POWER INVERTER

IB-INV-CSI; IB-INV-SSI

pure sinewave witch AC charger and MPPT charge controller for photovoltaic systems

THIS PRODUCT HAS THE CE MARK

AND HAS BEEN MANUFACTURED IN ACCORDANCE WITH ISO 9001 STANDARD

The manufacturer promotes development policy. The right to make changes and improvements to products and instructions without prior notice is reserved!

manual version: 1.0.0
firmware version: 1.0.0

Spis Treści

IB-INV-CSI; IB-INV-SSI

1 General information

The **IB-INV-CSI; IB-INV-SSI** inverter is a technical device to invert DC voltage into sinusoidal alternating voltage. DC voltage is usually provided by a battery or powerwall. The inverter inverts direct current (DC) into alternating current (AC). 230V AC power supply from the inverter allows to power the devices regardless of the availability of the domestic power supply (shore power).

With the integrated IUoU charger of the inverter **IB-INV-CSI** series, there is the possibility to recharge the discharged batteries or powerwall.

The **IB-INV-SSI** series inverters, in addition to the integrated IUoU charger, are equipped also with the MPTT charge controller for photovoltaic systems.

ECO Mode: Only solar power is used to charge the batteries. Only solar power is used to supply the 230V consumers (inverter function witch MPPT-solar charge controller). If solar power is not available, 230V consumers are supplied from the battery (inverter function).

2 Scope of delivery

- 1x Inverter
- 1x User Manual

3 Technical data

Model	Continuous output	Battery voltage	Idle current consumption	AC charger	Dimensions (LxWxH) mm	Weight kg
IB-INV-CSI-3-12V	300 W	12V DC	0,65 A	10 A	270x150x55	2,1
IB-INV-CSI-3-24V	300 W	24V DC	0,33 A	5 A	270x150x55	2,1
IB-INV-CSI-5-12V	500 W	12V DC	0,65 A	10 A	355x150x75	3,0
IB-INV-CSI-5-24V	500 W	24V DC	0,33 A	5 A	355x150x75	3,0
IB-INV-CSI-10-12V	1000 W	12V DC	0,65 A	10 A	430x150x75	3,7
IB-INV-CSI-10-24V	1000 W	24V DC	0,33 A	5 A	430x150x75	3,7
IB-INV-CSI-10-48V	1000 W	48V DC	0,17 A	5 A	430x150x75	3,7
IB-INV-CSI-15-12V	1500 W	12V DC	0,65 A	20 A	450x220x90	5,3
IB-INV-CSI-15-24V	1500 W	24V DC	0,33 A	10 A	450x220x90	5,3
IB-INV-CSI-15-48V	1500 W	48V DC	0,17 A	5 A	450x220x90	5,3
IB-INV-CSI-20-12V	2000 W	12V DC	0,98 A	20 A	480x220x90	6,5
IB-INV-CSI-20-24V	2000 W	24V DC	0,50 A	10 A	480x220x90	6,5
IB-INV-CSI-20-48V	2000 W	48V DC	0,25 A	5 A	480x220x90	6,5
IB-INV-CSI-25-12V	2500 W	12V DC	1,0 A	20 A	530x220x90	7,3
IB-INV-CSI-25-24V	2500 W	24V DC	0,50 A	10 A	530x220x90	7,3
IB-INV-CSI-25-48V	2500 W	48V DC	0,25 A	5 A	530x220x90	7,3
IB-INV-CSI-30-12V	3000 W	12V DC	1,2 A	20 A	480x220x150	9,5
IB-INV-CSI-30-24V	3000 W	24V DC	0,60 A	10 A	480x220x150	9,5
IB-INV-CSI-30-48V	3000 W	48V DC	0,30 A	5 A	480x220x150	9,5
IB-INV-CSI-40-12V	4000 W	12V DC	1,2 A	20 A	480x220x150	11,5
IB-INV-CSI-40-24V	4000 W	24V DC	0,6 A	10 A	480x220x150	11,5
IB-INV-CSI-40-48V	4000 W	48V DC	0,30 A	5 A	480x220x150	11,5
IB-INV-SSI-10-12V	1000 W	12V DC	0,5 A	20 A	380x220x150	5,5
IB-INV-SSI-10-24V	1000 W	24V DC	0,25 A	10 A	380x220x150	5,5
IB-INV-SSI-10-48V	1000 W	48V DC	0,13 A	5 A	380x220x150	5,5
IB-INV-SSI-15-12V	1500 W	12V DC	0,5 A	20 A	450x220x150	6,5
IB-INV-SSI-15-24V	1500 W	24V DC	0,25 A	10 A	450x220x150	6,5
IB-INV-SSI-15-48V	1500 W	48V DC	0,13 A	5 A	450x220x150	6,5
IB-INV-SSI-20-12V	2000 W	12V DC	0,65 A	20 A	500x220x150	8,5
IB-INV-SSI-20-24V	2000 W	24V DC	0,32 A	10 A	500x220x150	8,5
IB-INV-SSI-20-48V	2000 W	48V DC	0,16 A	5 A	500x220x150	8,5
IB-INV-SSI-25-12V	2500 W	12V DC	1,0 A	20 A	520x220x150	9,0
IB-INV-SSI-25-24V	2500 W	24V DC	0,5 A	10 A	520x220x150	9,0
IB-INV-SSI-25-48V	2500 W	48V DC	0,25 A	5 A	520x220x150	9,0
IB-INV-SSI-30-12V	3000 W	12V DC	1,2 A	20 A	500x220x150	10,5
IB-INV-SSI-30-24V	3000 W	24V DC	0,6 A	10 A	500x220x150	10,5
IB-INV-SSI-30-48V	3000 W	48V DC	0,30 A	5 A	500x220x150	10,5

