



INVERTER SIEMENS S120 PM240-2 for HI POWER UNITS

Index

1	INTRODUCTION	1-1
2	SAFETY INSTRUCTIONS AND PRECAUTIONS	2-1
2.1	SAFETY INSTRUCTIONS	2-1
2.2	PRECAUTIONS	2-1
3	POWER MODULE	3-1
3.1	POWER MODULE BLOCKSIZE (PM240-2)	3-1
3.1.1	Description	3-1
3.1.2	Safety instructions	3-2
3.1.3	Interface description	3-3
3.1.4	Dimension drawings	3-6
3.1.5	Wire assembly	3-8
3.1.6	Technical data	3-9
4	ELECTROMAGNETIC COMPATIBILITY (EMC)	4-1
5	BRAKING RESISTORS	5-1
5.1	DESCRIPTION BRAKING RESISTORS	5-1
5.2	SAFETY INSTRUCTIONS	5-1
5.3	DIMENSION DRAWINGS	5-1
5.4	MOUNTING	5-2
5.5	TECHNICAL DATA	5-3
6	CONTROL UNIT CU310-2 PN (PROFINET)	6-1
6.1	DESCRIPTION	6-1
6.2	SAFETY INSTRUCTIONS	6-2
6.3	INTERFACE DESCRIPTION	6-2
6.4	MEANING OF THE LEDS	6-3
6.5	DIMENSION DRAWING	6-4
6.6	TECHNICAL DATA	6-4
6.7	MOUNTING	6-5
7	POWER WIRING	7-1
7.1	POWER CIRCUIT CONNECTION	7-1
7.2	SAFETY INSTRUCTIONS	7-1
7.3	RULES FOR EMC COMPLIANT MOTOR - INVERTER WIRING	7-1
7.4	SIEMENS S120 GENERAL CONCEPT OF ELECTRICAL WIRING	7-2
7.5	SIEMENS S120 CONTROL UNIT ELECTRICAL WIRING	7-3
7.6	THERMOCOUPLE	7-4
8	WEBSERVER COMPUTER COMMISSIONING	8-1
8.1	WEBSERVER CONNECTION	8-1
8.2	MENU	8-2
8.3	PARAMETERS CUSTOMIZATION	8-5

8.3.1	Parameter value editing	8-5
8.3.2	Saving changes	8-6
8.3.3	Add new parameters list	8-7
9	DOWNLOAD STARTER SOFTWARE (OPTIONAL)	9-1
10	PROGRAMMING WITH KEYBOARD AND MENU	10-1
10.1	BASIC OPERATOR PANEL BOP20	10-1
10.1.1	Description	10-1
10.1.2	Interface description	10-1
10.1.3	Displays and using the BOP20	10-2
10.1.4	Example: Changing a parameter	10-4
10.1.5	Fault and alarm displays	10-5
10.1.6	Mounting	10-5
11	PARAMETERS	11-1
11.1	DISPLAY PARAMETERS	11-1
11.2	INVERTER COMMISSIONING	11-1
11.3	PARAMETERS LIST	11-2
11.4	CONFIGURATION PARAMETERS	11-3
11.4.1	Upwards	11-4
11.4.2	Downwards	11-6
11.4.3	Re-leveling	11-7
11.4.4	Emergency	11-7
11.4.5	General Considerations	11-7
11.5	RUPTURE VALVE TEST	11-7
12	ACTIVE FAULTS & ALERT	12-1
12.1	RESET OF THE ANOMALIES	12-1
12.2	ANOMALIES CODES LIST	12-1
13	CHECKS AND MAINTENANCE	13-1
13.1	MEGGER TEST	13-1

1 INTRODUCTION

SIEMENS PM240 is an inverter with special software for hydraulic systems, that controls the phase of travel in upward direction and, with prearranged hydraulic power units, also the travel in downward direction. This inverter is able to work both with old and new hydraulic power units.

The advantages are:

- **Reduction of starting current peaks. The maximum starting current is near the rated current.**
- **Power factor correction of absorbed current. $\cos\varphi \geq 0.98$.**
- **Energy saving.**
- **Run comfort optimization.**
- **Adjustable inspection speed.**
- **Possibility of setting a maximum limit for the absorbed power from the mains, to limit the installed power.**



NOTE:

For further insights regarding the functions of the Siemens PM240-2, refer to the corresponding manuals Siemens, available on the website of the company.

All information, product manuals and details, could be found at the internet address: <http://support.automation.siemens.com> entering the 16-digit product code (6SL3210...) that you can found on the inverter or on the present manual in the technical data section.

2 SAFETY INSTRUCTIONS AND PRECAUTIONS

Read all of this manual before powering the equipment, following step by step the procedures.

2.1 SAFETY INSTRUCTIONS

Carefully follow the procedures given below, to prevent the risk of serious accidents.

- 1- **The leakage current from the inverter to earth is greater than 30mA**, therefore a differential switch with **Id of at least 300mA, type B or type A**, must be provided. Regulations require the use of a cable with a section of at least 10 mm² for the earth connection.



If the differential switch trips when the main power switch is closed, do not repeat the operation in succession, because the inverter could become permanently damaged.

- 2- If the parameters are incorrect, the inverter can cause the motor to rotate at a speed higher than synchronous speed. Do not run the motor beyond its electrical and mechanical limits. The installer is responsible for ensuring that movements occur in safe conditions, without exceeding the specified operating limits.
- 3- Risk of electrocution. Power on the inverter only with the front cover fitted. **NEVER** remove the cover during operation. Before carrying out any operation on the equipment, disconnect the power supply and wait a few minutes for the internal capacitors to discharge.
- 4- The external braking resistor heats up during operation. Do not install it near or in contact with inflammable materials. To improve heat dissipation it is advisable to fix it to a metal plate. Make sure it is suitably protected and cannot be touched.
- 5- The inverter must always be connected to the mains. In case of an interruption, wait at least 1 minute before reconnecting. **RECONNECTING WITHOUT WAITING LONG ENOUGH WILL DAMAGE THE INVERTER.**
- 6- Do not use an oscilloscope or similar instruments to test the internal circuits of the inverter. This type of operation must be performed only by specialized personnel.

2.2 PRECAUTIONS

Carefully follow the procedures given in the manual to avoid the risk of damaging the inverter.

- 1- Do not connect the equipment to a voltage higher than that permissible. An excessive voltage can cause permanent damage to the internal components.
- 2- **To avoid damaging the inverter in case of prolonged stoppages with no power supply, before restarting proceed as follows:**
 - **If the inverter has been idle for several months, connect it to the power supply for at least 1 hour in order to regenerate the bus capacitors.**
 - **If the inverter has been idle for more than one year, power it for 1 hour at 50% less than the nominal voltage, and then for 1 hour at nominal voltage.**
- 3- Do not connect capacitors to the inverter outputs.
- 4- Before resetting an inverter fault, carefully check what caused activation of the protection.
- 5- Use an inverter with rated current equal to, or higher than, the motor rated current.

3 POWER MODULE

3.1 POWER MODULE BLOCKSIZE (PM240-2)

3.1.1 Description

The Power Module are in Blocksize format and their size are identified with letters, from FSA to reach FSF. They consist of the following components:

- Line-side diode rectifier
- DC link electrolytic capacitors with pre-charging circuit
- Output inverter
- Braking chopper for (external) braking resistor
- 24 V DC / 1 A power supply
- Gating unit, actual value acquisition
- Fan to cool the power semiconductors

The Power Modules are supplied in versions with line filter with reference to the standard EMC EN 61800-3

Table 1 Power Module PM240-2 overview

	
Power Module frame size FSB, with integrated line filter	Power Module frame size FSC, with integrated line filter

		
Power Module frame size FSD, with integrated line filter	Power Module frame size FSE, with integrated line filter	Power Module frame size FSF, with integrated line filter

3.1.2 Safety instructions



WARNING

Danger of fire through overheating caused by insufficient ventilation and installation Clearances
Insufficient ventilation and installation clearances result in overheating with danger to persons as a result of smoke and fire.

- Always mount the Power Module in a vertical position
- Maintain the following clearances between the components when mounting (*):
 - Frame size FSA: 30 mm (1.18 inches)
 - Frame size FSB: 40 mm (1.57 inches)
 - Frame size FSC: 50 mm (1.96 inches)
- Maintain the following ventilation clearances above and below the component:
 - Frame size FSB: 100 mm (3.93 inches)
 - Frame size FSC: 125 mm (4.92 inches)
 - Frame sizes FSD and FSE: 300 mm (11.81 inches)
 - Frame size FSF: 350 mm (13.77 inches)
- Maintain the following ventilation clearances in front of the component:
 - Frame sizes FSB to FSF: 30 mm (1.18 inches)
- Ensure that the cooling air flow of the Power Modules can flow unrestricted.

(*)The Power Modules can be mounted side by side without base components up to an ambient temperature of 40° C.

In combination with base components and at ambient temperatures of 40° C to 55° C, the specified lateral minimum clearances must be observed. Where combinations of different frame sizes are concerned, the longer of the two clearances shall apply.

3.1.3 Interface description

Overview

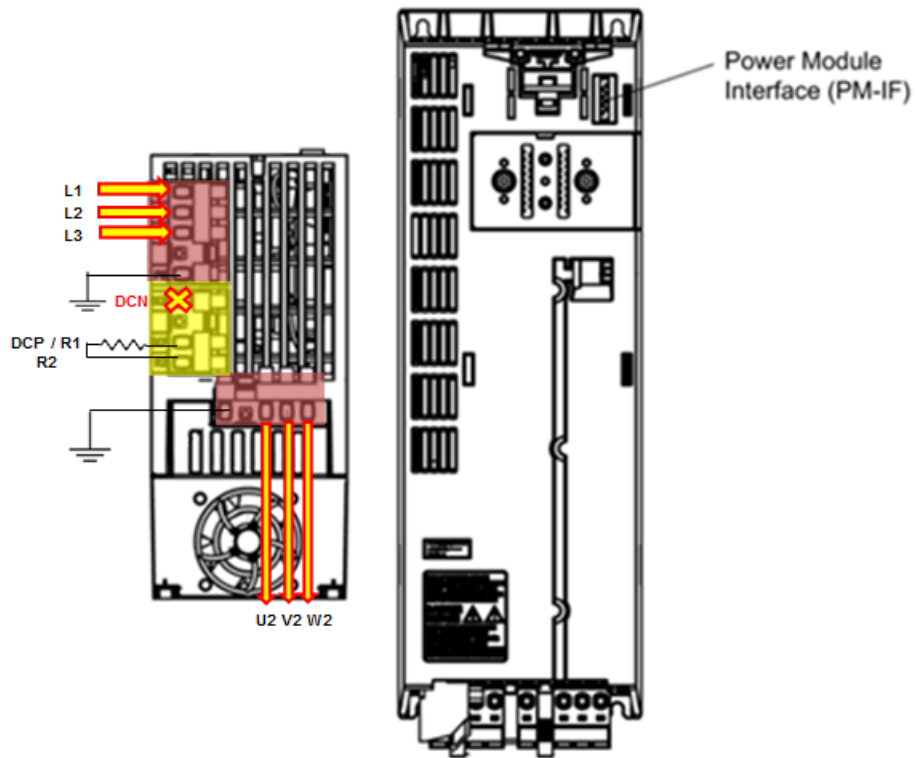


Figure 1 PM240-2, frame size FSB

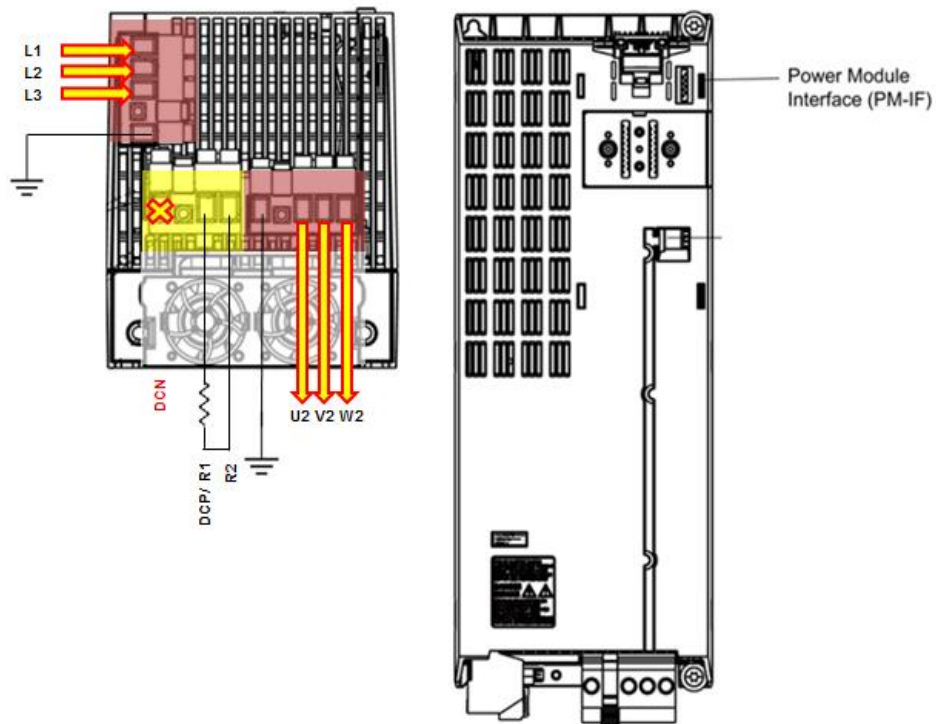


Figure 2 PM240-2, frame size FSC

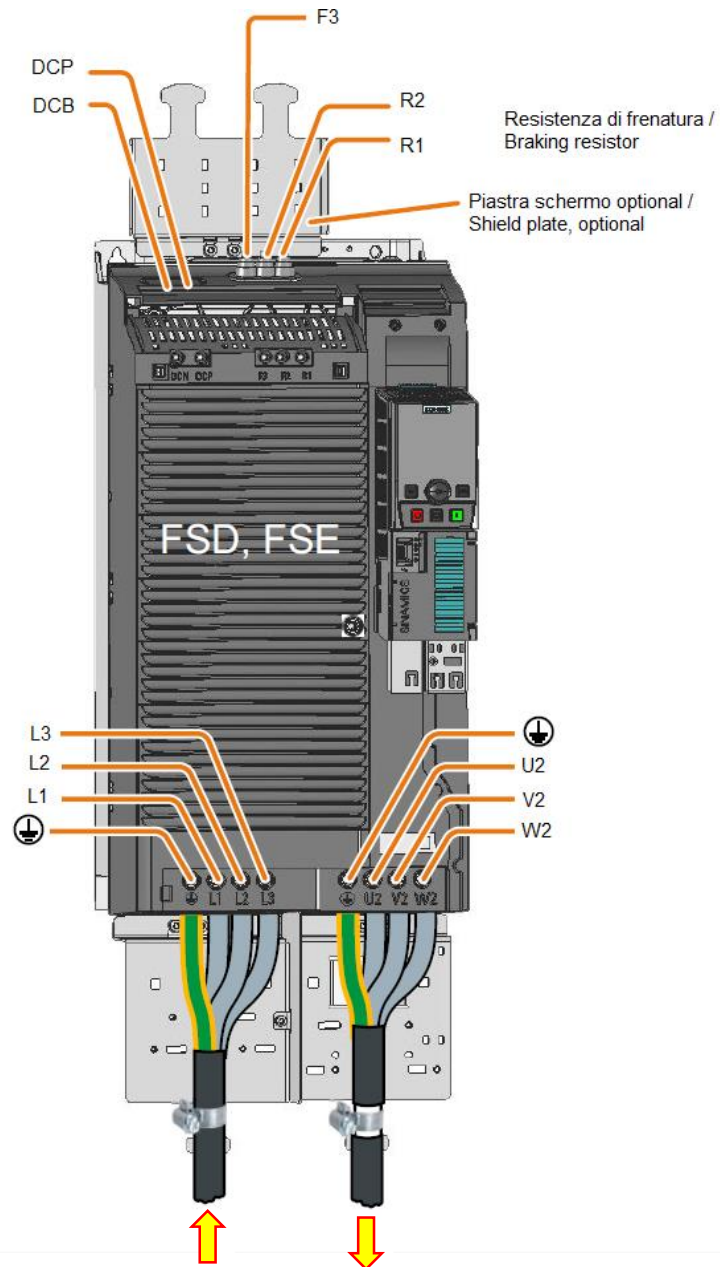


Figure 3 PM240-2, frame size FSD, FSE

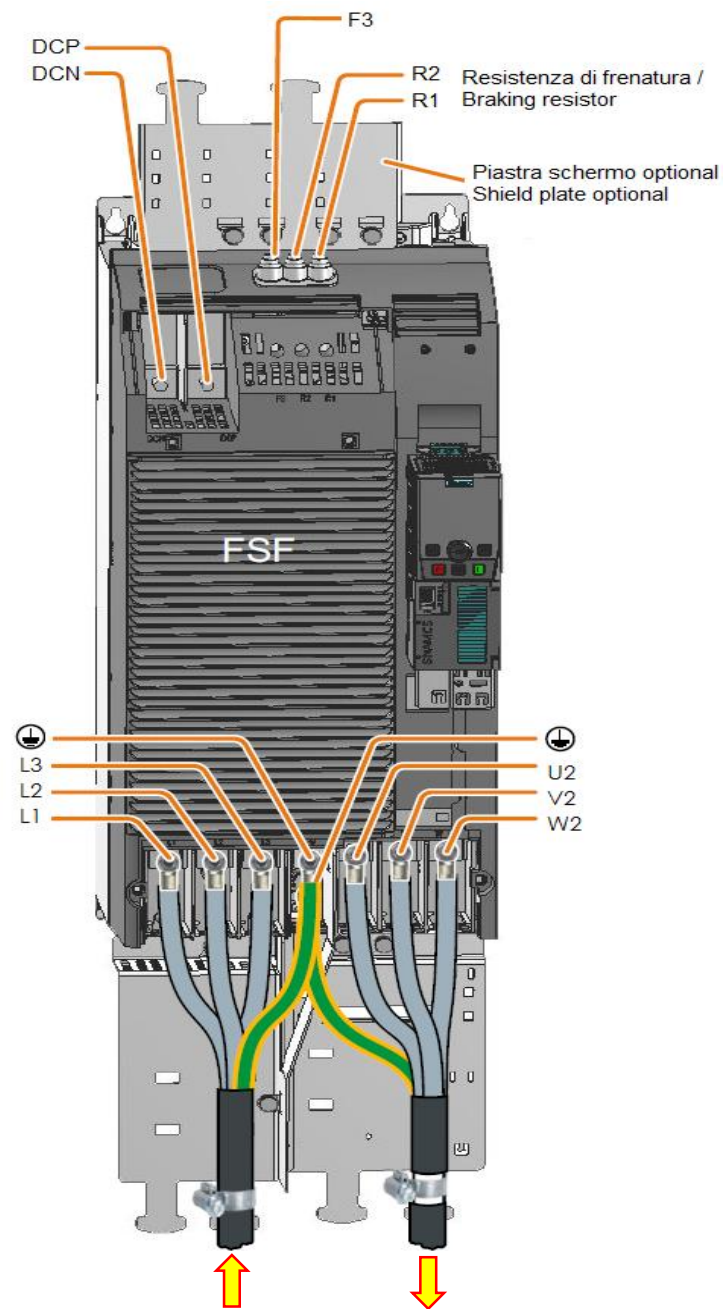


Figure 4 PM240-2, frame size FSF

For more details on:

- Arrangement of the line and motor terminals,
- Technical details
- Fixing modes

refer to the SIEMENS product manual G120-PM240-2

3.1.4 Dimension drawings



WARNING: for the inverter overall dimensions, the PM dimensions shown must be added together with the dimensions of the Control Unit

Frame size FSB

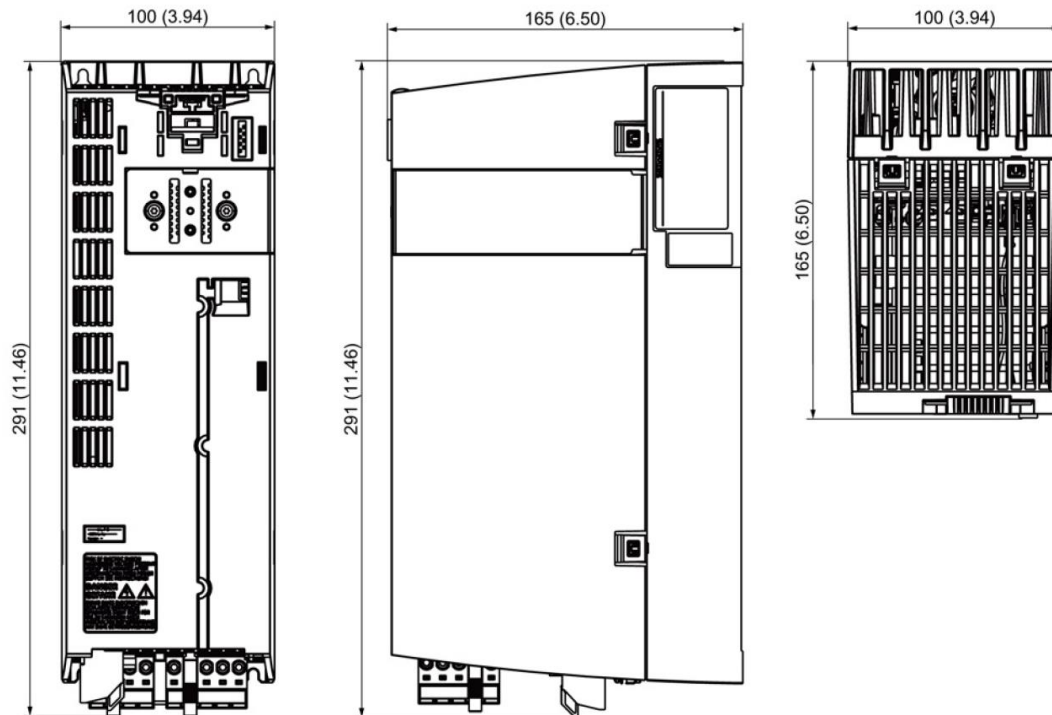


Figure 5 Drilling pattern, PM240-2 Power Modules, frame sizes, FSB; all data in mm and (inches)

