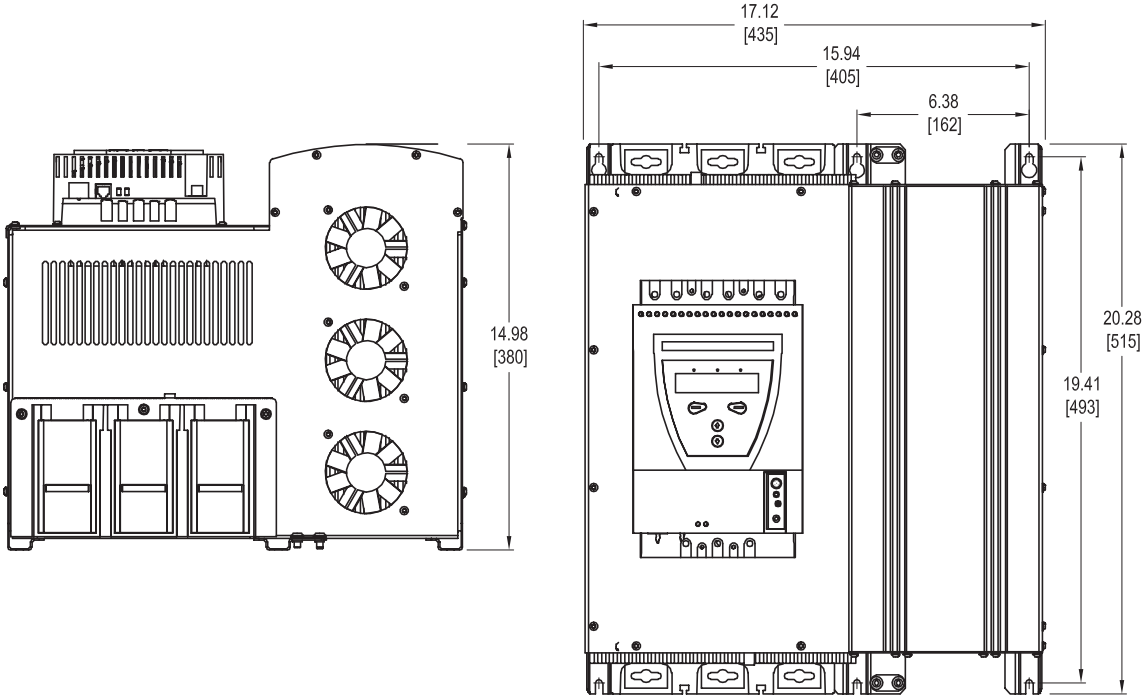


Figure 5: Dimensions PSTB570...1050

Chapter 4
Mounting

4

Chapter 4
Mounting

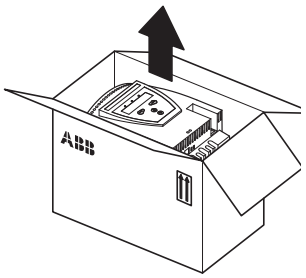


Figure 1: Package

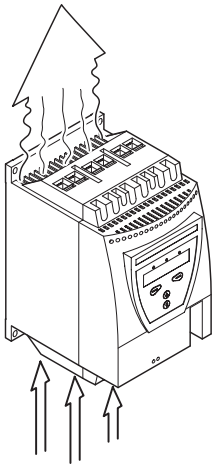
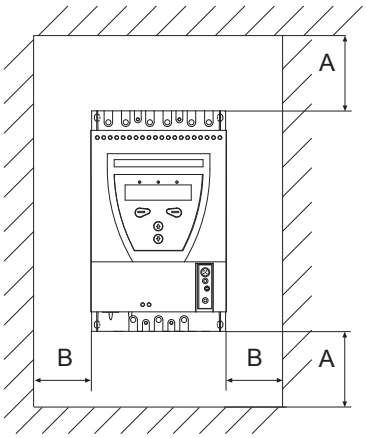


Figure 2: Airways



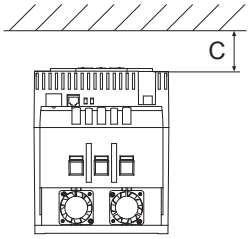


Figure 3: Minimum distances, wall/front

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

4:1 Receiving, unpacking and checking

- Check that the package is turned with the correct side up, Figure 1.
- Check for transport damages
- Remove transport casing.
- Visually inspect the softstarter
- Check that the serial number corresponds with the delivery documents
- Check the softstarter as well as the package. If you find any damages, please contact the transport company or 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. Models PST30 to PST300 can be taken out of the packages and mounted without lifting equipment.
For all other models, lifting equipment is recommended due to the weight.
See Chapter 3 “Description”, for weights.

Warning!
Do not lift the softstarter by the connection bars. Lifting by the connection bars may cause damage to the product.

4:2.2 Requirements

See Chapter 3 “Description” for environmental requirements.

4:2.3 Minimum distance to wall/front

To ensure a suitable cooling, the softstarter must be mounted vertically and in such a way that the airways are not blocked, see Figure 2.

Use the table below and Figure 3 for minimum distances between wall/front of the PST softstarter.

Information!
The values are minimum distances.

Softstarter type	A		B		C	
	mm	in	mm	in	mm	in
PST30...72	100	3.94	10	0.39	20	0.79
PST85...300	100	3.94	10	0.39	20	0.79
PST175...300	100	3.94	10	0.39	20	0.79
PSTB370...470	150	5.91	15	0.59	20	0.79
PSTB570...1050	150	5.91	15	0.59	20	0.79

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			
	mm	in	mm	in	mm	in	m^3/h	ft^3/min
PST30...72	300	12	400	16	250	10	42	25
PST85...300	400	16	500	20	300	12	95	60
PST175...300	500	20	600	24	300	12	210	125
PSTB370...470	600	24	600	24	400	16	210	125
PSTB570...1050	750	30	900	36	400	16	210	125.00

Dimensions and drilling plan: See Chapter 3, “Description”

Notes

Chapter 5
Connection

5

Chapter 5
Connection

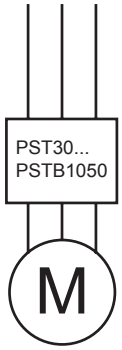


Figure 1: In Line Connection

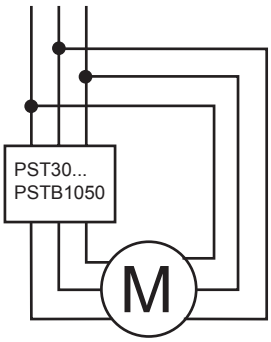


Figure 2: Inside Delta connection

This chapter describes the electrical connections as well as connections for communication devices (optional) that must be made before the softstarter can be operated.

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.

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.

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.
For torque requirements and cable sizes, see Figure 5.

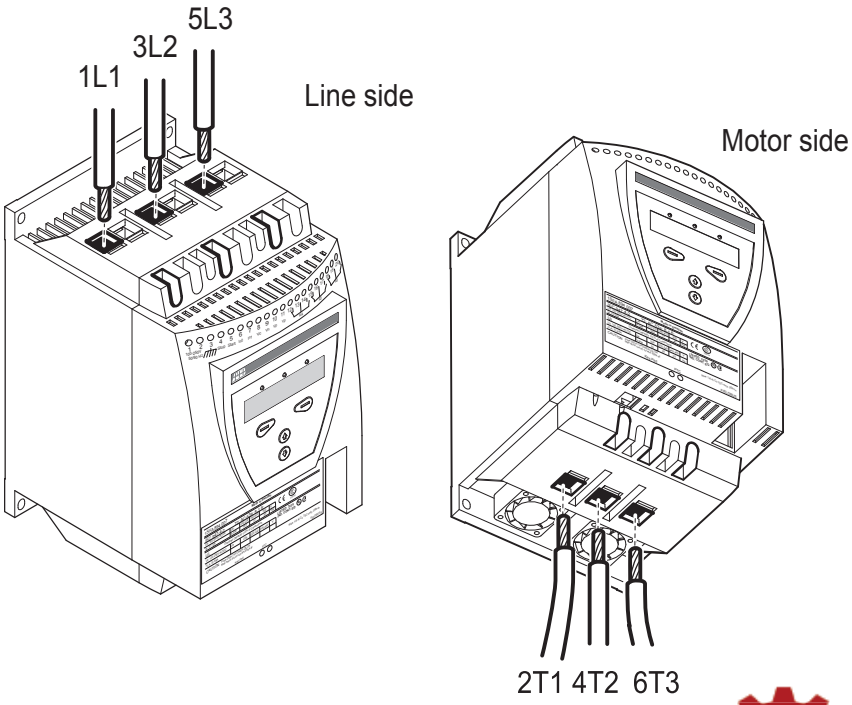


Figure 3: Connection of line side and motor side

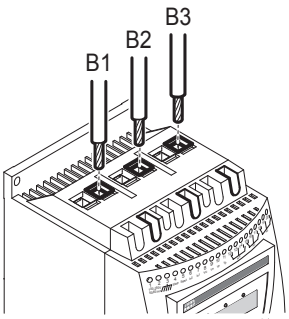


Figure 4: External bypass contactor connection

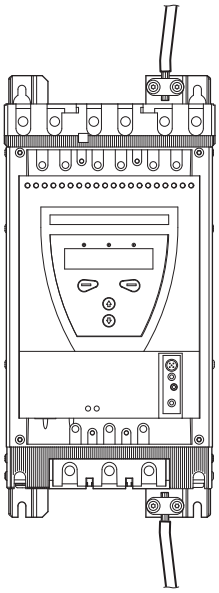


Figure 5: Protective earthing.

5:2.1.1 External Bypass contactor

An external by-pass contactor can be used for softstarter sizes PST30...300 (built in for 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 markings are printed on the front label.

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

5:2.1.2 Protective earthing

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

Warning!
Do not operate machine with the grounding wire disconnected

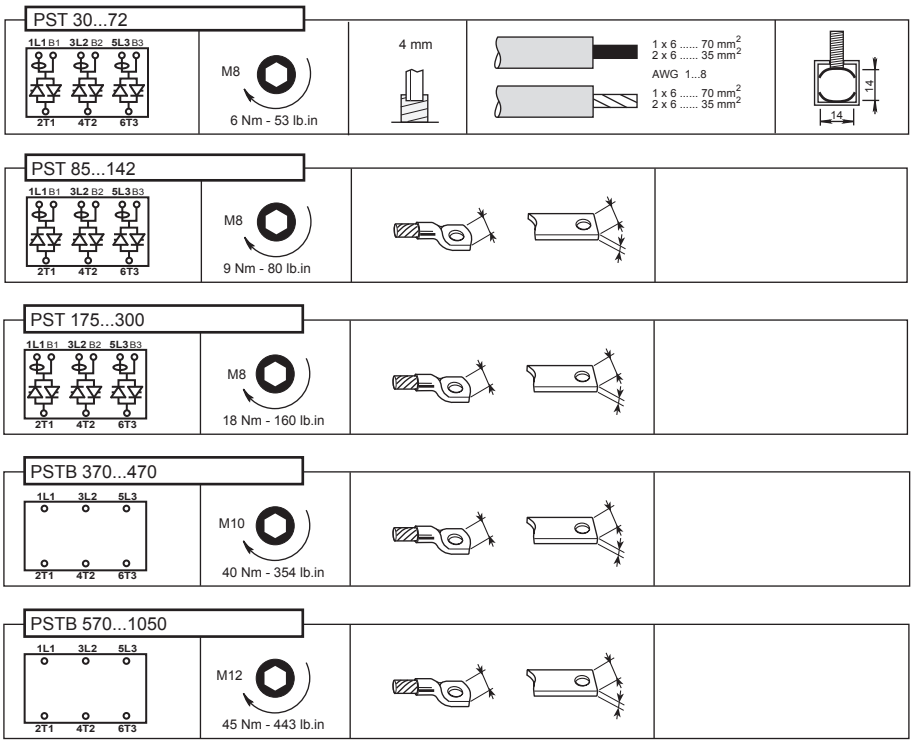


Figure 6: Tightening torques and cable sizes

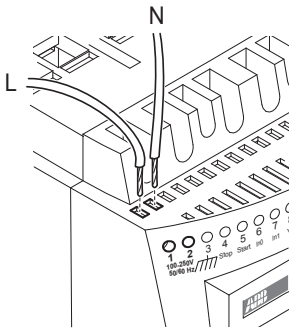


Figure 7: Control voltage

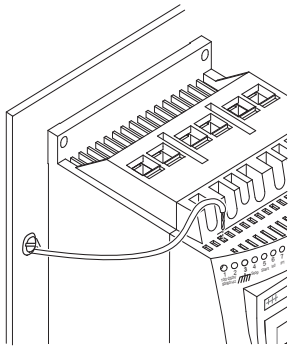


Figure 8: Functional ground

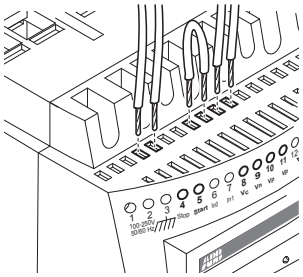


Figure 9: Terminals 4, 5, 8, 9, 10, 11

5:2.2 Control voltage and control circuit

5:2.2.1 Control voltage, terminals 1 and 2

Connect the hot and neutral and phase to terminals 1 and 2.

Information!
Check that you have the correct control voltage U_s.

5:2.2.2 Grounding, terminal 3

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

Information!
This is not a protective ground, it is a functional ground. The grounding cable should be as short as possible. Maximum length: 1.5 ft.

5:2.2.3 Start and Stop, terminals 4, 5, 8, 9, 10, 11

Internal control voltage

The softstarter has a built-in holding circuit which does not require any external power source for start and stop, See Figure 10.

A conventional circuit with a HOA switch is also possible, see Figure 11.

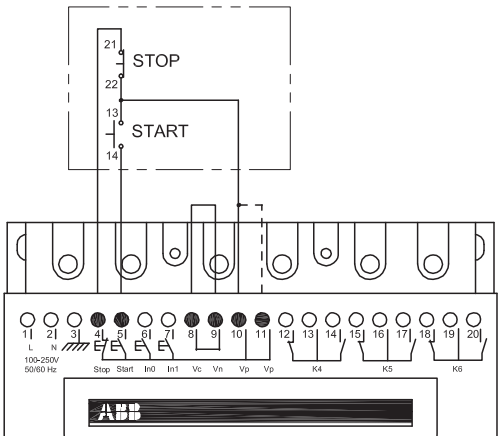


Figure 10: Holding circuit (momentary start signal required)

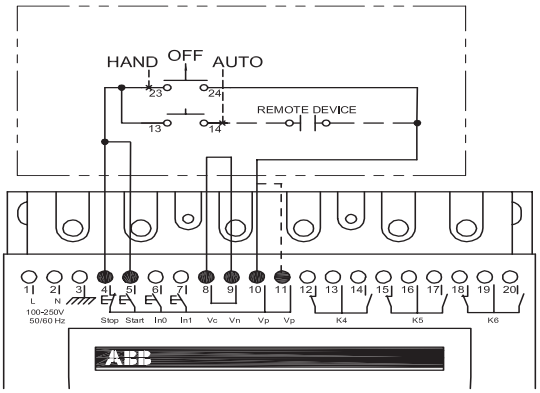


Figure 11: Conventional circuit (maintained start signal required)

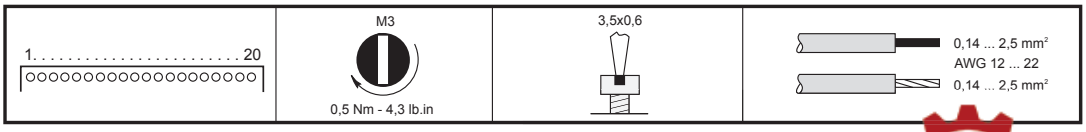


Figure 12: Tightening torques and cable sizes

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 13 or Figure 14 depending on which type of control method is used.

