Corab® Encor

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Operating and assembly manual

Translation

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pt. II of III

Construction
Assembly
Starting and stopping the device
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Inspections and cleaning
Display and disassembly

READ BEFORE ASSEMBLY
KEEP FOR THE WHOLE
PERIOD OF USE OF THE DEVICE

Corab Encor Inverter

17k/20k/30k

en.corab.pl

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1 Construction

1.1 Personnel and safety

Preparation of components of the device for assembly and verification of their condition must be carried out only by the qualified personnel.
General safety rules have been described in Chapter 2 of part I of this operating manual.

1.1.1 Results of non-compliance

Non-compliance with the requirements regarding personnel, safety rules and OH&S regulations may lead to:
- danger for human health and/or life;
- risk to the condition and lifetime of the device;
- risk to the safe use of the device.

1.2 Inverter - construction

1.2.1 Control panel

The control panel is located on the front wall of the inverter. The control panel is composed of elements described in Table 1 and marked in Figure 1:

Table 1 Elements of the control panel.

No.	Name	Description of the function / operation
1.	LCD display	Displays information.
2.	Status diode - operation status	Blue diode. Steady light means that the inverter operates in normal mode. Blinking light means that the inverter is in standby mode.
3.	Status diode - fault	Red diode. Steady light means that the inverter system detected a fault and the device is in failure mode.
4.	Function key - up / return	The key used to: ○ move the cursor up on the LED display – short press; ○ increase the displayed value – short press; ○ go back to the previous menu – longer press ; ○ confirm input settings of functions – longer press .
5.	Function key - down / confirm	The key used to: ○ move the cursor down on the LED display – short press; ○ decrease the displayed value – short press; ○ go to the next menu – longer press ; ○ confirm the input value – longer press .

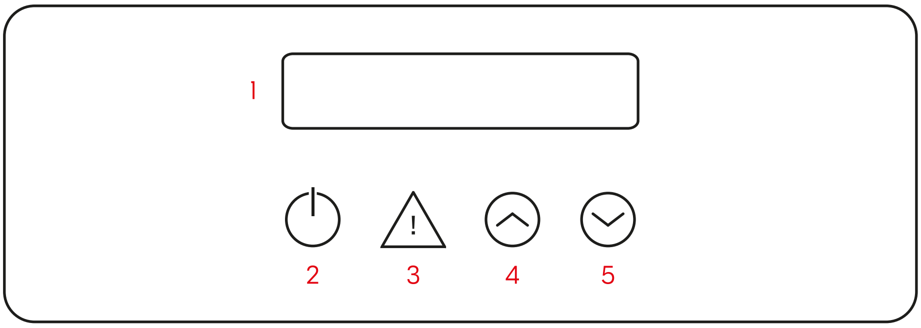


Fig. 1 The control screen, where 1 - LED display, 2 - status diode - operation status, 3 - status diode - fault, 4 - function key — up / return, 5 - function key — down / confirm.

1.2.2 Anti-islanding

The inverter is equipped with a protective device that prevents generation of electrical energy of alternating current in case of power breakdown. Anti-islanding is required under relevant provisions of law. It protects people during renovations and modernization of the electrical grid.

1.2.3 Differential current protection

The inverter is equipped with a protection device that secures the customer, user and qualified personnel against electrocution. In case of a breakdown of the device, connected PV modules and/or wires, the device protects the listed elements from fire. The protection device has two response thresholds: at voltage value of 30 mA and 300 mA for slowly raising current.

1.2.4 Earthing (PE connection)

The inverter has a built-in terminal for PE connection. The inverter must be monitored by a residual current device (RCD) with a nominal current of Ifn ≤ 240 mA. The protective device must shut down the inverter immediately after a failure is detected. The insulation resistance and power of the PV module result in generation of differential current. The value of the RCD nominal current must be minimum 240 mA in order to prevent an unintended start of the inverter.

1.2.5 DC surge arrester

The inverter is equipped with a DC surge arrester. The DC surge arrester protects the inverter from damage caused by lightning, surges in the electrical grid. The protection is only available with a proper separation distance from PV modules and buildings equipped with an exterior lightning protection system (LPS).

NOTE
Use an external surge arrester in order to fully protect the circuits of direct current.

An external surge arrester can be used, for instance, at the end of the direct current circuit or in a separated switching station between the inverter and PV modules.

NOTE
Use an additional type 3 surge arrester, if the voltage protection level (VP) of the surge arrester is higher than 1100 V.

1.2.6 Communication interface

The built-in interface allows displaying data on a computer or a different monitoring device. For this purpose, the Corab Encor 17-30k inverter has been equipped with:

- external Wi-Fi/LAN logger – a communication module that gathers information from the module, such as data on its status, efficiency, etc. Connection of Pocket Wi-Fi enables visualization of data in the Corab One application within the scope of own consumption, import and export of electricity to and from the electrical grid;
- radio frequency interface (RF) – it switches or controls the load for a specific period. Connecting an external intelligent connector allows controlling or limiting the output power of the inverter;
- RS-485 interface – the communication interface communicates via MODBUS RTU. The list of MODBUS RTU logs can be provided by the Manufacturer of the inverter;

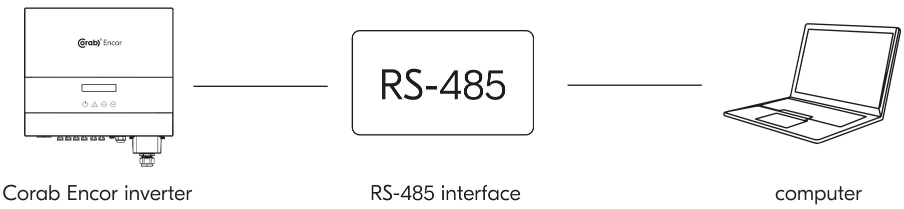


Fig. 2 Communication between a computer and the inverter through RS-485.

- 3-phase Power Meter (option) – an element included in the set that allows for an extended data view in the Corab One application with added information within the scope of own consumption, import and export of electricity;

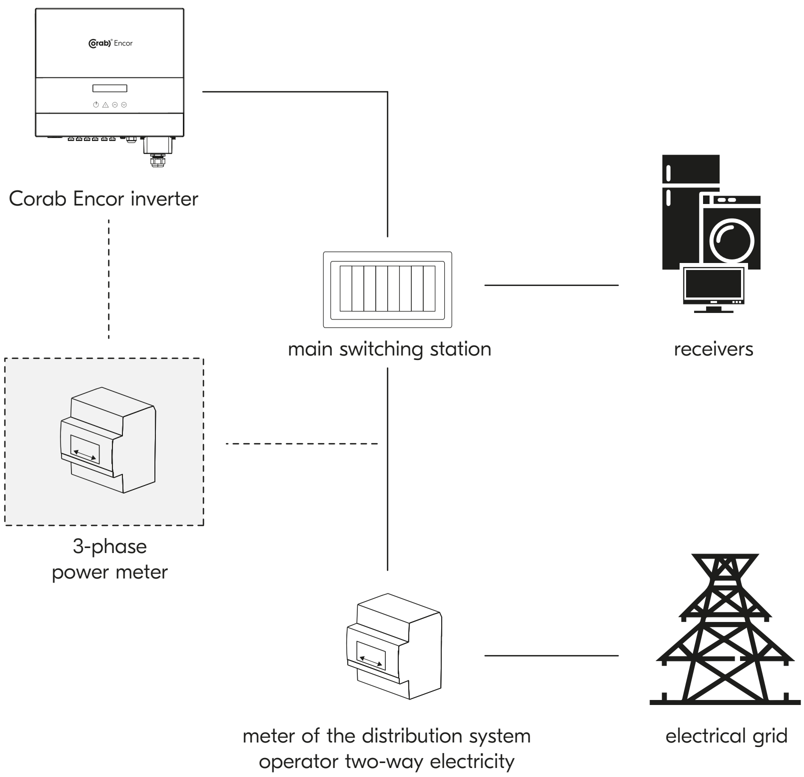
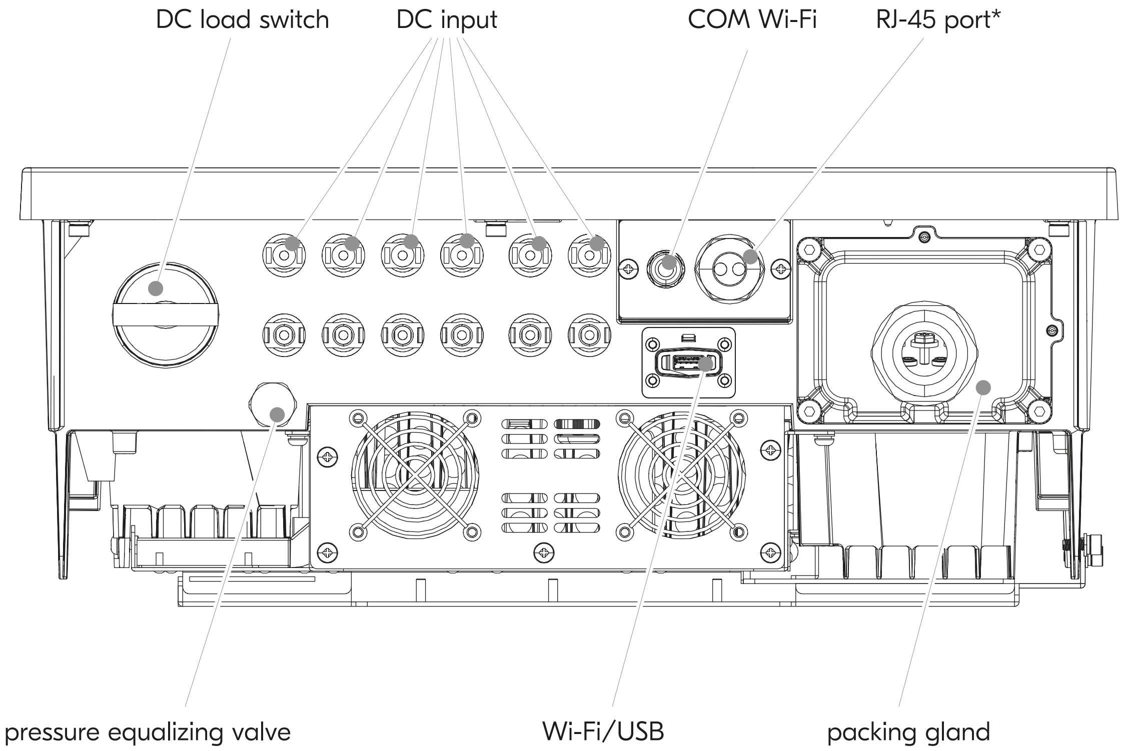