Surge power proportional to the continuous output	120% – 150% for 10 seconds 150% – 200% for 2 seconds
Switching time UPS	<16 ms
output AC voltage	230V AC voltage fluctuation: max. 10% Frequency: 50 Hz ± 1Hz
Waveform	Pure sine wave (THD < 4%) at rated input voltage
Battery types	Wet, AGM, GEL, $LiFePO_4$ (only with BMS)
Operating temperature	$-15 \div 40°C$
Storage temperature	$-40 \div 85°C$
Relative humidity	20% ÷ 90%
Efficiency range (The efficiencies depend on the type of consumer devices and load. For example, the inverter typically has the highest efficiency at a load of approx. 70%.)	12V: 86% – 92% 24V: 87% - 93% 48V: 88% - 94%

Operating performance MPPT-charge controller (**IB-INV-SSI**)

Battery voltage	**12V**	**24V**	**48V**
Charge efficiency	> 97%	> 97%	> 97%
Solar input voltage	15 - 70V	> 24 - 70V	> 48 - 70V
Max. output current	20 A	20 A	20 A

Recommended battery cables and battery capacity:

Model	Number of sets	Recommended thickness at 100cm	Recommended thickness at 150cm	Recommended thickness at 200cm	Recommended thickness at 200cm	Battery capacity (Wet, Gel, AGM)	Battery capacity ($LiFePO_4$)
3-12V	1	4 mm^2	6 mm^2	10 mm^2	16 mm^2	≥50Ah	≥25Ah
3-24V	1	2.5 mm^2	4 mm^2	6 mm^2	10 mm^2	≥25Ah	≥12Ah
5-12V	1	6 mm^2	10 mm^2	16 mm^2	25 mm^2	≥100Ah	≥50Ah
5-24V	1	4 mm^2	6 mm^2	10 mm^2	16 mm^2	≥50Ah	≥25Ah
10-12V	1	16 mm^2	25 mm^2	35 mm^2	50 mm^2	≥160Ah	≥90Ah
10-24V	1	6 mm^2	10 mm^2	16 mm^2	25 mm^2	≥80Ah	≥50Ah
10-48V	2	6 mm^2	10 mm^2	16 mm^2	25 mm^2	≥25Ah	≥25Ah
15-12V	2	10 mm^2	16 mm^2	35 mm^2	50 mm^2	≥250Ah	≥100Ah
15-24V	2	6 mm^2	10 mm^2	16 mm^2	25 mm^2	≥120Ah	≥70Ah
15-48V	2	6 mm^2	10 mm^2	16 mm^2	25 mm^2	≥80Ah	≥35Ah
20-12V	2	16 mm^2	25 mm^2	50 mm^2	50 mm^2	≥320Ah	≥180Ah
20-24V	2	10 mm^2	16 mm^2	25 mm^2	35 mm^2	≥160Ah	≥90Ah
20-48V	2	10 mm^2	16 mm^2	25 mm^2	35 mm^2	≥80Ah	≥50Ah
25-12V	2	25 mm^2	35 mm^2	50 mm^2	50 mm^2	≥400Ah	≥200Ah
25-24V	2	10 mm^2	16 mm^2	25 mm^2	35 mm^2	≥200Ah	≥100Ah
25-48V	2	10 mm^2	16 mm^2	25 mm^2	35 mm^2	≥100Ah	≥50Ah
30-12V	2	25 mm^2	35 mm^2	50 mm^2	50 mm^2	≥480Ah	≥250Ah
30-24V	2	10 mm^2	16 mm^2	25 mm^2	35 mm^2	≥240Ah	≥125Ah
30-48V	2	10 mm^2	16 mm^2	25 mm^2	35 mm^2	≥120Ah	≥70Ah

⚠ Cables and batteries are not included!

⚠ **Please note the capacity!** An underrun of the recommended battery capacity can cause a loss of performance or serious use restrictions as a result of voltage drops.

⚠ **Please respect a sufficient ventilation!** The inverter produces heat loss. The device is equipped with a thermal overload protection. An insufficient ventilation can affect the function of the inverter, because the inverter can shut itself down for safety reasons. Please follow the appropriate installation advice below.

⚠ The inverter should not be used in vehicles, in which the +pole is connected to the chassis!

⚠ **Please mind the input voltage!** The inverter should only be connected to voltage sources which correspond to technical data. If connected to a higher voltage source the fuse can immediately blow and damage the inverter.

⚠ **Please note the maximum power of the consumer devices!** For currents >15 A consumer devices have to be con-

nected directly to the terminal for direct connections.

Idle current consumption! When the inverter is not in use, turn it off with the main switch. Otherwise, idle current consumption will take place according to this table and deep discharge may damage your battery (if there is no BMS).

Please mind the starting current! Keep in mind that inductive devices (for example power drills or refrigerators etc.) often need a 3–10 times higher power at the beginning than indicated on the descriptive type plate. The maximum power of this short period should not surpass the maximum surge power of the inverter.

Note the acoustic signal! In case of overload an acoustic signal will sound. If the consumer devices power is not reduced to the maximal continuous output, the inverter will shut down automatically.

Output power losses because of heat. An ambient temperature over 40°C (for ex. due to heat at the installation site or direct sunlight) can lower the specified output and efficiency.

Restrictions on Use. The following persons should use this product only under the supervision of another responsible person:

- Persons with limited physical aptitude.
- Persons with limited mental aptitude.
- Persons with limited sensory aptitude.

Use the device only in accordance with its designated use.

Store the device out of the reach of children.

When the inverter isn't in use for longer periods of time, please follow this advice to protect your battery from discharge:

- Disconnect all consumers from the inverter.
- Disconnect the battery from the inverter by using a disconnector or by disconnecting the cables.
- If the battery isn't completely disconnected, a minimal current consumption by the inverter will continue to take place.