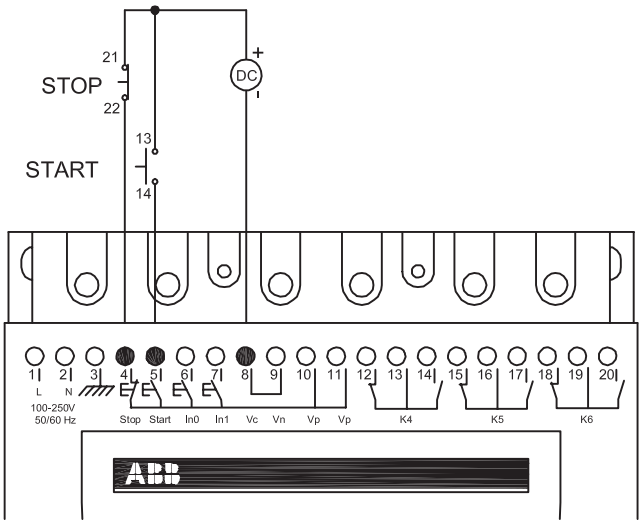


Figure 13: Holding circuit with external control voltage (momentary start signal required)

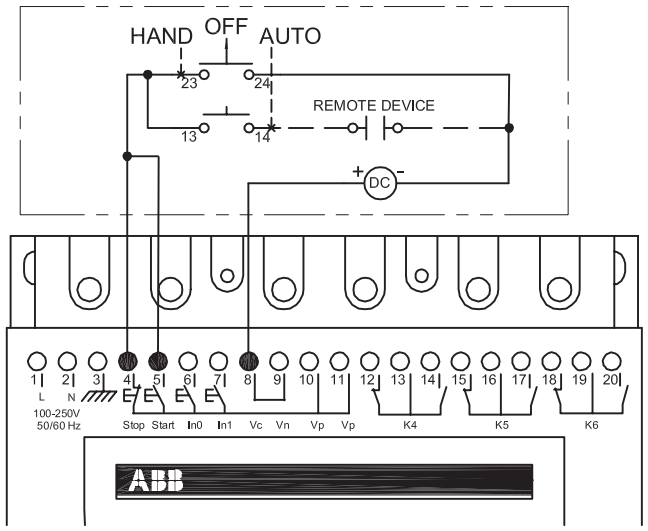


Figure 14: Conventional circuit with external control voltage (maintained start signal is required)

5

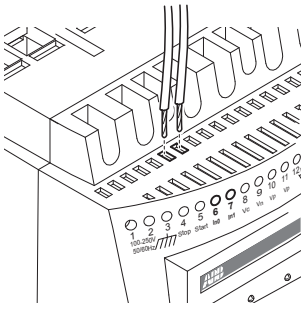


Figure 15: Terminals 6, 7

5:2.2.4 Programmable inputs, terminals 6 and 7

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

Connect the cables according to Figure 16 or Figure 17 depending on whether the internal or external source is being used.

Information!

See next page for multiple motor (sequence) starting

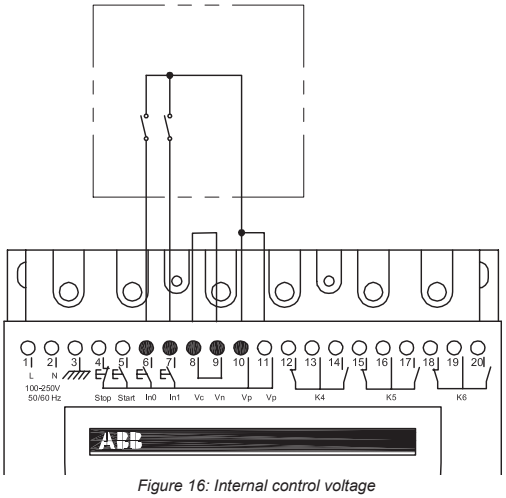


Figure 16: Internal control voltage

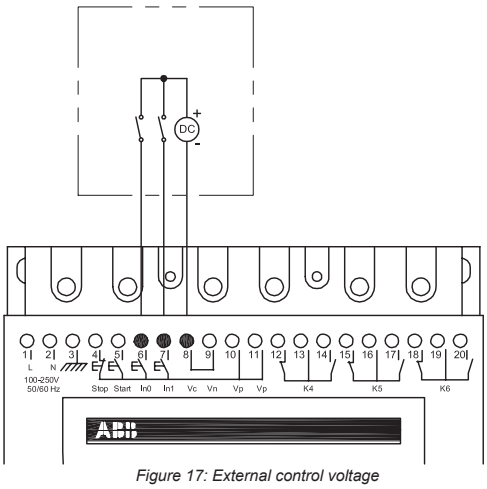


Figure 17: External control voltage

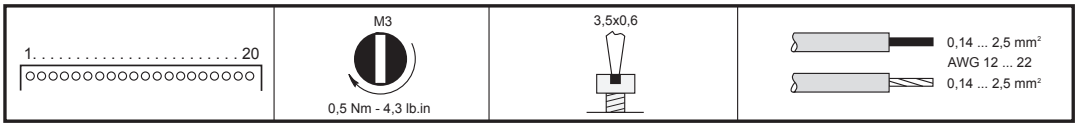


Figure 18: Tightening torques and cable sizes

Programmable Inputs (Sequence start)

When sequence start is going to be used, the wiring should be according to Figure 18 or Figure 19.

The start command (Terminal 5, 6 and 7) must be maintained during th complete starting sequence; 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 opening the Stop command (Terminal 4).

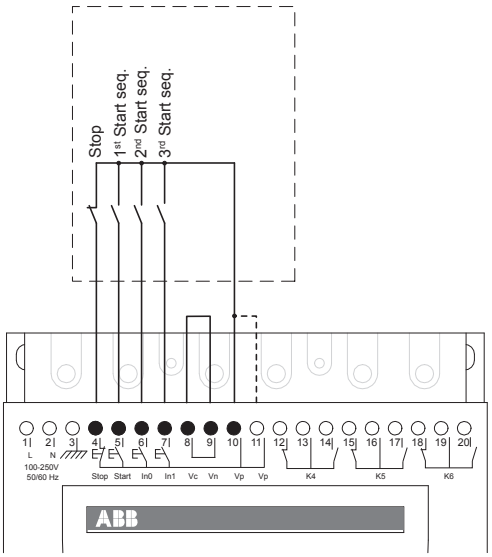


Figure 18: Internal control voltage

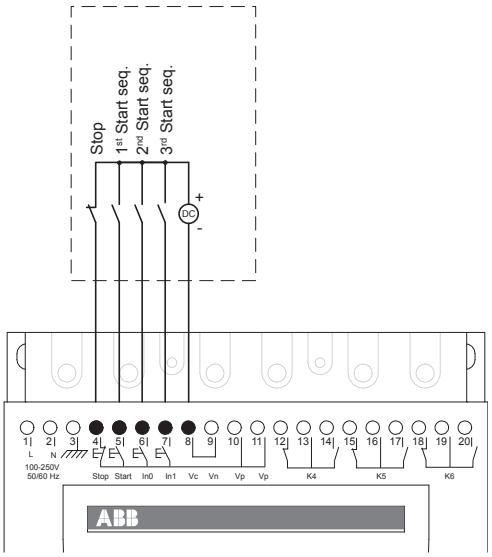


Figure 19: External control voltage

5:2.2.5 Programmable output relay K4, terminals 12, 13 and 14

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

Connect the cables to terminal 12, 13 and 14.

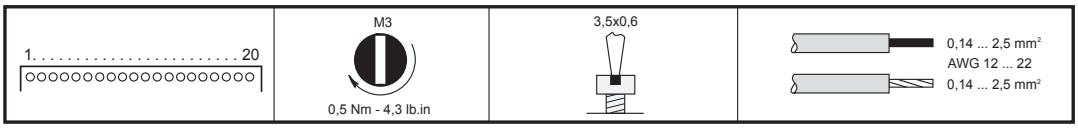


Figure 21: Tightening torques and cable dimensions (1 mm=0,0394 in)

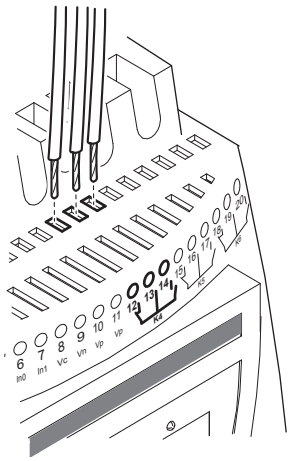


Figure 20: Terminals 12, 13, 14

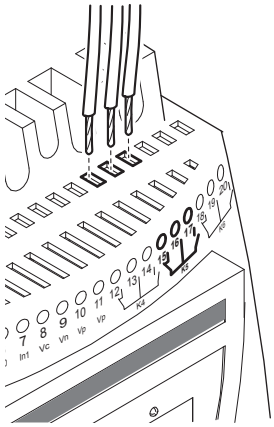


Figure 22: Terminals 15, 16, 17

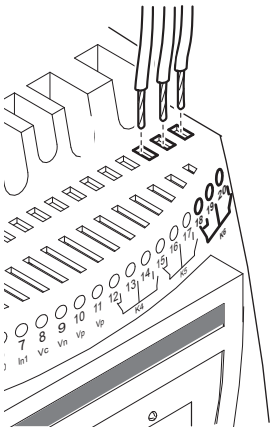


Figure 23: Terminals 18, 19, 20

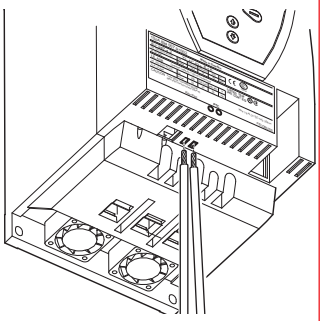


Figure 24: PTC connection

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

The output relay gives a 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.

5:2.2.7 Programmable output relay K6, terminals 18, 19 and 20

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

Connect the cables to terminal 18, 19 and 20.

5

5:2.2.8 PTC input

If the motor is protected by PTC elements, the cables must be connected to terminals PTC, see Figure 24.
See Chapter 7 " Settings and configuration" for programming.

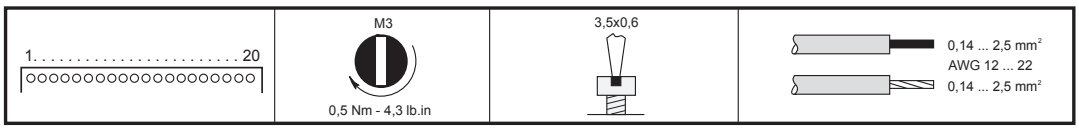


Figure 25: Tightening torques and cable sizes

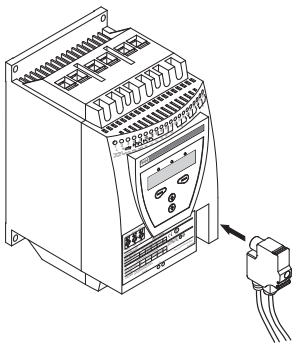


Figure 26: Fieldbus plug

5:3 Connection of communication devices (optional)

5:3.1 Fieldbus communication

The fieldbus communication plug must be connected to the communication interface on the front of the PST, see Figure 26. 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)".

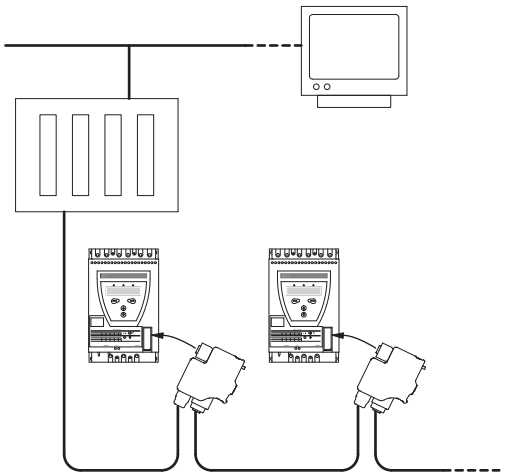


Figure 27: Principle of a fieldbus network with PST softstarters connected

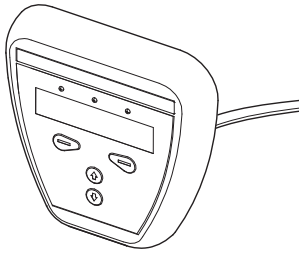


Figure 28: External keypad

5:3.2 External keypad

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

The external keypad can also be used for transferring parameters from one softstarter to another during commissioning (temporarily handheld). Note that NEMA 4/4X cannot be achieved when the keypad is not mounted.

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

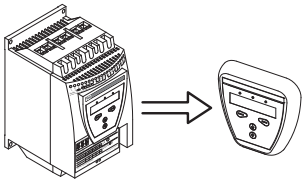


Figure 29: Upload

5:3.3 Transferring 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 parameters

Enter the menu *Transfer par.* Select *To Keypad* and confirm by pressing *Select.* A text *Load to Keypad* will be displayed.. Continue by pressing *Execute* and then *Yes* when the text *Are You Sure* is displayed. *Transfer OK* will now be displayed if the transmission was successful. Otherwise, *Transfer Not OK* will be displayed.

