

Soft-Starter

Arrancador Suave

Chave de Partida Soft-Starter



SSW 04



User's
Guide

Guia del
Usuario

Manual
do usuário

ADDENDUM TO THE MANUAL 0899.4510 E/4 - SSW-04

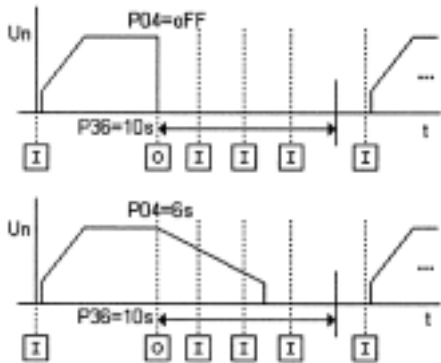
This addendum refers to the following changes that have been made on the SSW-04 software from Version 4.XX to Version 5.XX.

1. Inclusion of the time interval between starts function.

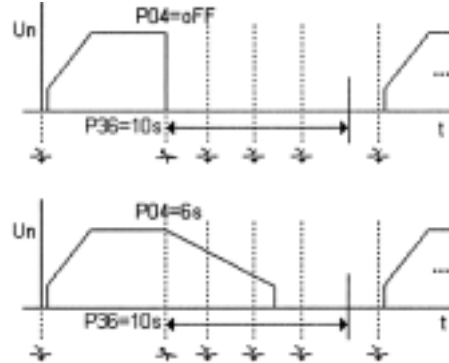
This protection acts limiting the time minimum interval between starts to avoid excessive starting and stopping according to the time adjusted in parameter P36.

- **P36:** Time Interval Between Starts (oFF, 1 ... 999s). Factory Standard: "oFF".

Operation by HMI
(I/O)



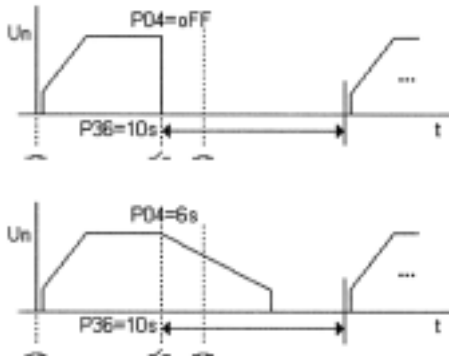
Operation by three wire digital input
(E.D.1 and E.D.2)



Attention:

The SSW controller will not accept a new Start command during the time, adjusted in P36, elapsed after Stop. Identically to serial interface communication.

Operation by two wire digital input
(E.D.1)



Attention.:

The SSW controller will not accept a new Start command during the time, adjusted in P36, elapsed after Stop.

NOTE!

- 1) Use this function only if you need to avoid excessive starting and stopping.
- 2) The time counter starts after a Stop command, with or without soft stop.
- 3) The time adjusted in P36 must be greater than the time adjusted in P04 for this function to work properly.
- 4) This function doesn't work for the Jog function.
- 5) During the reversal of the motor direction, the new start of the motor will be only realized after the time adjusted in P36 elapses.

ADDENDUM TO THE MANUAL 0899.4510 E/4 - SSW-04

This addendum refers to the following changes that have been made on the SSW-04 software from Version 3.XX to Version 4.XX

1. Addition of the function Watch Dog of the Serial Communication.
This protection acts when the serial communication between the master and the Soft-Starter is interrupted, causing indication and action as set in parameters P63 and P64.
 - **P63:** Watch Dog Time of the Serial Communication (oFF, 1 ... 5s). Factory Standard: "oFF".
 - **P64:** Action After Watch Dog Time is Elapsed (1, 2 and 3). Factory Standard: 1.
 - 1 = Indicates only error E29.
 - 2 = Indicates error E29 and disables the motor by ramp, if P04 is programmed different from "oFF" and motor is stopped by inertia if equal "oFF".
 - 3 = Indicates error E29 and cause general disabling of the Soft-Starter. Its cats as emergency. The motor is stopped by inertia.

NOTE!

Error E29 is reset when the correct serial communication returned.

NOTE!

Enable this function only if there is cyclic serial communication with a Master.
Set the watch dog time according to the time between telegrams sent by the master.

2. Change in the setting range of P15 to: off, 1 ... 200s.
3. Addition the following NOTE! in the item 6.3.19 - Pump Control.

NOTE!

Before the first start of the Pump, disable the Pump Control function. P45 must be set at "oFF".
Set the following parameters:

- P01 = 30 (Initial Voltage)
- P02 = 15 (Acceleration Ramp Time)
- P03 = 80 (Voltage Fall Step during Deceleration)
- P04 = 15 (Deceleration Ramp Time)
- P11 = OFF (Current Limitation)

After setting the values above start and stop the Pump. Then check the correct direction of rotation, pump flow and the current of the motor.
After the above step you can enable the Pump Control (P45 = "on").

4. Addition the following items 10.2, 10.3 e 10.4 in the accessories chapter.

10.2 - RS-485.

Optionally the SSW-04 can operate in serial interface RS-485 by Weg Interface Module MIW-02.

| Module Type | WEG Item |
|-------------|-----------|
| MIW-02 | 417100543 |

NOTE!

For more details see MIW-02 Manual (0899.4430).

10.3 - Fieldbus Network.

Optionally the SSW-04 can operate in communication network "FieldBus", by a gateway, Weg Fieldbus Module MFW-01.

| Module Type | Protocol | WEG Item |
|-------------|-------------|-----------|
| MFW-01/PD | ProfiBus DP | 417100540 |
| MFW-01/DN | DeviceNet | 417100541 |
| MFW-01/MR | ModBus RTU | 417100542 |

NOTE!

For more details see MFW-01 Manual (0899.4429).

10.4 - SuperDrive.

Programming software for microcomputer PC, for windows environment. Permits parameter programming, command and monitoring of the Soft-Starter SSW-04. It edits parameters "on-line", directly to the Soft-Starter or it edits parameters files "off-line", saving in the microcomputer. The communication between Soft-Starter and Microcomputer is by serial interface RS232 (Point to Point) or RS485 (Network Line).

| Product | WEG Item |
|-------------|-----------|
| Super Drive | 417102505 |

SOFT-STARTER MANUAL

SSW-04 Series

Software: version 5.XX

0899.4510 E/4



NOTE!

It is very important to check if the Soft-Starter Software is the same as the above.

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QUICK PARAMETER REFERENCES, ERROR MESSAGES AND STATUS MESSAGES

Software: V5.XX

Application: _____

Type: _____

Serial Number: _____

Responsible: _____ Date: ____/____/____.

1. Parameters

| Parameter | Function | Adjustable Range | Factory Setting | User's Setting | Page |
|-----------------------------|----------------------------------|-----------------------|-----------------|----------------|------|
| P00 | Permits parameter changing | OFF, ON | OFF | | 52 |
| Regulation Parameter | | | | | |
| P01 | Initial Voltage | 25...90% UN | 30%UN | | 52 |
| P02 | Acceleration ramp time | 1...240 s | 20s | | 53 |
| P03 | Voltage ramp during deceleration | 100... 40%UN | 100%UN | | 53 |
| P04 | Ramp time during deceleration | OFF,2...240s | OFF | | 54 |
| P11 | Current limit during starting | OFF, 150...500%IN | OFF | | 54 |
| P12 | Immediate over current | 32...200%IN | 120%IN | | 56 |
| P13 | Immediate over current time | OFF, 1...20s | OFF | | 58 |
| P14 | Immediate undercurrent | 20...190%IN | 70%IN | | 57 |
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QUICK PARAMETER REFERENCES, ERROR MESSAGES AND STATUS MESSAGES

| Parameter | Function | Adjustable Range | Factory Setting | User's Setting | Page |
|--------------------------------|--|--|------------------------|----------------|------|
| Regulation Parameter | | | | | |
| P22 | Rated current | 16, 30, 45, 60, 85A | According to the Model | | 58 |
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| P31 | Phase rotation | OFF, ON | OFF | | 59 |
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| P34 | DC braking time | OFF, 1...10s | OFF | | 60 |
| P35 | DC braking voltage level | 30...50%UN | 30%UN | | 60 |
| P41 | Voltage pulse at start (kick start) | OFF; 0.2...2s | OFF | | 60 |
| P42 | Voltage pulse level during starting | 70...90%UN | 70%UN | | 61 |
| P45 | Pump control | OFF, ON | OFF | | 61 |
| P47 | Errors auto-reset | OFF, 10...600s | OFF | | 63 |
| Configuration Parameter | | | | | |
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| P46 | Default values | OFF, ON | OFF | | 65 |
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| Reading Parameters | | | | | |
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**QUICK PARAMETER REFERENCES,
ERROR MESSAGES AND STATUS MESSAGES**

| Parameter | Function | Adjustable Range | Factory Setting | User's Setting | Page |
|-----------|--|------------------|-----------------|----------------|------|
| P73 | Motor current indication (A) | 0.0...999.9A | | | 51 |
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| P99 | Fourth hardware error | 1...8 | | | 52 |

QUICK PARAMETER REFERENCES, ERROR MESSAGES AND STATUS MESSAGES

2. Error Messages

| Display | Meaning |
|---------|--|
| E01 | Phase failure or thyristor fault or motor not connected |
| E02 | At the end of time of the programmed acceleration time, the voltage does not reach 100% U _N due to the current limit. |
| E03 | Overtemperature at the thyristors and in the heatsink |
| E04 | Motor overload |
| E05 | Undercurrent (applicable to pumps) |
| E06 | Immediate overcurrent |
| E07 | Phase rotation |
| E08 | External fault |
| E24 | Programming error |
| E2X | Serial communication error |

3. Soft-Starter Status

| Display | Definition |
|---------|-------------------------------------|
| rdy | Soft-Starter is ready to be enabled |
| PuP | Loading pump control parameters |
| EEP | Loading "Default" values |
| On | Function enabled |
| OFF | Function disabled |

1

SAFETY NOTICE

This Manual contains all necessary information for the correct installation and operation of the SSW-04 Soft-Starter.

This Manual has been written for qualified personnel with suitable training or technical qualifications to operate this type of equipment.

1.1 SAFETY NOTICES IN THE MANUAL



The following Safety Notices will be used in this Manual:

DANGER!

If the recommended Safety Instructions are not strictly observed, it can lead to serious or fatal injuries of personnel and/or equipment damage.

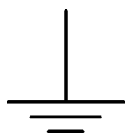
ATTENTION!

Failure to observe the recommended Safety Procedures can lead to material damage.

NOTE!

The content of this Manual supplies important information for the correct understanding of operation and proper performance of the equipment.

1.2 SAFETY NOTICES ON THE PRODUCT



The following symbols may be attached to the product, serving as Safety Notice:

High Voltages

Components are sensitive to electrostatic discharge. Do not touch them without following proper grounding procedures.

Mandatory connection to ground protection (PE)

Shield connection to ground

1.3 PRELIMINARY RECOMMENDATIONS



DANGER!

Only qualified personnel should plan or implement the installation, startup, operation and maintenance of this equipment.

Personnel must review this entire Manual before attempting to install, operate or troubleshoot the SSW-04. These personnel must follow all safety instructions included in this Manual and/or defined by local regulations.

Failure to comply with these instructions may result in personnel injury and/or equipment damage.



NOTE!

In this Manual, qualified personnel are defined as people that are trained to:

1. Install, ground, power up and operate the SSW-04 according to this manual and the local required safety procedures;
2. Use of safety equipment according to the local regulations;
3. Administer Cardio Pulmonary Resuscitation (CPR) and First Aid.



DANGER!

Always disconnect the supply voltage before touching any electrical component inside the Soft-Starter.

Many components are charged with high voltages, even after the incoming AC power supply has been disconnected or switched OFF. Wait at least 3 minutes for the total discharge of the power capacitors.

Always connect the frame of the equipment to the ground (PE) at the suitable connection point.



ATTENTION!

All electronic boards have components that are sensitive to electrostatic discharges. Never touch any of the electrical components or connectors without following proper grounding procedures. If necessary to do so, touch the properly grounded metallic frame or use a suitable ground strap.

**Do not apply High Voltage (High Pot) Test on the Soft-Starter!
If this test is necessary, contact the Manufacturer.**



NOTE!

Read this entire Manual carefully and completely before installing or operating the SSW-04.

2.1 - ABOUT THIS MANUAL

This Manual describes how to install, start-up, operate and identify the problems of the SSW-04 Soft-Starters series.

Should you require any training or further info, please contact:

Servicing:
WEG INDÚSTRIAS LTDA - AUTOMAÇÃO
Tel. (0055) 47 372-4004
Fax: (0055) 47 372-4200

This Manual is divided into 10 Chapters, providing information to the user on how to receive, install, start-up and operate the SSW-04:

Chapter 1- Safety Notices;
Chapter 2 - Introduction;
Chapter 3 -Installation;
Chapter 4 -Power-up / Commissioning;
Chapter 5 -Use of the HMI;
Chapter 6 -Detailed Parameter Description;
Chapter 7 -Maintenance;
Chapter 8 -Technical Characteristics;
Chapter 9 -Appendix;
Chapter 10- Warranty.

This Manual provides information for the correct use of the SSW-04. The SSW-04 is very flexible and allows for the operation in many different modes as described in this manual.

As the SSW-04 can be applied in several ways, it is impossible to describe here all of the application possibilities. WEG does not accept any responsibility when the SSW-04 is not used according to this Manual.

No part of this Manual may be reproduced in any form, without the written permission of WEG.

2.2 VERSION OF SOFTWARE

It is important to note the Software Version installed in the Version SSW-04, since it defines the functions and the programming parameters of the Soft-Starter.

This Manual refers to the Software version indicated on the inside cover. For example, the Version 1.XX applies to versions 1.00 to 1.99, where “X” is a variable that will change due to minor software revisions. The operation of the SSW-04 with these software revisions are still covered by this version of the Manual.

The Software Version can be read in the Parameter P71.

2.3 - ABBREVIATIONS USED

| | |
|---------------|--|
| HMI | - Human machine interface (keypad + display) |
| HMI-3P | - Keypad + Display interface - Linked via parallel cable |
| RLX | - Relay output No X |
| DIX | - Digital input No X |
| IN | - Soft-Starter nominal output current |
| UN | - Rated mains voltage |
| LED | - Light Emitting Diode |

2.4 - ABOUT THE SSW-04

The SSW-04 series is a totally microprocessor controlled Soft-Starter series which controls the starting current of three-phase induction motors. In this way mechanical impacts on the load and current peaks on the supply network are prevented.

2.4.1 - Introduction

This series includes models from 16 to 85A, being supplied from 220V, 230V, 240V, 380V, 400V, 415V, 440V, 460V, 480V, 525V or 575V. (The available types are listed in Section 8).

The models up to 45A are with natural cooling and isolated heatsink (thyristor-thyristor modules). The models from 60A and 85A have forced cooling and isolated heatsink (Thyristor-Thyristor Modules).

The electronic control circuit uses a 16 bit microprocessor with high performance, allowing settings and displaying by means of the interface (keypad + display) of all needed parameters.

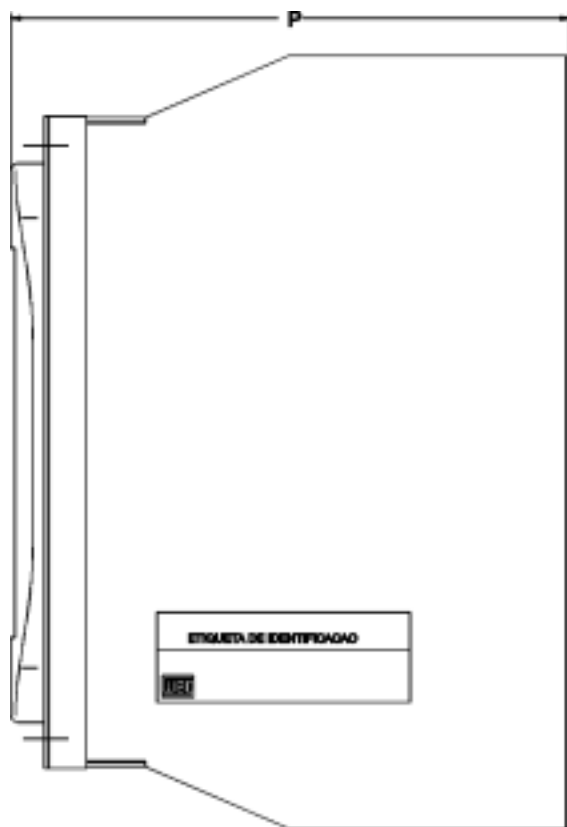
Depending on the power, this series (SSW-04) has 2 different construction forms, as shown in Figure 2.1.

2

INTRODUCTION

| MEC | Rated Current | Width L mm (in) | Depth P mm (in) | Height H mm (in) | Weight kg (lb) |
|-----|-------------------|-----------------------|-----------------------|------------------------|----------------------|
| 1 | 16A 30A 45A | 140 (5.51) | 199 (7.83) | 275 (10.83) | 5.2 (11.46) |
| 2 | 60A 85A | 140 (5.51) | 283 (11.06) | 275 (10.83) | 9.0 (19.84) |

SIDE VIEW



FRONT VIEW

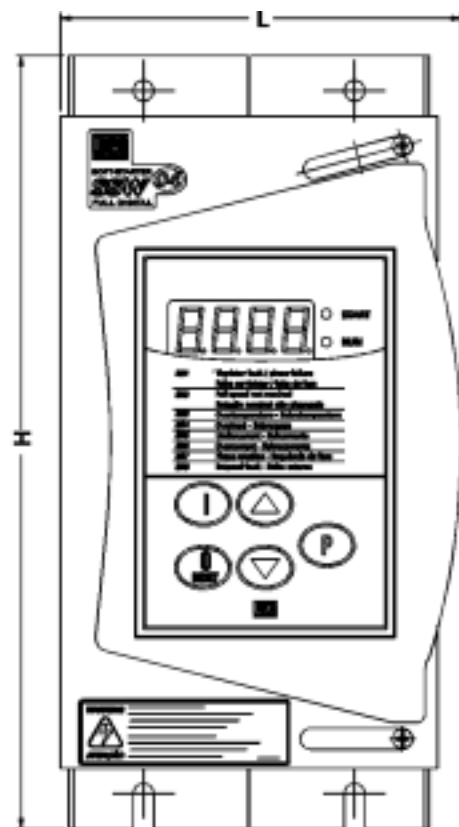


Figure 2.1 - Construction forms.

2.4.2 - Simplified Block Diagram of the SSW-04

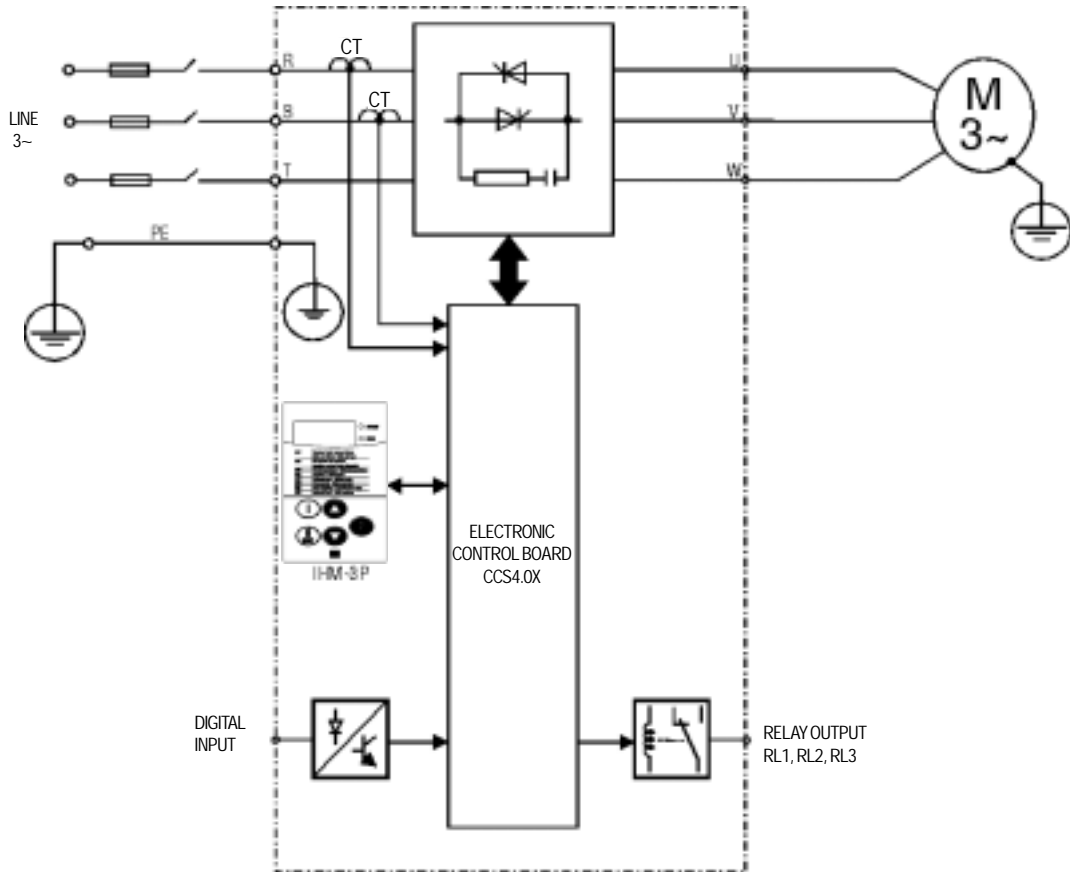


Figure 2.2 - Simplified Block Diagram of the SSW-04

In the power stage, the line voltage is controlled by means of 6 SCR's that allow the variation of the conduction angle of the voltage supplied to the motor.

For the internal supply of the electronics, a switched source is used with several voltages, fed independently of the power supply.

The control board contains the circuits responsible for the control, monitoring and protection of the power components. This board also contains the control and signalling circuit to be used by the user according to its application as a relay output.

All parameters or controls for the operation of the Soft-Starter can be displayed or changed through the HMI.