Fig. 3 Diagram for data transmission with the use of a meter.

- DRMs feature – allows operation of several modes of responses on demand. The response is sent with a control signal;
- USB port – allows software updates.

1.2.7 Arrangement of terminals and clamps

The clamps are located in the bottom wall of the device. The arrangement of the clamps has been presented in Fig. 4.



* The connector includes the interface of the electric energy meter, RS-485, DRMs.

Fig. 4 Arrangement of keys and terminals on the device.

1.3 Device specification

1.3.1 General details

Table 2 List of general details of all models of the device.

Parameter/model of inverter	CE 17k	CE 20k	CE 30k
Dimensions XxYxZ [mm] (Fig. 5)	417 x 482 x 181		
Packaging size [mm]	590 x 530 x 315		
Net weight [kg]	27,5		28,0
Gross weight [kg]	31,5		32,0
Work temperature range [°C]	from -30 to +60 (decreased efficiency above 45°C, Fig. 6)		
Storage temperature [°C]	from -30 to +60		
Relative humidity [%]	0-100, condensation		
Protection level	IP66 (for outdoor use)		
Insulation type	transformer-free		
Protection class	class I		
DC/AC surge arrester	II / II		
Power consumption at night [W]	< 3		
Noise emission [dB]	< 55		< 58
Cooling	fan		
Communication	RS-485, DRMs, USB, Wi-Fi, LAN (option), 4G (option)		
Installation method	wall mounting		
Inverter topology	bare		
Max working height above sea level [m]	3 000		
Ext. / Int. environment pollution level	II		

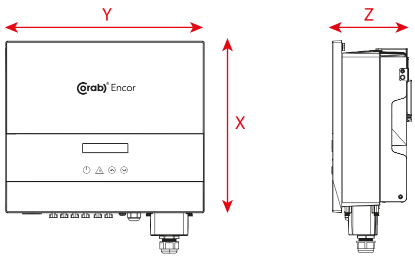


Fig.5 Marking of device dimension.

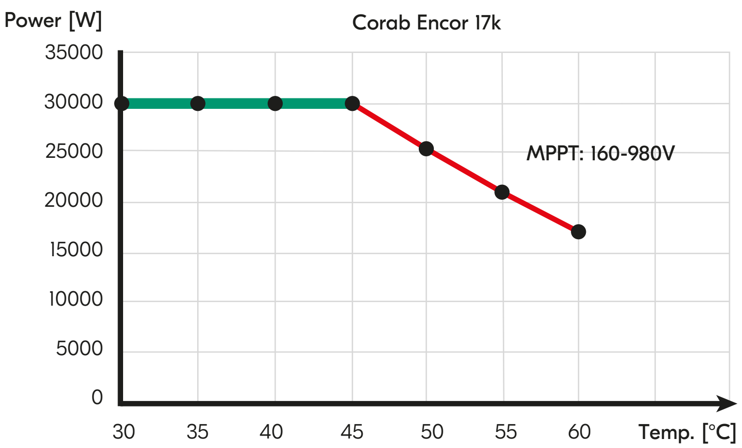


Fig. 6 Chart depicting the change in working parameters for Corab Encor 17k depending on temperature.

1.3.2 DC input

Table 3 DC input parameters for all models of the device.

Parameter/model of inverter	CE 17k	CE 20k	CE 30k
Max input power [Wp]	25 500	30 000	45 000
Max input voltage V]		1 100	
Nominal DC voltage [V]		650	
Range of MPPT voltage [V]		160-980	
Range of MPPT voltage (at full load) [V]	400-850		500-850
Max MPPT input current [A]	32/32		32/32/32
Max MPPT short-circuit current [A]	20 x 2/20 x 2		20 x 2/20 x 2/20 x 2
Initial voltage [V]		200	
Number of MPPT (MPPT strings)	2/2		3/2
DC load switch		standard	

1.3.3 AC output

Table 4 AC output parameters for all models of the device.

Parameter/model of inverter	CE 17k	CE 20k	CE 30k
Nominal AC output power [W]	17 000	20 000	30 000
Max apparent output power [VA]	18 700	22 000	30 000
ZNominal AC voltage [V]		220/380, 230/400, 3/N/PE	
Nominal AC frequency of AC network [Hz]		50/60	
Nominal AC output current [A]	25,8	30,3	45,5
Max AC output current [A]	27,5	33,6	45,5
Starting current [A]		27	
Total harmonic distortion, THD [%]		<3	
Power factor adjustment range		0,8 leading – 0.8 lagging	
Number of phases		3	

1.3.4 Protective equipment and effectiveness

Table 5 Parameters of protective equipment and effectiveness for all models of the device.

Parameter/model of inverter	CE 17k	CE 20k	CE 30k
European efficiency [%]	97,8		98,0
Maximum efficiency [%]	98,3		98,5
Protection against insufficier / excessive voltage		YES	
DC insulation monitoring		YES	
Protection against polarity inversion		YES	
AC network monitoring		YES	
DC impulse monitoring		YES	
Backward current monitoring		YES	
Leakage current monitoring		YES	
Anti-islanding		YES	
Backward current supervision		YES	
Protection against excessive temperature		YES	

1.4 Operating modes

Once turned on, the device can operate in one of the three operating modes:

- Standby mode – the inverter is waiting for the information that the input voltage from PV modules falls within the range from 160V (minimum voltage required for the startup) to 200V (the minimum work voltage). The diode is blinking with blue light;
- Verification mode – the inverter automatically verifies the voltage at DC input from PV modules. After reading DC voltage higher than 200V, the inverter has sufficient power to switch to normal operation mode. The diode is blinking with blue light;
- Standard operation – the inverter is working; the control panel displays the current output power. The diode is lit with steady blue light;
- Failure mode – the system of the inverter detected an error. The diode is lit with solid red light. The inverter is not working.

2 Assembly

2.1 Personnel and safety

Works connected with the assembly of the device and additional elements can be carried out only by the qualified personnel.
General safety rules have been described in Chapter 2 of part I of this operation manual

2.1.1 Results of non-compliance

Non-compliance with the requirements regarding personnel, safety rules and OH&S regulations may lead to:
- danger for human health and/or life;
- risk to the condition and lifetime of the device;
- risk to the safe use of the device.

2.2 Procedures and tests

DANGER
It is prohibited to turn on the device until it is verified that the whole system meets the requirements provided for in directives: 2014/35/EU, 2014/30/EU.

Before starting the work on the device:
- read and understand the contents of this operating manual;
- check the received components for damaged coating;
- check whether the components did not lose their shape due to bends, twisting;
- check whether all the assembly elements have been supplied;
- prepare all the additional elements necessary for the complete assembly of the device;
- check whether the prepared additional elements are free from defects;
- prepare all the machines and tools necessary for the assembly;
- check whether the prepared machines and tools are free from defects;
- check whether the tools for electrical works are insulated and the insulation is undamaged;
- disconnect AC and DC power from the inverter;
- make sure that there is no voltage in the circuit;
- prepare all the necessary personal protective equipment for every member of the qualified personnel.

DANGER
Do not carry out works when the device and/or any of its elements is live (with the power turned on).

WARNING
Check the voltage between DC U+ and DC U- terminals before starting works inside the device. The voltage measured with a universal meter with a minimum impedance of 1 Ω must be maximum 35 VDC. High voltage in the circuits may lead to a hazardous situation.

WARNING
If assembled with improperly selected machines and tools, the device might get damaged or it might malfunction during further exploitation.

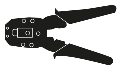
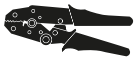
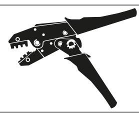
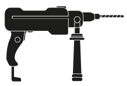
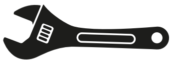
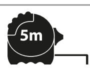
HINT
The place of assembly must allow for freedom of movement, without collision with buildings, permanent elements of the terrain (poles, buildings, fences).

