Soft-Starter

SSW900

User's Manual



User's Manual

Series: SSW900

Language: English

Document: 10005616165 / 06

Publication Date: 10/2020

The information below describes the revisions made to this manual.

Version	Revision	Description
-	R00	First edition
-	R01	General revision
-	R02	General revision
-	R02	General revision
-	R03	General revision
-	R04	Inclusion of the frame E
-	R05	Inclusion of the frames F and G and general revision
-	R06	Inclusion of the 690 V line and general revision

1 SAFETY INSTRUCTIONS 1

1.1. SAFETY NOTICES IN THE MANUAL 1
1.2. SAFETY NOTICES ON THE PRODUCT 1
1.3. PRELIMINARY RECOMMENDATIONS 2

2 GENERAL INFORMATION 3

2.1. ABOUT THIS MANUAL 3
2.2. ABOUT THE SSW900 4
2.3. SOFT-STARTER SSW900 IDENTIFICATION 4
2.4. HOW TO SPECIFY THE SSW900 MODEL (SMART CODE) 5
2.5. RECEIVING AND STORAGE 6

3 INSTALLATION AND CONNECTION 7

3.1. MECHANICAL INSTALLATION 7
3.1.1. Environmental Conditions 7
3.1.2. Soft-Starter SSW900 Dimensions 7
3.1.3. Mounting Specifications 8
3.1.4. Mounting inside a Panel 9
3.1.5. Mounting on a Surface 10
3.2. ELECTRICAL INSTALLATION 10
3.2.1. Power Terminals 10
3.2.2. Recommended Power and Grounding Cables - IEC 15
3.2.3. Recommended Power and Grounding Cables - UL 16
3.2.4. Connection of the Supply to the SSW900 18
3.2.5. Short Circuit Capacity – Tested at UL 18
3.2.6. Input Circuit Breakers and Fuses 20
3.2.7. Main Input Contactor or Circuit Breaker 25
3.2.8. Bypass Contactor 25
3.2.9. Connection of the SSW900 to the motor 25
3.2.10. Standard Three-Wire Connection of the SSW900 to the Motor 27
3.2.11. Grounding Connections 29
3.2.12. User's Signal and Control Connections 29
3.3. INSTALLATION IN COMPLIANCE WITH STANDARD EN60947-4-2 34
3.4. RECOMMENDED SET-UPS 34
3.4.1. Commands via HMI and Power Isolation Contactor 35
3.4.2. Commands via Digital Inputs and Power Isolation Circuit Breaker 36
3.4.3. Commands via Digital Inputs and Power Isolation Contactor 37
3.4.4. Commands via Digital Inputs and Inside Delta Motor Connection 38
3.4.5. Commands via Digital Inputs and External Bypass Contactor 39
3.4.6. Commands via Digital Inputs, Optimal Braking and DC Braking 40
3.4.7. Command via Digital Inputs and Reverse Braking 41
3.4.8. Command via Digital Inputs and Change of Direction of Rotation 42

4 POWER-UP AND START-UP 43

4.1. POWER-UP PREPARATION 43
4.2. INITIAL POWER-UP 43
4.3. START-UP 44

5 TROUBLESHOOTING AND MAINTENANCE 45

5.1. ACTUATION OF PROTECTIONS, FAULTS AND ALARMS 45
5.2. FREQUENT PROBLEMS 46
5.3. PREVENTIVE MAINTENANCE 48
5.4. ELECTRONICS FUSE REPLACEMENT 49
5.5. RTC BATTERY REPLACEMENT 49
5.6. INFORMATION NECESSARY TO CONTACT TECHNICAL SUPPORT 49

6 ACCESSORIES 50

6.1. INSTALLATION OF ACCESSORY IN THE SLOT 51
6.2. IP20 KIT 51

6.3. TOUCH PROTECTION KIT 52
6.4. BAR KIT 53

7 TECHNICAL CHARACTERISTICS 54

7.1. POWER DATA 62
7.2. ELECTRONICS DATA 62
7.3. CONSIDERED STANDARDS 63

8 ATTACHMENT 64

8.1. CHANGING THE BUSBARS OF THE FRAME E, F, G 64

1 SAFETY INSTRUCTIONS

This manual contains all necessary information for the correct installation and operation of the SSW900.

It was written to be used by 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 are used in the manual:



DANGER!
The procedures recommended in this warning have the purpose of protecting the user against death, serious injuries and considerable material damage.



ATTENTION!
The procedures recommended in this warning have the purpose of avoiding material damage.



NOTE!
The information mentioned in this warning is important for the proper understanding and good operation of the product.

1.2.SAFETY NOTICES ON THE PRODUCT

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



High voltages present.



Components sensitive to electrostatic discharges.
Do not touch them.



Mandatory connection to the protection earth (PE).



Connection of the shield to the ground.

1.3.PRELIMINARY RECOMMENDATIONS



DANGER!
Only qualified personnel familiar with the SSW900 and associated equipment should plan or implement the installation, start-up and maintenance of this equipment.
These personnel must follow all the safety instructions included in this manual and/or defined by local regulations.
Failure to follow these safety instructions may result in personnel injury and/or equipment damage.



NOTES!
For the purposes of this manual, qualified personnel are those trained to be able to:
1. Install, ground, energize and operate the SSW900 according to this manual and the effective legal safety procedures.
2. Use protective equipment according to the established standards.
3. Give first aid services.



DANGER!
Always disconnect the main power supply before touching any electrical component associated with the SSW900.
High voltages and spinning parts (fans) may be present even after switching off the power supply. Wait at least 3 minutes for the complete discharge of the capacitors and until the fans stopped.
Always connect the equipment frame to the protection earth (PE) at the proper 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 any high voltage test on the SSW900.
If necessary, contact the manufacturer.



NOTE!
Soft-Starter SSW900 can interfere with other electronic equipment. Follow the measures in Chapter 3 to reduce these effects.



NOTE!
Read this manual completely before installing or operating the SSW900.

2 GENERAL INFORMATION

2.1.ABOUT THIS MANUAL

This manual presents the necessary information for the installation and commissioning, as well as the product main technical characteristics, and how to troubleshoot the SSW900 most common problems.

This manual must be used together with the SSW900 programming manual.



ATTENTION!

The operation of this equipment requires installation instructions and detailed operation provided in the user's manual, programming manual and communication manuals.

The User's Manual is provided in a hard copy together with the soft-starter SSW900.

The guides are provided in print with their respective accessory. The other manuals are only supplied in electronic format on WEG's website – www.weg.net

For information on the accessories and operation conditions, refer to the following manuals:

- Modbus RTU communication manual.
- Anybus communication manual specific for the protocol used.

Reproduction of this manual content is prohibited, as a whole or in parts, without written permission from WEG.

2.2.ABOUT THE SSW900

The “Soft-Starter WEG 900” is a high-performance product that allows the starting/stopping control and protection of three-phase induction motors. Thus, it prevents mechanical shocks on the load, current peaks in the supply line and damage to the motor.

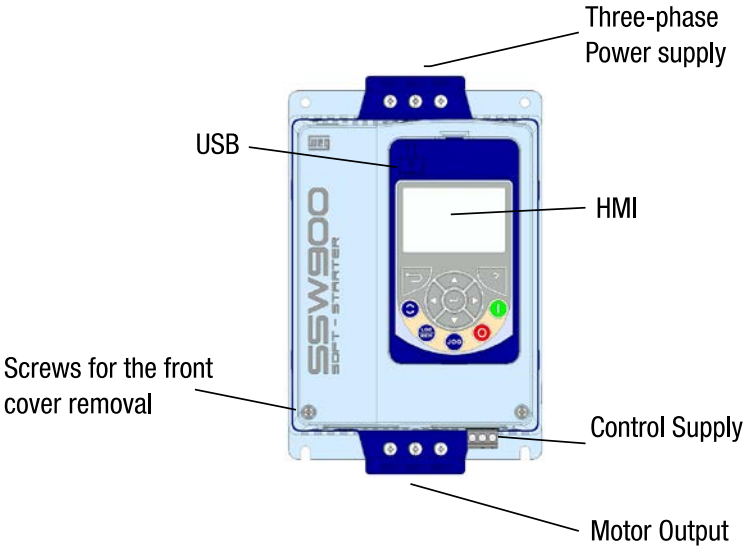


Figure 2.1: Front view of the SSW900

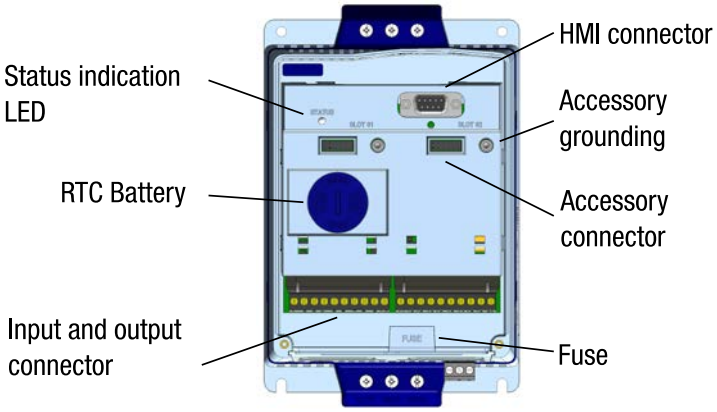


Figure 2.2: Access to the control of the SSW900

2.3.SOFT-STARTER SSW900 IDENTIFICATION



Figure 2.3: Soft-Starter SSW900 identification plate

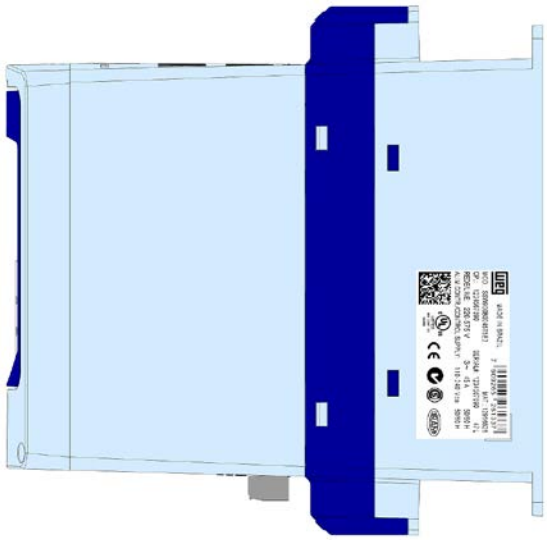


Figure 2.4: Position of the label on the SSW900

2.4.HOW TO SPECIFY THE SSW900 MODEL (SMART CODE)

Table 2.1: Smart code

SSW900	_	_ _ _ _	T _	E _	_ _	_ _
Soft-starter WEG Series	Frame Size	Rated Current	Three-phase Rated Voltage of the Power	Rated Voltage of the Electronics	Special hardware	Special software
SSW900	A	0010 = 10 A 0017 = 17 A 0024 = 24 A 0030 = 30 A	T5 = 220 to 575 V T6 = 380 to 690 V standard connection three cables	E2 = 110–240 V	Hx = reserved	Sx = special
	B	0045 = 45 A 0061 = 61 A 0085 = 85 A 0105 = 105 A				
	C	0130 = 130 A 0171 = 171 A 0200 = 200 A				
	D	0255 = 255 A 0312 = 312 A 0365 = 365 A 0412 = 412 A	T5 = 220 to 500 V T6 = 380 to 575 V inside delta motor connection six cables	E3 = 110–130 V E4 = 220–240 V		
	E	0480 = 480 A 0604 = 604 A 0670 = 670 A				
	F	0820 = 820 A 0950 = 950 A				
	G	1100 = 1100 A 1400 = 1400 A				

Example:
SSW900A0017T5E2
Soft-starter WEG series: SSW900
Frame size: A
Rated current: 17 A
Three-phase rated voltage of the power: 220 to 575 V
Rated voltage of the electronics: 110 to 240 V

2.5.RECEIVING AND STORAGE

The SSW900 is supplied package in a cardboard box.
On the outside of the package there is an identification plate which is identical to the one placed on the Soft-Starter SSW900.

To open the package:
1- Place the package on a table;
2- Open the package;
3- Take out the SSW900.

Check if:
- The Identification plate of the SSW900 matches the model purchased.
- Damage has occurred during transport. If so, contact the carrier immediately.
- If the SSW900 is not to be installed immediately, store it in its package in a clean and dry place with temperature between -25 ºC and 65 ºC (-13 ºF to 149 ºF).

Table 2.2: Dimensions of the package in mm (in)

Model SSW900	Frame	Height H mm (in)	Width L mm (in)	Depth P mm (in)	Volume cm^3 (in)	Weight kg (lb)
10 A 17 A 24 A 30 A	A	351 (13.82)	220 (8.66)	300 (11.81)	23166 (1414)	2.58 (5.69)
45 A 61 A 85 A 105 A	B	351 (13.82)	220 (8.66)	300 (11.81)	23166 (1414)	4.67 (10.30)
130 A 171 A 200 A	C	410 (16.14)	263 (10.35)	310 (12.2)	33427 (2040)	7.48 (16.49)
255 A 312 A 365 A 412 A	D	500 (19.69)	296 (11.65)	285 (11.22)	42180 (2574)	14.03 (300.93)
480 A 604 A 670 A	E	580 (22.83)	720 (28.35)	600 (23.62)	250560 (15290)	61.50 (135.58)
820 A 950 A	F	1103 (43.43)	801 (31.54)	724 (28.50)	639656 (39034)	118.40 (261.03)
1100 A 1400 A	G	1244 (48.98)	1054 (41.50)	774 (30.47)	1014850 (61930)	163.20 (359.79)

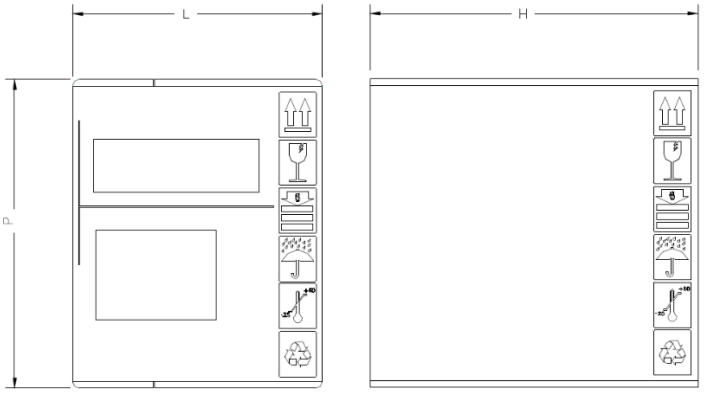


Figure 2.5: Dimensions of the package

3 INSTALLATION AND CONNECTION

This chapter describes the procedures for the electrical and mechanical installation of the Soft-Starter SSW900. The guidelines and suggestions must be observed so as to ensure the safety of people and equipment, and the proper operation of the SSW900.

3.1.MECHANICAL INSTALLATION

3.1.1.Environmental Conditions

The location of the SSW900 is determinant for its proper operation, and for the regular useful life of its parts.

Avoid:
- Direct exposure to sunlight, rain, high moisture and sea air.
- Exposure to explosive or corrosive gases and liquids.
- Excessive vibration.
- Dust or any metallic and/or oil particles in the air.

Allowed Environment Conditions:
- Temperature: -10 ºC to 55 ºC (32 ºF to 131 ºF) - nominal conditions (measured under the SSW900).
  -10 ºC to 55 ºC (14 ºF to 131 ºF) models until 412 A;
  -10 ºC to 40 ºC (14 ºF to 104 ºF) models up 412 A. From 40ºC to 55ºC (104ºF to 131ºF) see item 7 Technical Characteristics;
  Current derating by 2 % for each degree Celsius above the specification of nominal conditions.
- Relative air moisture: 5 % to 90 % with no-condensing.
- Maximum altitude: 1000 m (3281 ft) above sea level - nominal conditions.
  From 1000 m to 4000 m (3281 ft to 13123 ft) above sea level – current derating of 1 % for each 100 m (328 ft) above 1000 m (3281 ft).
  From 2000 m to 4000 m (6562 ft to 13123 ft) above sea level – voltage derating of 1.1 % for each 100 m (328 ft) above 2000 m (6562 ft).
- Pollution degree: 2 (according to UL508). Normally, only non-conductive pollution. Condensation must not cause conduction of the accumulated residues.

3.1.2.Soft-Starter SSW900 Dimensions

The external dimensions and mounting holes are shown in Figure 3.1 and Table 3.1 below.

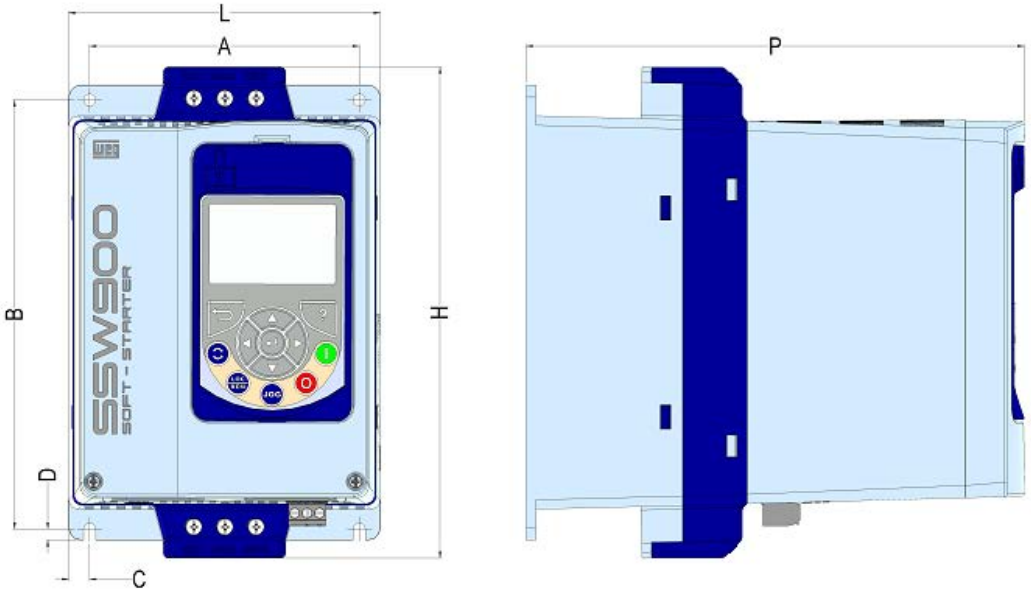


Figure 3.1: SSW900 Dimension

Table 3.1: Data for installation with dimensions in mm (in)

SSW900 Model	Height H mm (in)	Width L mm (in)	Depth P mm (in)	A mm (in)	B mm (in)	C mm (in)	D mm (in)	Mounting Screw	Weight kg (lb)	Degree of Protection
10 A 17 A 24 A 30 A	200 (7.87)	127 (5.00)	203 (7.99)	110 (7.33)	175 (6.89)	8.5 (0.33)	4.3 (0.17)	M4	1.93 (4.25)	IP20
45 A 61 A 85 A 105 A	208 (8.19)	144 (5.67)	260 (10.24)	132 (5.20)	148 (5.83)	6 (0.24)	3.4 (0.13)	M4	4.02 (8.86)	IP20
130 A 171 A 200 A	276 (10.87)	223 (8.78)	261 (10.28)	208 (8.19)	210 (8.27)	7.5 (0.30)	5 (0.20)	M5	6.55 (14.44)	IP00 IP20 (*)
255 A 312 A 365 A 412 A	331 (13.03)	227 (8.94)	282 (11.10)	200 (7.87)	280 (11.02)	15 (0.59)	9 (0.35)	M8	12.83 (28.29)	IP00 IP20 (*)
480 A 604 A 670 A	575 (22.64)	390 (15.35)	260 (10.24)	270 (10.63)	480 (18.90)	56 (2.20)	10 (0.39)	M8	38.00 (83.78)	IP00
820 A 950 A	760 (29.92)	464 (18.27)	316 (12.44)	320 (12.60)	625 (24.61)	72 (2.83)	10 (0.39)	M8	75.40 (166.23)	IP00
1100 A 1400 A	914 (35.98)	539 (21.22)	316 (12.44)	369 (14.53)	732 (28.82)	85 (3.35)	12 (0.47)	M10	107.20 (236.34)	IP00

(*) IP20 with optional kit.

3.1.3.Mounting Specifications

To install the SSW900 leave at least the free spaces surrounding the Soft-Starter as in Table 3.2 below. The dimensions of these free spaces are described in Table 3.2.

Table 3.2: Recommended free spaces

SSW900 Model	Frame	A mm (in)	B mm (in)	C mm (in)
10 A 17 A 24 A 30 A	A	50 (2)	50 (2)	30 (1.2)
45 A 61 A 85 A 105 A	B	80 (3.2)	80 (3.2)	30 (1.2)
130 A 171 A 200 A	C	100 (4)	100 (4)	30 (1.2)
255 A 312 A 365 A 412 A	D	150 (6)	150 (6)	30 (1.2)
480 A 604 A 670 A	E	150 (6)	150 (6)	30 (1.2)
820 A 950 A	F	180 (7.09)	180 (7.09)	30 (1.18)
1100 A 1400 A	G	180 (7.09)	180 (7.09)	30 (1.18)

Install the SSW900 in the vertical position according to the following recommendations:
1 - Install it on a reasonably flat surface;
2 - Do not put heat sensitive components immediately above the SSW900.

ATTENTION!
If you install one SSW900 above the other, use the minimum distance A + B and place the upper SSW900 out of the way of the hot air coming from the lower SSW900.

ATTENTION!
Provide independent conduits or gutters for the physical separation of signal, control, and power cables (Refer to the Section 3.2 Electrical Installation).

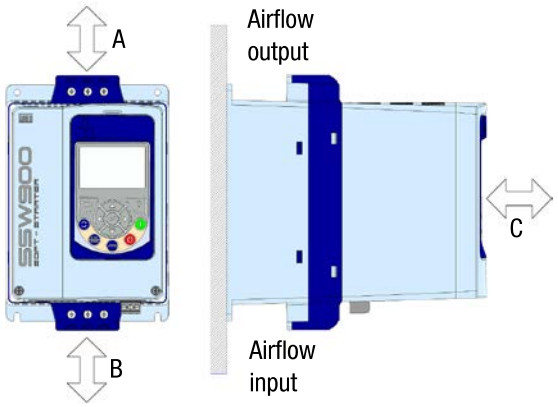


Figure 3.2: Clearances for ventilation

3.1.4.Mounting inside a Panel

For SSW900 units installed inside panels or metallic boxes, provide proper exhaustion so that the temperature remains within the allowed range. Refer to the rated dissipated powers in the following Table 3.3.

Table 3.3: Dissipated powers for sizing the panel fan

Model SSW900	Dissipated Power in the Bypass W	Total Dissipated Power in the Ciclo W	Duty Cicle	Maximum Air Temperature Inside Panel
10 A	34	54	10 starts / hour 3 x In @ 30 s	55 °C (131 °F)
17 A	41	91		
24 A	51	140		
30 A	63	196		
45 A	33	77		
61 A	35	102		
85 A	41	123		
105 A	46	146		
130 A	54	186		
171 A	57	223		
200 A	67	274		
255 A	42	312		
312 A	48	410		
365 A	55	443		
412 A	62	489		
480 A	80	351	5 starts / hour 3 x In @ 30 s	40 °C (104 °F)
604 A	109	444		
670 A	127	479		
820 A	102	519		
950 A	126	638		
1100 A	159	682		
1400 A	239	973		

3.1.5.Mounting on a Surface

Table 3.3 presents the installation of the SSW900 on the surface of a mounting plate.

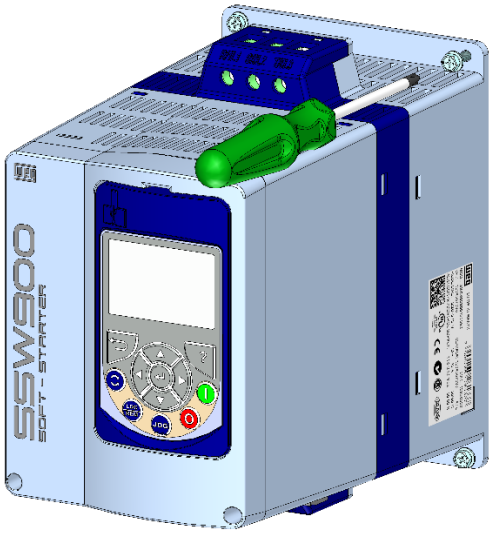


Figure 3.3: Installation procedures of the Soft-Starter SSW900 on a surface

3.2.ELECTRICAL INSTALLATION

ATTENTION!
The following information is a guide for the proper installation. Follow also the applicable local standards for electrical installations.

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

DANGER!
The SSW900 cannot be used as an emergency stop device.

DANGER!
On the first power-up, if a contactor or circuit breaker for power isolation with minimum voltage coil is not used, at the first power on, then power up the electronics first, adjust the trimpots that are necessary to put the SSW900 into operation and only after this energize the power section.