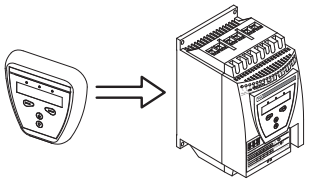


Figure 30: Download

5:3.3.2 Downloading parameters

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

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

To learn how to operate the keypad, see Chapter 6 “Human-Machine Interface (HMI)”

5:3.3.3 Technical data

Display	LCD type
Signal indication LEDs	*Power on:* Green *Protection:* Yellow *Fault:* Red
Ambient temperature	*Storage:* -25°C to +70°C (-13°F to 158°F) *Operation:* 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

Notes

Chapter 6
Human Machine Interface (HMI)

Chapter 6
Human-Machine Interface (HMI)

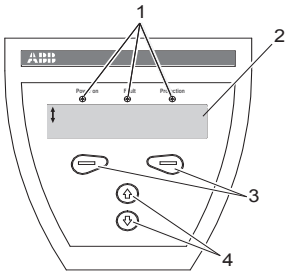
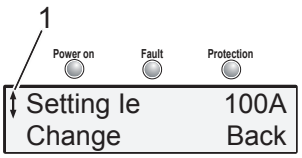


Figure 1: Human-Machine Interface
1 Status indication LEDs
2 LCD display
3 Selection keys
4 Navigation keys



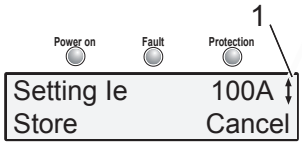


Figure 2: Menu examples

1 Scrolling icons

Figure 3: Top level

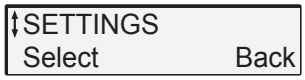


Figure 4: SETTINGS menu

Figure 5: Application Setting menu

Figure 6: Functional settings menu

Figure 7: Start/stop menu

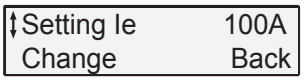


Figure 8: Setting Ie menu

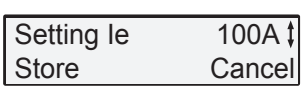


Figure 9: Setting Ie menu, changing menu

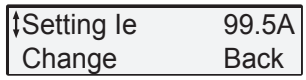


Figure 10: Setting Ie menu, changing setting

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 setup of inputs and outputs, protection functions, warning levels, fieldbus communication, etc. The HMI is also used for monitoring, local control and receiving status information from the softstarter.

6:1.2 Design

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

The LED indicators work as follows:

LED	Color	Description
Power on	Green	Control voltage connected
Fault	Red	Indicates faults
Protection	Yellow	Indicates protective function has activated
When a Fault or Protection LED is activated, the LCD displays the actual fault or protection.		

The keypad is based on the same user concept as today's mobile phones.

The LCD contains two rows with 20 characters each.

The top row presents various information depending on its state. The bottom row indicates which function is currently selected.

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 parameters. See the text on the bottom row of the LCD.

The *Navigation keys* are used for navigating through the various menus to the desired setting. When selecting from a list, the scrolling is done in a closed loop fashion.

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 Ie

2. The top level of the softstarter start menu looks as in Figure 3. Press the left selection key to enter the menu. The display now appears as in Figure 4.
3. Press the left selection key to select *SETTINGS*. The display appears as in Figure 5.
4. Press the lower navigation key until the display appears as in Figure 6.
5. Press the left selection key to select *Functional settings*. Press the left selection key to select *Start/Stop*, Figure 7.
6. Press the left selection key to *Change* the *Setting Ie*, 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. Otherwise, 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.

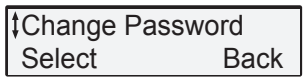


Figure 11: Change password

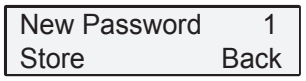


Figure 12: New password

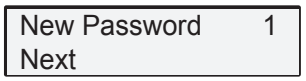


Figure 13: New password stored

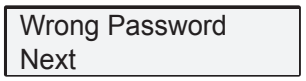


Figure 14: Wrong password

Figure 15: Support code

Figure 16: Keypad is menu

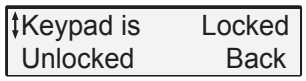


Figure 17: Locked keypad menu

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 or actions can be initiated.

6:1.3.1 Setting password

The default password is always 1.

1 Press the upper navigation key once to enter the parameter Change Password.

2 Select *Change Password*, Figure 11

3 Set the new password (*No or 1...255*) using the navigation keys.
Select *Store* and *Next*, Figure 12 and Figure 13.
Select *Back* to return to top level.

6:1.3.2 Wrong password

If an incorrect password is entered, the text “Wrong Password” will be displayed, Figure 14.

A support code will be given, Figure 15. The code can be ignored and an unlimited number of attempts can be made.

If you are unable to unlock the keypad, note the support code and contact your local ABB sales office.

6:1.4 Locking/unlocking the keypad

1 Press the upper navigation key twice to enter the parameter *Keypad is* Figure 16. The keypad is unlocked if the display indicates *Active* in the upper right corner.

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

3 Unlock the keypad.
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

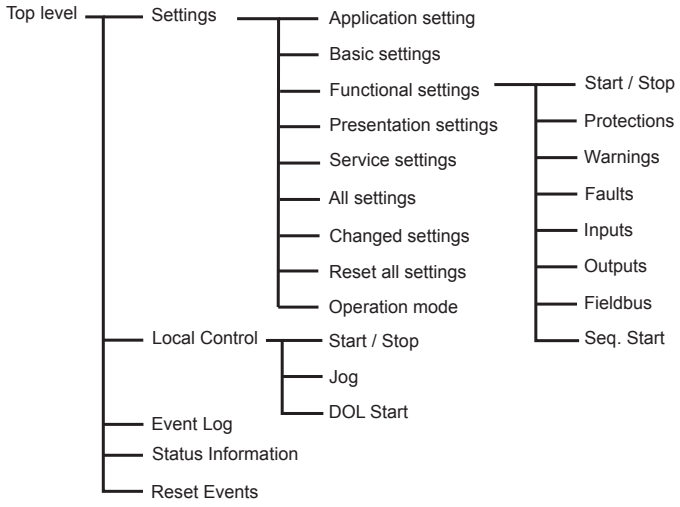


Figure 18: Menu tree

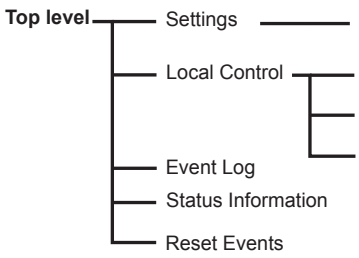


Figure 19: Top level

6:2.2 Top Level

Top Level contains general softstarter information, and the menus can be reached from here.
Use the navigation keys to cycle through the various menus.
Press Select to enter a menu.
Press Back to return to previous state

Menu	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

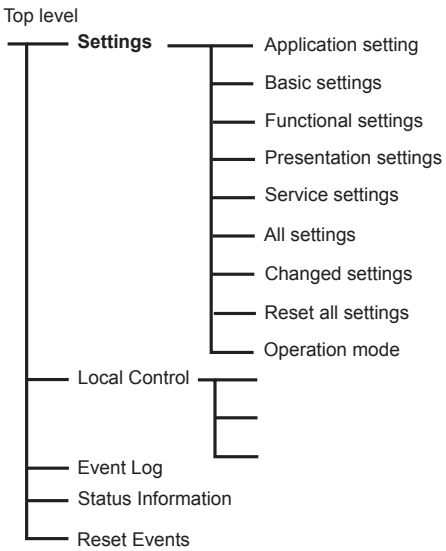


Figure 20: Settings menu

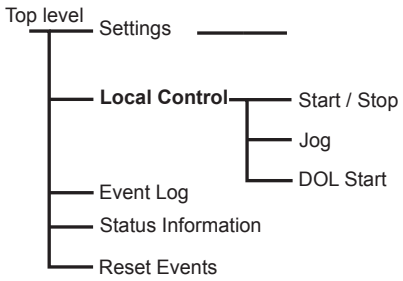


Figure 21: Local control menu

6:2.3 Settings menu

The settings menu is used to set up the softstarter parameters for various applications.

Use the navigation keys to cycle through the various sub menus.

Function	Description
Application setting	Predefined parameters for typical applications
Basic settings	The basic and most used start/stop settings
Functional settings	Language, date, time, etc.
Service settings	Service and repair settings
All settings	A list with all possible settings
Changed settings	A list of all changed settings
Reset all settings	Reset all settings to factory default settings
Operation mode	Test mode for softstarter

Figure 20: Settings menu

6:2.4 Local Control menu

The Local Control menu is used to start or stop the motor from the keypad. When local control is selected, the softstarter can only be controlled by the keypad.
The previous type of control is activated when exiting local control.
Three different selections are possible (see the table below).
Press navigation keys to view different types of local control.

Information!

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 the menu 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. (See Chapter 3 for AC3 ratings.)

Figure 21: Local control menu

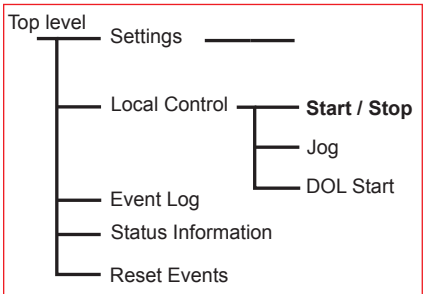


Figure 22: Start/Stop menu

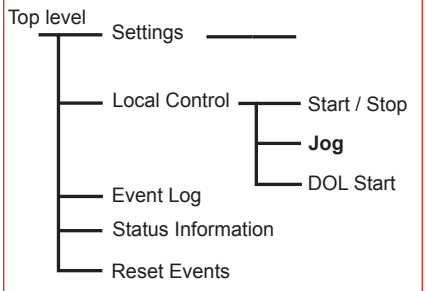


Figure 23: Jog menu

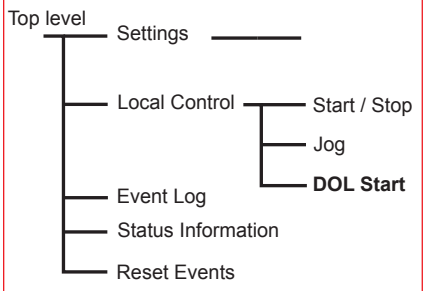


Figure 24: DOL start menu

6:2.4.1 Start/Stop the motor

Start

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

Stop

Select *Stop*. The motor will stop according to the set parameters. It is possible to press the stop command during the start ramp if necessary.

6:2.4.2 Jog

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

6:2.4.3 DOL start

(PSBT370...1050 only)

Start from the softstarter

If necessary, the motor can be started DOL (Direct On Line/across the 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.

Warning!
The rated motor current must never exceed the AC-3 rating of the integrated by-pass contactor. See Chapter 3 for AC3 ratings.

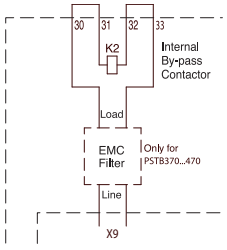


Figure 25: Connection when the contactor is operated from the keypad (factory wiring).

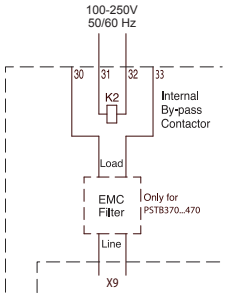


Figure 26: Connection when the by-pass contactor is operated separately (emergency DOL)

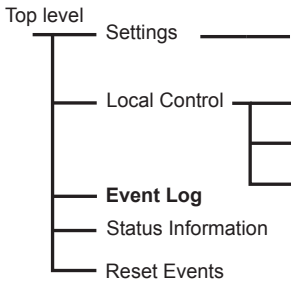


Figure 25: Event log menu

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 twenty 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 the navigation keys to view all entries in the event log.

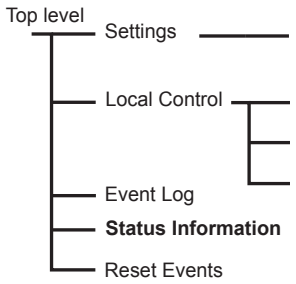


Figure 26: Status information menu

6:2.6 Status Information menu

The Status information menu is used to present various information.
Use the navigation keys to cycle through the various sub menus.

If the unit is connected “inside delta”, the displayed phase currents, L1, L2 & L3 are inside delta current values.

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
Run time	Total run time of the motor
No. of Starts	Run counter
SW Ver. CU	Software version CU.
SW Ver. FU	Software version FU.
SW Ver KP ①	Software version External Keypad
DB Version	Database version
MAC Address	Internal addressing
LV Board No	Serial No of the LV PCB

① Only if connected.

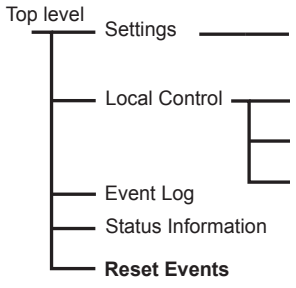


Figure 27: Reset events menu

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 through the main menu.
Use the navigation keys to view all events. Each event can be reset.

Notes

Chapter 7
Settings and configuration

Chapter 7
Settings and configuration

7:1 Settings

Settings can be done in three different ways:

- Keypad
- Fieldbus communication
- External keypad (optional)

With the keypad, settings can be done as individual parameter settings or by selecting pre-defined parameters for different applications.

The unit has one complete set of parameters but some parameters have extra settings (i.e., sequence start). All default parameters are stored in the unit in case a full reset to default values is required. 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 / hardware control)*
- *Re-programmming the programmable inuts*
- *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 Ie		X	X	X		X	
Overload class		X	X	X		X	
External By-pass		X	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	
Kick start				X		X	
Kick level				X		X	
Kick time				X		X	
Start range				X		X	
Stop range				X		X	
Overload protectcion				X		X	
Overload start class				X		X	
Overload run class				X		X	
Overload operation				X		X	
Locked rotor protection				X		X	
Locked rotor protection level				X		X	
Locked rotor protection time				X		X	
Locked rotor protection operation				X		X	
Underload protection				X		X	
Underload protection level				X		X	
Underload protection time				X		X	
Underload protection operation				X		X	
Phase imbalance protection				X		X	
Phase imbalance protection level				X		X	
Phase imbalance protection operation				X		X	
High current protection				X		X	
High current protection operation				X		X	
Phase reversal protection				X		X	
Phase reversal protection operation				X		X	
PTC protection				X		X	
PTC protection operation				X		X	
By-pass fault operation				X		X	
Warning high current				X		X	
Warning high current level				X		X	
Warning low current				X		X	
Warning low current level				X		X	
Warning overload				X		X	
Warning overload level				X		X	
Warning thyristor (SCR) overload				X		X	
Phase loss fault operation				X		X	
Fieldbus fault operation				X		X	
Frequency fault operation				X		X	

7:1.1 Overview of all accessible settings (different menus) cont.

Setting/parameter	Top level	Application setting	Basic settings	Functional settings	Presentation settings	All settings	Reset all settings
Heat sink over-temperature operation				X		X	
Shorted thyristor (SCR) fault 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 SW output V7				X		X	
Fieldbus control				X		X	
Fieldbus type				X		X	
Fieldbus address				X		X	
No. of sequences (sequence start)				X		X	
1st Setting Ie				X		X	
2nd Setting Ie				X		X	
3rd Setting Ie				X		X	
Start ramp 1				X		X	
Start ramp 2				X		X	
Start ramp 3				X		X	
Initial voltage 1				X		X	
Initial voltage 2				X		X	
Initial voltage 3				X		X	
Current limit 1				X		X	
Current limit 2				X		X	
Current limit 3				X		X	
Language					X	X	
LCD auto off					X	X	
Date type					X	X	
Date year					X	X	
Date month					X	X	
Date day					X	X	
Time hour					X	X	
Time minutes					X	X	

7:1.1 Overview of all accessible settings (different menus) cont.