2.4.3 - Description of the control board - CCS 4.00 or CCS 4.01

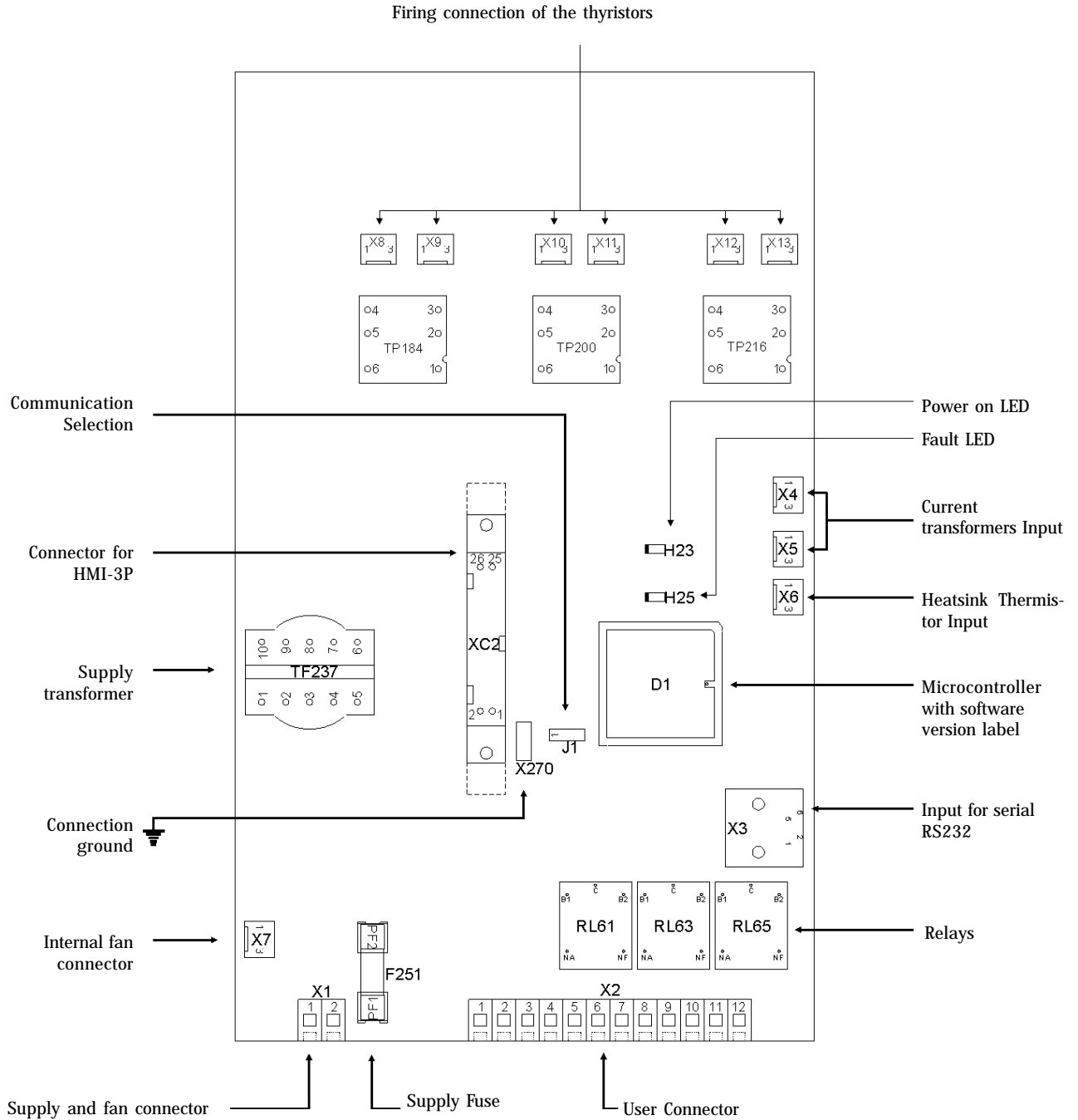
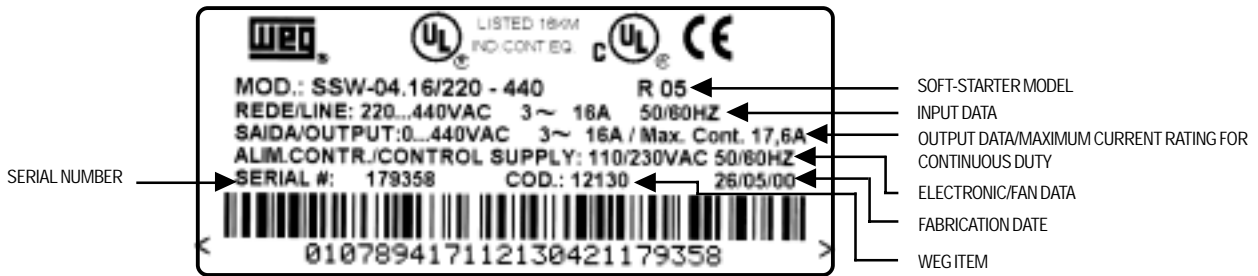


Figure. 2.3 - Layout of the electronic control board CCS 4.00 or CCS4.01

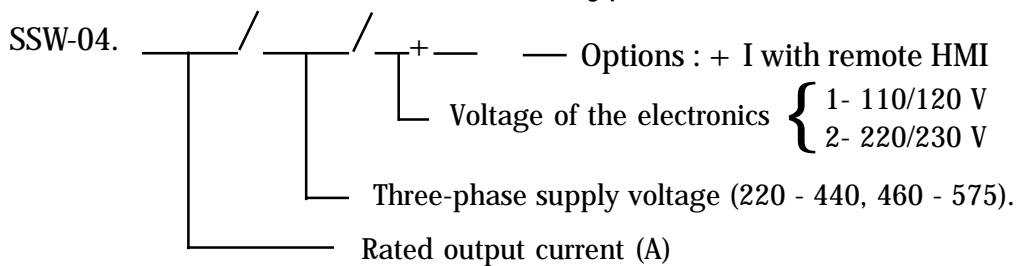
2

INTRODUCTION

2.5 - PRODUCT IDENTIFICATION



Soft-Starter Type



Max. Cont.: It's the maximum current that the Soft-Starter can have in continuous duty. For this current the Soft-Starter can only have 1 start per hour.

EXTERN HMI

- HMI-3P.1: HMI with LEDs, 1 m (3.28ft) cable
- HMI-3P.2: HMI with LEDs, 2 m (6.56ft) cable
- HMI-3P.3: HMI with LEDs, 3 m (9.84ft) cable

2.6 - RECEIVING

The SSW-04 is supplied in cardboard boxes.

The outside of the packing container has a nameplate that is the identical to that on the SSW-04. Please check if the SSW-04 is the one you ordered.

Open the box, remove the foam and then remove the SSW-04.

- SSW-04 nameplate data matches the purchase order;
 - The equipment has not been damaged during transport.
- If any problem is detected, contact the carrier immediately.

If the SSW-04 is not to be installed immediately, store it in a clean and dry room (Storage temperatures between - 25°C and 60°C). Cover it to prevent dust, dirt or other contamination of the drive.

3

INSTALLATION

3.1 - MECHANICAL INSTALLATION

3.1.1 - Environment

The location of the SSW-04 installation is a determining factor for obtaining a good performance and a normal useful life of its components.

Regarding the installation of the Soft-Starter we make the following recommendations:

- ☑ Avoid direct exposure to sunlight, rain, high moisture and sea air.
- ☑ Avoid exposure to gases or explosive or corrosive liquids;
- ☑ Avoid exposure to excessive vibration, dust, oil or any (conductive particles or materials).

Environmental Conditions:

- ☑ **Temperature:** 32...104° F (0 ... 40° C) - nominal conditions. 104...131° F (40 ... 55° C) - see table 8.2.
- ☑ **Relative Air Humidity:** 5% to 90%, non-condensing.
- ☑ **Maximum Altitude:** 3,300 ft (1000m) - nominal conditions. 3,300 ... 13,200 ft (1000 ... 4000m) - with 10% current reduction for each 3,300 ft (1000m) above 3,300 ft (1000m).

Pollution Degree: 2 (according to EN50178 and UL508)
(It is not allowed to have water, condensation or conductive dust/ particles in the air)



NOTE!

When Soft-Starter is installed in panels or closed metallic boxes, adequate cooling is required to ensure that the temperature around the Soft-Starter will not exceed the maximum allowed temperature. See Dissipated Power in Section 8.2.

Please meet the minimum recommended panel dimensions and its cooling requirements:

| SSW-04 type | Panel Dimensions | | | Blower CFM |
|-------------|------------------|--------------|-------------|------------|
| | Width | Height | Depth | |
| 16A | 600 (23.62) | 1000 (39.37) | 400 (15.75) | - |
| 30A | 600 (23.62) | 1200 (47.24) | 400 (15.75) | - |
| 45A and 60A | 600 (23.62) | 1200 (47.24) | 400 (15.75) | 226 |
| 85A | 600 (23.62) | 1500 (59.05) | 400 (15.75) | 226 |

All dimensions in mm (inches)

3

INSTALLATION

3.1.2 - Location / Mounting

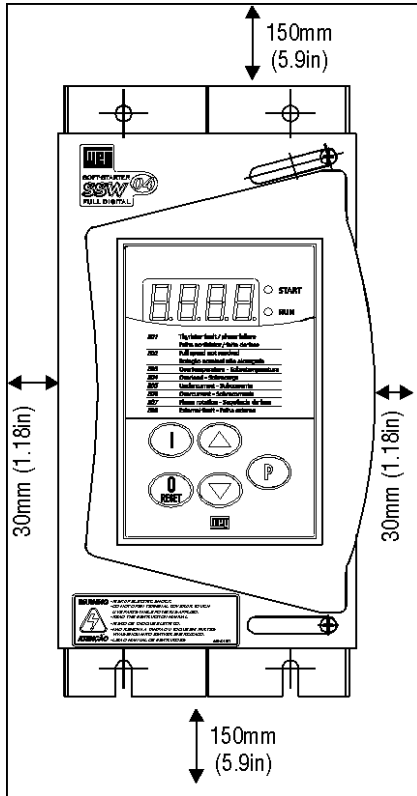


Figure 3.1 - Free space for ventilation

Install the Soft-Starter in Vertical Position:

- ☑ Allow for free space around the SSW-04, as shown in Fig. 3.1.
- ☑ Install the Soft-Starter on a flat surface.
- ☑ External dimensions, fastenings drillings, etc. according to Figure 3.2.
- ☑ First install and partially tighten the mounting bolts, then install the Soft-Starter and tighten the mounting bolts.
- ☑ Provide independent conduits for physical separation for signal conductors, control and power conductors (See Electrical Installation).

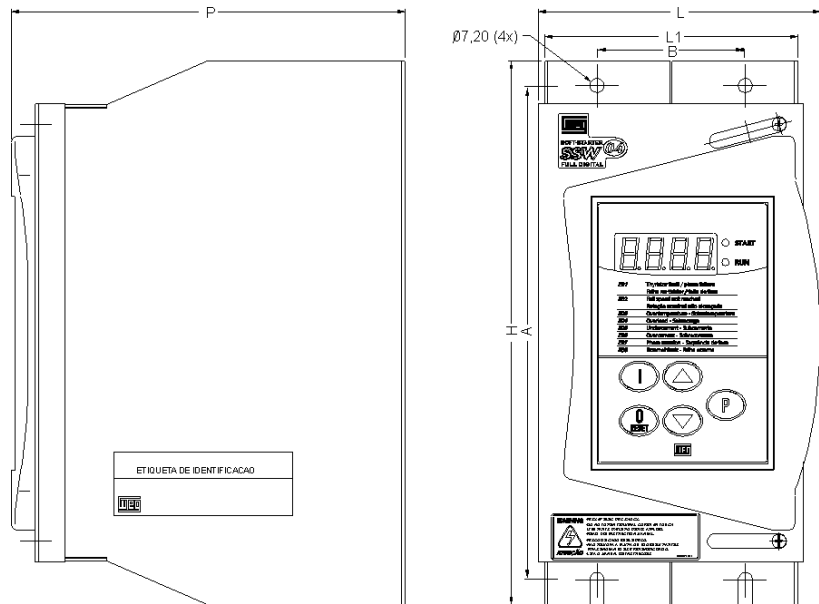


Figure 3.2 - External dimensions for the SSW-04 and its screwing drillings

| Type | Width L1 mm (in) | Width L mm (in) | Height H mm (in) | Depth P mm (in) | Fasten. A mm (in) | Fasten. B mm (in) | Fasten bolt | Weight kg (lb) | Degree Protect. |
|-------------|---------------------|--------------------|---------------------|--------------------|----------------------|----------------------|--------------|----------------|-----------------|
| 16...45A | 128 (5.0) | 140 (5.51) | 275 (10.83) | 199 (7.83) | 250 (9.84) | 75 (2.95) | (1/4") M6 | 5.2 (11.46) | IP20 |
| 60A and 85A | 128 (5.0) | 140 (5.51) | 275 (10.83) | 283 (11.06) | 250 (9.84) | 75 (2.95) | (1/4") M6 | 9.0 (19.84) | IP20 |

3

INSTALLATION

3.2 - ELECTRICAL INSTALLATION

3.2.1 - POWER/ GROUNDING CONNECTIONS



DANGER!

AC input disconnect: provide an AC input disconnecting switch to switch OFF input power to the Soft-Starter.

This device shall disconnect the Soft-Starter from the AC input supply when required (e.g. during maintenance services).



DANGER!

The AC input disconnect cannot be used as an emergency stop device.



DANGER!

Be sure that the AC input power is disconnected before making any terminal connection.



DANGER!

The information below will be a guide to achieve a proper installation. Follow also all applicable local standards for electrical installations.



ATTENTION!

Provide at least 10 in (0.25m) spacing between low voltage wiring and the Soft-Starter, line or load reactors, AC input power, and AC motor cables.

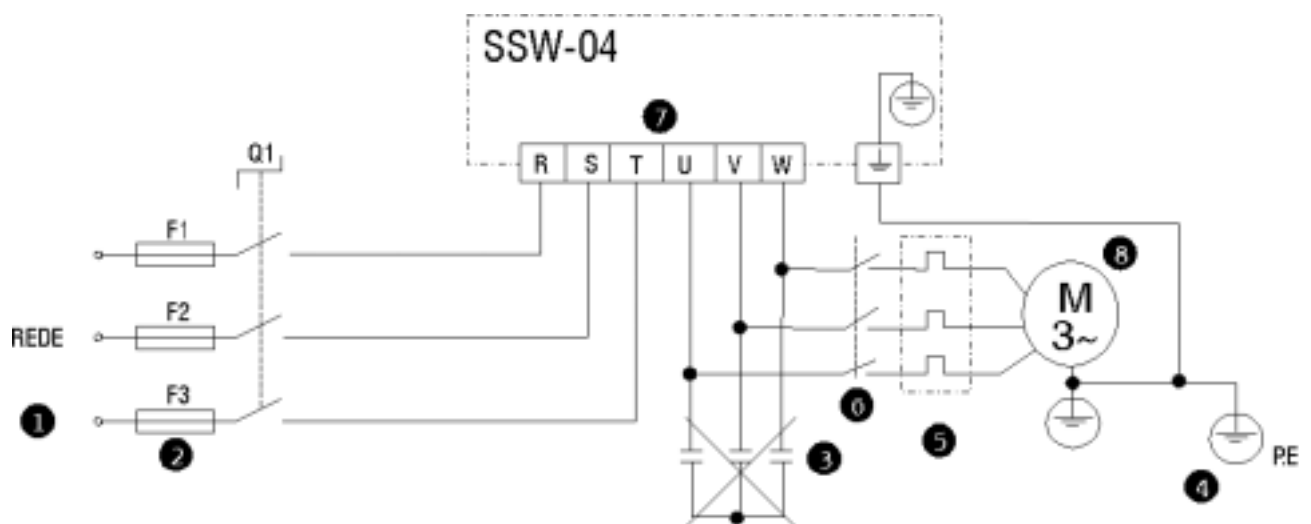


Figure 3.3 - Power and Grounding Connections



❶ The line voltage must be compatible with the rated voltage of the Soft-Starter.

❷ For installation use the cable cross sections and the fuses recommended in Table 3.1., maximum torque as indicated in table 3.2

❸ Power factor correction capacitors must never be installed on the Soft-Starter output.

❹ The Soft-Starters must be grounded. For this purpose use a cable with a cross section as indicated in Table 3.1.

Connect it to a specific grounding bar or to the general grounding point (resistance ≤ 10 ohms).

Do not share the grounding wiring with other equipment which operate at high currents (for instance, high voltage motors, welding machines, etc.).

If several Soft-Starters are used together, see Figure 3.4.

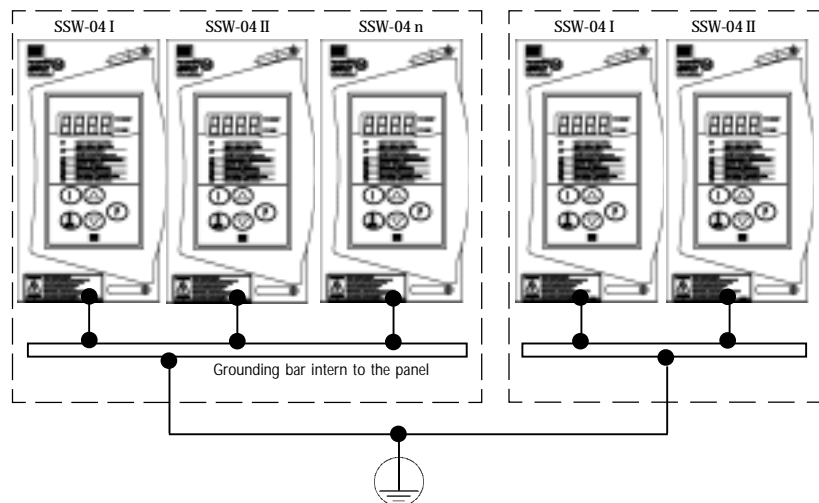


Figure 3.4 - Grounding connection for more than one Soft-Starter



Do not use the neutral conductor for grounding purpose.

❺ The Soft-Starter is fitted with electronic protection against motor overloads. This protection must be set according to the specific motor.

When several motors are connected to the same Soft-Starter, use individual overload relays for each motor.

❻ If a isolating switch or a contactor is inserted in the motor supply, do not operate them with running motor or when the Soft-Starter is enabled.

3

INSTALLATION

Table 3.1 - Recommended Cables/Fuses - Use 75°C Copper Wire Only

| Rated current of the SSW-04 | Power Wiring mm ² (AWG) | Grounding Wiring mm ² (AWG) | Ultra fast acting Fuse for SCR's protection | I ² t of SCR (A ² s) |
|-----------------------------|------------------------------------|--|---|--|
| 16A | 2.5mm ² (12) | 6mm ² (8) | 50A | 1,150 |
| 30A | 6mm ² (8) | 6mm ² (8) | 80A | 8,000 |
| 45A | 8mm ² (8) | 6mm ² (8) | 125A | 15,000 |
| 60A | 16mm ² (4) | 8mm ² (8) | 160A | 15,000 |
| 85A | 25mm ² (3) | 10mm ² (6) | 200A | 125,000 |

The cross sections indicated in Table 3.1 are orientative values only. For correct cables dimensioning consider the installation condition and the maximum allowable voltage drop.

The recommended fuse connected at the input side must be a ultra rapid type (UR) with I²t smaller than 75% of the value indicated in Table 3.1 (I²t of the SCR).

When a short circuit occurs the ultra rapid fuse protects the SCR.

Normal fuses can also be used, in that case the installation is protected against short circuit, but the SCR isn't protected.



- 7 Recommended torque on the power terminals:

Table 3.2 - Maximum torque

| Soft-Starter Type | Grounding wiring N _m (Lb.in) | Power wiring N _m (Lb.in) |
|-------------------|---|-------------------------------------|
| 16A | 1.2 - 1.4 (10.6-12.3) | 1.2 - 1.4 (10.6 - 12.3) |
| 30A | | |
| 45A | | |
| 60A | 5.0 (43.9) | 2.5 - 3.0 (21.8 - 26.1) |
| 85A | | |

- 8 It is Recommended to use motors with load above 30% rated motor load.



NOTE!

The rated motor current shall not be less than 30% of the soft-starter rated current, in order that the overload protection works properly.



The SSW-04 is suitable for use on a circuit capable of delivering not more than X Arms (see below) symmetrical amperes, Y volts maximum, when protected by Ultra-fast Semiconductor Fuses.

3

INSTALLATION

| Type | X | Y |
|------------------------|--------|-----|
| 16 - 45A 460 - 575V | 5,000 | 575 |
| 60 - 85A 460 - 575V | 10,000 | 575 |
| 16 - 60A 220 - 440V | 5,000 | 440 |
| 85A 220 - 440V | 10,000 | 440 |

3.2.2 - Location of the power/grounding/fans connection

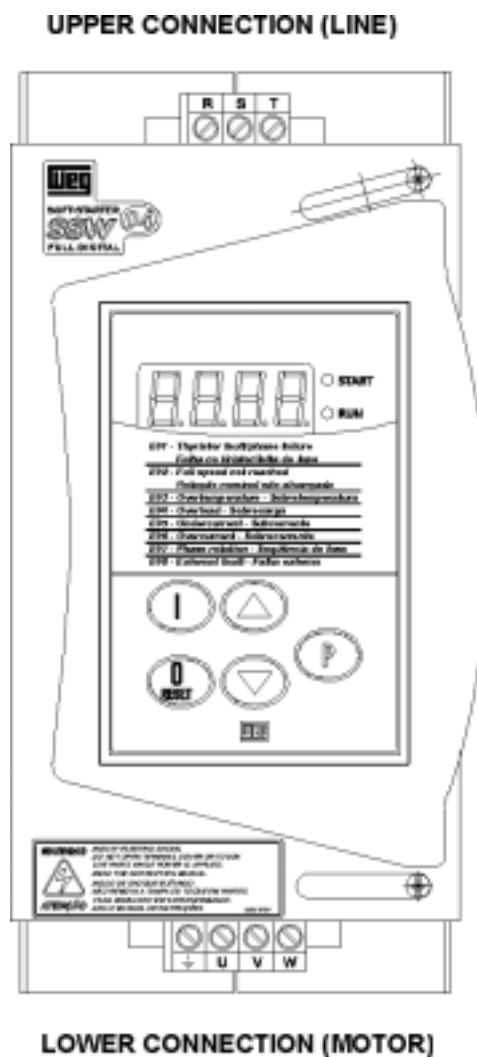


Figure 3.5- Location of the power/grounding connection

3

INSTALLATION

3.2.3 - Signal and Control Connections

The signal (digital inputs/outputs by relay) are performed through the following connectors of the Control Board CCS4.0X (see location in Figure 2.3).

X2 : Digital input and output by relay

X1 : Electronics and Fan supply

XC2 : connection to HMI-3P

X3 : connection to serial communication



NOTE!

Soft-starters types 60A and 85A the fan current pass also through the connector X1. Thus the total current is: 274.5mA for 110Vac or 140mA for 220Vac.

3

INSTALLATION

3.2.3.1 - Description of the X2 Connector

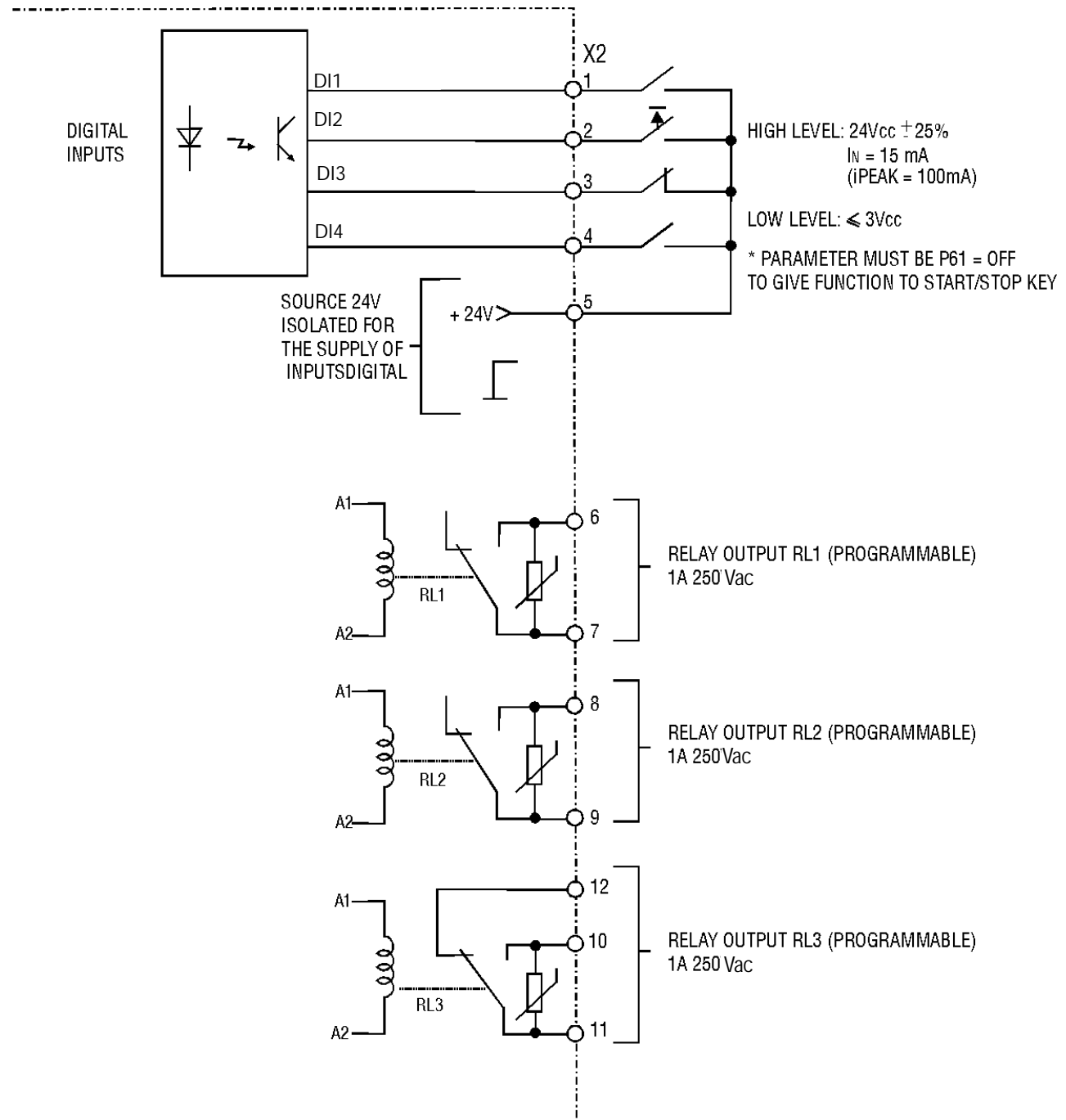


Figure 3.6 - Description of the X2 (CCS4.00 or CCS4.01 connector)

When installing the signal and control wiring, please note the following:

- ❶ Cable cross-section: 0.5...1.5mm²;
- ❷ Relays, contactors, solenoid valves or breaking coils installed near to Soft-Starters can generate interferences in the control circuit. To eliminate this, you must install RC suppressors connected in parallel with the coils of these devices, when fed by alternate current and free wheel diodes when fed by direct current.
- ❸ When an external HMI is used, the connection cable to the Soft-Starter should be passed through the slot at the bottom of the Soft-Starter. This cable must be laid separate from the other cables existing in the installation, maintaining a distance of 100mm (3.94in) each other.
- ❹ Max. recommended torque in the terminals X2 and X1: Maximum 0.4 Nm or 3.5lb.in.
- ❺ The control wiring (X2:1...5) must be laid separate from the power wiring.