3.2.1.Power Terminals

The power terminal blocks vary in size and configuration, depending on the SSW900 soft-starter model, as can be observed at the Figure 3.4 to Figure 3.7 and Table 3.4.

Connection to the supply line: R / 1L1, S / 3L2 and T / 5L3
Motor connection: U / 2T1, V / 4T2 and W / 6T3

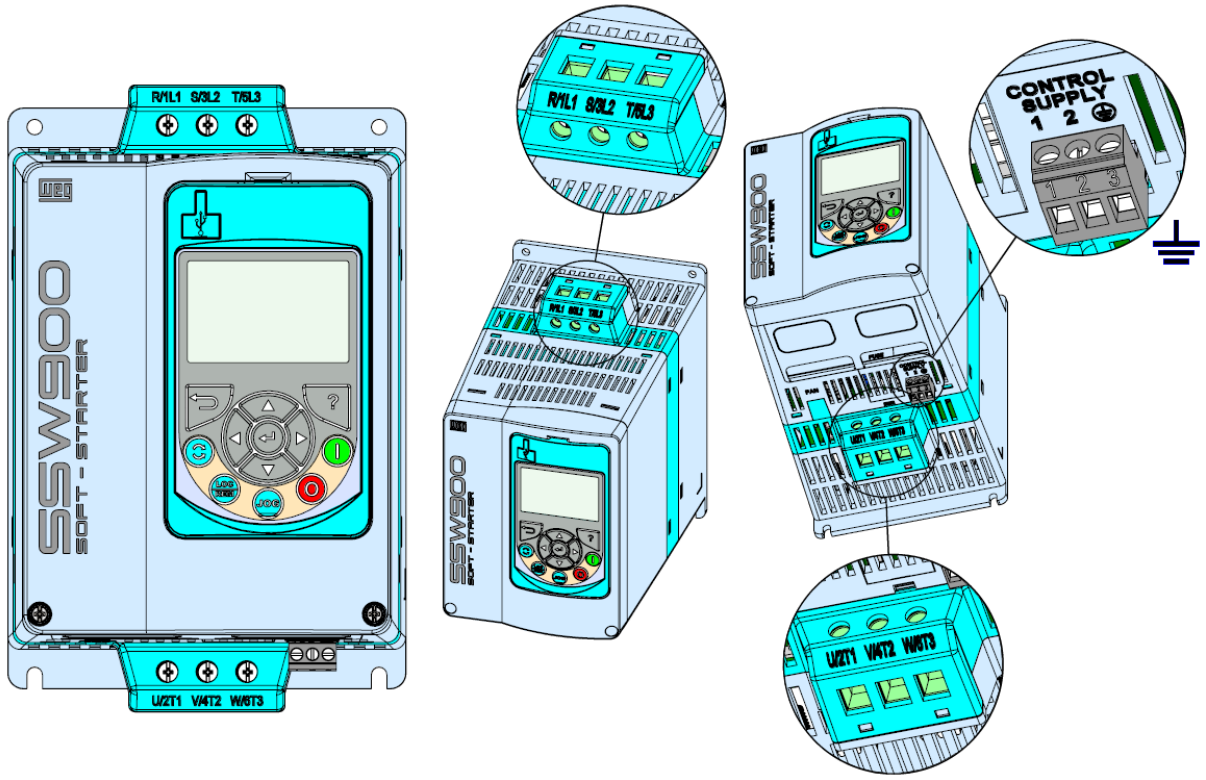


Figure 3.4: Power and grounding terminals, frame A

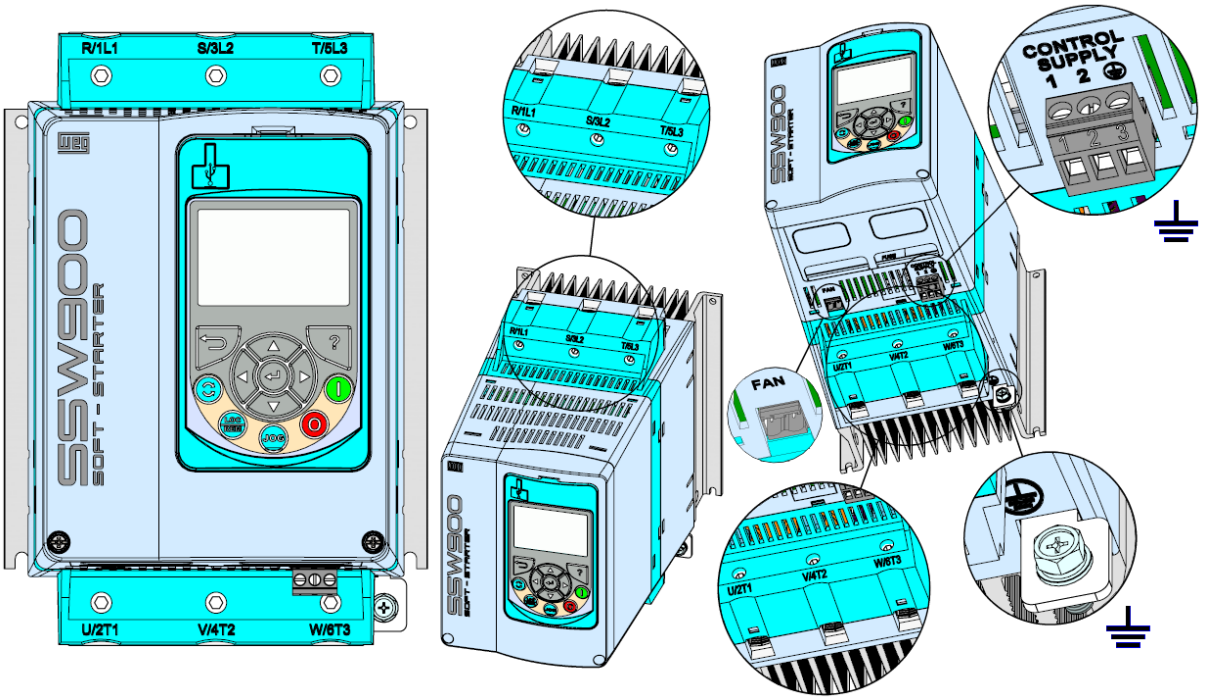


Figure 3.5: Power and grounding terminals, frame B

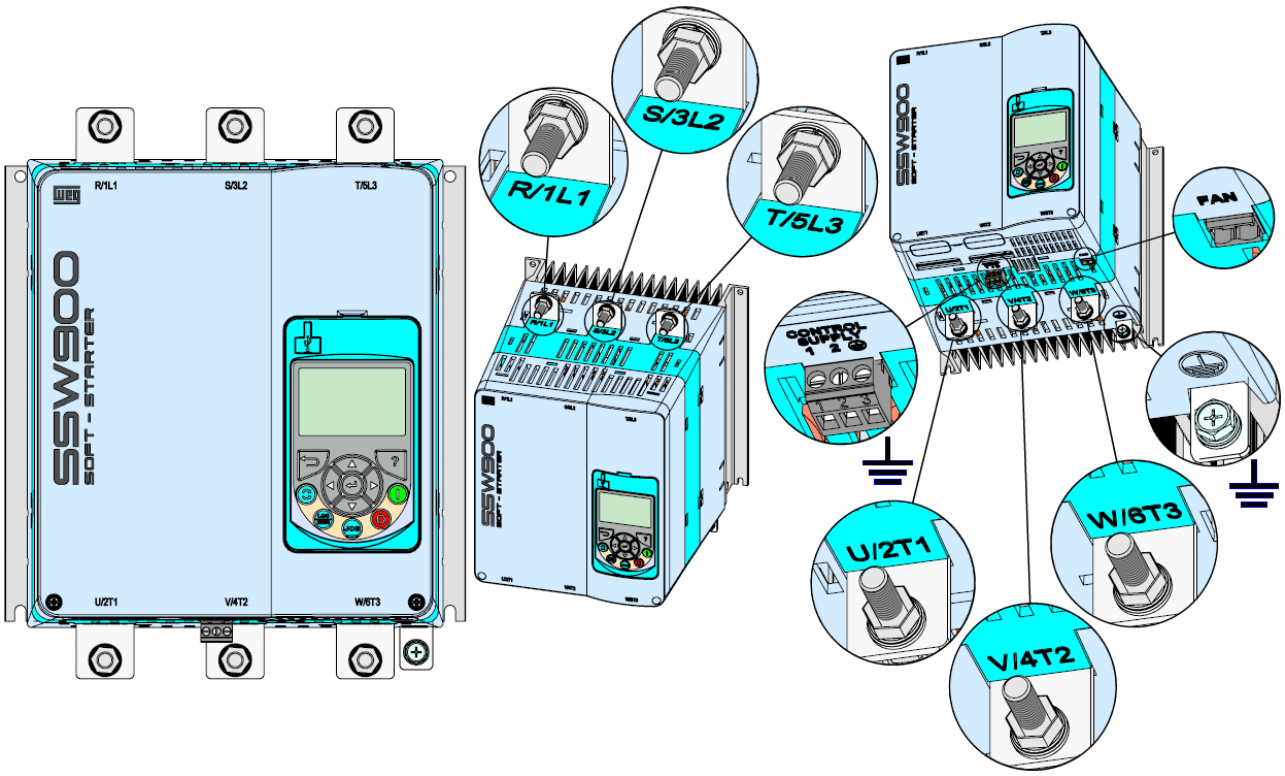


Figure 3.6: Power and grounding terminals, frame C

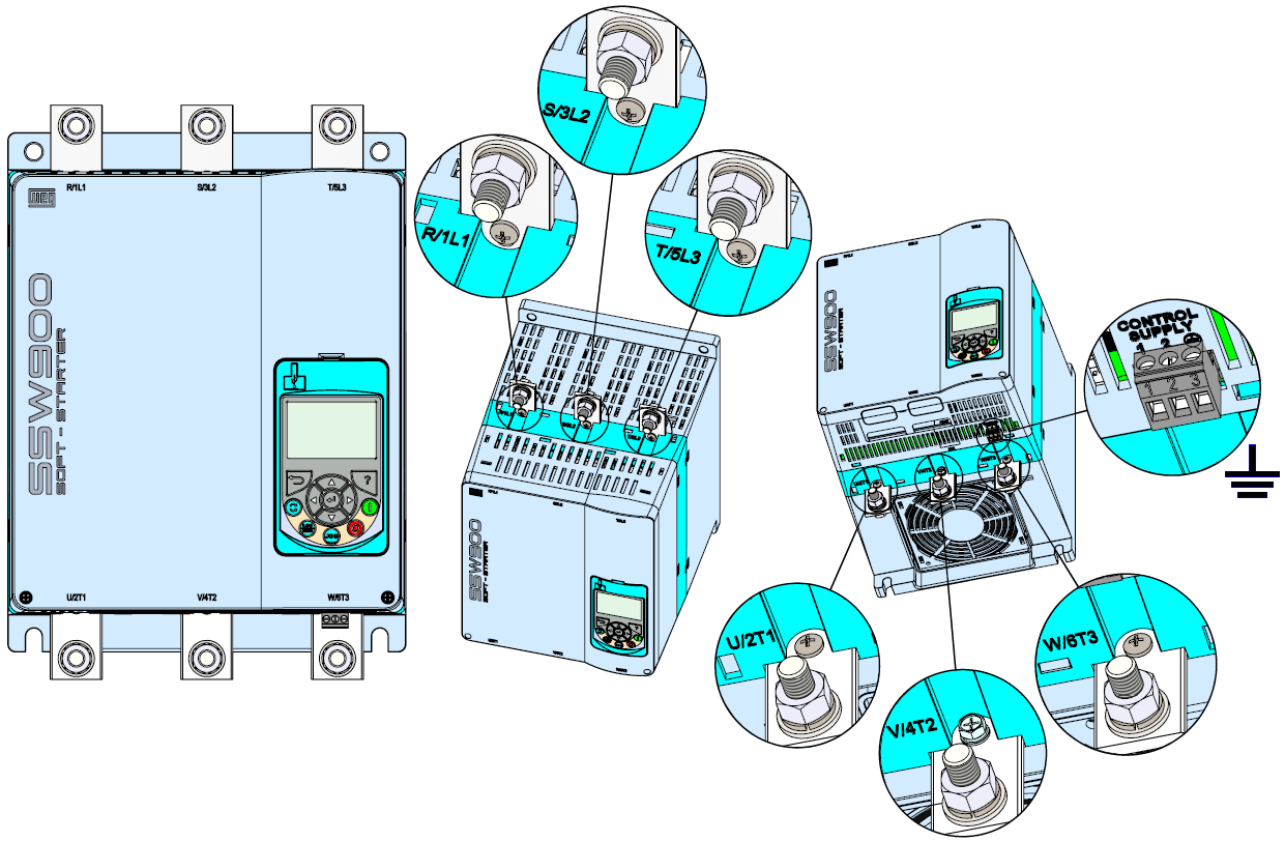


Figure 3.7: Power and grounding terminals, frame D

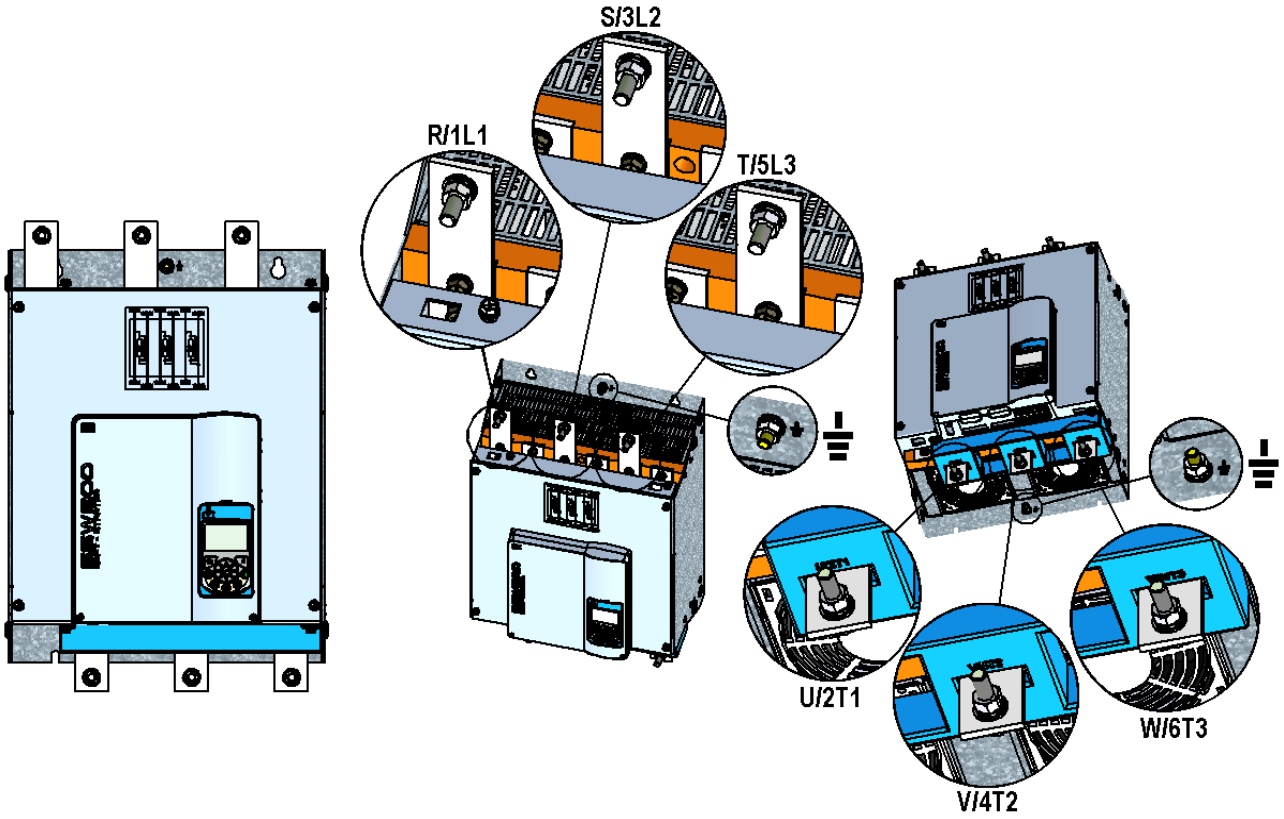


Figure 3.8: Power and grounding terminals, frame E

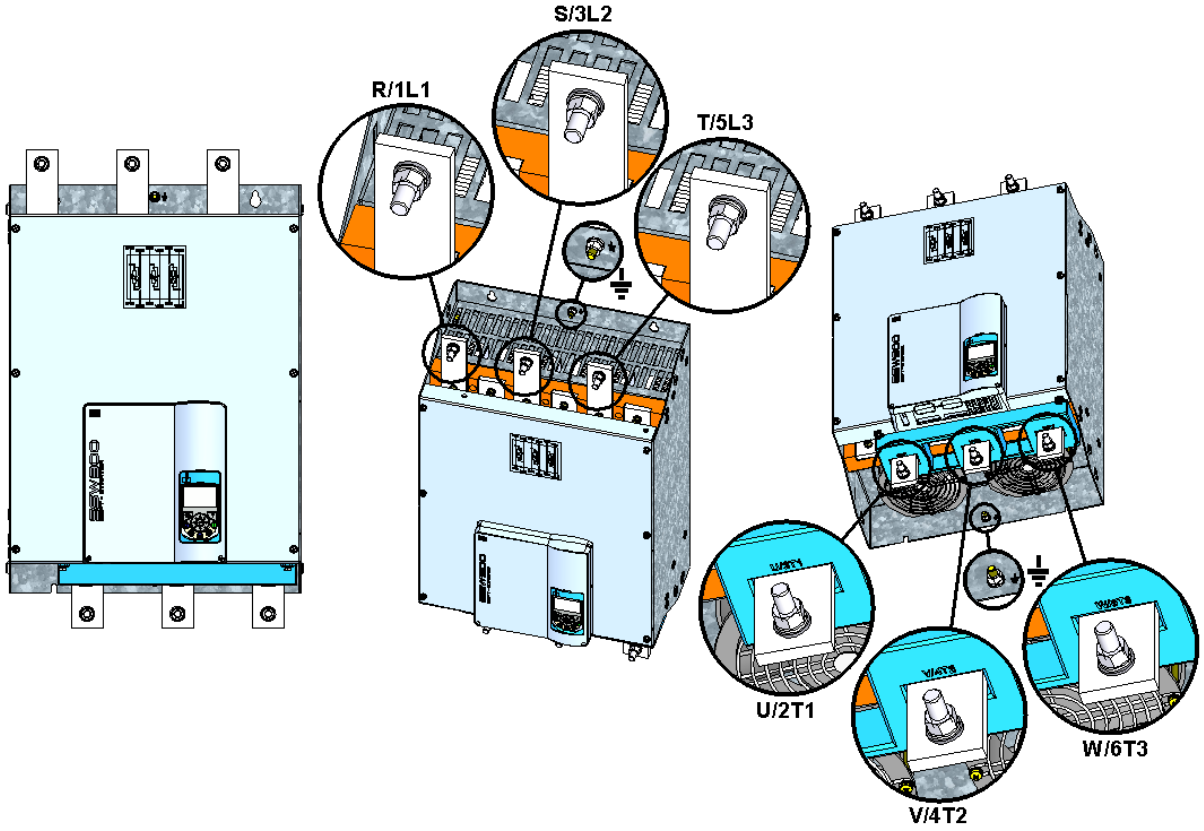


Figure 3.9: Power and grounding terminals, frame F

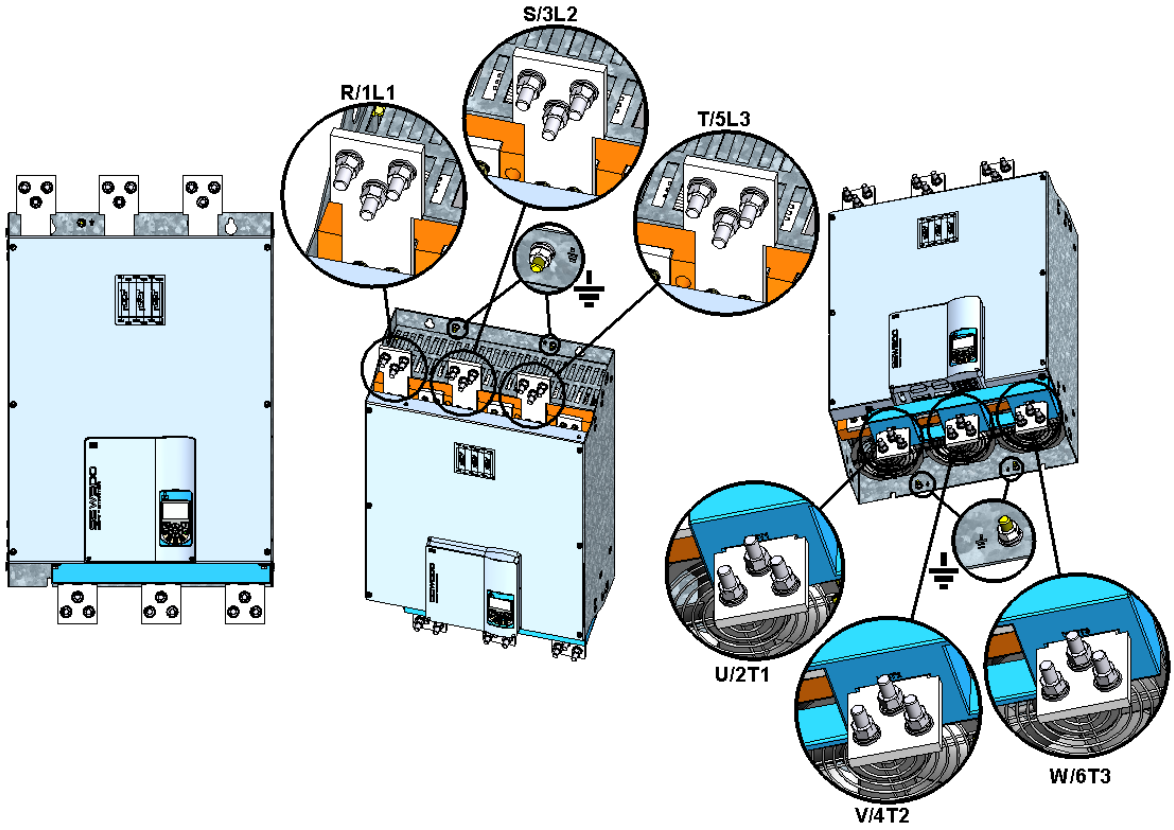


Figure 3.10: Power and grounding terminals, frame G

Table 3.4: Maximum torque for power connection

Model SSW900	Frame	Power Supply Line / Motor		Grounding - Control		Grounding - Heatsink	
		Screw / Terminal	Torque Nm (lbf·in)	Terminal	Torque Nm (lbf·in)	Terminal	Torque Nm (lbf·in)
10 A 17 A 24 A 30 A	A	Terminal	1.5 (27)	Terminal	0.5 (4.5)	-	-
45 A 61 A 85 A 105 A	B	Terminal	5.5 (49)	Terminal	0.5 (4.5)	M5 (3/16”)	6 (53)
130 A 171 A 200 A	C	M8 (5/16”)	19 (168)	Terminal	0.5 (4.5)	M6 (1/4”)	8.3 (73)
255 A 312 A 365 A 412 A	D	M10 (3/8”)	37 (328)	Terminal	0.5 (4.5)	-	-
480 A 604 A 670 A	E	M10 (3/8”)	37 (328)	Terminal	0.5 (4.5)	M8 (5/16”)	15 (132)
820 A 950 A	F	M12 (1/2”)	45 (398)	Borne	0.5 (4.5)	M8 (5/16”)	15 (132)
1100 A 1400 A	G	M12 (1/2”)	45 (398)	Borne	0.5 (4.5)	M8 (5/16”)	15 (132)

3.2.2.Recommended Power and Grounding Cables - IEC

The described specifications in Table 3.5 and Table 3.6 are valid only for the following conditions:

- Copper wires for 70 °C (158 ºF) with PVC insulation, ambient temperature of 40 °C (104 ºF), installed in vertical or horizontal perforated channels, with the cables arranged in a single layer.
- Naked or silver coated copper busbars with round edges with 1 mm radius with ambient temperature of 40 ºC (104 ºF) and bus temperature of 80 °C (176 °F).

NOTE!
For correct cable sizing, take into account the installation conditions, the maximum permitted line voltage drop accepted, and follow the electrical instructions defined by local regulations.