Description	Display text	Setting range	Default value	Actual setting
Setting current	Setting Ie	9.0...1207A	Individual	
Time for start ramp	Start Ramp	1...30s, 1...120s	10s	
Time for stop ramp	Stop Ramp	0...30s, 0...120s	0s	
Initial voltage for start ramp	Init Volt	30...70%	30%	
End voltage for stop ramp	End Volt	30...70%	30%	
Step down voltage	Step down	30...100%	100%	
Level of the current limit	Current Lim	2.0...7.0xIe	4.0xIe	
Selection of kick start	Kick Start	Yes, No	No	
Level of kick start	Kick Level	50...100%	50%	
Time for kick start	Kick Time	0.1...1.5s	0.2s	
Range for start ramp	Start Range	1-30s, 1-120s	1-30s	
Range for stop ramp	Stop Range	0-30s, 0-120s	0-30s	
Overload protection	Overload	No, Normal, Dual	Normal	
Overload class	OL Class	10A, 10, 20, 30	10	
Overload class, Dual type, Start class	OL Class S	10A, 10, 20, 30	10	
Overload class, Dual type, Run class	OL Class R	10A, 10, 20, 30	10	
Type of operation for overload protection	OL Op	Stop-M, Stop-A, Ind	Stop-M	
Locked rotor protection	Locked Rotor	Yes, No	No	
Trip level for locked rotor protection	Lock R Lev	0.5...8.0xIe	4.0xIe	
Trip time for locked rotor protection	Lock R Time	0.2...10s	1.0s	
Type of operation for locked rotor protection	Lock R Op	Stop-M, Stop-A, Ind	Stop-M	
Underload protection	Underload	Yes, No	No	
Trip level for underload protection	Underl Lev	0.4...0.8xIe	0.5xIe	
Trip time for underload protection	Underl Time	1...30s	10s	
Type of operation for underload protection	Underl Op	Stop-M, Stop-A, Ind	Stop-M	
Phase imbalance protection	Phase Imb	Yes, No	No	
Trip level for phase imbalance protection	Ph Imb Lev	10...80%	80%	
Type of operation for imbalance protection	Ph Imb Op	Stop-M, Stop-A, Ind	Stop-M	
High current protection	High I	Yes, No	No	
Type of operation for high current protection	High I Op	Stop-M, Stop-A, Ind	Stop-M	
Phase reversal protection	Phase Rev	Yes, No	No	
Type of operation for phase reversal protection	Ph Rev Op	Stop-M, Stop-A, Ind	Stop-M	
PTC protection	PTC	Yes, No	No	
Type of operation for PTC protection	PTC Op	Stop-M, Stop-A, Ind	Stop-M	
Use of external by-pass contactor	Ext ByPass	Yes, No	No	
Type of operation, by-pass doesn't open	BP Closed Op	Stop-M, Stop A	Stop-M	
Type of operation, by-pass doesn't close	BP Open Op	Stop-M, Stop A	Stop-M	
High current warning	Warn I=High	Yes, No	No	
Trip level for high current warning	Wa I=H Lev	0.5...5.0xIe	1.2xIe	
Low current warning	Warn I=Low	Yes, No	No	
Trip level for low current warning	Wa I=L Lev	0.4...1.0xIe	0.8xIe	
Motor overload warning	Warn OL	Yes, No	No	
Trip level for motor overload warning	Wa OL Lev	40...99%	90%	
Thyristor overload warning	Warn SCR OL	Yes, No	No	
Type of operation for phase loss fault	Ph Loss Op	Stop-M, Stop-A	Stop-M	
Type of operation for fieldbus fault	FB Fault Op	Stop-M, Stop-A	Stop-M	
Type of operation for frequency fault	Freq F Op	Stop-M, Stop-A	Stop-M	
Type of operation for heatsink overtemp fault	HS Temp Op	Stop-M, Stop-A	Stop-M	
Type of operation for shorted thyristor fault	SCR SC Op	Stop-M, Stop-A	Stop-M	
Function of programmable input In0	In0	None, Reset, Enable Jog, DOL, Start 2, FB-Dis	Reset	

7:1.1 Overview of all accessible settings (different menus) cont.

Description	Display text	Setting range	Default value	Actual setting
Function of programmable input In1	In1	None, Reset, Enable Jog, DOL, Start 3, FB-Dis	Reset	
Function of programmable output relay K4	Relay K4	Run, TOR, Event	Run	
Function of programmable output relay K5	Relay K5	Run, TOR, Event	TOR	
Function of programmable output relay K6	Relay K6	Run, TOR, Event	Event	
Function of programmable software relay V7	SW Outp V7	Run, TOR, Event	Event	
Overload event of relay K4	K4 Overload	Yes, No	No	
Fault event of relay K4	K4 Fault	Yes, No	No	
Shunt fault of relay K4	K4 Shunt Fault	Yes, No	No	
High current event of relay K4	K4 High I	Yes, No	No	
Thyristor overload event of relay K4	K4 SCR OL	Yes, No	No	
Locked rotor event of relay K4	K4 Lock Rot	Yes, No	No	
Underload event of relay K4	K4 Underload	Yes, No	No	
Phase imbalance event of relay K4	K4 Phase Imb	Yes, No	No	
PTC event of relay K4	K4 PTC	Yes, No	No	
Phase reversal event of relay K4	K4 Phase Rev	Yes, No	No	
Warning motor overload event of relay K4	K4 Warn OL	Yes, No	No	
Warning thyristor overload event of relay K4	K4 Wa SCR OL	Yes, No	No	
Warning high current event of relay K4	K4 Wa I=High	Yes, No	No	
Warning low current event of relay K4	K4 Wa I=Low	Yes, No	No	
Overload event of relay K5	K5 Overload	Yes, No	No	
Fault event of relay K5	K5 Fault	Yes, No	No	
Shunt fault of relay K5	K5 Shunt Fault	Yes, No	No	
High current event of relay K5	K5 High I	Yes, No	No	
Thyristor overload event of relay K5	K5 SCR OL	Yes, No	No	
Locked rotor event of relay K5	K5 Lock Rot	Yes, No	No	
Underload event of relay K5	K5 Underload	Yes, No	No	
Phase imbalance event of relay K5	K5 Phase Imb	Yes, No	No	
PTC event of relay K5	K5 PTC	Yes, No	No	
Phase reversal event of relay K5	K5 Phase Rev	Yes, No	No	
Warning motor overload event of relay K5	K5 Warn OL	Yes, No	No	
Warning thyristor overload event of relay K5	K5 Wa SCR OL	Yes, No	No	
Warning high current event of relay K5	K5 Wa I=High	Yes, No	No	
Warning low current event of relay K5	K5 Wa I=Low	Yes, No	No	
Overload event of relay K6	K6 Overload	Yes, No	Yes	
Fault event of relay K6	K6 Fault	Yes, No	Yes	
Shunt fault of relay K6	K6 Shunt Fault	Yes, No	Yes	
High current event of relay K6	K6 High I	Yes, No	Yes	
Thyristor overload event of relay K6	K6 SCR OL	Yes, No	No	
Locked rotor event of relay K6	K6 Lock Rot	Yes, No	No	
Underload event of relay K6	K6 Underload	Yes, No	No	
Phase imbalance event of relay K6	K6 Phase Imb	Yes, No	No	
PTC event of relay K6	K6 PTC	Yes, No	No	
Phase reversal event of relay K6	K6 Phase Rev	Yes, No	No	
Warning motor overload event of relay K6	K6 Warn OL	Yes, No	No	
Warning thyristor overload event of relay K6	K6 Wa SCR OL	Yes, No	No	
Warning high current event of relay K6	K6 Wa I=High	Yes, No	No	
Warning low current event of relay K6	K6 Wa I=Low	Yes, No	No	
Overload event of relay V7	V7 Overload	Yes, No	Yes	
Fault event of relay V7	V7 Fault	Yes, No	Yes	
High current event of relay V7	V7 High I	Yes, No	Yes	
Thyristor overload event of relay V7	V7 SCR OL	Yes, No	No	
Locked rotor event of relay V7	V7 Lock Rot	Yes, No	No	
Underload event of relay v7	V7 Underload	Yes, No	No	
Phase imbalance event of relay V7	V7 Phase Imb	Yes, No	No	

7:1.1 Overview of all accessible settings (different menus) cont.

Description	Display text	Setting range	Default value	Actual setting
PTC event of relay V7	V7 PTC	Yes, No	No	
Phase reversal event of relay V7	V7 Phase Rev	Yes, No	No	
Warning motor overload event of relay V7	V7 Warn OL	Yes, No	No	
Warning thyristor overload event of relay V7	V7 Wa SCR OL	Yes, No	No	
Warning high current event of relay V7	V7 Wa I=High	Yes, No	No	
Warning low current event of relay V7	V7 Wa I=Low	Yes, No	No	
Control of the softstarter with the fieldbus	Fieldb Ctrl	Yes, No	No	
Type of fieldbus protocol used	Fieldb Type	AS-Int, Other	Other	
Fieldbus address	Fieldb Addr	0...1000	0	
Number of sequences for sequence start	No of Seq	No, 2, 3	No	
1st sequence, time for start ramp	Start Ramp 1	1...30s, 1...120s	10s	
1st sequence, initial voltage for start ramp	Init Volt 1	30...70%	30%	
1st sequence, current limit level	Curr Lim 1	2.0...7.0xIe	4.0xIe	
1st sequence, setting current	1st Set Ie	9.0...1207A	Individual	
2nd sequence, time for start ramp	Start Ramp 2	1...30s, 1...120s	10s	
2nd sequence, initial voltage for start ramp	Init Volt 2	30...70%	30%	
2nd sequence, current limit level	Curr Lim 2	2.0...7.0xIe	4.0xIe	
2nd sequence, setting current	2st Set Ie	9.0...1207A	Individual	
3rd sequence, time for start ramp	Start Ramp 3	1...30s, 1...120s	10s	
3rd sequence, initial voltage for start ramp	Init Volt 3	30...70%	30%	
3rd sequence, current limit level	Curr Lim 3	2.0...7.0xIe	4.0xIe	
3rd sequence, setting current	3st Set Ie	9.0...1207A	Individual	
Language to use on the display	Language	US/UK, FI, SE, PT, NL, IT, FR, ES, DE, CN, RU, TR	Indiividual	
Time for display automatic turn off	LCD Auto Off	1...255min	15min	
Type of date presentation	Date Type	ISO, CE, US	ISO	
Year	Date Year	2001...2060	Individual	
Month	Date Month	1...12	Individual	
Day	Date Day	1...31	Individual	
Hour	Time Hour	0...23	Individual	
Minutes	Time Min	0...59	Individual	

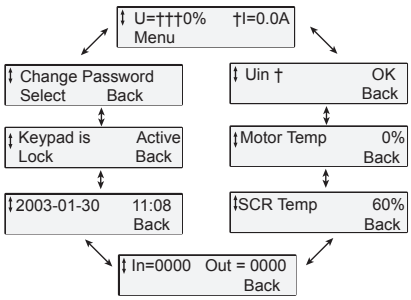


Figure 1: Top level display loop

Figure 2: Top level (start position)

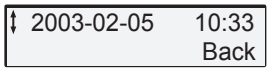


Figure 3: Real time clock

Figure 4: U_{in} status

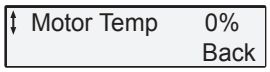


Figure 5: Motor temperature

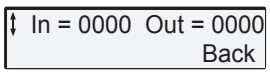


Figure 6: Input/outputs

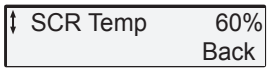


Figure 7: SCR temperature

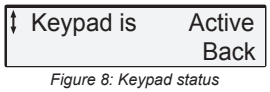


Figure 8: Keypad status

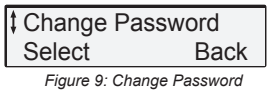


Figure 9: Change Password

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, current, heat sink temperature, real time clock and more. From this menu, the keypad can be locked/unlocked and a password can be set. It is also possible to enter all top level menus.

Display at start up

When switching on the control voltage, the LCD will first display the text “Hello”, and after a few seconds switch to the Top Level start position, Figure 2.

Real time clock

The real time clock displays the present date and time. To set date, time and display types, see “Presentation Settings.”

U_{in} status

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

Motor temperature

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

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 the following functions:

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

SCR Temperature

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

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)”.

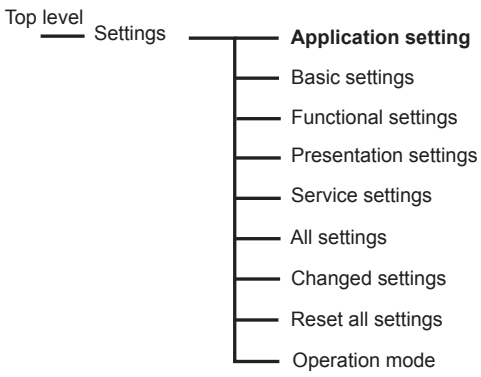


Figure 10: Application setting menu

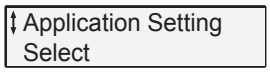


Figure 11: Application setting menu

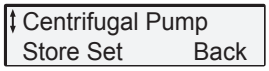


Figure 12: Application type

Figure 13: Confirming application type

Figure 14: Setting Ie menu

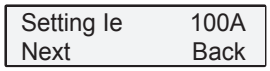


Figure 15: Confirming Setting Ie

Figure 16: Overload class

Figure 17: Confirming OL Class

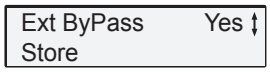


Figure 18: External By-Pass

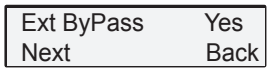


Figure 19: Confirming External By-Pass

Figure 20: Ready?/Tune Set menu

7:2.2 Application Setting

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

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 desired application is not listed, select the one closest to the application 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 the wrong application type was selected, press *Back* and select the correct type.

Setting I_e (motor FLA)

Set the motor full load current (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/(√3)) of the rated motor current.
Press Store to save the data after setting the current.
Confirm the *Setting* I_e by pressing *Next*. If the wrong value is set, press *Back* and set the correct value.

Overload class (OL Class)

Select the desired overload class. Available classes:
- 10A
- 10
- 20
- 30

Press *Store* to save the selected class.

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

External By-Pass contactor (Ext ByPass)

If an External Bypass contactor is used, set the parameter to *Yes*, otherwise select *No*.
Press *Store* to save the data.

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

Tune Set

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

Figure 21: All tuning parameters have been passed

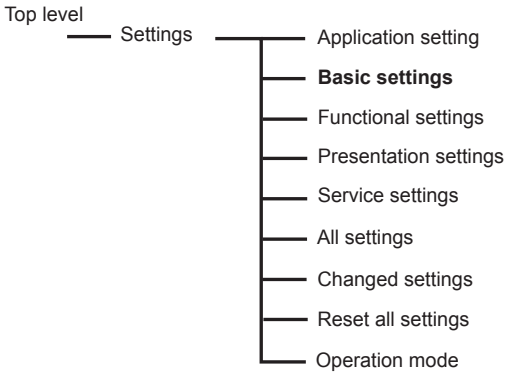


Figure 22: Basic Settings menu

Tuning parameters

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

- Start ramp
- Stop ramp
- Initial voltage
- End voltage
- Step down voltage
- Current limit level

When all tuning parameters have been cycled through, the following information will be displayed, Figure 21. Select *Yes* if all necessary parameters are tuned. If a new tuning is required, select *Back* and follow the step *Tune Set* above

7:2.3 Basic Settings

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

Enter the Basic settings

Enter the menu by selecting *Basic Settings*.