If two sets of battery cables are recommended, both sets with an appropriate cable thickness must be installed. Failure to do so can easily lead to overheating of the overloaded cables and connection points and cause a dangerous cable fire.

The **IB-INV-CSI** inverter are generally build for so called „Off-Grid"-Systems and should only be used autonomously. Do not connect the inverter output (socket) with an other voltage source. Disregarding this advice is life threatening and will destroy the inverter immediately.

Risk of electric shocks! The device is equipped with security features to prevent dangerous electric shocks. However, in order to ensure the highest possible safety during operation, it is imperative that the inverter's ground connection be connected to a protective earth in any case.

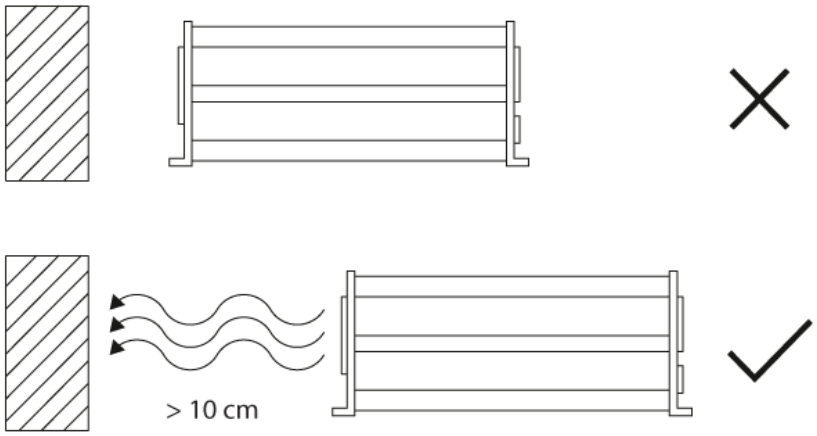
Maintenance and repairs may only be performed by properly trained personnel.

The installation of this equipment may only be performed by trained and authorized personnel and in compliance with all applicable safety regulations and guidelines.

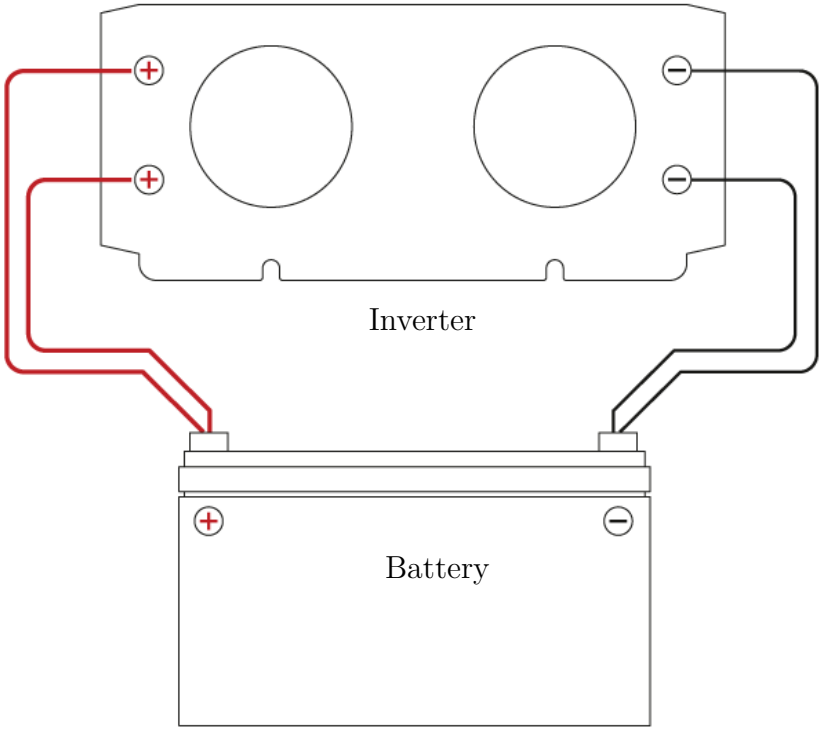
Especially when used on a boat an incorrect installation can lead to corrosion damage. Therefore the installation should be performed by trained boat electricians.

Important mounting instructions!
To reduce the risk of fire, injuries and electronic shocks, please note the following instructions:

- The device can be installed horizontally or vertically.
- Do not cover the ventilation slits and ensure adequate ventilation. The installation site of the inverter has to be well ventilated.
- Install the inverter only on solid mounting surfaces.
- Do not pull the cable.
- Do not install near heat sources or in direct sunlight.
- Avoid dust, humidity and flammable or caustic substances near the inverter.
- The inverter heats up during operation, keep away from heat-sensitive materials.
- Do not drop the inverter and avoid shocks.
- Do not place any objects on top of the inverter.
- Do not open the device.
- Only use dry wipes or compressed air for cleaning. Switch off the inverter before cleaning.
- Switch of the inverter before all kinds of work.
- The damaged inverter should be taken out of service.