SAFETY INSTRUCTION
The customer is responsible for verifying the qualifications of the qualified personnel.

2.2.1 Tools used for assembly

The tools and accessories necessary for the assembly have been listed in Table 6.

Table 6 List of tools and accessories needed for the assembly of the device.

Tool	Picture
Crimper for RJ plugs	
Crimper for ring terminals	
Crimper for MC4 connectors	
Wire stripping pliers	
Driller with ø10 drill	
Torque screwdriver	
5.0 mm slot screwdriver	
Phillips screwdriver	
Monkey wrench	
Socket wrench, size 10	
H X* Allen key	
Hammer	
Level	
Marker pen	
Tape measure	
Multimeter	

* X – the variable specifying the size of the Allen key

2.3 Additional elements

The Corab Encor 17-30k inverter is a device intended for connection to a power grid and PV modules. During the installation, the wires and their layout must comply with applicable regulations of law.
The parameters of individual additional elements have been specified in part III of this operating mannual, next to the action that requires a particular element.

DANGER
Do not start the device that, once connected, does not meet the requirements of the applicable regulations and standards.

2.4 Installation

All works connected with the installation of the device must be carried out by the qualified personnel. The installation method and parameters of required additional elements have been specified in part III of this operating mannual - List of elements and assembly.

DANGER
The installation must not be carried out by a person without a valid certificate qualifying for the performed task.

During the installation, follow the connection method presented in the diagram below in Fig. 7.

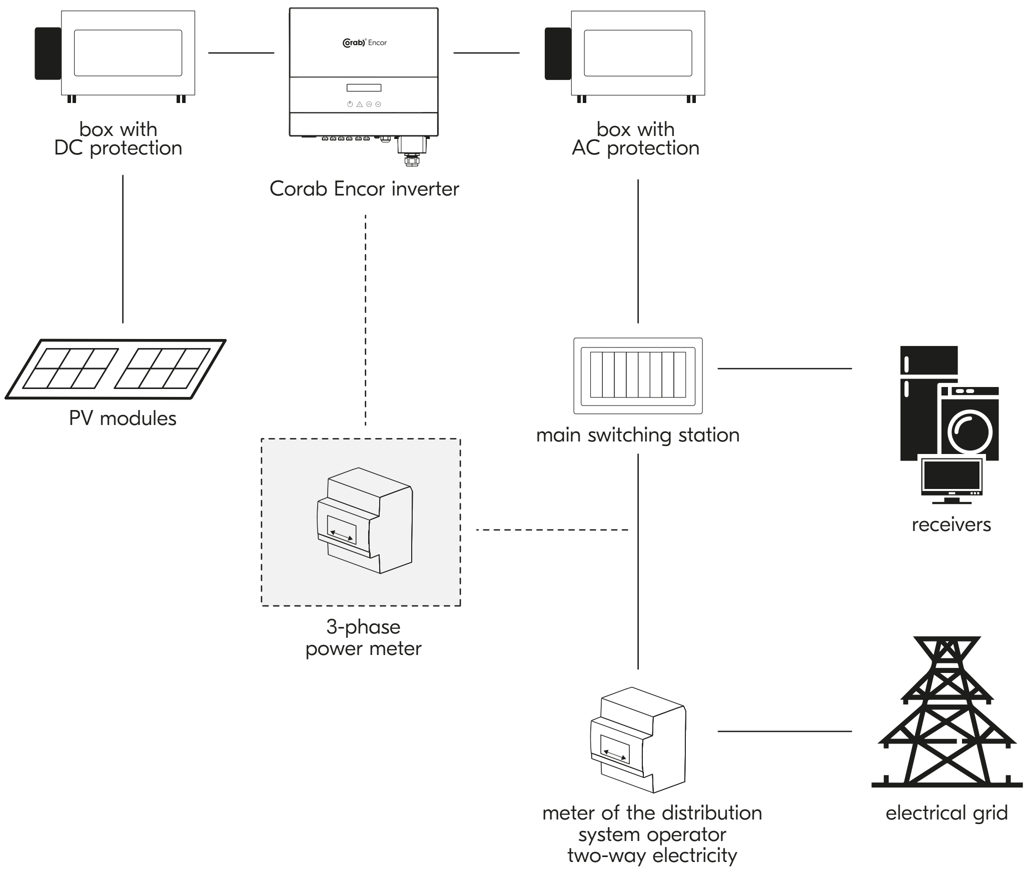


Fig. 7 Installation diagram.

DANGER
Connecting the receivers directly to the inverter is forbidden.

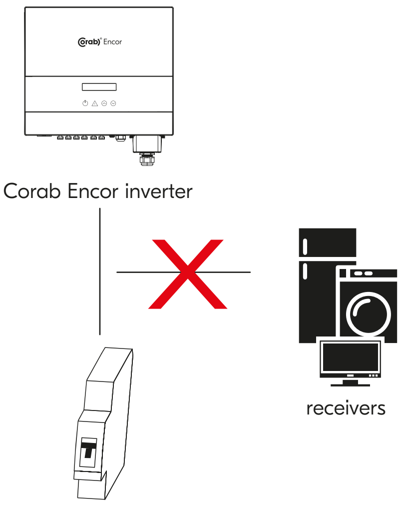
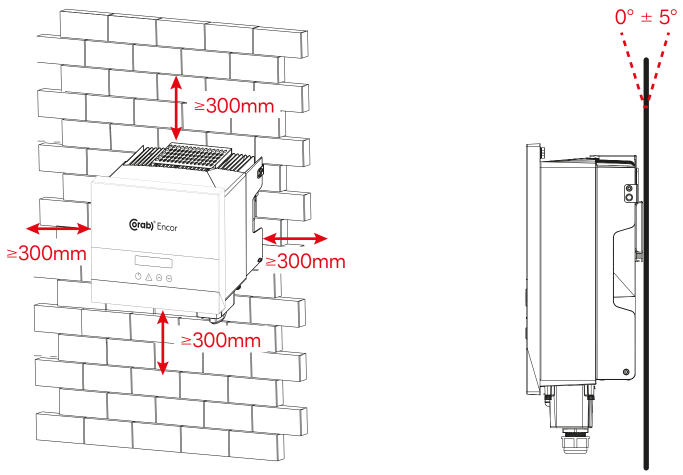


Fig 8. The prohibited installation method.

2.4.1 Place of installation

The Corab Encor 17-30k inverter can be mounted only in a placet:
- with a ± 5° inclination angle to the vertical;
- that provides ventilation;
- that does not expose the device to direct sunlight;
- that prevents accumulation of snow;
- that is not in proximity of a TV antenna and/or television cables.

DANGER
When PV modules are directly exposed to sunlight, high DC voltage is generated in wires between the PV modules and the inverter. Touching the wires in such a situation may lead to fatal electrocution.



1. A minimum distance of 300 mm on each side must be preserved between the inverter and other elements and walls.
2. The inverter must not be installed at an angle i.e., it must not be slanted but leveled.
3. The wall on which the inverter will be mounted must be at maximum ±5° inclination to the vertical.

Fig. 9 Position of the device after installation.

The wall that the device is mounted on must be made of brick or concrete. The manufacturer allows for other surfaces used for installation only when they are as sturdy and stable as a brick or concrete wall.

WARNING
Assembly elements are not adjusted for installation on walls other than brick or concrete walls. When using a different type of wall, the assembly elements must be properly adjusted.

NOTE
Use additional reinforcement when mounting on a wall that is not sturdy enough (compared to a brick or concrete wall).

SAFETY INSTRUCTION
Secure the place of installation to protect the device from mechanical damage and alterations by unauthorized persons.

6.5 Commissioning

Before commissioning, it is necessary to carry out the following activities and tests. For this purpose, check whether:

- the installation has voltage protection;
- the used additional elements are accompanied with proper documentation;

DANGER
The installation that does not meet the relevant regulations, directive 2014/35/EU and directive 2014/30/EU may lead to a dangerous situation.

- the length of the wires ensures proper functioning of the device and does not cause a dangerous situation (wires are not too long or too short);
- wires of the same potential are connected into one wire harness;

NOTE
Creating loops in the circuit is prohibited.

- the DC input voltage is lower than or equal to the maximum DC voltage (DC ≤ max. DC).

SAFETY INSTRUCTION
Before commissioning, make sure that all the required activities at individual stages of installation were carried out.

The manual forms an integral part of the device. It must be handed over upon commissioning.

3 Starting and stopping the device

3.1 Personnel and safety

The startup of the device must be carried out only by the qualified personnel.
General safety rules have been described in Chapter 2 of part I of this operation manual.

3.1.1 Results of non-compliance

Non-compliance with the requirements regarding personnel, safety rules and OH&S regulations may lead to:
- danger for human health and/or life;
- risk to the condition and lifetime of the device;
- risk to the safe use of the device.

3.2 Preparations

Before starting the device, verify and make sure that:
- all components of the device and the installation are defect-free;
- the device has been installed correctly on the wall and is stable;
- the configuration used for the device is correct (for that particular place of use);
- all AC and DC circuit breakers are disconnected;
- PV modules have been correctly connected to the device;
- unused DC connectors are secured/sealed;
- the AC wire is correctly connected to the network.