Setting I_e (motor FLA)

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

Information!

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, otherwise select *No*.

Start ramp

Set the ramp time for start.

Stop ramp

Set the ramp time for stop (softstop). Note that this function should only be used for applications with small flywheel masses, for example pumps and conveyors (minimizes product damage during the stop).

Initial voltage (Init Volt)

Set the initial voltage level.

End voltage (End Volt)

Set the end voltage level.

Step down

Set the level of the step down voltage. This function is only present if softstop is selected.

Current limit (Current Lim)

Set the current limit level for the start.

Overload Class (OL Class)

Select the desired 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.

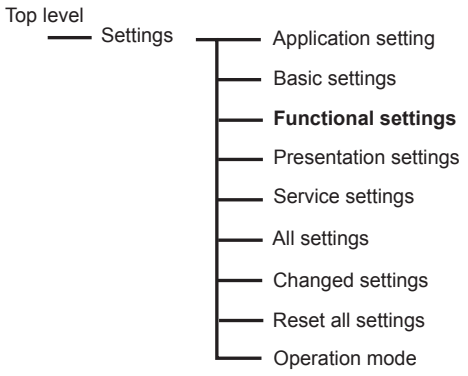


Figure 23: Functional Settings menu

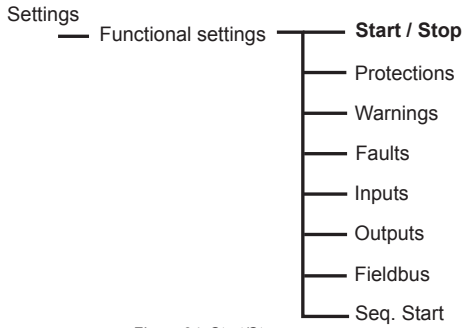


Figure 24: Start/Stop group

7:2.4 Functional Settings

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

Enter the Functional settings

Enter the menu by selecting *Functional Settings*.

7:2.4.1 Start/Stop

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

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

To set parameters from Setting I_e to Current limit level, see "Basic Settings".

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 visible 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 visible 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 protections, proceed to that menu.

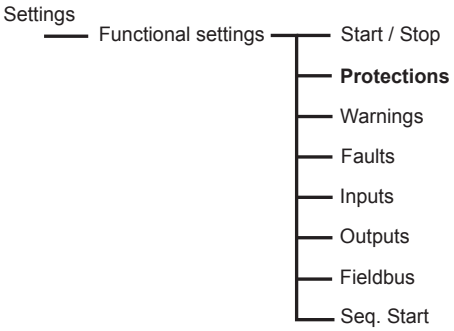


Figure 25: Protections group

7:2.4.2 Protections

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

Overload
Select the required overload type for the application. The 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 overload class. Following classes are available:
- 10A
- 10
- 20
- 30

Press *Store* to save the selected class.

Overload type of operation (OL Op)
Select what operation should be initiated 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 an automatic reset is performed.

Ind Only indication will be given.

Press *Store* to save the selected operation.

If overload "Dual" is selected, the following settings will be available:
Overload start class (OL Class S)
Select the required overload class during start condition. The following overload classes are available:
- 10A
- 10
- 20
- 30

Press *Store* to save the selected class.

Overload run class (OL Class R)
Select the required overload class during continuous run. The following overload classes are available:
- 10A
- 10
- 20
- 30

Press *Store* to save the selected class.

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 should be initiated 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 an automatic reset is performed.

Ind Only indication will be given.

Press *Store* to save the selected operation.

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 should be initiated 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 an automatic reset is performed.
Ind Only indication will be given.
Press *Store* to save the selected operation.

Phase imbalance (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 should be initiated 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 an automatic reset is performed.
Ind Only indication will be given.
Press *Store* to save the selected operation.

High current (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 should be initiated 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 (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 should be initiated 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 an automatic reset is performed.
Ind Only indication will be given.
Press *Store* to save the selected operation.

PTC
Activate the PTC protection if required by changing to *Yes*.

If "Yes" is selected, the following setting will be available:
PTC type of operation (PTC Op)
Select what operation should be initiated 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 an automatic reset is performed.
Ind Only indication will be given.
Press *Store* to save the selected operation.

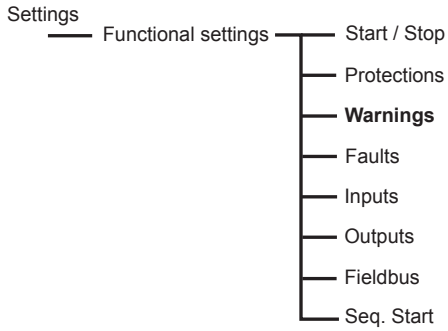


Figure 26: Warnings group

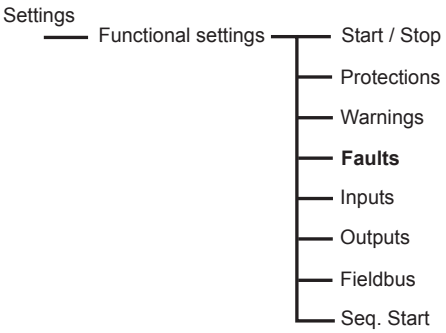


Figure 27: Faults group

7:2.4.3 Warnings

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

Warning high current (Warn I=High)
Activate the warning function if required by changing to *Yes*.
Press *Store* to save the selected operation

Warning high current 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.

Warning low current (Warn I=Low)
Activate the warning function if required by changing to *Yes*.
Press *Store* to save the selected operation.

Warning low current 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.

Warning overload (Warn OL)
Activate the warning function if required by changing to *Yes*.
Press *Store* to save the selected operation.

Warning overload 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.

Warning SCR overload (Warn SCR OL)
Activate the warning function if required by changing to Yes.
Press *Store* to save the selected operation.

7:2.4.4 Faults

Phase loss type of operation (Ph Loss Op)
Select what operation should be initiated 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 should be initiated 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 should be initiated 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 type of operation (HS Temp Op)
Select what operation should be initiated 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.

Shorted SCR type of operation (SCR SC Op)
Select what operation should be initiated 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 operation
Select what operation should 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 operation (BP Open Op)
Select what operation should 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.

Fault Connection, Fault Open SCR, Fault Line Side and Fault Intern
Selected operation for the faults listed above is always:
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.

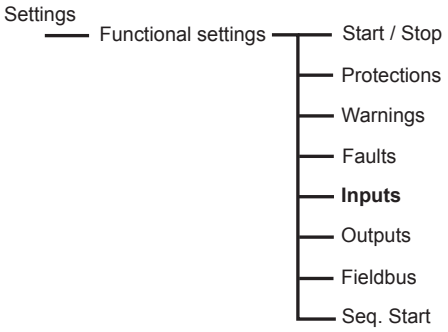


Figure 28: Inputs group

7:2.4.5 Inputs

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

First programmable input (In0)

Select the required function for the input In0.
Press *Store* to save/activate the selected function.
One of the following functions can be selected:

None	No specific function (not activated).
Reset	Reset of a fault or overload condition.
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. The motor stops immediately when the input is opened.
DOL	Open/close the bypass contactor (PSTB370...PSTB1050) *only if setting Ie is equal to or lower than AC-3 rating*.
Start2	Start signal for 2nd parameter set-up.
FB-Dis	Disable the fieldbus communication. The softstarter can be controlled by 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 controol to another (fieldbus control/hardwire control)*
- *Re-programming 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 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. The motor stops immediately when the input opens.
DOL	Open/close the bypass contactor (PSTB370...PSTB1050) *only if setting Ie is equal to or lower than AC-3 rating*.
Start3	Start signal for 3rd parameter set-up.
FB-Dis	Disable the fieldbus communication. The softstarter can be controlled by 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 controol to another (fieldbus control/hardwire control)*
- *Re-programming the programmable inputs.*
- *Reset all Settings (programmable input set to Enable)*

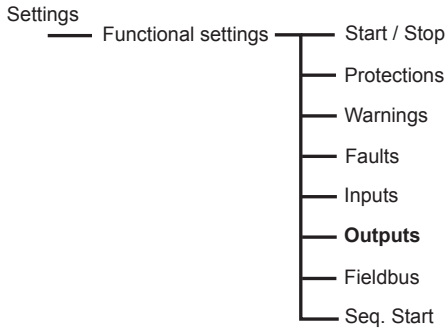


Figure 29: Outputs group

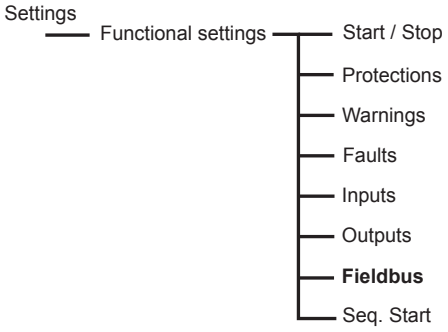


Figure 30: Fieldbus group

7:2.4.6 Outputs

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

Relay K4

Select the required function for 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) . The following events can be selected individually:

- Motor overload protection
- Fault
- High current protection
- SCR overload protection
- Locked rotor protection
- Underload protection
- Phase imbalance protection
- Shunt fault
- Low current warning
- High current warning
- SCR overload warning
- Overload warning
- Phase reversal protection
- PTC protection

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

Relay K5

Select the required function for 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.

Relay K6

Select the required function for 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.

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.

Fieldbus

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

Fieldbus control (Fieldb Ctrl)
Activate the fieldbus control 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-I protocol.
Other Used for protocols other than AS-I (i.e., DeviceNet, Profibus DP, Modbus).
Press *Store* to save/activate the selected function.

Fieldbus address (Fieldb Addr)
Set a unique address number between 1 and 1000 for fieldbus communication.
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 fieldbus control to another (e.g., manual control)*
- *Re-programming the programmable inputs.*
- *Reset all Settings (programmable input set to Enable)*

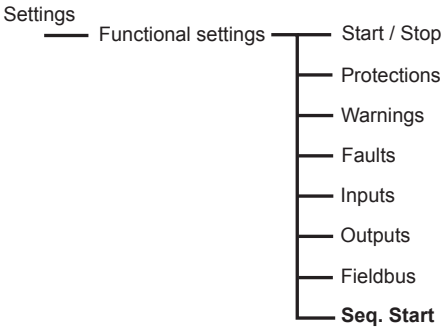


Figure 31: Sequence start group

7:2.4.8 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.

Information!
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.

Information!
If sequence start was used and the parameter No of Seq is changed to No, the overload protection will automatically be set to Normal regardless of previous settings.

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 the required function.

Information!
The overload protection should not be used when starting several motors since the total starting time will become too long and the protection will trip.Normally the overload should be turned off and each motor should have separate overload protection.

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. The 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. The 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.

Information!
For wiring and operation of the start/stop signals, see Chapter 5, “Connection” under programmable inputs.

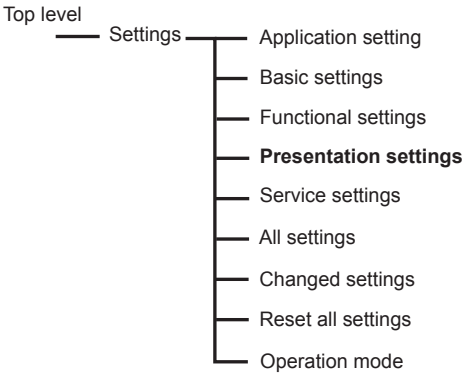


Figure 32: Presentation Settings menu

7:2.5 Presentation Settings

The Presentation setting menu consists of parameters for the LCD set-up. The presentation language can be chosen among 12 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 desired 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	Language	Abbreviation in LCD
English	US/UK	Italian	IT
Chinese	CN	Dutch	NL
German	DE	Portuguese	PT
Spanish	ES	Swedish	SE
French	FR	Finnish	FI
Russian	RU	Turkish	TR

Information!
In case the wrong language is selected, follow the "emergency instructions" below to reach this parameter. (Start from the top level.)

Press left selection key twice.
Press lower navgation key three times.
Press left selection key twice.
Use the navigation keys to find the required language abbeviation.
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, touch any of the keys to turn 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 the 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.

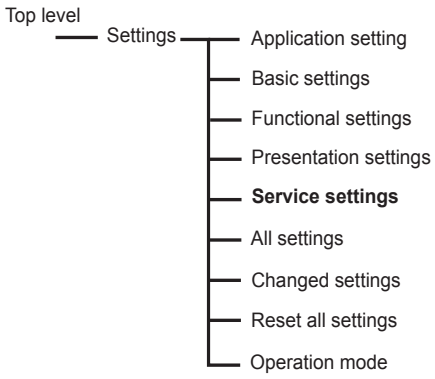


Figure 33: Service Settings menu (for authorized personnel only)

7:2.6 Service Settings

The service setting menu consists of parameters used for maintenance and repair. **This menu should only be used by authorized service personnel.**

Warning!

If parameters are changed, the softstarter can be damaged or malfunction. The warranty will be void if these parameters are changed without factory authorization.

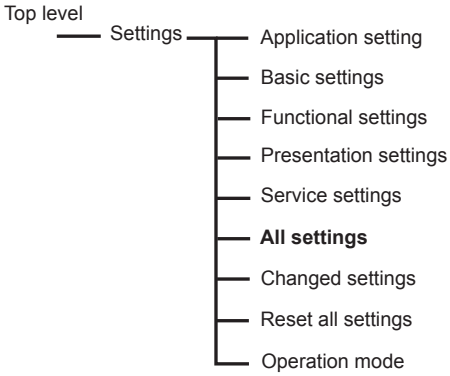


Figure 34: All Settings menu

7:2.7 All Settings

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

Enter the All settings

Enter the menu by selecting *All Settings*.

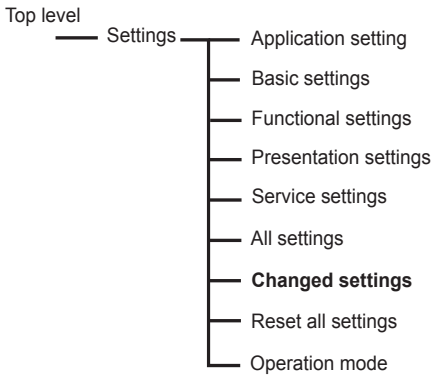


Figure 35: Changed Settings menu

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*.