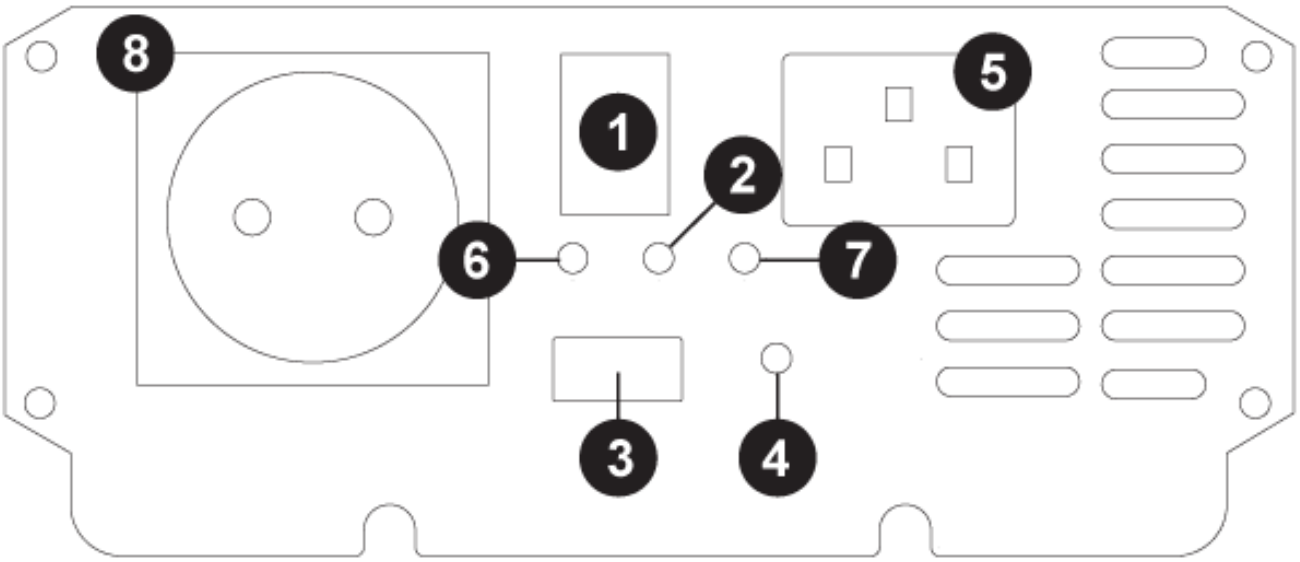
Connecting an inverter and a battery with 2 sets of cables:



4 Overview

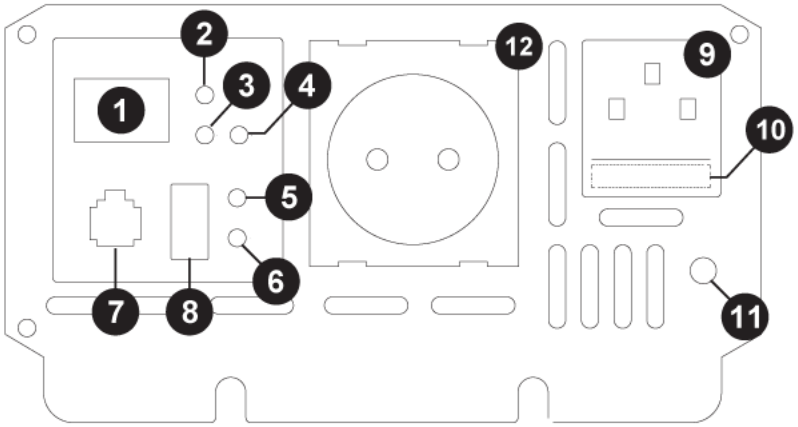
These illustrations show the most important external components and connections.

Front view: **IB-INV-CSI-3**



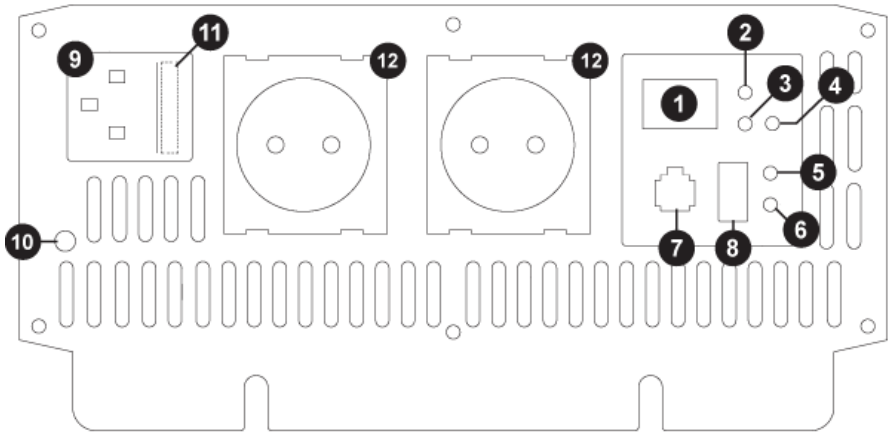
- **1** - Switch ON/OFF
- **2** - LED „Fault”
- **3** - USB-port
- **4** - Protective earthing
- **5** - Shore power
- **6** - LED „Inverter”
- **7** - LED „AC-Charge”
- **8** - 230V consumer devices power socket