3.2.4 - FAN CONNECTIONS

The fan connections must be done through X1:1 and X1:2 connector according to the voltage defined by the Soft-Starter code:

Ex.: SSW-04. 60/220-440/



Electronic / fan voltage:

1 = 110Vac

2 = 220Vac

3

INSTALLATION

3.2.5 - Combination drive "A" - Operation by HMI-3P

With the factory standard programming, you can operate the Soft-Starter with the minimum connection shown in Figure 3.7. This operation mode is recommended for users who operate the Soft-Starter by first time, as initial training form.

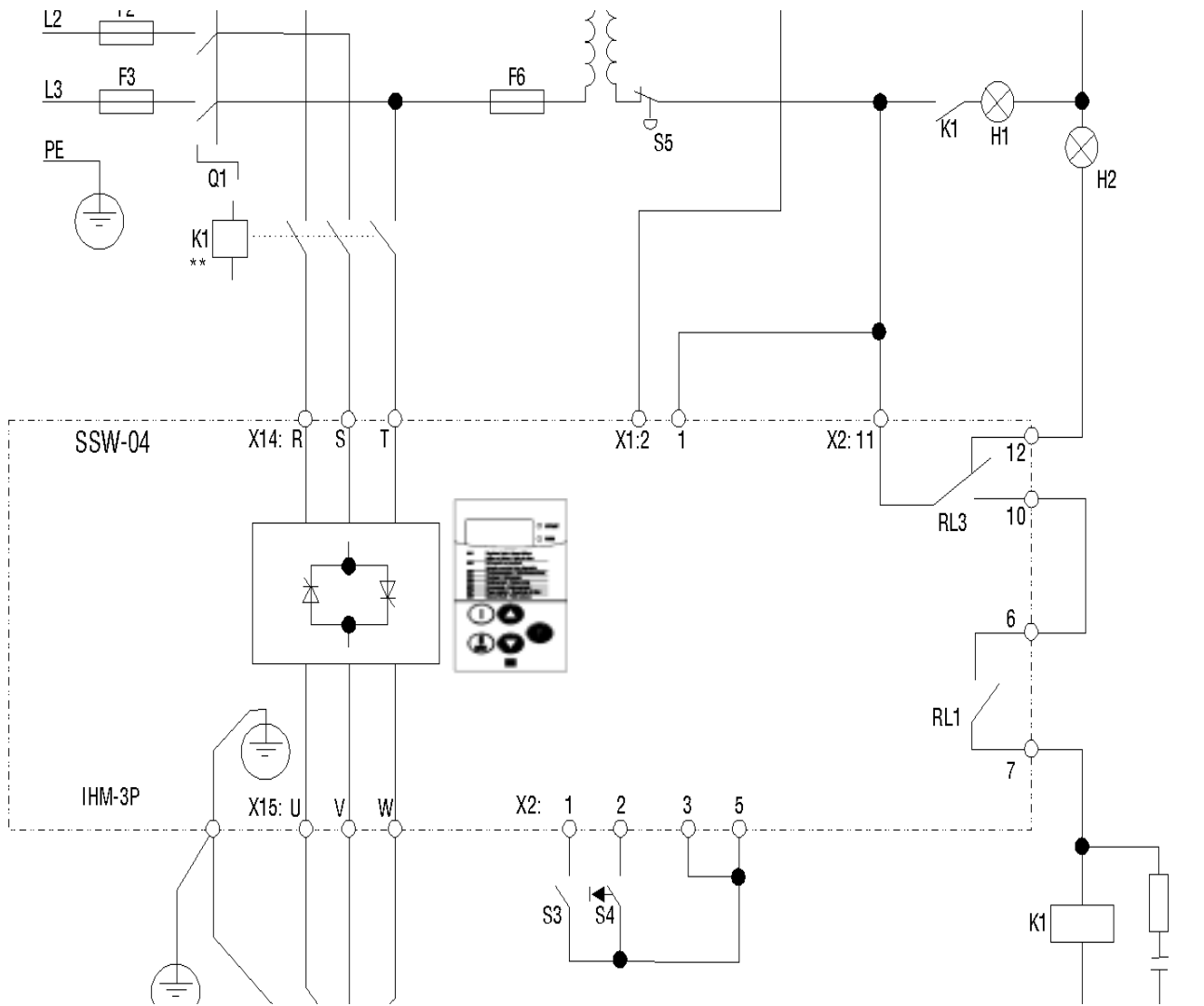


Figure 3.7 - Minimum connections for operation through HMI

Note: It's necessary to use normal fuses or breaker to protect the installation. Ultra-Rapid fuses are not necessary for the SSW-04 operation, but they are recommended for SCR protection.

The transformer "T" is optional and must be utilized when the line voltage is different than the electronics and fan voltage.

The isolation contactor "K1" is optional, and is not necessary for the SSW-04 operation. However due to protection and safety reasons it's recommended. In case

of maintenance the input fuses must be removed for a complete disconnection of the SSW-04 from the line. For the integral motor protection it's recommended to install one or more thermostats in the motor. If the thermostat is not used, the external input error (DI3) from SSW-04 must be connected to + Vcc.

**NOTE!**

Contactors "K1" is necessary to protect the motor in case there is a phase failure which is caused by damage in the SSW-04 power circuit.

For Start-up according this operation mode, follow chapter 4.

3

INSTALLATION

3.2.6 - Combination Drive "B" - Operation through Terminals

Shown in Figure 3.8 is an example of a typical combination drive circuit . For other application needs, we recommend the following:

- ☑ to analyse the application
- ☑ to study the SSW-04 programming possibilities
- ☑ to define the electrical connection diagram
- ☑ to perform the electrical installation
- ☑ to start-up (programming the Soft-Starter correctly)
- ☑ to start-up the SSW-04 in this operation mode, follow chapter 4.

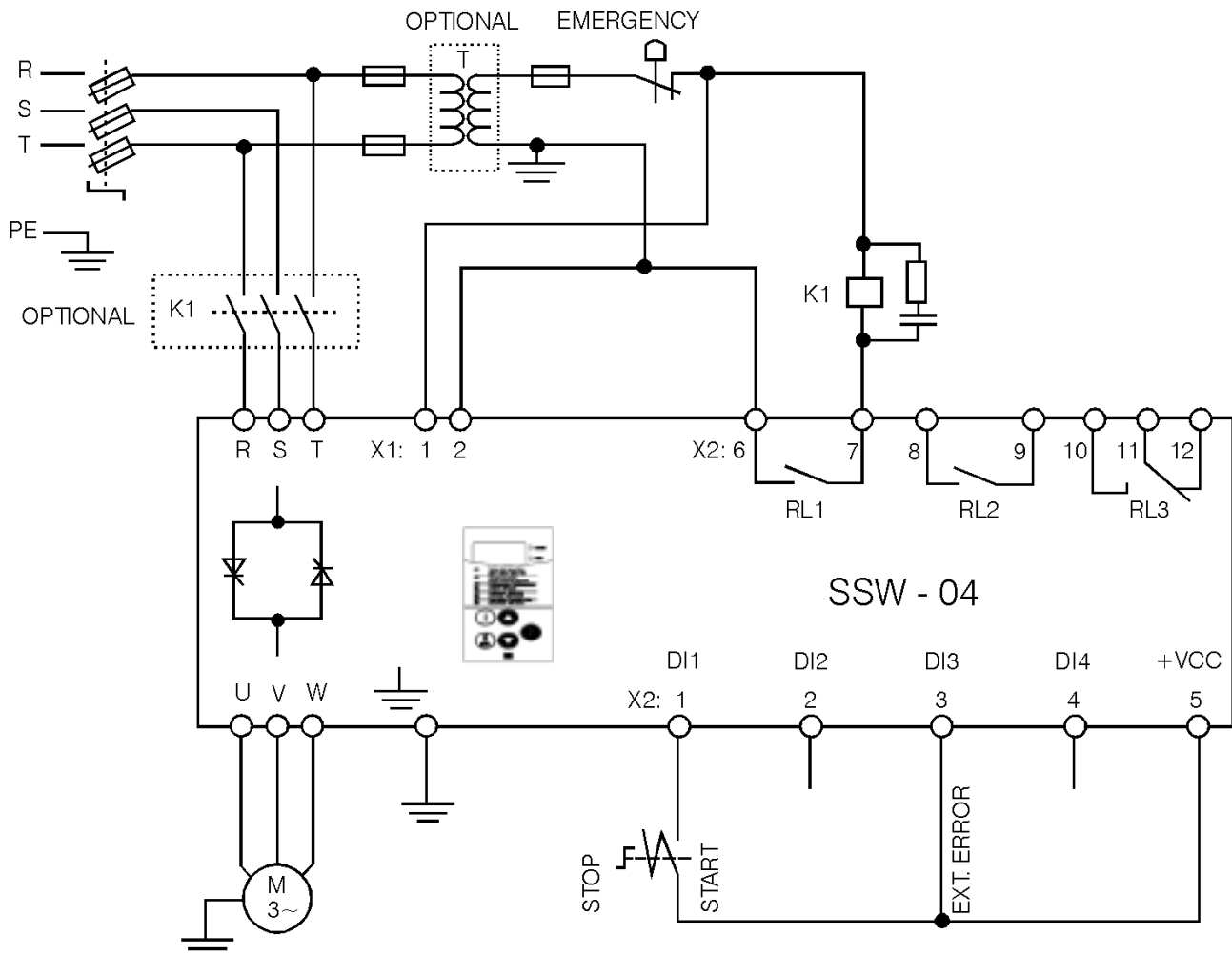


Figure 3.8- Combination Drive "B" Operation through Terminals

Note: It's necessary to use normal fuses or breaker to protect the installation. Ultra-Rapid fuses are not necessary for the SSW-04 operation, but they are recommended for SCR protection. The transformer "T" is optional and must be utilized when the line voltage is different to the electronics

and fan voltage.

The isolation contactor "K1" is optional, and is not necessary for the SSW-04 operation. However due to protection and safety reasons it's recommended. In case of maintenance, the input fuses must be removed for a complete disconnection of the SSW-04 from the line.

For the integral motor protection it's recommended to install one or more thermostats in the motor. If the thermostat is not used, the external input error (DI3) from SSW-04 must be connected to + Vcc.



NOTE!

Contactors "K1" is necessary to protect the motor in case there is a phase failure which is caused by damage in the SSW-04 power circuit.

Programm P61 to "OFF" for operation through terminals.

3

INSTALLATION

3.3 - INSTALLATION OF OPTIONAL DEVICES

3.3.1 - HMI-3P AT THE PANEL DOOR

3.3.1.1 - Mechanical installation

When installed on the panel door, the following is recommended:

- temperature within the range of 0°C to 55°C (32°F to 131°F).
- environment free of corrosive vapour, gas or liquids.
- air free of dust or metallic particles
- avoid to exposing the key pad to direct sunlight, rain or moisture.

For mounting, see Figure 3.9.

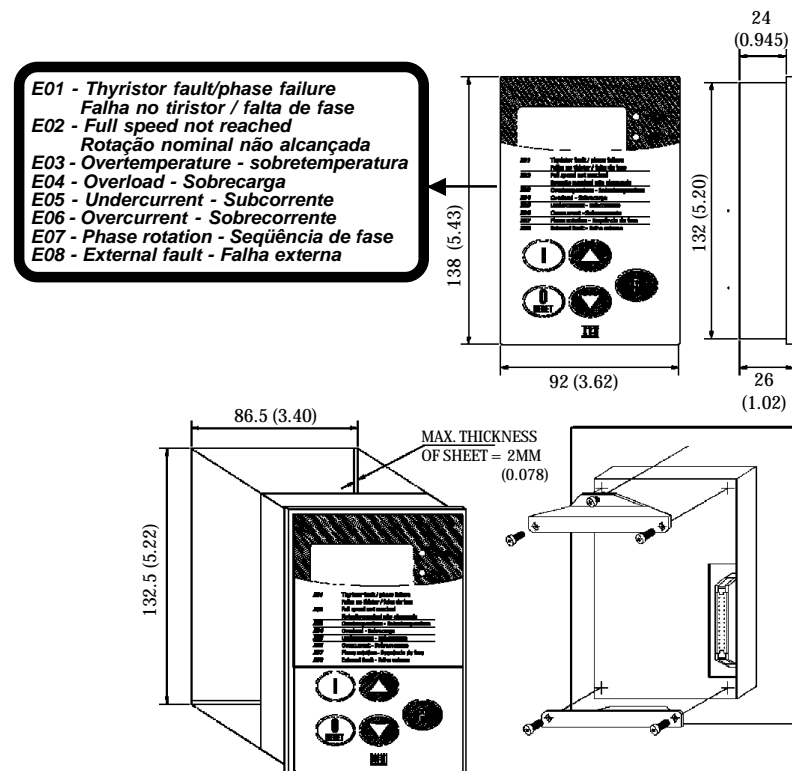


Figure 3.9 - Dimensions/Fastening of the HMI-3P
All dimensions in mm (inches)

3

INSTALLATION

3.3.1.2 - Electrical installation

The connection of the HMI-3P to the Soft-Starter is made through shielded flat cable connected to XC2 on the CCS4.0X control board. The shielding must be connected through a Faston type terminal near to XC2, as shown in Figure 3.10.

This cable must be laid separately from the other wirings at a minimum distance of 100mm (3.94in).

OPTIONS:

- HMI-3P + 1m (3.28ft) cable
- HMI-3P + 2m (6.56ft) cable
- HMI-3P + 3m (9.84ft) cable

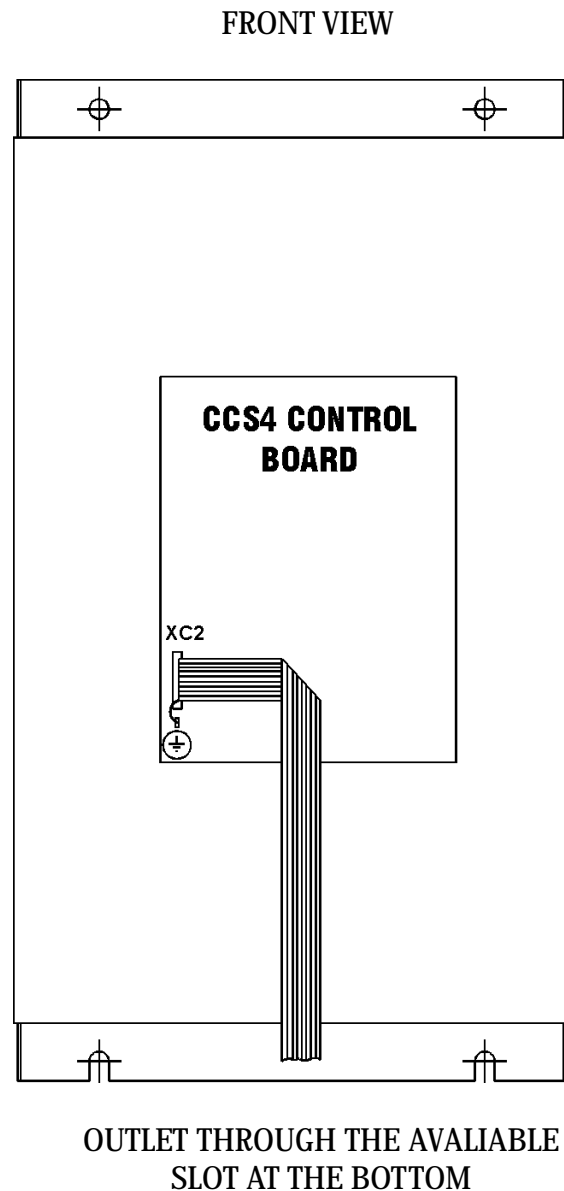


Figure 3.10 - HMI-3P Cable Connection.

This Section deals with the following:

- ☑ How to check and prepare the Soft-Starter before power-up.
- ☑ How to power-up and check if the power-up has been successful.
- ☑ How to operate the soft-starter according to the combination drives "A" and "B" after it has been installed. (See Electrical Installation).

The Soft-Starter shall be installed according to the Section 3 - Installation. If the driving design is different from the suggested combination drives "A" and "B", you must follow the procedures below:

4.1 - POWER-UP PREPARATIONS



DANGER!

Disconnect always the power system before making any connection

- 1) Check all connections
Check if all power, grounding and control connections are correct and well tightened.
- 2) Clean the inside of the Soft-Starter
Remove all material residues from inside of the Soft-Starter.
- 3) Check the motor
Check all motor connections and verify if its voltage, current and frequency meet the Soft-Starter ones.
- 4) Mechanically decouple the load from the motor
If the motor can not be decoupled, be sure that the direction of rotation (forward, reverse) can not cause damage to the machine or person.
- 5) Close the Soft-Starter covers

4

POWER-UP/COMMISSIONING

4.2 - POWER-UP

After the Soft-Starter has been prepared it can now be powered-up:

- 1) Check the supply voltage:
Measure the line voltage and check if it is within the permitted range (rated voltage + 10% / -15%).
- 2) Power-up the input and switch on the control **voltage**:
Close the input circuit breaker.
- 3) Check if the power-up has been successful:

The HMI-3P display will show:



Now the Soft-Starter will run some self-diagnosis routines and if there is no problem, the display will show:



This means that the Soft-Starter is rdy= ready to be operated.

- 4) Follow the commissioning procedures
For combination drive "A" - Operation by HMI-3P - follow Item 4.3.2
For combination drive "B" - Operation by terminals - follow Item 4.3.3.
For other configurations that require the change of several parameters (different standards), read first Chapter 6 - Detailed description of the parameters.

4.3 - COMMISSIONING

This Section describes the commissioning of the two characteristic combination drives describe above:

- Combination drive "A" - Operation through HMI-3P
- Combination drive "B" - Operation through Terminals

4

POWER-UP/COMMISSIONING

4.3.1 - Preparation



DANGER!

Even after disconnecting the supply, high voltage can be present.

Wait at least 3 minutes after switching OFF the equipment to allow full discharge of the capacitors.

- The Soft-Starter must be installed and powered up as described in section 3 and 4.
- The user must have read Section 5 and 6 and be acquainted with the use of the HMI-3P and with the parameter organization.
- The user must also understand how to localize and to change the parameters.

4.3.2 - Commissioning and operation via HMI-3P

Connections according to Figure 3.7.



















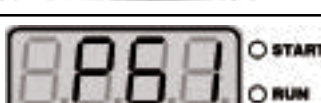

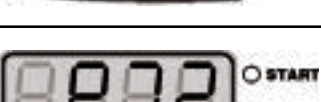

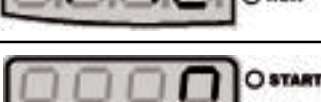
| ACTION | RESULT | INDICATION |
|--------|---|------------------------|
| | <input checked="" type="checkbox"/> Soft-Starter powered-up | 88.89 ○ START ○ RUN |
| Press | <input checked="" type="checkbox"/> Motors starts | 82.00 ● START ● RUN |
| | <input checked="" type="checkbox"/> After start time has been | 88.00 ● START ● RUN |
| Press | <input checked="" type="checkbox"/> Switching Off by ramp provided P04 is set by parameter Ex: P04 = 20; P03 = 80 | 88.88 ○ START ● RUN |
| | <input checked="" type="checkbox"/> Soft-Starter energized | 88.89 ○ START ○ RUN |





4

POWER-UP/COMMISSIONING

4.3.3. - Commissioning and Operation via Terminals

Connections according to figure 3.8.

| ACTION | RESULT | INDICATION |
|---|--|---|
| Power-up the driving Start/Stop = open | <input checked="" type="checkbox"/> Soft-Starter realizes self-diagnosis Soft-Starter ready to be programmed. |  |
| Press  | |  |
| Press  | <input checked="" type="checkbox"/> It permits changing of parameters |  |
| Press  | |  |
| Press  | |  |
| Press  | |  |
| Press  | <input checked="" type="checkbox"/> To program operation via terminal |  |
| Press  | |  |
| Press  | <input checked="" type="checkbox"/> To change the parameters, it is necessary to set P00 = ON |  |
| Press  | |  |
| Press  | <input checked="" type="checkbox"/> Reading parameter of the current in percentage (%In) |  |
| Press  | <input checked="" type="checkbox"/> Soft-Starter ready to be operated |  |

| ACTION | RESULT | INDICATION |
|--------------|---|---|
| Close X2:1-5 | <input checked="" type="checkbox"/> Motor starts |  |
| | <input checked="" type="checkbox"/> After starting time has been |  |
| Open X2:1-5 | <input checked="" type="checkbox"/> Switch Off by ramp provided P04 is set by parameters. P04 = 20s; P03 = 80% |  |
| | <input checked="" type="checkbox"/> Soft-Starter is powered up. |  |



NOTES:

- 1) Symbol of the LEDs Start/Run
 - LED ON
 - ◐ LED Flashing
 - LED OFF
- 2) If the direction of rotation of the motor is not correct, switch OFF the Soft-Starter and change two output cables of the Soft-Starter.

4.4 - SETTINGS DURING THE COMMISSIONING

Although the factory standard parameters are chosen in such a way to meet most application conditions, even so can be necessary to make some parameters settings during the commissioning.

Follow the Parameter Quick Reference Table, checking the need to set each of the parameters.

Make the setting according to the specific application and record the last value in the corresponding column for the User's Setting.

These remarks can be important to clear up any questions.



Minimum Parameters to be set

P11 - Current Limitation:

Select the current limitation during the starting
Standard: OFF (inactive)

P21 - Motor Current Setting:

Motor overload protection (Standard: OFF)



This setting is set OFF at factory. This means that it is disabled and there is no motor overload protection. For an efficient motor protection, set as described in Section 6.5.1 of this manual.