If all the above conditions are met, switch on the external AC and DC overcurrent protection and set the DC switch to ON.

> **!** NOTE
> Turn on the device only after completing the operation settings of the inverter and/or finishing its update.

3.3 Start-up

When the DC switch is set to ON, the inverter will start automatically once the PV modules generate sufficient amount of energy. After turning on, the ⏻ diode will turn blue and the main screen will appear on the control display. If the diode does not light up with blue light, check whether:
- all the connections are correct;
- all the load switches are in the closed position;
- DC load switch is set to ON.

The working status of the inverter has been described in section 1.4 of part II of this operating manual. During the first startup, it is necessary to set the inverter within the range described in Chapter 4 of part II of this operating manual.
See how easy it is to add a new installation with the dedicated application developed for our inverter - Corab One. You will find in on Google Play or App Store. More information: www.en.corab.pl/encor.

Google Play

App Store

3.4 Restart

Before restarting the device, make sure that:

- the surge arrester ensures proper surge protection;
- the DC input voltage is lower than or equal to the maximum DC voltage (DC ≤ max. DC);

WARNING
If the DC voltage is too high, it may lead to permanent damage of the device or losses which are not covered by the warranty.

- none of the wires is damaged;
- the device has been installed in a stable manner and has not moved from its original position;
- the device is not damaged.

DANGER
Turning on a malfunctioning device might lead to a dangerous situation.

3.5 Shutting down

In order to shut down the device:

- set the DC load switch to OFF;
- disconnect the DC and AC power;
- wait 5 minutes.

NOTE
Once the power has been disconnected, the device will discharge the accumulated power within 5 minutes. Do not disconnect the DC and AC connectors or carry out any other tasks until then.

4 Operation

4.1 Personnel and safety

Works connected with operation of the device must be carried out only by the qualified personnel.
The general safety rules have been described in Chapter 2 of part I to this operating manual.

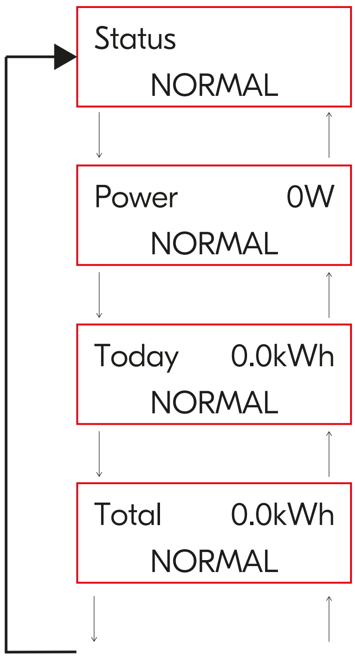
4.1.1 Results of non-compliance

Non-compliance with the requirements regarding personnel, safety rules and OH&S regulations may lead to:

- danger for human health and/or life;
- risk to the condition and lifetime of the device;
- risk to the safe use of the device.

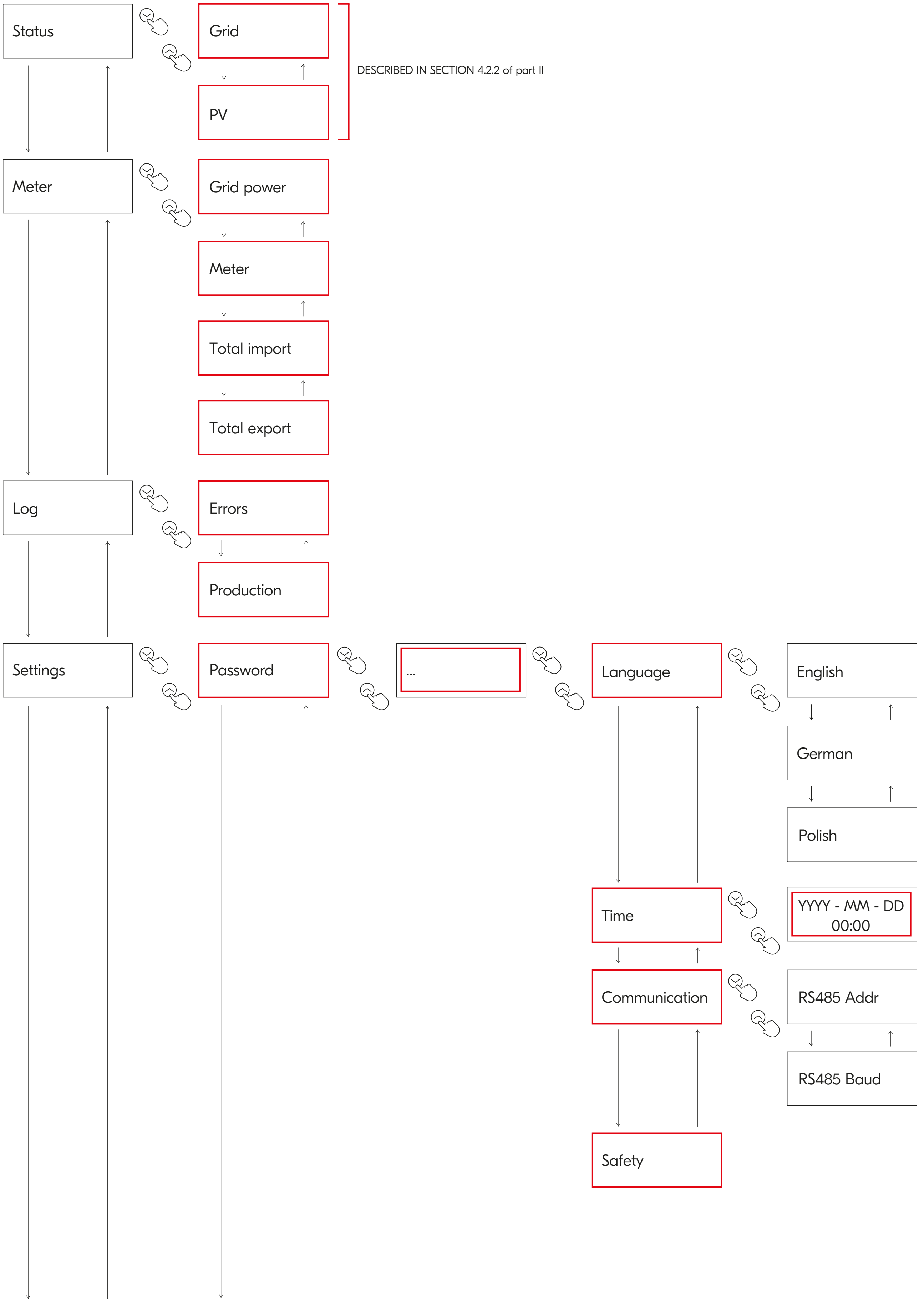
4.2 Functions and operation

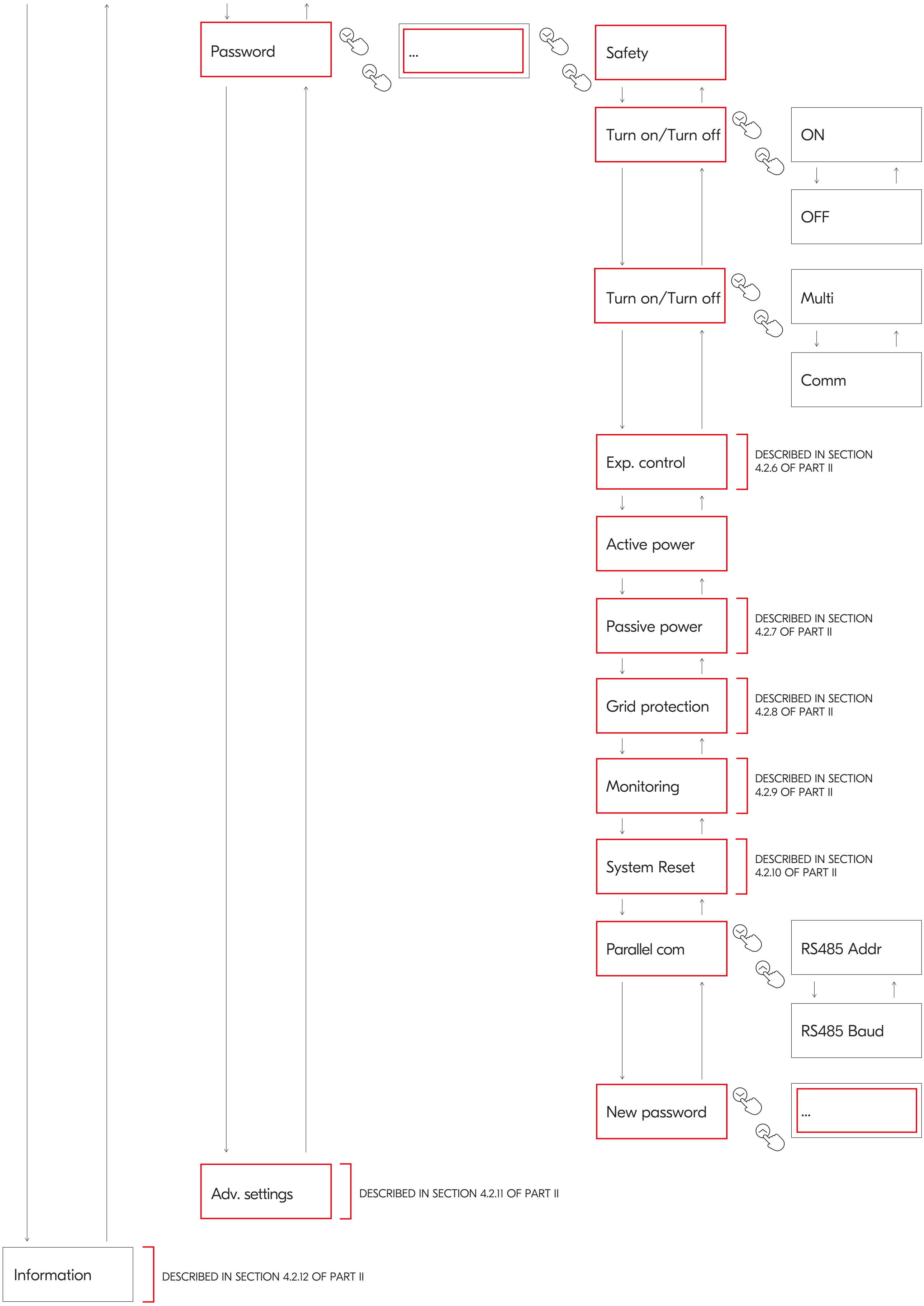
The interface is divided into 3 main levels: level 1, level 2 and level 3. The LED screen displays the current production and the status of the inverter. It is the default menu of the device (level 1) which allows to alternately display functions such as: Status, Power, Today, and Total. To switch between different functions, long press the or function key. You can move around the interface by using the function keys described in section 1.2.1 of part II of this operating manual.