Table 3.5: Recommended cables and busbar for standard connection - IEC

Model SSW900	Current 100 % In A	C2 Cables mm²	C2 Busbar mm x mm	Ground Cables	
				Power mm²	Control mm²
10 A	10	2.5	-	-	2.5
17 A	17	2.5	-	-	2.5
24 A	24	4	-	-	2.5
30 A	30	6	-	-	2.5
45 A	45	10	-	6	2.5
61 A	61	16	-	10	2.5
85 A	85	25	-	10	2.5
105 A	105	35	-	25	2.5
130 A	130	50	20 x 3	25	2.5
171 A	171	70	20 x 3	35	2.5
200 A	200	95	20 x 3	50	2.5
255 A	255	120	25 x 5	-	2.5
312 A	312	150	25 x 5	-	2.5
365 A	365	185	25 x 5	-	2.5
412 A	412	240	30 x 5	-	2.5
480 A	480	300	40 x 5	120	2.5
604 A	604	2 x 120	40 x 10	150	2.5
670 A	670	2 x 150	40 x 10	150	2.5
820 A	820	2 x 240	40 x 10	240	2.5
950 A	950	2 x 300	50 x 10	300	2.5
1100 A	1100	3 x 240	60 x 10	2 x 120	2.5
1400 A	1400	3 x 300	80 x 10	2 x 150	2.5

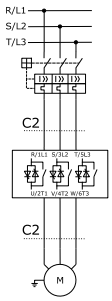
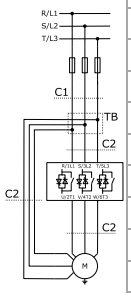


Table 3.6: Recommended cables and busbar for delta inside motor connection - IEC



Model SSW900	Current 100 % In A	C1 Line Cables mm²	C1 Line Busbar mm x mm	C2 Motor Cables mm²	C2 Motor Busbar mm x mm	Ground Cables	
						Power mm²	Power mm²
130 A	225	95	20 x 3	50	20 x 3	25	2.5
171 A	296	150	25 x 5	70	20 x 3	35	2.5
200 A	346	185	25 x 5	95	20 x 3	50	2.5
255 A	441	300	30 x 5	120	25 x 5	-	2.5
312 A	540	2 x 120	40 x 5	185	25 x 5	-	2.5
365 A	631	2 x 150	40 x 10	240	25 x 5	-	2.5
412 A	713	2 x 185	40 x 10	240	30 x 5	-	2.5
480 A	831	2 x 240	40 x 10	300	40 x 5	120	2.5
604 A	1046	2 x 300	60 x 10	2 x 120	40 x 10	150	2.5
670 A	1160	3 x 240	60 x 10	2 x 150	40 x 10	150	2.5
820 A	1420	3 x 300	80 x 10	2 x 240	40 x 10	240	2.5
950 A	1645	4 x 240	100 x 10	2 x 300	50 x 10	300	2.5
1100 A	1905	4 x 300	120 x 10	3 x 240	60 x 10	2 x 120	2.5
1400 A	2425	6 x 300	160 x 10	3 x 300	80 x 10	2 x 150	2.5

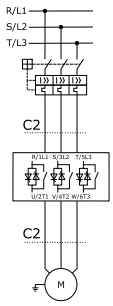
NOTE!
Do not shunt power cables on the SSW900 terminals. Use “TB - terminal blocks” to shunt the power cables.

NOTE!
For the connection of the external bypass contactor, use the same cable or busbar used in the motor connection.

3.2.3.Recommended Power and Grounding Cables - UL

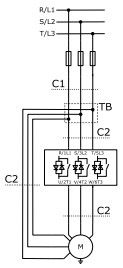
NOTE!
For correct cable sizing, take into account the installation conditions, the maximum permitted line voltage drop accepted, and follow the electrical instructions defined by local regulations.

Table 3.7: Recommended cables and busbar for standard connection - UL



Model SSW900	Current 100 % In A	C2 Cables AWG	C2 Busbar in x in	Grounding Cables	
				Power AWG	Control AWG
10 A	10	14	-	-	14
17 A	17	12	-	-	14
24 A	24	10	-	-	14
30 A	30	10	-	-	14
45 A	45	8	-	10	14
61 A	61	6	-	8	14
85 A	85	4	-	8	14
105 A	105	2	-	4	14
130 A	130	1/0	3/4 x 1/16	4	14
171 A	171	2/0	3/4 x 1/8	1	14
200 A	200	3/0	3/4 x 1/8	1/0	14
255 A	255	250 kcmil	3/4 x 1/4	-	14
312 A	312	350 kcmil	3/4 x 1/4	-	14
365 A	365	500 kcmil	1 x 1/4	-	14
412 A	412	600 kcmil	1 x 1/4	-	14
480 A	480	2 x 250 kcmil	1 x 1/2	250 kcmil	14
604 A	604	2 x 350 kcmil	1 1/4 x 1/2	350 kcmil	14
670 A	670	2 x 400 kcmil	1 1/2 x 1/2	400 kcmil	14
820 A	820	2 x 600 kcmil	1 1/2 x 1/2	600 kcmil	14
950 A	950	2 x 750 kcmil	1 3/4 x 1/2	750 kcmil	14
1100 A	1100	3 x 500 kcmil	2 x 1/2	2 x 400 kcmil	14
1400 A	1400	3 x 750 kcmil	3 x 1/2	2 x 600 kcmil	14

Table 3.8: Recommended cables and busbar for delta inside motor connection – UL



Model SSW900	Current 100 % In A	C1 Line Cables AWG	C1 Line Busbar in x in	C2 Motor Cables AWG	C2 Motor Busbar in x in	Grounding Cables	
						Power AWG	Power AWG
130 A	225	250 kcmil	3/4 x 1/8	1/0	3/4 x 1/16	4	14
171 A	296	350 kcmil	3/4 x 1/4	2/0	3/4 x 1/8	1	14
200 A	346	500 kcmil	1 x 1/4	3/0	3/4 x 1/8	1/0	14
255 A	441	700 kcmil	1 x 1/4	250 kcmil	3/4 x 1/4	-	14
312 A	540	2 x 300 kcmil	1 x 1/2	350 kcmil	3/4 x 1/4	-	14
365 A	631	2 x 400 kcmil	1 1/4 x 1/2	500 kcmil	1 x 1/4	-	14
412 A	713	2 x 500 kcmil	1 1/4 x 1/2	600 kcmil	1 x 1/4	-	14
480 A	831	2 x 600 kcmil	1 1/4 x 1/2	2 x 250 kcmil	1 x 1/2	250 kcmil	14
604 A	1046	3 x 500 kcmil	2 x 1/2	2 x 350 kcmil	1 1/4 x 1/2	350 kcmil	14
670 A	1160	3 x 600 kcmil	2 x 1/2	2 x 400 kcmil	1 1/2 x 1/2	400 kcmil	14
820 A	1420	3 x 750 kcmil	3 x 1/2	2 x 600 kcmil	1 1/2 x 1/2	600 kcmil	14
950 A	1645	-	4 x 1/2	2 x 750 kcmil	1 3/4 x 1/2	750 kcmil	14
1100 A	1905	-	4 x 1/2	3 x 500 kcmil	2 x 1/2	2 x 400 kcmil	14
1400 A	2425	-	5 x 1/2	3 x 750 kcmil	3 x 1/2	2 x 600 kcmil	14

NOTE!
Do not shunt power cables on the SSW900 terminals. Use “TB - terminal blocks” to shunt the power cables.

NOTE!
For the connection of the external bypass contactor, use the same cable or busbar used in the motor connection.

3.2.4.Connection of the Supply to the SSW900

DANGER!
The AC input must be compatible with the voltage range of the SSW900.

DANGER!
Provide a power supply disconnecting switch for the SSW900. This disconnecting switch must disconnect the AC input voltage to the SSW900 whenever necessary (for example: during maintenance services).
If a disconnected switch or a contactor is inserted in the motor supply line never operate these devices with the motor running or when the SSW900 is enabled.

ATTENTION!
The overvoltage control in the line that feeds the soft-starter must be done using overvoltage suppressors with a clamping voltage of 680 Vac (phase-to-phase connection) and an energy absorption capability of 40 joules (models from 10 A to 200 A) and 80 joules (models from 255 A to 670 A).

NOTE!
See recommended cables in Item 3.2.2.
See tightening torque in Item 3.2.1.

3.2.5.Short Circuit Capacity – Tested at UL

Table 3.9 presents the short circuit capacity of the power supply (symmetric Arms) at which the SSW900 can be installed within a closed panel, standard connection, provided that protected by means of regular fuses or circuit breakers, used in the UL tests.

Table 3.9: Short circuit capacity standard connection - UL

Model SSW900	Standard Connection 220-575V kA	Q1 Circuit Breaker UL489 A	F1 Fuse Time-delay A	Minimal Panel Dimensions		
				Height mm	Width mm	Depth mm
10 A	5	< 30	50	800	600	300
17 A	5	< 30	50	800	600	300
24 A	5	< 40	50	800	600	300
30 A	5	< 40	50	800	600	300
45 A	5	< 150	125	800	600	300
61 A	5	< 150	125	800	600	300
85 A	5	< 150	125	800	600	300
105 A	10	< 150	250	800	600	300
130 A	10	< 250	350	800	600	300
171 A	18	< 250	350	1000	600	400
200 A	18	< 250	600	1000	600	400
255 A	30	< 630	700	1000	600	400
312 A	30	< 630	700	1000	600	400
365 A	42	< 630	700	1000	600	400
412 A	42	< 630	1000	1000	600	400
480 A	42	< 1200	1200	1200	900	400
604 A	42	< 1200	1200	1200	900	400
670 A	42	< 1200	1600	1200	900	400
820 A	85	< 2500	2000	1200	1200	600
950 A	85	< 2500	2000	1200	1200	600
1100 A	85	< 2500	2500	2000	1000	600
1400 A	85	< 2500	2500	2000	1000	600

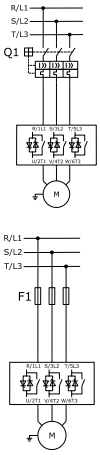
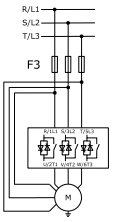


Table 3.10 presents the short circuit capacity of the power supply (symmetric Arms) at which the SSW900 can be installed within a closed panel, motor inside delta connection, provided that protected by means of regular fuses or circuit breakers, used in the UL tests.

Table 3.10: Short circuit capacity delta inside connection - UL

Model SSW900	Current 100 % In A	Delta Inside 220-575V kA	F3 Fuse Time-delay A	Minimal Panel Dimensions		
				Height mm	Width mm	Depth mm
130 A	225	18	350	800	600	300
171 A	296	18	350	1000	600	400
200 A	346	18	600	1000	600	400
255 A	441	42	700	1000	600	400
312 A	540	42	700	1000	600	400
365 A	631	42	700	1000	600	400
412 A	713	42	1200	1000	600	400
480 A	831	85	1600	1200	900	400
604 A	1046	85	1600	1200	900	400
670 A	1160	85	2500	1200	900	400
820 A	1420	100	3500	1200	1200	600
950 A	1645	100	3500	1200	1200	600
1100 A	1905	100	3500	2000	1000	600
1400 A	2425	100	3500	2000	1000	600



NOTE!
Tests with larger short-circuit capacitances are still being conducted.

3.2.6.Input Circuit Breakers and Fuses

Ultra-fast fuses class aR, regular fuses or circuit breakers:

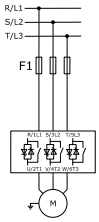
For Coordination Type 1, regular fuses or circuit breakers can be used, according to IEC 60947-4-2, which will protect the installation against short circuits; however, the SCRs will not be protected. Table 3.9 and Table 3.10.

For Coordination Type 2, the fuses to be used in the input must be for protection of semiconductors, ultra-fast class aR, according to IEC 60269-4. They reduce the risk of the SCRs to burn out because of overcurrent transients.

Ultra-fast fuses class aR Weg, recommended in Table 3.11, Table 3.12 and Table 3.14 were sized considering the maximum supply voltage maximum allowable supply voltage for the SSW900 model, started by current limiting control with 300% of the current of the SSW900, start time of 30 seconds, 10 or 5 starts per hour according to the SSW model. For applications other than these conditions, review the design of the fuses.

Table 3.11: Fuses aR Weg per phase for standard connection

Model SSW900	I^2t of the SCR (A^2s)	F1 FNH aR Blade Contacts	F1 FNHFE aR Flush End
10 A	720	1 x FNH000-35K-A / FNH00-40K-A (1)	-
17 A	720	1 x FNH000-40K-A / FNH00-40K-A (1)	-
24 A	4000	1 x FNH000-80K-A / FNH00-80K-A (1)	-
30 A	4000	1 x FNH000-100K-A / FNH00-100K-A (1)	-
45 A	8000	1 x FNH000-125K-A / FNH00-125K-A (1)	-
61 A	10500	1 x FNH00-160K-A (1)	-
85 A	51200	1 x FNH00-250K-A (1)	1 x FNH3FEM-450Y-A (1)
105 A	125000	1 x FNH1-315K-A (1)	1 x FNH3FEM-450Y-A (1)
130 A	97000	1 x FNH1-400K-A (1)	1 x FNH3FEM-450Y-A (1)
171 A	168000	1 x FNH2-500K-A (1)	1 x FNH3FEM-450Y-A (1)
200 A	245000	1 x FNH2-630K-A (1)	1 x FNH3FEM-450Y-A (1)
255 A	90000	2 x FNH3-710K-A (4)	1 x FNH3FEM-500Y-A (1)
312 A	238000	1 x FNH3-800K-A (1)	1 x FNH3FEM-700Y-A (1)
365 A	238000	2 x FNH3-900K-A (4)	1 x FNH3FEM-700Y-A (1)
412 A	320000	2 x FNH3-1000K-A (4)	1 x FNH3FEM-800Y-A (1)
480 A	320000	-	1 x FNH23FEA-1000Y-A (1)
604 A	781000	-	1 x FNH23FEA-1250Y-A (1)
670 A	1125000	-	1 x FNH23FEA-1400Y-A (1)
820 A	1200000	-	1 x FNH23FEA-1600Y-A (1)
950 A	2530000	-	1 x FNH23FEA-1800Y-A (1)
1100 A	3630000	-	1 x FNH23FEA-2000Y-A (1)
1400 A	10100000	-	2 x FNH3FEM-1250Y-A (4)



(1) (4) Fuses connection diagram:

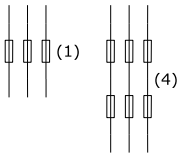
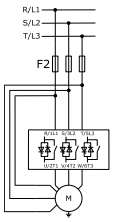


Table 3.12: Fuses aR Weg delta inside connection with the fuses outside of the delta



Model SSW900	I^2t of the SCR (A^2s)	F2 FNH aR Blade Contacts	F2 FNHFE aR Flush End
130 A	97000	1 x FNH2-630K-A (1)	1 x FNH3FEM-450Y-A (1)
171 A	168000	1 x FNH3-800K-A (1)	1 x FNH3FEM-630Y-A (1)
200 A	245000	1 x FNH3-1000K-A (1)	1 x FNH3FEM-700Y-A (1)
255 A	90000	-	2 x FNH3FEM-900Y-A (4)
312 A	238000	-	1 x FNH3FEM-1000Y-A (1)
365 A	238000	-	1 x FNH23FEA-1250Y-A (1)
412 A	320000	-	1 x FNH23FEA-1400Y-A (1)
480 A	320000	-	1 x FNH23FEA-1400Y-A (1)
604 A	781000	-	1 x FNH23FEA-2000Y-A (1)
670 A	1125000	-	1 x FNH23FEA-2000Y-A (1)
820 A	1200000	-	4 x FNH23FEA-1400Y-A (5)
950 A	2530000	-	3 x FNH3FEM-1000Y-A (3)
1100 A	3630000	-	3 x FNH3FEM-1100Y-A (3)
1400 A	10100000	-	3 x FNH3FEM-1400Y-A (3)

(1) (3) (4) (5) Fuses connection diagram:

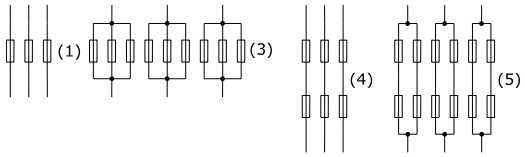
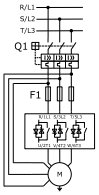
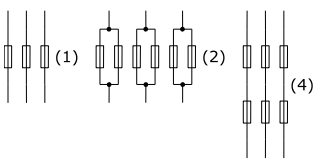


Table 3.13: Fuse aR Weg delta inside connection with the fuses inside of the delta



Modelo SSW900	I^2t do SCR A^2s	F2 FNH aR Blade Contacts	F2 FNHFE aR Flush End
130 A	97000	1 x FNH2-400K-A (1)	1 x FNH3FEM-450Y-A (1)
171 A	168000	1 x FNH2-500K-A (1)	1 x FNH3FEM-450Y-A (1)
200 A	245000	1 x FNH3-630K-A (1)	1 x FNH3FEM-450Y-A (1)
255 A	90000	2 x FNH3-630K-A (4)	2 x FNH3FEM-500Y-A (4)
312 A	238000	2 x FNH3-800K-A (4)	1 x FNH3FEM-630Y-A (1)
365 A	238000	2 x FNH3-800K-A (4)	1 x FNH3FEM-630Y-A (1)
412 A	320000	2 x FNH3-900K-A (4)	1 x FNH3FEM-700Y-A (1)
480 A	320000	-	2 x FNH3FEM-900Y-A (4)
604 A	781000	-	2 x FNH3FEM-1100Y-A (4)
670 A	1125000	-	1 x FNH23FEA-1250Y-A (1)
820 A	1200000	1 x FNH2-400K-A (1)	1 x FNH23FEA-1400Y-A (1)
950 A	2530000	1 x FNH2-500K-A (1)	1 x FNH23FEA-1800Y-A (1)
1100 A	3630000	1 x FNH3-630K-A (1)	1 x FNH23FEA-2000Y-A (1)
1400 A	10100000	2 x FNH3-630K-A (4)	2 x FNH3FEM-1250Y-A (2)

(1) (2) (4) Fuses connection diagram:



NOTE!
For some SSWs models, fuses in series are specified to meet type 2 coordination, where the I^2t of the protection is less than that of the SCR, and fuses in parallel to meet the SSW inrush current cycles.

NOTE!
The maximum I^2t of the fuse of the SSWs varies according to the design of the SCR used; therefore, higher rated currents may present lower I^2t.

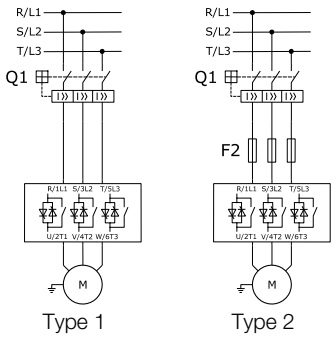
NOTE!
Starting controls that do not limit the start current and short starting times can blow the fuses prematurely.
Preferably use starting times that keep the current below 300% of the SSW current.

The fuse rated current should preferably be equal to or higher than the motor starting current in order to prevent cyclic overloads and the tripping of the fuse in the prohibited area of the Time x Current curve.

The proper sizing of the fuse should take into account: the local standards for electrical installations, the starting cycle, number of starts per hour, starting current and starting time, ambient temperature and altitude.

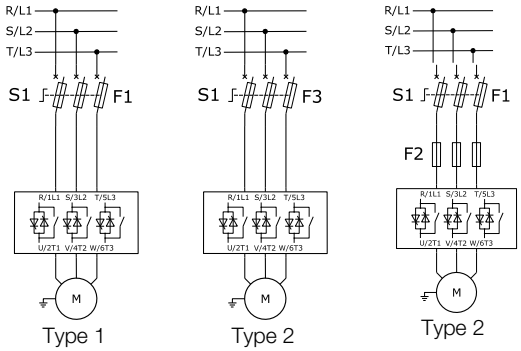
For the correct sizing of the fuses, see WEG Fuse Catalog:
www.weg.net
Automation - Fuses aR and gL/gG - Type NH Blade Contact, NH Flush End and Diametral.
Annex 1: Sizing Criteria for Ultra-Fast Fuses aR Blade Contact and Flush End.
Annex 2: Table for aR Fuse Sizing to Protect SSW900 Soft-Starters and CFW Inverters.

Table 3.14: Coordenation types for standard connection



Q1 – short circuit protection circuit breaker and when it is necessary to disconnect the SSW from the power supply. This circuit breaker with shunt trip coil can be disabled via a digital output of the SSW.

F2 – high speed semiconductor protection fuse.

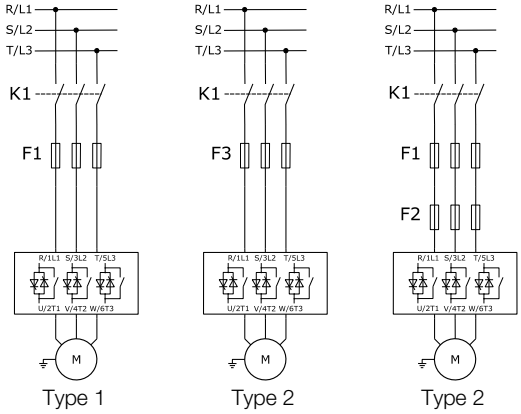


S1 – fuse-switch-disconnector – when it is necessary to disconnect the SSW from the power supply.

F1 – regular short circuit protection fuse.

F2 – ultra fast semiconductor protection fuse.

F3 – double protection fuse, that is, short circuit and ultra-fast semiconductor protection.

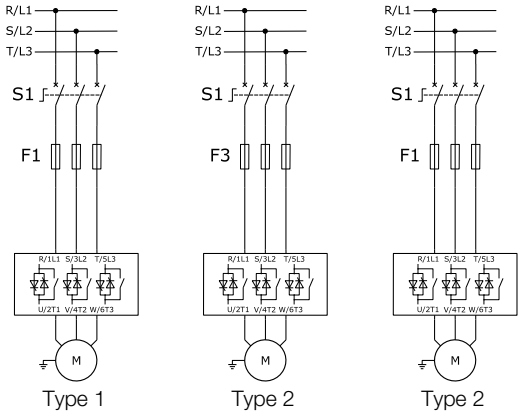


K1 – isolation contactor – used when it is necessary to disconnect the SSW from the power supply with the motor turned off. It can be controlled by a digital output of the SSW.

F1 – regular short circuit protection fuse.

F2 – ultra fast semiconductor protection fuse.

F3 – double protection fuse, that is, short circuit and ultra-fast semiconductor protection.



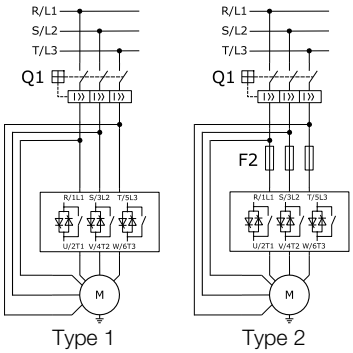
S1 – switch-disconnector – when it is necessary to disconnect the SSW from the power supply.

F1 – regular short circuit protection fuse.

F2 – ultra fast semiconductor protection fuse.

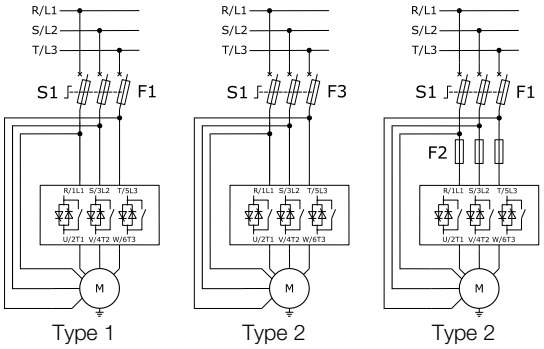
F3 – double protection fuse, that is, short circuit and ultra-fast semiconductor protection.

Table 3.15: Coordenation types for delta inside connection



Q1 – short circuit protection circuit breaker and when it is necessary to disconnect the SSW from the power supply. This circuit breaker with shunt trip coil can be disabled via a digital output of the SSW.

F2 – ultra fast semiconductor protection fuse. Delta inside current only.

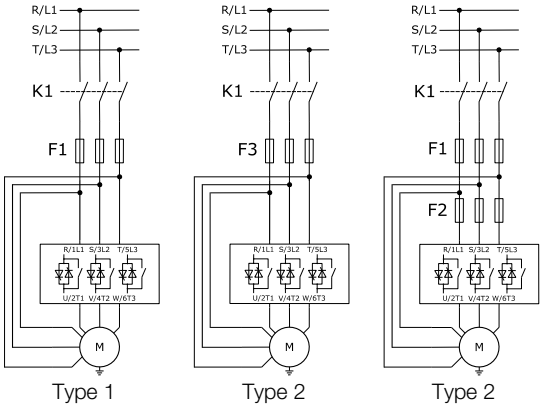


S1 – fuse-switch-disconnector – when it is necessary to disconnect the SSW from the power supply.

F1 – regular short circuit protection fuse. Total motor current.

F2 – ultra fast semiconductor protection fuse. Delta inside current only.

F3 – double protection fuse, that is, short circuit and ultra-fast semiconductor protection. Total motor current.