Frame size FSC

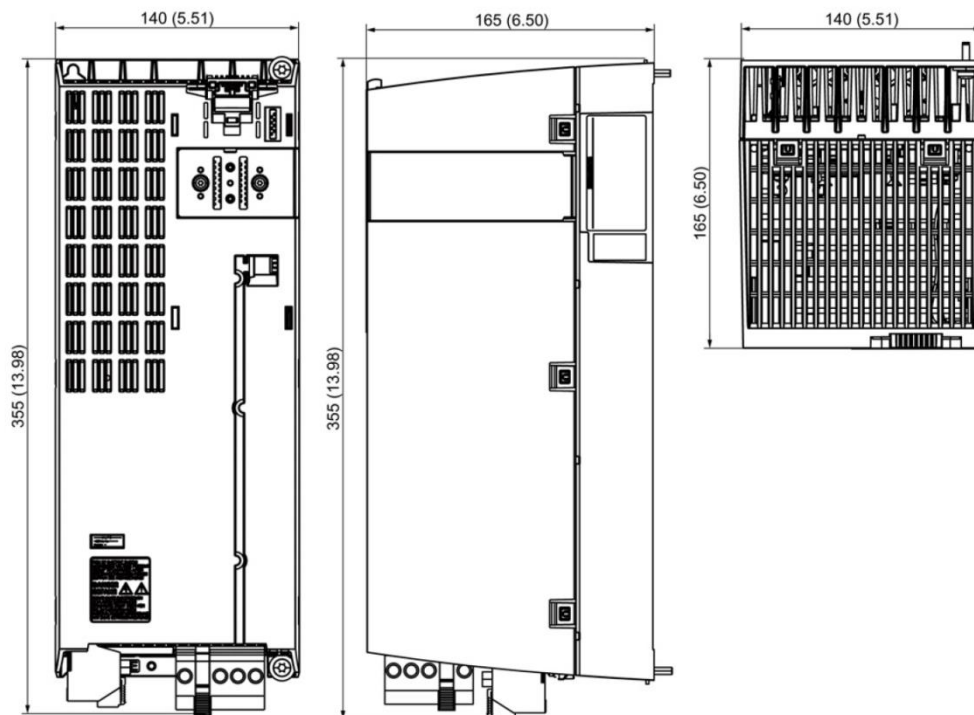


Figure 6 Dimension drawing, PM240-2 Power Modules, frame sizes FSC; all data in mm and (inches)

Frame size FSD

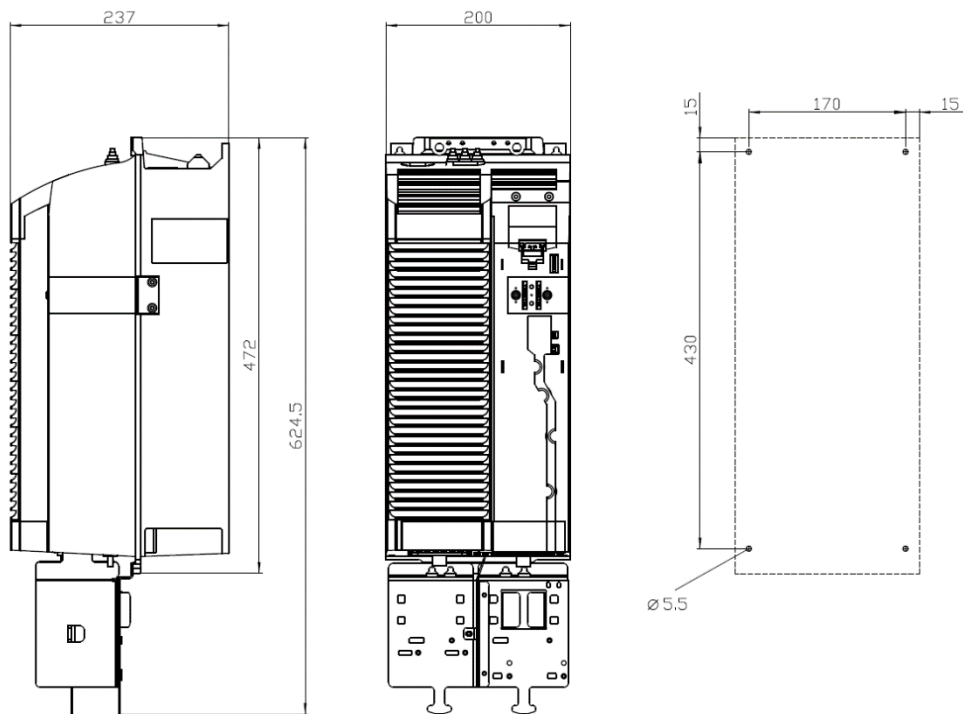


Figure 7 Dimension drawing, PM240-2 Power Module, frame size FSD; all dimensions in mm and (inches)

Frame size FSE (with integrated line filter)

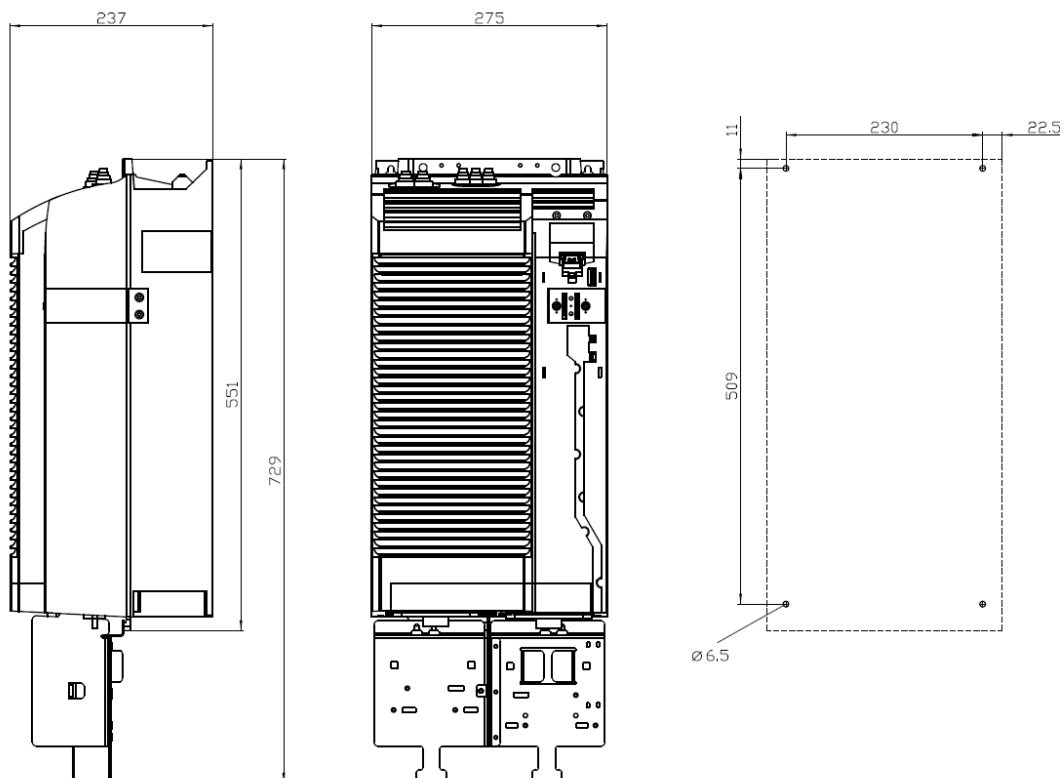


Figure 8 Dimension drawing, PM240-2 Power Module, frame size FSE (with integrated line filter); all dimensions in mm

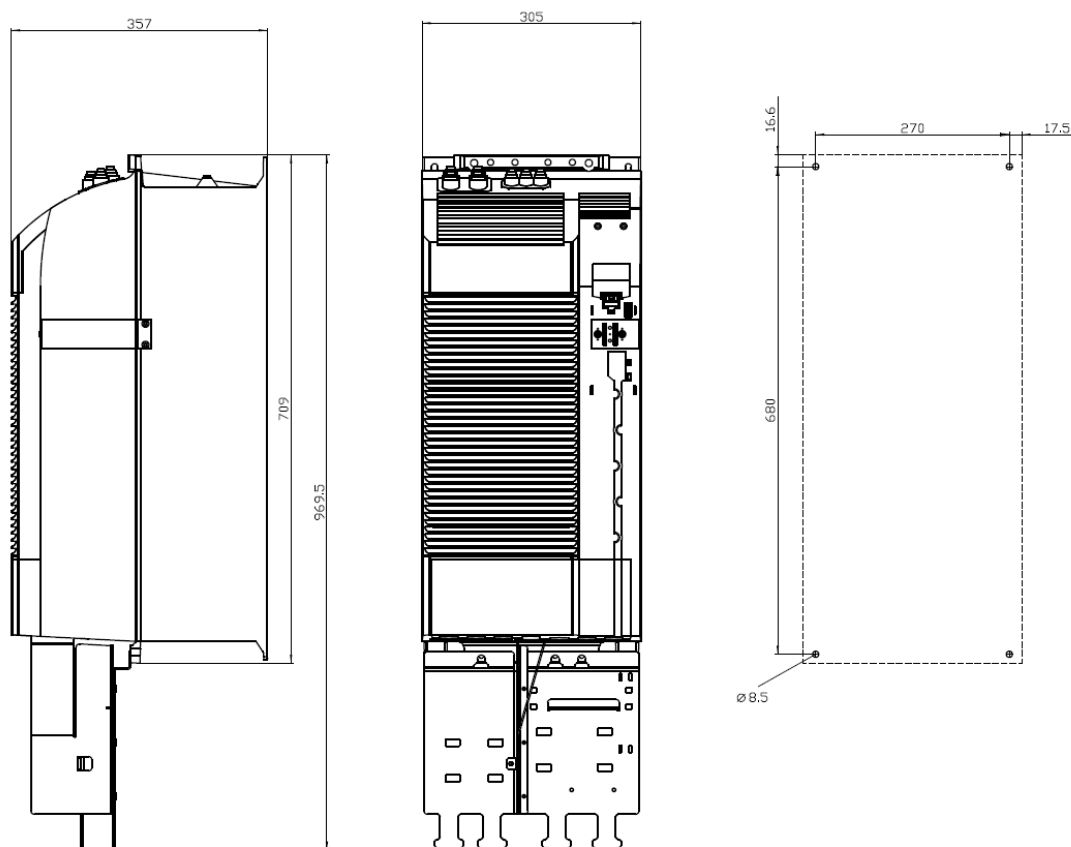


Figure 9 Dimension drawing, PM240-2 Power Module, frame size FSF (with integrated line filter); all dimensions in mm and (inches)

3.1.5 Wire assembly

Access to the power supply terminals and motor terminals

To access the screw clamp and the motor, if a cover carter is provided, remove the protection using a suitable tool. Successively reassemble the cap.

	 DANGER
	Danger of death due to electric shock with exposed terminals Touching live components results in death or severe injury. • Only operate the Power Module with the terminal cover closed

3.1.6 Technical data

Table 2 Technical data of the PM240-2, FSB (3 AC 380 ... 480 V ± 10 %)

PM240-2 with integrated line filter code→	6SL3210-	1PE21-1AL0	1PE21-4AL0	1PE21-8AL0
Output current				
Rated current In	A	10.20	13.20	18.0
Base-load current IH	A	7.70	10.20	13.2
Peak current I _{max} (3s over 300s)	A	15.4	20.4	26.4
Peak current I _{max} (57+3s over 300s)	A	11.55	15.3	19.8
Type rating¹⁾				
on basis of In	kW	4	5.5	7.5
on basis of IH	kW	3	4	5.5
Rated pulse frequency	kHz	4	4	4
Power loss	kW	0.11	0.15	0.2
Cooling air requirement	m ³ /s	0.009	0.009	0.009
Sound pressure level L_{pA} (1m)	dB	72	72	72
24 V DC supply for the Control Unit	A	1.0	1.0	1.0
Rated input current²⁾ with/without integrated line reactor	A	11.60	15.30	22.2
Class J UL fuses Rated current	A	35	35	35
NH fuses IEC 60947 Rated current	A	3NA3812 32	3NA3812 32	3NA3812 32
Circuit breaker type designation IEC 60947 Rated current	A	3RV2021- 4BA10 14 ... 20	3RV2021- 4BA10 14 ... 20	3RV1031- 4EA10 22 ... 32
Resistance value ext. braking resistor	Ω	370	140	75
Max. cable length to braking resistor	m	15		
Line supply connection L1, L2, L3 Tightening torque		Plug connector with screw terminals 1.5... 6.00 mm ² (AWG16... 10) 0.6Nm 5.5lib.in		
Motor connection U2, V2, W2 Tightening torque				
DC link connection, connection for braking resistor DCP/R1, DCN, R2		Plug connector with screw terminals 1.5... 6.00 mm ² (AWG16... 10) 0.6Nm 5.5lib.in		
Max. motor cable length ³⁾ shielded/unshielded	m	50/100		
Degree of protection		IP20		
Weight	kg	3.10		3.20

¹⁾ Rated power of a typical standard induction motor at 400 V 3 AC

²⁾ The input current depends on the motor load and line impedance. The input currents apply for a load with the type rating (based on In) for a line impedance corresponding to $u_k = 1\%$.

³⁾ Max. motor cable length 50 m (shielded) for PM240-2 Power Modules with integrated line filter to maintain the limit values of EN 61800-3 Category C2.

Table 3 Technical data of the PM240-2, FSC (380 V ... 480 V 3 AC $\pm 10\%$)

PM240-2 with integrated line filter code→	6SL3210-	1PE22-7AL0	1PE23-3AL0
Output current			
Rated current I_n	A	26	32
Base-load current I_H	A	18	26
Peak current I_{max} (3s over 300s)	A	36	52
Peak current I_{max} (57+3s over 300s)	A	27	39
Type rating¹⁾			
on basis of I_n	kW	11	15
on basis of I_H	kW	7.5	11
Rated pulse frequency	kHz	4	4
Power loss	kW	0.30	0.37
Cooling air requirement	m ³ /s	0.018	0.018
Sound pressure level L_{pA} (1m)	dB	72	72
24 V DC supply for the Control Unit	A	1.0	1.0
Rated input current²⁾ with/without integrated line reactor	A	32.60	39.90
Class J UL fuses			
Rated current	A	50	50
NH fuses IEC 60947			
Rated current	A	50	50
Circuit breaker type designation IEC 60947			
Rated current	A	3RV1031-4FA10 28 ... 40	3RV1031-4HA10 40 ... 50
Resistance value ext. braking resistor	Ω	30	
Max. cable length to braking resistor	m	150	
Line supply connection L1, L2, L3 Tightening torque		Plug connector with screw terminals 6.00...16.00 mm ² (10... 6 AWG) 1.3 Nm 12lbf. in	
Motor connection U2, V2, W2 Tightening torque			
DC link connection, connection for braking resistor DCP/R1, DCN, R2		6,00...16,00 mm ² (AWG10...AWG6)	
Max. motor cable length ³⁾ shielded/unshielded	m	50/100	
Degree of protection		IP20	
Weight	kg	5.30	5.40

¹⁾ Rated power of a typical standard induction motor at 400 V 3 AC

²⁾ The input current depends on the motor load and line impedance. The input currents apply for a load with the type rating (based on I_n) for a line impedance corresponding to $u_k = 1\%$.

³⁾ Max. motor cable length 50 m (shielded) for PM240-2 Power Modules with integrated line filter to maintain the limit values of EN 61800-3 Category C2.

Table 4 Technical data PM240-2, FSD (3 AC 380 V to 480 V $\pm 10\%$)

PM240-2 with integrated line filter code→	6SL3210-	1SE23-8AA0	1SE24-5AA0	1SE26-0AA0	1PE27-5AL0
Output current					
Rated current In	A	38	45	60	75
Base-load current IH	A	32	38	45	60
Peak current I _{max} (3s over 300s)	A	64	76	90	120
Peak current I _{max} (57+3s over 300s)	A	48	57	67.5	90
Type rating¹⁾					
on basis of In	kW	18	22	30	37
on basis of IH	kW	15	18.50	22	30
Rated pulse frequency	kHz	4	4	4	4
Power loss	kW	0.55	0.68	0.77	0.69
Cooling air requirement	m³/s	0.038	0.022	0.022	1.02
Sound pressure level L_{pA} (1m)	dB	72	72	72	72
24 V DC supply for the Control Unit	A	1.0	1.0	1.0	1.0
Rated input current²⁾ with integrated line reactor	A	36	42	57	70
Class J UL fuses					
Rated current	A	50	70	90	100
NH fuses IEC 60947					
Rated current	A	3NA3820 50	3NA3824 80	3NA3830 100	3NA3830 100
Circuit breaker type designation IEC 60947					
Rated current	A	3RV1042-1JA10 45 ... 63	3RV1042-4KA10 57 ... 75	3RV1042-4KA10 57 ... 75	3VL1712-1DD33-0AA0 100 ... 125
Resistance value ext. braking resistor	Ω	25		15	
Max. cable length to braking resistor	m	15			
Line supply connection L1, L2, L3 Tightening torque		Screw terminals 10.00...35.00mm² (20 ... 10 AWG) 2.5 ... 4.5 Nm 22 lbf in			
Motor connection U2, V2, W2 Tightening torque		Screw terminals 10.00...35.00mm² (20 ... 10 AWG) 2.5 ... 4.5 Nm 22 lbf in			
DC link connection, connection for braking resistor DCP/R1, DCN, R2		2,50...16,0mm² (AWG20... AWG6)			
Max. motor cable length ³⁾ shielded/unshielded	m	200/300			
Degree of protection		IP20			
Weight with integrated line filter	kg	17.50	17.50	18.50	18.50

¹⁾ Rated power of a typical standard induction motor at 400 V 3 AC

²⁾ The input current depends on the motor load and line impedance. The input currents apply for a load with the type rating (based on I_n) for a line impedance corresponding to $u_k = 1\%$.

³⁾ Max. motor cable length 200 m (shielded) for PM240-2 Power Modules with integrated line filter to maintain the limit values of EN 61800-3 Category C2.

Table 5 Technical data PM240-2, FSE(3 AC 380 V to 480 V $\pm 10\%$)

PM240-2 with integrated line filter	code→	6SL3210	1PE28-8AL0	1PE31-1AL0
Output current				
Rated current I _n		A	90	110
Base-load current I _H		A	75	90
Peak current I _{max} (3s over 300s)		A	150	180
Peak current I _{max} (57+3s over 300s)		A	113	135
Type rating¹⁾				
on basis of I _n		kW	45	55
on basis of I _H		kW	37	45
Rated pulse frequency		kHz	4	4
Power loss		kW	1.20	1.55
Cooling air requirement		m³/s	0.083	0.083
Sound pressure level L_{pA} (1m)		dB	71	71
24 V DC supply				
for the Control Unit		A	1.0	1.0
Rated input current²⁾				
with integrated line reactor		A	86	104
Class J UL fuses				
Rated current		A	125	150
NH fuses IEC 60947				
Rated current		A	3NA3832 125	3NA3836 160
Circuit breaker type designation IEC 60947				
Rated current		A	3VL1716-1DD33- 0AA0 125 ... 160	3VL3720-1DC36- 0AA0 160 ... 200
Resistance value				
ext. braking resistor		Ω	10	
Max. cable length				
to braking resistor		m	15	
Line supply connection				
L1, L2, L3			Screw terminals 25...70mm² (6 ... 3/0 AWG,) 10 Nm 88.5 lbf in	
Tightening torque				
Motor connection				
U2, V2, W2			10,00...35,00mm² (AWG8... AWG2)	
Tightening torque				
DC link connection, connection for braking resistor				
DCP/R1, DCN, R2				
Max. motor cable length ³⁾				
shielded/unshielded		m	200/300	
Degree of protection				
			IP20	
Weight				
with integrated line filter		kg	28	

¹⁾ Rated power of a typical standard induction motor at 400 V 3 AC

²⁾ The input current depends on the motor load and line impedance. The input currents apply for a load with the type rating (based on I_n) for a line impedance corresponding to $u_k = 1\%$.