By long pressing the function key you can enter the Menu interface. The Main Menu of the device displays level 1. By long pressing the function key, you can go to level 2 of the selected Menu.
Level 2 allows making changes in the settings of the selected function. Advanced settings are protected with a password. By long pressing the function key, you can move to level 3 of the selected parameter.

4.2.1 Functions diagram




Password
...
Safety
Turn on/Turn off
ON
OFF
Turn on/Turn off
Multi
Comm
Exp. control
DESCRIBED IN SECTION 4.2.6 OF PART II
Active power
Passive power
DESCRIBED IN SECTION 4.2.7 OF PART II
Grid protection
DESCRIBED IN SECTION 4.2.8 OF PART II
Monitoring
DESCRIBED IN SECTION 4.2.9 OF PART II
System Reset
DESCRIBED IN SECTION 4.2.10 OF PART II
Parallel com
RS485 Addr
RS485 Baud
New password
...
Adv. settings
DESCRIBED IN SECTION 4.2.11 OF PART II
Information
DESCRIBED IN SECTION 4.2.12 OF PART II

4.2.2 Function: Status

Function Status is available on level 2. The function includes two parameters (level 3), where:

- Grid – stands for the current electrical and generation data for alternating current;
- PV – stands for current electrical data for PV modules.

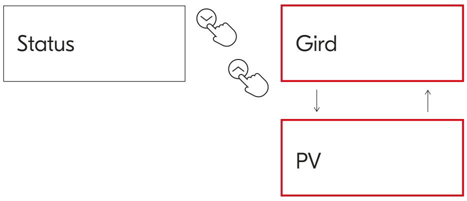


Table 7 Parameters of the Status function.

	Tool	Description
Gird	Ua	Phase 1 voltage
	Ia	Phase 1 current
	Ub	Phase 2 voltage
	Ib	Phase 2 current
	Uc	Phase 3 voltage
	Ic	Phase 3 current
	Freq	Frequency
	PF	Power factor
	Pout	Output active power
	Sout	Output apparent power

	Tool	Description
PV	MPPT1_U	MPPT 1 voltage
	MPPT1_I	MPPT 1 current
	MPPT2_U	MPPT 2 voltage
	MPPT2_I	MPPT 2 current
	MPPT3_U	MPPT 3 voltage
	MPPT3_I	MPPT 3 current
	MPPT4_U	MPPT 4 voltage
	MPPT4_I	MPPT 4 current
	MPPT5_U	MPPT 5 voltage
	MPPT5_I	MPPT 5 current
	MPPT6_U	MPPT 6 voltage
	MPPT6_I	MPPT 6 current

4.2.3 Function: Meter

The function allows receiving information within the scope of values of the meter, import, export and grid power. Parameters can be selected with the and function keys. The available parameters are: Import today, Total import, Export today, Total export.

4.2.4 Functions: Log

The function allows receiving information within the scope of detected errors and production.

4.2.5 Function: settings

The function allows for setting the inverter. There are two access passwords. **Password: 0000** allows for setting the following parameters: language, time, communication and some setting from the safety parameter. **Access password: 2014** allows making changes in other described advanced settings. The function can be selected with and function keys. The selection is confirmed by long pressing the key. Available functions:

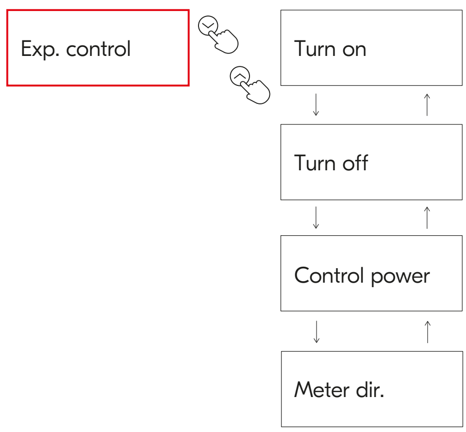
- Language - can be used to set the menu language. Defined languages are: English, German, Polish;
- Time – can be used to change the date and time by changing each digit separately. The values of digits can be changed with function keys. The setting of each digit must be confirmed by long pressing the key;
- Communication – allows setting the RS-485 address and transmission speed. Setting the address allows for external communication with the communication device. Set an individual address for each consecutive device in the series. The speed must always be set to 9600bit/s;
- Safety – used to check the current country code and related voltage and frequency limits;
- Turn on/Turn off – used to turn the inverter on and off. In the “Turn off” mode, the inverter does not transform

DC power to AC;

- PV connection — used to select the connection mode of PV modules: in series or in parallel;
- Exp. control — used to change the limits in the outflow of energy to the grid. More information has been provided in section 4.2.6 of part II this operating manual and . The value can be within the range from 0 to 30;
- Active power — can be used to set the percentage value of generated power;
- Passive power — used to set the parameter for the selection of Turn off, Q mode and PF mode. Details of the parameter have been described in section 4.2.7 of part II this operating manual;
- Grid protection — these settings are changed automatically according to the country code. The user is not authorized to change the parameters of this function. Details of the parameter have been described in section 4.2.8 of part II this operating manual;
- Monitoring — can be used for checking individual options. Details of the parameter have been described in section 4.2.9 of part II this operating manual;
- System reset — used to reset the values of parameters. Details of the parameter have been described in section 4.2.10 of part II this operating manual;
- Parallel com. — this setting allows communicating several devices that are connected with each other in parallel;
- New password - this setting allows changing the local access code to the advanced settings of the inverter.

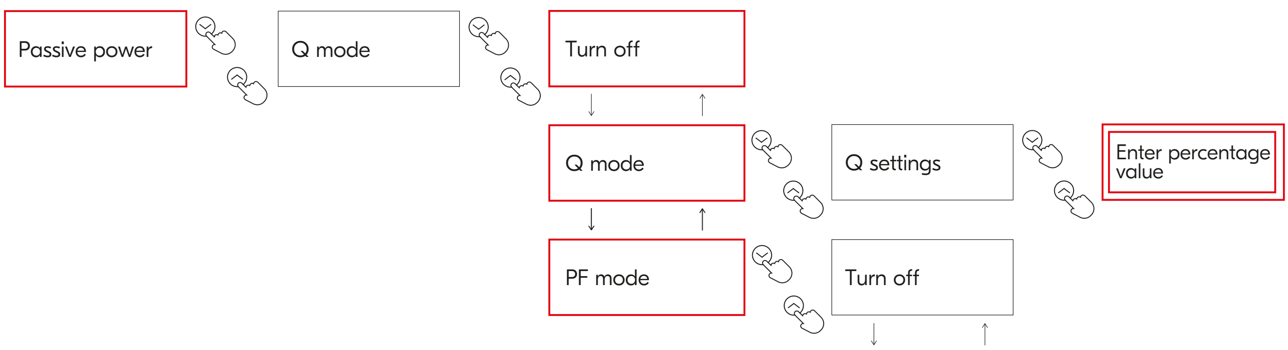
4.2.6 Parameter: Exp. control

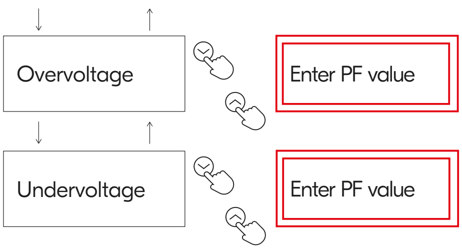
The parameter of the “Settings” function allows turning on or off the parameter and selecting the Control power and Meter direction options.