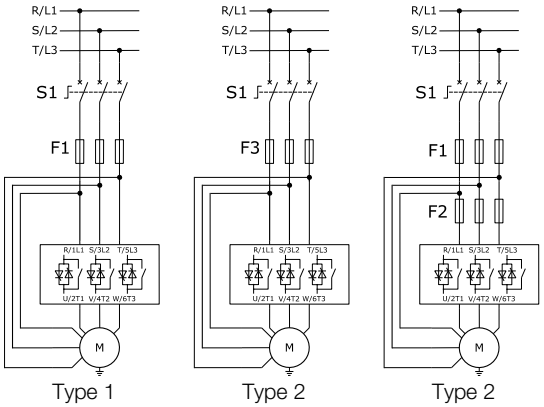


K1 – isolation contactor – used when it is necessary to disconnect the SSW from the power supply with the motor turned off. It can be controlled by a digital output of the SSW.

F1 – regular short circuit protection fuse. Total motor current.

F2 – ultra-fast semiconductor protection fuse. Delta inside current only.

F3 – double protection fuse, that is, short circuit and ultra-fast semiconductor protection. Total motor current.



S1 – switch-disconnector – when it is necessary to disconnect the SSW from the power supply.

F1 – regular short circuit protection fuse. Total motor current.

F2 – ultra-fast semiconductor protection fuse. Delta inside current only.

F3 – double protection fuse, that is, short circuit and ultra-fast semiconductor protection. Total motor current.

3.2.7.Main Input Contactor or Circuit Breaker

In case of damages in the power circuit of the SSW900 that keep the motor driven by short circuit, the motor protection is only obtained by using the power isolation contactor (K1) or circuit breaker (Q1) with shunt trip coil, according to Section 3.4.

An AC3 contactor with rated current higher than or equal to the rated current of the motor connected to the SSW900 must be used.

In order to select the correct sizing of the contactor, see WEG Contactor Catalog:
www.weg.net
Controls - Motor Start and Protection

3.2.8.Bypass Contactor

The SSW900 has internal bypass contactor; however, it is recommended the use of an external bypass contactor for applications where the motor may frequently present locked rotor during the full operating duty. In this case, an AC3 contactor with rated current higher than or equal to the rated current of the motor connected to the SSW900 must be used.

Example of loads:
Crushers, grinders, chippers, conveyor belts.

When the external bypass contactor is used, it is necessary to install the current transformers in the motor power supply output, so as to keep the current indications and protections.

For sizes A to D, use the current measurement accessory (see Chapter 6). For mechanics E to G, reposition the current transformer of the SSW900..

In order to select the correct sizing of the contactor, see WEG Contactor Catalog:
www.weg.net
Controls - Motor Start and Protection

3.2.9.Connection of the SSW900 to the motor

DANGER!
Capacitors for power factor correction must never be installed in the output of the SSW900 (U / 2T1, V / 4T2 and W / 6T3).

ATTENTION!
For the protections based on the reading and indication of current to work properly, like in the overload protection, for instance, the motor rated current must not be below 30 % of the SSW900 rated current.
We do not recommend the use of motors that run under duty with a load below 50 % of its rated current.

NOTE!
See recommended cables in Item 3.2.2.
See tightening torque in Item 3.2.1.

NOTE!
The SSW900 has an electronic motor overload protection, which must be adjusted according to the specific motor. When several motors are connected to the same SSW900, install individual overload relays for each motor.

Table 3.16: Minimum and maximum current allowed

Model SSW900	Standard Connection		Inside Delta Motor Connection	
	Minimum A	Maximum A	Minimum A	Maximum A
10 A	3.0	10.0	-	-
17 A	5.1	17.0	-	-
24 A	7.2	24.0	-	-
30 A	9.0	30.0	-	-
45 A	13.5	45.0	-	-
61 A	18.3	61.0	-	-
85 A	25.5	85.0	-	-
105 A	31.5	105.0	-	-
130 A	39.0	130.0	67.5	225.2
171 A	51.3	171.0	88.9	296.2
200 A	60.0	200.0	103.9	346.4
255 A	76.5	255.0	132.5	441.7
312 A	93.6	312.0	162.1	540.4
365 A	109.5	365.0	189.7	632.2
412 A	123.6	412.0	214.1	713.6
480 A	144.0	480.0	249.4	831.4
604 A	181.2	640.0	313.8	1046.2
670 A	201.0	670.0	348.1	1160.5
820 A	246.0	820.0	426.1	1420.3
950 A	285.0	950.0	493.6	1645.4
1100 A	330.0	1100.0	571.6	1905.3
1400 A	420.0	1400.0	727.5	2424.9

The minimum and maximum current at full load depends on the model of the SSW900, current and frame.

The SSW900 may be connected to the motor in two ways; they are presented in Item 3.2.10 and Item 3.2.11.

3.2.10.Standard Three-Wire Connection of the SSW900 to the Motor
(C3.9.2.1 = 0 = Inactive)

The standard connection allows the line current of the SSW900 to be the equal as the motor current.

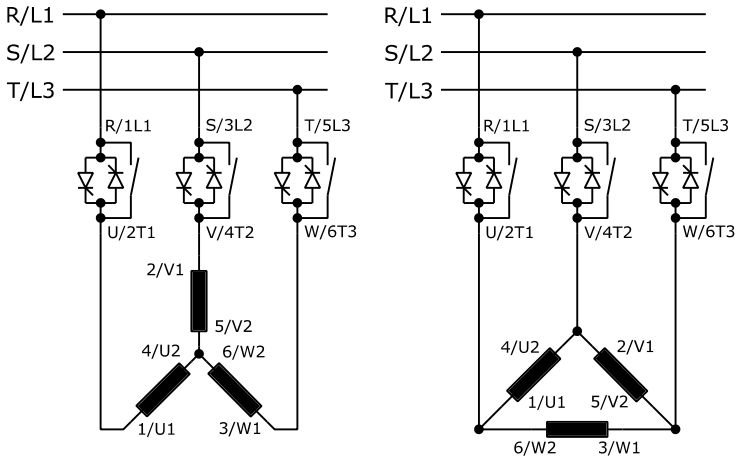


Figure 3.11: SSW900 with standard connection

Connection of the SSW900 Inside Delta Motor Connection Six-Cable
(C3.9.2.1 = 1 = Active)

In this type of connection, the line current of the SSW900 is equal to approximately 58 % of the motor rated current.

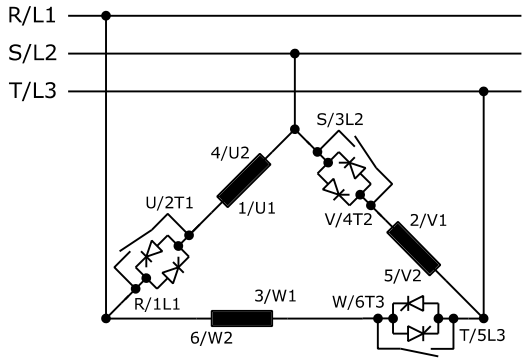


Figure 3.12: SSW900 inside delta motor connection with motor in delta

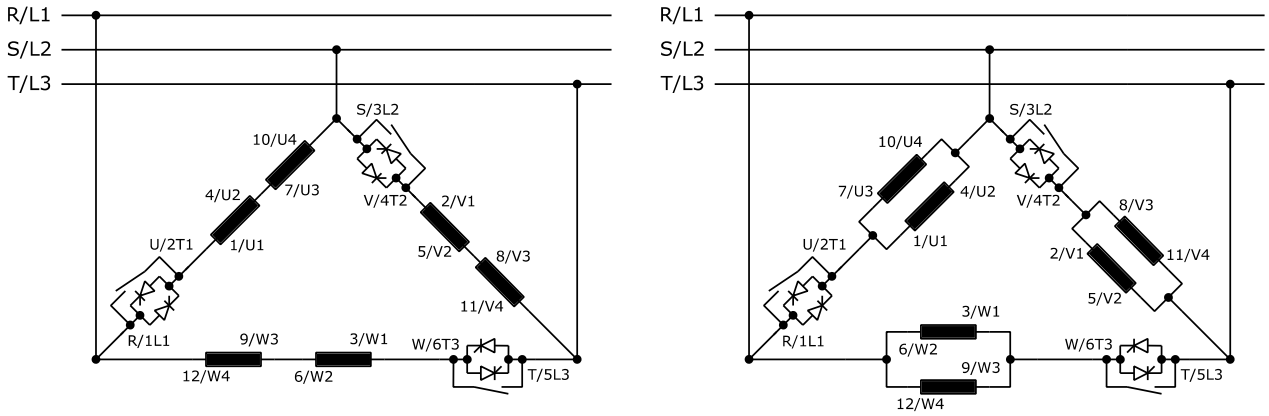


Figure 3.13: SSW900 inside delta motor connection with double delta

ATTENTION!
Check if the model of your SSW900 allows inside delta motor connection. Models below 130 A do not allow it.

ATTENTION!
For the inside delta motor connection, the motor must have delta connection in the desired voltage.

ATTENTION!
The permitted three-phase voltage value of the power is reduced for inside delta motor connection:
T5 = 220 a 575 V standard connection, T5 = 220 a 500 V inside delta motor connection
T6 = 380 a 690 V standard connection, T6 = 380 a 575 V inside delta motor connection

NOTES!
1. In the inside delta motor connection, the connecting cables of the SSW900, the supply line, fuses and/or contactor for power line isolation must withstand the motor rated current. The cables that connect the motor to the SSW900 and/or connect the external bypass contactor must withstand 58 % of the motor rated current.
2. For this type of connection, it is also suggested the use of copper busbars in the connection of the SSW900 to the supply line, due to the high currents involved and cable gauges.
3. During the motor start, the motor current ratio to the SSW900 is 1.50. However, at full voltage (after the motor start) the current ratio is 1.73.

ATTENTION!
Special attention must be given to the connection of the motor to the SSW900; observe the wiring diagram shown in the figures above, according to the motor windings.
If it is necessary to invert the direction of rotation of the motor, invert only the connections of the SSW900 to the supply line.
Keep the electronics off during the connection changes.

ATTENTION!
Do not drive the motor with the content of parameter C9.2.1 incorrectly set.
If the setting of this parameter is wrong, the SSW900 may be damaged.

Table 3.17: Connection of the SSW900 to the motor

C9.2.1	Action
0 (Inactive)	SSW900 with standard connection to the motor
1 (Active)	SSW900 inside delta motor connection

3.2.11.Grounding Connections

DANGER!
The SSWs must be grounded for safety purposes (PE).
The ground connection must comply with the local regulations. Make the ground connection to a grounding bar or to the general grounding point (resistance ≤10 ohms).
Frame A and D - Control Supply pin 3.
Frame C and B – Control Supply pin 3 and heatsink terminal must be grounding.

DANGER!
The AC input must have a ground connection.

DANGER!
Do not use the neutral for grounding, purpose. Use dedicated ground conductor.

ATTENTION!
Do not share the grounding wiring with other equipment that operate with high currents (for examples: high voltage motors, welding machines, etc.). When several SSW900 are used, observe the connections in Figure 3.12: Grounding connections for more than one SSW900.

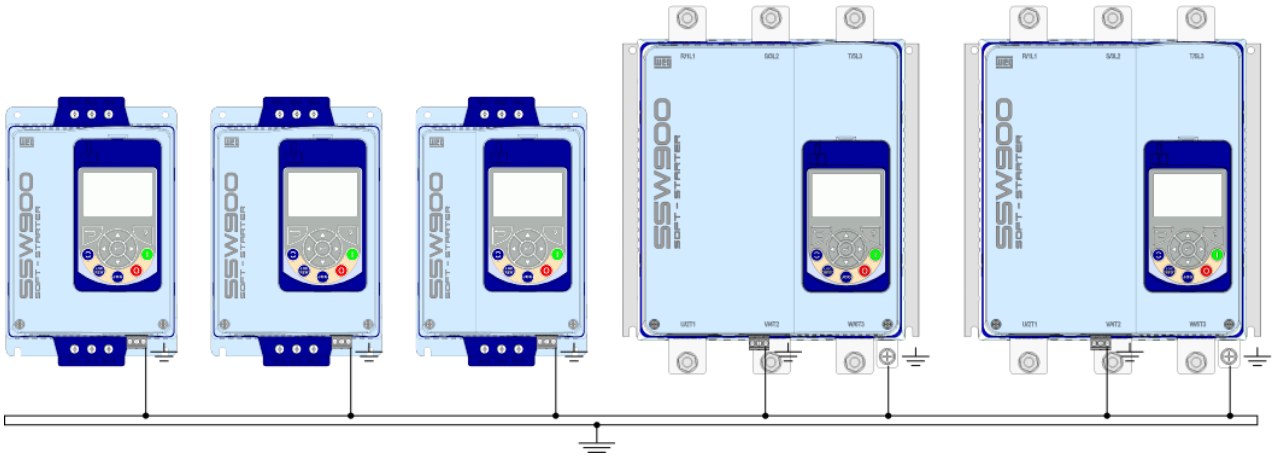


Figure 3.14: Grounding connections for more than one SSW900

EMI - Electromagnetic Interference

The SSW900 is developed to be used in industrial systems (Class A), according to standard EN60947-4-2.
It's necessary to have a distance of 0.25 m (10 in) between the SSW900 control cables and motor cables.
Example: PLC wiring, temperature controllers, thermocouple cables, etc.

Motor Frame Grounding

Always ground the motor frame. The SSW900 output wiring to the motor must be installed separately from the line input wiring, as well as from the control and signal wiring.

3.2.12.User's Signal and Control Connections

It is necessary to remove the HMI and the front cover to access the control terminals.

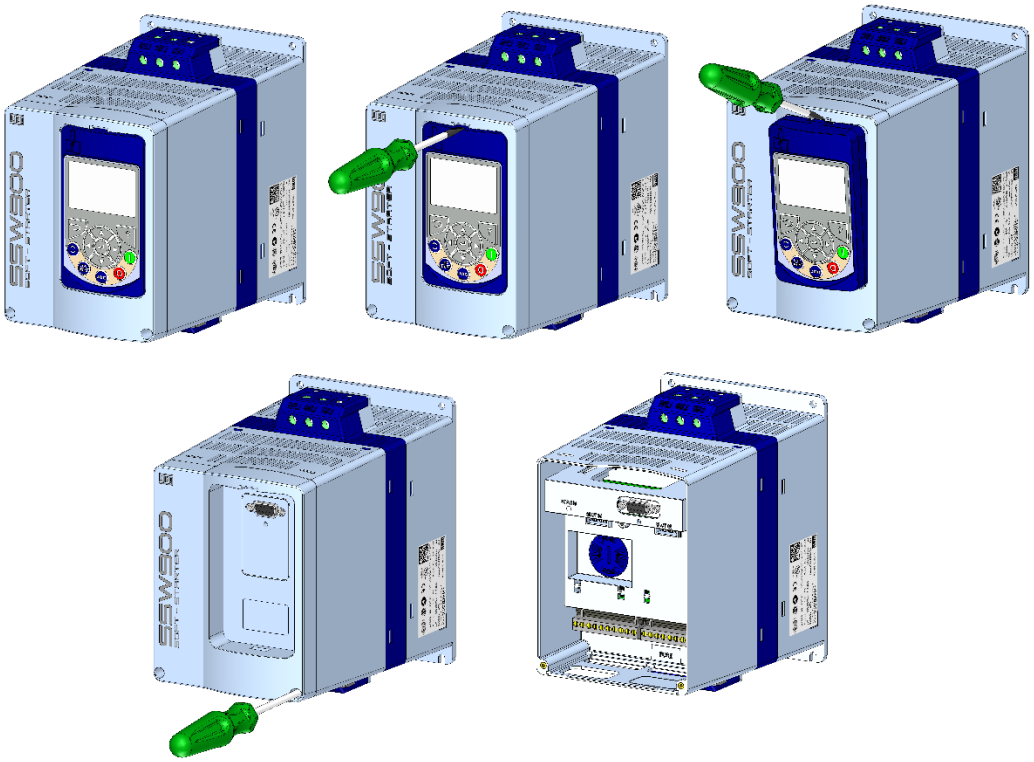


Figure 3.15: Removal of the HMI and front cover

Control power supply connections:

Control Supply		Description	Specification
1	Phase	Control power supply	Models from 10 A to 200 A: E2 = 110 to 240 V (-15 % to +10 %), or 93.5 to 264 Vac Models from 255 to 1400 A: E3 = 110 to 130 V (-15 % to +10 %), or 93.5 to 143 Vac, or E4 = 220 to 240 V (-15 % to +10 %), or 176.8 to 264 Vac
2	Neutral		
3	Ground		

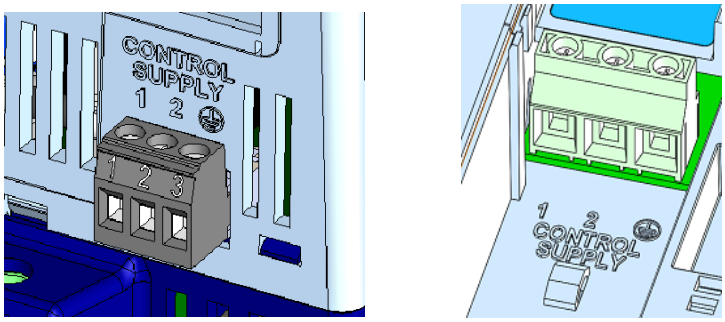
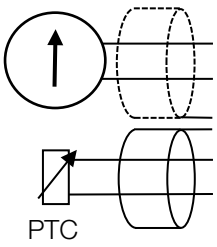


Figure 3.16: Power supply connector of the electronics

Signal (analog outputs) and control (digital inputs and outputs) connections:



Control		Factory default function	Specification
1	AO	Analog output Not used	Voltage or current output configurable by software. Resolution: 10 bits Voltage: 0 to 10 V, R_L = 10 kΩ (Maximum load) Current: 0 to 20 mA R_L = 500 Ω (Minimum load).
2	AGND		
3	Ground		
4	PTCB	Input for the motor PTC Not used	Actuation: 3k9 Ω Release: 1k6 Ω Minimum resistance :100Ω
5	PTCA		
6	DI1	Run/Stop the motor	5 Isolated digital inputs Minimum high level: 18 V Maximum low level: 3 V Maximum voltage: 30 V Input current: 11 mA @ 24 Vdc
7	DI2	Fault reset	
8	DI3	Not used	
9	DI4	Not used	
10	DI5	Not used	
11	0V	Reference 0 V – DIs	Use the digital inputs only
12	COM	Common point - DIs	
13	24V	Reference 24 V – DIs	
14	RL1C	In operation	3 relay outputs Capacity of the contacts: 2 A / 240 Vac, PF = 0.6 2 A / 30 Vdc
15	RL1NO		
16	RL2C	Bypass	
17	RL2NO		
18	RL3NO	With fault	
19	RL3C		
20	RL3NC		

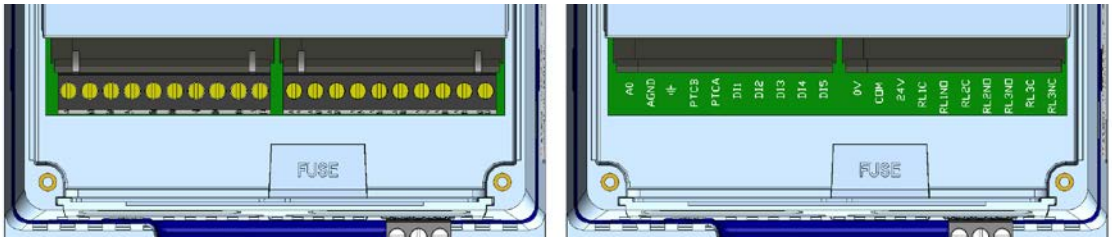


Figure 3.17: Position of the connections on the control board

In the installation of signal and control wiring, the following care must be taken:

- The digital inputs of the SSW900 allow several types of electrical connections. They can be supplied by an internal auxiliary power supply of +24 Vdc using the 0 V as common point or the +24 Vdc. They can also be supplied via an external power supply of +24 Vdc, connection with PLCs, using the 0 V as common point or the +24 Vdc according to the needs of the application:

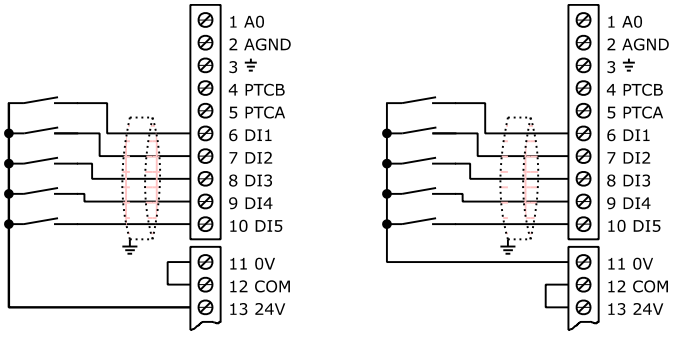


Figure 3.18: Wiring diagram of the digital inputs using internal power supply

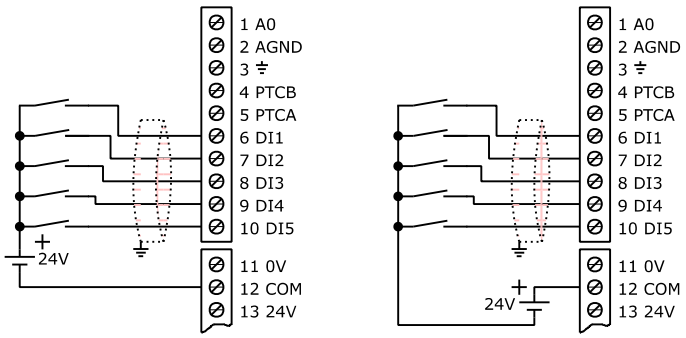


Figure 3.19: Wiring diagram of the digital inputs using internal power supply

- The auxiliary power supply of the SSW900 of +24 Vdc must be used to supply the digital inputs only.
- The SSW900 comes from the factory with pins 11 and 12 of the control terminal connected (wire jumper).
- Gauge of the cables: 0.5 mm² (20 AWG) to 1.5 mm² (14 AWG).
- Maximum torque: 0.5 Nm (4.50 lbf.in).
- Wiring on the control terminals must be done with shielded cables and separated from the other wiring (power, command in 110/220 V, etc.), as follows:

Table 3.18: Wiring separation distance

Wiring Length	Minimum Separation Distance
≤ 30 m (100 ft)	≥ 10 cm (3.94 in)
> 30 m (100 ft)	≥ 25 cm (9.84 in)

If those cables must cross other cables, it must be done perpendicularly, keeping the minimum separation distance of 5 cm at the crossing point.

Connect the shield as follows:

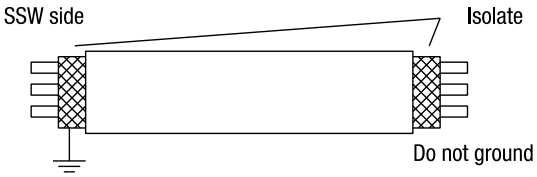


Figure 3.20: Connection of the shield

- Relays, contactors and solenoids installed inside the SSW900 may occasionally generate interference in the control circuitry. To eliminate this effect, RC suppressors must be connected in parallel to the coils of these devices in case of AC power supply, and freewheel diodes in case of DC power supply.
- When an external HMI is used, you must be careful to keep the cable that connects it to the SSW900 at least 10 cm (3.94 in) away from the other cables present in the installation.

Fan connection



Figure 3.21: Ventilation kit connector

The frames B and C (45 A to 200 A) have a connector (FAN) for installing the Ventilation Kit. For more details see Chapter 6.

ATTENTION!
This connector is only available in frames B and C, and should only be used to connect the Ventilation Kit.

3.3.INSTALLATION IN COMPLIANCE WITH STANDARD EN60947-4-2

In order to install the SSW900 in compliance with standard EN60947-4-2 it is necessary to meet the following requirements:

1. The cables used for the control (inputs and outputs) and signal wiring must be shielded or run in metallic conduits or channels with equivalent attenuation.
2. It is essential to follow the grounding recommendations presented in this manual.
3. The SSW900 is classified for use in “Class A”, individual use and without requiring external filters or shielded power cables.

Description of the conducted emission class according to standard EN60947-4-2 (2000) + A1 (2002):
Class B: residential environment (first environment), unrestricted distribution.
Class A: industrial environment (second environment), unrestricted distribution.

3.4.RECOMMENDED SET-UPS

Some recommended set-ups are shown here and they can be completely or partly used.
The main warning notes for all the recommended set-ups are shown below and are described in the schemes by their respective numbers.