³⁾ Max. motor cable length 200 m (shielded) for PM240-2 Power Modules with integrated line filter to maintain the limit values of EN 61800-3 Category C2.

Table 6 Technical data PM240-2, FSF(3 AC 380 V to 480 V ± 10 %)

PM240-2 with integrated line filter code→	6SL3210-	1PE31-5AL0	1SE31-8AA0	1SE32-1AA0	1SE32-5AL0
Output current					
Rated current I _n	A	145	178	205	250
Base-load current I _H	A	110	145	178	205
Peak current I _{max} (3s over 300s)	A	220	308	365	410
Peak current I _{max} (57+3s over 300s)	A	165	231	267	308
Type rating¹⁾					
on basis of I _n	kW	75	90	110	132
on basis of I _H	kW	55	75	90	110
Rated pulse frequency	kHz	4	4	2	2
Power loss	kW	1.79	2.33	2.17	2.48
Cooling air requirement	m³/s	0.153	0.153	0.153	0.153
Sound pressure level L_{pA} (1m)	dB	68	68	68	68
24 V DC supply for the Control Unit	A	1.0	1.0	1.0	1.0
Rated input current²⁾ with integrated line reactor	A	140	172	198	242
Class J UL fuses					
Rated current	A	200	250	300	350
NH fuses IEC 60947					
Rated current	A	3NA3140 200	3NA3142 224	3NA3250 300	3NA3252 315
Circuit breaker type designation IEC 60947					
Rated current	A	3VL3720- 1DC36-0AA0 160 ... 200	3VL3725- 1DC36-0AA0 200 ... 250	3VL3720- 1DC36-0AA0 200 ... 250	3VL4731- 1DC36-0AA0 250 ... 315
Resistance value ext. braking resistor	Ω	7.1		5	
Max. cable length to braking resistor	m	15			
Line supply connection L1, L2, L3 Tightening torque		Cable lug according to SNL71322 for M10 bolts 35.00 ... 2 x 120mm² (1 AWG ... 2 x 4/0 AWG) 22...25Nm 10 lbf.in			
Motor connection U2, V2, W2 Tightening torque					
DC link connection, connection for braking resistor DCP/R1, DCN, R2		25...70mm² 6...3/0 AWG			
Max. motor cable length ³⁾ shielded/unshielded	m	300/450			
Degree of protection		IP20			
Weight with integrated line filter	kg	63		65	

¹⁾ Rated power of a typical standard induction motor at 400 V 3 AC

²⁾ The input current depends on the motor load and line impedance. The input currents apply for a load with the type rating (based on I_{rated}) for a line impedance corresponding to $u_k = 1\%$.

³⁾ Max. motor cable length 300 m (shielded) for PM240-2 Power Modules with integrated line filter to maintain the limit values of EN 61800-3 Category C2.

4 ELECTROMAGNETIC COMPATIBILITY (EMC)

Together with a system configuration in conformity with EMC standards, the line filters limit the conducted interference emitted by the Power Modules to limit values according to standard EN61800-3, which defines the installation Ambient and the Category of Drive Systems from C1 (best) to C4 (worst).

All POWER MODULES (PM) delivered are provided with line filter, and they are in conformity with category C3 (industrial) in accordance with the standard EN 61800-3.

For PM Block Size this is obtained by mains integrals filters,

The PM with a suitable line filter shall correspond to the category C2 for domestic installations, provided that:

- they are installed and put into service by a specialist (according to the definition given by the normative), in compliance with the limit values for electromagnetic compatibility
- the below shown additional requisites are respected:
 - Connection by use of a shielded cable at reduced capacity
 - Motor cable shorter than 25 m in PM Blocksize
 - Pulse frequency ≤ 4 kHz in the PM Blocksize
 - Current $\leq$ nominal input current in the technical data

See also paragraph 7.3 for information about power wiring

5 BRAKING RESISTORS

5.1 DESCRIPTION BRAKING RESISTORS

The PM240-2 Power Modules cannot regenerate power into the line supply. For regenerative operation, e.g. the braking of a rotating mass, a braking resistor must be connected to convert the resulting energy into heat. A thermostatic switch monitors the braking resistor for over-temperature and issues a signal on an isolated contact if the limit value is exceeded.

5.2 SAFETY INSTRUCTIONS



WARNING

Risk of fire and device damage as a result of ground fault / short-circuit

The cables to the braking resistor must be routed so that a ground fault or short circuit can be ruled out. A ground fault can result in fire.

- Comply with local installation regulations, which allow this fault to be ruled out.
- Protect the cables from mechanical damage.
- In addition, apply one of the following measures:
 - Using cables with double insulation.
 - Observe adequate clearances, e.g. through the use of spacers.
 - Route the cables in separate cable ducts or pipes.



CAUTION

Risk of burns or damage resulting from high surface temperature of the braking resistor

The braking resistor can become very hot. You can be severely burnt when touching the surface. Neighboring components can become damaged.

- Mount the braking resistor so that it cannot be touched. If this is not possible, at the dangerous locations, attach an appropriate warning note that is clearly visible and easy to understand.
- To avoid temperature-related damage to adjacent components, follow these rules:

For PM240-2 Power Modules:

 - Ensure a cooling clearance of 100 mm on all sides of the braking resistor

5.3 DIMENSION DRAWINGS

Braking resistors for PM240-2

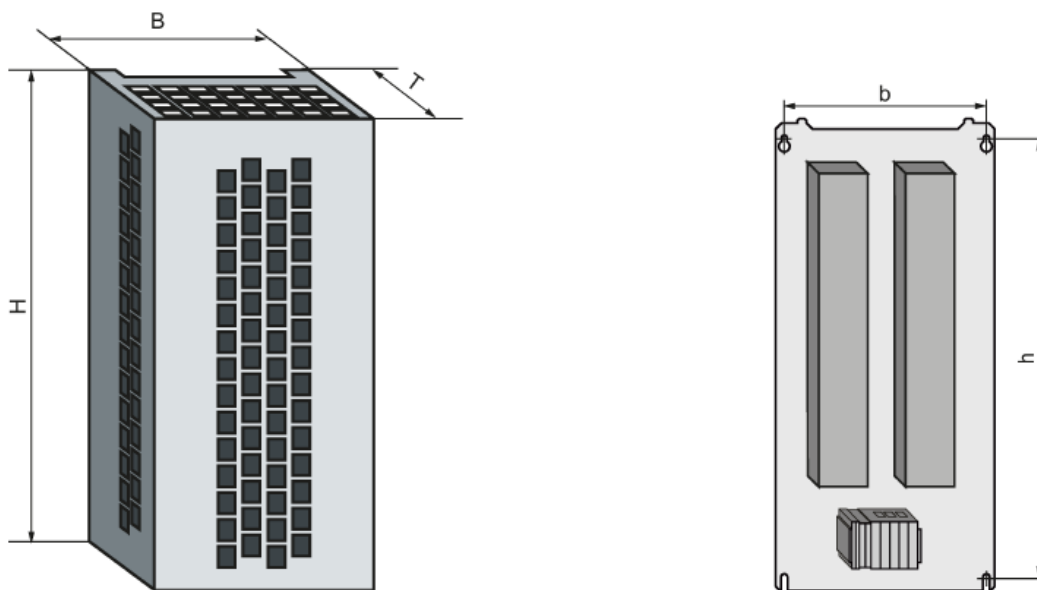


Figure 10 Dimension drawing of braking resistor for PM240-2, frame sizes FSA / FSB

Table 7 Dimension drawing in mm (inches)

Article number	Frame Dimension	Overall Dimensions [mm]			Drilling Dimensions [mm]		Fixing screws / Tightening torque	Weight [kg]
		B	H	T	b	h		
6SL3201-0BE21-8AA0	FSB	175	345	100	142	316	M4 / 3 Nm	2.7
6SL3201-0BE23-8AA0	FSC	250	490	140	217	460	M5 / 6 Nm	6.2
JJY:023422620001	FSD	220	470	180	187	430	M5 / 6 Nm	7
JJY:023424020001	FSD	220	610	180	187	570	M5 / 6 Nm	9.5
JJY:023434020001	FSE	350	630	180	317	570	M5 / 6 Nm	13.5
JJY:023454020001*)	FSF							
*JJY:023422620001	(FSD)	220	470	180	187	430	M5 / 6 Nm	7
*JJY:023434020001	(FSE)	350	630	180	317	570		13.5
JJY:023464020001*)	FSF							
* JJY:023434020001	(FSE)	350	630	180	317	570	M5 / 6 Nm	13.5
* JJY:023434020001	(FSE)	350	630	180	317	570		13.5

When fixing the braking resistor, use screws, nuts and washers

*) This type of braking resistor comprises two resistors which must be connected to each other **in parallel** on the plant/ system side.

5.4 MOUNTING

The braking resistor for all modules is connected at terminals DCP/R1 and R2. Since it generates heat, it should be mounted to the side of the Power Modules.

The braking resistors for the PM240-2 Power Modules in frame sizes FSA and FSB are designed as base components. If the PM240-2 Power Modules of the FSA or FSB frame size are operated without a line reactor, the braking resistors can also be installed under the Power Modules.

The braking resistors for the PM240-2 Power Modules of the FSC to FSF frame sizes should be placed outside the control cabinet or the switchgear room to lead the resulting heat loss away from the Power Modules. This reduces the level of air conditioning required.

The braking resistors can be installed horizontally or vertically. The power connections on vertically installed resistors, must be at the bottom.

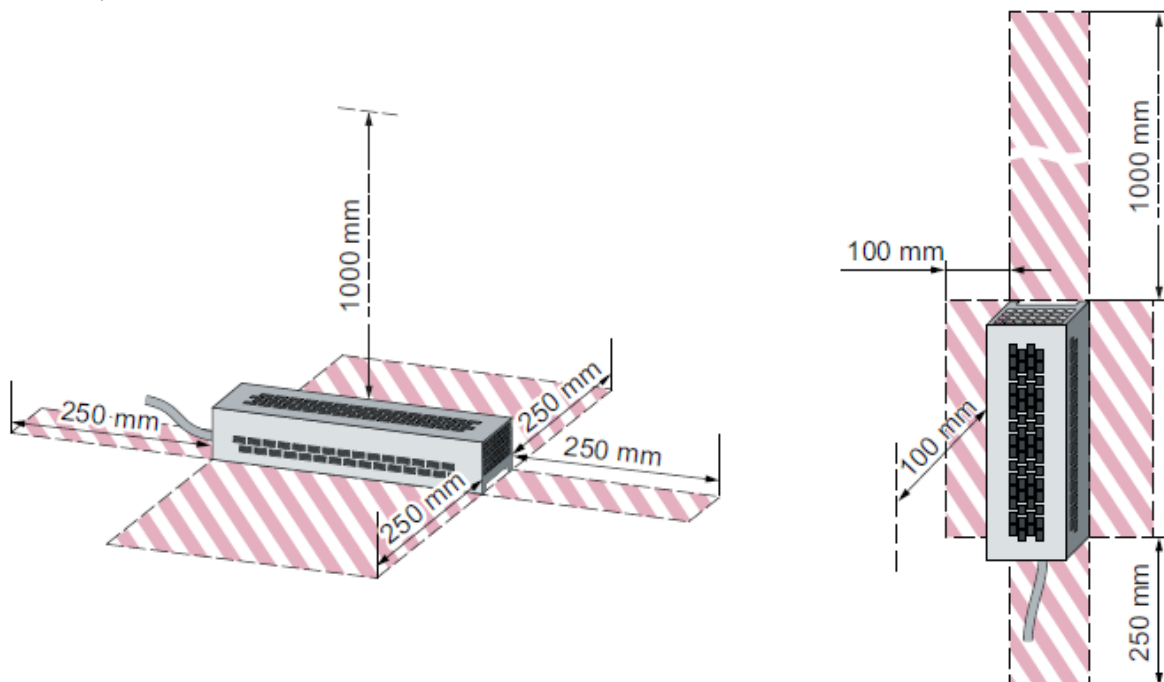


Figure 11- Minimum clearances for the braking resistor when mounting on a flat surface and for wall/panel mounting

5.5 TECHNICAL DATA

Table 8 Technical data of braking resistors for PM240-2 Power Modules, frame sizes FSB, FSC

Order number	6SL3201-	0BE21-8AA0	0BE23-8AA0
Suitable for Power Modules of frame size		FSB	FSC
Resistance	Ω	75	30
Unit rating PDB	W	375	925
Peak power Pmax	kW	7.5	18.5
Load duration for peak power Ta	s	→Figure 12	
Period duration of braking duty cycle T	s	→Figure 12	
Degree of protection		IP20	IP20
Power connections (including PE)		4 mm ² / 0.7 Nm 10 AWG / 6.2 lbf in	4 mm ² / 0.7 Nm 10 AWG / 6.2 lbf in
Weight	kg	2.7	6.2

Table 9 Technical data of braking resistors for PM240-2 Power Modules, frame sizes FSD to FSF

Order number	JJY0234-	22620001	24020001	34020001	54020001	64020001
Suitable for Power Modules of frame size		FSD	FSD	FSE	FSF	FSF
Resistance	Ω	25 con In ≤ 45A	15 con In > 45A	10	7.1	5
Unit rating PDB	W	1100	1850	2750	3850	5500
Peak power Pmax	kW	22	37	55	77	110
Load duration for peak power Ta	s	→Figure 12				
Period duration of braking duty cycle T	s	→Figure 12				
Degree of protection		IP21	IP21	IP21	IP21	IP21
Power connections (including PE)		10 mm ² / 0.8 Nm 8 AWG / 7.1 lbf in	10 mm ² / 0.8 Nm 8 AWG / 7.1 lbf in	16 mm ² / 1.2 Nm 6 AWG / 4.5 lbf in	10 mm ² / 0.8 Nm 8 AWG / 7.1 lbf in	16 mm ² / 1.2 Nm 6 AWG / 4.5 lbf in
Weight	kg	7.0	9.5	13.5	7	13.5

Duty cycles

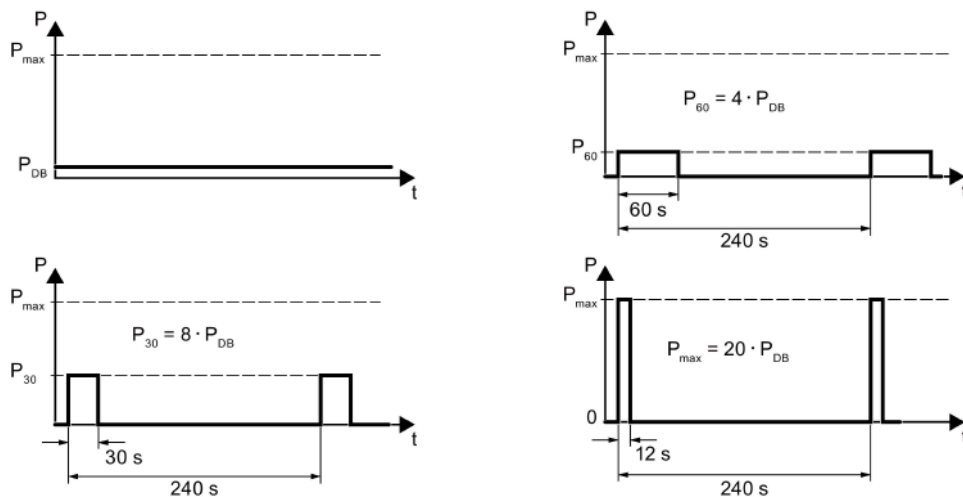


Figure 12 Load diagram for the braking resistor, in Blocksize format

T [s] period duration of braking duty cycle

T_a [s] load duration for peak power

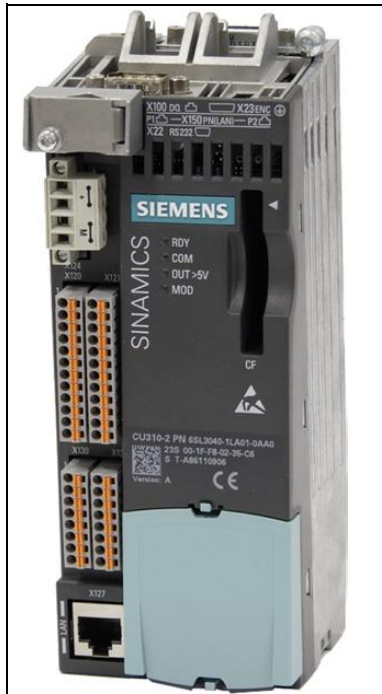
P_{DB} [W] unit rating of the braking resistor

P_{max} [W] peak braking power of the braking resistor

6 CONTROL UNIT CU310-2 PN (PROFINET)

6.1 DESCRIPTION

The CU310-2 Controller Units are designed for operation connected to a Power Module, in the Blocksize or chassis formats.



The Control Unit CU310-2 PN (PROFINET) is a control module for single drives in which the open-loop and closed-loop control functions of the drive are implemented. It controls the Power Modules in the Blocksize format via the PM-IF interface and is mounted directly on the Power Module.

The table shows an overview of the available interfaces on the CU310-2 PN.

Table 10 Overview of the CU310-2 PN interfaces

Type	Quantity
Isolated digital inputs	11
Non-isolated digital inputs/outputs	8
Isolated digital output	1
Non-isolated analog input	1
DRIVE-CLiQ interface	1
PROFINET interfaces	2
Serial interface (RS232)	1
Encoder interface (HTL/TTL/SSI)	1
LAN (Ethernet)	1
Temperature sensor input	1
EP terminal	1
Measuring sockets	3

NOTE:

For the characteristics of interfaces and inputs / outputs refer to the manual SIEMENS S120-GH6

6.2 SAFETY INSTRUCTIONS



WARNING

Danger of fire through overheating for insufficient ventilation clearances:

- It is essential that you maintain 50 mm ventilation clearances above and below the Control Unit and Control Unit Adapter.
- Ensure that the air openings are not blocked by connecting cables.



WARNING

As a result of incorrect parameterization, machines can malfunction, which in turn can lead to injuries or death.

6.3 INTERFACE DESCRIPTION

Overview

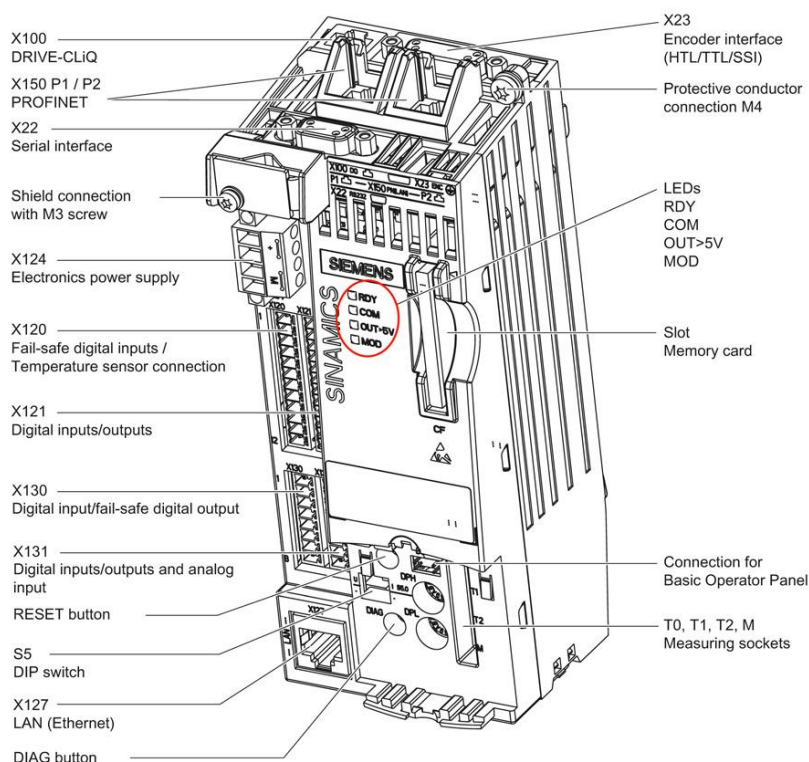


Figure 13 CU310-2 PN Overview of interfaces

Note:

The PROFIBUS address switch on the CU310-2 PN has no function.

Memory card

Use only memory cards manufactured by Siemens to run the CU310-2 PN. These cards will be pre-loaded by the factory with the adequate management software.



DO NOT REMOVE FOR ANY REASON THE COMPACT-FLASH. RISK OF DAMAGE / LOSS OF SOFTWARE

6.4 MEANING OF THE LEDS

Function of the LEDs

There are four LEDs on the front panel of the CU310-2 PN's housing (see CU310-2 PN Interface Overview, Figure 13).

Table 11 LEDs

RDY	Ready
COM	Status of the fieldbus communication
OUT>5V	Encoder current supply > 5 V (TTL/HTL)
MOD	Operating mode (reserved)

The various LEDs are switched on and off as the control unit is powered up (depending on the phase the system is currently in). When switched on, the color of the LEDs shows the status of the corresponding power-up phase (see Behavior of the LEDs during booting).