4.2.7 Parameter: Passive power

The parameter of the “Settings” function allows setting the parameter to off, Q mode or PF mode. In Q mode, it is possible to set the percentage value of the parameter. The PF mode allows setting the parameter to Turn off, Overvoltage, Undervoltage according to grid requirements of a particular country. In the Overvoltage and Undervoltage mode, it is possible to set the PF value.





For the VDE ARN 4105 standard, the cos ɸ=f(P) setting is according to the diagram presented in Figure X;

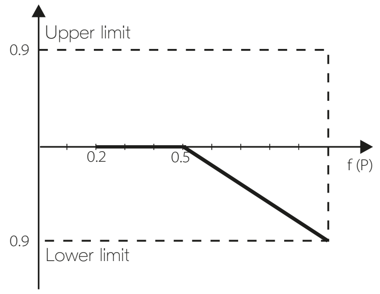


Fig. 10 cos ɸ=f(P) setting for the VDE ARN 4105 standard.

For the E8001 standard, cos ɸ=f(P) is according to the diagram presented in Figure 14. Its default setting is managed by passive power in the inverter.

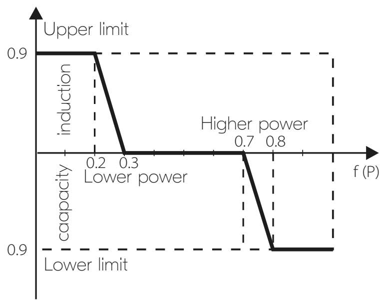


Fig. 11 cos ɸ=f(P) setting for the E8001 standard.

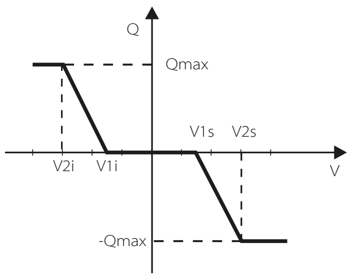


Fig. 12 The standard curve for passive power Q=f(V), where V2s= 1.10Vn, V1s=1.08Vn=QuVlowRate, V2i=0.90Vn, V2i=0.92Vn= QuVlowRate.

4.2.8 Parameter: Grid protection

The parameter includes settings within ranges specified in Table 8.

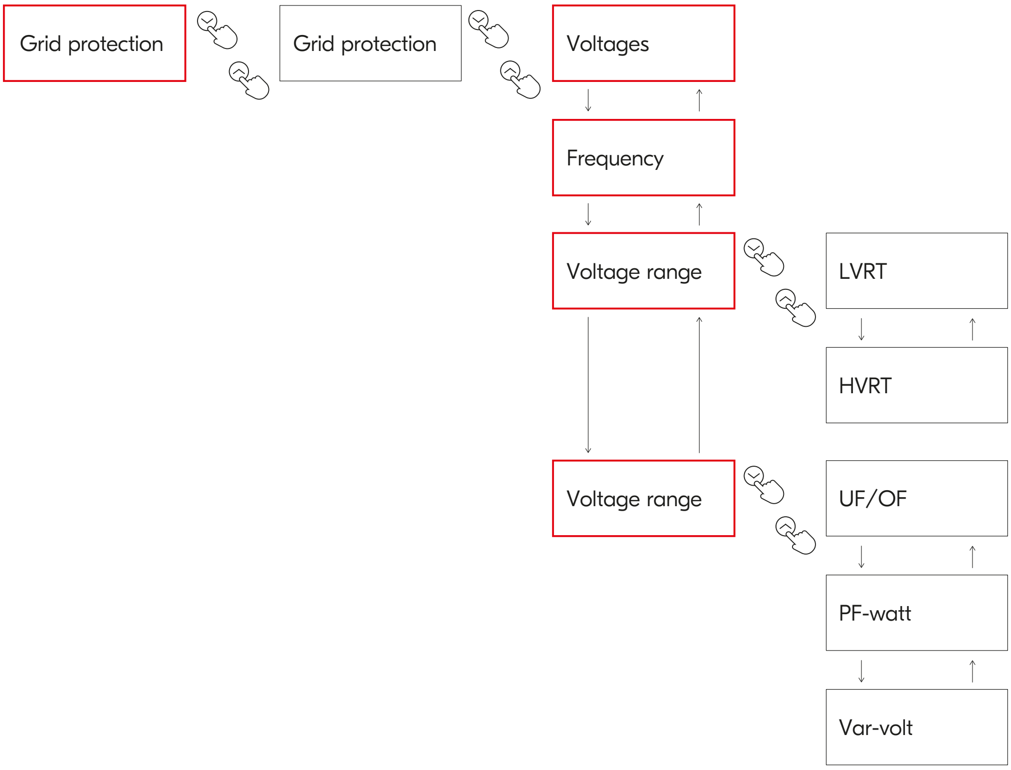


Table 8. Parameters for grid protection: voltage, frequency, voltage range, curve par.

	Designation	Description
Voltages	O/V stage1	Threshold 1 for shutting down when voltage is too high.
	U/V stage1	Threshold 1 for shutting down when voltage is too low.
	O/V stage2	Threshold 2 for shutting down when voltage is too high.
	U/V stage2	Threshold 2 for shutting down when voltage is too low
	O/V stage3	Threshold 3 for shutting down when voltage is too high.
	U/V stage3	Threshold 3 for shutting down when voltage is too low.
	VacOVPTime1	Response time for the first threshold with overvoltage.
	VacUVPTime1	Response time for the first threshold with undervoltage.
	VacOVPTime2	Response time for the first threshold with overvoltage.
	VacUVPTime2	Response time for the first threshold with undervoltage.
	VacOVPTime3	Response time for the first threshold with overvoltage.
	VacUVPTime3	Response time for the first threshold with undervoltage.
	RecoveryVacMax	Maximum voltage value to return from overvoltage to normal operation mode.
	RecoveryVacMin	Minimum voltage value to return from undervoltage to normal operation.
	O/V 10min Set	Setting of the voltage value for 10-minute protection against overvoltage/ undervoltage (average).
	VacReconTime	Time of re-enabling after an error.
	T Start	Setting for the inverter check time from standby to normal status after shutting down.
Frequency	O/F stage1	Protection point against excessive level 1 frequency.
	FreqOFPTime1	Level 1 response time at excessive frequency.
	U/F stage1	Protection point against insufficient level 1 frequency.
	FreqUFPTime1	Level 1 - response time at insufficient frequency.
	O/F stage2	Level 2 - protection point against excessive frequency.
	FreqOFPTime2	Level 2 - response time at excessive frequency.
	U/F stage2	Protection point against insufficient level 2 frequency.

	Designation	Description
Frequency	FreqUFPTime2	Level 2 - response time at insufficient frequency.
	O/F stage3	Level 3 - protection point against excessive frequency.
	FreqOFPTime3	Level 3 - response time at excessive frequency.
	U/F stage3	Protection point against insufficient frequency Level 3.
	FreqUFPTime3	Level 3 - underfrequency response time.
	Recovery Freq Max	Maximum frequency to restore normal operation.
	FreqReconTime	Time of re-connecting after an error.
	Recovery Freq Min	Minimum frequency to return to normal operation.
Voltage range - LVRT	Enable/Disable	Passing through low voltages, possible continuation of operation without disconnecting from the grid when the voltage drops down to a certain value.
	LVRT 1 -V	Voltage value for level 1 of low voltage passing.
	LVRT 2 -V	Voltage value for level 2 of low voltage passing.
	LVRT 3 -V	Voltage value for level 3 of low voltage passing.
	LVRT 4 -T	Travel duration at level 1 low voltage.
	LVRT 5 -T	Remaining time for level 2 low voltage travel.
	LVRT 6 -T	Switchover time for level 3 low voltage.
Voltage range - HVRT	EnabLe/DisabLe	Passing through high voltage, possible continuation of operation without disconnecting from the grid when the voltage drops down to a certain value.
	HVRT 1 -V	Voltage value for level 1 pass through high voltage.
	HVRT 2 -V	Voltage value for level 1 pass.
	HVRT 3 -V	Voltage value for level 3 operation at high voltage.
	HVRT 4 -V	Voltage value for level 4 high-voltage travel.
	HVRT 5 -T	Level 1 travel duration at high voltage.
	HVRT 6 -T	Duration of level 2 high-voltage travel.
	HVRT 7 -T	Duration of level 3 high-voltage travel.
Curve parameter - UF/OF	Ofstart	According to some domestic/regional standards, the output active power must be reduced when the grid frequency exceeds the set value.
	Ofstop	Set the frequency value when the output power drops down to the lower limit for reduction mode of nominal values over frequency.
	Ofdelatp	Reduction rate of active power.
	Ufstart	According to some domestic/regional standards, the output active power of the inverter must be increased when the grid frequency drops down below this added value.
	Ufstop	Set frequency at which the maximum output power is reached in the underfrequency ramp mode.
	Ufdelatp	Growth rate of gradient active power.
	Delay time	Delay time in lowering or increasing the frequency.
	Watt-freq	Turning on or off of the power and frequency curves.
Curve parameter - PF-watt	PF-watt no/off	Power and power factor curves; allow setting the passive power by setting two points of the output curve.
	PFWattLockInV	Voltage threshold upon entering the curve.
	PFWattL 1 -P	Point 1 power.
	PFWattL 1 -PF	Power factor of point 1.
	PF-Watt tau	PF-Watt (curve) passive level setting time.
	PFWattLockOutV	Voltage threshold upon leaving the curve.
	PFWattL 2 -P	Point 2 power.
	PFWattL 2 -PF	Power factor of point 2.