P25 - Thermal classes of the overload protection:

Selects the class of the overload protection suitable for the motor application (Factory Setting: 30)



According to the thermal class curves in Section 6.5.2. Class 30 takes the longest time to activate the motor overload protection.

To achieve a correct setting of this thermal class, proceed as follows:

1. Verify the motor data sheet the locked rotor time and the starting current (I_p/I_n) for DOL starting. Select a thermal class that in this condition trips in a time shorter (Section 6.5.2 - Figure 6.10) than the indicated motor data.

Check also, if the selected thermal class, as described above, allows to start with reduced current. In this case, the actuation time, according to chart in Figure 6.10 - Item 6.5.2 - must be longer than the starting time of this motor with soft-starter.

P26 - Motor service factor:

Also applied for motor overload protection (Standard: 1.00), obtained from motor nameplate.

This Section describes the Human-Machine Interface (HMI-3P) and the programming mode of the Soft-Starter, giving the following information:

- ☑ General description of the HMI-3P
- ☑ Use of the HMI-3P
- ☑ SSW-04 Parameter Organization
- ☑ Access to the parameters of the Soft-Starter
- ☑ Parameter changing (programming)
- ☑ Description of the Status and Signalling Indications

5.1 - DESCRIPTION OF THE HMI-3P INTERFACE

The HMI-3P consists in 4 digits, seven segment LED display, 2 signalling LEDs and 5 keys. Figure 5.1 describes the HMI-3P.

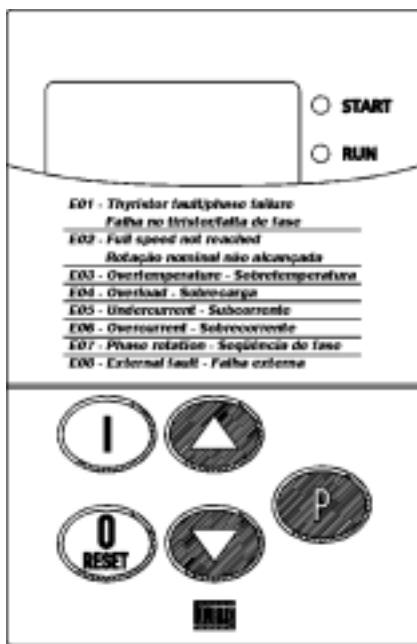


Figure 5.1 - HMI-3P Description

START Indicates that the Soft-Starter has received a start or stop command. (motor driven)

RUN Indicates the switch status; if at acceleration / deceleration ramp or at rated voltage.



Enables motor via ramp.



Disables the Soft-Starter via ramp (when programmed). Resets the Soft-Starter after an error has occurred.



Changes display between the parameter number and its value.



Increments the number of the parameter or its value.



Decrements the number of the parameter or its value.

5.2 - USE OF THE HMI-3P

The HMI-3P is a simple interface which permits the operation and the programming of the Soft-Starter. It permits the following functions:

- ☑ Display of the Soft-Starter operation status, as well as the main variables
- ☑ Error display
- ☑ Display and changing of the adjustable parameters
- ☑ Soft-Starter operation through the keys ON ("I") and OFF ("O")

5.2.1 - Use of the HMI-3P for operation

All functions relating to the Soft-Starter operation (enabling (ON - "I") disabling (OFF "O")); increment/decrement (values/parameters) can be performed through the HMI-3P. This is made through standard factory programming of the Soft-Starter. These functions ON, OFF and Reset can also be executed individually by means of digital inputs. So it is necessary to program the parameters relating to these correspondent functions and inputs.

Find below the key description of the HMI-3P used for operation, when the Soft-Starter is Standard factory programmed:

When programmed P61 = ON

It functions as "I" (ON), "O" (OFF) the motor



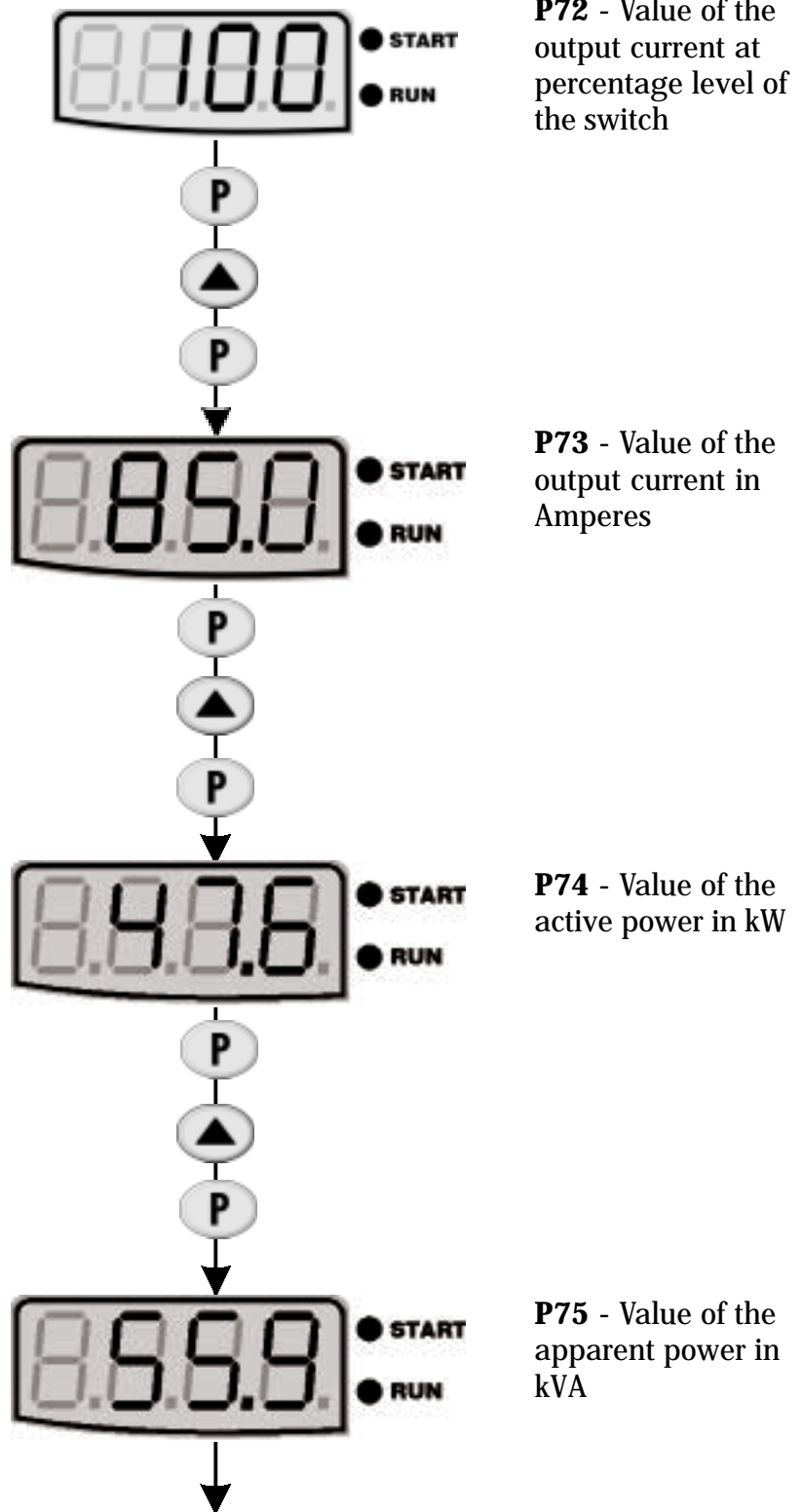
The motor accelerates and decelerates according to the set ramps.

5

USE OF THE HMI

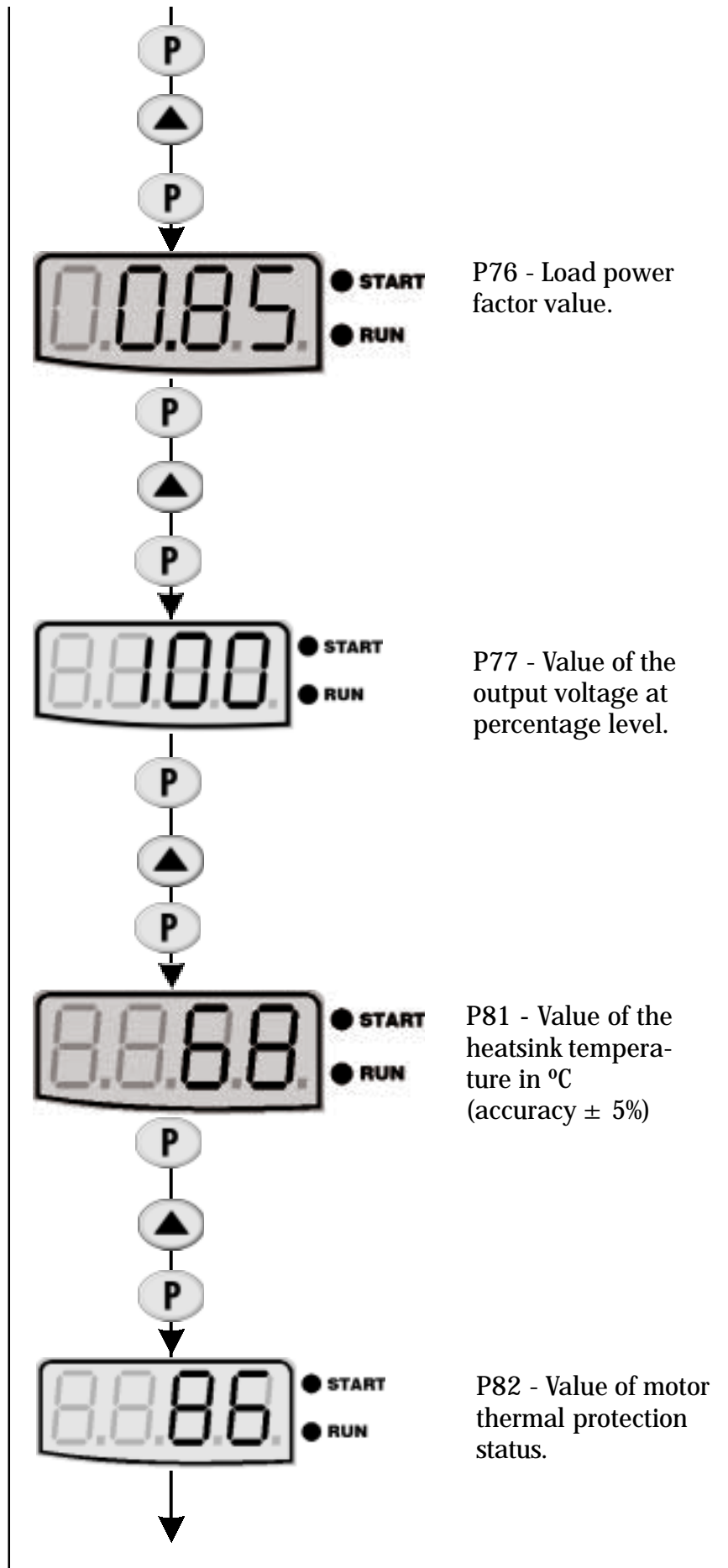
5.2.2 - Signalling/ Indications of the HMI-3P (Display)

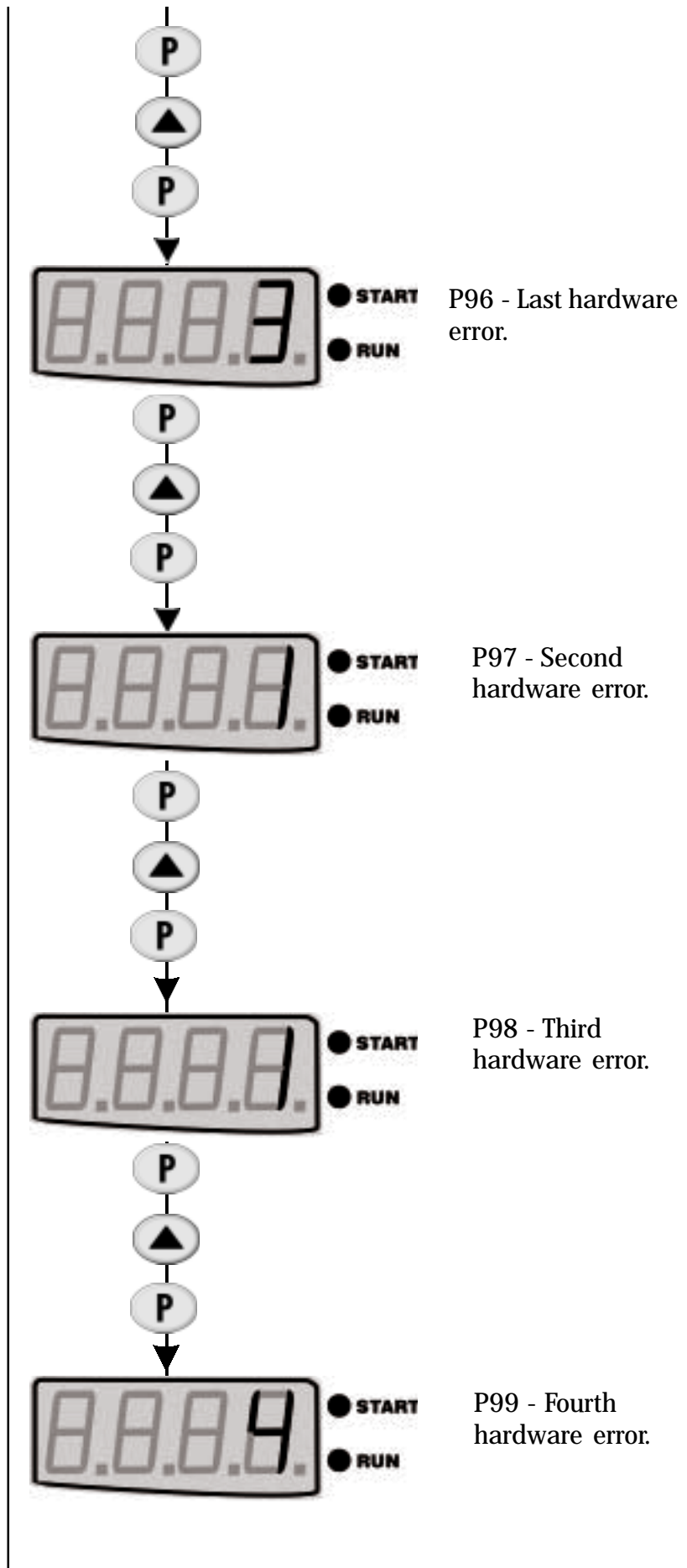
a) Monitoring Variables:



5

USE OF THE HMI





5.3 - PARAMETER
CHANGING**b) Flashing Display**

Display flashes in the following conditions:

- Changing attempt of one non permitted parameter (see Item 5.3.1)
- Soft-Starter in fault condition (see Section: Maintenance)

All information exchange between the Soft-Starter and the user is made through parameters. The parameter are shown on the display through the letter "P" followed by a number:



Each parameter is related to a numeric value or a function.

















The parameter values define the Soft-Starter programming or the value of a variable (for instance, current, voltage, power).

To programm the Soft-Starter you must change the parameter(s) content(s).

5

USE OF THE HMI

5.3.1 - Selection/Changing Parameters

| ACTION | DISPLAY | COMMENTS |
|---|---|---|
| Use the keys  |  | Localize the parameter P00 |
| Press key  |  | Numeric value associated with the parameter |
| Press key  |  | Permit changing the parameters value |
| Press key  |  | |
| Use the keys  |  | Localize the desired parameter |
| Press key  |  | Numeric value associated with the parameter |
| Use the keys  |  | Adjust the new desired value *1 |
| Press Key  |  | *1,*2 |

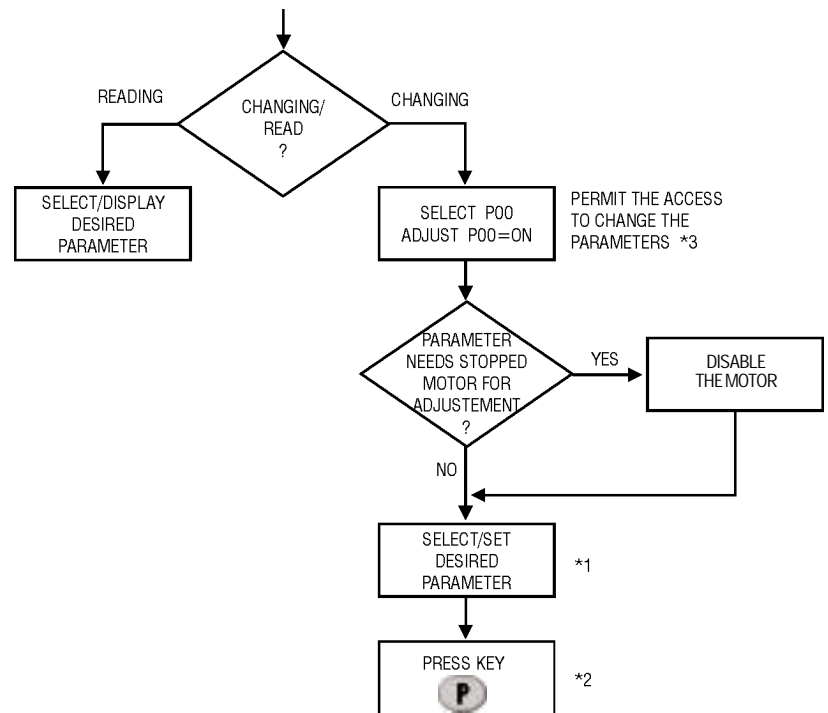


Figure 5.2 - Flowchart for read/changing of parameters.

- *1 The parameters which can be changed with a running motor, the Soft-Starter begins to use the new set value immediately, after pressing key **P** .
The parameter, which can be changed with stopped motor only, the motor must be disabled, now set the new parameters and press the key **P** .



Note!

If it is not possible to change a parameter with running motor, the display will indicate the parameter content by flashing.

- *2 By pressing the key **P** after the adjustment, the last adjusted value will be stored automatically and this value will remain stored until new changes are made.
- *3 The disabling of the parameter changing access is made by setting P00 at "OFF" or de-energizing/energizing the soft-starter electronics.

This section describes in detail all the Soft-Starter parameters. In order to facilitate the description, the parameters were grouped by characteristics and functions.


| | |
|--------------------------|--|
| Read Parameters | Variables which can be seen on the display, but they can not be changed by the user. |
| Regulation Parameters | They are adjustable values and used according to the Soft-Starter function |
| Configuration Parameters | They define the Soft-Starter characteristics, the functions to be executed, as well as the input/output functions. |
| Motor Parameters | It defines the rated motor characteristics. |

6.1- STANDARD PARAMETER SET AT FACTORY



The standard factory parameters are predefined values, with which the Soft-Starter is programmed at factory. The set of values is so selected to meet most applications, thus reducing the reprogramming during the start-up. If necessary, the user can change each parameter individually according to this application. At any time the user can return to the standard parameter set at factory, adopting the following procedures:

All set parameters will be lost (replaced by the factory standard)

- 1) Disabling the Soft-Starter
- 2) Setting P00 = ON
- 3) Setting P46 = ON.
- 4) Pressing Key 
- 5) The display indicates "EPP" in the time of the "default" values are loading.

6

DETAILED PARAMETER DESCRIPTION

6.2- READ PARAMETERS - P71...P77, P81, P82, P96...P99

6.2.1 - P71 - Software Version

☑ It indicates the Software Version contained in the CPU (integrated circuit D1 CCS4.0X)

6.2.2 - P72 - Motor Current

☑ It indicates the output current of the Soft-Starter in percentage of the switch (IN-%). (Accuracy of $\pm 10\%$).

6.2.3 - P73 - Motor Current

☑ It indicates directly the Soft-Starter current in Ampere. (Accuracy of $\pm 10\%$).

6.2.4 - P74 - Active Power

☑ It indicates the active power required by the load, values in kW. (Accuracy of $\pm 10\%$).



NOTE!

OFF will be displayed when by-pass contactor or energy save is used.

6.2.5 - P75 - Apparent Power

☑ It indicates the apparent power required by the load, values in kVA. (Accuracy of $\pm 10\%$).

6.2.6 - P76 - Load power factor

☑ It indicates the load power factor, without by considering the harmonic currents generated the load switching.



NOTE!

OFF will be displayed when by-pass contactor or energy save is used.

6.2.7 - P77 - Output voltage

It indicates the Soft-Starter output voltage about the load, without carrying the Back-EMF from the motor.



NOTE!

When the contactor by-pass is used for current or apparent power reading, the current transformer must be connected externally after the by-pass connection.

6.2.8 - P81- Heatsink temperature

It indicates the Heatsink temperature from the thyristors in °C. Overtemperature protection actuate in 90°C (194°F).

6.2.9 - P82 - Motor thermal protection status

☑ It indicates the status from motor thermal protection in percentage (0 ... 250).
Note: 250 is the value of the motor thermal protection tripping, and display indicates E04.

6

DETAILED PARAMETER DESCRIPTION

6.2.10 - Last errors

- P96 - Last hardware error
- P97 - Second hardware error
- P98 - Third hardware error
- P99 - Fourth hardware error
- They indicate the codes of the last, second, third and fourth error. The register indicates the last 4 Soft-Starter errors or faults.
- Register systematic:
 $\text{EXX} \leftarrow \text{P96} \leftarrow \text{P97} \leftarrow \text{P98} \leftarrow \text{P99} \leftarrow$ The former content of P99 is lost

6.3 - REGULATION PARAMETERS - P00... P15,P22...P42, P45, P47

6.3.1 - P00-Parameter access

- It releases the access to change the parameters.

| P00 | ACCESS |
|-----|-----------------------|
| OFF | Reading of Parameter |
| ON | Changing of Parameter |

6.3.2 - P01- Initial Voltage (% U_N)

- It adjusts the initial voltage value (% U_N) which will be applied to the motor according to Figure 6.1
- This parameter must be set at the minimum value that starts the motor.

| | min. | Range | max. | Factory Standard |
|-----------------------|-----------|--|-----------|------------------|
| P01 - Initial Voltage | 25% U_N | <div style="text-align: center;"> </div> | 90% U_N | 30 |

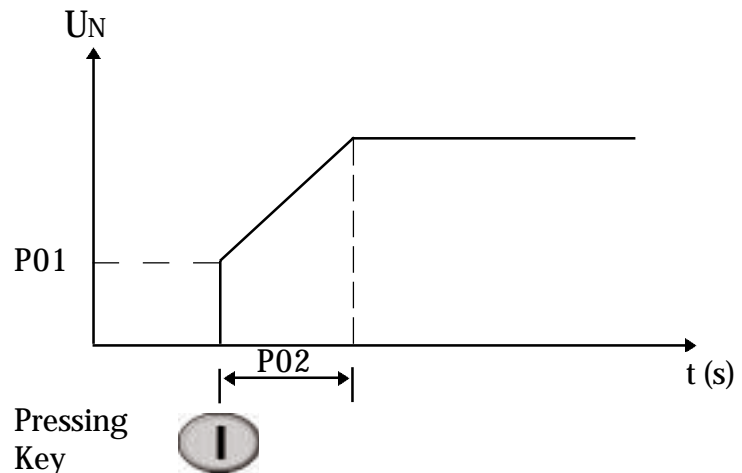


Figure - 6.1- Acceleration Ramp.

6

DETAILED PARAMETER DESCRIPTION

6.3.3 - P02-Time of the Acceleration Ramp

- ☑ If defines the time of the voltage ramp, as shown in figure 6.1, provided the soft-starter does not enter in current limitation (P11).
- ☑ When in current limitation, P02 acts as protection time against locked rotor.

| | min. | Range | max. | Factory Standard |
|-------------------------------------|------|-------|------|------------------|
| P02 - Time of the Acceleration Ramp | 1s | | 240s | 20 |



NOTE!