In the event of a fault, power up will be ended in the corresponding phase. The LEDs that are switched on, retain their color at this particular instant in time, so that the fault can be determined based on the combination of LEDs that are switched on (bright) and switched off (dark).

All the LEDs go out briefly if the CU310-2 PN has powered up without error. The system is ready for operation when the LED "RDY" is permanently green.

All the LEDs are controlled by the software loaded during operation (see Behavior of the LEDs in the operating state).

Behavior of the LEDs during booting

For information about the start-up phase with verification software / firmware, refer to the manual SIEMENS S120 - GH6

Behavior of the LEDs in the operating state

Table 12 Description of the LEDs during operation of the CU310-2 PN

LED	Color	Stat	Description / cause	Remedy
RDY (READY)	-	OFF	The electronics power supply is missing or outside the permissible tolerance range.	Check the power supply
	Green	Continuous light	The unit is ready for operation. Cyclic DRIVE-CLiQ communication is in progress.	-
		Flashing light 1x2 sec	Commissioning/reset	-
		Flashing light 2x1 sec.	Writing to the memory card.	-
	Red	Flashing light 2x1 sec.	General fault	Check parameter assignment/ configuration
	Red/ Green	Flashing light 1x2 sec	The control unit is ready for operation, but there are no software licenses.	Install the missing licenses.
	Orange	Flashing light 1x2 sec	Updating the firmware of the DRIVE-CLiQ components.	-
		Flashing light 2x1 sec.	DRIVE-CLiQ component firmware update completed. Waiting for POWER ON of the corresponding components.	Switch on the component.
	Green/ Orange or Red/ Orange	Flashing light 2x1 sec.	Recognition of the component via LED is activated (see SINAMICS S120/S150 List Manual.) Note: Both options depend on the LED status when component recognition is activated.	-

6.5 DIMENSION DRAWING

⚠ WARNING: the dimensions given must be added together with the dimensions of the Power Module for overall dimensions

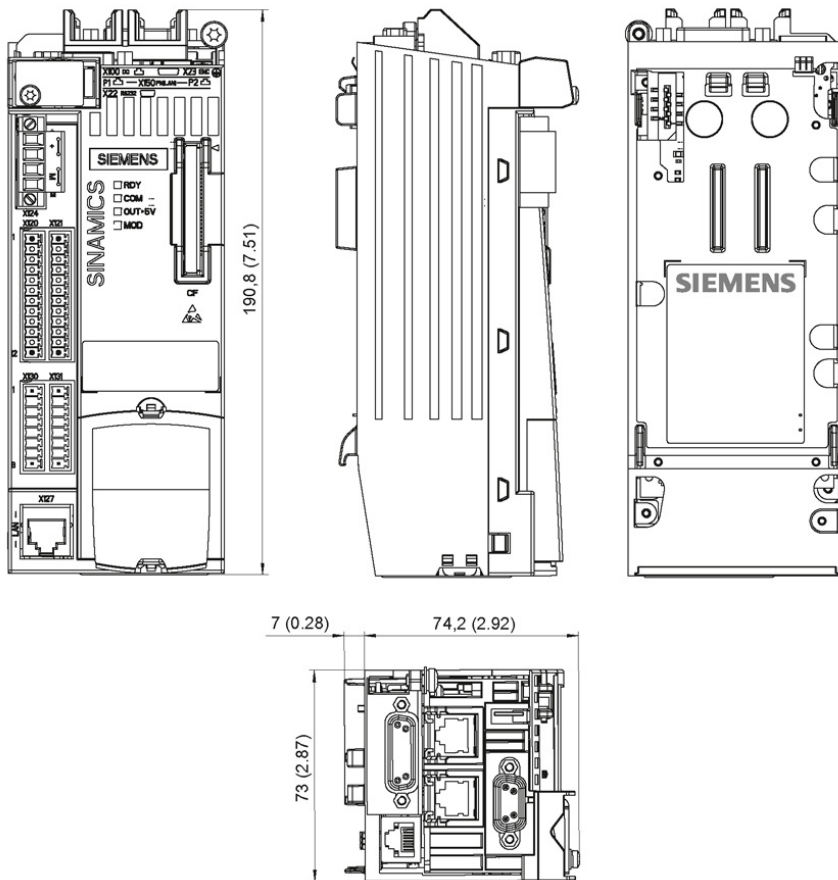


Figure 14 Dimension drawing, Control Unit CU310-2 PN, all data in mm (inches)

6.6 TECHNICAL DATA

Table 13 Technical data for CU310-2 PN

6SL3040-1LA01-0AA0	Unit	Value
Electronics power supply	VDC	DC 24 (20.4 ... 28.8)
Voltage	ADC	0.8
Current (without DRIVE-CLiQ and digital outputs)	W	<20
Power loss	m	100
Maximum DRIVE-CLiQ cable length		
PE/ground connection	At the housing with M4/3 Nm screw	
Response time	The response time of digital inputs/outputs depends on the evaluation ⁽¹⁾	
INPUT:	VDC	-3...30
• Absorption Current (at 24V)	mA	6
• Signal level (including ripple)	V	15...30
• High	V	-3...5
• Low		
OUTPUT:	VDC	24
• Max. current	mA	500
Weight	Kg	0.95

⁽¹⁾You will find information on this topic in the SINAMICS S120/S150 List Manual, Chapter "Function block diagrams."

6.7 MOUNTING

Power Module Blocksize

The Control Unit (CU310-2 PN) can be mounted onto Power Modules Blocksize of any size and the communication between the devices is realized via the PM-IF interface.

Mounting

1. Mount the Control Unit on the PM.
2. Press the Control Unit back until it latches into the blue interlocking lug.

The diagrams show the Control Unit mounted on the PM240-2 (frame size FSD), using the CU310-2 PN as an example.

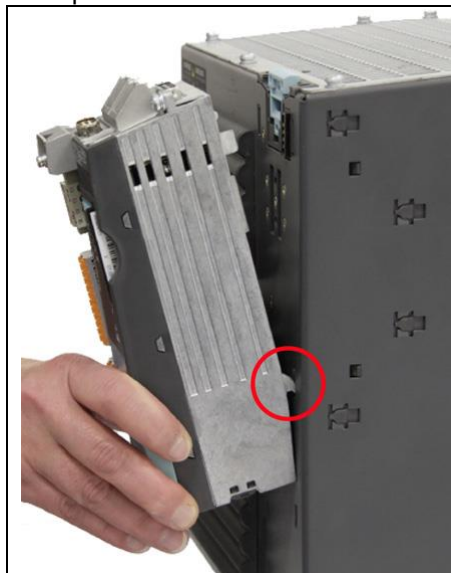


Figure 15 CU310-2 PN insertion on the PM



PM240-2 with CU310-2 PN fitted

Removal

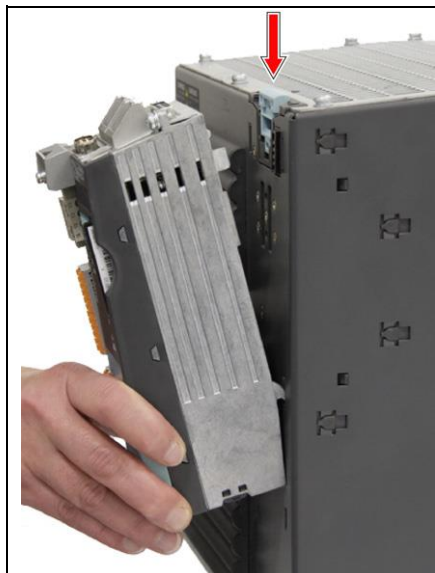


Figure 16 Removing the CU310-2 PN from the PM240-2

1. Press the blue locking latch downwards (see arrow).
2. Remove the Control Unit towards the front.

7 POWER WIRING

7.1 POWER CIRCUIT CONNECTION

All electrical wirings have to be done, respecting the rules shown in the table below:

U1;V1;W1	Mains power supply input	Connect the mains power supply input phases in any order.
U2;V2;W2	Inverter output	Connect the three output phases to the contactors, then to the motor.
R1;R2	External braking resistor	Connect the external braking resistor (mandatory if inverter up+down)
	Earth	Connect to the building's earth system.

7.2 SAFETY INSTRUCTIONS

- 1- Do not power the inverter without first making the earth connection.
- 2- To increase inverter protection (especially against overvoltage due to electrical storms), three extrafast-blow fuses (one for each phase) can be installed in series with the supply mains input terminals. The fuses must be rated according to the various sizes. The set of fuses, complete with protection box, can be supplied on request (not indispensable!).
- 3- To avoid permanently damaging the inverter, **do not connect braking resistors with resistance or power ratings lower than those given in the table (see) .**
- 4- The inverter drive must be connected "upstream" of the power contactors.
- 5- The external braking resistor heats up during operation. Do not install it near or in contact with inflammable materials; protect it to prevent direct contact.
- 6- Wire earth connections and masses correctly to avoid problems of EMC interference.
- 7-  Pay particular attention to the power connection; **if the input and output are inverted, the inverter will inevitably be damaged.**

7.3 RULES FOR EMC COMPLIANT MOTOR - INVERTER WIRING

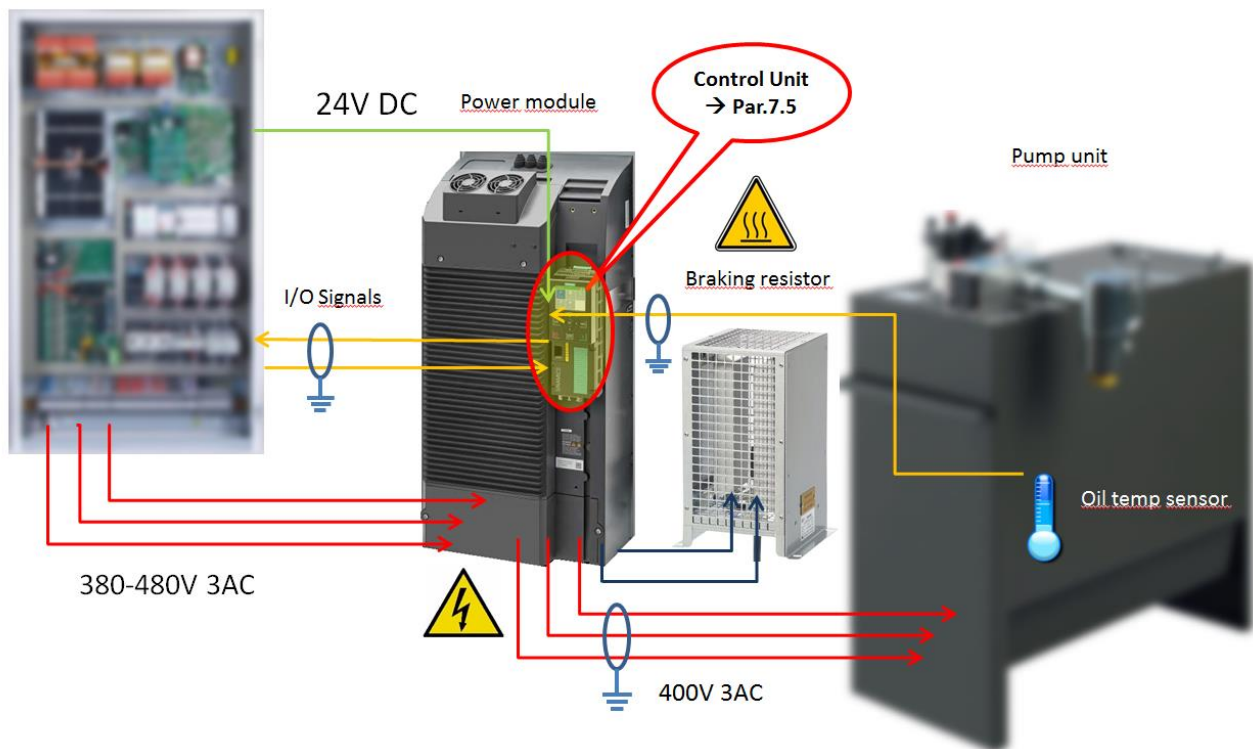
For a correct wiring of the group INVERTER - ENGINE, in addition to the procedure described in Chapter 4, about electromagnetic compatibility, follow the steps below:

1. The inverter and motor must be connected directly to the building's earth system.
2. The power cables for the inverter/contactors and contactors/motor connection must be as short as possible, shielded four-core (three phases plus yellow/green earth wire), or four unshielded cables bound together and inserted in a raceway or a metal pipe connected to earth. In other words, there must be an earth wire as close as possible to the power wires in the same cable or in the same pipe. If shielded cable is used, continuity of the earth braid between the inverter/contactors and contactors/motor section must be ensured.
It is advisable to connect the shielding to earth at both ends by means of a U-clip or with special terminals.
If the shield cannot be connected with a U clip inside the motor terminal block, it must be earthed on the frame before entering the terminal block.
3. Even if it is not essential, a good engineering way provides to have a shielded cable also in the power line in input, in order to prevent that irradiated noises are brought out, by means this cable.
4. The inverter power cables (input and output) and control cables must be kept as far apart as possible and must not run parallel, even if shielded; if the cables cross, they must be arranged at an angle of 90°.
5. Irrespective of the connection to the building's earth system, the motor frame **MUST** be connected to the cable shield and to the yellow/green earth wire inside the shielded cable.
6. The inverter emits radiated interference, which can therefore be picked up and carried outside the panel by the cables, especially by flexible cables which radiate the interference into the lift shaft. If this problem is to be avoided, the connections between the panel and the inverter must be made using shielded wires with shield connected to earth at both ends. Shielded cables must not be used without the shield connected to earth, as in this case any interference will be greater than with an unshielded cable.
 **Any free or unused wires in a multicore cable must be connected to earth at both ends.**
7. Any cable, for control or external connections for the shaft and lift car, must never run near and parallel to the power cable, even if shielded; if parallel routing cannot be avoided, they must be in separate metal raceways.

8. All earth connections must be as short and wide as possible.
9. To avoid unwanted tripping of the differential switch:
 - Make the power connection as short as possible
 - Use suitable differential switches (type A or B 300mA)
 - When possible, reduce the inverter carrier frequency: in fact, as lower is the frequency, is greater the motor noise, but with less current leakage to earth and less EMC interference; so the motor windings are less stressed.

7.4 SIEMENS S120 GENERAL CONCEPT OF ELECTRICAL WIRING

Main switchboard



7.5 SIEMENS S120 CONTROL UNIT ELECTRICAL WIRING

Below is a diagram for the execution of wiring for inverter Control Unit (CU) with all electrical connections. All supplies at 24V are in continuous current (DC) rectified.

Highlighted in red, the wirings you have to perform.

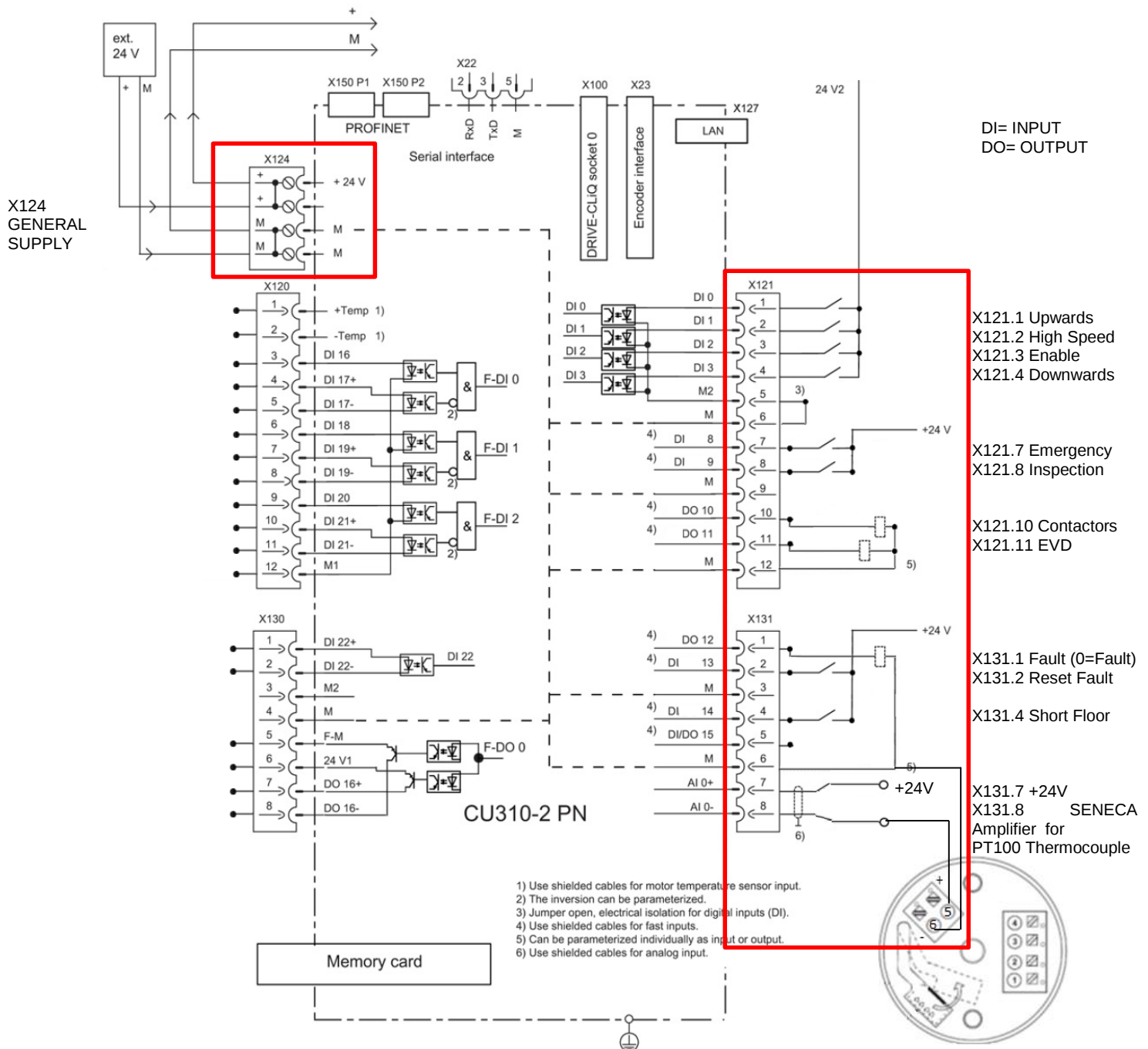


Figure 17 Connection example CU310-2 PN without safety function



The Input port X131.2 could be used for reset automatically some system faults by the main switch board, on the base of its evaluation.

X121.7-Emergency and X131.4-Short Floor, allow to set specific reduced high speed that will be used in place of the standard value of high speed.

X121.7 has to be used as a +24V command to reduce the power used in condition of UPS feeding (for example in emergency conditions activated by the fire fighters). See paragraph 11.4.4.

⚠ X121.7 isn't the command for emergency downward travel in the event of a power failure! It cannot be used to open the valve in case of lack of power.
The outputs (DO) are signals +24V that guarantee maximum 0,5A and can't be able to directly feed the coils!

7.6 THERMOCOUPLE

For a proper operation of the inverter and in order to ensure the temperature compensation, must be connected a thermocouple PT100 and its transmitter amplifier to the terminals X131.7 and X131.8 of the CU.
OMARLIFT deliver as standard a thermocouple and an amplifier from SENECA company.

Amplifier technical data:

EN	T120
2 WIRE - LOOP POWERED TRANSMITTER FOR PT100 AND NI100 PROBES	

General Description

The T120 instrument converts a temperature signal read by a PT100 (EN 60751) or NI100 probe with connection by 2, 3 or 4 wires into a signal normalised in current for 4 - 20 mA loop (2 wires technology).