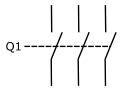
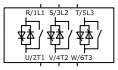
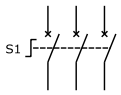
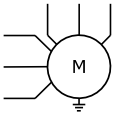
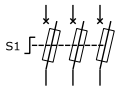
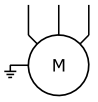
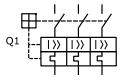
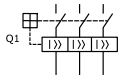
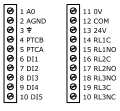
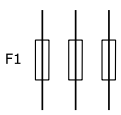
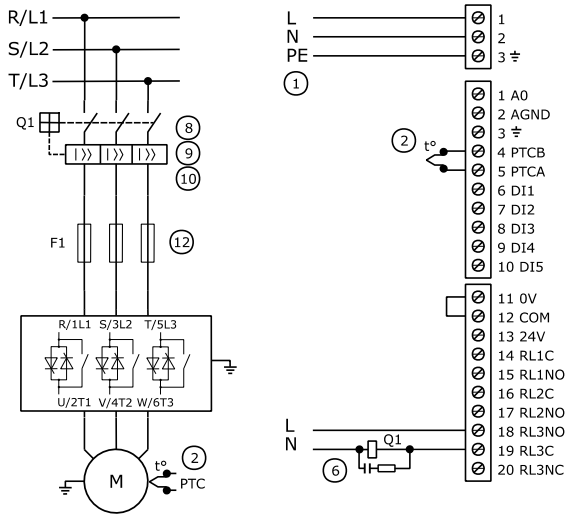
	Contactor		Normally open (NO) push-botton		SSW900 Power circuit
	Switch-disconnector		Normally closed (NC) push-botton		Motor with 6 cables
	Fuse-switch-disconnector		Normally open (NO) switch		Motor with 3 cables
	Motor circuit-breaker		Motor RTD Sensor		SSW900 power supply connector
	Circuit-breaker		Shunt trip with snubber		SSW900 control connector
	Fuse		Contactor bobbin with snubber		

Figure 3.22: Symbology

3.4.1.Commands via HMI and Power Isolation Contactor



Commands via HMI

C3 - LOC/REM Selection
C3.1 = 0
(Mode = Always LOC)
C3.2 = 0
(LOC Command = HMI Keys)

C4 - I/O
C4.2.3 = 14
(DO3 = Breaker Shunt Trip)

NOTES!

(1) Check the electronics power supply. “Control Supply” connector.

(2) Optional. It is recommended to use a PTC, thermostat connected to a digital input programmed for external fault or PT100 accessory.

(6) Use a digital output programmed for "Breaker Shunt Trip" fault to open the circuit breaker when a fault occurs on the power circuit of the SSW.

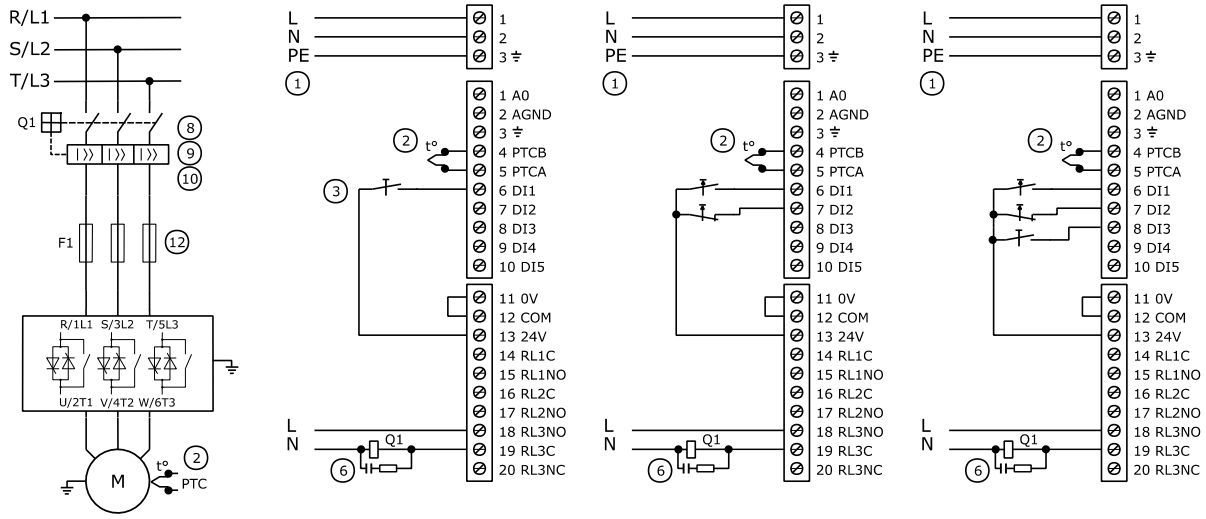
(8) In case of maintenance on the SSW or on the motor, it is necessary to disconnect the power supply input so as to ensure the full disconnection of the equipment from the supply line.

(9) In case of damages on the power circuit of the SSW which keep the motor running by short circuit, the motor protection is obtained by using the power isolation contactor (K1) or circuit breaker (Q1) controlled by the SSW.

(10) Coordination Type 1 – use a circuit breaker for short circuit protection on the input circuit.
Use a shunt trip on the circuit breaker to open the circuit breaker via digital output of the SSW.

(12) Optional. Coordination Type 2 – use aR ultra-fast fuses for semiconductor protection.

3.4.2.Commands via Digital Inputs and Power Isolation Circuit Breaker



Commands 2 wires

C3 - LOC/REM Selection
C3.1 = 0
(Mode = Always LOC)
C3.2 = 1
(LOC Command= DIx)

C4 - I/O
C4.1.1 = 1
(DI1 = Start / Stop)
C4.2.3 = 14
(DO3 = Breaker Shunt Trip)

Commands 3 wires

C3 - LOC/REM Selection
C3.1 = 0
(Mode = Always LOC)
C3.2 = 1
(LOC Command= DIx)

C4 - I/O
C4.1.1 = 2
(DI1 = Start 3 Wires)
C4.1.2 = 3
(DI2 = Stop 3 Wires)
C4.2.3 = 14
(DO3 = Breaker Shunt Trip)

Commands 3 wires and LOC/REM

C3 - LOC/REM Selection
C3.1 = 4
(Mode = DIx)
C3.2 = 0
(LOC Command= DIx)
C3.3 = X
(REM Command= X)

C4 - I/O
C4.1.1 = 2
(DI1 = Start 3 Wires)
C4.1.2 = 3
(DI2 = Stop 3 Wires)
C4.1.3 = 5
(DI3 = LOC/ REM)
C4.2.3 = 14
(DO3 = Breaker Shunt Trip)

NOTES!

(1) Check the electronics power supply. “Control Supply” connector.

(2) Optional. It is recommended to use a PTC, thermostat connected to a digital input programmed for external fault or PT100 accessory.

(3) Start/Stop switch: remember that when a command via two-wire digital input is used, when the power is restored after a power failure, the motor starts immediately if the switch remains closed.

(6) Use a digital output programmed for "Breaker Shunt Trip" fault to open the circuit breaker when a fault occurs on the power circuit of the SSW.

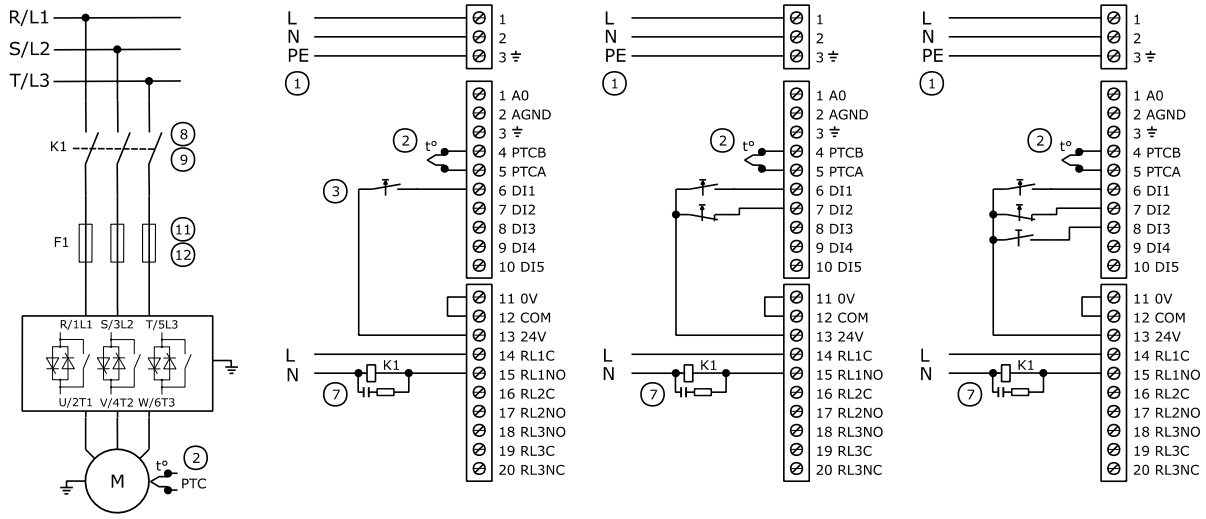
(8) In case of maintenance on the SSW or on the motor, it is necessary to disconnect the power supply input so as to ensure the full disconnection of the equipment from the supply line.

(9) In case of damages on the power circuit of the SSW which keep the motor running by short circuit, the motor protection is obtained by using the power isolation contactor (K1) or circuit breaker (Q1) controlled by the SSW.

(10) Coordination Type 1 – use a circuit breaker for short circuit protection on the input circuit.
Use a shunt trip on the circuit breaker to open the circuit breaker via digital output of the SSW.

(12) Optional. Coordination Type 2 – use aR ultra-fast fuses for semiconductor protection.

3.4.3.Commands via Digital Inputs and Power Isolation Contactor



Commands 2 wires

C3 - LOC/REM Selection
C3.1 = 0
(Mode = Always LOC)
C3.2 = 1
(LOC Command= DIx)

C4 - I/O
C4.1.1 = 1
(DI1 = Start / Stop)
C4.2.1 = 1
(DO1 = Running)

Commands 3 wires

C3 - LOC/REM Selection
C3.1 = 0
(Mode = Always LOC)
C3.2 = 1
(LOC Command= DIx)

C4 - I/O
C4.1.1 = 2
(DI1 = Start 3 Wires)
C4.1.2 = 3
(DI2 = Stop 3 Wires)
C4.2.1 = 1
(DO1 = Running)

Commands 3 wires and LOC/REM

C3 - LOC/REM Selection
C3.1 = 4
(Mode = DIx)
C3.2 = 0
(LOC Command= DIx)
C3.3 = X
(REM Command= X)

C4 - I/O
C4.1.1 = 2
(DI1 = Start 3 Wires)
C4.1.2 = 3
(DI2 = Stop 3 Wires)
C4.1.3 = 5
(DI3 = LOC/ REM)
C4.2.1 = 1
(DO1 = Running)

NOTES!

(1) Check the electronics power supply. “Control Supply” connector.

(2) Optional. It is recommended to use a PTC, thermostat connected to a digital input programmed for external fault or PT100 accessory.

(3) Start/Stop switch: remember that when a command via two-wire digital input is used, when the power is restored after a power failure, the motor starts immediately if the switch remains closed.

(7) Use a digital output programmed for “Running” to control the input contactor.

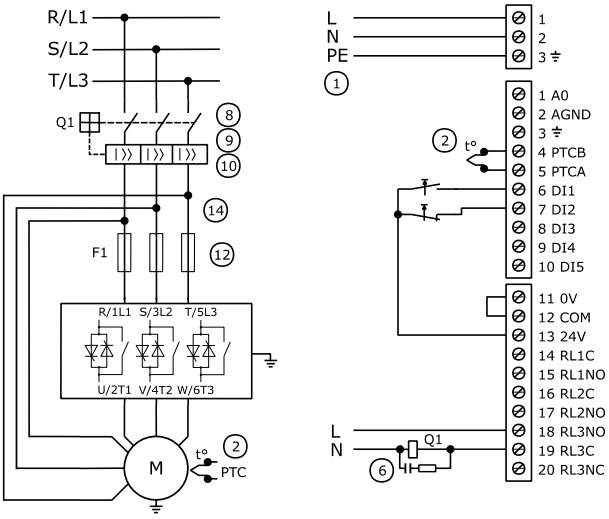
(8) In case of maintenance on the SSW or on the motor, it is necessary to disconnect the power supply input so as to ensure the full disconnection of the equipment from the supply line.

(9) In case of damages on the power circuit of the SSW which keep the motor running by short circuit, the motor protection is obtained by using the power isolation contactor (K1) or circuit breaker (Q1) controlled by the SSW.

(11) Coordination Type 1 – use regular fuses for short circuit protection on the input circuit.

(12) Optional. Coordination Type 2 – use aR ultra-fast fuses for semiconductor protection.

3.4.4.Commands via Digital Inputs and Inside Delta Motor Connection



Inside Delta Motor Connection

C9 – SSW900
C9.2.1 = 1
(Delta Inside= On)

Commands 3 wires

C3 - LOC/REM Selection
C3.1 = 0
(Mode = Always LOC)
C3.2 = 1
(LOC Command = DIx)

C4 - I/O
C4.1.1 = 2
(DI1 = Start 3 Wires)
C4.1.2 = 3
(DI2 = Stop 3 Wires)
C4.2.3 = 14
(DO3 = Breaker Shunt Trip)

NOTES!

(1) Check the electronics power supply. “Control Supply” connector.

(2) Optional. It is recommended to use a PTC, thermostat connected to a digital input programmed for external fault or PT100 accessory.

(6) Use a digital output programmed for "Breaker Shunt Trip" fault to open the circuit breaker when a fault occurs on the power circuit of the SSW.

(8) In case of maintenance on the SSW or on the motor, it is necessary to disconnect the power supply input so as to ensure the full disconnection of the equipment from the supply line.

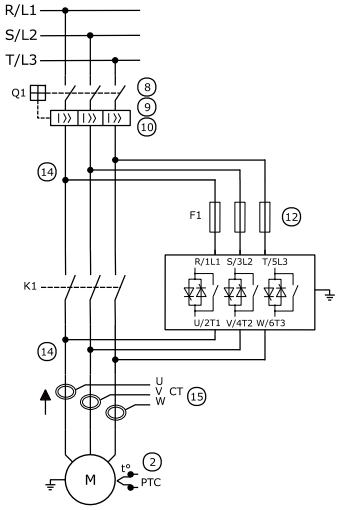
(9) In case of damages on the power circuit of the SSW which keep the motor running by short circuit, the motor protection is obtained by using the power isolation contactor (K1) or circuit breaker (Q1) controlled by the SSW.

(10) Coordination Type 1 – use a circuit breaker for short circuit protection on the input circuit.
Use a shunt trip on the circuit breaker to open the circuit breaker via digital output of the SSW.

(12) Optional. Coordination Type 2 – use aR ultra-fast fuses for semiconductor protection.

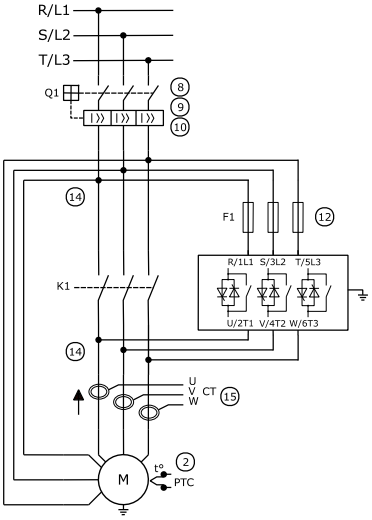
(14) Use “terminal blocks” to shunt the power cables.

3.4.5.Commands via Digital Inputs and External Bypass Contactor



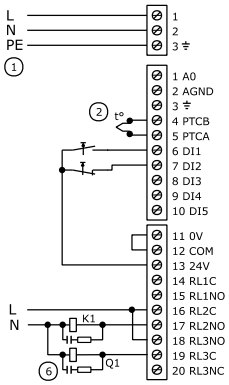
Standard Connection

C9 – SSW900
C9.2.1 = 0
(Delta Inside= Off)



Inside Delta Motor Connection

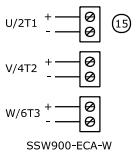
C9 – SSW900
C9.2.1 = 1
(Delta Inside = On)



Comands 3 wires

C3 - LOC/REM Selection
C3.1 = 0
(Mode = Always LOC)
C3.2 = 1
(LOC Command = DIx)

C4 - I/O
C4.1.1 = 2
(DI1 = Start 3 Wires)
C4.1.2 = 3
(DI2 = Stop 3 Wires)
C4.2.2 = 3
(DO2 = Bypass)
C4.2.3 = 14
(DO3 = Breaker Shunt Trip)



Slot 1 or 2

NOTES!

(1) Check the electronics power supply. “Control Supply” connector.

(2) Optional. It is recommended to use a PTC, thermostat connected to a digital input programmed for external fault or PT100 accessory.

(6) Use a digital output programmed for "Breaker Shunt Trip" fault to open the circuit breaker when a fault occurs on the power circuit of the SSW.

(8) In case of maintenance on the SSW or on the motor, it is necessary to disconnect the power supply input so as to ensure the full disconnection of the equipment from the supply line.

(9) In case of damages on the power circuit of the SSW which keep the motor running by short circuit, the motor protection is obtained by using the power isolation contactor (K1) or circuit breaker (Q1) controlled by the SSW.

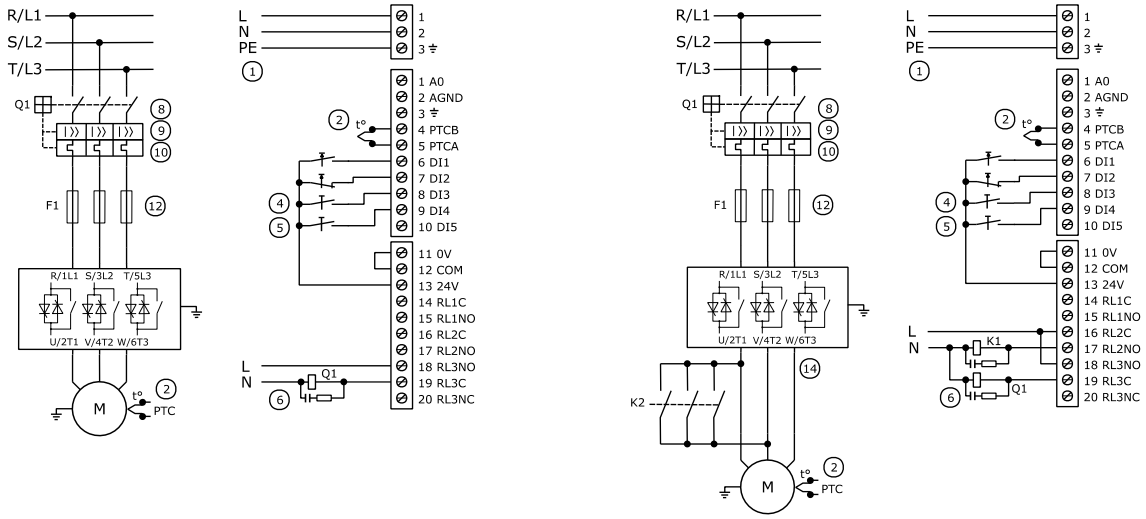
(10) Coordination Type 1 – use a circuit breaker for short circuit protection on the input circuit.
Use a shunt trip on the circuit breaker to open the circuit breaker via digital output of the SSW.

(12) Optional. Coordination Type 2 – use aR ultra-fast speed fuses for semiconductor protection.

(14) Use “terminal blocks” to shunt the power cables.

(15) When using an external bypass contactor, on models up to 412 A, use the “SSW900-KECA-xxx” accessory to keep the current protections and readings.

3.4.6.Commands via Digital Inputs, Optimal Braking and DC Braking



Optimal Braking

C7 – Special Functions
C7.4.1 = 2
(Mode = Optimal)

Commands 3 wires

C3 - LOC/REM Selection
C3.1 = 0
(Mode = Always LOC)
C3.2 = 1
(LOC Command = DIx)

C4 - I/O
C4.1.1 = 2
(DI1 = Start 3 Wires)
C4.1.2 = 3
(DI2 = Stop 3 Wires)
C4.1.3 = 4
(DI3 = General Enable)
C4.1.4 = 10
(DI4 = Brake)
C4.2.3 = 14
(DO3 = Breaker Shunt Trip)

DC Braking

C7 – Special Functions
C7.4.1 = 3
(Mode = DC)

Commands 3 wires

C3 - LOC/REM Selection
C3.1 = 0
(Mode = Always LOC)
C3.2 = 1
(LOC Command = DIx)

C4 - I/O
C4.1.1 = 2
(DI1 = Start 3 Wires)
C4.1.2 = 3
(DI2 = Stop 3 Wires)
C4.1.3 = 4
(DI3 = General Enable)
C4.1.4 = 10
(DI4 = Brake)
C4.2.2 = 5
(DO2 = DC Braking)
C4.2.3 = 14
(DO3 = Breaker Shunt Trip)

NOTES!

(1) Check the electronics power supply. “Control Supply” connector.

(2) Optional. It is recommended to use a PTC, thermostat connected to a digital input programmed for external fault or PT100 accessory.

(4) Use a digital input programmed as “General Enable” to stop the motor without the braking.

(5) For safety reasons, use a digital input programmed as “Braking”, with the possibility to install a motor stop sensor.

(6) Use a digital output programmed for "Breaker Shunt Trip" fault to open the circuit breaker when a fault occurs on the power circuit of the SSW.

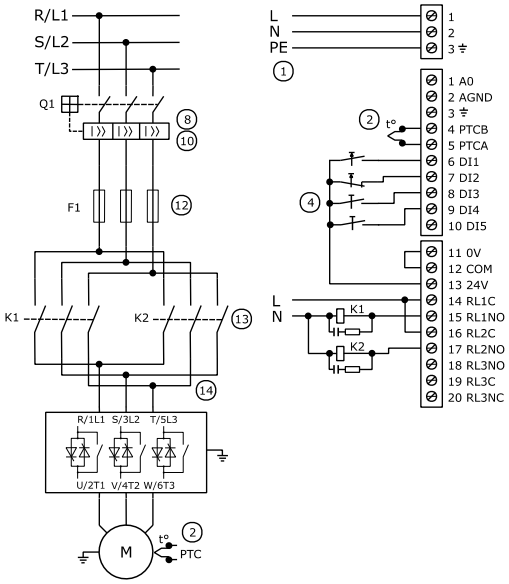
(8) In case of maintenance on the SSW or on the motor, it is necessary to disconnect the power supply input so as to ensure the full disconnection of the equipment from the supply line.

(9) In case of damages on the power circuit of the SSW which keep the motor running by short circuit, the motor protection is obtained by using the power isolation contactor (K1) or circuit breaker (Q1) controlled by the SSW.

(10) Coordination Type 1 – use a circuit breaker for short circuit protection on the input circuit.
Use a shunt trip on the circuit breaker to open the circuit breaker via digital output of the SSW.

(12) Optional. Coordination Type 2 – use aR ultra-fast speed fuses for semiconductor protection.

3.4.7.Command via Digital Inputs and Reverse Braking



Reverse Braking

C7 – Special Functions
C7.4.1 = 1
(Mode = Reverse)

Commands 3 wires

C3 - LOC/REM Selection
C3.1 = 0
(Mode = Always LOC)
C3.2 = 1
(LOC Command = DIx)

C4 - I/O
C4.1.1 = 2
(DI1 = Start 3 Wires)
C4.1.2 = 3
(DI2 = Stop 3 Wires)
C4.1.3 = 4
(DI3 = General Enable)
C4.1.4 = 10
(DI4 = Brake)
C4.2.1 = 4
(DO1 = FWD / REV K1)
C4.2.2 = 4
(DO2 = FWD / REV K2)

NOTES!

(1) Check the electronics power supply. “Control Supply” connector.

(2) Optional. It is recommended to use a PTC, thermostat connected to a digital input programmed for external fault or PT100 accessory.

(4) Use a digital input programmed as “General Enable” to stop the motor without the braking.

(5) For safety reasons, use a digital input programmed as “Braking”, with the possibility to install a motor stop sensor.

(8) In case of maintenance on the SSW or on the motor, it is necessary to disconnect the power supply input so as to ensure the full disconnection of the equipment from the supply line.

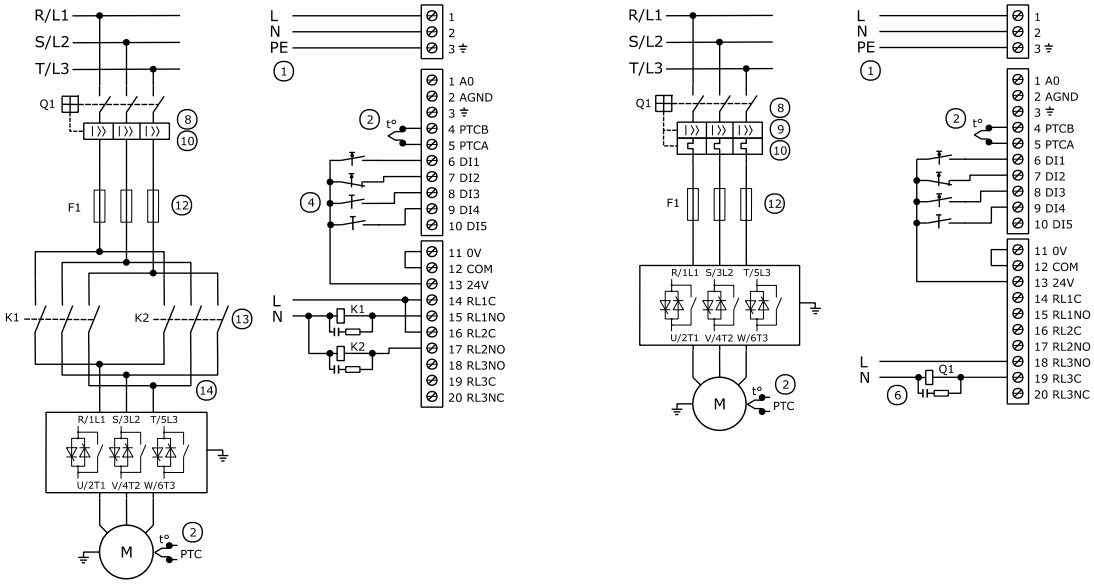
(10) Coordination Type 1 – use a circuit breaker for short circuit protection on the input circuit.
Use a shunt trip on the circuit breaker to open the circuit breaker via digital output of the SSW.