When motors are run without load or with small loads, the acceleration time will be shorter than the time programmed at P02, due to the back-emf generated by the motor.

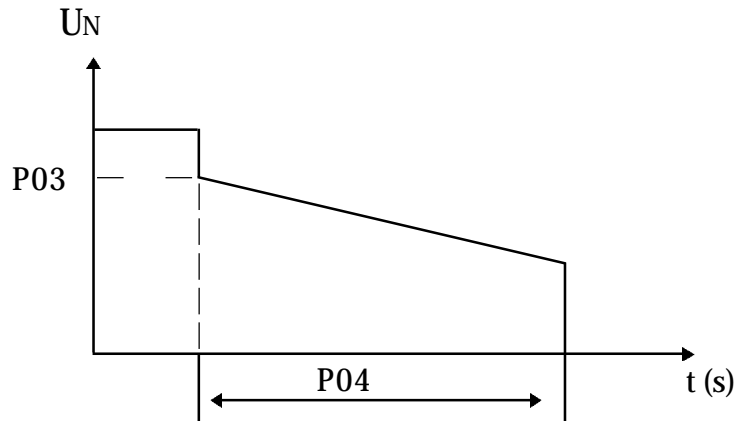
6.3.4 - P03 - Voltage steps during Deceleration (%UN)



NOTE!

In order to enable this function, P04 must be set by parameter at time according to Figure 6.2.

| | min. | Range | max. | Factory Standard |
|--|--------|-------|-------|------------------|
| P03 - Voltage step during deceleration | 100%UN | | 40%UN | 100 |



Pressing Key
 Figure - 6.2 - Deceleration Ramp

6.3.5 - P04-Time of the deceleration ramp

It defines the time of the deceleration ramp that will be effected at the level set at P03 up to the thyristor locking voltage which is approx. 30% of the UN. As shown in Figure 6.2, this ramp is mainly beneficial for pump application.



NOTE!
 This function is used to lengthen the normal load deceleration time and not to force a time shorter than that imposed by the load.

| | min. | Range | max. | Factory Standard |
|-------------------------------------|---------|-------|------|------------------|
| P04 - Time of the deceleration ramp | OFF, 2s | | 240s | OFF |

6.3.6 - P11 - Current Limitation (%In of the switch)



It sets the max.current value that will be supplied to the motor (load) during the acceleration.

The current limitation is used for loads with high or constant starting torque.

The current limitation must be set at a level that permits the motor acceleration, otherwise the motor will not start.

6

DETAILED PARAMETER DESCRIPTION



NOTE!

- 1) If the full voltage is not reached at the end of the acceleration ramp time (P02), the error E02 will be displayed and the motor will be disabled.
- 2) The thermal thyristor protection, inclusive during the current limitation, is carried through thermistor NTC of the Soft-Starter.

| | min. | Range | max. | Factory Standard |
|--------------------------|-------------|--|--------|------------------|
| P11 - Current limitation | OFF, 150%IN | <div style="text-align: center;"> \longleftrightarrow shortest step 1% \longleftrightarrow </div> | 500%IN | OFF |

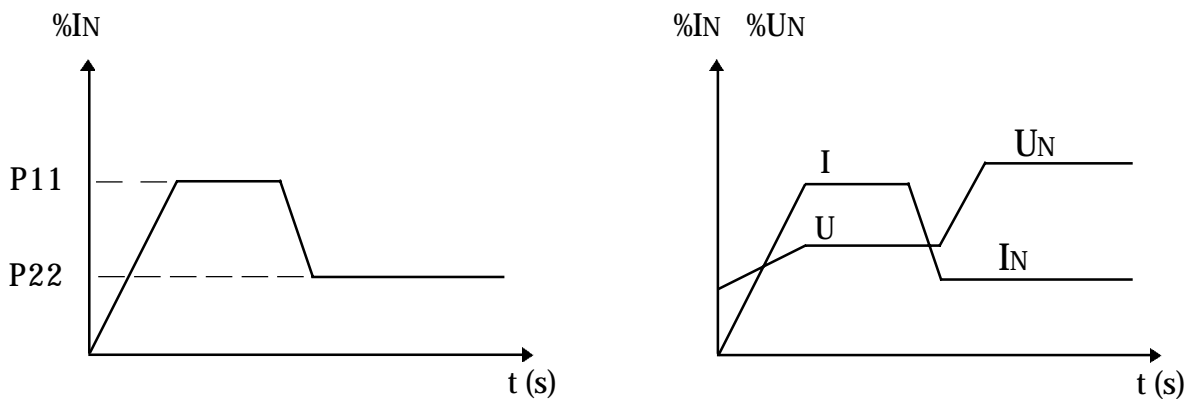


Figure - 6.3 - Current Limitation

P11- Calculation example for setting of current limitation

- To limit the current at 2.5 x IN of the motor

IN of the switch = 60A

IN of the motor = 52A

ILIM = 250% of the IN of the motor

2.5x 52A = 130A

$$\frac{130A}{IN \text{ of the switch}} = \frac{130A}{60A} = 2.17 \times IN \text{ of the switch}$$

P11 = 217% of the IN of the switch = 2.5x IN of the motor.



Note:

This function (P11) does not active when the voltage pulse is enabled during the start (P41)

6.3.7- P12- Immediate overcurrent (%I_N of the switch)

It adjusts the instantaneous overcurrent level that the Soft-Starter permits during a time preset at P13, after then the switch is switched Off, indicating E06, as shown in Figure 6.4.



NOTE!

This function is activated only at full voltage after the motor has started.

| | min. | Range | max. | Factory Standard |
|-----------------------------|-------------------|--|--------------------|------------------|
| P12 - Immediate Overcurrent | 32%I _N | <div style="text-align: center;"> ← → </div> shortest step 1% | 200%I _N | 120 |

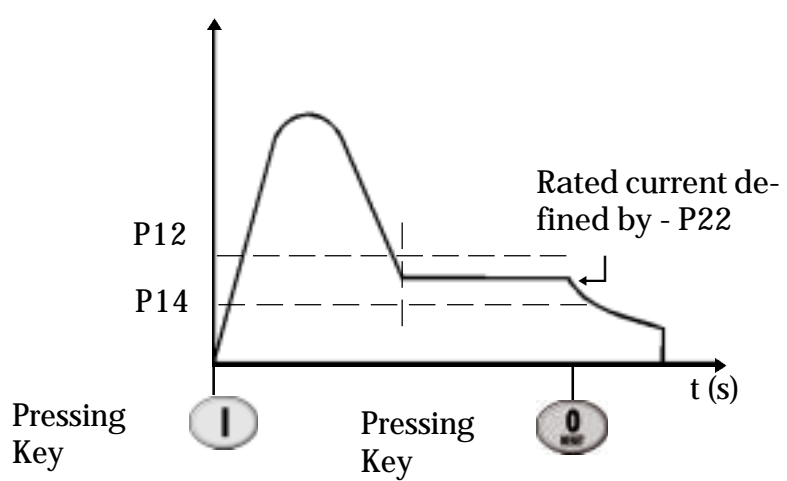


Figure - 6.4 - Protection against over/undercurrent at duty

6

DETAILED PARAMETER DESCRIPTION

P12 - Calculation example for setting of immediate overcurrent.

- Maximum Current equal to 1.4 x I_N of the motor

I_N of the switch = 60A

I_N of the motor = 52A

$$1.4 \times 52A = 72.8A$$

$$\frac{72.8A}{I_N \text{ of the switch}} = \frac{72.8A}{60A} = 1.21 \times I_N \text{ of the switch } 60A$$

P12 = 121% of the I_N of the switch = 140% of the I_N of the motor

6.3.8 - P14- Immediate undercurrent (%I_N of the switch)

- It adjust the minimum undercurrent level that the equipment (load) can operate without problems. This protection actuates when the current of load (Figure 6.4) goes to value lower than set in P14; and for a time equal or higher than preset in P15, indicating error E05.



NOTE!

This function is activated only at full voltage after the motor has started.

| | min. | Range | max. | Factory Standard |
|------------------------------|-------------------|-------|--------------------|------------------|
| P14 - Immediate undercurrent | 20%I _N | | 190%I _N | 70 |

P14- Calculation example for setting of immediate undercurrent (%I_N of the switch)

- Minimum Current equal to 70% of the I_N of the motor

I_N of the switch = 60A

I_N of the motor = 52A

$$70\% \text{ of the } 52A = 0.7 \times 52A = 36.4A$$

$$\frac{36.4A}{I_N \text{ of the switch}} = \frac{36.4A}{60A} = 0.61 \times I_N \text{ of the switch } 60A$$

P14 = 61% of the I_N of the switch = 70% of the I_N of the motor

6

DETAILED PARAMETER DESCRIPTION

6.3.9 - P13 - Immediate Overcurrent Time(s) | This parameter determines the maximum time that the load can operate with overcurrent, as set in P12.

| | min. | Range | max. | Factory Standard |
|----------------------------------|---------|-------|------|------------------|
| P13 - Immediate Overcurrent Time | OFF, 1s | | 20s | OFF |

6.3.10 - P15 - Immediate undercurrent Time(s) | Through this parameter is determined the maximum time that the load can operate with undercurrent, as set in P14. Typical application for this function is in pumping systems that benefit when they are dry operated.

| | min. | Range | max. | Factory Standard |
|-----------------------------------|---------|-------|------|------------------|
| P15 - Immediate undercurrent Time | OFF, 1s | | 30s | OFF |

6.3.11 - P22 - Rated current of the Soft-Starter (A) | It function is to adjust the Software to certain conditions of the hardware, being used as base of the following functions: starting current limitation (P11); immediate overcurrent (P12) at duty; undercurrent at duty (P14).

| | Possible Values | Factory Standard |
|---|---------------------|-----------------------|
| P22 - Rated current of the Soft-Starter | 16, 30, 45, 60, 85A | According to the type |

6

DETAILED PARAMETER DESCRIPTION

6.3.12 - P23 - Rated voltage of the Soft-Starter (V)

The function is to calculate the power supplied to the load.

| | Possible Values | Factory Standard |
|---|--|------------------|
| P23 - Rated voltage of the Soft-Starter | 220, 230, 240, 380, 400, 415, 440, 460, 480, 525, 575V | 380 |

6.3.13 - P31 - Phase rotation (ON = RST; OFF = any sequence)

This function can be enabled or disabled, but when enabled its function is to protect the loads that can not be driven in both direction of rotation.



NOTE!

The phase sequence is only detected at the first time when the power part is activated after the electronic part has been energized. Thus a new phase sequence can only be detected when the electronic part is switched OFF or reset.

| | Possible Values | Factory Standard |
|----------------------|-----------------|------------------|
| P31 - Phase rotation | OFF, ON | OFF |

6.3.14 P33 - Voltage level of the JOG function

This parameter realizes the acceleration ramp up to the set value of the JOG voltage during the time at which the digital Input (DI4) is closed. After opening, DI4 realizes the deceleration via ramp, provided this function has been enabled at P04.



NOTE!

- 1) The maximum activation time of the JOG function is determined by the time set at P02. After the elapsing this time, it disables the thyristor firing and indicates the Error "E02".
- 2) Thus P55 = 4.

| | min. | Range | max. | Factory Standard |
|-------------------------|--------------------|--|--------------------|------------------|
| P33 - JOG voltage level | 25% U _N | <div style="text-align: center;"> ← shortest setp → ← 1% → </div> | 50% U _N | 25 |

6

DETAILED PARAMETER DESCRIPTION

6.3.15 -P34 - DC
braking time (s)



- ☑ This parameter sets the DC braking time, provided P52=3. This function is only possible with the aid of a contactor that must be connected according to Item 9.6 - Typic DC braking connection diagram.
- ☑ This function must be used when reduction of the deceleration time imposed by the load to the system is desired.

NOTE!

Wherever this function is used, you must consider a possible thermal overload on the motor windings. The protection against SSW overload does not operate at DC braking.

| | min. | Range | max. | Factory Standard |
|-----------------------|---------|-------|------|------------------|
| P34 - DC braking time | OFF, 1s | | 10s | OFF |

6.3.16 - P35 - DC-
braking voltage
level (%U_N)

- ☑ This parameter sets the AC line voltage, that is converted directly into DC-voltage and applied on the motor terminals during the braking time.

| | min. | Range | max. | Factory Standard |
|---|-------------------|-------|-------------------|------------------|
| P35 - DC braking voltage level (%U _N) | 30%U _N | | 50%U _N | 30 |

6.3.17 - P41 - Voltage
pulse time at
the start
(Kick Start)



- ☑ The voltage pulse at the start, when enabled, defines the time during which this voltage pulse (P42) will be applied to the motor, so that the motor succeeds to accelerate the initial moment of inertia of the load coupled to its shaft, as shown in Figure 6.5.

NOTE!

Use this function only for specific applications, where break away torque is needed.

6

DETAILED PARAMETER DESCRIPTION

| | min. | Range | max. | Factory Standard |
|--|-----------|--|------|------------------|
| P41 - Voltage pulse time at the start (Kick Start) | OFF, 0.2s | <div style="text-align: center;"> $\left\langle \begin{array}{c} \text{shortest step} \\ 0.1s \end{array} \right\rangle$ </div> | 2s | OFF |

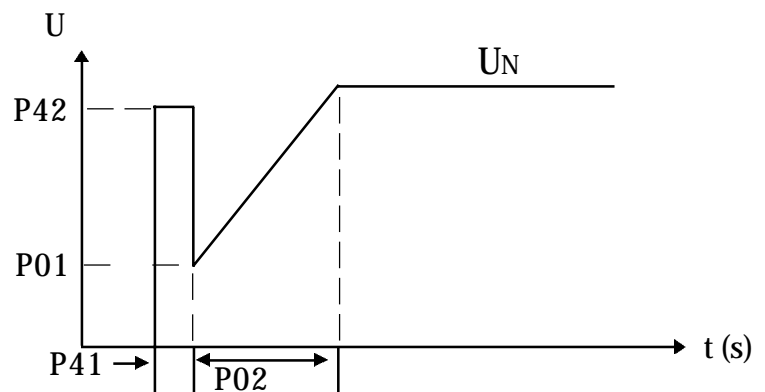


Figure - 6.5 - Voltage pulse at the start

6.3.18 - P42 - Voltage pulse level at the start (Kick Start).

- This function determines the voltage level applied to the motor, so it is able to accelerate the inertia process of the load, as shown in Figure 6.5



NOTE: This function, when enabled, does not permit the activation of the current limitation during the start.

| | min. | Range | max. | Factory Standard |
|--|-------|---|-------|------------------|
| P42 - Voltage pulse level at the start | 70%UN | <div style="text-align: center;"> $\left\langle \begin{array}{c} \text{shortest step} \\ 1\% \end{array} \right\rangle$ </div> | 90%UN | 70 |

6.3.19 - P45 - Pump Control

- Weg has developed for a special algorithm for application with centrifugal pumps. This special algorithm is used to minimize pressure overshoots in the hydraulic pipeline that can cause ruptures or excessive wear.

- ☑ When P45 set at "On" and key "P" is pressed, the display indicates "PuP" and the following parameters will be set automatically:

P02 = 15 s (acceleration time)

P03 = 80% UN (voltage step during deceleration)

P04 = 15 s (deceleration time)

P11 = OFF (Current Limit)

P14 = 70% IN (switch undercurrent)

P15 = 5s (Undercurrent Time)

The other parameters continue with their previous values.



NOTE!

Although the values that are set automatically meet the most applications, they can be improved to meet the requirements of your application.

Please find below a procedure to improve the performance of the control of pumps.

End setting of the pump control function:



NOTE!

This setting must be used only to improve the performance of the pump control and when the pump is already installed and able to operate at full-load.

1. Set P45 (Pump control) at "On".
2. Set P14 (undercurrent) or set P15 (Undercurrent Time) at "OFF" until the set has finished. After then, program it again.
3. Check the correct direction of rotation of the motor, as indicated ON the pump frame.
4. Set P01 (initial voltage - % UN) to the level so the motor starts to run without vibration.
5. Set P02 (Acceleration Time [s]) to the starting time required by the load. With the manometer in the pipeline, check the pressure increase that must be continuous until the max. required level is reached without overshoots. If overshoots occur, increase the acceleration time to reduce this pressure overshoots at maximum.
6. P03 (Deceleration voltage ramp - %UN) use this function to cause an immediate pressure drop or a more linear pressure drop during the motor deceleration.

6

DETAILED PARAMETER DESCRIPTION

7. P04 (deceleration time) during the motor deceleration check with manometer the pressure drop that must be continuous until the minimum level is reached without the presence of hydraulic ram when the non-return valve is closed. If this occurs, increase the deceleration time until the oscillations are reduced at maximum.



NOTE!

If no manometer is installed in the pipelines, the hydraulics ram can be observed through the pressure relief valves.



NOTE!

Excessive acceleration or deceleration times can cause motor overheating. Program them for your application as short as possible.

| | Possible Values | Factory Standard |
|--------------------|-----------------|------------------|
| P45 - Pump Control | OFF, ON | OFF |

6.3.20 P47 - Auto-Reset Time (s)

- When an error occurs, except E01, E02 and E07 or E2x, the Soft-Starter can realize an automatic reset after the programmed time at P47 has been elapsed. If P47= OFF, the Auto-Reset will not occur. After the Auto-Reset time has been elapsed and the same error occurs three consecutive times (*), the Auto-Reset Function will be disabled. Thus, if an error occurs four consecutive times, this error remains on the display (and the Soft-Starter will be disable).

(*) an error will be considered consecutive, if it occurs within 60 seconds after has been executed the last Auto-Reset.

| | min. | Range | max. | Factory Standard |
|-----------------------|----------|-------|------|------------------|
| P47 - Auto-Reset Time | OFF, 10s | | 600s | OFF |

6

DETAILED PARAMETER DESCRIPTION

6.4 - CONFIGURATION PARAMETERS - P43, P44, P46, P50... P55, P61, P62

6.4.1 - P43 - By-Pass relay



- This function, when enabled, permits activates full voltage indication by means of RL1 or RL2 (P51 or P52) in order to energise a by-pass contactor.
- The main function of the Soft-Starter By-Pass is to eliminate the losses in the form of heat generated by the Soft-Starter.

NOTE!

- 1) This function must always be programmed when a by-pass contactor is used.
- 2) To keep the protections relating to motor current reading, use external current transformers. See item 9.5.
- 3) When P43 is set to "On", the parameters P74 and P76 become inactive "OFF".

| | Possible Values | Factory Standard |
|---------------------|-----------------|------------------|
| P43 - By-Pass relay | OFF, ON | OFF |

6.4.2 - P44 - Energy Save



- This function can be enabled or disabled. When enabled, its function is to reduce the losses in the motor air gap when motor runs without load or only drives a partial load.

NOTE!

- 1) The total energy save depends on the load which is driven by the motor.
- 2) This function generates undesired harmonic currents in the network due to the conduction angle for the voltage reduction.
- 3) When P44= ON, the parameters P74 and P76 are disabled "OFF".
- 4) Not possible to enable with by-pass (P43 = ON).
- 5)Run led is flashing when energy save is enabled.

6

DETAILED PARAMETER DESCRIPTION

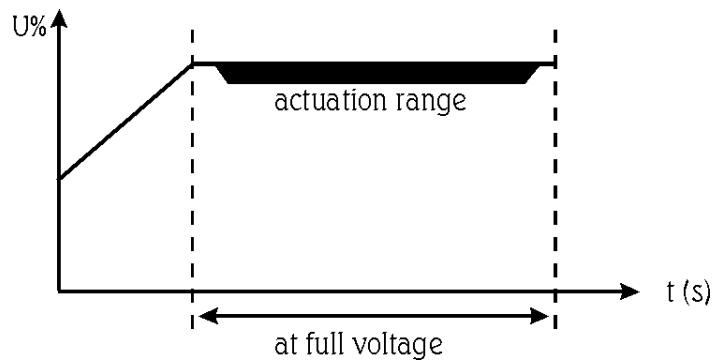


Figure 6.6 - Energy save

| | Possible Values | Factory Standard |
|-------------------|-----------------|------------------|
| P44 - Energy save | OFF, ON | OFF |

6.4.3 - P46 - Default values (it loads factory parameters)

- When this function is enabled, it resets the parameters to the factory default values, excepting parameter "P22" and "P23".

| | Possible Values | Factory Standard |
|----------------------|-----------------|------------------|
| P46 - default values | OFF, ON | OFF |

6.4.4 - P50 - Function of the Relay RL3

- It enables the Relay RL3 to operate according to the parameters set below:
 - 1 - The N.O. contact from RL3 is closed when the SSW-04 does not have a fault condition.
 - 2 - The N.O. contact from RL3 is closed when the SSW-04 have a fault condition.

| | Possible Values | Factory Standard |
|------------------------------------|-----------------|------------------|
| P50 - Programming of the Relay RL3 | 1, 2 | 1 |

6.4.5 - P51 - Function of the relay RL1

It enables the Relay RL1 to operate according to the parameters set below:

- 1 - Function "Operation", the relay is switched ON instantaneously with the order Switch ON of the Soft-Starter, switching Off only when the Soft-Starter receives an order of general switching Off, or by ramp when the voltage reaches 30% of the rated voltage, as shown in Figure 6.6.
- 2 - Full voltage Function, the relay is only switched On after Soft-Starter has reached 100% of U_N , and switched Off when the Soft-Starter receives a command for general switching Off, or by ramp, as shown in Figure 6.7.

**NOTE!**

The function of full voltage is used to activate the by-pass contactor, the parameter P43 must be set at "On"

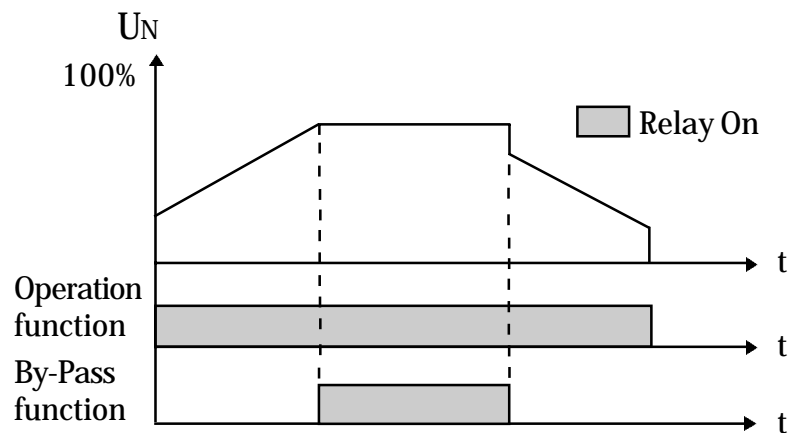


Figure 6.7 - Functioning of the relays RL1 and RL2

- 3 - Function direction of rotation. The relay is ON when digital input (DI3) is closed, and OFF when digital input is open (DI3).

The relay controls a contactor that must be connected at the SSW-04 output, which reverse the direction of rotation by inverting two motor phases - See Item 9.7 - Typical Application with Reversal.

**NOTE!**

for this function, the parameter P54 must be programmed at 4.