Front view: **IB-INV-CSI-5** and **IB-INV-CSI-10**



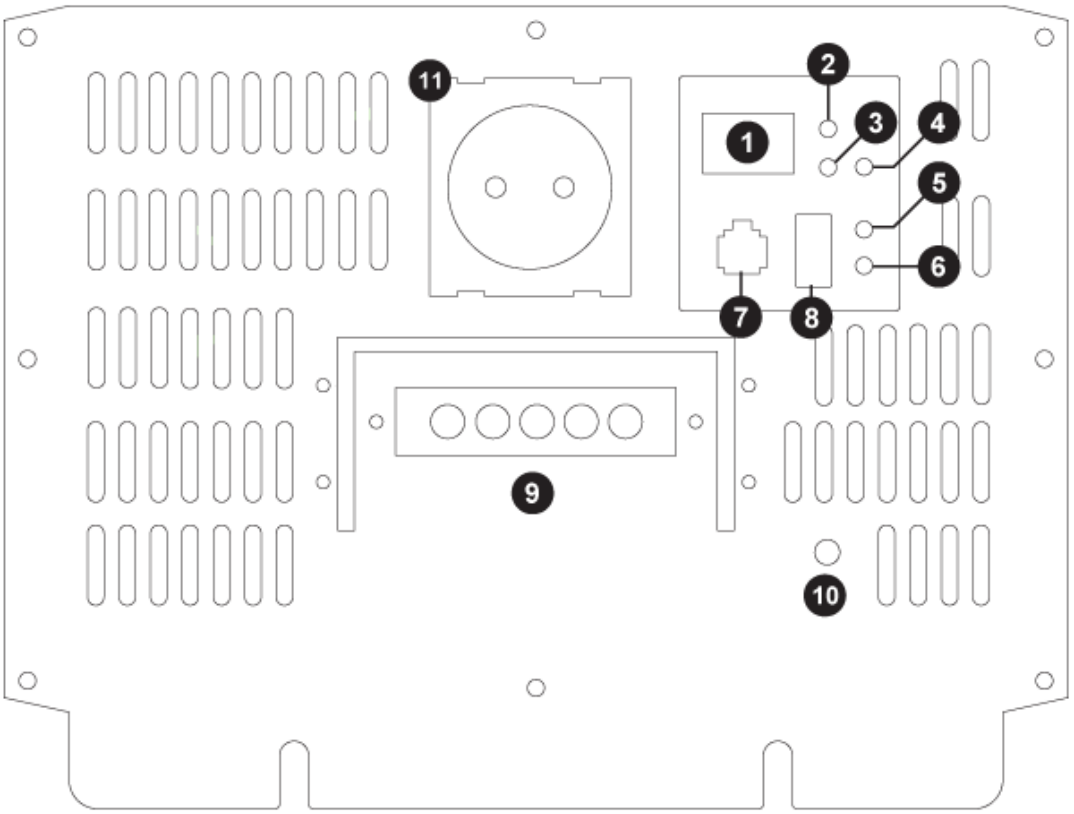
- **1** - Switch ECO/OFF/UPS
- **2** - LED „Power”
- **3** - LED „Fault”
- **4** - LED „Charge”
- **5** - LED „AC-In”
- **6** - LED „By-Pass”
- **7** - Remote control port
- **8** - USB-port
- **9** - Shore power
- **10** - Fuse
- **11** - Protective earthing
- **12** - 230V consumer devices power socket

Front view: **IB-INV-CSI-15**, **IB-INV-CSI-20** and **IB-INV-CSI-25**



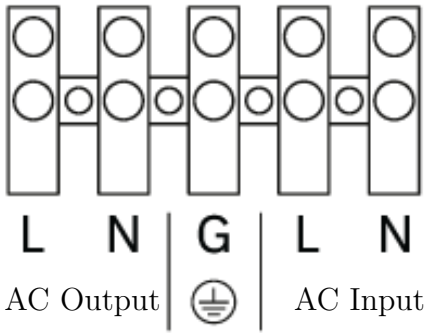
- **1** - Switch ECO/OFF/UPS
- **2** - LED „Power”
- **3** - LED „Fault”
- **4** - LED „Charge”
- **5** - LED „AC-In”
- **6** - LED „By-Pass”
- **7** - Remote control port
- **8** - USB-port
- **9** - Shore power
- **10** - Protective earthing
- **11** - Fuse
- **12** - 230V consumer devices power socket