(12) Optional. Coordination Type 2 – use aR ultra-fast speed fuses for semiconductor protection.

(13) The contactors must be of the same model and withstand the motor starting current, AC3.
For safety reasons, the auxiliary contacts must be used in order to prevent the two contactors from closing at the same time.

(14) Use “terminal blocks” to shunt the power cables.

3.4.8.Command via Digital Inputs and Change of Direction of Rotation



Via Direction of Rotation

C7 – Special Functions
C7.1.1 = 1
(Mode = Via Contator)

Commands 3 wires

C3 - LOC/REM Selection
C3.1 = 0
(Mode = Always LOC)
C3.2 = 1
(LOC Command = DIx)

C4 - I/O
C4.1.1 = 2
(DI1 = Start 3 Wires)
C4.1.2 = 3
(DI2 = Stop 3 Wires)
C4.1.4 = 7
(DI4 = FWD / REV)
C4.2.1 = 4
(DO1 = FWD / REV K1)
C4.2.2 = 4
(DO2 = FWD / REV K2)

Via JOG

C7 – Special Functions
C7.1.1 = 2
(Mode = Only for JOG)

C7.3.1 = 1
(Mode = On)

Commands 3 wires

C3 - LOC/REM Selection
C3.1 = 0
(Mode = Always LOC)
C3.2 = 1
(LOC Command = DIx)

C4 - I/O
C4.1.1 = 2
(DI1 = Start 3 Wires)
C4.1.2 = 3
(DI2 = Stop 3 Wires)
C4.1.3 = 6
(DI3 = JOG)
C4.1.4 = 7
(DI4 = FWD / REV)
C4.2.3 = 14
(DO3 = Breaker Shunt Trip)

NOTES!

(1) Check the electronics power supply. “Control Supply” connector.

(2) Optional. It is recommended to use a PTC, thermostat connected to a digital input programmed for external fault or PT100 accessory.

(6) Use a digital output programmed for "Breaker Shunt Trip" fault to open the circuit breaker when a fault occurs on the power circuit of the SSW.

(8) In case of maintenance on the SSW or on the motor, it is necessary to disconnect the power supply input so as to ensure the full disconnection of the equipment from the supply line.

(9) In case of damages on the power circuit of the SSW which keep the motor running by short circuit, the motor protection is obtained by using the power isolation contactor (K1) or circuit breaker (Q1) controlled by the SSW.

(10) Coordination Type 1 – use a circuit breaker for short circuit protection on the input circuit.
Use a shunt trip on the circuit breaker to open the circuit breaker via digital output of the SSW.

(12) Optional. Coordination Type 2 – use aR ultra-fast speed fuses for semiconductor protection.

(13) The contactors must be of the same model and withstand the motor starting current, AC3.
For safety reasons, the auxiliary contacts must be used in order to prevent the two contactors from closing at the same time.

(14) Use “terminal blocks” to shunt the power cables.

4 POWER-UP AND START-UP

This chapter explains:

- How to inspect and prepare the SSW900 before the power-up.
- How to power up and check the success of the power-up.
- How to operate the SSW900 when installed according to the typical drives (see Chapter 3).

4.1.POWER-UP PREPARATION

The SSW900 must first be installed according to Chapter 3. If the drive project is different from the typical drives suggested, the steps below may also be followed.



DANGER!
Always disconnect the general power supply before making any connections.

1. Check all the connections: Check if the power, grounding and control connections are correct and firm.

2. Clean the inside of the SSW: Remove all the materials left inside the SSW900 or drive.

3. Check the correct voltage selection: In the models from 255 A to 670 A, the voltage of the electronics power supply must be checked.

4. Check the motor: Check the motor connections and if the motor voltage and current are according to the SSW900.

5. Check the connection type of the SSW900 to the motor: If the connection to be used is the standard three-wire connection or inside delta motor connection with six cables. More details in Chapter 3.2.

6. Mechanically uncouple the motor from the load: If the motor cannot be uncoupled, make sure that any spin in any direction (forward or reverse) will not result in personal risk and/or equipment damage.

7. Close the driver or SSW900 covers.

4.2.INITIAL POWER-UP

After the proper preparation, the SSW900 may be powered up:

1. Check the supply voltage. The line voltage must be within the allowed range (Rated voltage -15 % to + 10 %).

2. Power up the electronics supply.



ATTENTION!
Always energize the electronics supply before energizing the power, and make all the adjustments contained in this Chapter.

3. Check the result of the power-up:

4. Run the Oriented Start-up function.
   Conform Chapter 12 of the SSW900 Programming Manual.
   The parameter to run the Oriented Start-up is in the Assistant menu. Set parameter A1 (Oriented Start-up) to 1 = Yes.

NOTES!
For further details on the operation and programming of the HMI, see Chapter 8 of the SSW900 Programming Manual.
For details on typical applications, see Chapter 13 of the SSW900 Programming Manual.

ATTENTION!
It is essential to have at hand the catalog or motor plate data of the motor to be used. Those data are necessary to properly set the motor data and protection parameters.

ATTENTION!
The protection Thermal Class of the motor must be set so as to protect the motor against overloads during the start and full operating duty. For details about the setting of the Thermal Class, see the Programming Manual.

ATTENTION!
In the adjustment sequence by means of the Oriented Start-up are only the main parameters for learning the operation of the SSW900. Before putting it at full operating duty, all the necessary parameters for the perfect operation of the SSW900 and motor protection must be set.

4.3.START-UP

If the first parameterization by means of the Oriented Start-up is satisfactory, first, with the motor uncoupled from the load, make an operation test by starting the motor.

1. Initially you can use the voltage ramp control plus current limit to start the motor, with long starting times (C1.3 ≈ 20 s) and low initial voltages (C1.2 ≈ 30 %), so as to minimize the starting currents. For details on the control methods to be used, refer to the Chapter Programming Suggestions of the Programming Manual.

2. Before coupling the motor to the load, check the direction of rotation of the motor shaft. Program the protections according to the application requirements. For further details, refer to the Programming Manual.

3. Use a thermal protection method for the motor.

4. Couple the motor shaft to the load. Energize the power and start the motor.

5. The data of this start can be checked by using the diagnosis parameters, such as maximum starting current, average starting current, real starting time. Refer to the Chapter Diagnosis in the Programming Manual.

6. Based on the diagnosis data, it is possible to adjust the best programming to be used in the next starts under full operating duty.

ATTENTION!
Special attention to the starting limits of the SSW900:
Maximum starting times.
Maximum starting currents.
Time interval between the starts.
The noncompliance with those limits may lead to the burn out of the SSW900.

5 TROUBLESHOOTING AND MAINTENANCE

This chapter presents:

- The description of the actuation of faults and alarms.
- The list of the most common problems and corrective actions.
- It contains instructions for periodical inspections of the product and preventive maintenance.

5.1.ACTUATION OF PROTECTIONS, FAULTS AND ALARMS

When fault "FXXX" is identified, what occurs is:

- Bypass opens.
- Triggers of the SCRs are blocked.
- Indication on the display of the fault description and code.
- Indication in the present fault in D1.1.1.
- Indication in the logical status word in S3.1.3.1.
- The relay programmed for “NO FAULTS” is turned off.

For the SSW900 to go back to normal operation right after the occurrence of a fault, it is necessary to reset it, which can be done as follows:

- Pressing the key O (manual reset).
- Via soft key "Reset".
- Automatically by setting C5.11.1 (auto-reset).
- Via digital input: (C4.1.1 to C4.1.6) DIx = 11 (Reset).
- Switching off the power supply, and switching it back on (power-on reset).

When alarm "AXXX" is identified, what occurs is:

- Indication on the display of the alarm description and code.
- Indication of the alarm in D2.1.1 to D2.1.5.
- Indication in the logical status word in S3.1.3.1.
- The triggers of the SCRs are not blocked, neither the bypass opens; the SSW900 keeps operating. Except for the protection of the communications.

The indications are automatically removed after the system leaves the alarm condition.



NOTE!
The actuation of alarms and faults is described in the Chapter Faults and Alarms of the Programming Manual.

5.2.FREQUENT PROBLEMS

Table 5.1: Frequent problems

Problem	Probable Cause	Cause Description
The SSW900 will not respond to the commands	Fault	Indication on the HMI: "FXXX". In a fault situation, the SSW900 will not drive the motor. Check the fault. Refer to the Chapter Faults and Alarms of the Programming Manual.
	Time before the start or after the stop Time between starts.	Indication on the HMI: "Start Delay" or "Re-start Delay". The SSW900 is waiting for the time after the motor stop, set in C5.7.2. Refer to the Chapter Time Protections of the Programming Manual.
	General enable	Indication on the HMI: "Ger.Dis". General Disabled Check the command source. If some DI is set for General Enable, it may be general disable even with commands by other sources. Refer to the Chapter Digital Inputs of the Programming Manual.
	Mode Configuration	Indication on the HMI: "Config". It indicates that the SSW900 is in a special condition that cannot drive the motor. Refer to the description of parameter S5.6.1 in the Programming Manual.
	Command source LOC/REM	Check if the active command source is in Local or Remote. Indication in S3.1.2. Refer to the Chapter Local/Remote Configuration of the Programming Manual.
	Commands by HMI – Keys I,O	Check the Fault conditions, Time after Stop, General Enable, Configuration Mode and Command Source indicated on the HMI. Refer to the Chapter HMI of the Programming Manual.
	Commands by DIx – Digital inputs	Check the Fault conditions, Time after Stop, General Enable, Configuration Mode and Command Source indicated on the HMI. Check the drive types, two wires, three wires. Check the connections of the digital inputs, DIx, 24V and COM. Refer to 3.2.13 - User's Signal and Control Connections Refer to the Chapter Digital Inputs of the Programming Manual.
	Commands by USB	Check the Fault conditions, Time after Stop, General Enable, Configuration Mode and Command Source indicated on the HMI. Check the commands sent by the USB in S5.2.3. The logical status of the SSW900 can be checked in S5.1.1. Refer to the Serial Communication Manual and the description of parameters S5.1.1 and S5.2.3 in the Programming Manual.
	Commands by SLOT 1	Check the Fault conditions, Time after Stop, General Enable, Configuration Mode and Command Source indicated on the HMI. Check the commands sent by the SLOT 1 in S5.2.5. The logical status of the SSW900 can be checked in S5.1.1. Refer to the Serial Communication Manual and the description of parameters S5.1.1 and S5.2.5 in the Programming Manual.
	Commands by SLOT 2	Check the Fault conditions, Time after Stop, General Enable, Configuration Mode and Command Source indicated on the HMI. Check the commands sent by the SLOT 2 in S5.2.6. The logical status of the SSW900 can be checked in S5.1.1. Refer to the Serial Communication Manual and the description of parameters S5.1.1 and S5.2.6 in the Programming Manual.
Motor will not reach rated speed	Motor will not start	Values of Current or Torque Limit too low for the load applied to the motor.
	Motor starts	Line voltage too low or undersized transformers.
Motor speed too high or too low	Motor data	Check if the motor used is according to the application.

Problem	Probable Cause	Cause Description
Abnormal vibration in the motor stop	Applications in general	The stopping time (deceleration) must be used only in applications with centrifugal hydraulic pumps. For other applications, C1.13 must remain 0 = Inactive.
	Pumps	Stopping times too high. Deceleration control method is not suitable for the application. Refer to the Chapter Control Types and Programming Information and Suggestions of the Programming Manual.
Noise on the motor	In the start	The noise produced by the motor in the start depends on the starting method used and time involved, however, it is continuous, medium and without jolts. Wrong connection to the motor, wrong connection inside the motor delta box.
	In JOG	The JOG function of the SSW900 applies a low frequency to the motor, which produces pulsed and high noises on the motor, according to the JOG level.
	In braking	The optimal braking method produces high and discontinuous noises on the motor, becoming lower and continuous when it stops. The DC braking method produces medium and constant noises on the motor. The Reverse braking produces noises equal to the motor start, becoming the same as the noise of the optimal braking in the motor stop.
Increase of the motor current in the deceleration	Applications in general	The stopping time (deceleration) must be used only in applications with centrifugal hydraulic pumps. For other applications, C1.13 must remain 0 = Inactive.
	Pumps	It is normal in the controlled deceleration of centrifugal hydraulic pumps for the current to increase as the motor stops, because the motor is in the locked rotor state. In order to reduce such effect, you may set C1.15 to the value in % of the motor voltage at the moment of its stop. The value of the motor voltage in V at the moment of the stop may be viewed in S1.3.1. Refer to the description of parameter S5.6.1 in the Programming Manual.
HMI display OFF	Connections to the HMI	Check the cable that connects the HMI to the SSW900.
	Power supply	Check if the electronics power supply is out of the range allowed. See Figure 3.14: Power supply connector of the electronics.
	Fuse	Check the fuse of the electronics power supply. If replacement is necessary, use glass time delay fuses 5x20 mm. It is recommended to use: 0239002.P.H Littelfuse; GMD-2 A Cooper Bussmann; GGA2 Ferraz / Mersen; See Figure 5.1: Procedure to change the fuse of the electronics power supply

5.3.PREVENTIVE MAINTENANCE



DANGER!
Always disconnect the general power supply before touching any electrical component in connection with the SSW900.
High voltages may still be present even after disconnecting the power supply.
Wait for at least three minutes for the complete discharge of the electronics capacitors.
Always connect the equipment frame to the protective earth (PE) at the proper terminal.



ATTENTION!
Electronic boards have components sensitive to electrostatic discharges.
Do not touch the components or connectors directly. If necessary, first touch the grounded metallic frame or wear a ground strap.

Do not apply any high voltage tests on the SSW900!
If necessary, contact the manufacturer.

Do not use megometers to test the thyristors.

Periodic inspections of SSW900 and installations are necessary to avoid operating problems due to unfavorable environmental conditions like high temperature, moisture, dust, vibrations or due to the aging of the components.
When the SSW900 Soft-Starter is stored for a long period of time, it is recommended that it be energized for 1 hour, each year.

Table 5.2: Preventive maintenance

Maintenance	Interval	Instructions
Fan replacement (if used)	After 40.000 hours of operation	Replace the fan
Battery replacement	Every 10 years or when alarm A181 warns that the battery voltage level is low	The battery used is of 3 V, CR2032 type for 85 °C. It is recommended to use the brands Maxell, Panasonic or Roadstar. See Figure 5.2: Procedure to change the battery of the Real Time Clock

Table 5.3: Periodic inspections every six months

Component	Problem	Corrective Action
Terminals, connectors	Loose screws	Tighten
	Loose connectors	
Fans (if used)	Dirt on the fans	Clean
	Abnormal noise	Replace the fan
	Fan stopped	
	Abnormal vibration	
Printed circuit boards	Buildup of dust, oil, moisture, etc.	Clean
	Smell	Replace
Power module / Power connections	Buildup of dust, oil, moisture, etc.	Clean
	Loose connection screws	Tighten
Power resistors	Discoloration	Replace
	Smell	
Heatsinks	Dust buildup	Clean
	Dirt	

5.4.ELECTRONICS FUSE REPLACEMENT

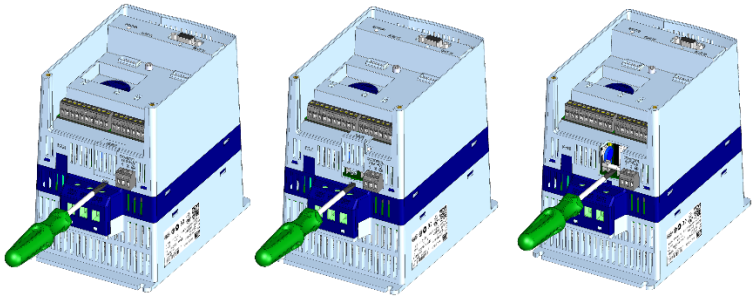


Figure 5.1: Procedure to change the fuse of the electronics power supply

5.5.RTC BATTERY REPLACEMENT

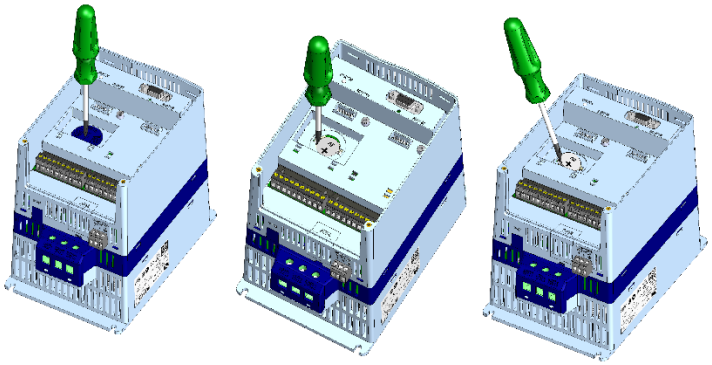


Figure 5.2: Procedure to change the battery of the Real Time Clock

5.6. INFORMATION NECESSARY TO CONTACT TECHNICAL SUPPORT

NOTE!
For technical support or servicing, it is important to have the following information at hand:
The SSW900 model, serial number and manufacturing date are available on the nameplate of the product (refer to Section 2.3. SOFT-STARTER SSW900).
Software versions installed (refer to menu S.3.2).
Data on the motor nameplate (power, voltage, current and number of poles).
Data on the application and settings made.

For further clarification, training or service, please contact WEG Technical Support.

6 ACCESSORIES

The code and models available of each accessory are presented in Table 6.1. The accessories may be ordered separately, and they will be shipped in individual packages containing the components and guides with detailed instructions for the installation, operation and programming.

Table 6.1: Accessory models

Part number	Name	Description
Control accessories to install in SLOTS 1 and 2		
12966043	SSW900-CRS485-W	Plug-in RS485 communication module
12966003	SSW900-CDN-N	Plug-in Anybus communication module - DeviceNet
12966001	SSW900-CPDP-N	Plug-in Anybus communication module – Profibus-DP
12966102	SSW900-CETH-IP-N	Plug-in Anybus communication module – EtherNet/IP
12966038	SSW900-CMB-TCP-N	Plug-in Anybus communication module – Modbus-TCP
12966099	SSW900-CPN-IO-N	Plug-in Anybus communication module – Profinet IO
14261364	SSW900-CAN-W	Plug-in communication module – CANopen or DeviceNet
14260745	SSW900-CETH-W	Plug-in communication module – Ethernet (pendent)
14260747	SSW900-PT100-W	Plug-in RTD module –6 channels
14190553	SSW900-KECA-10	External Current Acquisition – 10 A
14197757	SSW900-KECA-17	External Current Acquisition – 17 A
14197809	SSW900-KECA-24	External Current Acquisition – 24 A
14197811	SSW900-KECA-30	External Current Acquisition – 30 A
14197812	SSW900-KECA-45	External Current Acquisition – 45 A
14197814	SSW900-KECA-61	External Current Acquisition – 61 A
14197815	SSW900-KECA-85	External Current Acquisition – 85 A
14197816	SSW900-KECA-105	External Current Acquisition – 105 A
14197817	SSW900-KECA-130	External Current Acquisition – 130 A
14197838	SSW900-KECA-171	External Current Acquisition – 171 A
14197839	SSW900-KECA-200	External Current Acquisition – 200 A
14197840	SSW900-KECA-255	External Current Acquisition – 255 A
14197841	SSW900-KECA-312	External Current Acquisition – 312 A
14197842	SSW900-KECA-365	External Current Acquisition – 365 A
14197843	SSW900-KECA-412	External Current Acquisition – 412 A
Other Accessories		
10935650	SSW0708900-KVT-2B	Ventilation kit for frame B (Currents 45 to 105 A)
10935559	SSW0708900-KVT-3C	Ventilation kit for frame C (Currents 130 to 200 A)
10935651	SSW0708900-IP20-3C	IP20 kit for frame C (Currents 130 to 200 A)
11059230	SSW0708900-IP20-4D	IP20 kit for frame D (Currents 255 to 412 A)
13469204	SSW900-KMD-CB01	Frame Kit for HMI + cable of 1 m
13466665	SSW900-KMD-CB02	Frame Kit for HMI + cable of 2 m
13469206	SSW900-KMD-CB03	Frame Kit for HMI + cable of 3 m
13469207	SSW900-KMD-CB05	Frame Kit for HMI + cable of 5 m
13469208	SSW900-KMD-CB07	Frame Kit for HMI + cable of 7.5 m
13469209	SSW900-KMD-CB10	Frame Kit for HMI + cable of 10 m
13469211	SSW900-KMD-CB20	Frame Kit for HMI + cable of 20 m
14691775	SSW0708900-PROT-3C	Touch protection kit for frame C (Currents 130 to 200 A)
14691772	SSW0708900-PROT-4D	Touch protection kit for frame D (Currents 255 to 412 A)
14691809	SSW900-PROT-E	Touch protection kit for frame E (Currents 480 to 670 A)
14691998	SSW900-6BAR-E	Kit with six busbars for frame E (Currents 480 to 670 A)
15144306	SSW900-6BAR-F	Kit with six busbars for frame F (Currents 820 and 950 A)
15144348	SSW900-3BAR-G	Kit with three busbars for frame G (Currents 1100 and 1400 A)
14773867	SSW900-HMI-BLT	Graphical Human Machine Interface with Bluetooth communication

NOTE!
The accessory installed in SLOT 1 must be different from the one installed in SLOT 2.
It is not possible to use simultaneously two identical accessories in SLOTs 1 and 2.
It is not possible to use two Anybus modules simultaneously, even being two different protocols.

6.1.INSTALLATION OF ACCESSORY IN THE SLOT

The accessories are easily and quickly incorporated to the SSW900. The models of the accessory installed can be viewed in S3.5.1 and S.3.5.2.

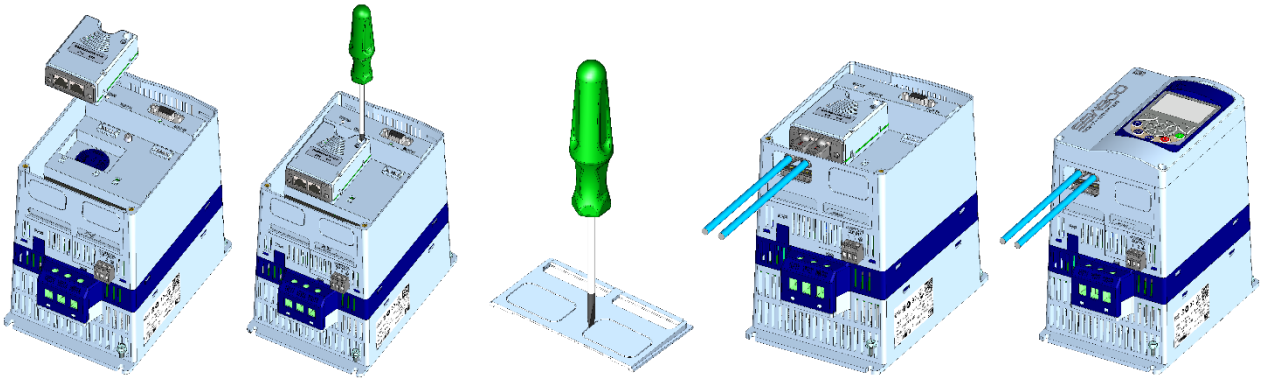


Figure 6.1: Procedure to install accessory

NOTE!
The accessories must be installed with the control of the SSW900 powered down.

6.2.IP20 KIT

IP20 kit, touch protection with the parts energized according to IEC 60529.