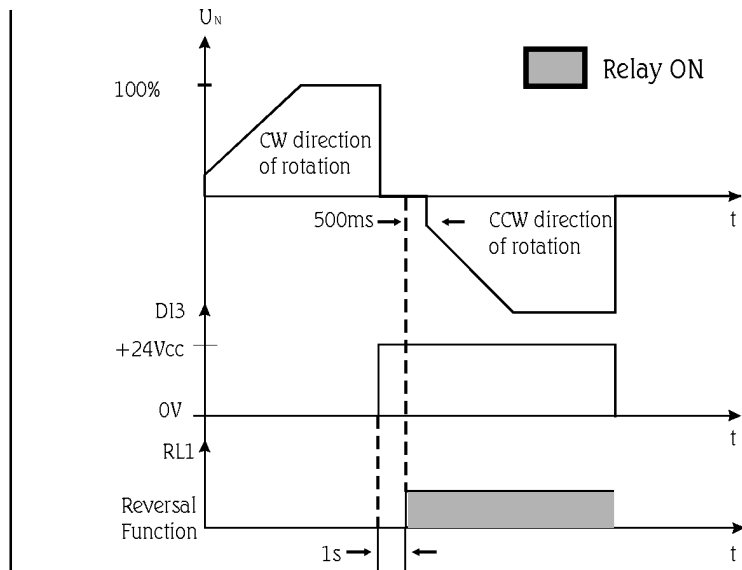


Figure 6.8 - Functioning of the reversal relay RL1

| | Possible Values | Factory Standard |
|---------------------------------|-----------------|------------------|
| P51 - Function of the relay RL1 | 1, 2, 3 | 1 |

6.4.6 - P52 - Function of the relay RL2

It enables the Relay RL2 to operate according to the parameters set below:

1-2 - Enables the Relay RL2 to operate according to the parameters described in Item 6.4.5.

3 - Function DC braking. The relay is ON when the Soft-Starter receives an OFF command. For this function an additional contactor must be used. See item 9.6 - Typical diagram for DC braking.

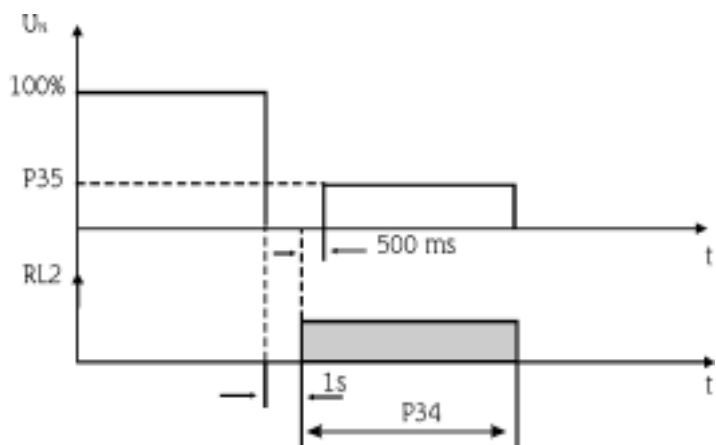


Figure 6.9 - Operating mode of the RL2 for the DC braking.

**NOTE!**

Before starting programming, make all needed external connections.

| | Possible Values | Factory Standard |
|---------------------------------|-----------------|------------------|
| P52 - Function of the relay RL2 | 1, 2, 3 | 2 |

6.4.7 - P53 - Programming of the Digital Input 2

- Enable the digital input 2 (terminal X2:2) to operate according to described codes:
OFF = without function
- 1 - Error Reset = it reset an error status every time the DI2 input is at + 24Vdc (X2:5).
 - 2 - External Error = can be used as additional load protection. It acts when the input is open.
Ex.: thermal protection for the motor by means of dry contact (without voltage) of a protection relay (thermostat).
 - 3 - General Enabling = X2:2 must be connected to + 24Vdc (X2:5) for the Soft-Starter to operate. If it is not connected, the SCR's firing pulses are disabled.
 - 4 - Three Wire Control = allows control of the Soft-Starter through digital inputs: DI1 (X2:1) start input and DI2 (X2:2) stop input. According to item 9.3.

| | Possible Values | Factory Standard |
|--|-----------------|------------------|
| P53 - Programming of the Digital Input 2 (DI2) | OFF, 1, 2, 3, 4 | 1 |

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DETAILED PARAMETER DESCRIPTION

6.4.8 - P54-Programming of the digital input 3

- ☑ This parameter enables the digital input 3 (terminal X2:3) to operate according to the describe codes:
OFF = without function
- 1 - "Error Reset" (As described in item 6.4.7).
- 2 - "Extern Error" (As described in Item 6.4.7).
- 3 - "General Enabling" (As described in Item 6.4.7).
- 4 - "Direction of rotation". It enables the digital Input 3 (DI3), when connected to + 24Vdc (X2:5), it drives the relay RL1 (as described in item 6.4.5) and realizes the reversal of the motor direction of rotation with the Soft-Starter. See Item 9.7 - Typic Application with Reversal.



NOTE!

For this function, the parameter P51 must be programmed to "3".

| | Possible Values | Factory Standard |
|---|-----------------|------------------|
| P54 - Programming of the Digital Input 3 (DI 3) | OFF, 1, 2, 3, 4 | 2 |

6.4.9 - P55 - Programming of the digital input 4

- ☑ This parameter enables the digital input 4 (terminal X2:4) to operate according to the described codes:
OFF = Without Programming
- 1 - "Error Reset" (As described in Item 6.4.7).
- 2 - "Extern Error" (As described in Item 6.4.7).
- 3 - "General Enabling" (As described in Item 6.4.7).
- 4 - "JOG Function". It enables the Digital Input 4 (DI4), when connected to+ 24Vdc (X2:5), and enables the SSW-04 to apply the JOG voltage (P33) to the motor (as described in Item 6.3.14).

| | Possible Values | Factory Standard |
|--|-----------------|------------------|
| P55 - Programming of the Digital Input 4 (DI4) | OFF, 1, 2, 3, 4 | OFF |

6.4.10 - P61 - Control enabling

Table 6.1 - Command that depend on the P61 adjust.

| Comands | P61 = OFF | P61 = ON | | Description |
|-----------------------|---------------|----------|--------|----------------------------------|
| | Digital Input | HMI | Serial | |
| I/O | X | X | X | Digital Input or HMI/Serial |
| JOG Function | X | | X | Digital input 4 (DI4) or Serial |
| Direction of rotation | X | | X | Digital input 3 (DI3) or Serial |
| General Enabling | X | | X | Digital inputs 2, 3, 4 or serial |

- I/O (Start/Stop): When P61 = OFF, it enables via digital inputs (DI1 or DI1 and DI2) the motor start/stop.
When P61 = ON, it enables the motor start/stop via HMI-3P and serial.
When P61 = ON, the digital input "DI1" is without function.

**NOTE!**

To make the selection through HMI-3P/serial or digital input, the motor must locked, inclusive when the change is HMI-3P/serial to digital input (DI1), it must be open. If the digital input (DI1) is closed, the parametrization can not be processed and the display flashes.

- JOG Function: This function can be programmed at the Digital Input (DI4) if P61= OFF; or P61=ON it operates via serial input.
- Function of the change of the Direction of Rotation: This function can be programmed at the Digital Input (DI3) if P61= OFF, or P61= ON it operates via serial.
- General Enabling: This function can be used as "Emergency Stop" and it can be programmed for any of the following Digital Inputs DI2, DI3 or DI4 and also via serial (provided P61= ON). If more than one Digital Input is programmed for this function, the first that opens will be the emergency stop. If the command is also enabled for serial operation (P61= ON), all Digital Inputs programmed to General Enabling must be closed.

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DETAILED PARAMETER DESCRIPTION

Table 6.2 - Controls that do not depend on the setting of P61.

| Commands | Digital Input | HMI | Serial | Description |
|--------------|---------------|-----|--------|--------------------------------------|
| Extern Error | X | | | Only at the Digital Input 2, 3 ou 4. |
| Error Reset | X | X | X | available at any. |

- External Error: It can be programmed for any Digital Input DI2, DI3 or DI4. If there is no external error, there is also no actuation. If more than one digital Input has been programmed for "External Error", any input will actuate, when disconnected from + 24Vdc (X2:5).
- Error Reset: The Error Reset is accepted via HMI-3P, serial and Digital Inputs DI2, DI3 or DI4, when so programmed. If more than one Digital Input if programmed, any one can reset the error status, requiring only the receipt of a + 24Vcc (X2:5) pulse.

| | Possible Values | Factory Standard |
|------------------------|-----------------|------------------|
| P61 - Command Enabling | OFF, ON | ON |

6.4.11 - P62 - Address of the Soft-Starter at the communication network

- This parameter defines the address of Soft-Starter on the communication network. This is for use with the superdrive software.

| | min. | Range | max. | Factory Standard |
|---|------|-------|------|------------------|
| P62 - Address of the Soft-Starter on the Communication Network | 1 | | 30 | 1 |

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DETAILED PARAMETER DESCRIPTION

6.5 - MOTOR PARAMETERS - P21, P25, P26, P27

6.5.1 - P21 - Motor Current Setting (% I_N of the switch)

- ☑ Sets the motor current value percentually relating to rated switch current.
- ☑ Monitors the overload condition according to the thermal class curve selected at P25, and protects the motor against overloads applied on the shaft. When the overload time is exceeded as defined by the thermal class protection, the firing will be disabled and the HMI-3P display will show error E04.
- ☑ Parameter P21, P25, P26 and P27 are part of the thermal protection.
- ☑ To disable the thermal protection, set P21= OFF

Ex: How to set P21:

I_N of the switch = 60A

I_N of the motor = 52A

$$\frac{52A}{60A} = 0.867$$

P21 = 86.7%



NOTE: The error E04, motor overload, remains in the memory, even if the CPU is reset, and when the CPU is switched Off, the last value is stored. The value is only decremented with the switch On and the motor Off.

| | min. | Range | max. | Factory Standard |
|-----------------------------------|--------------------------|-------|----------------------|------------------|
| P21 - Adjust of the motor current | OFF, 30.0%I _N | | 200.0%I _N | OFF |

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DETAILED PARAMETER DESCRIPTION

6.5.2 - P25 - Thermal Protection Class of the motor overload

This parameter determines the activation curve of the thermal motor protector according to IEC 947-4-1, as show in the chart below:

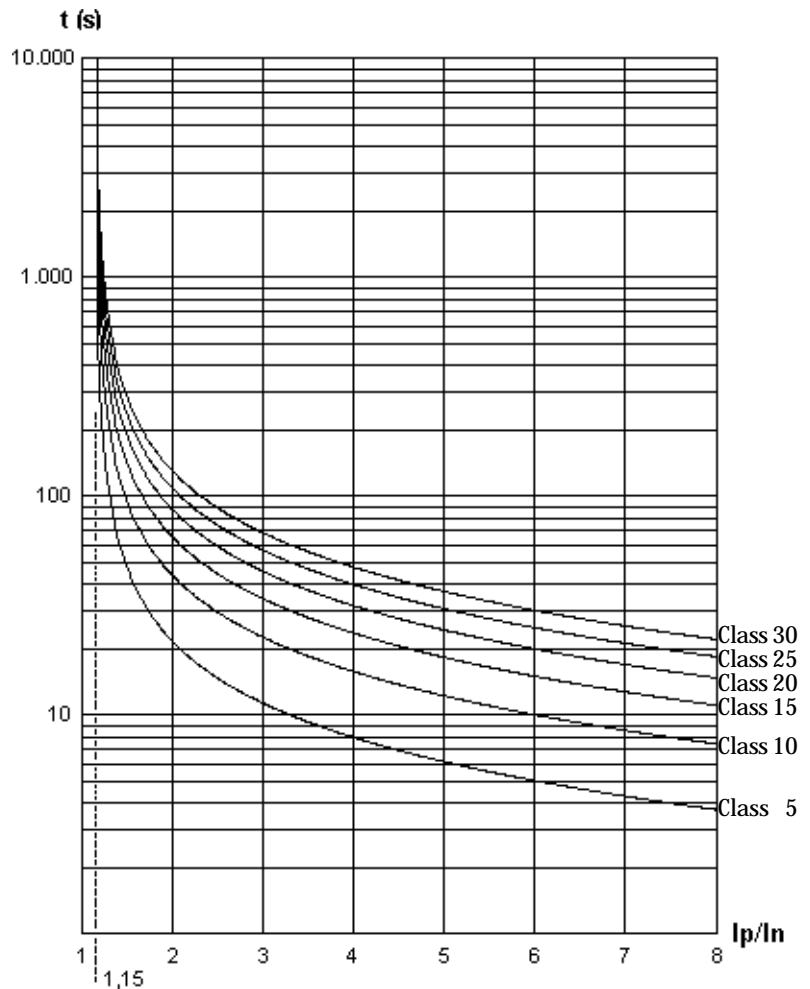


Figure 6.10 - Thermal class for motor protection. Curve for cold start condition and P26= 1.15.



NOTE!

When the motor is hot, the time of the curves must be reduced by the factors show in table below. These factor must be applied for motor with three-phase symmetric load - Class 5 up to Class 30.

Table 6.3- Multiples for hot start

| I_p/I_N | 0 | 20% | 40% | 60% | 80% | 100% |
|-----------|---|------|------|------|------|------|
| = P26 | 1 | 1 | 1 | 1 | 1 | 1 |
| > P26 | 1 | 0.84 | 0.68 | 0.51 | 0.35 | 0.19 |

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DETAILED PARAMETER DESCRIPTION

Example:

A motor is being operated at 100% I_N and then it is switched OFF. After that it is immediately switched ON. The selected Thermal Class at P25 is 10. The start current is $3 \times I_N$. The actuation time is of aprox. 23s. The setting factor in the Table for 100% I_N is 0.19. The final actuation time will be $0.19 \times 23s = 4.3s$.

| | Possible Values | Factory Standard |
|---|-----------------------|------------------|
| P25 - Thermal Protection classes for motor overload | 5, 10, 15, 20, 25, 30 | 30 |

6.5.3 - P26 - Motor Service Factor

- It sets the Motor Service Factor (SF) according to the motor nameplate data. The value defines the load that the motor can drive.

| | min. | Range | max. | Factory Standard |
|----------------------------|------|-------|------|------------------|
| P26 - Motor Service Factor | 0.80 | | 1.50 | 1.00 |

6.5.4 - P27 - Auto-reset of the Thermal motor image

- It sets the time for the auto-reset of the thermal motor image. The thermal decrement of the thermal motor image simulates the motor cooling time with load and without load, ON and OFF. The algorithm that realizes this simulation is base on tests applied on WEG. IP55 is standard according to your power programmed in the soft-starter parameters. In application, where several starts per hour are required, you can use the auto-reset of the thermal image.

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DETAILED PARAMETER DESCRIPTION

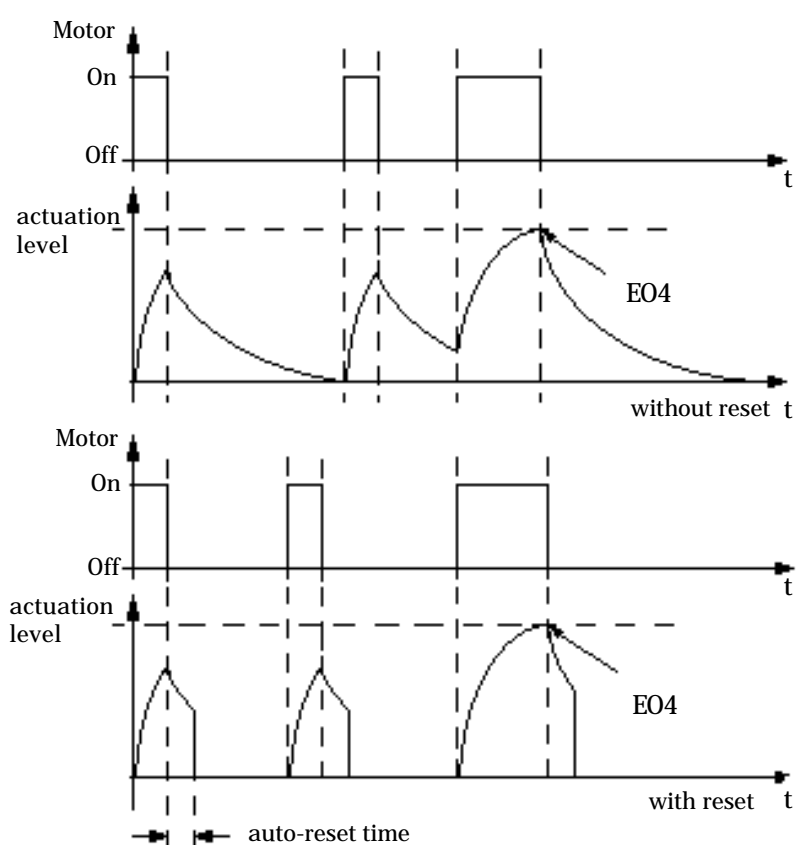


Figure 6.11- Auto-reset of the thermal memory.



NOTE!

Please not that every time you use this function you can reduce the winding life of your motor.

| | min. | Range | max. | Factory Standard |
|---|--------|--|------|------------------|
| P27 - Auto-reset of the thermal memory | OFF, 1 | <div style="text-align: center;"> ← shortest step → ← 1s → </div> | 600s | OFF |

7.1 - ERROR AND POSSIBLE CAUSES

7.1.1 - Programming error (E24)

- ☑ The Soft-Starter can indicate an error of incorrect programming (E24), serial errors (E2X) and Hardware errors (E0X).

- ☑ The error of incorrect programming (E24) does not permit that the value, changed incorrectly, be accepted. This error occurs when any parameter is changed with the motor OFF and under the following incompatibility conditions between the parameters.

- P11 current limiting with P41 kick start.
- P41 kick start with P55= 4 at Jog.
- P43 by-pass with P44 energy saving.
- P61 at Off with ED1 driven or P55 Jog driven.

To abandon this error condition, press keys P, I, O.

7.1.2 - Serial communication error

- ☑ Serial communication errors (E2X) do not permit the changing of the value or that the incorrectly transmitted value be accepted.

For further info, see please Serial Communication Manual - SSW-04.

To abandon this error condition, press keys P, I, O.

7.1.3 - Hardware errors (E0X)

- ☑ Hardware errors (E0X) disable the Soft-Starter. To abandon this error condition, switch OFF the equipment and switch it again ON, or press RESET key. Before doing this you must eliminate the source of the error.



NOTE!

Long connection cables between the Soft-Starter and the motor (longer than 150m (492ft)) or shielded cables can show a high reactance. This may cause error "E01".

Solution:

Connect a three-phase reactance in series with the motor supply line. In this case, contact the manufacturer.



Note: Actuation form of the errors:

All errors E01...E08 switch Off the relay RL3 and disable the thyristor firing and indicate the error on the display.

Error Led in the control board card CCS4.00 or CCS4.01 flashes.

Table 7.1- Hardware errors


| ERROR | RESET | POSSIBLE CAUSE |
|-------|---|--|
| E01 | <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Switch OFF/ON the electronics <input checked="" type="checkbox"/> Or through key  | <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Phase-fault in the three-phase network <input checked="" type="checkbox"/> Short-circuit or fault in the thyristor <input checked="" type="checkbox"/> Motor is not connected <input checked="" type="checkbox"/> Supply frequency with oscillation higher than 10%. |
| E02 | <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Or through digital input for reset | <ul style="list-style-type: none"> <input checked="" type="checkbox"/> The time of the ramp acceleration is shorter than the actual acceleration time since the function of the current limitation is activated. |
| E03 | <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Or through serial | <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Ambient temperature higher than 40°C and current too high. <input checked="" type="checkbox"/> Starting time with current limitation higher than specified by switch. <input checked="" type="checkbox"/> Too many of successive starts. <input checked="" type="checkbox"/> fan is locked or defective |
| E04 | | <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Set of P21, P25 and P26 too low relating to the used motor <input checked="" type="checkbox"/> Load on the motor shaft too high <input checked="" type="checkbox"/> Too many of successive starts |
| E05 | | <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Pump is dry operating <input checked="" type="checkbox"/> Load decoupled from the motor shaft |
| E06 | | <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Short-circuit between phases <input checked="" type="checkbox"/> Motor shaft is locked |
| E07 | | <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Network phase sequence inverted at the input |
| E08 | | <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Terminal board X2.3 and X2.5 is open (not connected to + 24Vdc) |

Table 7.2- Hardware errors and possible solutions.

| PROBLEM | POINT TO BE CHECKED | CORRECTIVE ACTION | | | | | |
|----------------------------------|--|--|----------------|----------------|--------------|-----------------|-------------|
| Motor does not run | <input checked="" type="checkbox"/> Wiring not correct | 1. Check all power and control connections. For instance, check the digital input of extern error that must be connected to + 24V. | | | | | |
| | <input checked="" type="checkbox"/> Wrong programming | 1. Check if the parameter are correct programmed for the application. | | | | | |
| | <input checked="" type="checkbox"/> Error | 1. Check if the Soft-Starter is not disabled due to a detected error condition (see table above). | | | | | |
| Motor speed changes (oscillates) | <input checked="" type="checkbox"/> Loose connections | 1. Disable the Soft-Starter, switch OFF the supllly voltage and tighten all connections. 2. Check if all intern Soft-Starter connections are tightened. | | | | | |
| Motor speed too high or too low | <input checked="" type="checkbox"/> Motor nameplate data | 1. Check if the motor is used according to its application | | | | | |
| Display OFF | <input checked="" type="checkbox"/> HMI connections | 1. Check the HMI connections to the Soft-Starter (control board CCS4.0X) | | | | | |
| | <input checked="" type="checkbox"/> Check the supply voltage X1.1 and X1.2 | 1. The rated values must meet the following requirements: <table style="display: inline-table; vertical-align: middle;"> <tr> <td>For 220-230Vac</td> <td>For 110-120Vac</td> </tr> <tr> <td>- Min.: 187V</td> <td>- Min.: 93.5Vac</td> </tr> <tr> <td>- Max. 253V</td> <td>- Max. 132Vac</td> </tr> </table> | For 220-230Vac | For 110-120Vac | - Min.: 187V | - Min.: 93.5Vac | - Max. 253V |
| For 220-230Vac | For 110-120Vac | | | | | | |
| - Min.: 187V | - Min.: 93.5Vac | | | | | | |
| - Max. 253V | - Max. 132Vac | | | | | | |
| Jerk during deceleration | <input checked="" type="checkbox"/> Soft-Starter programming | 1. Decrease the deceleration time setting on the parameter P04. | | | | | |

Table 7.3 - Periodical Inspections after the commissioning.

| COMPONENT | PROBLEM | CORRECTIVE ACTION |
|--------------------------------------|--|-------------------------|
| Terminals, connectors | Loose screws | Tighten them (2). |
| | Loose connectors | |
| Fans ⁽¹⁾ / cooling System | Fans are dirt | Clean them.(2) |
| | Abnormal acoustic noise | Replace the fan. |
| | Abnormal vibration | |
| | Dust in the air filter | Clean or replace it.(3) |
| Printed circuit boards | Dust, oil, moisture accumulation, etc. | Clean them.(2) |
| | Smell | Replace them. |
| Power Module/ Power Connections | Dust, oil, moisture accumulation, etc. | Clean them.(2) |
| | Connection screws are loose | Tighten them (2). |
| Power Resistors | Discoloration | Replace them. |
| | Smell | |

Note:

- (1) We recommend to replace the fans after each 40,000 hours of operation.
- (2) Every 6 months.
- (3) Twice per month.

7.2 - PREVENTIVE
MAINTENANCE**DANGER!**

Disconnect always the supply voltage before attempting to service any electric component of the Soft-Starter.

Even after switching OFF the Soft-Starter, during a certain time high voltages may be present. Thus wait 3 minutes to allow a complete discharge of the power capacitors.

Always connect the equipment frame to the grounding (P.E) at the suitable point.

**ATTENTION!**

The electronic boards are fitted with components sensitive to electrostatic discharges.

Never touch the components or connectors directly. If this is necessary, touch before on the metallic frame or use a suitable grounding bracelet.

**Never apply a high voltage test on the
Soft-Starter!
If this is necessary, contact the
manufacturer.**

In order to avoid operation problems caused by unfriendly ambient conditions, such as high temperature, moisture, dirt, vibration or aging of the components, make periodical inspections on the Soft-Starter and installations.