Front view: **IB-INV-CSI-30**

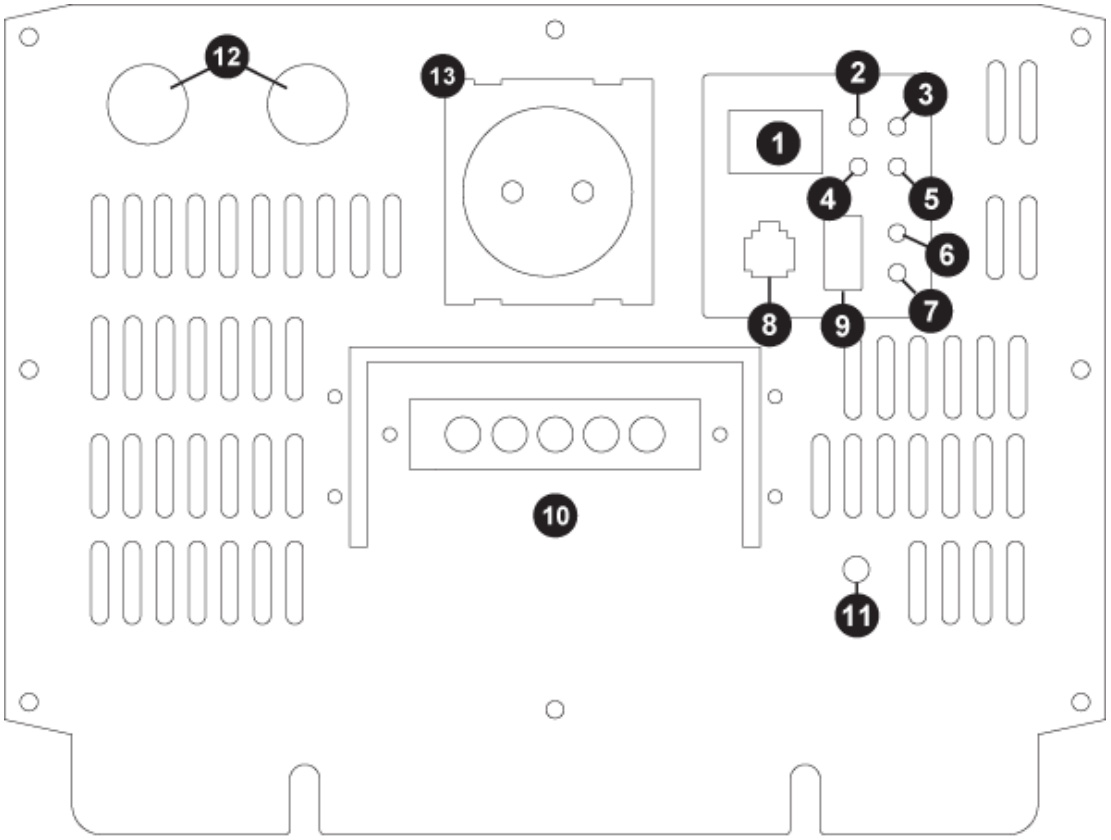


- **1** - Switch ECO/OFF/UPS
- **2** - LED „Power”
- **3** - LED „Fault”
- **4** - LED „Charge”
- **5** - LED „AC-In”
- **6** - LED „By-Pass”
- **7** - Remote control port
- **8** - USB-port
- **9** - Shore power
- **10** - Protective earthing
- **11** - 230V consumer devices power socket

Terminal for direct connection (**IB-INV-CSI-30** and **IB-INV-SSI** series):



Front view: IB-INV-SSI-10 to IB-INV-SSI-30



- **1** - Switch ECO/OFF/UPS
- **2** - LED „Power”
- **3** - LED „Solar”
- **4** - LED „Fault”
- **5** - LED „Charge”
- **6** - LED „AC-In”
- **7** - LED „By-Pass”
- **8** - Remote control port
- **9** - USB-port
- **10** - Shore power
- **11** - Protective earthing
- **12** - MC4 Solar Connection
- **13** - 230V consumer devices power socket

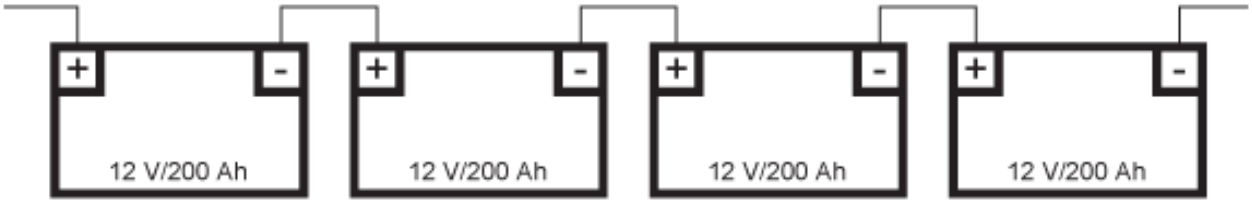
5 Possible configurations of batteries

If several batteries are used, there are various configuration possibilities of the battery banks depending on the inverter model (12V, 24V, 48V).

Examples:

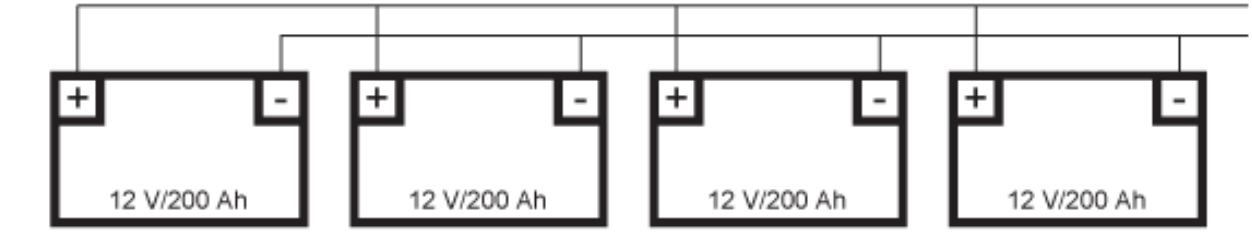
- ☞ Series connection (serial): voltages add up, capacity remains unchanged.
- ☞ Parallel connection (parallel): capacities add up, voltage remains unchanged.
- ☞ Series and parallel connection (serial and parallel): capacities and voltages add up.

SERIES



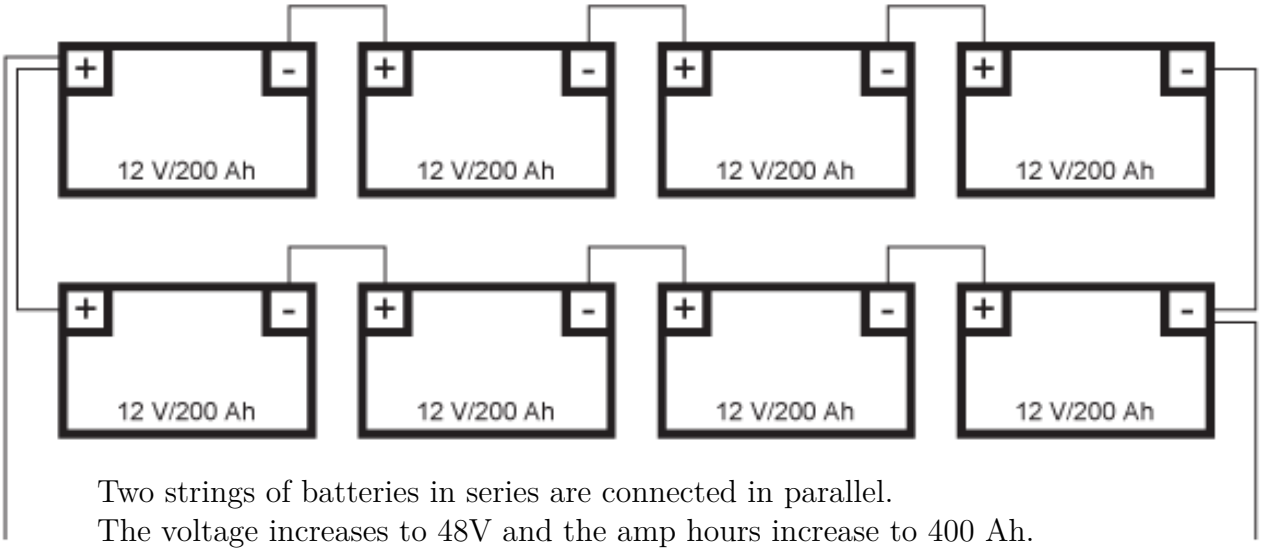
Voltage: 12V + 12V + 12V + 12V = 48V; Amp Hours remain at 200