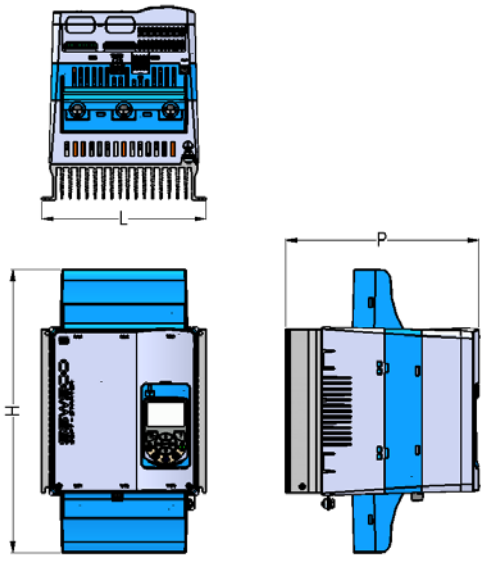


Figure 6.2: IP20 Kit frame C

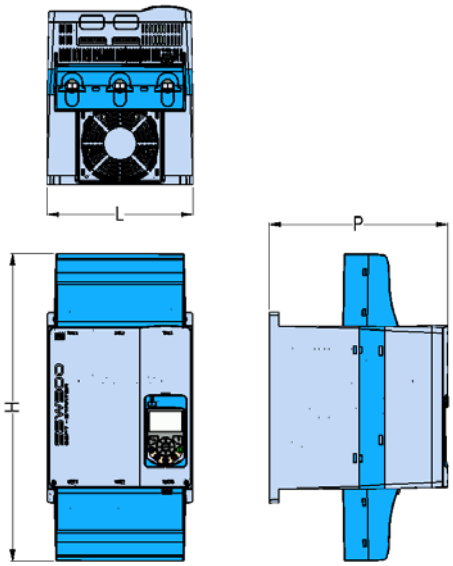


Figure 6.3: IP20 Kit frame D

Table 6.2: Dimensions with IP20 Kit

Model SSW900	Frame	L mm (in)	H mm (in)	P mm (in)
130 A 171 A 200 A	C	233 (9.17)	383 (15.07)	262 (10.31)
255 A 312 A 365 A 412 A	D	230 (9.05)	480 (18.89)	285 (11.22)

6.3.TOUCH PROTECTION KIT

Front touch protection with live parts, with more flexibility for power cables.

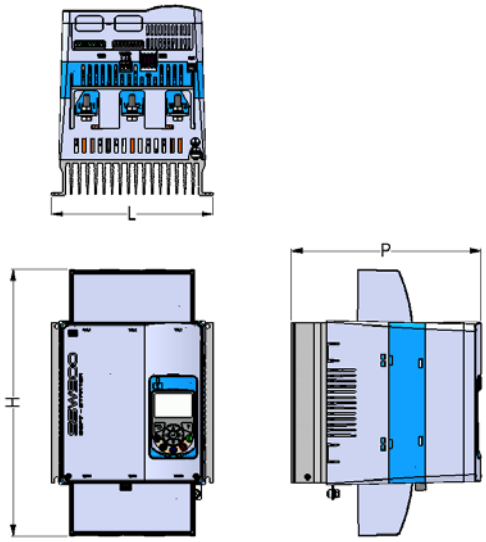


Figure 6.4: Touch protection kit frame C

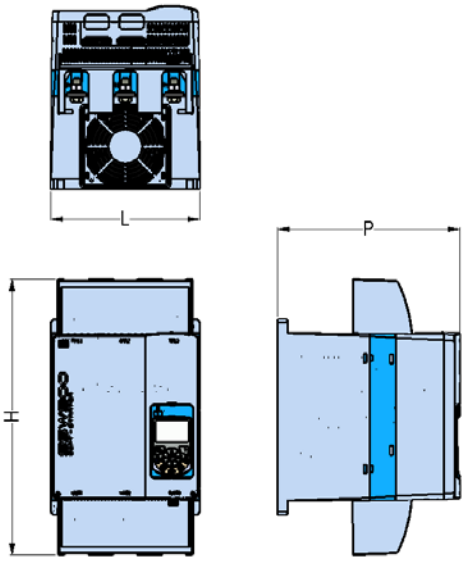


Figure 6.5: Touch protection kit frame D

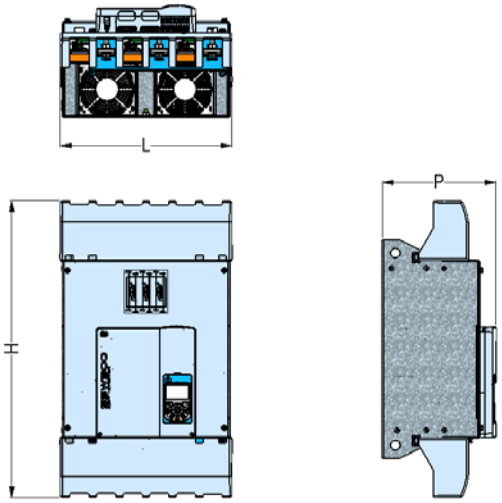


Figure 6.6: Touch protection kit frame E

Table 6.3: Dimensions with IP20 Kit

Model SSW900	Frame	L mm (in)	H mm (in)	P mm (in)
130 A 171 A 200 A	C	223 (8.77)	370 (14.56)	262 (10.31)
255 A 312 A 365 A 412 A	D	230 (9.05)	425 (16.73)	285 (11.22)
480 A 604 A 670 A	E	390 (15.35)	685 (26.96)	260 (10.23)

6.4.BAR KIT

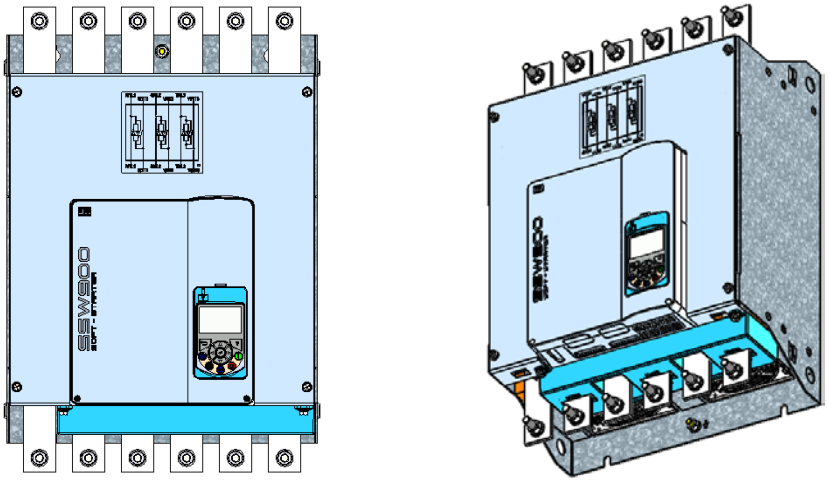


Figure 6.7: Kit with six busbars for frames E or F

For connection of more power cables or external bypass contactor.

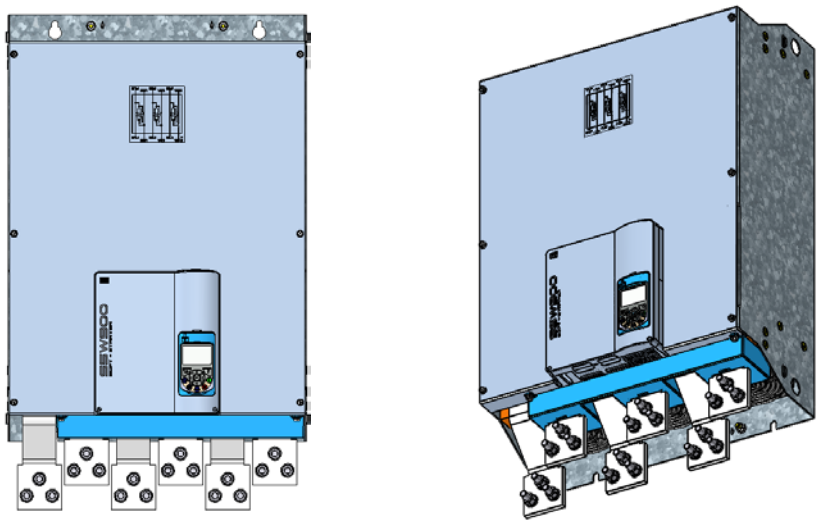


Figure 6.8: Kit with three busbars for frame G

For connection of all power cables at the bottom or top.

7 TECHNICAL CHARACTERISTICS

This chapter describes the technical characteristics of the SSW900.

According to IEC EN60947-4-2, the operation conditions of the starting devices must be defined. Many manufacturers define them in different ways, not standardized though.

Example 1:
130A: AC-53b:3-30:330
130 A: soft-starter current rating (FLC)
AC-53b: device with integrated bypass
3-: start current (3 x FLC)
30: start time (in seconds)
330: time in nominal conditions (FLC), duty cycle with 100 % of the time ON
30 s + 330 s = 360 s, 360 s x 10 = 1 h, that is, 10 starts per hour

Example 2:
130A: AC-53a:4-30:50-6
130 A: soft-starter current rating (FLC)
AC-53a: device without integrated bypass
4-: start current (4 x FLC)
30: start time (in seconds)
50-: duty cycle with 50 % of the time ON (FLC) and 50 % of the time OFF
6: starts per hour

The SSW900 has the following main definitions:

Table 7.1: Standardized operation conditions

Standard Connection with Three Cables		
Models from 10 A to 30 A and 255 A to 412 A. Models from 45 A to 200 A (with ventilation accessory).	AC-53b 3-30:330	3 x FLC for 30 s 10 starts per hour 100 % of the time with FLC with integrated bypass from -10 to 55 °C (14 °F to 131 °F) without current derating
Models from 45 A to 200 A (without ventilation accessory).	AC-53b 3-30:1170	3 x FLC for 30 s 3 starts per hour 100 % of the time with FLC with integrated bypass from -10 to 55 °C (14 °F to 131 °F) without current derating
Models from 480 A to 1400 A	AC-53b 3-30:690	3 x FLC for 30 s 5 starts per hour 100 % of the time with FLC with integrated bypass from -10 to 40 °C (14 °F to 104 °F) without current derating

Table 7.2: Standardized operation conditions

Inside Delta Motor Connection with Six Cables		
Models from 10 A to 30 A and 255 A to 412 A. **Models from 45 A to 200 A (with ventilation accessory).**	AC-53b 3-25:335	3 x FLC for 25 s 10 starts per hour 100 % of the time with FLC with integrated bypass from -10 to 55 °C (14 ºF to 131 ºF) without current derating
Models from 45 A to 200 A (without ventilation accessory).	AC-53b 3-25:1175	3 x FLC for 25 s 3 starts per hour 100 % of the time with FLC with integrated bypass from -10 to 55 °C (14 ºF to 131 ºF) without current derating
Models from 480 A to 1400 A	AC-53b 3-25:695	3 x FLC for 25 s 5 starts per hour 100 % of the time with FLC with integrated bypass from -10 to 40 °C (14 ºF to 104 ºF) without current derating

Other operation conditions are shown below:

Table 7.3: Rated currents according to the operation conditions, standard connection with three cables 55 °C (131 °F)

Model SSW900	AC-53b: 2,5-35:325 A	AC-53b: 3-30:330 A	AC-53b: 3,5-15:345 A	AC-53b: 4-10:350 A	AC-53b: 4-20:340 A	AC-53b: 4,5-30:330 A	10 starts/h
10 A	10	10	10	10	10	10	-
17 A	17	17	17	16	14	11	
24 A	24	24	24	24	21	16	
30 A	30	30	30	30	26	20	
45 A	45	45	41	38	35	30	With ventilation accessory
61 A	61	61	56	52	48	40	
85 A	85	85	80	75	67	56	
105 A	105	105	103	98	85	70	
130 A	130	130	130	126	109	87	
171 A	171	171	171	171	149	114	
200 A	200	200	200	200	172	133	
255 A	255	255	255	255	215	170	-
312 A	312	312	312	312	262	208	
365 A	365	365	365	365	309	243	
412 A	412	412	412	412	351	274	
Model SSW900	**AC-53b: 2,5-35:1165 A**	**AC-53b: 3-30:1170 A**	**AC-53b: 3,5-15:1185 A**	**AC-53b: 4-10:1190 A**	**AC-53b: 4-20:1180 A**	**AC-53b: 4,5-30:1170 A**	**3 starts / h**
45 A	45	41	38	34	32	28	Without ventilation accessory
61 A	61	61	56	51	48	41	
85 A	85	85	80	74	67	57	
105 A	105	105	104	98	86	70	
130 A	130	130	130	128	110	87	
171 A	171	171	171	171	150	114	
200 A	200	200	200	200	172	133	
Model SSW900	**AC-53b: 2,5-35:685 A**	**AC-53b: 3-30:690 A**	**AC-53b: 3,5-15:705 A**	**AC-53b: 4-10:710 A**	**AC-53b: 4-20:700 A**	**AC-53b: 4,5-30:690 A**	**5 starts / h**
480 A	480	469	454	423	378	312	-
604 A	**604**	**548**	**529**	**492**	**441**	**365**	
670 A	670	604	590	553	490	402	
820 A	777	672	665	622	551	448	
950 A	942	814	802	748	665	543	
1100 A	935	814	821	769	677	543	
1400 A	1327	1153	1152	1075	952	769	

NOTE!
For Table 7.3 the ambient temperature should not exceed 55 ° C (131 ° F).
The air temperature below the SSW900 should not be above 55 ° C (131 ° F).

NOTE!
For use of the SSW900 near maximum duty, set the fan to always on (C9.4.1=1).

Table 7.4: Rated currents according to the operation conditions, inside delta motor connection 55 °C (131 °F)

Model SSW900	AC-53b: 2,5-30:330 A	AC-53b: 3-26:334 A	AC-53b: 3,5-13:347 A	AC-53b: 4-8:352 A	AC-53b: 4-17:343 A	AC-53b: 4,5-26:334 A	10 starts/h
130 A	225	225	225	218	189	151	With ventilation accessory
171 A	296	296	296	296	258	197	
200 A	346	346	346	346	298	230	
255 A	442	441	442	442	372	294	-
312 A	540	540	540	540	454	360	
365 A	632	632	632	632	535	421	
412 A	714	713	714	714	609	475	
Model SSW900	**AC-53b: 2,5-30:1170 A**	**AC-53b: 3-26:1174 A**	**AC-53b: 3,5-13:1187 A**	**AC-53b: 4-8:1192 A**	**AC-53b: 4-17:1183 A**	**AC-53b: 4,5-26:1174 A**	**3 starts / h**
130 A	225	225	225	222	191	151	Without ventilation accessory
171 A	296	296	296	296	260	197	
200 A	346	346	346	346	298	230	
Model SSW900	**AC-53b: 2,5-30:690 A**	**AC-53b: 3-26:694 A**	**AC-53b: 3,5-13:707 A**	**AC-53b: 4-8:712 A**	**AC-53b: 4-17:703 A**	**AC-53b: 4,5-26:694 A**	**5 starts / h**
480 A	831	812	785	733	655	541	-
604 A	1046	949	916	853	764	633	
670 A	1160	1046	1022	958	848	697	
820 A	1346	1164	1151	1077	954	776	
950 A	1632	1410	1389	1296	1153	940	
1100 A	1620	1411	1422	1332	1172	940	
1400 A	2298	1997	1995	1861	1649	1331	

NOTE!
For Table 7.4 the ambient temperature should not exceed 55 ° C (131 ° F).
The air temperature below the SSW900 should not be above 55 ° C (131 ° F).

NOTE!
For use of the SSW900 near maximum duty, set the fan to always on (C9.4.1=1).

Table 7.5: Rated currents according to the operation conditions, standard connection with three cables 40 °C (104 °F)

Model SSW900	AC-53b: 2,5-35:325 A	AC-53b: 3-30:330 A	AC-53b: 3,5-15:345 A	AC-53b: 4-10:350 A	AC-53b: 4-20:340 A	AC-53b: 4,5-30:330 A	10 starts/h
10 A	10	10	10	10	10	10	-
17 A	17	17	17	17	16	13	
24 A	24	24	24	24	23	18	
30 A	30	30	30	30	28	22	
45 A	45	45	45	42	39	34	With ventilation accessory
61 A	61	61	61	56	52	44	
85 A	85	85	85	81	73	61	
105 A	105	105	105	105	94	77	
130 A	130	130	130	130	125	99	
171 A	171	171	171	171	170	130	
200 A	200	200	200	200	193	150	
255 A	255	255	255	255	239	189	-
312 A	312	312	312	312	284	225	
365 A	365	365	365	365	335	264	
412 A	412	412	412	412	379	297	
Model SSW900	**AC-53b: 2,5-35:1165 A**	**AC-53b: 3-30:1170 A**	**AC-53b: 3,5-15:1185 A**	**AC-53b: 4-10:1190 A**	**AC-53b: 4-20:1180 A**	**AC-53b: 4,5-30:1170 A**	**3 starts / h**
45 A	45	45	43	39	37	32	Without ventilation accessory
61 A	61	61	61	56	53	45	
85 A	85	85	85	81	74	62	
105 A	105	105	105	105	97	79	
130 A	130	130	130	130	125	99	
171 A	171	171	171	171	170	130	
200 A	200	200	200	200	193	150	
Model SSW900	**AC-53b: 2,5-35:685 A**	**AC-53b: 3-30:690 A**	**AC-53b: 3,5-15:705 A**	**AC-53b: 4-10:710 A**	**AC-53b: 4-20:700 A**	**AC-53b: 4,5-30:690 A**	**5 starts / h**
480 A	480	480	480	470	420	348	-
604 A	604	604	582	541	486	403	
670 A	670	670	653	612	542	446	
820 A	820	820	807	753	670	547	
950 A	950	950	932	868	775	633	
1100 A	1100	1100	1100	1027	909	733	
1400 A	1400	1400	1392	1296	1153	933	

NOTE!
For Table 7.5 the ambient temperature should not exceed 40 ° C (104 ° F).
The air temperature below the SSW900 should not be above 40 ° C (104 ° F).

NOTE!
For use of the SSW900 near maximum duty, set the fan to always on (C9.4.1=1).

Table 7.6: Rated currents according to the operation conditions, inside delta motor connection 40 °C (104 °F)

Model SSW900	AC-53b: 2,5-30:330 A	AC-53b: 3-26:334 A	AC-53b: 3,5-13:347 A	AC-53b: 4-8:352 A	AC-53b: 4-17:343 A	AC-53b: 4,5-26:334 A	10 starts/h
130 A	225	225	225	225	217	171	With ventilation accessory
171 A	296	296	296	296	294	225	
200 A	346	346	346	346	334	260	
255 A	442	442	442	442	414	328	-
312 A	540	540	540	540	492	390	
365 A	632	632	632	632	579	457	
412 A	714	714	714	714	657	514	
Model SSW900	**AC-53b: 2,5-30:1170 A**	**AC-53b: 3-26:1174 A**	**AC-53b: 3,5-13:1187 A**	**AC-53b: 4-8:1192 A**	**AC-53b: 4-17:1183 A**	**AC-53b: 4,5-26:1174 A**	**3 starts / h**
130 A	225	225	225	225	217	171	Without ventilation accessory
171 A	296	296	296	296	294	225	
200 A	346	346	346	346	334	260	
Model SSW900	**AC-53b: 2,5-30:690 A**	**AC-53b: 3-26:694 A**	**AC-53b: 3,5-13:707 A**	**AC-53b: 4-8:712 A**	**AC-53b: 4-17:703 A**	**AC-53b: 4,5-26:694 A**	**5 starts / h**
480 A	831	831	831	814	728	603	-
604 A	1046	1046	1008	937	841	698	
670 A	1160	1160	1131	1059	939	773	
820 A	1420	1420	1398	1304	1161	947	
950 A	1645	1645	1614	1504	1342	1097	
1100 A	1905	1905	1905	1779	1575	1270	
1400 A	2425	2425	2411	2245	1997	1617	

NOTE!
For Table 7.6 the ambient temperature should not exceed 40 ° C (104 ° F).
The air temperature below the SSW900 should not be above 40 ° C (104 ° F).

NOTE!
For use of the SSW900 near maximum duty, set the fan to always on (C9.4.1=1).

In order to calculate the maximum rated power of the motors that can be driven by the SSW900, you just have to use the equation:

$$Pn_{Mot} = \mathrm{Vn_{Mot}} \times \mathrm{In_{SSW}} \times \sqrt{3} \times Re \times \cos\varphi$$

Pn_{Mot} : Motor rated power
$\mathrm{Vn_{Mot}}$: Motor rated voltage
$\mathrm{In_{SSW}}$: Rated current of the SSW (according to the operation conditions)
Re : Motor efficiency
$\cos\varphi$: Motor power factor

Below are some tables with powers of some UL and WEG standard motors with certain operation conditions. However, they can be optimized according to the operation conditions used and the motor rated data.

The easiest way to choose the SSW900 to be used is by the motor rated current, by the operation conditions and by using WEG Sizing Software (SDW, the Portuguese acronym).

Table 7.7: Powers and currents for standard connection with three cables according to UL508

Model SSW900	Rated Current	Motor Voltage 220/230 V SSW - T5		Motor Voltage 380/400 V SSW - T5, T6		Motor Voltage 440/460 V SSW - T5, T6		Motor Voltage 575 V SSW - T5, T6	
	A	cv	kW	cv	kW	cv	kW	cv	kW
10 A	10	3	2.2	5	3.7	5	3.7	7.5	5.5
17 A	17	5	3.7	7.5	5.5	10	7.5	15	11
24 A	24	7.5	5.5	10	7.5	15	11	20	15
30 A	30	10	7.5	15	11	20	15	25	18.5
45 A	45	15	11	25	18.5	30	22	40	30
61 A	61	20	15	30	22	40	30	50	37
85 A	85	30	22	50	37	60	45	75	55
105 A	105	40	30	60	45	75	55	100	75
130 A	130	50	37	75	55	100	75	125	90
171 A	171	60	45	100	75	125	90	150	110
200 A	200	75	55	100	75	150	110	200	150
255 A	255	100	75	150	110	200	150	250	185
312 A	312	125	90	175	130	250	185	300	220
365 A	365	150	110	200	150	300	225	350	260
412 A	412	150	110	250	185	350	260	450	330
480 A	480	200	150	300	220	400	300	500	370
604 A	604	250	185	350	260	500	370	600	450
670 A	670	250	185	400	300	550	410	650	485
820 A	820	300	220	500	370	600	450	750	550
950 A	950	350	260	600	450	700	525	850	630
1100 A	1100	450	330	700	525	800	600	1000	750
1400 A	1400	500	370	900	670	1050	775	1300	1000

Models ≤ 412 A: AC-53b 3-30: 330, ambient temperature 55 °C (131 °F);
Models ≥ 480 A: AC-53b 3-30: 690, ambient temperature 40 °C (104 °F);
Models 45 A to 200 A: with ventilation accessory;
UL standard motors.

Table 7.8: Powers and currents for inside delta motor connection with six cables according to UL508

Model SSW900	Rated Current	Motor Voltage 220/230 V SSW – T5		Motor Voltage 380/400 V SSW – T5, T6		Motor Voltage 440/460 V SSW – T5, T6		Motor Voltage 575 V SSW – T6	
	A	cv	kW	Cv	kW	cv	kW	cv	kW
130 A	225	75	55	125	90	150	110	200	150
171 A	296	100	75	150	110	200	150	300	220
200 A	346	125	90	200	150	250	185	350	260
255 A	441	150	110	250	185	350	260	450	330
312 A	540	200	150	300	220	450	330	550	410
365 A	631	250	185	350	260	500	370	650	485
412 A	713	250	185	450	330	550	410	750	550
480 A	831	350	260	550	410	650	485	850	630
604 A	1046	450	330	700	525	800	600	1100	800
670 A	1160	450	330	850	630	900	670	1200	900
820 A	1420	550	410	1000	750	1150	820	1500	1200
950 A	1645	650	485	1150	820	1350	1000	1750	1290
1100 A	1905	800	600	1350	1000	1600	1175	2000	1475
1400 A	2425	1000	750	1750	1290	2000	1475	2500	1850

Models ≤ 412 A: AC-53b 3-25: 335, ambient temperature 55 °C (131 °F);
Models ≥ 480 A: AC-53b 3-25: 695, ambient temperature 40 °C (104 °F);
Models 130A to 200A: with ventilation accessory;
UL standard motors.