7.2.1 - CLEANING INSTRUCTIONS

When it is necessary to clean the Soft-Starter follow these guidelines:

a) Cooling system:

- Switch OFF Soft-Starter power supply.
- Remove all the dust located on the ventilation openings of the enclosure using a plastic brush or flannel.
- Remove all the dust accumulated on the heatsink fins and fans using compressed air.

b) Printed circuit boards (PCBs):

- Switch OFF Soft-Starter power supply.
- Remove all the dust or moisture accumulated on the board using a anti-static brush and/or a compressed air ion gun (ex: charger buster ion gun (non-nuclear) Ref. A6030-6 from DESCO). If necessary remove PCBs from the Soft-Starter.

7.3 - CHANGING SUPPLY FUSE



1. Disconnect power supply of the Soft-Starter.

DANGER!

Disconnect always the supply voltage before attempting to service any electric component of the Soft-Starter. Even after switching OFF the Soft-Starter, during a certain time high voltages may be present. Thus wait 3 minutes to allow a complete discharge of the power capacitors.

2. Open the enclosure of the Soft-Starter.
3. Find the fuse on the board CCS4 and replace it by the type specified in the spare parts list.
4. Close the Soft-Starter.

7.4 - SPARE PART LIST

| Name | Item N° | Specification | Types (Amper) 220...440 Vac | | | | |
|---------------------|-----------|--------------------------------|-----------------------------|----|----|----|----|
| | | | 16 | 30 | 45 | 60 | 85 |
| | | | Units per Soft-Starter | | | | |
| Thyristor Module | 0303.7541 | Thyristor module 25A 1200V | 3 | | | | |
| | 0303.8106 | Thyristor module 56A 1200V | | 3 | | | |
| | 0303.7495 | Thyristor module 90A 1200V | | | 3 | 3 | |
| | 0303.8238 | Thyristor module 160A 1200V | | | | | 3 |
| * Fan | 0400.2571 | Fan 120x120mm 110 Vca | | | | 1 | 1 |
| | 0400.1494 | Fan 120x120mm 220 Vca | | | | 1 | 1 |
| Source Fuse | 0305.5175 | Glass Fuse 2A / 250V | 1 | 1 | 1 | 1 | 1 |
| HMI-3P | 4160.0497 | Human/Machine Interface HMI-3P | 1 | 1 | 1 | 1 | 1 |
| CCS4.00 | 4160.0942 | Control Board | 1 | 1 | 1 | 1 | 1 |
| Current Transformer | 0307.2673 | CT 200/1A 1VA | 2 | 2 | 2 | | |
| | 0307.2681 | CT 400/1A 1VA | | | | 2 | 2 |

| Name | Item N° | Specification | Types (Amper) 460...575 Vac | | | | |
|---------------------|-----------|--------------------------------|-----------------------------|----|----|----|----|
| | | | 16 | 30 | 45 | 60 | 85 |
| | | | Units per Soft-Starter | | | | |
| Thyristor Module | 0303.9918 | Thyristor module 25A 1600V | 3 | | | | |
| | 0303.9900 | Thyristor module 56A 1600V | | 3 | | | |
| | 0303.9896 | Thyristor module 90A 1600V | | | 3 | 3 | |
| | 0303.9617 | Thyristor module 160A 1600V | | | | | 3 |
| * Fan | 0400.2571 | Fan 120x120mm 110 Vca | | | | 1 | 1 |
| | 0400.1494 | Fan 120x120mm 220 Vca | | | | 1 | 1 |
| Source Fuse | 0305.5175 | Glass fuse 2A / 250V | 1 | 1 | 1 | 1 | 1 |
| HMI-3P | 4160.0497 | Human/Machine Interface HMI-3P | 1 | 1 | 1 | 1 | 1 |
| CCS4.01 | 4160.0950 | Control Board | 1 | 1 | 1 | 1 | 1 |
| Current Transformer | 0307.2673 | CT 200/1A 1VA | 2 | 2 | 2 | | |
| | 0307.2681 | CT 400/1A 1VA | | | | 2 | 2 |

- * **Note:** a) The 220V fan is used in the SSW-04.XX/YYY-YYY/2
b) The 110V fan is used in the SSW-04.XX/YYY-YYY/1

8

TECHNICAL CHARACTERISTICS

8.1 - POWER DATA

- Line Voltage
 - ⇒ Voltage: + 10%, -15% (with motor power loss)
 - ⇒ Frequency: 50/60Hz± 10%
 - ⇒ Start Duty: 3xI_N for 20sec. 10 starts per hour.
- Overvoltage category III (EN61010/UL508).
- Transient voltages according to overvoltage category III.

8.2 - POWER / CURRENT TABLE

| Type | 40°C | | | Rated dissipated power | 40°C | | | | | | | | | |
|-----------|---|---|--------------------------------------|------------------------|------|-----|------|-----|------|-----|------|----|------|----|
| | Rated Current (3xI _N @ 20s.) | Rated Current (4.5xI _N @ 20s.) | Maximum Current for Continuous Duty* | | 220V | | 380V | | 440V | | 525V | | 575V | |
| | | | | | HP | kW | HP | kW | HP | kW | HP | kW | HP | kW |
| SSW-04.16 | 16A | 11A | 17.6A | 73W | 6 | 4.5 | 10 | 7.5 | 12.5 | 9.2 | 15 | 11 | 15 | 11 |
| SSW-04.30 | 30A | 20A | 33A | 123W | 10 | 7.5 | 20 | 15 | 20 | 15 | 30 | 22 | 30 | 22 |
| SSW-04.45 | 45A | 30A | 49.5A | 177W | 15 | 11 | 30 | 22 | 30 | 22 | 40 | 30 | 40 | 30 |
| SSW-04.60 | 60A | 40A | 68A | 250W | 20 | 15 | 40 | 30 | 50 | 37 | 60 | 45 | 60 | 45 |
| SSW-04.85 | 85A | 57A | 96A | 340W | 30 | 22 | 60 | 45 | 75 | 55 | 75 | 55 | 75 | 55 |

| Type | 55°C | | | Rated dissipated power | 55°C | | | | | | | | | |
|-----------|---|---|--------------------------------------|------------------------|------|-----|------|------|------|-----|------|------|------|------|
| | Rated Current (3xI _N @ 20s.) | Rated Current (4.5xI _N @ 20s.) | Maximum Current for Continuous Duty* | | 220V | | 380V | | 440V | | 525V | | 575V | |
| | | | | | HP | kW | HP | kW | HP | kW | HP | kW | HP | kW |
| SSW-04.16 | 16A | 11A | 17.6A | 73W | 6 | 4.5 | 10 | 7.5 | 12.5 | 9.2 | 15 | 11 | 15 | 11 |
| SSW-04.30 | 27A | 18A | 29.7A | 112.8W | 10 | 7.5 | 15 | 11 | 20 | 15 | 25 | 18.5 | 25 | 18.5 |
| SSW-04.45 | 38A | 26A | 41.8A | 151.8W | 12.5 | 9.2 | 25 | 18.5 | 30 | 22 | 30 | 22 | 30 | 22 |
| SSW-04.60 | 52A | 35A | 58.9A | 221.2W | 20 | 15 | 30 | 22 | 40 | 30 | 50 | 37 | 50 | 37 |
| SSW-04.85 | 80A | 55A | 90.3A | 322W | 30 | 22 | 50 | 37 | 60 | 45 | 75 | 55 | 75 | 55 |

* Note: It's the maximum current that the Soft-Starter can have in continuous duty. For this current the Soft-Starter can only have 1 start per hour.



8.3 - MECHANICAL DATA

NOTE:
The maximum indicated power above refer to WEG IV pole standard motors.

- See figure
- Finish: - Electrostatic Epoxy Powder Paint
 - Colour: Cover - light-gray - RAL 7032
 - Cabinet - dark-gray - RAL 7022

8.4 - ELECTRONICS DATA / GENERAL

| | | |
|-------------------------|-----------------------|--|
| Control | Method | <input checked="" type="checkbox"/> Voltage variation under load |
| Inputs | Digital | <input checked="" type="checkbox"/> 04 Galvanically isolated input (optocoupled), 24Vdc <input checked="" type="checkbox"/> Programmable functions |
| Outputs | Relay | <input checked="" type="checkbox"/> 02 relays, NO contact, 250V/1A <input checked="" type="checkbox"/> Programmable functions <input checked="" type="checkbox"/> 01 relay, REV contact - 250V/1A specific for faults. |
| Safety | Protections | <input checked="" type="checkbox"/> Under/Overcurrent at the output of the Soft-Starter <input checked="" type="checkbox"/> Phase fault for the supply <input checked="" type="checkbox"/> Motor phase fault (motor non connected) <input checked="" type="checkbox"/> Mains frequency with $\pm 10\%$ oscillation <input checked="" type="checkbox"/> Thyristor fault <input checked="" type="checkbox"/> Inverted phase sequence (programmable) <input checked="" type="checkbox"/> Overtemperature at the power stage <input checked="" type="checkbox"/> Overload at the output (I^2t). <input checked="" type="checkbox"/> Extern fault <input checked="" type="checkbox"/> CPU Error <input checked="" type="checkbox"/> Programming error <input checked="" type="checkbox"/> Error the serial interface |
| Communication | Serial Interface | <input checked="" type="checkbox"/> RS 232 |
| Human Machine Interface | HMI-3P (Destachable) | <input checked="" type="checkbox"/> 05 keys: ON, OFF, parameter content / increase, parameter / content / decrease, parameter / content. <input checked="" type="checkbox"/> 04 Displays - 7 segment LEDs <input checked="" type="checkbox"/> Permits access / changing of all parameters <input checked="" type="checkbox"/> Display accuracy - Current: $\pm 10\%$ - Power: $\pm 5\%$ <input checked="" type="checkbox"/> Types for extern mounting: - HMI-3P.1 - 1 m (3.28ft) cable - HMI-3P.2 - 2 m (6.56ft) cable - HMI-3P.3 - 3 m (9.84ft) cable |
| Fulfilled Standards | UL 508 EN60947-4-2 | <input checked="" type="checkbox"/> Industrial Control Equipment. <input checked="" type="checkbox"/> Low voltage switchgear - AC. motor controllers |

9.1 CONFORMITY

9.1.1 EMC AND LVD Directives



9.1.2 Requirements for conforming Installations

9.1.2.1 EMC Directive

The SSW-04 line, all models listed in this manual with 220-440V rated voltage were tested to meet the following:

EMC Directive 89/336/EEC (Electromagnetic Compatibility), using a Technical Construction File and the following standards:

EN60947-4-2: Low-voltage switchgear and controlgear Part 4, contactors and motor-starters Section 2. AC semiconductor motor controllers and starters.

Low Voltage Directive (LVD) 73/23/EEC

Attention!

The SSW-04 line has been designed for class A equipment. Use of the products in domestic environments may cause radio interference, in which case the user may be required to employ additional mitigation methods.

NOTE!

The conformity of the Soft-Starter to any standard does not guarantee that the entire installation will conform. Many other factors can influence the total installation. Only direct measurements can verify total conformity.

The following items are required for CE conformance:

1. The Soft-Starters must be installed into closed metallic boxes or panels that have a door only able to be opened with a tool. A suitable cooling must be provided to ensure that the temperature will be within the allowed range. See item 3.1.1
2. Filters as called on table 9.1.
3. Output cables (motor cables) must be armored, flexible armored or installed inside a metallic conduit or trunking with equivalent attenuation.
4. Control (I/O) and signal wiring must be shielded or installed inside a metallic conduit or trunking with equivalent attenuation.
5. The remote keypad (External HMI-3P) cable must be shielded or installed inside a metallic conduit or trunking with equivalent attenuation.
6. Grounding as stated in this Manual item 3.2.1.

9.1.2.2 Low Voltage Directive (LVD)

The following items are required for CE conformance:

1. The same as item 1 above.
2. The installation must provide a supply disconnecting (isolation) device. A hand-operated supply disconnecting device must be provided for each income supply and be near to the equipment. This device must disconnect the Soft-Starter from the supply when required (e. g. during work on the electrical equipment). See EN60204-1, 5.3. Specify the current and voltage of this disconnecting device according to the data given in the item 8.1 and 8.2.



DANGER!

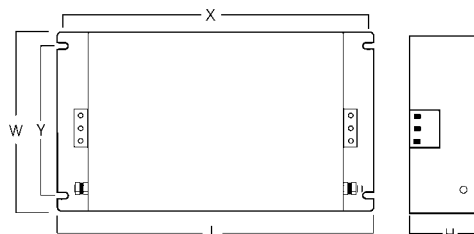
This equipment must not be used as an emergency stop mechanism (See EN60204, 9.2.5.4).

Table 9.1 - Types of Soft-Starters and filters

| SSW-04 Model no | Filter | | | |
|--------------------------|------------------------|------------|----------------------|------------|
| | Power | | Control | |
| | Model (WEG number) | Case Style | Model (WEG number) | Case Style |
| 16/220-440 | RF3020-DLC (0208.1881) | D | RF103-1M (0208.1962) | M1 |
| 30/220-440 | RF3040-DLC (0208.1903) | | | |
| 45/220-440 60/220-440 | RF3070-DLC (0208.1920) | F | | |
| 85/220-440 | RF3100-DLC (0208.1938) | G | | |

Case Dimensions (mm)

| Case Style | L | W | H | X | Y | Mount |
|------------|-----|-----|-----|-----|-----|-------|
| D | 270 | 140 | 60 | 238 | 106 | M6 |
| F | 350 | 180 | 90 | 338 | 146 | M6 |
| G | 420 | 200 | 130 | 408 | 166 | M6 |
| M1 | 88 | 58 | 40 | 78 | 44 | |



9.1.3 - Filter installation

**DANGER!**
Filter grounding

Using the line filter may result in relatively high ground leakage currents.

Ensure the following:

- The filter must be permanently installed and solid grounded (bonded).
- Grounding must not rely on flexible cables and should not include any form of plug or socket that would permit inadvertent disconnection.

Make sure to fulfill the requirements of the local security standards.

1. The filter must be connected between the incoming AC supply line and the Soft-Starter input terminals. See Fig 9.1.
2. The Soft-Starter and filter must be mounted to a common backplane with a positive electrical bond and in close proximity to one another.
3. The length of the wiring among filter and Soft-Starter inputs and must be kept as short as possible.

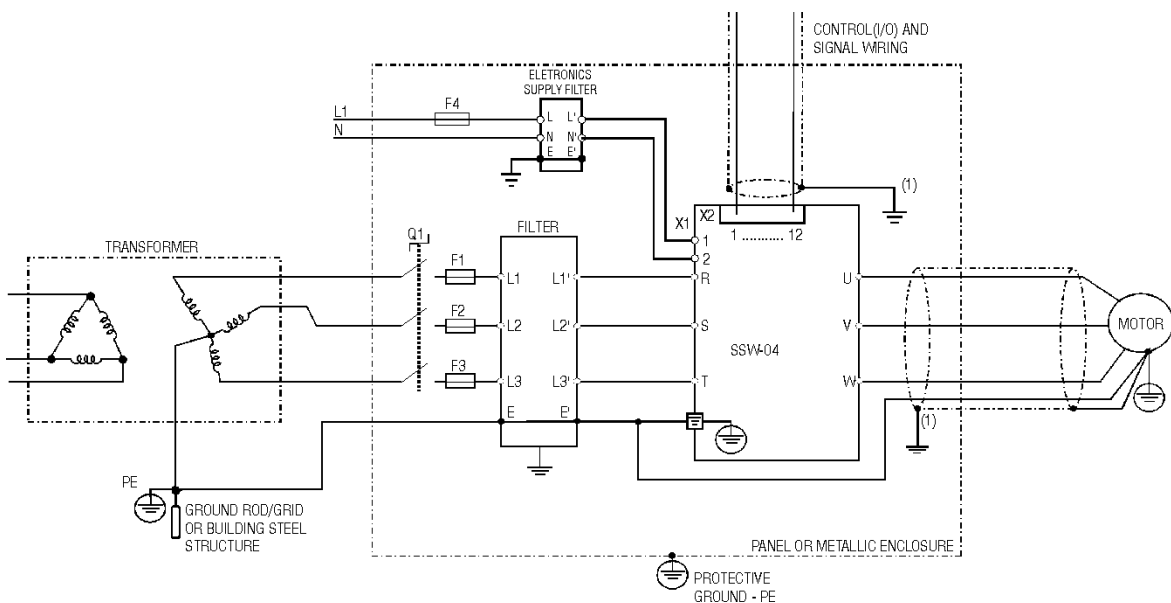
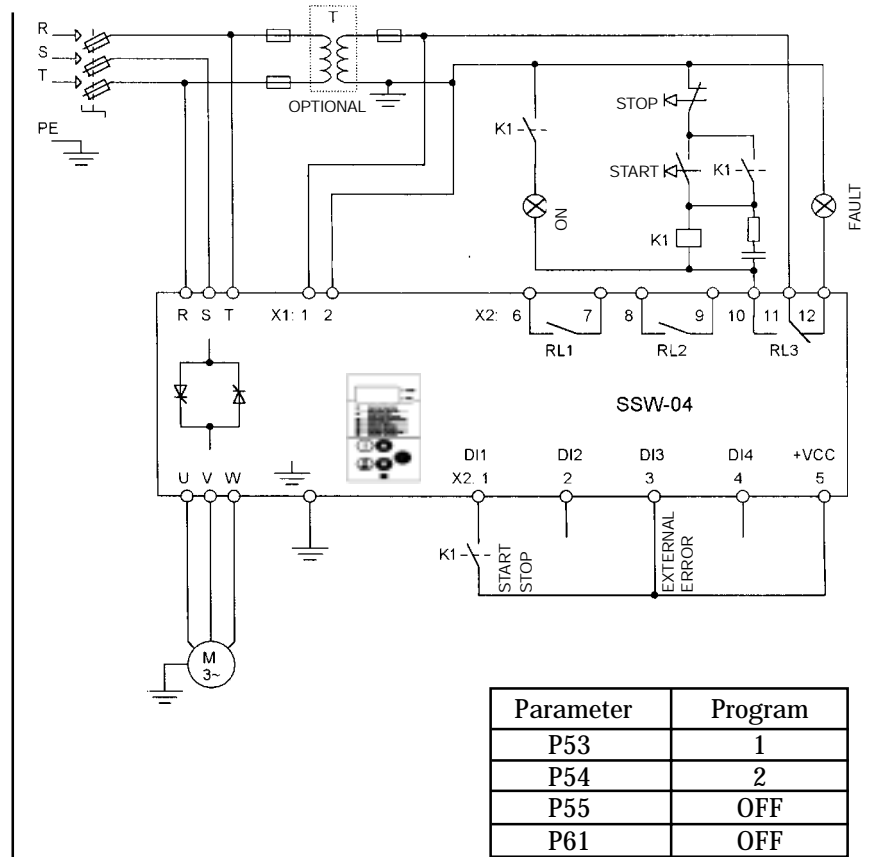


Figure 9.1 - Filter connection

- (1) The cables shielding must be solidly connected to the common backplane, using preferably a bracket. The backplane must be electrically conductive (have no paint).

9.2 - RECOMMENDED APPLICATION WITH TERMINALS FOR TWO WIRE CONTROL



Obs.: It's necessary to use normal fuses or breaker to protect the installation. Ultra-Fast fuses are not necessary for the SSW-04 operation, but they are recommended for SCR protection.

The transformer "T" is optional and must be utilized when the line voltage is different than the electronics and fan voltage.

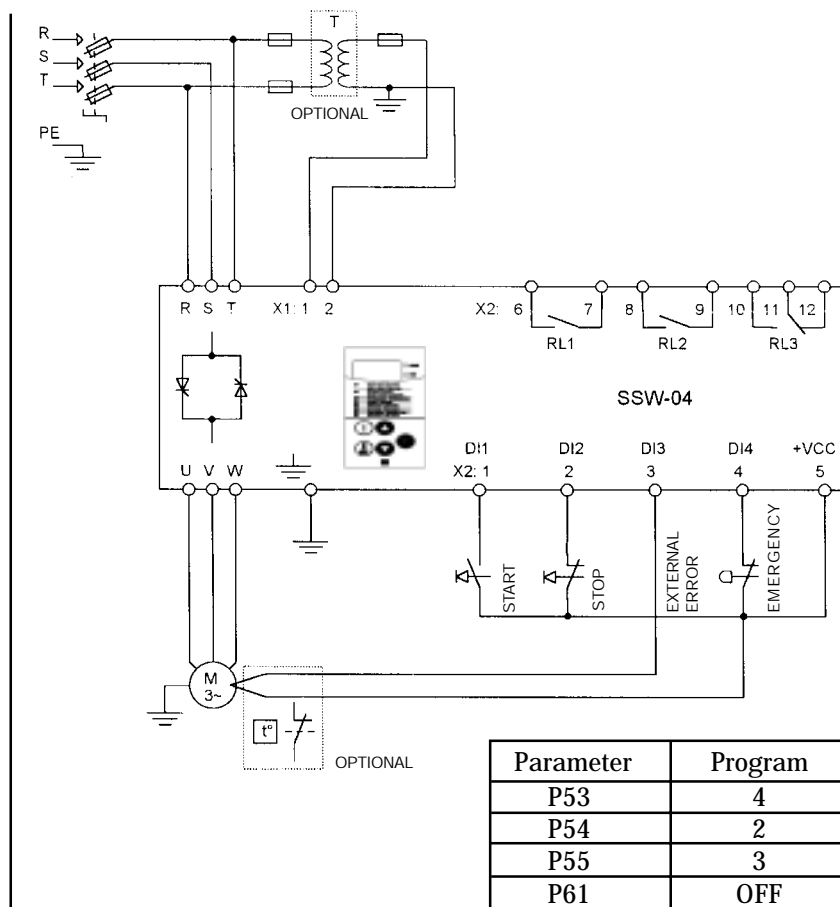
For the integral motor protection it's recommended to install one or more thermostats in the motor. If the thermostat is not used, the external input error (DI3) from SSW-04 must be connected to +Vcc.



NOTE!

A contactor in the mains input (see 9.4) is necessary to protect the motor in case there is a phase failure which is caused by damage in the SSW-04 power circuit.

9.3 - RECOMMENDED APPLICATION WITH TERMINALS FOR THREE WIRE CONTROL



Obs.: It's necessary to use normal fuses or breaker to protect the installation. Ultra-Fast fuses are not necessary for the SSW-04 operation, but they are recommended for SCR protection.

The transformer "T" is optional and must be utilized when the line voltage is different than the electronics and fan voltage.

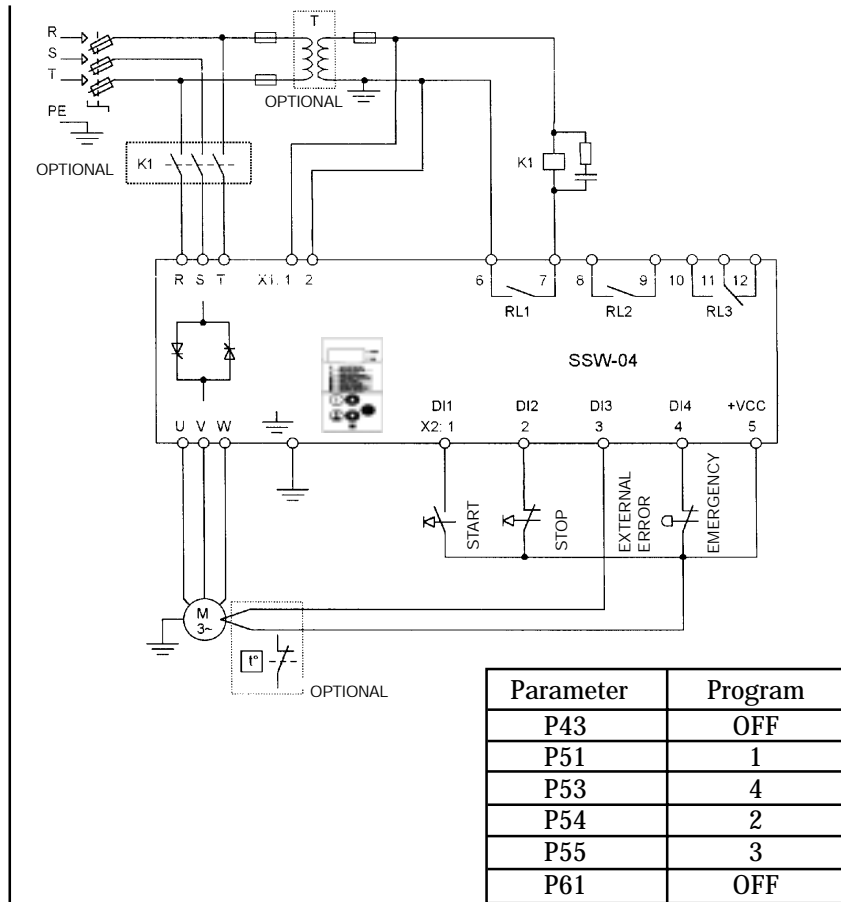
For the integral motor protection it's recommended to install one or more thermostats in the motor. If the thermostat is not used, the external input error (DI3) from SSW-04 must be connected to + Vcc.