	Designation	Description
Curve parameter - Var-watt	Var-volt on/off	Turning on or off of the voltage and passive power curves. Setting of four point for the output curve.
	Var-watt tau	Var-Volt passive power adjustment time (curve).
	Var-volt 1 -V	Point 1 voltage.
	Var-volt 2 -V	Point 2 voltage.
	Var-volt 3 -V	Point 3 voltage.
	Var-volt 4 -V	Point 4 voltage.
	Var-volt 5 -V	Ratio of passive power to nominal power in point 4.
	Var-volt 6 -V	Ratio of point 4 passive power to nominal power.
	VarVoltLockInP	Power threshold at curve entry.
	VarVoltLockOutP	Power threshold upon leaving the curve.

4.2.9 Parameter: Monitoring

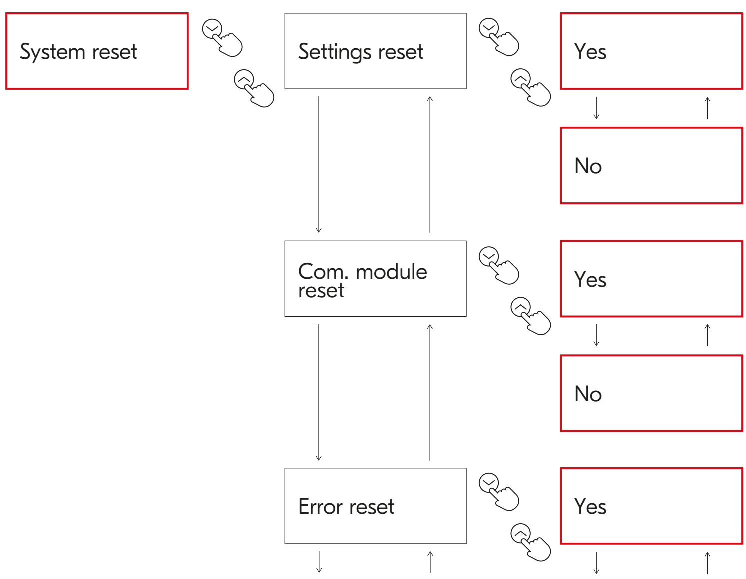
The parameter includes settings within ranges specified in Table 9.

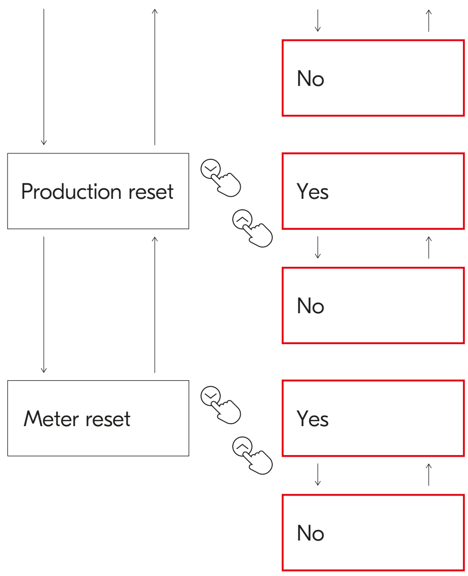
Table 9 Monitoring parameters.

	Designation	Description
Monitoring	AI state	Turning on the anti-islanding function.
	P (u) Derate	Turning on the function for reducing the voltage nominal value.
	MPPT Scan	Turning on the MPPT global scanning function.
	Anti_PID	Turning off the PID function.
	DRM Function	Remote turn on/off of the inverter (for Australia) via DRM0; More details in the operating manual.
	ARC Check State	Turning on the AFCI function.
	ARC Reset	Resetting the AFCI function.
	Reconnect Limit	Allowing for soft start after shutting down due to grid disconnection.
	Ground Check	Possibility of checking the condition of utilities.
	Delta Grid	Possibility of connection with a delta grid.
	Fan Check	Possibility of checking the fan operation status.
	SVG	Possibility of compensating the grid with passive power at night.

4.2.10 Parameter: System reset

The parameter includes a reset in the ranges specified below.





4.2.11 Parameter: Advanced settings

The parameter includes settings within ranges specified in Table 10.

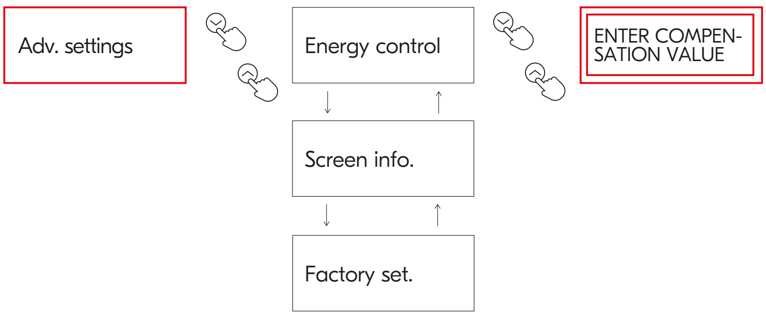


Table 10 Adv. settings parameters.

	Designation	Description
Adv. Settings	Energy control	Setting for passive power compensation level.
	Screen info.	Information on screen parameters.
	Factory set.	Reset to factory settings.

4.2.12 Function: Information

The function allows displaying information other than the functions and parameters specified before. The parameter can be selected with the ⌃ and ⌄ function keys. The information covered by the function are within the ranges specified in Table 11.

Table 11 Information function.

	Designation	Description
Information	Pcs type	Inverter type.
	SN	Serial number .
	Master	Number of master devices.
	Slaver	Number of slave devices.
	Manager	
	Internal code	Own code.
	Dongle SN	Logger serial number.

4.3 Failures

The Corab Encor 17-30k inverter is in failure mode when the ⚠ status diode on the control panel lights up red.

DANGER
The Corab Encor 17-30k is an electrical device. All works on the device must be carried out by the qualified personnel.

The list of failures that might occur during the use of the device describes the procedures on how to handle them. In case of a failure that has not been described in this manual, follow the steps used in case of inspections and cleaning (Chapter 4 of part II of this operating manual). If the said actions fail to restore the operating mode, contact the Servicing Department of the Manufacturer.

NOTE
Before starting the procedure to remove the issues, read the messages displayed on the device.

HINT
Do not undertake any actions other than those described in the operating manual. For issues other than those described in the manual, call the Servicing Department of the Manufacturer.

4.3.1 Procedure in case of failures

During the use of the inverter, there is a risk of failures. The possible failures along with appropriate procedures have been described in Table 12.

Table 12 Test parameters.

Error	Description of the error	Procedure
TZProtectFault IE01	Current too high	1. Wait 10 seconds and check whether the inverter returned to its normal operation; 2. Disconnect the PV circuit with the DC load switch, reset the inverter; 3. Contact the servicing department if the inverter still prompts a failure.
GridLostFault IE02	No grid	1. Check the voltage value at the point of connection of the inverter, if it is incorrect, contact the local distribution system operator; 2. Check all the AC connections; 3. Contact the servicing department if the inverter still prompts a failure.
GridVoltFault IE03	Incorrect voltage of the grid	
GridFreqFault IE04	Incorrect frequency of the grid	
PV Volt Fault IE05	DC voltage failure	1. Check the value and polarity of DC voltage on every string; 2. Check all the DC connections; 3. Contact the servicing department, if the problem still persists.
BusVoltFault IE06	DC busbar error	1. Check whether the voltage value of DC strings is compatible with the device; 2. Disconnect the PV circuit with the DC load switch, reset the inverter; 3. Contact the servicing department if the inverter still prompts a failure.

Error	Description of the error	Procedure
AC10minsVolt IE08	Voltage error over 10 min	1. Check the voltage value at the point of connection of the inverter, if it is incorrect, contact the local distribution system operator; 2. Check all the AC connections; 3. Contact the servicing department if the inverter still prompts a failure.
DCI OCP Fault IE09	DCI current fault	1. Disconnect the PV circuit with the DC load switch, reset the inverter; 2. Contact the servicing department if the inverter still prompts a failure.
DCV OVP Fault IE10	DCV voltage fault	
SW OCP Fault IE11	SW current fault	
RC OCP Fault IE12	RC current fault	
IsolationFault IE13	Insulation resistance fault	1. Check all the cable connections; 2. Measure the insulation resistance with a meter intended for this purpose; 3. Contact the servicing department if the inverter still prompts a failure.
TempOverFault IE14	Temperature too high	1. Check whether the ambient temperature of the device falls within its operation parameters, check whether the place of assembly is in line with the manual; 2. Disconnect the PV circuit with the DC load switch, reset the inverter; 3. Contact the servicing department if the inverter still prompts a failure.
Fan Fault IE20	Fan error	1. Disconnect the PV circuit with the DC load switch, reset the inverter; 2. Contact the servicing department if the inverter still prompts a failure.
LowTempFault IE21	Temperature too low	1. Check whether the ambient temperature of the device falls within its operation parameters, check whether the place of assembly is in line with the manual; 2. Disconnect the PV circuit with the DC load switch, reset the inverter; 3. Contact the servicing department if the inverter still prompts a failure.
INVR EEPROM IE26	EEPROM error	1. Disconnect the PV circuit with the DC load switch, reset the inverter; 2. Contact the servicing department if the inverter still prompts a failure.
RCD Fault IE27	RCD error	
GridRelayFault IE28	AC contactor error	
Meter Fault IE109	Meter error	1. Check whether the meter has been connected according to the manual; 2. Disconnect the PV circuit with the DC load switch, reset the inverter; 3. Contact the servicing department if the inverter still prompts a failure.
FAN1 Fault IE112	Fan 1 error	1. Disconnect the PV circuit with the DC load switch, reset the inverter; 2. Contact the servicing department if the inverter still prompts a failure.
FAN2 Fault IE113	Fan 2 error	
OtherFault	Other error	1. Write down the error code; 2. Immediately turn off the inverter; 3. Contact the servicing department.