Table 7.9: Powers and currents for standard connection with three cables according to WEG motors

Model SSW 900	Rated Current	Motor Voltage 220/230 V SSW – T5		Motor Voltage 380/400 V SSW – T5, T6		Motor Voltage 440/460 V SSW – T5, T6		Motor Voltage 525 V SSW – T5, T6		Motor Voltage 575 V SSW – T5, T6		Motor Voltage 690 V SSW – T6	
	A	cv	kW	cv	kW	cv	kW	cv	kW	cv	kW	cv	KW
10 A	10	3	2.2	6	4.5	7.5	5.5	7.5	5.5	10	7.5	-	-
17 A	17	6	4.5	10	7.5	12.5	9.2	15	11	15	11	-	-
24 A	24	7.5	5.5	15	11	15	11	20	15	20	15	-	-
30 A	30	10	7.5	20	15	20	15	25	18.5	30	22	-	-
45 A	45	15	11	30	22	30	22	40	30	40	30	-	-
61 A	61	20	15	40	30	50	37	50	37	60	45	-	-
85 A	85	30	22	60	45	60	45	75	55	75	55	-	-
105 A	105	40	30	75	55	75	55	75	55	100	75	-	-
130 A	130	50	37	75	55	100	75	125	90	125	90	150	110
171 A	171	60	45	125	90	125	90	150	110	175	132	220	165
200 A	200	75	55	150	110	150	110	200	150	200	150	250	185
255 A	255	100	75	175	132	200	150	250	185	250	185	340	250
312 A	312	125	90	200	150	250	185	300	220	300	220	430	320
365 A	365	150	110	250	185	300	225	350	260	400	300	470	350
412 A	412	150	110	300	220	350	260	440	315	450	330	500	370
480 A	480	200	150	350	260	400	300	500	370	500	370	600	450
604 A	604	250	185	450	330	500	370	600	450	650	485	750	550
670 A	670	250	185	500	370	550	410	650	485	750	550	850	630
820 A	820	350	260	550	410	700	525	800	600	850	630	1000	750
950 A	950	400	300	750	550	800	600	900	670	1050	775	1150	860
1100 A	1100	450	330	800	600	900	670	1100	810	1200	900	1300	1000
1400 A	1400	550	410	1000	750	1200	900	1400	1050	1500	1100	1700	1250

Models ≤ 412 A: AC-53b 3-30: 330, ambient temperature 55 °C (131 °F);
Models ≥ 480 A: AC-53b 3-30: 690, ambient temperature 40 °C (104 °F);
Models 45 A to 200 A: with ventilation accessory;
Weg Premium Motors or Plus IV Poles

Table 7.10: Powers and currents for inside delta motor connection with six cables according to WEG motors

Model SSW900	Rated Current	Motor Voltage 220/230 V SSW – T5		Motor Voltage 380/400 V SSW – T5, T6		Motor Voltage 440/460 V SSW – T5, T6		Motor Voltage 525 V SSW – T6		Motor Voltage 575 V SSW – T6	
	A	cv	kW	cv	kW	cv	kW	cv	kW	cv	kW
130 A	225	75	55	150	110	175	132	200	150	250	185
171 A	296	125	90	200	150	200	150	250	185	300	220
200 A	346	150	110	250	185	300	220	300	220	350	260
255 A	441	175	132	300	220	350	260	400	300	450	330
312 A	540	200	150	350	260	450	330	500	370	550	410
365 A	631	250	185	450	330	500	370	600	450	650	485
412 A	713	250	185	500	370	600	450	700	525	800	600
480 A	831	350	260	600	450	700	525	800	600	900	670
604 A	1046	450	330	750	550	850	630	1050	775	1150	820
670 A	1160	500	370	850	630	950	700	1150	820	1250	920
820 A	1420	600	450	1000	750	1200	900	1400	1050	1550	1140
950 A	1645	720	520	1200	900	1400	1030	1650	1200	1800	1325
1100 A	1905	800	600	1400	1030	1600	1175	1900	1400	2100	1550
1400 A	2425	1050	775	1750	1290	2000	1475	2450	1800	2650	1950

Models ≤ 412 A: AC-53b 3-25: 335, ambient temperature 55 °C (131 °F);
Models ≥ 480 A: AC-53b 3-25: 695, ambient temperature 40 °C (104 °F);
Models 130A to 200A: with ventilation accessory;
Weg Premium Motors or Plus IV Poles.

7.1.POWER DATA

Power supply	Power Voltage (R/1L1, S/3L2, T/5L3)	T5 = 220 to 575 V (-15 % to +10 %), or 187 to 632 Vac (standard connection) T6 = 380 to 690 V (-15 % to +10 %), or 323 to 759 Vac (standard connection) T5 = 220 to 500 V (-15 % to +10 %), or 187 to 550 Vac (inside delta) T6 = 380 to 575 V (-15 % to +10 %), or 323 to 632 Vac (inside delta)
	Frequency	50 to 60 Hz (±10 %), or 45 to 66 Hz.
Capacity	Maximum number of starts per hour, starting duty	According to Table 7.1 and Table 7.2.
Thyristor (SCRs)		Maximum reverse peak voltage 1600 V (T5). Maximum reverse peak voltage 1800 V (T6).

7.2. ELECTRONICS DATA

Power supply	Control voltage	Models from 10 A to 200 A: E2 = 110 to 240 V (-15 % to +10 %), or 93.5 to 264 Vac Models from 255 to 1400 A: E3 = 110 to 130 V (-15 % to +10 %), or 93.5 to 143 Vac, or E4 = 220 to 240 V (-15 % to +10 %), or 176.8 to 264 Vac
	Frequency	50 to 60 Hz (±10 %), or 45 to 66 Hz
	Consumption	Models from 10 A to 200 A: 32 VA. Models from 255 to 412 A: 70 VA continuous, 700 VA additional during the closing of the internal bypass. Models from 480 to 670 A: 90 VA continuous, 700 VA additional during the closing of the internal bypass. Models from 820 to 950 A: 140 VA continuous, 800 VA additional during the closing of the internal bypass. Models from 1100 to 1400 A: 180 VA continuous, 850 VA additional during the closing of the internal bypass.
Digital	Outputs	5 isolated digital inputs: Minimum high level: 18 Vdc; Maximum low level: 3 VdcC; Maximum voltage: 30 Vdc; Input current: 11 mA @ 24 Vdc; Programmable functions.
	Inputs for motor thermistors	1 input for thermistor: Actuation: 3.9 kΩ, Release: 1.6 kΩ; Minimum resistance: 100 Ω;
Digital	Outputs	3 isolated digital outputs: 2 relays with NO contacts, 240 Vac, 30 Vdc, PF = 0.6, 2A, programmable functions; 1 relay with NO/NC contact, 240 Vac, 30 Vdc, PF = 0.6, 2A, programmable functions.
	Analog	1 not isolated analog output: 0 to 10 V or 0/4 to 20 mA configurable by software.
HMI Human Machine Interface	Standard HMI	12 keys: Run/Stop, Direction of Rotation, Jog, Local/Remote and browsing buttons: Left, Right, Up, Down, Enter, Back and Help; Graphic LCD display; It allows monitoring/changing all the parameters of the SSW; Option of external mounting, panel door; USB for firmware updates or communication with the product.
PC connection for programming	USB connector by means of the HMI	USB standard Rev. 2.0 (basic speed). USB plug type mini B "device" Interconnecting cable: standard host/device shielded USB cable

NOTE!
Refer to the Programming Manual for information on programming data and all the functions of the SSW900.

7.3. CONSIDERED STANDARDS

Safety standards	UL508 - Industrial control equipment. EN60947-4-2, LVD 2014/35/EU - Low-voltage Directive.
Electromagnetic compatibility standards	CISPR 11 - Industrial, scientific and medical (ISM) radio-frequency equipment - electromagnetic disturbance characteristics - limits and methods of measurement EN 61000-4-2 - Electromagnetic compatibility (EMC) - part 4: testing and measurement techniques - section 2: Electrostatic discharge immunity test EN 61000-4-3 - Electromagnetic compatibility (EMC) - part 4: testing and measurement techniques - section 3: radiated, radio-frequency, electromagnetic field immunity test. EN 61000-4-4 - Electromagnetic compatibility (EMC) - part 4: testing and measurement techniques - section 4: electrical fast transient/burst immunity test. EN 61000-4-5 - Electromagnetic compatibility (EMC) - part 4: testing and measurement techniques - section 5: surge immunity test. EN 61000-4-6 - Electromagnetic compatibility (EMC) - part 4: testing and measurement techniques - section 6: immunity to conducted disturbances, induced by radio-frequency fields. EN 61000-4-11 – Electromagnetic compatibility (EMC) - part 4: testing and measurement techniques - section 11: voltage dips, short interruptions and voltage variations immunity tests.
Mechanical construction standards	EN 60529 - degrees of protection provided by enclosures (IP code). UL 50 - enclosures for electrical equipment. IEC 60721-3-3 - classification of environmental conditions.

NOTE!
Product still under certification.

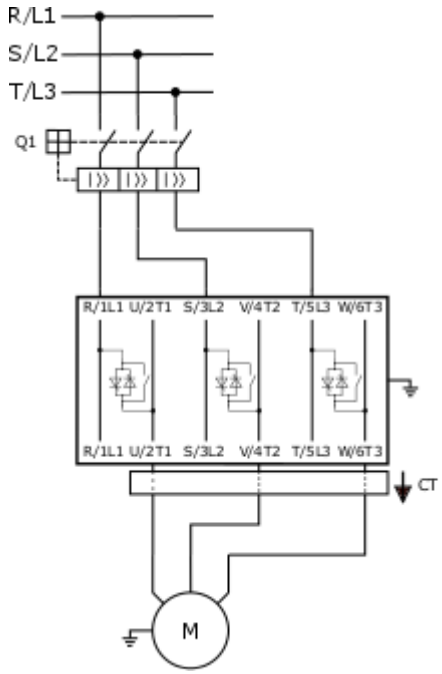
8 ATTACHMENT

8.1.CHANGING THE BUSBARS OF THE FRAME E, F, G

The frames E, F and G make it possible to change the position of the busbars.

NOTE!
The change of position of the busbars must only be done by specialized technical assistants.

The standard product comes with:



Power supply connection:
R / 1L1, S / 3L2 and T / 5L3
At the top of the SSW and left side of the thyristor bridges.

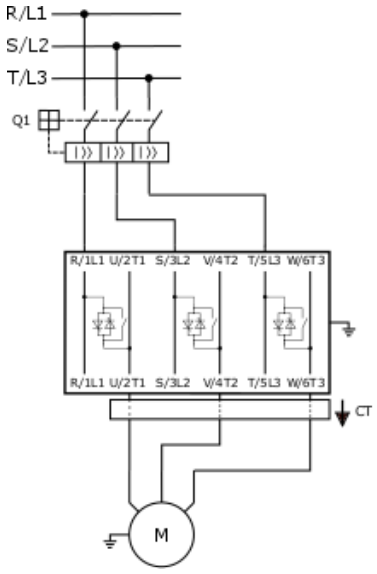
Motor connection:
U / 2T1, V / 4T2 and W / 6T3
At the bottom of the SSW and right side of the thyristor bridges.

NOTE!
Pay attention to the maximum torque allowed on the busbar mounting screws.
Screw M8 (5/16 ").
Maximum torque 12 Nm (106 lbf·in).

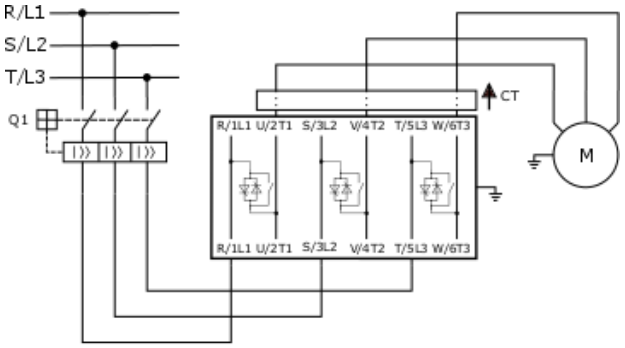
NOTE!
Current transformers "CT" must always remain on the busbars that connect to the motor.

NOTE!
For the use of external bypass, 12 cables, it is necessary to use an accessory with 6 additional busbars, see Table 6.1.

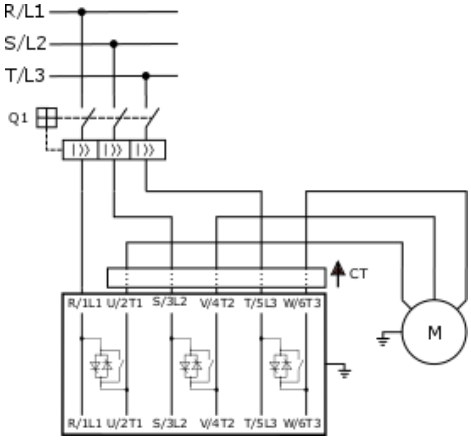
Connection possibilities are shown below:



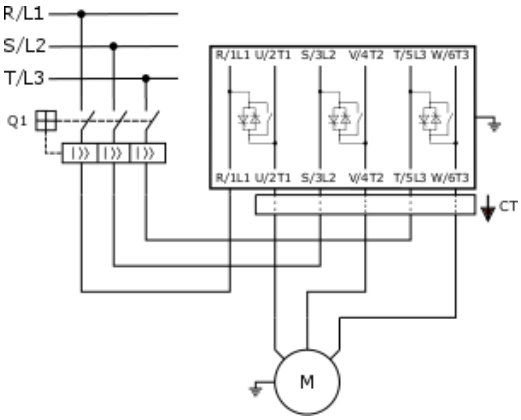
Standard feed



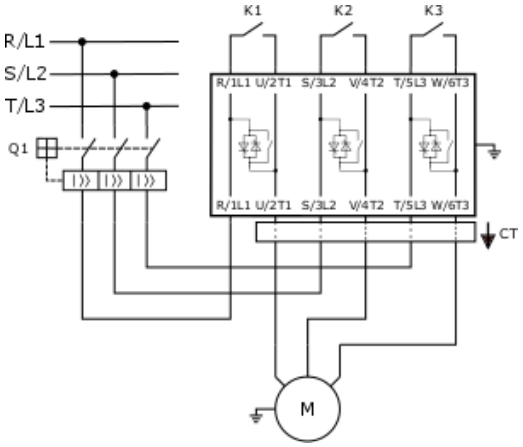
Reverse feed



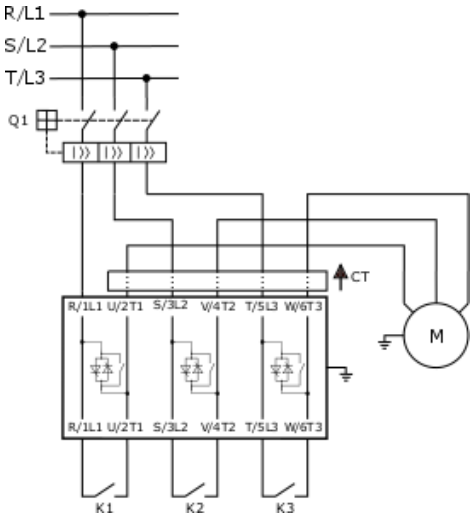
All over



All down

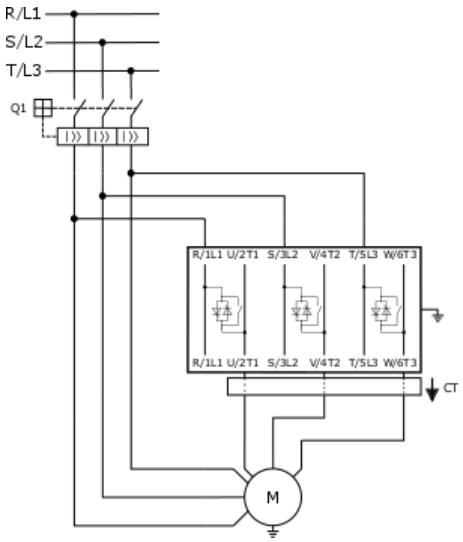


External Bypass

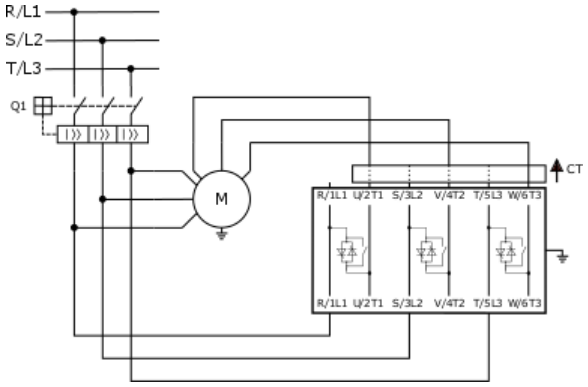


External Bypass

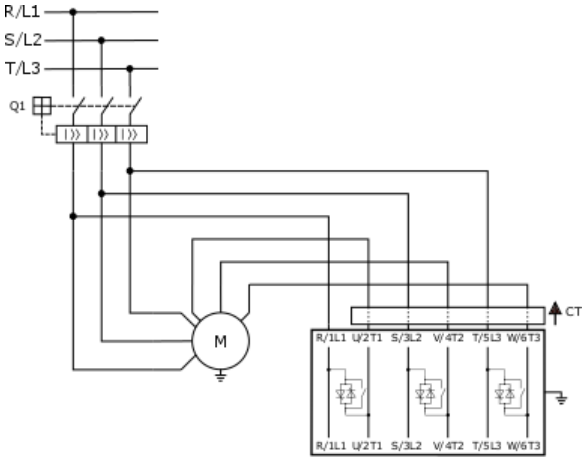
Figure 8.1: Frame E standard connection to the motor with three wires



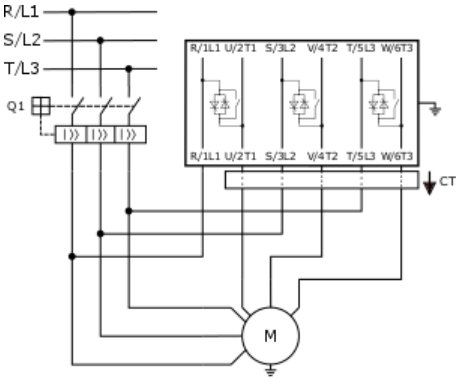
Standard feed



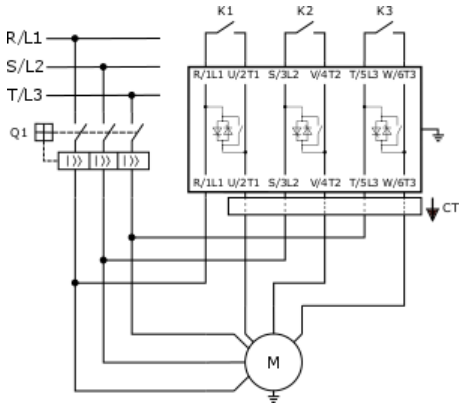
Reverse feed



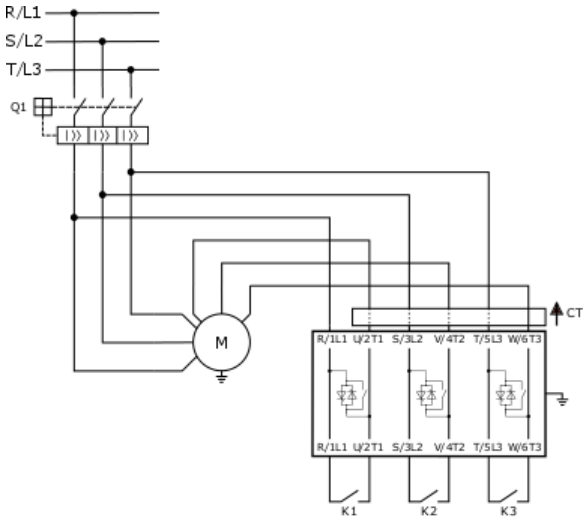
All over



All down



External Bypass



External Bypass

Figure 8.2: Frame E connection inside delta motor with six wires

Process of changing the busbars:

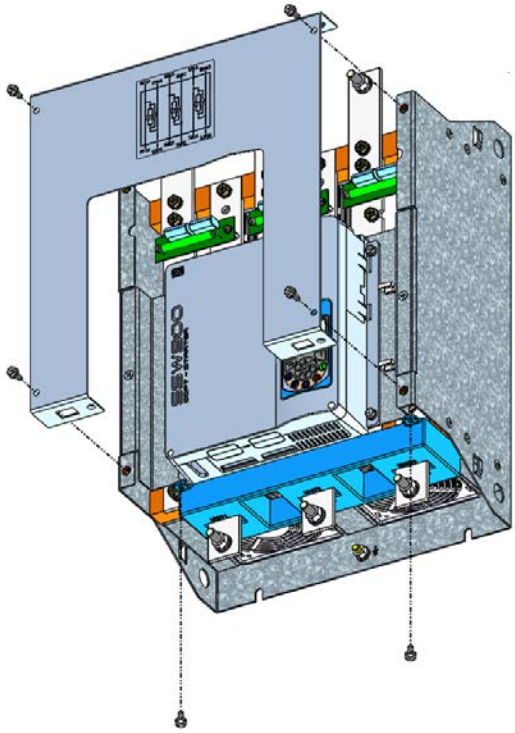


Figure 8.3: Opening the front cover

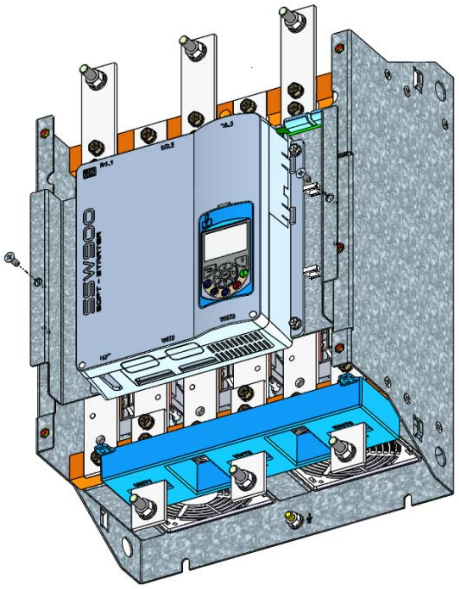


Figure 8.4: Moving the control

There is no need to remove control, just move the necessary to access the busbar screws.

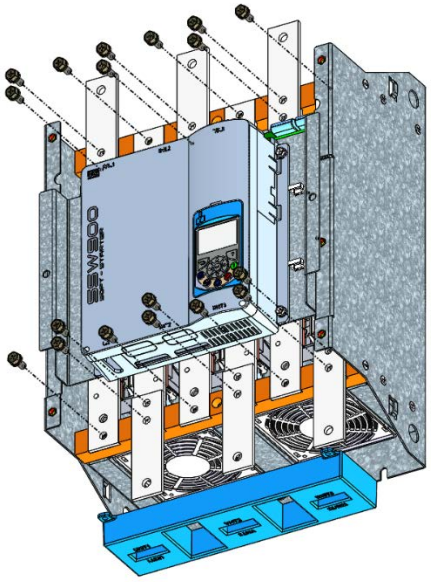


Figure 8.5: Removing the busbars and CT

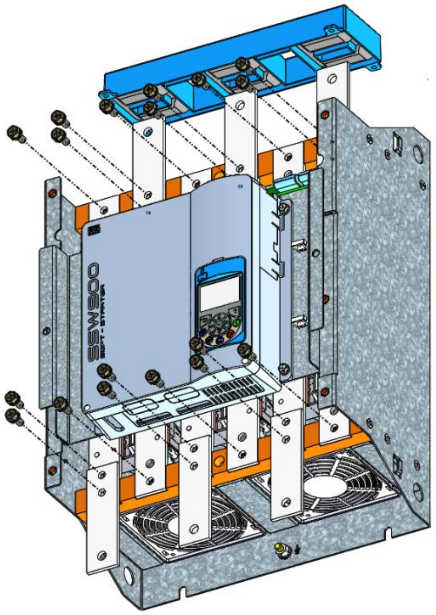


Figure 8.6: Moving the control

NOTE!
Pay attention to the maximum torque allowed on the busbar mounting screws.
Screw M8 (5/16 ").
Maximum torque 12 Nm (106 lbf·in).

NOTE!
Current transformers "CT" must always remain on the busbars that connect to the motor. Pay attention to the U/2T1, V/4T2 and W/6T3 markings.

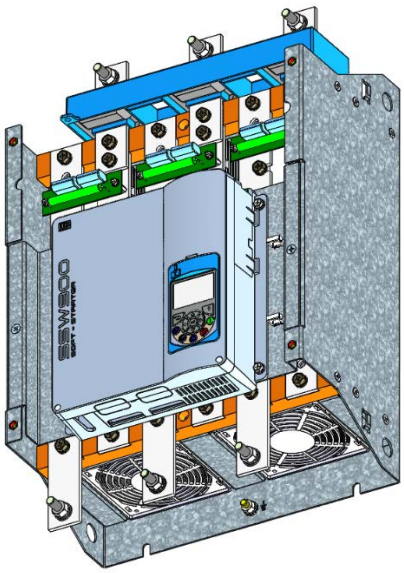


Figure 8.7: Placing control

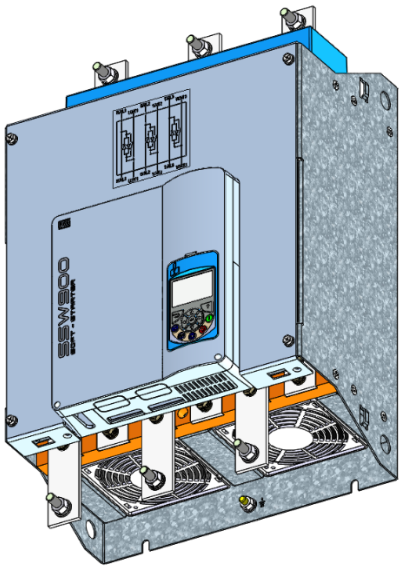


Figure 8.8: Closing the front cover