NOTE!

A contactor in the mains input (see 9.4) is necessary to protect the motor in case there is a phase failure which is caused by damage in the SSW-04 power circuit.

9.4 - RECOMMENDED APPLICATION WITH TERMINALS FOR THREE WIRE CONTROL AND POWER ISOLATION CONTACTOR



Obs.: It's necessary to use normal fuses or breaker to protect the installation. Ultra-Fast fuses are not necessary for the SSW-04 operation, but they are recommended for SCR protection.

The transformer "T" is optional and must be utilized when the line voltage is different than the electronics and fan voltage.

The isolation contactor "K1" is optional, and is not necessary for the SSW-04 operation. However due to protection and safety reasons it's recommended. In case of maintenance the input fuses must be removed for a complete disconnection of the SSW-04 from the line.

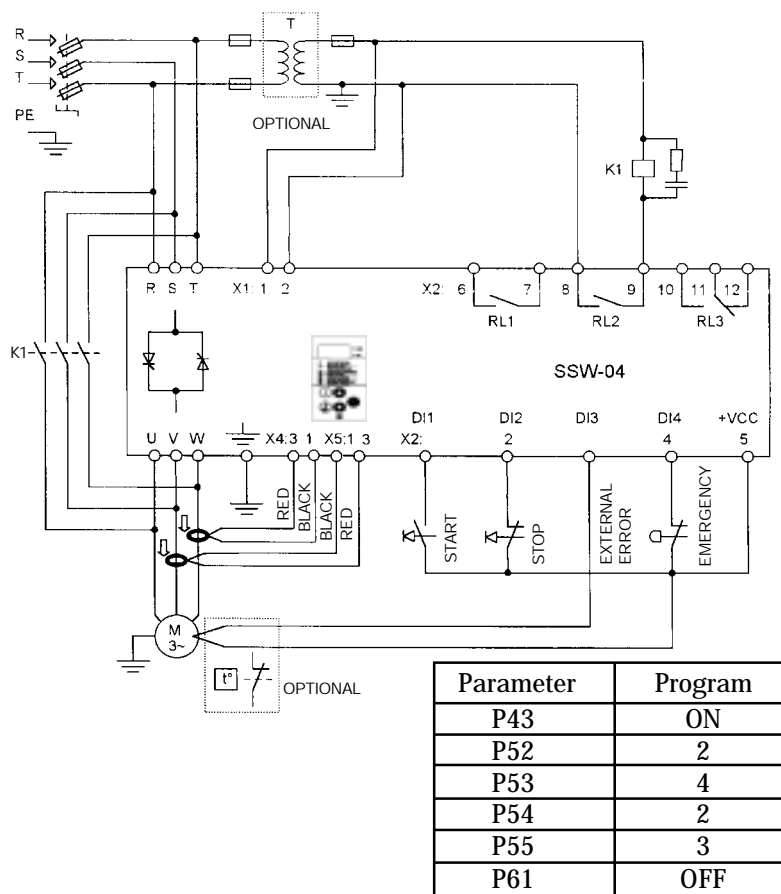
For the integral motor protection it's recommended to install one or more thermostats in the motor. If the thermostat is not used, the external input error (DI3) from SSW-04 must be connected to +Vcc.



NOTE!

Contactor "K1" is necessary to protect the motor in case there is a phase failure which is caused by damage in the SSW-04 power circuit.

9.5 - RECOMMENDED APPLICATION WITH TERMINALS FOR THREE WIRE CONTROL AND BY-PASS CONTACTOR



Obs.: It's necessary to use normal fuses or breaker to protect the installation. Ultra-Fast fuses are not necessary for the SSW-04 operation, but they are recommended for SCR protection.

The transformer "T" is optional and must be utilized when the line voltage is different than the electronics and fan voltage.

For the integral motor protection it's recommended to install one or more thermostats in the motor. If the thermostat is not used, the external input error (DI3) from SSW-04 must be connected to +Vcc.

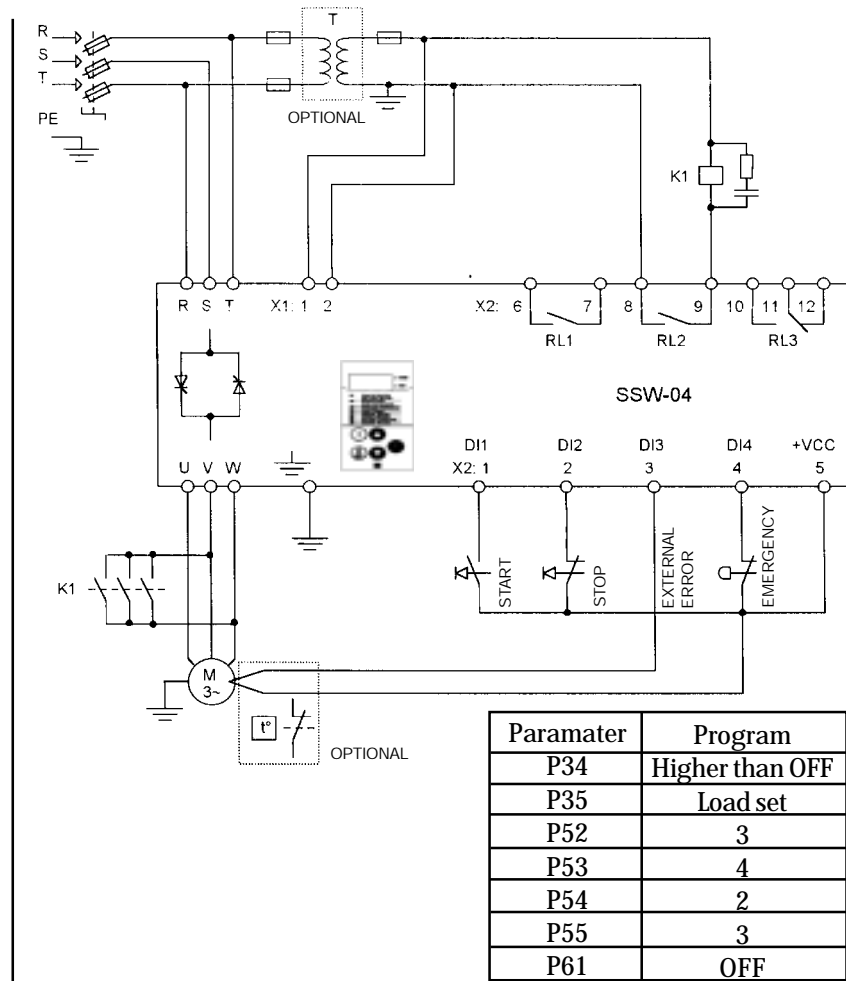


NOTE!

A contactor in the mains input (see 9.4) is necessary to protect the motor in case there is a phase failure which is caused by damage in the SSW-04 power circuit.

To maintain motor thermal protection after the Soft-Starter is by-passed, the Current Transformers (CT) must be connected in conformity with the diagram above.

9.6 - RECOMMENDED APPLICATION WITH TERMINALS FOR THREE WIRE CONTROL AND DC BRAKING



Obs.: It's necessary to use normal fuses or breaker to protect the installation. Ultra-Fast fuses are not necessary for the SSW-04 operation, but they are recommended for SCR protection.

The transformer "T" is optional and must be utilized when the line voltage is different than the electronics and fan voltage.

For the integral motor protection it's recommended to install one or more thermostats in the motor. If the thermostat is not used, the external input error (DI3) from SSW-04 must be connected to +Vcc.

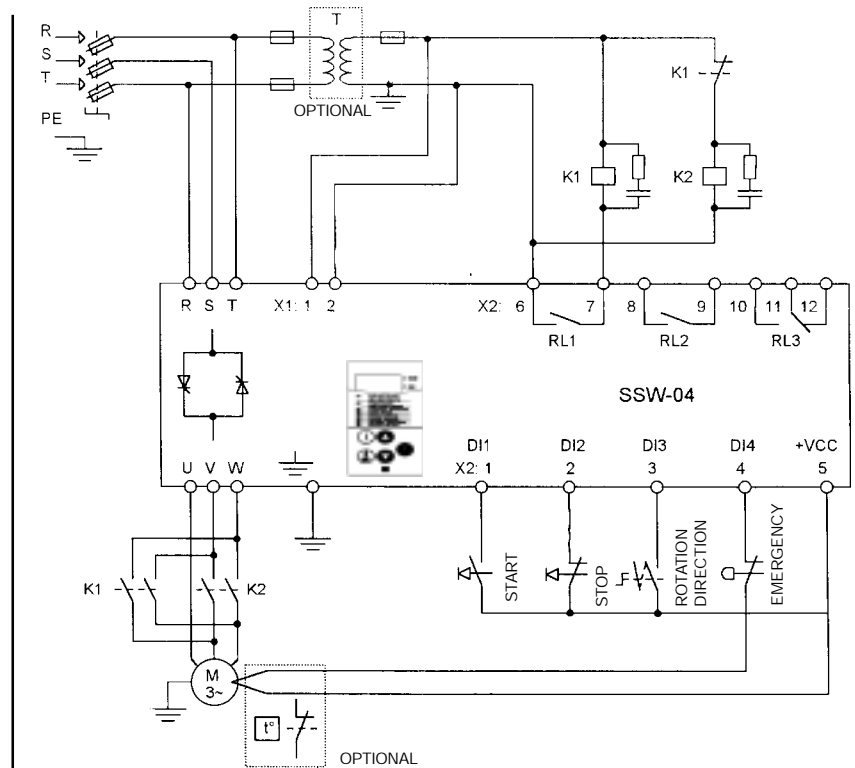


NOTE!

A contactor in the mains input (see 9.4) is necessary to protect the motor in case there is a phase failure which is caused by damage in the SSW-04 power circuit.

For DC braking you can select the contactor "K1" to use the three contacts in parallel.

9.7 - RECOMMENDED APPLICATION WITH TERMINALS FOR THREE WIRE CONTROL AND MOTOR SPEED REVERSAL



| Parameter | Program |
|-----------|---------|
| P04 | OFF |
| P51 | 3 |
| P53 | 4 |
| P54 | 4 |
| P55 | 3 |
| P61 | OFF |

Obs.: It's necessary to use normal fuses or breaker to protect the installation. Ultra-Fast fuses are not necessary for the SSW-04 operation, but they are recommended for SCR protection.

The transformer "T" is optional and must be utilized when the line voltage is different than the electronics and fan voltage.

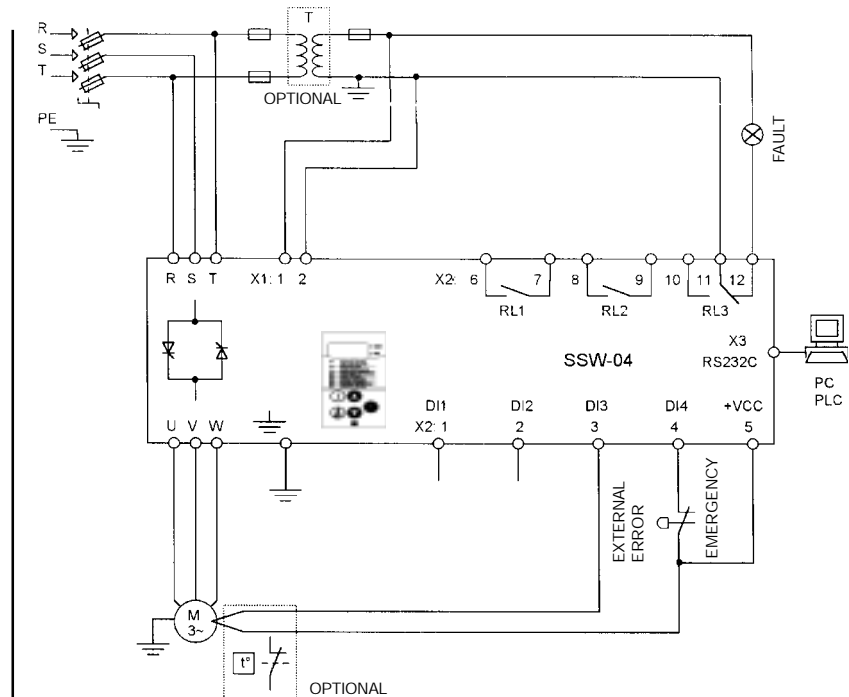
For the integral motor protection it's recommended to install one or more thermostats in the motor. If the thermostat is not used, the external input error (DI3) from SSW-04 must be connected to +Vcc.



NOTE!

A contactor in the mains input (see 9.4) is necessary to protect the motor in case there is a phase failure which is caused by damage in the SSW-04 power circuit.

9.8 - RECOMMENDED APPLICATION WITH PC OR PLC COMMAND



| Parameter | Program |
|-----------|---------|
| P54 | 2 |
| P55 | 3 |
| P61 | ON |
| P62 | ADDRESS |

Obs.: It's necessary to use normal fuses or breaker to protect the installation. Ultra-Fast fuses are not necessary for the SSW-04 operation, but they are recommended for SCR protection.

The transformer "T" is optional and must be utilized when the line voltage is different than the electronics and fan voltage.

For the integral motor protection it's recommended to install one or more thermostats in the motor. If the thermostat is not used, the external input error (DI3) from SSW-04 must be connected to +Vcc.

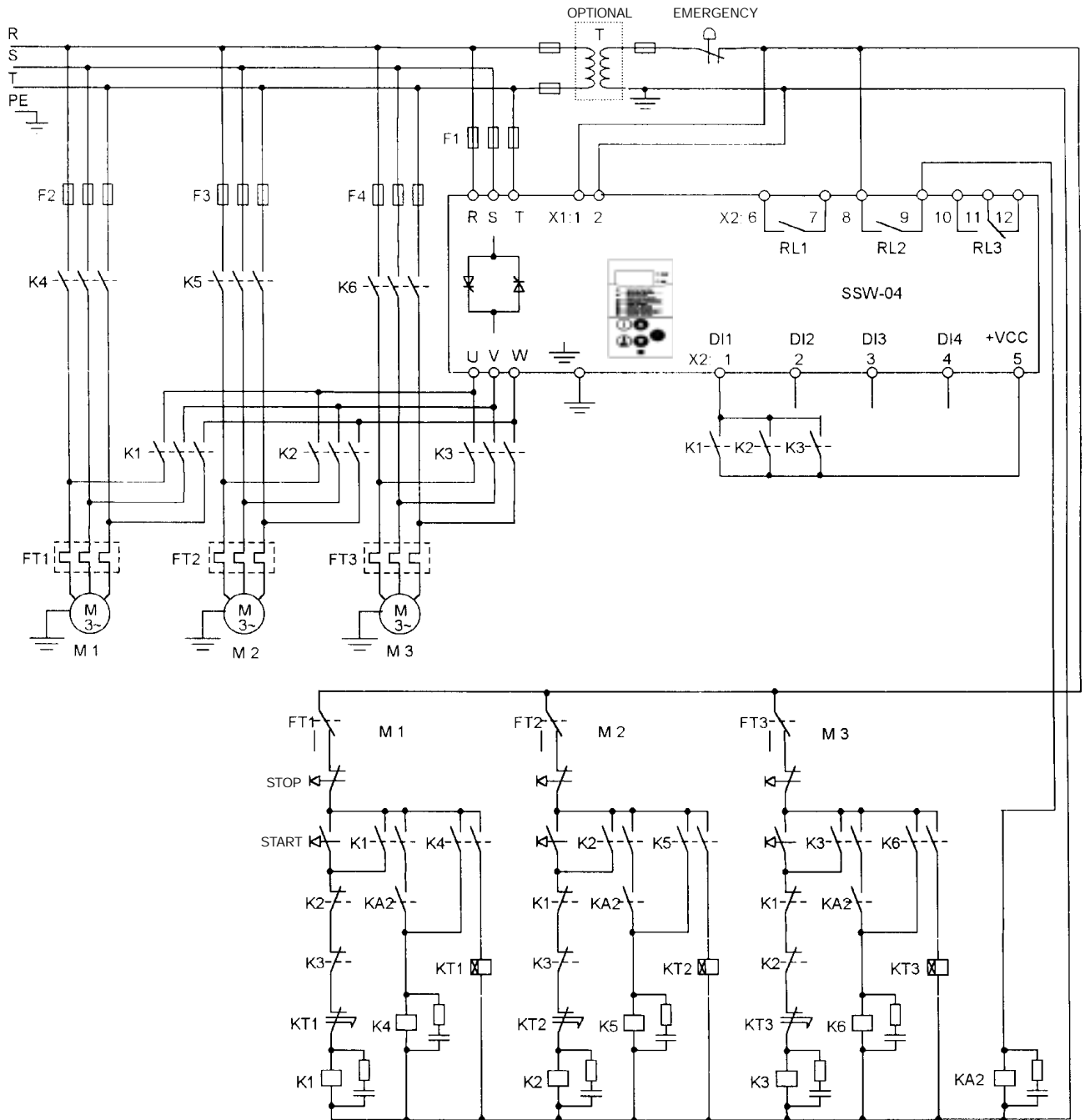


NOTE!

A contactor in the mains input (see 9.4) is necessary to protect the motor in case there is a phase failure which is caused by damage in the SSW-04 power circuit.

Connect the PC or PLC to control board via connector X3 (RS 232C).

9.9 - RECOMMENDED APPLICATION WITH TERMINALS FOR THREE WIRE CONTROL FOR SEVERAL MOTORS



Obs.: It's necessary to use normal fuses or breaker to protect the installation. Ultra-Fast fuses are not necessary for the SSW-04 operation, but they are recommended for SCR protection. The transformer "T" is optional and must be utilized when the line voltage is different than the electronics and fan voltage.

For the integral motor protection it's recommended to install one or more thermostats in the motor. If the thermostat is not used, the external input error (DI3) from SSW-04 must be connected to + Vcc.

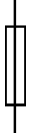

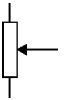
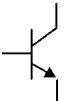
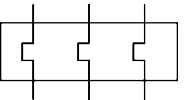
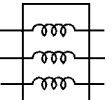
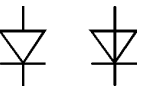
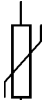
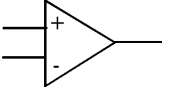
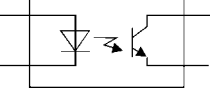
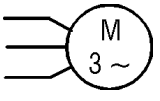

Motor fuses are normal.

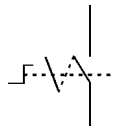
Install one overload relay to each motor.

The Soft-Starter must be selected for a complete start cycle.

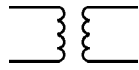
9.10 - SYMBOLS

| | |
|--|---|
| | Electrical Connection between two signals |
| | Boundary Equipment |
| | Terminals for Connection |
| | Signal Shielding |
| | $A + B = C$ |
| | Coil - relay, contactor |
| | Normally Open Contact (NO) |
| | Normally Closed Contact (NC) |
| | Indicator light |
| | Resistor |
| | Capacitor |

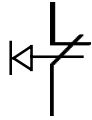
| | |
|---|-----------------------|
|  | Fuse |
|  | Thyristor/SCR |
|  | Potentiometer |
|  | Bipolar Transistor |
|  | Thermal Relay |
|  | Three-Phase Reactor |
|  | Diode |
|  | Varistor (MOV) |
|  | Operational Amplifier |
|  | Optocoupler |
|  | Three-Phase Motor |
|  | Emergency button |



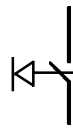
Reversible switch



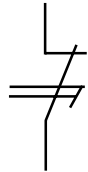
Transformer



Normally closed pushbutton



Normally open pushbutton



Delay time contact

WARRANTY TERMS
FOR SOFT-STARTERS
SSW-04

WEG INDÚSTRIAS LTDA - AUTOMAÇÃO

WEG Indústrias Ltda - Automação established at Av. Prefeito Waldemar Gubba No. 3000 in Jaraguá do Sul – Santa Catarina – Brazil - warrants WEG Soft-Starters against defects in workmanship and materials under the following conditions:

- 1.0 - For the effectiveness of this warranty it is essential that the purchaser inspects carefully the purchased soft-starter, immediately after receipt, checking its characteristics and following its installation, adjustments, operation and maintenance instructions. The soft-starter will be considered as accepted and approved automatically by the purchaser, when the purchaser does not give written notice within max. five days after the receipt of the product about verified non-conformities.
- 2.0 - The warranty period is for twelve months from the invoice date of the equipment issued by WEG or its authorized distributor, but limited to twenty four months from the manufacturing date, that is indicated on the product name plate.
- 3.0 - In case the soft-starter fails to function or operate incorrectly during the warranty time, the warranty services will be carried out, at WEG discretion, at its head office in Jaraguá do Sul – SC, or at WEG Authorized Repair Shops.
- 4.0 - The failed product must be available to the supplier for a required period to detect the cause of the failure and to make the corresponding repairs
- 5.0 - WEG Automação, or its Authorized Repair Shops will analyze the returned soft-starter and when the existence of the failure covered by the warranty is proved, it will repair, modify or replace, at its discretion, the defective soft-starter without cost to the purchaser, except as indicated in Item 7.0.
- 6.0 - The present warranty responsibility is limited only to repairs, changes or replacement of the supplied soft-starter. WEG will have no obligation or liability whatsoever to people, third parties, other equipments or installations, including without limitation, any claims for loss of profits, consequential damages or labor costs.

- 7.0 - Other expenses as freights, packing, disassembling/assembling and parameter setting costs will be paid exclusively by the purchaser, including all fees, ticket, accommodation and meals expenses for technical personnel, when needed and/or requested by the customer.
- 8.0 - The present warranty does not cover the normal wear of the product or equipment, neither damages resulting from incorrect or negligent operation, incorrect parameter setting, improper maintenance or storage, operation out the technical specification, bad installation quality, or operated in ambient with corrosives gases or with harmful electrochemical, electrical, mechanical or atmospheric influences.
- 9.0 - This warranty does not cover parts or components that are considered to wear, such as rubber or plastic parts, incandescent bulbs, fuses, etc.
- 10.0 - This warranty will be cancelled automatically, independently of any previous written notice or not, when the purchaser, without previous written authorization by WEG, makes or authorizes third parties to make any changes or repair on the product or equipment that failed during the warranty period.
- 11.0 - Repairs, changes, or replacements due to manufacturing defects will not stop nor extend the period of the existing warranty term.
- 12.0 - Any request, complaint, communication, etc. related to the product under warranty, servicing, start-up, etc., shall be send in writing to the following address: WEG Automação, Att.: Servicing Department, Av. Prefeito Waldemar Grubba, 3000, 89256-900-Jaraguá do Sul – SC – Brazil, Fax 0055 47 3724200, e-mail: astec@weg.com.br
- 13.0 - The Warranty granted by WEG Automação is conditioned by the observation of this warranty term that is the only valid warranty term for the good.