The module's main features are:

- %High precision
- %16 bit resolution
- %Compact size
- %Configuration by PC with KT120 dedicated software downloadable at www.seneca.it

Technical Features

PT100 Input- EN 60751/A2 (ITS-90)

Measurement Range :	-200 - +650 °C
Resistance Range :	18,5 Ω - 330 Ω
Minimum span :	20 °C
Current on sensor :	750 µA rated
Cable resistance :	Max 25 Ω per wire
Connection :	2, 3 or 4 wires
Resolution :	~ 6 mΩ

NI100 Input

Measurement Range :	-60 - +250 °C
Resistance Range :	69 Ω - 290 Ω
Minimum span :	20 °C
Current on sensor :	750 µA rated
Cable resistance :	Max 25 Ω per wire
Connection :	2, 3 or 4 wires
Resolution :	~ 6 mΩ

Output/Power Supply

Operating Voltage :	5 - 30 V _{DC}
Current output :	4 - 20 mA, 20 - 4 mA (2 wires technology)
Load resistance :	1 kΩ @ 26 V _{DC} , 21 mA (see on page 2, Load Resistance vs Minimum Functioning Voltage diagram)
Resolution :	1 µA (>14 bits)
Output in case of over-range :	102,5% of full scale value (see Table on Page 3)
Output in case of fault :	105% of full scale value (see Table on Page 3)
Current output protection :	approximately 30 mA

Other Features

Network freq. Rejection :	50 Hz and 60 Hz (settable)
Transmission error :	Max of 0,1% (of measurement range) or 0,1 °C
Error caused by EMI (*)	< 0,5%
Influence of cable resistance :	0,005 Ω/Ω
Temperature Coefficient :	< 100 ppm, Typical : 30 ppm
Sampling Time :	100 ms (without 50/60 Hz Rejection) 300 ms (with 50/60 Hz Rejection)
Response time (10..90 %) :	< 220 ms (without 50/60 Hz Rejection) < 620 ms (with 50/60 Hz Rejection)

Protection Index : IP20

Operating Conditions : Temperature -40 - +85 °C
Humidity 30 - 90 % at 40 °C (non-condensing)
Altitude up to 2000 m.a.s.l

Storage Temperature : -40 - +105 °C

Connections : Spring terminals

Conductor Section : 0,2..2,5 mm²

Wire stripping : 8 mm

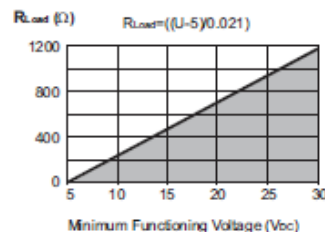
Box : Nylon / glass, (black colour)

Dimensions : 20,0 mm x φ 40,0 mm

Standards : EN 61000-6-4/2002-10 (electromagnetic emission, industrial surroundings)
EN 61000-6-2/2006-10 (electromagnetic immunity, industrial surroundings)



Diagram: Load Resistance vs Minimum Functioning Voltage

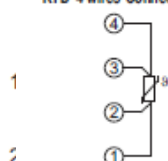


(*) EMI: electromagnetic interferences.

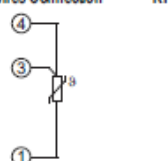
4-wire connection

Fr This connection to be used for media-long distances (> 10 m) between module and probe. Provides the maximum precision because the instrument measure the resistance of the sensor independently of the resistance of the connection cables. The module has to be programmed by PC for 4 wires connection.

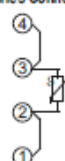
RTD 4 wires Connection



RTD 3 wires Connection



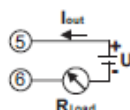
RTD 2 wires Connection



Output

Current Loop connection (regulated current).

The use of shield cables is recommended for the electronic connections.



Ele

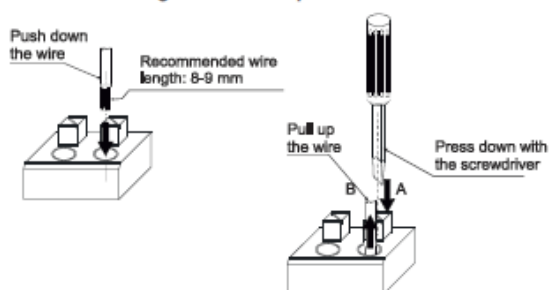
Inf Note: In order to reduce the instrument's dissipation, we recommend guaranteeing a load of >250 Ω to the current output.

Pattern of connecting terminal with push-wire connection

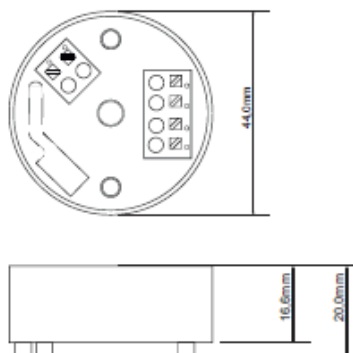
The

2-w
This
bea
equ
The

3-w
This
prol
in c
con
me
con
The



Size and dimensions



Smaltimento dei rifiuti elettrici ed elettronici (applicabile nell'Unione Europea e negli altri paesi con servizi di raccolta differenziata).
Il simbolo presente sul prodotto o sulla sua confezione indica che il prodotto non verrà trattato come rifiuto domestico. Sarà invece consegnato al centro di raccolta autorizzato per il riciclo dei rifiuti elettrici ed elettronici. Assicurandovi che il prodotto venga smaltito in modo adeguato, eviterete un potenziale impatto negativo sull'ambiente e la salute umana, che potrebbe essere causato da una gestione non conforme dello smaltimento del prodotto. Il riciclaggio dei materiali contribuirà alla conservazione delle risorse naturali.

This document is property of SENECA srl. Duplication and reproduction are forbidden, if not authorized. Contents of the present documentation refers to products and technologies described.



SENECA s.r.l.
Via Austria, 26 - 35127 - PADOVA - ITALY
Tel. +39.049.8705355 - 8705359 - Fax +39.049.8706287
e-mail: info@seneca.it - www.seneca.it



MI001352-E
MI001352-E

ENGLISH - 5/6
ENGLISH - 4/6



MI001352-E

ENGLISH - 6/6

8 WEBSERVER COMPUTER COMMISSIONING

	The Computer programming is not available with full functionality in all types of installations in dependence of SIEMENS availability (required CFC v4.7 or higher).
	It is preferable and easier to perform the commissioning by PC using WEBSERVER or STARTER software. In alternative it is always allowed to set up the parameters from the operator panel (BOP). Webserver functionality is already uploaded on the inverter. STARTER software can be free downloaded from the SIEMENS website (https://support.industry.siemens.com), typing SINAMICS MICROMASTER STARTER and choosing DOWNLOAD as <i>Article Type</i> , than clicking on the search tool.
	For the CFC V4.8 (or higher) version it is possible to use the trace functionality with activated KHP (Know How Protection). Some features or parameters described in the following paragraphs maybe not accessible if know-how protection is activated

8.1 WEBSERVER CONNECTION

The following instructions are about Windows 7. For other version of Windows, it may change a bit the screens or the sequences of screens, but the content is the same.

You can connect to the inverter system by using any browser such as Explorer (version 7 or higher), Mozilla (version 35 or higher), Google Chrome (version 69 or higher). Small variations may occur from one version to another.

 There could be some problem with the SIEMENS website connection if you use Google Chrome in this case you have to change the main settings of the browser

1. Physically connect your Computer with the inverter through the LAN cable and the X127 adapter on the CU of the machine.
2. Type **169.254.11.22** on the URL bar of the browser
3. There is no password. Just add SINAMICS at *user name* and click on *Login*

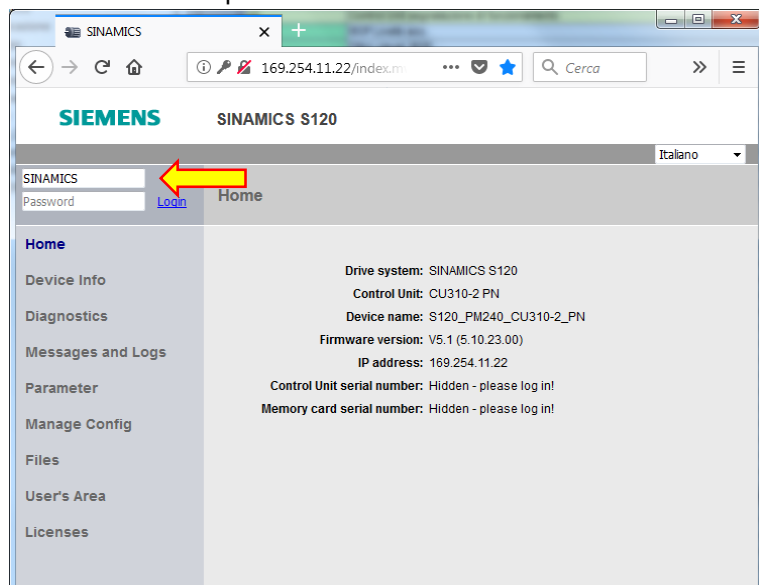


Figure 18 SIEMENS S120, Main screen

8.2 MENU

Here below are described the main screen options on the Menu on the left side.

1. *Home* displays all the sections of your SIEMENS interface and the main features of the inverter like Drive System, Control Unit, Device name, Firmware version (CFC version), IP address (169.254.11.22), serial number of the Control Unit and of the Memory card. (Figure 19)

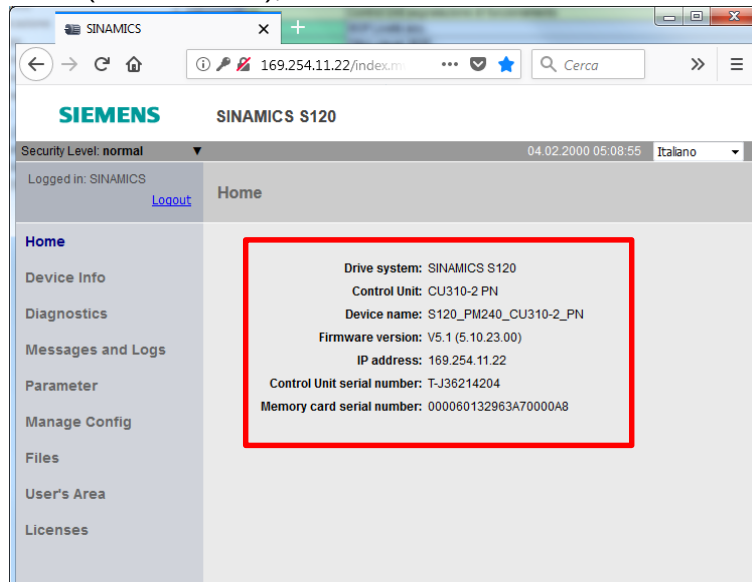


Figure 19 SIEMENS S120, General Menu

2. *Device Info* is composed by the installed components. Through the LED legend it is possible to read the status of the Control Unit and the Drive

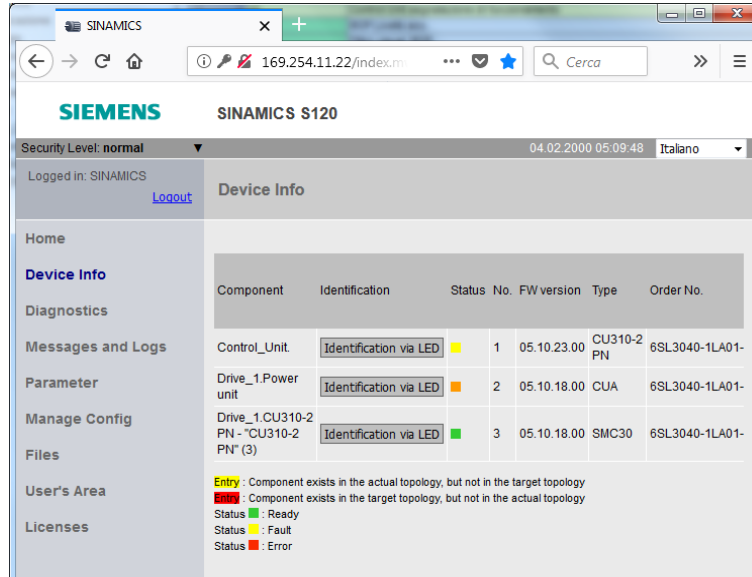


Figure 20 SIEMENS S120, Device Info

3. *Diagnostics: the Service overview tab, identifies the operating status of the Drive and Control Unit*

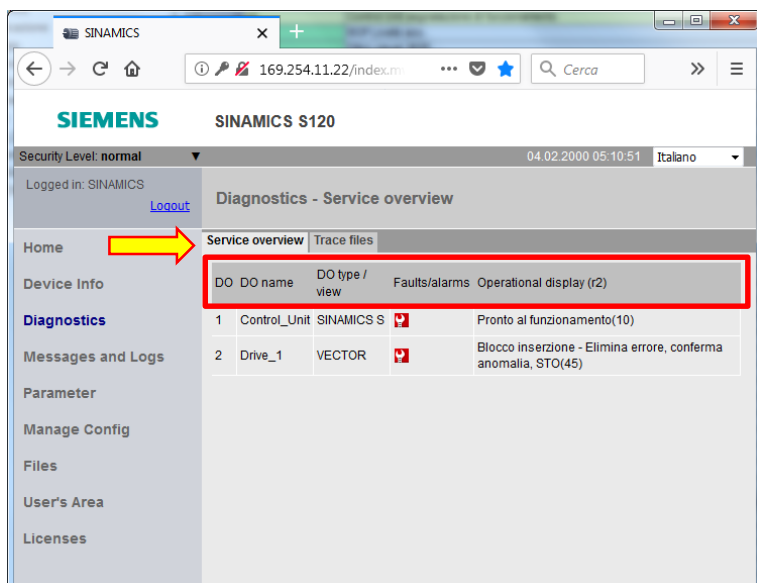


Figure 21 SIEMENS S120, Diagnostics

4. In Messages and Logs, to the tab Alarm display you find some status messages:

- *TIME*, is the indicative order sequence but it isn't a real reference of the time in which the problem occurs.
- *TYPE*, identifies the type of signaling in Alarm (A) and Fault (F).
- *DRIVE OBJECT*, indicates the area involved in the anomaly (Drive or Control Unit)
- *ALARM*, shows the error or warning code (es:13000, 3505, 1073, etc...) and refers to the type of problem encountered, followed by a brief description. With this code it will be possible to discover the cause and to the solution of the problem. To deep the topic go to *SIEMENS LH1 Lists Manual*



WARNING: If you click *Acknowledge faults* button, you accept and reset any errors, that will disappear from the message screen.

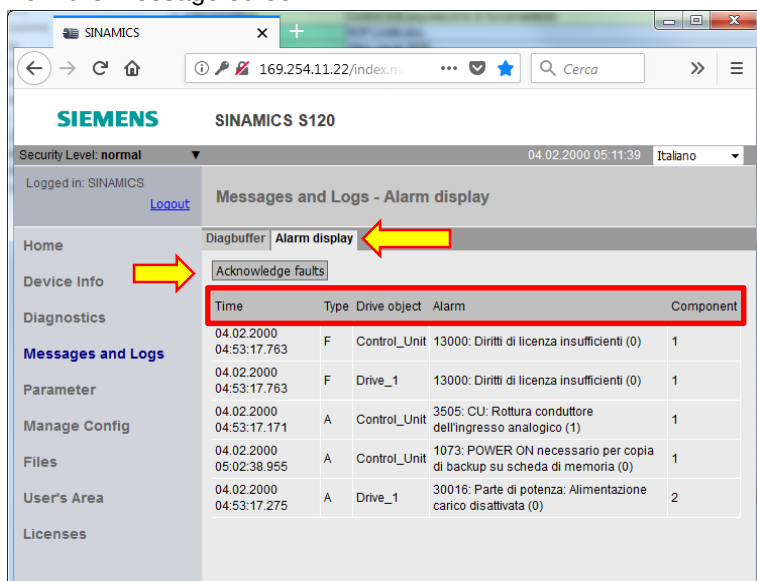


Figure 22 SIEMENS S120, Messages and Logs

5. *Parameter allows reading and edit the inverter system parameters*

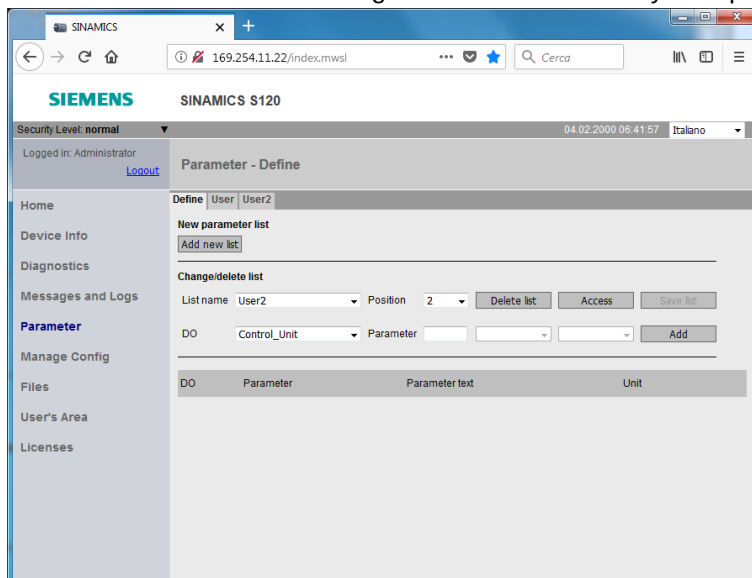


Figure 23 SIEMENS S120, Parameter

6. *Manage Config., Files and User's Area are not sections of User interest*
 7. *Licenses groups the software licenses installed on the machine and/or problems or requested activities related to the same.*

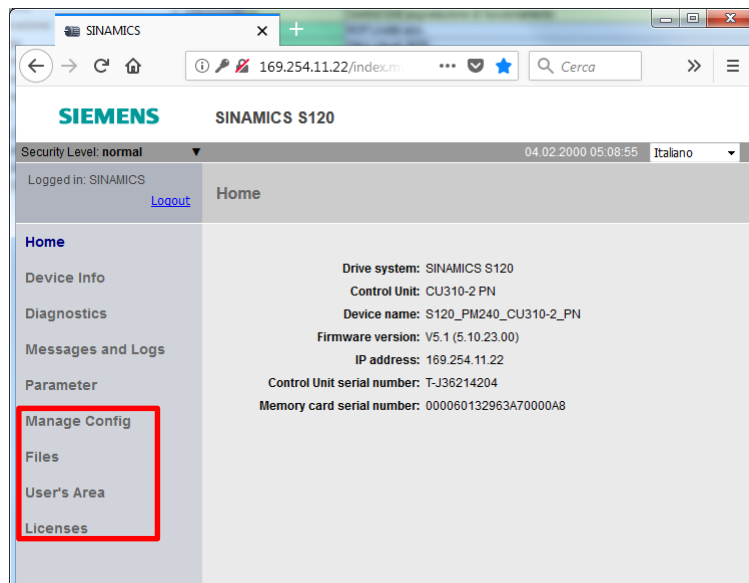


Figure 24 SIEMENS S120, Manage Config., Files, User's Area, Licenses

8.3 PARAMETERS CUSTOMIZATION

In the *Parameter* section you can edit, add and cancel a new or old list, and you can modify the value for each parameter

8.3.1 Parameter value editing

In the Parameter section there are at least two screens: DEFINE and – in the example on the picture- USER. Select the tab related to the function of interest, in which you can see and edit the enabled parameter list (R=Read, P=Programmable), when you need

- *DO*: shows the parameters of the Drive or the Control Unit
- *Parameter*: contains the identification number of the parameter
- *Parameter text*: describes the function of the parameter
- *Value*: indicates the actual value or the one set
- *Change*: allows you to change the value of the parameters.

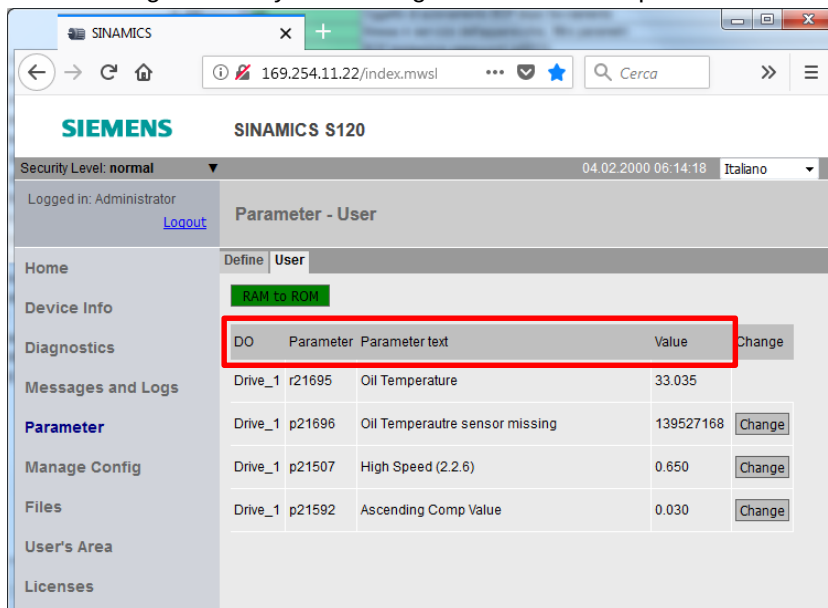


Figure 25 SIEMENS S120, Parameter - User list



WARNING to edit the interesting parameter, click *Change*> Enter_New_value>*Submit* (to divide the decimals use dot “.” not comma “,”).

The only parameters that you can edit are that starting with letter “p”.