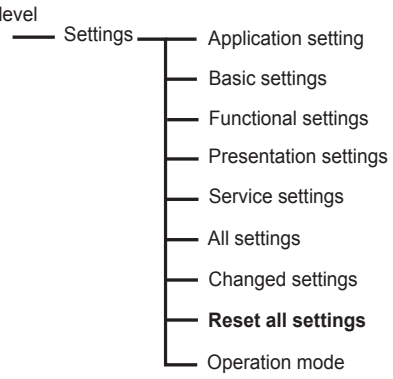


Figure 36: Reset all Settings menu

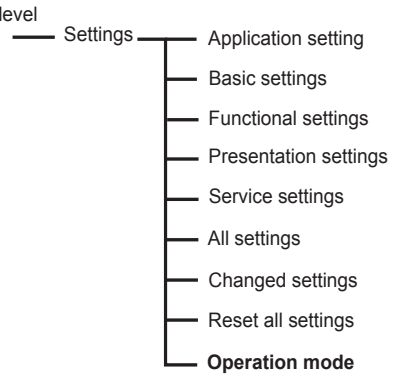


Figure 37: Reset all Settings menu

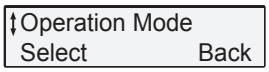


Figure 38: Display appearance in normal mode

Figure 39: Display appearance in demo mode

7:2.7.2 Reset All Settings

To reset all the changed parameters back to factory default settings, 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 the programmable inputs***
- ***Reset all Settings (programmable input set to Enable)***

7:2.7.3 Operation (test) mode

The Operation mode makes it possible to switch between two different modes in the softstarter: a demo mode and the regular operation mode. By entering the demo mode, programmable inputs/outputs, start and stop circuits, by-pass contactor etc. can be tested before the unit is put into operation. As long as the unit is in demo mode, the color on the display is inverted (except on the 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.

Information!

The total run time of the motor and the total number of starts will be counted also during demo mode. When exiting demo mode, these values will be reset to previous values. Parameters changed and the Event Log will be kept when exiting demo mode.

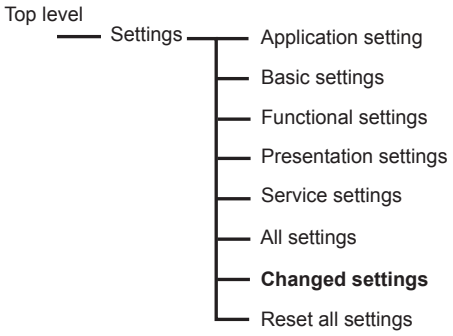


Figure 40: Changed Settings menu

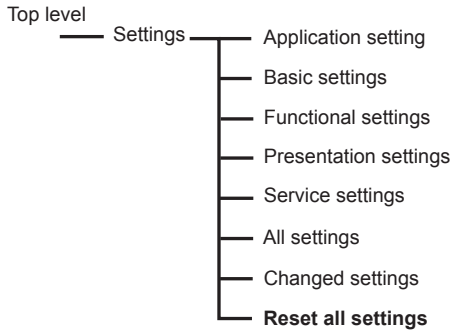


Figure 41: Reset all Settings menu

7:2.7.1 Changed Settings

The Changed settings menu consists of all parameters that have been changed from the factory default setting.

If no parameters have been changed, the LCD will display *No Changed Settings*.

7:2.7.2 Reset all Settings

To reset all the changed parameters back to factory default setting, enter this menu. Confirmation of reset will be displayed as *Done* on the LCD.
The real time clock, the hour run meter, and the total number of starts will not be affected by the reset.

Notes

Chapter 8
Fieldbus communication (option)

8

Chapter 8
Fieldbus communication (option)

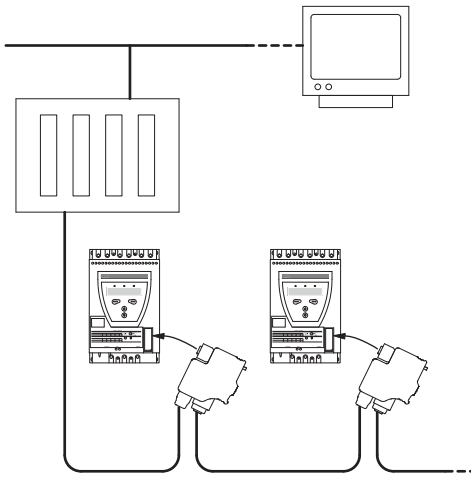


Figure 1: Principle of a fieldbus network with PST softstarters connected

8:1 Overview

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

The interface between the softstarter and the eplug is always the same. Independent of softstarter size, it is possible to connect any fieldbus protocol in the future since the protocol is defined in the eplug itself.
The following fieldbus protocols are available:

- AS-Interface
- DeviceNet
- Profibus DP
- Modbus

8:1.1 Required accessories

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

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

8:1.2 Instructions

To set up I/O, parameters, etc., please visit www.abb-control.com, go to the Literature Library, select “3. Technical Manual Download Library” and scroll down the page to locate the Softstarter technical literature library. Engineering document packages can be downloaded for all available protocols.

Chapter 9
Maintenance

9

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 control 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 pressurised air to clean.
- Check external filters. Clean, if necessary.
- Check that the fan is working and rotating freely. The blades should 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

A spare parts list and all necessary instruction for softstarter repair can be found at www.abb-control.com

Information!

Service and repair should be performed by authorized personnel only. Unauthorized repair may affect warranty.

Chapter 10
Functions

Chapter 10
Functions

This chapter describes all possible settings and functions 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 described.

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).

Information!
If the motor is connected Inside Delta, set the current in the Delta circuit by multiplying the rated motor current by 1/(√3) = 58% (or .58).

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 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 gradually increasing the output voltage to the motor. The start ramp continues until full voltage is applied to the motor.

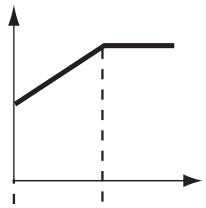


Figure 1: Start ramp

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

10:3 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 gradually decreasing the output voltage to the motor. If the ramp time is set to 0, the softstarter will completely remove the voltage when a stop command is given.

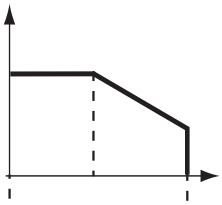


Figure 2: Stop ramp

Information!
This parameter shall be set to 0 for applications when large masses are involved!

Parameter text	Default value	Setting range	Description
Stop Ramp	0s	1...30s, 1...120s (Range depends on Stop Range)	Time for stop ramp

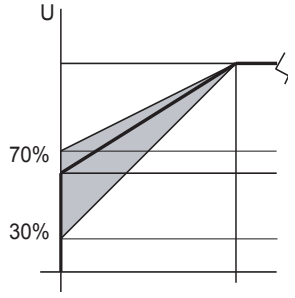


Figure 3: Initial voltage for Start Ramp

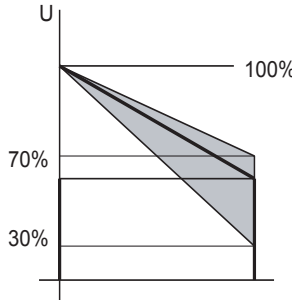


Figure 4: End voltage for Stop ramp

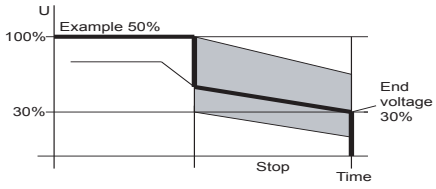


Figure 5: Step down voltage for Stop ramp

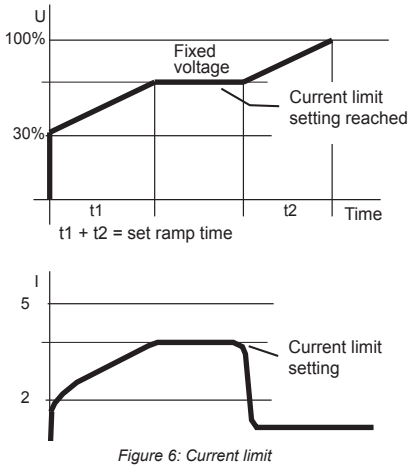


Figure 6: Current limit

10:4 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. If the initial voltage is set too low, it will cause unneccessary long starting times and unnecessary heating of the motor.

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

10:5 End voltage

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

This parameter makes it possible to set the voltage level where the stop ramp ends. This function will be active only if parameter Stop ramp is used.

Parameter text	Default value	Setting range	Description
End Volt	30%	30...70%	Initial voltage for Stop Ramp

10:6 Step down voltage

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

When stopping a motor using the stop ramp, the speed will not decrease immediately. The step down voltage function makes it possible to set a level where the motor speed decreases as soon as the stop ramp begins. By using, a more optimized stopping of the motor is achieved. It is mainly used for pump applications.

Parameter text	Default value	Setting range	Description
Step down	100%	30...100%	Voltage value to which the softstarter will step down at stop and where it will begin the stop ramp

10:7 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.

Information!
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 x Ie	2.0...7xIe	Level of the current limit

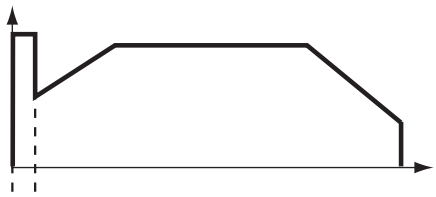


Figure 7: Kick start

10:8 Kick Start

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

In some applications it may be necessary to kick loose the motor i.e. initial friction, and therefore a kick start can be used. With this function, a selectable fixed voltage is applied during a settable time. Note that the current limit function is disabled during kick start.

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

10:9 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

10:10 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	0.2s	0.1...1.5s	Time for Kick Start

10:11 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 long start ramp time will increase the risk of tripping the overload protection.

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

10:12 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
Start range	0-30s	0-30s, 0-120s	Selectable range for stop ramp

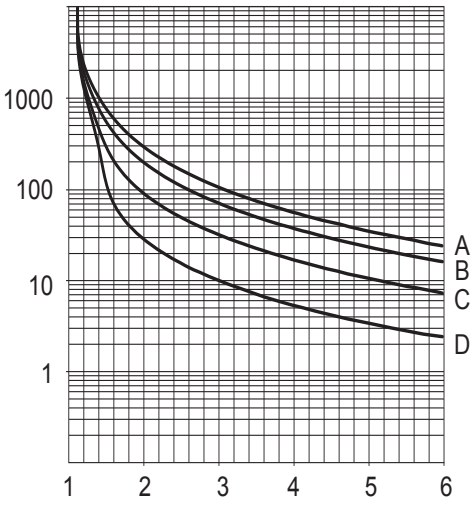


Figure 8: Tripping curves for the electronic overload

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

10:13 Motor overload protection

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. If an overload occurs, the motor stops 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

Information!
The motor thermal temperature is stored in the event of a power loss.

10:14 Overload class

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

This parameter makes it possible to set the required overload class. Four different classes are available according to Figure 8.

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

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

10:15 Overload class, 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 overload class 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

10:16 Overload class, 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 overload class during 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

10:17 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 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 Class R	10	10A, 10, 20, 30	Overload class, Dual type, Run class

10:18 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

10:19 Locked rotor protection, trip 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 x Ie	0.5...8.1 xIe	Trip level for locked rotor protection

10:20 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	1.0s	0.2...10.0s	Trip time for locked rotor protection

10:21 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 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

10:22 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.

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

Information!
This protection could be used to avoid for example a pump running dry or detecting a broken belt.

10:23 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 x Ie	0.4...0.8xIe	Trip level for Underload protection

10:24 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	10s	1....30s	Trip time for Underload protection

10:25 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 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

10:26 Phase imbalance protection

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

If the current in one phase differs from another phase by 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

10:27 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

10:28 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 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

10:29 High current protection

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

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

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

10:30 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 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

10:31 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 reveral protection

10:32 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 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 fro phase reversal protection

10:33 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.

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

10:34 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 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

10:35 External bypass

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

This parameter defines whether an external bypass contactor is used or not.

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

10:36 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

10:37 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 x Ie	0.5...5.0 x Ie	Trip level for high current warning

10:38 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

10:39 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 x Ie	0.4...1.0 x Ie	Trip level for low current warning

10:40 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

10:41 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

10:42 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 SCR 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	SCR overload warning

10:43 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 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

10:44 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 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

10:45 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 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

10:46 Heatsink 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

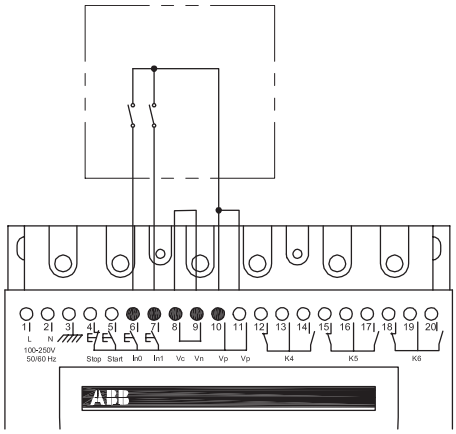


Figure 9: Internal control voltage

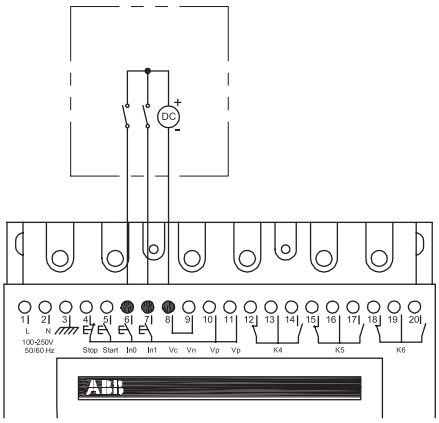


Figure 10: External control voltage

10:47 SCR 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.

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 SCR short circuit fault

10:48 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, Start 2, FB-Dis	Function of programmable input In0
In1	Reset	None, Reset, Enable, Jog, DOL, Start 3, 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 the programmable inputs*
- *Reset all Settings (programmable input set to Enable)*

10

10:49 Programmable outputs – Relay 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 an isolation 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.

Each output relay can be programmed to any combination of events below:

- Motor Overload Protection
- Fault
- High Current Protection
- SCR Overload Protection
- Locked Rotor Protection
- Underload Protection
- Phase Imbalance Protection
- Shunt fault
- Low current warning
- High current warning
- SCR Overload Warning
- Overload Warning
- Phase Reversal Protection
- PTC Protection

Description
Fault group consists of:

- By-pass contactor does not close
- Phase loss fault
- Fieldbus fault
- Frequency fault
- Heat sink temp. fault

Shunt fault group consists of:

- By-pass contactor does not open
- Shorted thyristor

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

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

10:50 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 outputs, Relay 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

10:51 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 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

10:52 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

10:53 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, non-occupied number as the address.

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

10:54 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

Information!
The LOCAL CONTROL menu cannot be entered if Sequence start is selected.