PARALLEL



Voltage remains at 12V; Ah: 200 Ah + 200 Ah + 200 Ah + 200 Ah = 800 Ah

SERIES/PARALLEL



Two strings of batteries in series are connected in parallel.
The voltage increases to 48V and the amp hours increase to 400 Ah.

6 Functional diagrams of charger/MPPT-solar charge controller

The inverter is able to charge batteries and supply consumer devices with electricity when shore or solar power is available as below:

Device switched on in ECO Mode (pure inverter mode):

- ☞ Only solar power is used to charge the batteries.
- ☞ Only solar power is used to supply the 230V consumers (inverter function witch MPPT-solar charge controller).
- ☞ If solar power is not available, 230V consumers are supplied from the battery (inverter function).

Device switched on in UPS mode (uninterruptible power supply):

- ☞ Solar power is primarily used to charge the batteries.
- ☞ Shore power is primarily used to supply 230V consumers(by-pass function).
- ☞ If solar power is disconnected, the system switches from solar to AC charging via shore power after approx. 30 seconds if battery needs charging.
- ☞ If shore power is not available, 230V consumers are supplied from the battery (inverter function).

Device switched off:

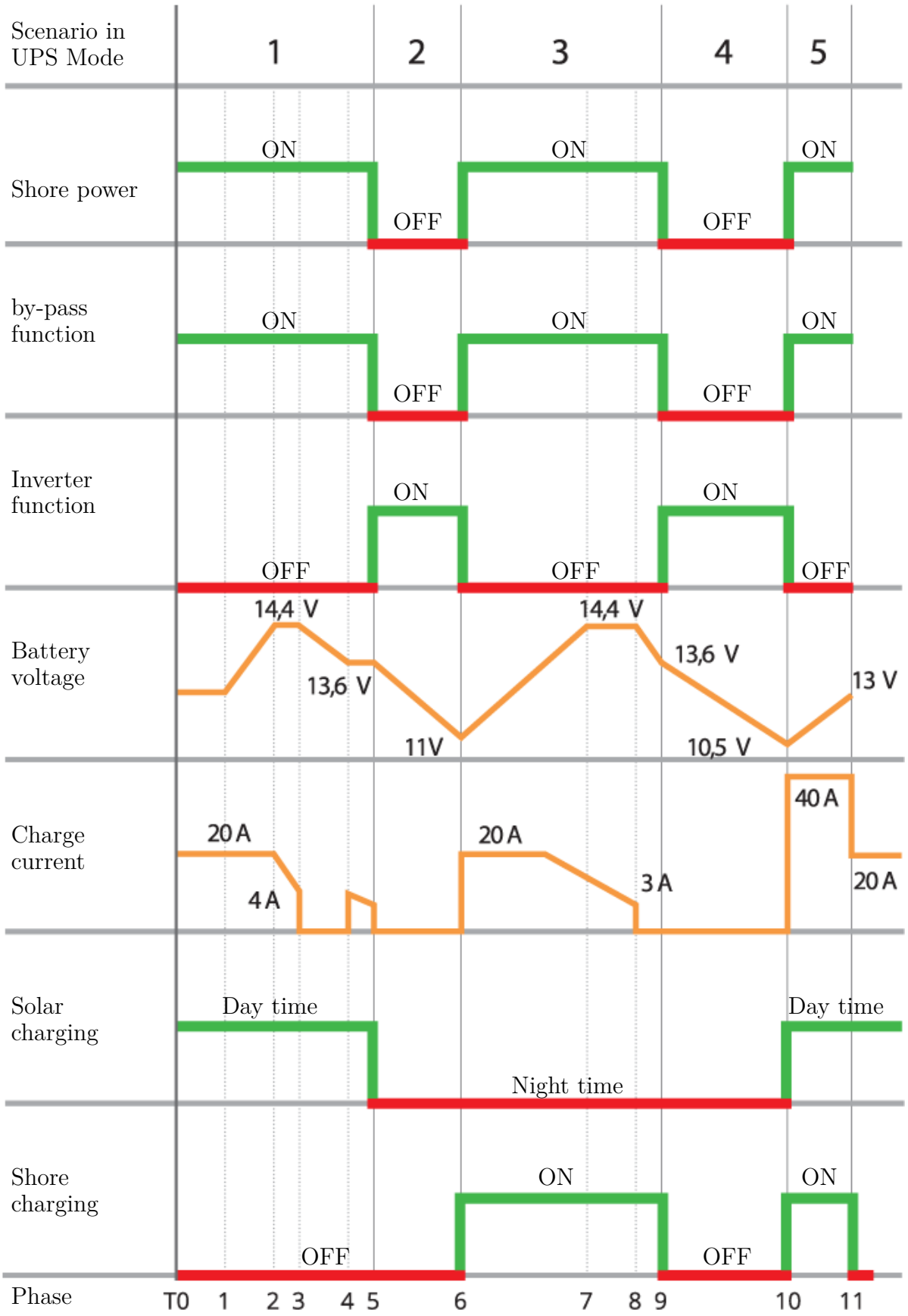
- ☞ Simultaneous charging with solar and shore power possible (like scenario 5, see section **UPS Mode**)
- ☞ Shore power can be used to supply the 230V consumers (by-pass function).
- ☞ Battery is not used to supply 230V consumers.