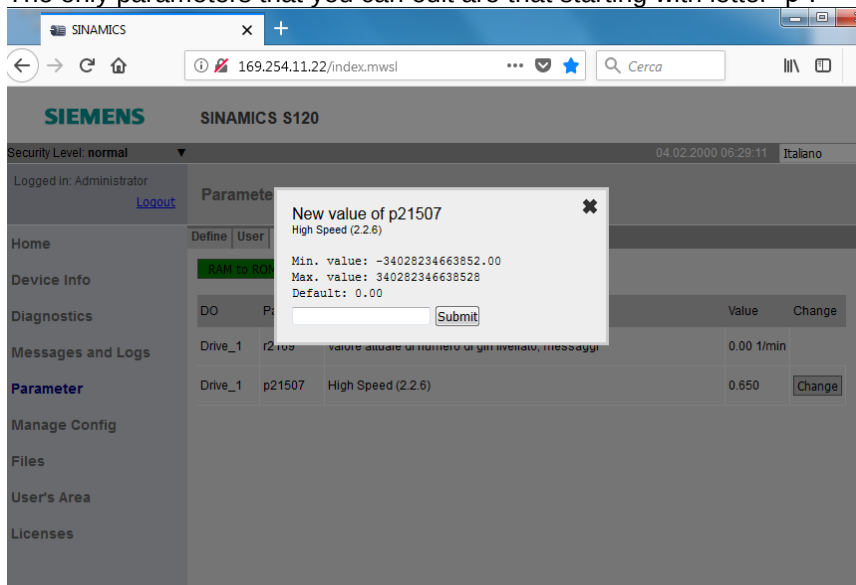


Figure 26 SIEMENS S120, Parameter p21507 modify - New value

8.3.2 Saving changes

⚠ WARNING: at the end of the modifications, you **MUST** click on the RAM to ROM red button or the new change will never be saved definitely and you can lost all in case of power shutdown.

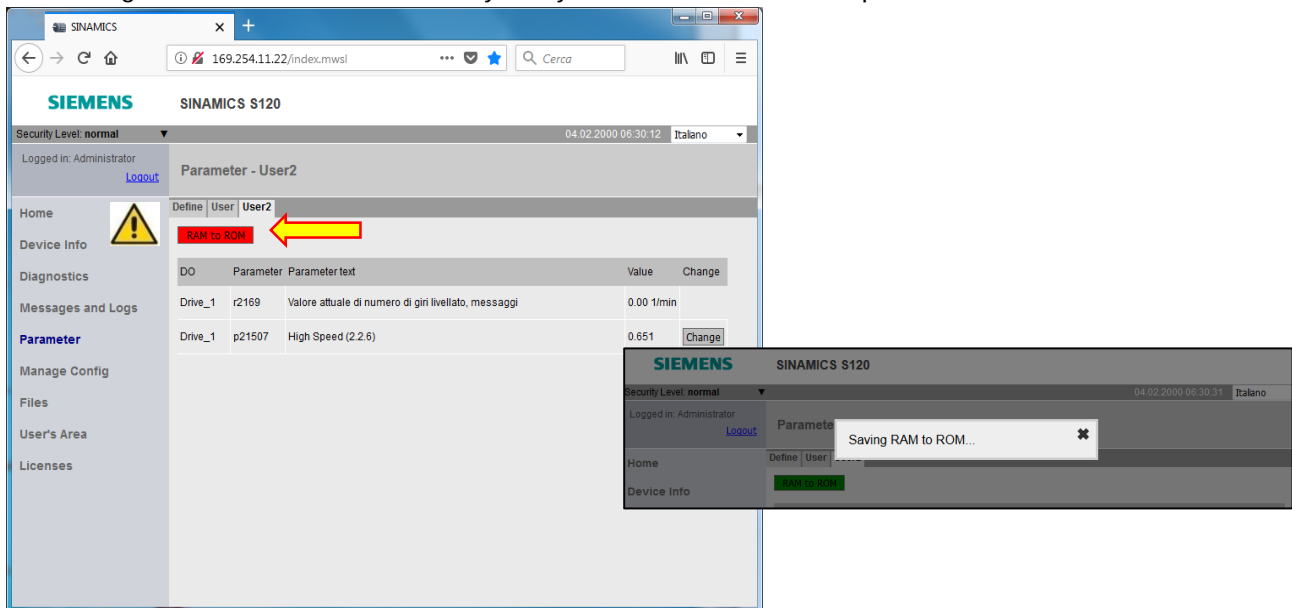


Figure 27 SIEMENS S120, Parameter – modification not saved

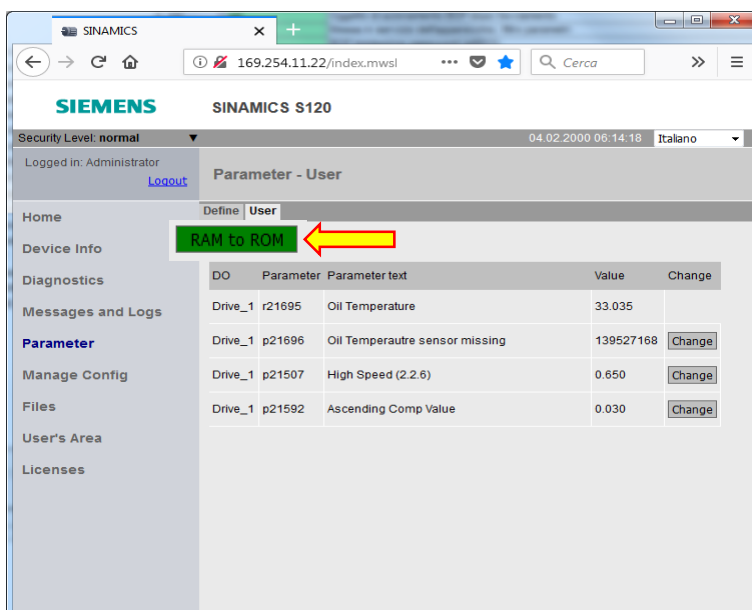


Figure 28 SIEMENS S120, Parameter ,modification saved

Click *Logout* at the end to be sure to save and to disconnect your PC.

8.3.3 Add new parameters list

- Select *Define* tab;
- Click *Add new list*;
- Set the name in *List name*;
- Choose the parameters source (*Control Unit* or *Drive*)
- Type the code of the interested parameter and if it is present select the relative index (example p7764[0], p7764[1])
- Click *Add* to introduce the new parameter.
- Click *Save list* to save the modification at the end.

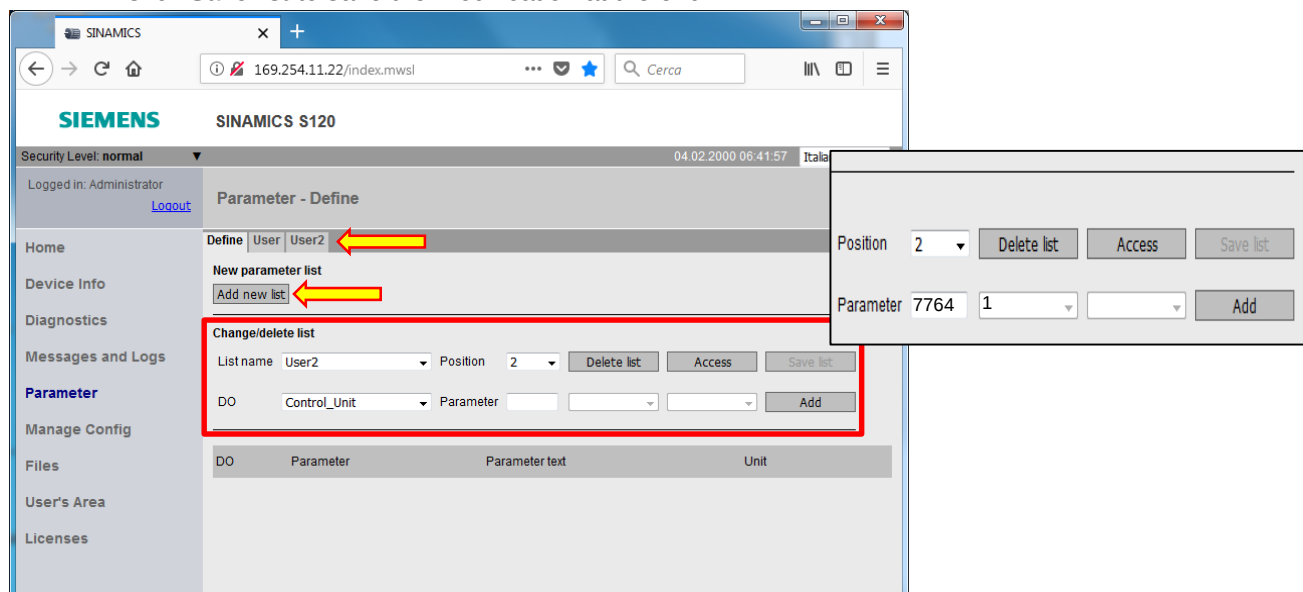


Figure 29 SIEMENS S120, Parameter - Define list

- After adding and saving procedure, the new list name appear on the top. Click on the tab to see the new list and to choose the parameter. For each line there are *UP* and *DOWN* buttons that allows to move the parameter position on the parameters list. Click *DEL* to eliminate (Figure 30)

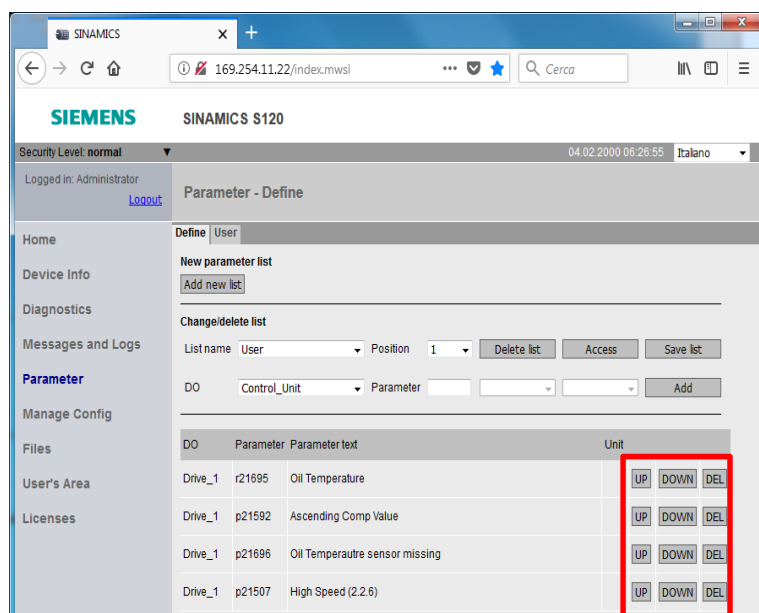


Figure 30 SIEMENS S120, Parameter – Define list

9 DOWNLOAD STARTER SOFTWARE (OPTIONAL)

If you wish to set up STARTER software on your PC, for a more in-depth and detailed commissioning, you can free download the software from the SIEMENS website, proceeding as follow:

1. Enter <https://support.industry.siemens.com>
2. Choose the *Download* section
3. Type SINAMICS MICROMASTER STARTER in URL research bar and choose as *Entry type*: DOWNLOAD, at the end click on the search lens (Figure 31).



Figure 31 Download research of Sinamics Micromaster STARTER from SIEMENS website

4. Select the interested link and save the compressed file

10 PROGRAMMING WITH KEYBOARD AND MENU



For simplicity it is preferable to perform the commissioning via PC using the STARTER software, rather than setting the parameters from the operator panel. See Chapter **Errore. L'origine r**
iferimento non è stata trovata..

10.1 BASIC OPERATOR PANEL BOP20

10.1.1 Description

The Basic Operator Panel BOP20 is an operator panel with six keys and a backlit display unit. The BOP20 can be inserted on the CU310-2 PN SINAMICS Control Units and operated.

The BOP20 supports the following functions:

- Input of parameters and activation of functions
- Display of operating modes, parameters, alarms and faults

10.1.2 Interface description



Figure 32 - Basic Operator Panel BOP20

Overview of displays and keys

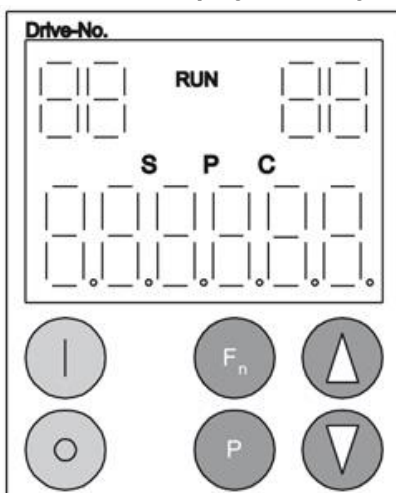


Figure 33 - Overview of displays and keys

Table 14 Views

Display	Meaning
Top left 2 positions	The active drive object of the BOP is displayed here. The displays and key operations always refer to this drive object.

RUN	Is lit (bright) if the displayed drive is in the RUN state (in operation).
Top right 2 positions	The following is displayed in this field: • More than 6 digits: Characters that are present but cannot be seen (e.g. "r2" → 2 characters to the right are invisible, "L1" → 1 character to the left is invisible) • Faults: Selects/displays other drives with faults • Designation of BICO inputs (bi, ci) • Designation of BICO outputs (bo, co) Source object of a BICO interconnection to a drive object other than the active one.
S	Is (bright) if at least one parameter was changed and the value was not transferred into the non-volatile memory.
P	Is lit (bright) if, for a parameter, the value only becomes effective after pressing the P key.
C	Is light (bright) if at least one parameter was changed and the calculation for consistent data management has still not been initiated.
Below, 6 position	Displays, e.g. parameters, indices, faults and alarms.

BOP20 keyboard

Table 15 - BOP20 keyboard layout

Key	Name	Meaning
	ON	Powering-up the drives for which the command "ON/OFF1","OFF2" or "OFF3" should come from the BOP.
	OFF	Power-down the drives for which the "ON/OFF1," "OFF2," or "OFF3" commands should come from the BOP. Note: The effectiveness of these keys can be defined using the appropriate BICO parameterization (e.g. using these keys, it is possible to simultaneously control all of the axes that have been configured.) The structure of the BOP control word corresponds to the structure of the PROFIBUS control word.
	Functions	The meaning of these keys depends on the actual display. Note: The effectiveness of this key to acknowledge faults can be defined using the appropriate BICO parameterization.
	Parameter	The meaning of these keys depends on the actual display. If you press "P" key for 3sec, the command "Copy from RAM to ROM" is performed, and the "S" key disappear from the BOP.
	Raise	The keys are dependent on the actual display and are used to raise or lower values.
	Lower	



Press the "FN" key to reset errors

10.1.3 Displays and using the BOP20

With the BOP these operation are possible:

- **Changing the active drive object**
 - Press key "FN" and "Arrow up" → the drive object number at the top left flashes
 - Select the required drive object using the arrow keys
 - Acknowledge using the "P" key

- **Parameter display**
 - Press the "P" key.
 - The required parameters can be selected using the arrow keys.
 - Press the "FN" key → "r00000" is displayed
 - Press the "P" key → changes back to the operating display

Parameter display

The parameters are selected in the BOP20 using the respective identification number (Pxxxxx).

The parameter display is reached from the operating display by pressing the "P" key.

Parameters can be searched for using the arrow keys.

The parameter value is displayed by pressing the "P" key again.

You can toggle between the drive objects by simultaneously pressing the "FN" key and an arrow key.

You can toggle between "r00000" and the parameter that was last displayed by pressing the "FN" key in the parameter display.

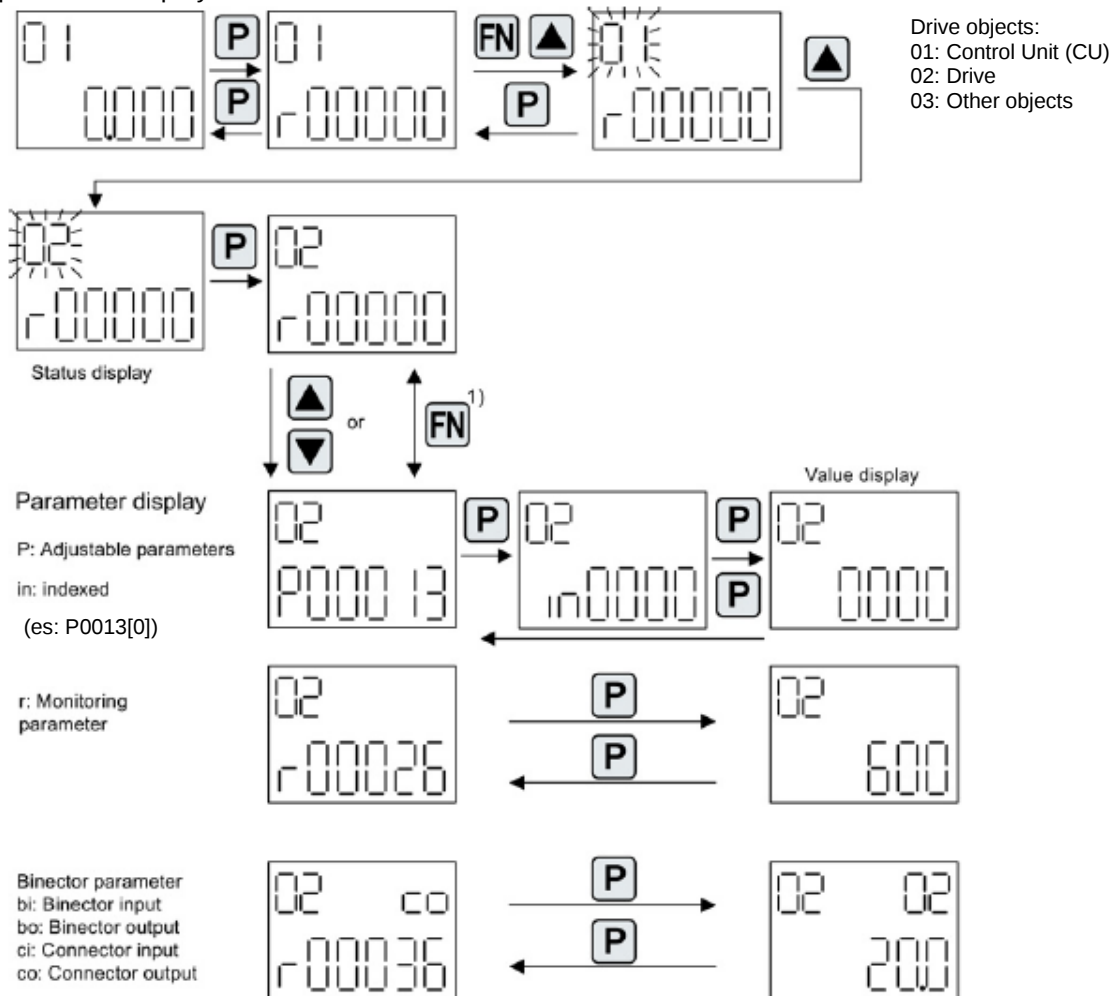
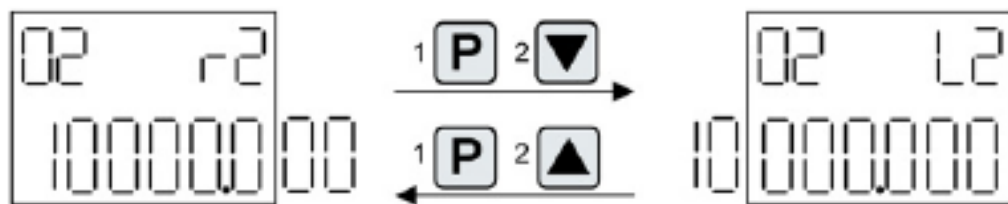


Figure 34 Parameter display

Value display

Displaying the presence of additional digits to the right/left of the six displayed

Decimal number
e.g. r1084



Changing the integer number



Cursor



Changing an individual digit



displaying the original value

Figure 35 Value display

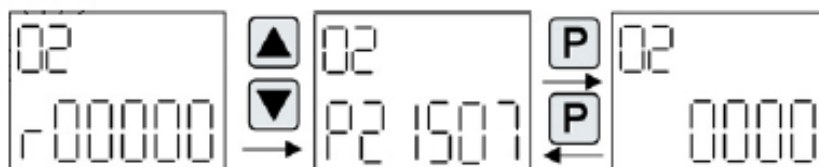
10.1.4 Example: Changing a parameter

Modify the parameter of the drive P21507 High speed (2.2.6) from 0 to 300.

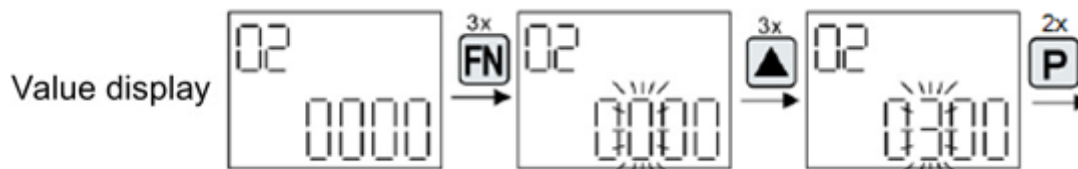
1. From the current display switch to parameter display by setting the drive 02 on the display



2. Select the parameter of the drive you want to modify (eg: p21507 - high speed (2.2.6)) by scrolling with the arrow keys keeping them pressed or pulse dialing



3. Move the cursor with "FN" and change the values with the arrow keys



4. Confirm the entered value by pressing "P". (2x), it will appear the number of the modified parameter
5. To proceed to the setting of another parameter, press "FN" while it is displayed the ID of the last modified parameter and repeat from the point 2
6. To end the setting while viewing the ID of the last parameter changed, press "FN" and confirm with "P": starting screen will be displayed.