4.3.2 Servicing Department - contact

Contact details to the Manufacturer's servicing department:
E-mail address: serwis.encor@corab.com.pl
Phone no.: +48 89 307 16 41

4.3.3 Frequent power loss

In a situation when the device loses power due to overheating and the red ⚠ status diode does not show up, check whether the radiators at the back of the inverter are not covered with dust or dirt. Dirty radiators might cause the device to overheat. In such a situation clean the radiators according to section 5 of part II of this operating manual.

DANGER
The Corab Encor 17-30k inverter is an electrical device. All works on the device must be carried out by the qualified personnel.

4.4 Update

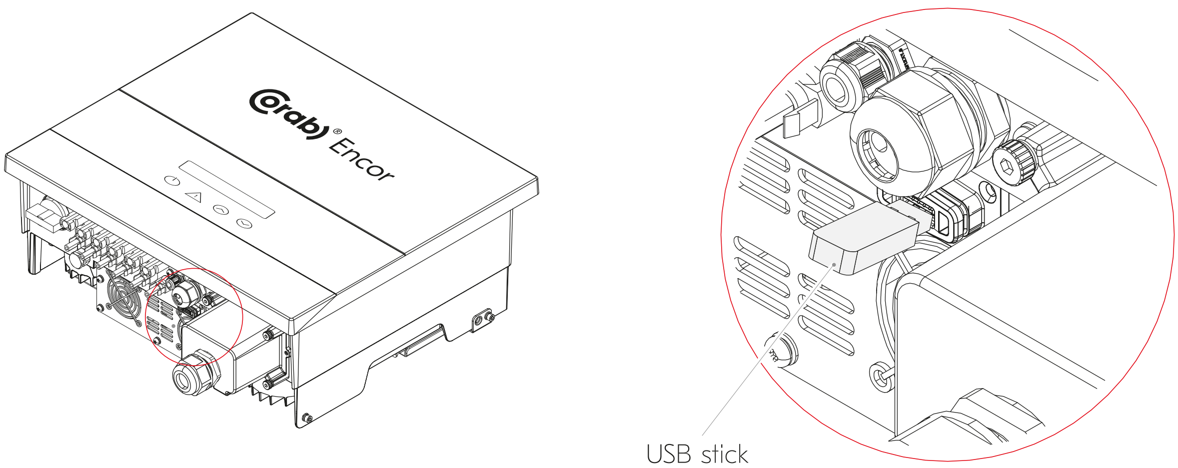


Fig. 13 Wi-Fi port.

NOTE
Before the works, make sure that the input voltage is higher than 200 V. If the voltage is too low, the update might fail.

The device can be updated by the qualified personnel. For that purpose, they will need a USB drive. Carry out the update according to the following procedure:
1. Obtain the update file. For this matter, contact the Manufacturer of the device;
2. Save the obtained file on the USB stick according to the following paths:
   update\ARM\618.xxxxx.00_MICPROG2_ARM_Vx.xx_xxxxxxxx.usb
   update\DSP\618.xxxxx.00_MICPROG2_DSP_Vx.xx_ xxxxxxxx.usb
   where:
   Vx.xx – version number
   xxxxxxxx – file creation date

HINT
Changing the file name might result in a failed update.

3. Set the DC load switch to OFF;
4. Disconnect the AC power;
5. Remove the Wi-Fi device from the Wi-Fi port, if the port is occupied;
6. Insert the USB stick with the save update file into the Wi-Fi port;
7. Set the DC load switch to ON;
8. Connect the AC power;
9. Choose the following on the control panel — xxxx - zzzz;
10. Choose ARM or DSP and confirm your selection (function keys described in section 1.2 of part II of this operating manual);
11. Set the DC load switch to OFF when the update is complete;
12. Disconnect the AC power;
13. Remove the USB stick from the Wi-Fi port;
14. Insert the Wi-Fi device connected before the update into the port (if necessary);
15. Set the DC load switch to ON;
16. Connect the AC power.

NOTE
Do not remove the USB stick if the AC power is interrupted. The update will be automatically resumed when the AC power is restored.

5 Inspections and cleaning

5.1 Personnel and safety

Inspections and cleaning of the device must be carried out only by the qualified personnel.
General safety rules have been described in Chapter 2 of part I of this operation manual.

5.1.1 Results of non-compliance

Non-compliance with the requirements regarding personnel, safety rules and OH&S regulations may lead to:
- danger for human health and/or life;
- risk to the condition and lifetime of the device;
- risk to the safe use of the device.

5.2 Initial and final actions

HINT
Proper preparation of the device, tools and personal protective equipment allows efficient performance of the works.

In order to start works connected with an inspection and cleaning, it is necessary to make preparations. In order to do that:
- prepare the devices and tools for the planned works;
- secure the site to prevent people from accessing the area where the works are performed;
- secure the site to prevent people from changing the settings of the device during the performed works;
- prepare the work stand;
- disconnect the power - set the DC load switch to OFF;
- after disconnecting the power, wait for 5 minutes before you disconnect the DC terminal and the AC terminal;
- disconnect the AC and DC power from the device.

DANGER
The Corab Encor 17-30k inverter is an electrical device. All works on the device must be carried out only by the qualified personnel.

DANGER
Working with a live device might lead to a hazardous situation that can be dangerous to one's life or health.

5.3 Inspections

The inspection should be planned and carried out with utmost care, according to safety precautions. The frequency of inspections must not be lower than specified by the Manufacturer of the device. The customer/user can carry out inspections more frequently.

WARNING
Inspections can be carried out only by the qualified personnel that is familiar with the construction and operation of the device and was granted the user's permission to carry out the works.

5.3.1 Semi-annual inspection

Perform the semi-annual inspection every 6 months starting from the date of installation of the device. During the semi-annual inspection:

- check the back radiators for dust and dirt;
- check whether the function keys are legible and in proper condition;
- check the control panel for damage;
- check whether the device indicators are in normal condition;
- check the protective elements of the device;
- check whether all input and output wires are undamaged and in a condition that will not cause any dangerous situations.

Remove the irregularities and defects detected during the inspection.

5.3.2 Annual inspection

Perform the annual inspection every 12 months starting from the date of installation of the device. The annual inspection includes verification of safety based on applicable regulations of law (including standards), directive 2014/35/EU and 2014/30/EU, and Chapter 2 of part I of this operating manual. Details on the inspection should be recorded in the device log.

DANGER
Commissioning of a device that does not meet the requirements of the documentation is prohibited. Commissioning of an inoperative device and installation that are not compliant with the above-mentioned documentation might lead to a situation dangerous to life and health.

5.4 Cleaning

In order to remove dirt from the device, use a soft and dry cloth or brush. Make sure that the used materials will neither damage the device nor interrupt its operation.

WARNING
Do not use a direct stream of water on the device since it may lead to a dangerous situation, electrocution and/or permanently damage the device.

6 Disposal and disassembly

6.1 Personnel and safety

Inspections and cleaning of the device must be carried out only by the qualified personnel.
General safety rules have been described in Chapter 2 of part I of this operation manual.

6.1.1 Results of non-compliance

Non-compliance with the requirements regarding personnel, safety rules and OH&S regulations may lead to:

- danger for human health and/or life;
- risk to the condition and lifetime of the device;
- risk to the safe use of the device.

6.2 Disassembly

The disassembly must be preceded by works connected with shutting-off, which have been described in Chapter 3 of part II of this operating manual. Next, remove the inverter from the base that it was mounted to on the wall. If necessary, dismantle the base.

DANGER
Carry out the disassembly by using operational and complete tools. The tools must fit the performed works in terms of durability and method of use.

6.3 Disposal

The disposal method used for the device, its components and additional elements must be strictly connected with the type of material they are made of. During disposal, it is necessary to comply with regulations applicable in a particular period and the country of use. It is forbidden to allow situations in which hazardous substances or materials would enter the environment.

Corab® Encor

Corab S.A. ul. Michała Kajki 4, 10-547 Olsztyn, REGON: 510519084, NIP: 7390207757 entered in to the National Court Register managed by the District Court in Olsztyn, the 8th Commercial Division of the National Court Register under KRS number: 0000950779. Share capital: PLN 1,184,000.00 fully paid up.

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