10:55 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

10:56 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

10:57 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 x Ie	2.0...7.0xIe	First sequence, current limit

10:58 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	Ir	9...1207A divided into 19 over-lapping ranges	First sequence, current limit

10:59 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	10s	1...30s, 1...120s	Second sequence, time for start ramp

10:60 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

10:61 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 Ie	2.0...7.0xIe	Second sequence, current limit

10:62 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
2 Set Ie	Ir	9...1207A divided into 19 overlapping ranges	Second sequence, current limit

10:63 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	10s	1...30s, 1...120s	Third sequence, time for start ramp

10:64 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

10:65 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 x Ie	2.0...7.0xIe	Third sequence, current limit

10:66 Setting current, third sequence

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

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 Ie	Ir	9...1207A divided into 19 overlapping ranges	Third sequence, motor rated current

10:67 Language

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

The text on the LCD display can be presented in 12 different languages. This parameter makes it possible to select among the following languages:

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

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

10:68 LCD display 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 activation.
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.

10:69 Password

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

This parameter makes it possible to set a password to lock the keypad. 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

10:70 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

10:71 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	2001...2060	Year

10:72 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

10:73 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

10:74 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

10:75 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

10:76 By-pass doesn't open, type of operation (BP Closed Op)

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 bypass does not open

10:77 By-pass doesn't close, type of operation (BP Open Op)

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 bypass does not close

Notes

Chapter 11
Troubleshooting

Chapter 11
Troubleshooting

11:1 General

This chapter is a guide that can be used in case problems 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 warning may show up.

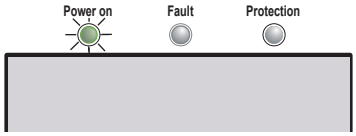
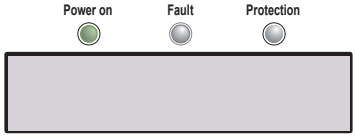
LCD indication	Active when selected								Always active										Active when selected			
	Prot Motor OL	Prot Underload	Prot Locked Rot	Prot High I	Prot Phase Imb	Prot Phase Rev	Prot PTC	Prot SCR OL	Fault Phase Loss	Fault Connection	Fault Wrong Freq	Fault Line Side	Fault HS Temp	Fault Kick-Cur	Fault SC SCR	Fault Open SCR	Fault FB Timeout	Fault BP Closed	Fault BP Open	Warn OL	Warn SCR OL	Warn I=High	Warn I=Low
Stand by	X	–	–	X	–	–	X	X	–	–	–	–	X		–	–	X[1]	–	–	X	X	–	–
At start signal	X	–	–	X	–	X	X	X	X	X	X	X	X	X[2]	X	–	X[1]	–	–	X	X	–	–
Ramp up	X	–	–	X	–	–	X	X	X	–	–	–	X		–	X	X[1]	–	–	X	X	–	–
TOR	X	X	X	X	X	–	X	X	X	–	–	–	X		–	X	X[1]	–	X[3]	X	X	X	X
At stop signal	X	–	–	X	–	–	X	X	X	–	–	–	X		X[4]	X	X[1]	X[3]	–	X	X	–	–
Ramp down	X	–	–	X	–	–	X	X	X	–	–	–	X		X	X	X[1]	–	–	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.

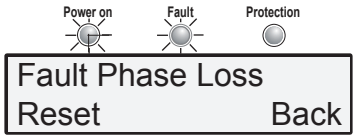
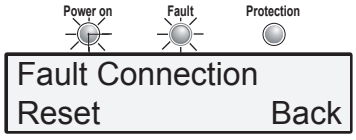
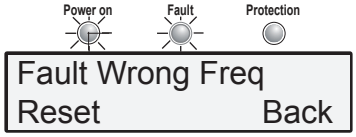
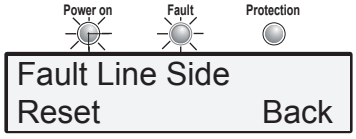
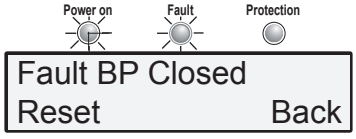
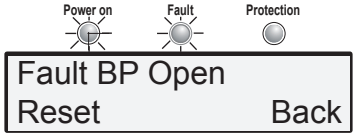
11:3 General problems and faults

Status	Possible cause	Solution
Motor humming/starts without given start signal	Shorted SCR By-pass contactor stuck in the closed position	Check and replace Check and correct the reason
Bad motor sound during start and operation	Inside Delta connection wrong	Check and correct the wiring
Bad motor sound during stop	Wrong ramp time for stop	Try different ramp times (some adjustments may be necessary for best result)
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	Check connections for start and stop Check that start and stop command is not given at the same time Check that the keypad is not in Local Control menu Check that parameter Fieldbus Ctrl is set to No.
Motor does not start when giving start command using the fieldbus communication	Setting of fieldbus parameter wrong	Check that parameter Fieldbus Ctrl is set to Yes Check that bit “Enable” is used Check that programmable inputs have correct settings
Displayed current in LCD does not correspond to motor current	Inside Delta connection	If the softstarter is connected inside Delta, the current displayed is 58% (1/(√ 3)) of the motor current.
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)	Check that the softstarter corresponds to the m
Loading of parameters does not work properly	Fieldbus settings	See Chapter 8 Fieldbus for actual fieldbus type

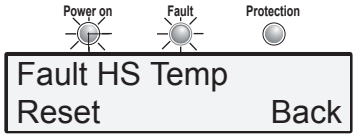
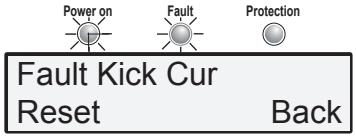
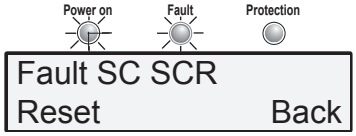
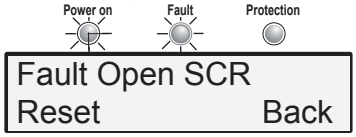
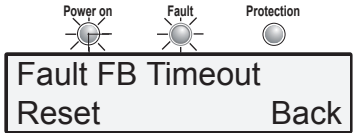
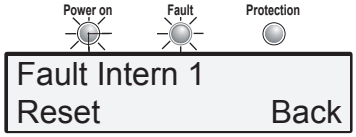
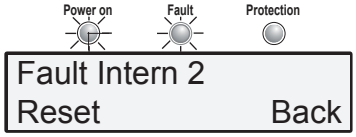
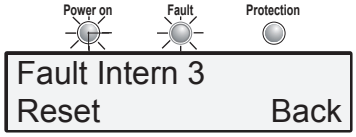
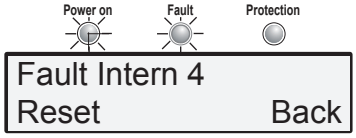
11:4 Start up faults

Status	Possible cause	Solution
	LCD Auto shut off the keypad	Touch any key onn the keypad
	Control voltage is not connected	Connect the control voltage according to the circuit diagram

11:5 Fault indication

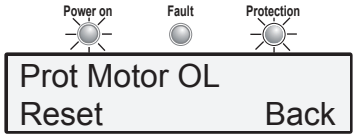
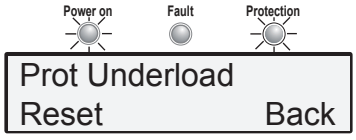
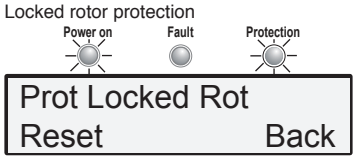
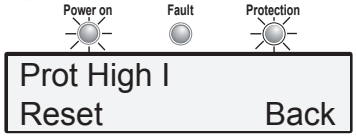
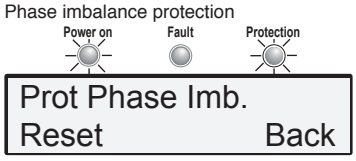
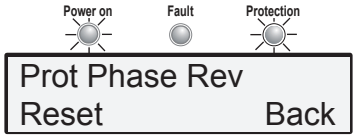
Status	Possible cause	Solution
	The main contactor or circuit breaker is open Fuse blown Any external device open / tripped Main contactor opens too quickly	Check and close contactor / breaker or any external switching device Check and replace the fuse in all (3) three phases Check upstream disconnect or fuses. Check all power cable connections.. Add a time delay before opening
	The motor connection is not correct Shorted SCR at start Shorted SCR at start	**In Line connected** • Check that there are no connections missing to the motor • Check that the connections are carried out correctly • Check and replace **Inside Delta connected** • Check that there are no connections missing to the motor • Check that the circuits are closed and correspond to the circuit diagram • Check and replace
Frequency fault 	The frequency is out of range. (47.5 - 52.5Hz or 57-63 Hz)	Check and correct the frequency
Line side fault 	The main voltage is not correct on the line side	Check and correct voltage on the line side
By-Pass does not open fault 	The by-pass contactor is not opening properly	**Without by-pass** • Check that the parameter Ext byPass is set to No. **With by-pass** • Check why the contactor is not opening and make necessary actions. • Check that the parameter Ext ByPass is set to Yes
By-Pass does not close fault 	The by-pass contactor is not closing properly	**Without by-pass** • Check that the parameter Ext byPass is set to No. **With by-pass** • Check why the contactor is not closing and make necessary actions. • Check that the parameter Ext ByPass is set to Yes

11:5 Fault indication (cont.)

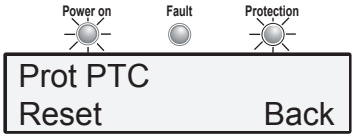
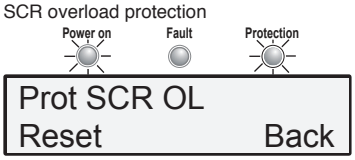
Heat sink over-temperature 	Temperature too high on the heat sink. If the fault remains after reset, the heat sink temperature is too warm.	Check that the fans are working in a proper way Check that the cooling airways are free from dirt and dust Check that the ambient temperature is not too high
Kick-current fault 	Parameter Setting Ie is set too low	**In Line connected** • Set the value acccording to the rated motor current **Inside Delta** • Set the value according to 58% (1/(√3)) of the rated motor current
Shorted SCR fault 	One or several SCRs are shorted	Check and replace. Contact your ABB sales office for replacement parts.
Non conducting SCR fault 	One or several SCRs are not conducting	Check and replace. Contact your ABB sales office for replacement parts.
Fieldbus fault 	The fieldbus commmunication is not working	Check that the fieldbusplug is connected correctly Check that the correct type of fieldbusplug is used Check that the paramter Fieldbus Type is set according to the present fieldbus type
Internal faults    	An internal communication fault of the softstarter has occurred	Disconnect and reconnect the control voltage (Ue) and make a restart. If the same fault remains, contact your ABB sales office

Chapter 11
Troubleshooting

11:6 Protection indication

Status	Possible cause	Solution
Motor overload protection 	The motor has been exposed to an overload condition because the current over a certain time is too high. (The load on the motor shaft is too high).	**In Line** ***At start*** Check and correct the reason for the overload. Check that current limit level is not set too low. Check that the ramp time for start is not too long. Check that correct overload class is used. Check that parameter Setting Ie is correct. ***Continuous run*** Check and correct the reason for the overload. **Inside Delta** ***At start*** Check and correct the reason for the overload. Check that current limit level is not seet too low. Check that the ramp time for start is not too long. Check that correct overload class is used. Check that parameter Setting Ie is set to 58% (1/√3)) of the rated motor current. ***Continuous run*** Check and correct the reason for the overload.
Underload protection 	The motor current is below set level and time	Check and correct the reason for the underload Check that the settings are according to the operation conditions
Locked rotor protection 	The motor is running stiff for some reason. A damaged bearing or a stuck load could be possible causes	Check the bearings of the motor and load Check that the load is not running stiff.
High current protection 	A fault current, higher than 8 times the softstarter rating has occured	Check the circuits including the motor for any insulation fault, phas to phase or ground fault
Phase imbalance protection 	Unbalance in the phase currents	Check the main voltage and the motor circuit Restart the motor and check the phase currents
Phase reversal protection 	The phase sequence is not correct	Check the phase sequence on the line side to (L1-L2-L3)

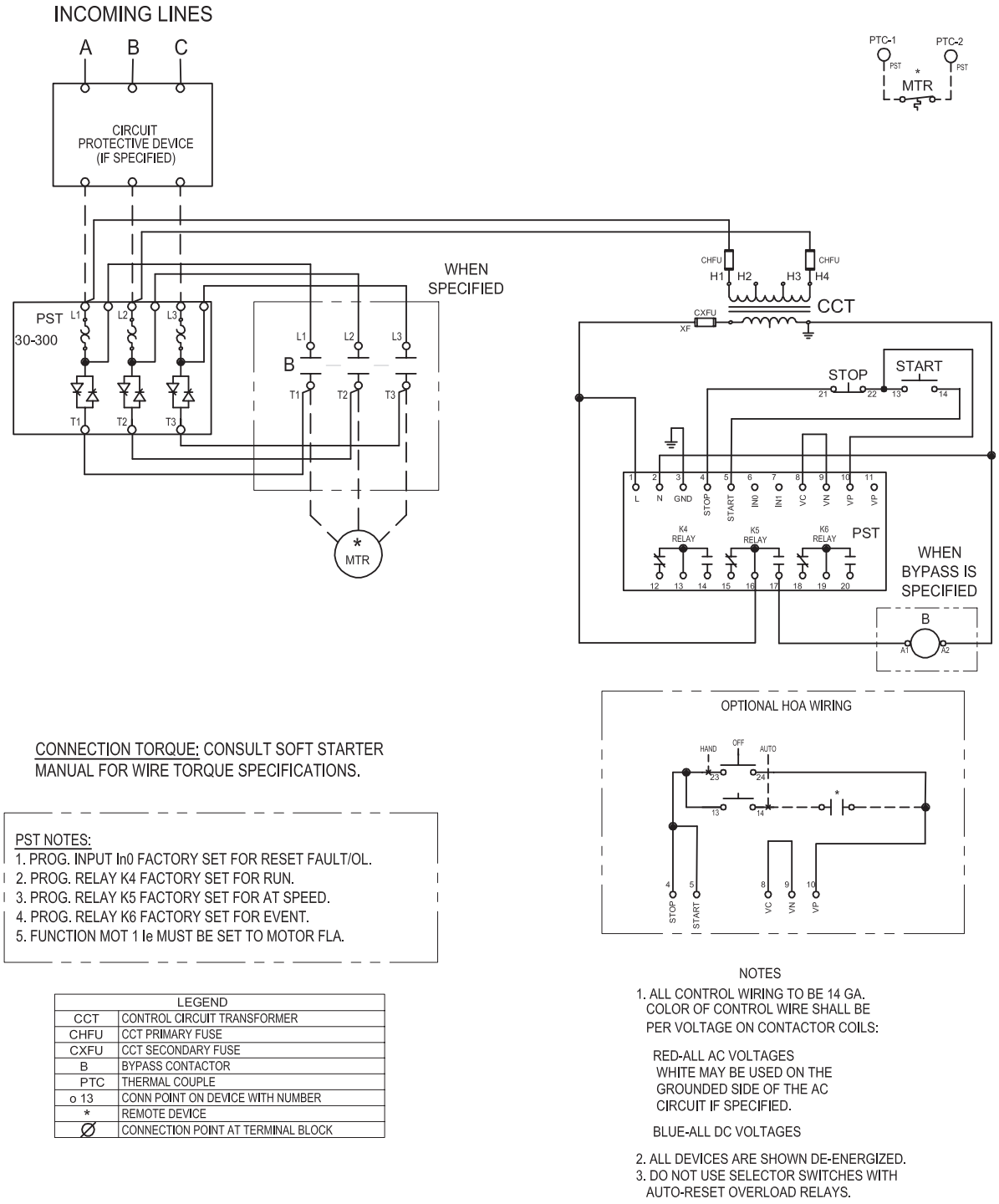
11:6 Protection indication (cont.)