After the modify of the parameters of interest, it is always necessary to save the new values on the hard memory of the Control Unit, in order to prevent a loss of data at the first shut down (voluntary or accidental).

You can proceed in 2 ways:

- Press “P” key for 3 sec long: the actual value on the display will flash and when it becomes fixed, the saving process on the ROM memory is terminated
- After setting all parameters, select P0971 (if enabled) and set it to 1 (default=0): This activate the data transfer RAM-ROM and the permanent saving.

10.1.5 Fault and alarm displays

Fault and alarm displays

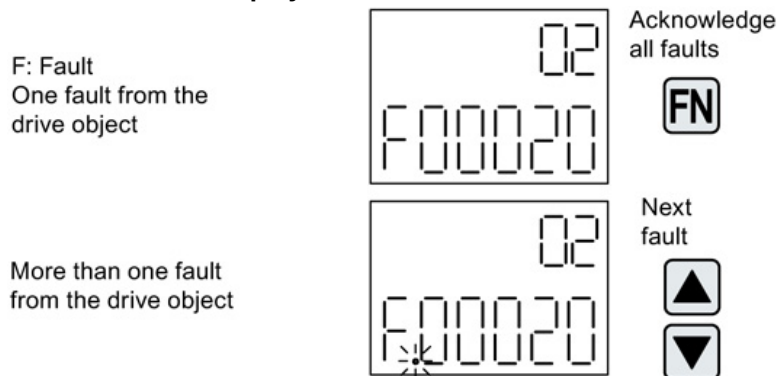


Figure 36 Faults

Displaying alarms

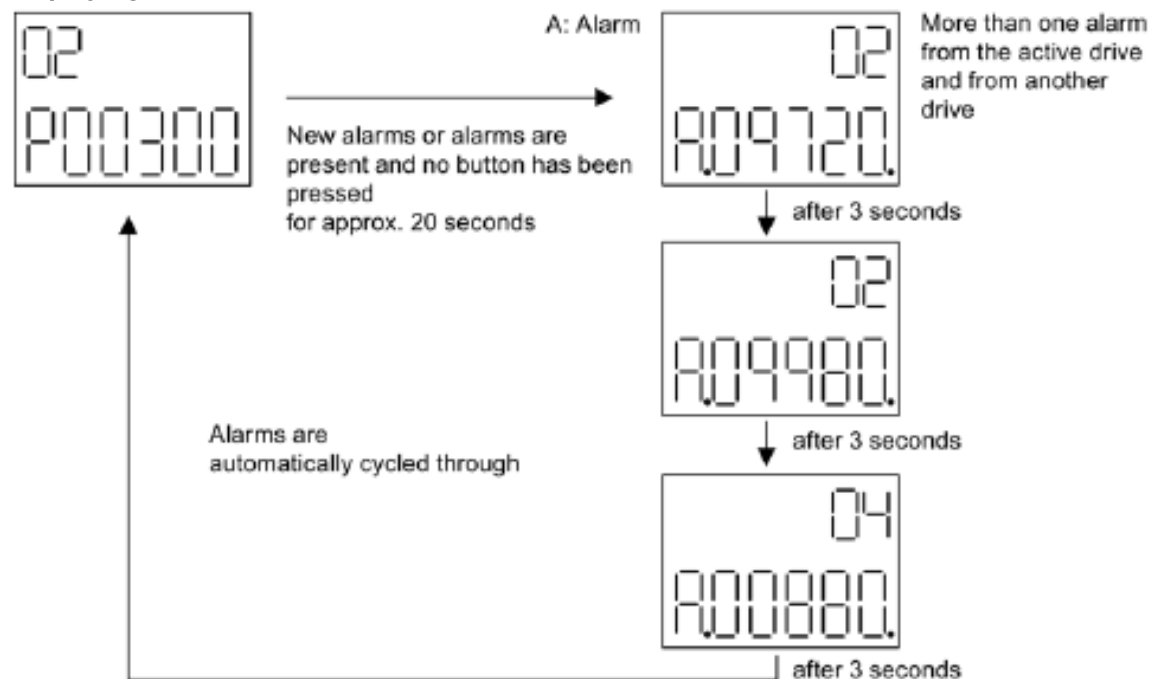


Figure 37 Alarms

For more functions or information about the BOP20, refer to the SIEMENS S120 Commissioning manual (IH1)

10.1.6 Mounting

ATTENTION

Damage when using the BOP

The interface for the BOP20 on the CU310-2 may be damaged when the BOP20 is used.

- Make sure that you insert and withdraw the BOP20 straight into/out of the CU310-2 and that it is not tilted up or down.

Mounting

The diagrams show how to mount the Basic Operator Panel BOP20 on a CU310-2

		
1. Remove the blind cover by pressing on the tabs to snap and pull the front.	2. Squeeze the tabs on the joint BOP20 and insert it directly into the housing of the CU310-2 until it clicks into place.	CU310-2 with BOP installed.
NOTE: The BOP20 may be inserted or withdrawn while the Control Unit is operational.		

Removal

- 1- Simultaneously press the latching cams on the BOP20.
- 2- Keep the latching cams pressed together and pull the BOP20 straight out.
- 3- Insert the blanking cover.

Display and operator controls of the BOP20

For information about display and operator controls of the BOP20, refer the *SINAMICS S120 Commissioning Manual (IH1)*.

11 PARAMETERS

Parameters can be edited manually according to the procedures shown in Chapter 10 or via WEBSERVER as explained in Chapter 8.

11.1 DISPLAY PARAMETERS

To perform a configuration / modification of parameters that control the elevator, follow these steps:

The lists related to each function, instead, provide tools for **advanced configuring and commissioning the inverter**.

In the list, **the parameters are grouped into families** based on the range of intervention and for each parameter, as well as a numeric identifier, there is a description of the function performed.

The only parameter that the user can edit are which one start with "p".

The parameters that start with "r" are a display of the current value of the parameter indicated.

 **DO NOT CHANGE PARAMETERS FOR WHICH YOU DO NOT KNOW EFFECT:** possibility of unintended consequences and / or serious physical injury to people and to the system.

11.2 INVERTER COMMISSIONING - AUTOTUNING

All activities below described can be performed alternatively with the BOP or by PC

 **ATTENTION: You must do self-learning inverter before performing any calibration, in order to adapt its behavior to the installation characteristics.**

 **ATTENTION:** The self-learning procedure, has to be performed mandatorily with **power limitation function** (if provided) **deactivated** by setting previously P23703=0, otherwise the set values could be not adequate under all functioning conditions

To run the self-learning inverter correctly, do the following:

1. Install and set up the system completely (electrical connections, piping, oil filling the tank,...)
2. make sure you have the weight that can be loaded to reach the maximum working pressure of the system (Pmax)
3. Only if you use PC commissioning, Start the WEBSERVER program, connect the PC ONLINE to the device
4. Only if you use PC commissioning, login to the parameter list *User*
5. Make sure the oil temperature (see parameter r21695 Drive) is within the range Tmin=20°C and Tmax=30°C. In case Toil<20°C, run a few cycles of movement up and down to increase the T oil. If Toil>30°C, let the oil cool with the system is shut down. If you use PC commissioning, the parameter is inside the parameters family AUTOTUNING,
6. Run **the self-learning without load** (by PC, *Use*, family parameters AUTOTUNING):

- Remove any load from the cab
- Set the parameter P21600=1
- Perform a normal cycle of ascent and descent of the lift
- Set the parameter P21600 = 0

In this way, the new torque values detected at empty conditions, that are visible to the parameters r21620 and r21621, are copied and saved in the parameters of the inverter use P21590 and P21595.

7. Run **the self-learning at full load** (by PC, *User*, family parameters AUTOTUNING):

- load the cab with weights to reach Pmax
- Set the parameter P21601=1
- Perform a normal cycle of ascent and descent of the lift
- Set the parameter P21601 = 0

In this way, the new torque values measured at full-load conditions, that are visible to the parameters visible to r21622 and r21623, are copied and saved in the parameters of the inverter use P21591 and P21596.

 **ATTENTION:** If the Toil is outside of the range Tmin / Tmax values, the results of auto-tuning procedure will not be captured and torque values may be set to 0 generating an unsatisfactory behavior of the inverter and therefore of the lift.

 **ATTENTION:** If you do not set the parameter to 0 at the end of the test, the system will remain under self-learning conditions and the system does not work properly.

⚠ ATTENTION: If during the procedure is missing voltage, the torque values remain set to 0! Repeat the tuning after restoring power.

⚠ ATTENTION: If you calibrate under conditions other than empty / full load, the torque values recorded may not ensure proper operation of the system under all conditions.

At this point, after performing the auto-tuning procedure, the system is ready to be used and configured. Any additional tune-up can be done by acting directly on the values of the parameters of the Drive available in the list "User" or BOP, as explained in detail in paragraph 11.4 .

⚠ ATTENTION: Only in case of replacement of the inverter or of the electric motor, you must do the motor recognition procedure by P1910, before performing any calibration. Please contact OMARLIFT Service, for the procedure.

11.3 PARAMETERS LIST

Below are listed the parameters of the list "User " and their default values:

⚠ After the modify of the parameters of interest, it is always necessary to save the new values on the hard memory of the Control Unit (with button RAM to ROM), in order to prevent a loss of data at the first shut down (voluntary or accidental). Using WEBSERVER software, you have to switch ONLINE, then press the push button RAM to ROM .Alternatively, see the procedure described to the chapter 10 for the setup by BOP.

Table 16 List of parameters

ID	Description	Valore Value	Unità Unit	MAX	min
SETTING UPWARDS DIRECTION - CONFIGURAZIONE SALITA					
p21502	Pre-Start Speed (2.2.2)	0.040	%	0.060	0.020
p21503	Pre-Start Time (2.2.3)	800.000	ms	1000	500
p21507	High Speed (2.2.6)	0.750	%	1.000	0.600
p21512	Low Speed (2.2.7)	0.095	%	0.12	0.060
p21513	Final Dec Time (2.2.14)	4.500.000	ms	6000	3000
p21514	Inspection Speed UP (2.2.9)	0.300	%	0.400	0.100
p21515	Releveling speed UP (2.2.8)	0.120	%	0.150	0.080
SETTING DOWNWARDS DIRECTION - CONFIGURAZIONE DISCESA					
p22011	Pre-Start Speed value 2 (2.3.2.2)	-0.002	%	0.020	- 0.020
p22017	Pre-Start Time value 2 (2.3.3.2)	100.000	ms	300	100
p22023	Pre-Start Delay Additional value 2 (2.3.3D.2)	500.000	ms	1000	100
p21537	High Speed (2.3.6)	-0.750	%	-1.000	-0.600.
p21542	Low Speed (2.3.7)	-0.090	%	-0.120	-0.060
p22081	Final Dec Time value 2 (2.3.14.2)	800.000	ms	1000	500
p21544	Inspection Speed DOWN (2.3.9)	-0.300	%	-0.400	-0.100
p21545	Releveling speed DOWN (2.3.8)	-0.020	%	-0.150	-0.080
p21630	Plus Speed while EDV closing	0.080	%	0.120	0.060
RUPTURE VALVE TEST- TEST VALVOLA PARACADUTE					
p21523	Parachute function (2.13.1)	0		NA	NA
p21524	Overspeed Factor	1.500		NA	NA
p21525	Ramp-up time (ms) (2.13.3)	2.000.000	ms	NA	NA
p21526	Ramp-down time (ms) (2.13.5)	1.500.000	ms	NA	NA
p21527	Max. Time Parachute (ms)	15.000.000	ms	NA	NA
p21529	Parachute Max.Speed TimeOut (2.13.4)	4.000.000	ms	NA	NA

EMERGENCY MODE - MODALITÀ EMERGENZA					
p21546	Emergency Speed Up (2.6.1)	0.200	%	1.000	0.100
p21547	Emergency Speed Down (2.6.2)	-0.150	%	-1.000	-0.100
p21650	Emergency Ramp Adaption	1.000		NA	NA
SHORT FLOOR - PIANO CORTO					
p21530	Short Floor activate	0		1	0
p21548	Short Floor Speed Up (2.14.2)	0.160	%	0.800	0.200
p21549	Short Floor Speed Down (2.14.3)	-0.110	%	-0.800	-0.200
p21651	Short Floor Ramp Factor	1.000		NA	NA
COMPENSATIONS – COMPENSAZIONI					
p21570	Switch tipologia olio	0		NA	NA
p21571	P.X1	0.900		4.000	0.000
p21572	P.X2	0.800		4.000	0.000
p21573	P.X3	0.200		4.000	0.000
p21574	P.X4	0.300		4.000	0.000
p21575	P.X5	0.250		4.000	0.000
p21576	P.X6	0.200		4.000	0.000
p21577	P.X7	1.000		4.000	0.000
p21578	P.X8	1.600		4.000	0.000
p21579	P.X9	1.000		4.000	0.000
p21580	P.X10	0.200		4.000	0.000
p21581	P.X11	2.900		4.000	0.000
p21582	P.X12	1.000		4.000	0.000
AUTOTUNING - AUTO REGOLAZIONE					
p21600	Torque Measure without load	0		1	0
p21601	Torque Measure with full load	0		1	0
TORQUE VALUES - VALORI COPPIA					
p21590	Ascending Torque Min Value	29.731	Nm	NA	NA
p21591	Ascending Torque Max Value	51.892	Nm	NA	NA
p21592	Ascending Comp Value	0.030	%	NA	NA
p21595	Descending Torque Min Value	-8.194	Nm	NA	NA
p21596	Descending Torque Max Value	9.558	Nm	NA	NA
p21597	Descending Comp Value	0.035	%	NA	NA

 NOTE: (*) all speeds are expressed in rpm% compared to the rated motor speed (usually 3000 r/min)

11.4 CONFIGURATION RUNNING PARAMETERS

For both directions, it is necessary to adjust some values to your system:

- Set the desired value for the high-speed P21507 (2.2.6) (P21537 (2.3.6) for downward).
- Set the desired value for the low speed P21512 (2.2.7) (P21542 (2.3.7) for the downward).
- Set the desired value for the inspection speed P21514 (2.2.9) (P21544 (2.3.9) for the downward direction).

11.4.1 Upwards



ATTENTION: The modification of global parameters for UP direction travels, has to be performed mandatorily with **power limitation function** (if provided) **deactivated** by setting previously P23703=0, otherwise the set values could be not adequate under all functioning conditions.



After the modify of the parameters of interest, it is always necessary to save the new values on the hard memory of the Control Unit press the push button RAM to ROM, **in order to prevent a loss of data at the first shut down (voluntary or accidental) of the inverter.** Using WEBSEVER software, you have to switch ONLINE, then press the push button RAM to ROM. Alternatively, see the procedure described to the chapter 10 for the setup by BOP.

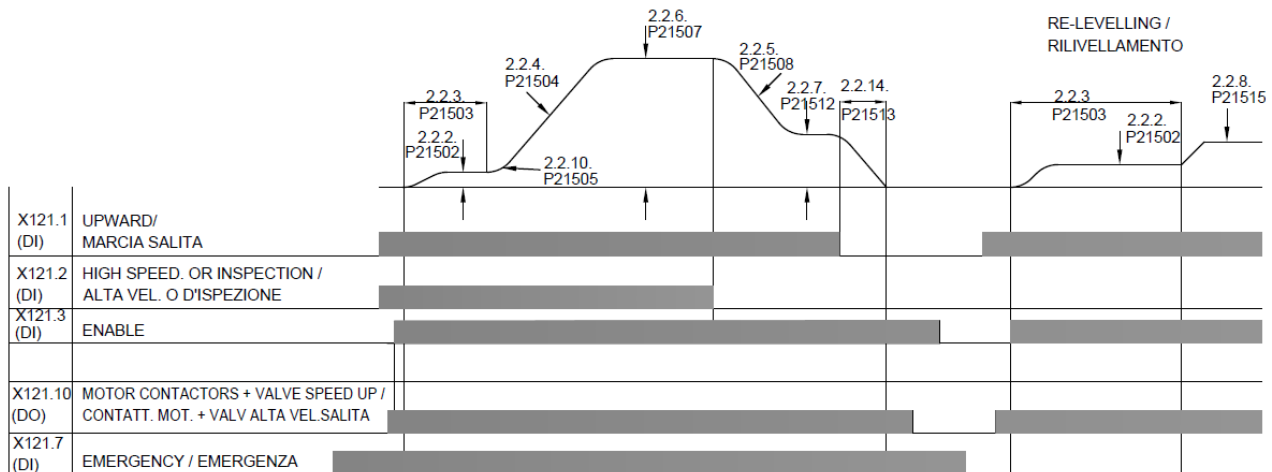


Figure 38 Upwards diagram DI=INPUT DO=OUTPUT

- **SIGNALS SEQUENCE - Upward travel**

1. Insertion of the UPWARD command then, when the contactors are closed, a signal has to arrive to the ENABLE input: this will enable the starting of the motor.
If you enable the High speed or INSPECTION, the motor runs at a speed "high" or "inspection" (P21507 (2.2.6) or P21514 (2.2.9)). If you do not enable any speed level (eg. During the re-leveling at floor), the motor will run at the speed of re-leveling (P21515 (2.2.8)).
2. During normal running, when the elevator reaches the command of slowdown, it should be taken off the signal HIGH SPEED: in this way, the inverter automatically switches to "low" speed (P21512 (2.2.7))
3. Once on the floor, you have to open the UPWARD command, so the inverter reduce the speed of the motor till to stop it, dropping the contactor command. As result of this operation, the command ENABLE will be removed.

- **START Setting – Upward travel**



Preferably adjust only the parameters visible in the list *User*. Some of parameters mentioned are available only after contacted OMARLIFT Support.

To have a good start, make sure that it is completely managed only by the inverter and not by the valve. In this sense, a good way is to adjust the hydraulic valve to the maximum opening (it is the same operation done, in installations without inverter, in order to have an instantaneous and rapid departure).

For "sweet" and without tearing departures it is necessary that the cabin moves slightly before the acceleration begins.

This could be done with the parameters P21502 (2.2.2), P21503 (2.2.3), by tuning them properly, as indicated in the table.

The subsequent acceleration phase is already set at the factory. If necessary, you can make a different setting with parameters P21504 (2.2.4) and P21505 (2.2.10) visible in the list *User*.

PARAMETER	CABIN DEPARTURE WITH TEARING	CABIN STARTING LATE	CABIN SPEEDS UP TOO FAST
P21502 (2.2.2)	↑	↑	=
P21503 (2.2.3)	↑	↑	=
P21504 (2.2.4)	=	=	↑
P21505 (2.2.10)	↑	=	↑

Legend: ↑ increase the value of the parameter
 ↓ decrease the value of the parameter
 = parameter has no effect

- **STOP Setting – Upward travel**



Preferably adjust only the parameters visible in the list *User*. Some of parameters mentioned are available only after contacted OMARLIFT Support.

The slowdown starts when you remove the command HIGH SPEED, and the UPWARDS command remains activated; once the elevator get on the floor, you will take off the UP command and the engine is automatically set to zero speed.

To achieve the desired accuracy of the stop, adjust the parameters P21512 (2.2.7) (Low Speed) and P21513 (2.2.14) (Deceleration Final).

PARAMETER	EXCESSIVE LENGTH OF LOW-SPEED	ARRIVAL AT THE FLOOR WITHOUT LOW SPEED	PRESENCE OF LOW SPEED, BUT STOP BEYOND THE FLOOR	PRESENCE OF LOW SPEED, BUT STOP BEFORE THE FLOOR
P21508 (2.2.5)	↑	↓		=
P21512 (2.2.7)	=	=	↓	↑
P21513 (2.2.14)	=	=	↓	↑



MODIFY ALWAYS ONLY ONE PARAMETER AT TIME.

The stopping accuracy should not be affected too much by the load in the cabin or oil temperature, as have been calculated with the appropriate automatic compensation.

If the situation on the arrival on the floor isn't satisfactory modifying the load or temperature, proceed as follows:

- Adjust the stop with cold oil and empty car, acting on the parameters P21512 (2.2.7) and P21513 (2.2.14).
- Repeat the test at the same temperature, but at full load and if necessary to adjust the accuracy of the correct destination, this time to act on the parameter P21578 (PX8) (DO NOT CHANGE the parameters P21512 (2.2.7) and P21513 (2.2.14)!)!
- **Make several trips to heat the oil**, then check the stopping accuracy with hot oil. **If the car stops before the floor, modify the parameter P21572 (PX2) until you have the desired accuracy.**
- Finally, check with cold oil and empty car that stopping accuracy remained the one obtained with the initial tests, otherwise repeat the procedure.

11.4.2 Downwards

! After the modify of the parameters of interest, it is always necessary to save the new values on the hard memory of the Control Unit press the push button RAM to ROM, in order to prevent a loss of data at the first shut down (voluntary or accidental) of the inverter. Using WEBSEVER software, you have to switch ONLINE, then press the push button RAM to ROM. Alternatively, see the procedure described to the chapter 10 for the setup by BOP.

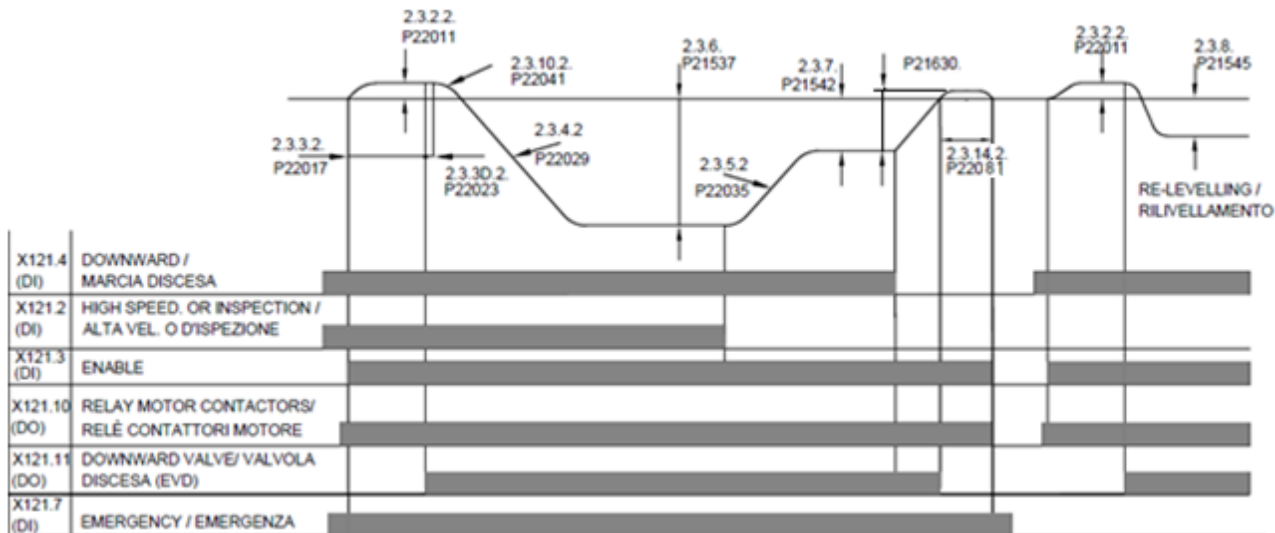


Figure 39 Downwards diagram DI=INPUT DO=OUTPUT

• START Setting – Downward travel

! Preferably adjust only the parameters visible in the list *User*. Some of parameters mentioned are available only after contacted OMARLIFT Support.

For departures "sweet" and without tearing it is necessary that the cabin moves slightly before acceleration begins. This is obtained with the parameters:

PARAMETER	THE CABIN AT THE FIRST MOVE UP THEN DOWN	SUDDEN ACCELERATION AT START	CABIN ACCELERATION TOO FAST
P22011 (2.3.2.2)	↓	↑	=
P22017 (2.3.3.2)	↓	↑	=
P22029 (2.3.4.2)	=	=	↑
P22041 (2.3.10.2)	=	=	↑

↑ increase the value of the parameter

↓ decrease the value of the parameter

= parameter has no effect

• STOP Setting – Downward travel

! Preferably adjust only the parameters visible in the list *User*

To get an accurate and "sweet" stop, with minor variations in load, it is necessary to adjust some parameters:

PARAMETER	ARRIVAL TO FLOOR STILL IN DECELERATION (NOT AT CONSTANT SPEED)	OVER TIME AT LOW SPEED	STOPPING AFTER THE FLOOR	STOPPING BEFORE THE FLOOR	SUDDEN STOP	UPWARD JUMP AFTER STOP
P22035 (2.3.5.2)	↓	↑	=	=	=	=
P21542 (2.3.7)	=	=	↓	↑	=	=
P21630	=	=	↑	↓	↓	↓

The P21630 parameter set the increase of speed in respect to the low speed in downward direction (negative value) in order to obtain a motor rotation in contrary sense during the valve closing phase. To modify this parameter, you have to proceed step by step of 0,05 at each time. For the compensation of P21630 when the temperature changes, contact the OMARLIFT support.



ALWAYS CHANGE ONLY ONE PARAMETER AT A TIME.

11.4.3 Re-leveling

- **Setting the re-leveling**

Test the re-leveling at empty conditions, moving the elevator downwards/upwards in respect to the floor, by press the Emergency button for descent direction, and with the hand pump for upwards direction.

If the restoration of the position of the plan is not satisfactory, adjust the parameter P21515 (2.2.8) until you get the desired stop.

You can change the re-leveling at full load using the parameter P21579 (PX9).

You can change the re-leveling at maximum oil temperature, using the parameter P21573 (PX3).

11.4.4 Emergency

- **Parameters for EMERGENCY operation (input X121.7)**

The inverter SIEMENS allows the dedicated management of a state of emergency power supply by installing a UPS AC 400 V (not supplied), whose installation and dimensioning are the responsibility of the customer.

The operation via UPS unit guarantees a limited number of runs both uphill and downhill, dependent on the dimensioning of the same.

The Emergency function is controlled via input X121.7

You can adjust the speed of movement in the direction up or down through the parameters:

P21546 (2.6.1)	Emergency Speed Upward
P21547 (2.6.2)	Emergency Speed Downward

11.4.5 General Considerations

- **General rules for proper adjustment**

- If the high-speed cabin speed is not constant, check the motor data. In particular, the motor data must match the "real" situation. Also verify that the mechanical devices (cabin / piston) have uniform friction during movement.
- To have a stop with constant precision is necessary that the cabin tread a small space (5 ÷ 10cm) in low constant speed (adjust the parameters as indicated in the table).
- Set the low speed to the desired value, bearing in mind that a very low value increases the time of arrival at the floor.
- Do not adjust the switching frequency at too high values, otherwise the engine and the inverter will overheat unnecessarily.

11.5 RUPTURE VALVE TEST

The rupture valve test, verify the functionality of the safety device, that normally is installed on the cylinder or in it neighborhood. This safety device, should stop the elevator in case of speed exceeding for 30% the rated speed of the elevator.

SIEMENS inverter supplied by OMARLIFT, allows to test the functionality by a specific function, that you can use only to perform the test and verify the rupture valve intervention.

If you need to perform a rupture valve test, see the following steps:

- Make sure that the system is on safety conditions (travel shaft free, functionality of all safety and control devices of elevator, etc..)
- Load the elevator to the nominal weight, and climb to the top floor
- Activate the test function, by setting the inverter parameter *P21523 Parachute function (P2.13.1)* to the value 1

- Perform a downward travel from the top floor to the ground floor
- The elevator's cabin will increase the speed, exceeding the rated value
- When the speed exceeds of 30% the rated speed, the safety valve starts to trip reducing the oil flow and stop the cabin.

 **If after some meters at speed higher than the nominal value, the safety valve doesn't trip, manually stop the elevator, by pressing the command STOP, without waiting the intervention of any other safety device.**

 The *Parachute function*, deactivate itself after each test (0). For a new test, after the valve regulation, re-activate the function.

 For rupture valve adjusting, refer to the relative manufacturer's instruction manual.

11.6 POWER LIMITATION

Inverters PM240-2 can be supplied with an optional functionality for power limitation, which reduces power value absorbed from the network and consent a corresponding limitation of the contractual power jointly to a main contactors dimensioning limitation.

In that case, the inverter's software introduces a progressive speed regulation approaching to the power limit threshold set by the User. The limitation operates only during up travels and, in case of deactivation of the power control, the system operates exactly as a normal software for inverters, without power limitation functionality.

When power limitation is activated, the speed modulation of the elevator, operates in active way at each cycle, depending from the power absorption level instantaneously calculated (thus depending from the load, friction losses and rated speed), starting from the acceleration ramp, by introducing appropriate speed reduction curves in respect to the theoretic value. Similarly, during the elevator's deceleration phase down to low-speed value, the software adopts appropriate re-entry curves to the speed provided in absence of limitation.

Some additional specific parameters are available to manage the power limitation optional functionality, as below described in the table:

ID	Description	REMARKS
POWER LIMITATION		
r23560	Power reference value [kW]	
r23567	Actual INPUT power value [kW]	Instantaneous value during functioning
P23703	Power limitation function activation request [1=ON; 0=OFF]	Activates power evaluation, requirements check and set limits check
P23710	% INPUT max Power [50-100%]	Referred to values of a Drive without power limitation
r23754	Indicator power limitation function activated [1=ON; 0=OFF]	It indicates if all conditions for the activation are satisfied and if the power limitation is truly effective.

 **ATTENTION:** The modification of global parameters for UP direction travels, as described to the paragraph 11.4, has to be performed mandatorily with **power limitation function deactivated** by setting previously P23703=0, otherwise the set values could be not adequate under all functioning conditions.

When the power limitation function is available on your system, you can activate it by setting P23703=1; its intensity can be modulated by setting the parameter P23710: higher values indicates a less invasive limitation and a speed much close to the rated value of your installation, for a wide range of load and functioning

conditions. Contrary, a hard power limitation of power absorbed from the network, gives big speed limitations even for medium-low load conditions.

The input power limitation value, as maximum can be pushed down till to 50% of the value that a system similar to your installation would have without power limitation, working in standard-mode at the same conditions.

 Under specific working conditions, typically for very hard input power limitation, low temperatures and high oil viscosity, at full load conditions, there can be moderate exceedances of the maximum power level absorbed from the network, in respect to the expected value.

 Power limitation function doesn't generate any specific alarm or fault signal, shown on the inverter display

In the table below a list of possible not satisfactory behavior and some possible solutions:

Malfunction	Cause	Solution
Power limitation function seems not activate itself even increasing the load.	- Activation request missing - Conditions for operation not fulfilled	- Set P23703=1 - r23754=1 → if the limitation doesn't intervene, it means that the absorbed power limit hasn't reached - r23754=0 → check specific point
r23754=0 Power limitation function not activated	- The power limitation option was not bought for your system - Activation request missing - Limitation values out of range	- Contact OMARLIFT to buy the specific software - Set P23703=1 - Set max power value in INPUT (P23710) between 50-100% - Contact OMARLIFT Service
Power level absorbed is too much high / the power meter trips-off after some seconds during an travel in UP direction.	- The max power value in INPUT is too much high - The motor is too much overloaded	- Reduce the max power limit in INPUT (P23710, min 50%) - If the max power limit in INPUT is already set to the minimum permissible value (P23710=50%), it means that working conditions (dynamic pressure, oil temperature and viscosity) doesn't allow to respect the constraint of the power meter → reduce the load, use oil with lower viscosity, increase the sizing of the power meter (supply)
The speed with increasing the load become too much low	Power limitation is too much invasive	- Increase INPUT power limit (P23710)  With power limitation activated (r23754=1), never modify the global High Speed in UP direction parameter P21506!
The low speed duration become too much long with increasing the load.	Because the physical position of the sensor for slowing-down is fixed in respect to the next floor, a stretching of the low speed travel length by reducing the max permitted power and consequently the speed, is absolutely a normal behaviour. Power limitation is too much invasive	- Increase INPUT power limit (P23710)  With power limitation activated (r23754=1) never modify the global ramp parameter P21508, otherwise it would be not adequate when the limitation doesn't intervene.

12 ACTIVE FAULTS & ALERT

SIEMENS inverters emit warnings type A (ALERT) or F (FAULT).

Errors are identified by the letter of the type (A/F), followed by a digit code that allows you to trace the causes that have generated and their possible solutions.

The errors are displayed: on the BOP operator panel.

A description of the error, the possible causes and solutions, is available in the following chapter.

The list of all possible errors and their solutions can be found in the standard manual SIEMENS V20, to which you could refer.

To **reset an error**, select the error and follow the following procedure through the BOP (see below).

In general, facing to a non-compliance detected, the inverter behaves as follows:

- Errors Type A (Alarm) are minor errors that, in principle, have no influence on the behavior of the inverter / LIFT.



The error A remains active, until is existing the cause that has determined it, then it reset.

- Errors TYPE F (Fault) are serious flaws that lead to the immediate arrest of the inverter and the lift that is placed safely via simultaneous closing of the valve.



The error F remains active even after the disappearance of the cause that determines it and has to be resetted manually.

Note: If there are multiple active faults and alarms, the BOP first displays all faults one after another. Once all faults are displayed, it displays all alarms in succession and the display continues to repeat.

12.1 RESET OF THE ANOMALIES

Acknowledging / clearing faults (FAULT)

- To navigate through the current list of faults, press ▲ or ▼ on the BOP panel.
- To clear / acknowledge the fault, press FN.

After you acknowledge or ignore the fault, the screen returns to the previous display. The fault icon remains active until the fault is cleared / acknowledged.

Note: the anomalies screen displays again if the fault has not been cleared and if any button is not pressed

12.2 ANOMALIES CODES LIST



WARNING: To understand the causes, after having acquired the error code it may be necessary to read the error index in the parameter r0949

Anomaly	Cause	Solution
F01042 Parameter error during project download	• An error was detected when downloading (upload or update) a project using the commissioning software (e.g. incorrect parameter value)	• Enter the correct value in the specified parameter • Identify the parameter that restricts the limits of the specified parameter (when it dependent by another parameter)
F01043 Fatal error at project download	• A fatal error was detected when downloading (upload or update) a project using the commissioning software	• Carefully note any other messages/signals and remove their cause. • Boot from previously saved files (power off/ power on) • Contact OMARLIFT Support
F01072 Memory card restored from the backup copy	• The Control Unit was switched-off while writing to the memory card. This is why the visible partition became defective • After switching on, the data from the non-visible partition (backup copy) were written to the visible partition	• Check that the firmware and parameterization is up-to-date • Contact OMARLIFT Support if the problem persist

Anomaly	Cause	Solution
A01073 POWER ON required for backup copy on memory card	The parameter assignment on the visible partition of the memory card has changed	Carry out a POWER ON (power off/on) for the Control Unit
A02050 Trace: Start not possible	The TRACE has already been started	Stop the trace and, if necessary, start again
A02051 Trace: recording not possible as a result of know-how protection	TRACE recording is not possible as at least one signal or trigger signal being used is under know-how protection	- If necessary, do not record the signal - Contact OMARLIFT Support
A02060 Trace: Signal to be traced missing	- A signal to be traced was not specified - The specified signals are not valid	- Specify the signal to be traced - Check whether the relevant signal can be traced
F03505 CU: Analog input wire breakage	- The wire-break monitoring for an analog input related to the thermocouple (X131.7/X131.8) has intervened - In case of error or missing connection of the thermocouple the temperature indicated on BOP it will be P21695=33,035	- Check if there are not interruptions in the wiring with the thermocouple - Check the connection and functionality of the SENECA amplifier in the electrical box - Check the intensity of the impressed current, if the received signal is too small - A current than then lower4 mA is not displayed in r752 [0], but r752 [0] = 4 mA is output
A03506 24 V power supply missing	The 24 V power supply for the digital outputs (X124) is missing	Check the terminals for the power supply voltage (X124, L1+, M)
A05000 A05001 A05002 A05003 A05004 A05006 A06260 Over temperature	Over temperature in different area of the inverter	- Check the surrounding temperature - Check the correct fan function - Automatic silencing when the temperature is under the limit
F06210 Infeed: Summation current too high	The smoothed total of the phase currents (i1 + i2 + i3) is greater than 4 % of the maximum power unit current (r0209) The DC link has a ground fault that results in a high summation current. The DC component in the line currents can damage/destroy the power unit, line reactor or line filter!	- Check the DC link for a low-ohmic or high-ohmic ground fault and if present, remove - Contact OMARLIFT Support - Replace the power unit if necessary
F06300 Infeed: Line voltage too high at power on	The RMS line supply voltage Vrms was so high when powering up that controlled operation is not possible without exceeding the permissible maximum voltage in the DC link	- Check the line supply voltage - Check the line supply voltage and compare with the actual line supply voltage (p0210) - Contact OMARLIFT Support
F06310 Supply voltage (p0210) incorrectly parameterized	- For AC/AC drive units, the measured DC voltage lies outside the tolerance range after pre-charging has been completed - For the tolerance range: $1.16 \cdot p0210 < r0070 < 1.6 \cdot p0210$ - The fault can only be acknowledged when the drive is powered down - See also: p0210 (Drive unit line supply voltage)	- Check the parameterized supply voltage and if required change (p0210). - Check the line supply voltage.

Anomaly	Cause	Solution
A06350 A06351 The line frequency f_{line} is higher than the parameterized warning threshold ($f_{rete} > p0211 * p0284$) or lower ($f_{rete} < p0211 * p0285$)	The alarm can be output: - During the power-on phase of the infeed unit - Synchronization of the infeed to the line supply is interrupted and is restarted - While the infeed is operational - The infeed remains in the operating (run) state and alarm is output. This signifies a critical operational fault	- Check the parameterized line frequency and if required change (p0211) - Check the alarm threshold (p0284 or p0285) - Check the line supply - Check the line supply quality
F07860 Drive: Power unit modified	The code number of the actual power unit (PM) does not match the saved number on CU	- If PM or CU+CFC have been changed, connect the original configuration of components - If the motor was changed, contact OMARLIFT Service.
F07860 External fault	External measured value / signal state outside the permissible range. in particular to refer to the cavitation control	- Modify the control setting by P22450 and P22451 parameters (Contact OMARLIFT support) - Permanently disable the cavitation control: P22453=0
F13100 Know-how protection: Copy protection error	- The know-how protection with copy protection for the memory card is active - An error has occurred when checking the memory card (wrong memory card or the memory card is inserted in another Control Unit)	- For fault value = 0: Insert the correct memory card and carry out POWER ON - Contact the responsible OEM (OMARLIFT)
F30001 Power unit: Overcurrent	The power unit has detected an overcurrent condition - Closed-loop control is incorrectly parameterized - Motor has a short-circuit or fault to ground (frame) - Infeed: High discharge and post-charging currents for voltage dip - Power cables are not correctly connected. - The power cables exceed the maximum permissible length. - Power unit defective. - Line phase interrupted.	- Check the motor data - if required, carry out commissioning - Check the motor circuit configuration (star/delta) - U/f operation: Increase up ramp - U/f operation: Check the assignment of the rated currents of the motor and Motor Module - Infeed: Check the line supply quality - Infeed: Reduce the motor load - Infeed: Check the correct connection of the line filter and the line commutating reactor - Check the power cable connections - Check the power cables for short-circuit or ground fault - Check the length of the power cables - Replace power unit - Check the line supply phases
F30002 Power unit: DC link voltage overvoltage	The power unit has detected overvoltage in the DC link - Motor regenerates too much energy. - Device connection voltage too high	- Increase the ramp-down time - Use a brake resistor maybe it is disconnect or connect in a wrong way - Increase the current limit of the infeed or use a larger module (for the Active Line Module) - Check the device supply voltage - Check the line supply phases
F30003 Power unit: DC link voltage undervoltage	The power unit has detected an undervoltage condition in the DC link Line supply failure	- Check the line supply voltage - Check the line supply infeed and observe the fault messages relating to it (if there are any)

	• Line supply voltage below the permissible value • Line supply infeed failed or interrupted • Line phase interrupted	• Check the line supply phases. • Check the line supply voltage setting (p0210)
--	---	--

Anomaly	Cause	Solution
F30015 Power unit: Phase failure motor cable	A phase failure in the motor feeder cable was detected • The motor is correctly connected, however the closed-speed control is instable and therefore an oscillating torque is generated	• Check the motor feeder cables • Check the speed controller settings
A30016 Power unit: Load supply switched out	• The DC link voltage is too low	• Switch on load supply • Check the line supply if necessary.

13 CHECKS AND MAINTENANCE

To ensure long service life and optimum operation of the inverter, carry out the following checks at regular intervals.

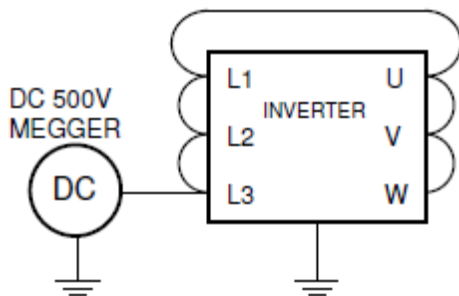


Operate on the inverter only after disconnecting the power and making sure the keypad is off.

1. Remove the dust collected on the cooling fins and on the control circuit board, if possible by blowing with compressed air or using a vacuum cleaner.
2. Make sure no screws are loose in the power or control terminal blocks.
3. Make sure inverter operation is “normal” and that there are no signs of anomalous overheating.

13.1 MEGGER TEST

When doing insulation tests using a Megger tester on the input/output cables or on the motor, remove all the connections from all the inverter terminals and perform the test only on the power circuit, according to the diagram opposite. Do not test the control circuits.



OMARLIFT s.r.l.
Via F.lli Kennedy, 22/D
24060 Bagnatica (BG) – ITALY
Phone +39 035 689611
Fax +39 035 689671
Email: info@omarlift.eu
Web: <http://www.omarlift.eu>