PTC protection 	An over-temperature is detected by the PTC thermistors in the motor	Check that the PTC circuit is closed and that the inputs are connected Check and correct the reason for the overheating
SCR overload protection 	The softstarter is too small Too many starts/hour The ramp time for start is too long	Check and replace the softstarters with one of a suitable size Check and decrease number of starts/hour Check that current limit level is not set too low Check that the ramp time for start is not too long

Chapter 12
Diagrams

Chapter 12
Diagrams

12:1 Circuit Inline PST30...PST300



CONNECTION TORQUE: CONSULT SOFT STARTER MANUAL FOR WIRE TORQUE SPECIFICATIONS.

PST NOTES:
1. PROG. INPUT In0 FACTORY SET FOR RESET FAULT/OL.
2. PROG. RELAY K4 FACTORY SET FOR RUN.
3. PROG. RELAY K5 FACTORY SET FOR AT SPEED.
4. PROG. RELAY K6 FACTORY SET FOR EVENT.
5. FUNCTION MOT 1 Ie MUST BE SET TO MOTOR FLA.

LEGEND	
CCT	CONTROL CIRCUIT TRANSFORMER
CHFU	CCT PRIMARY FUSE
CXFU	CCT SECONDARY FUSE
B	BYPASS CONTACTOR
PTC	THERMAL COUPLE
o 13	CONN POINT ON DEVICE WITH NUMBER
*	REMOTE DEVICE
∅	CONNECTION POINT AT TERMINAL BLOCK

NOTES
1. ALL CONTROL WIRING TO BE 14 GA. COLOR OF CONTROL WIRE SHALL BE PER VOLTAGE ON CONTACTOR COILS:

   RED-ALL AC VOLTAGES
   WHITE MAY BE USED ON THE GROUNDED SIDE OF THE AC CIRCUIT IF SPECIFIED.

   BLUE-ALL DC VOLTAGES

2. ALL DEVICES ARE SHOWN DE-ENERGIZED.
3. DO NOT USE SELECTOR SWITCHES WITH AUTO-RESET OVERLOAD RELAYS.

Figure 1: Circuit diagram PST30...3000

Terminal 3 is a functional ground, it is not a protective ground. It shall be connected to the mounting plate.

12:2 Circuit Inside Delta PST30...PST300

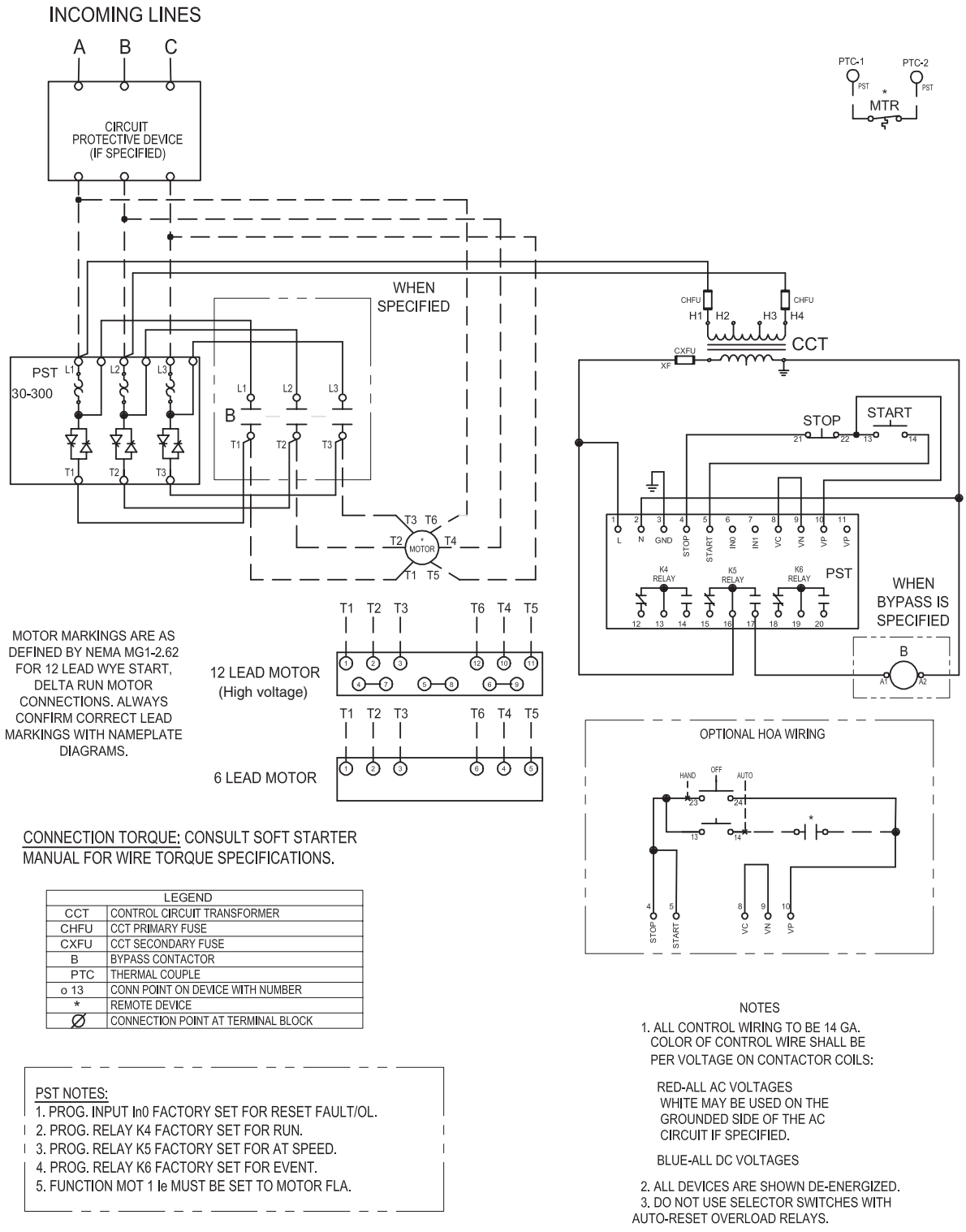
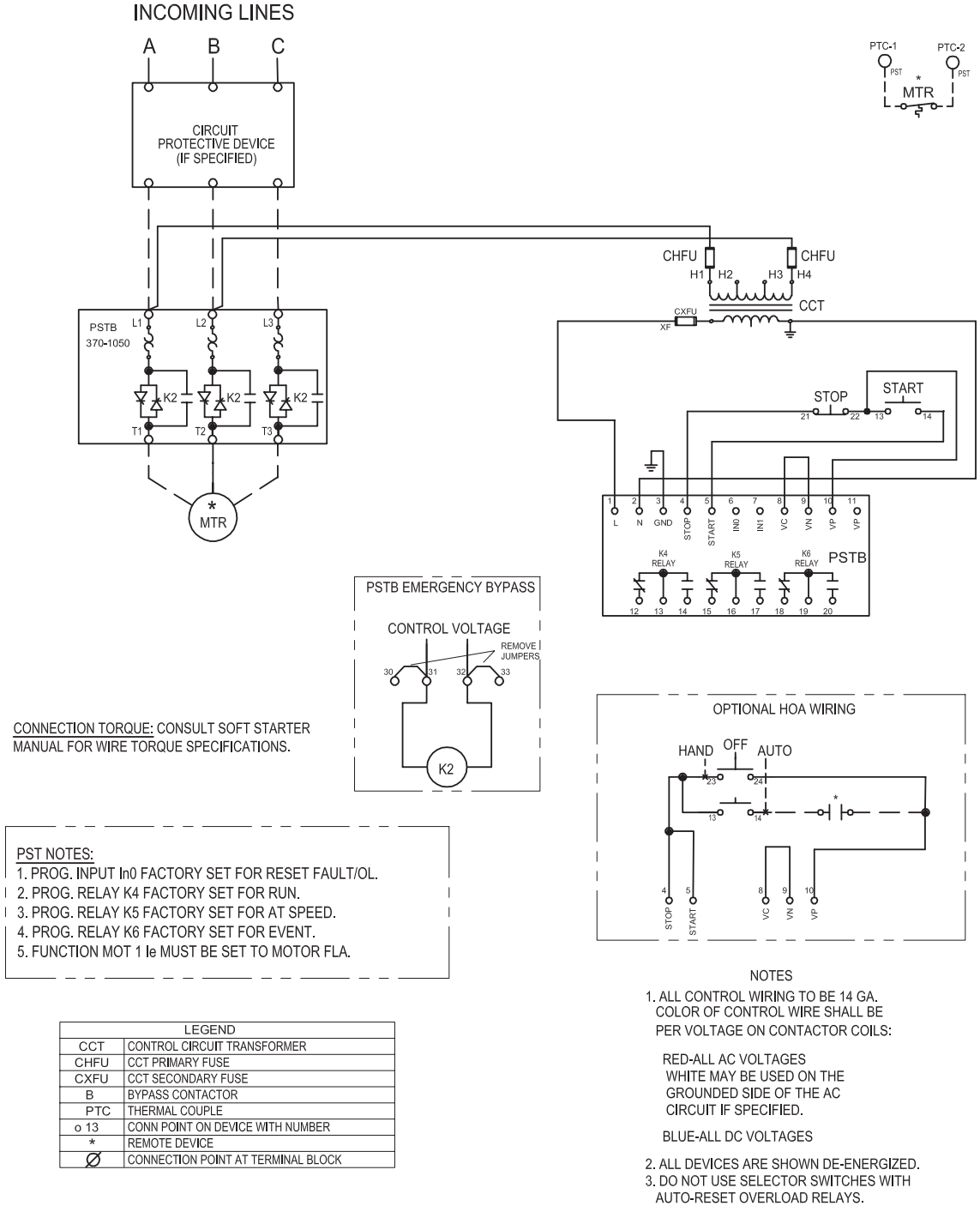


Figure 2: Circuit diagram PST30...3000

Terminal 3 is a functional ground, it is not a protective ground. It shall be connected to the mounting plate.

12:3 Circuit Inline PSTB370...PSTB1050



LEGEND	
CCT	CONTROL CIRCUIT TRANSFORMER
CHFU	CCT PRIMARY FUSE
CXFU	CCT SECONDARY FUSE
B	BYPASS CONTACTOR
PTC	THERMAL COUPLE
o 13	CONN POINT ON DEVICE WITH NUMBER
*	REMOTE DEVICE
∅	CONNECTION POINT AT TERMINAL BLOCK

Figure 3: Circuit diagram PSTB370...PSTB1050

Terminal 3 is a functional ground, it is not a protective ground. It shall be connected to the mounting plate.

12:4 Circuit Inside Delta PSTB370...PSTB1050

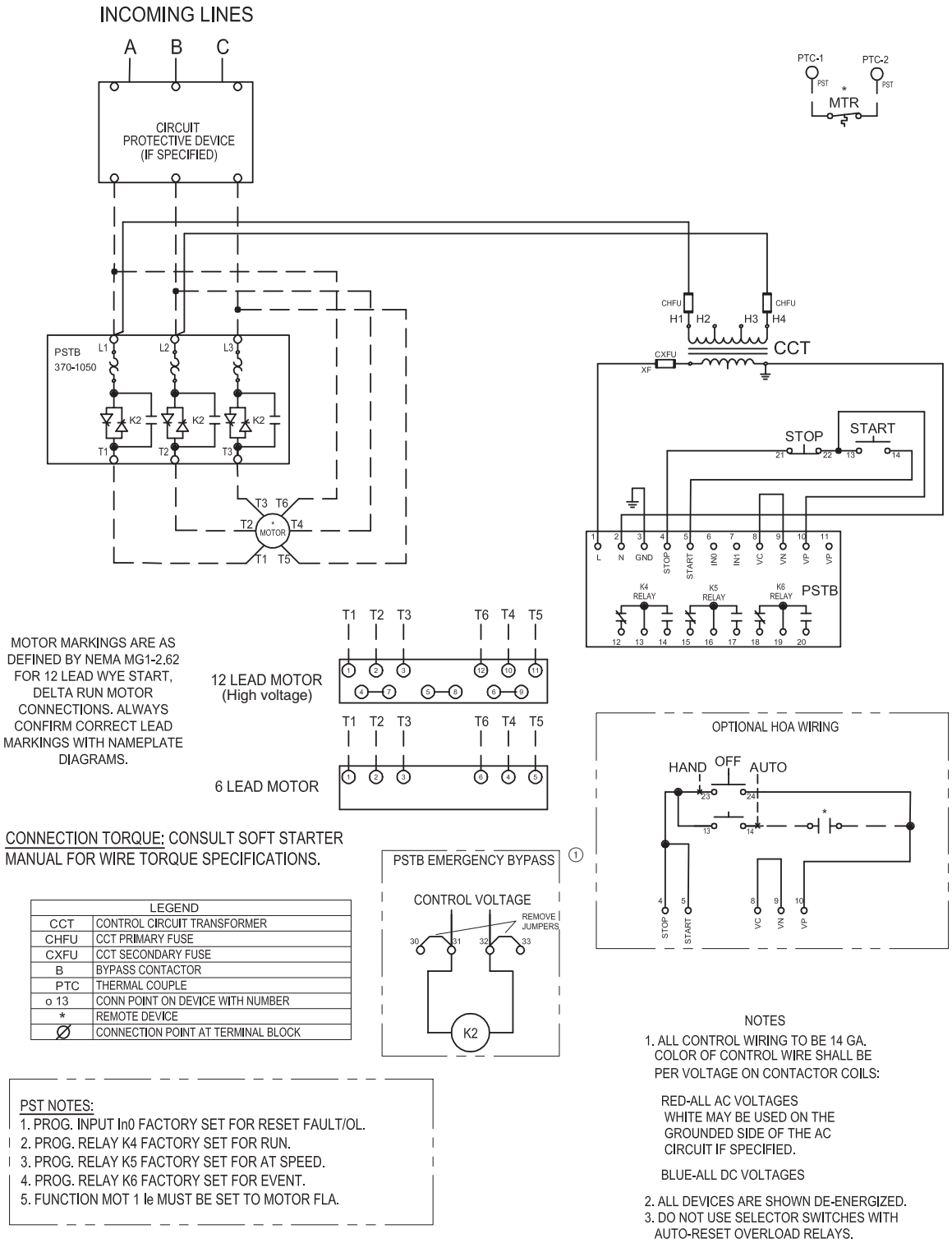


Figure 4: Circuit diagram PSTB370...PSTB1050

Notes

Notes

Notes

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