Explanation of charging phases **IB-INV-CSI** and **IB-INV-SSI** series. All voltage values refer to 12V. For 24V double value. For 48V 4x value. The voltage tolerance is ±0.2V.

The integrated charger as well as the MPPT-solar charge controller of the **IB-INV-SSI** charge battery automatically with a 3-step IUoU charge characteristic which is described below.

- ☞ **Bulk (main charge)**: The battery is charged with permanent current and carefully rising voltage until a predefined maximum voltage and until a stage of charging of 80% is reached.
- ☞ **Absorption (remaining charge)**: The battery is charged with permanent current and gradual decreasing current from 80% to 100% capacity. The gradual decreasing current ensures that the terminal voltage does not become too high during the complete charging process.
- ☞ **FLOAT (charge maintenance)**: The battery status remains permanently at 13,6V without overcharging or damaging the battery. The voltage is permanently controlled in this mode. If the voltage decreases to a predefined level, the battery is charged through a pulse charge until reaching again 100%, so the charge status remains permanently between 95% and 100%. This charging-cycle is repeated appropriately and influences the lifetime of the battery in a positive way.

Stage	**Current**	**Voltage**	**Capacity**
Bulk	100%	increasing up to ca. 14,4V	up to 80%
Absorption	decreasing	increasing from 14,4V	80% to 100%
Float	below 20%	13,6V	95% to 100%


Scenario in UPS Mode
1
2
3
4
5
Shore power
ON
OFF
ON
OFF
ON
by-pass function
ON
OFF
ON
OFF
ON
Inverter function
OFF
ON
OFF
ON
OFF
Battery voltage
14,4 V
13,6 V
11V
14,4 V
13,6 V
10,5 V
13 V
Charge current
20 A
4 A
20 A
3 A
40 A
20 A
Solar charging
Day time
Night time
Day time
Shore charging
OFF
ON
OFF
ON
Phase
T0
1
2
3
4
5
6
7
8
9
10
11

If the inverter is switched off, the batteries will be charged by shore power or solar power.

ECO mode:

If the inverter ECO function is activated, the batteries will not be charged by shore power.

UPS Mode:

Scenario 1: Shore power available during daytime

T0 – T5: (by-pass function)

If shore power is available, the by-pass function starts automatically, the inverter function is deactivated and all devices are supplied with shore power. As long as the battery voltage is >11V the shore charger remains deactivated in this phase.

The solar power charges the batteries with a IUoU charging characteristic (max. 14,4V) and remains afterwards at a maintenance-charge voltage of 13,6V.

Scenario 2: Shore power fails at night

T5 – T6: (UPS function/inverter function)

If there is no shore power and no solar power is available the device switches automatically from by-pass function into inverter function. Consumer devices will be supplied from battery. Battery will be discharged until 11V.

Scenario 3: Shore power returns at night

T6 – T9: (charging with shore charger)

As soon as shore power is available, the device switches immediately to by-pass function and the batteries are charged by the shore charger.

Scenario 4: Shore power fails a second time at night

T9 – T10: (deep discharge of batteries in emergencies)

If the shore power connection is disconnected a second time and there is no solar power available (at night for example) and the device switches into inverter function, the batteries are discharged to minimal voltage 10,5V and then disconnected.

Scenario 5: Simultaneous charging

T10 – T11: (simultaneous charging after deep discharge of batteries)

If deep discharge of batteries has occurred the batteries are charged via solar and shore power to charge battery as soon as possible, until a voltage of 13V is reached. Afterwards the batteries are charged with solar power only.

7 Safety features

The inverter is equipped with several safety features to protect the inverter and all its components as for example the batteries.

The inverter is equipped with a thermic and electronic over-/undervoltage protection. If the required values are exceeded or not reached, the device disconnects the AC output (consumer devices supply). After such an event, the inverter must be restarted by switching it off and then on again via the

ON/OFF switch.

Caution! The device remains switched on when the AC output is disconnected. There is a risk of deep discharge of connected batteries due to the power consumption of this standby mode.

The inverter disconnects the AC output in the following cases:

- internal temperature too high
- output load too high
- input voltage too high or too low

Reason	Type/Value	Action
Risk of undervoltage.	12V: 10,8V±0,2V 24V: 21,6V±0,4V 48V: 43,2V±0,8V	2x acoustic signal, red LED flashing, inverter still working.
Total undervoltage.	12V: 10,2V±0,2V 24V: 20,4V±0,4V 48V: 40,8V±0,8V	3x acoustic signal, red LED flashing, automatic inverter shutdown.
Overvoltage.	12V: 15,5V±0,2V 24V: 31,0V±0,4V 48V: 62,0V±0,8V	4x acoustic signal, red LED flashing, automatic inverter shutdown.
Overheating.	Internal temperature >75°C.	5x acoustic signal, red LED flashing, automatic inverter shutdown.
Overload due to powerful consumers.	Regardless of the type.	Constant acoustic signal, red LED flashing, automatic inverter shutdown.
Short circuit of consumers.	Regardless of the type.	11x acoustic signal, red LED on, automatic inverter shutdown.
Polarity reversal.	IB-INV-CSI-3	Via fuse: the fuse blows.
Polarity reversal.	Remaining models.	Via MOSFET: MOSFET cutoff.
Undervoltage ECO mode.	12V: 11V±0,2V 24V: 22V±0,4V 48V: 44V±0,8V	Shift to mains priority circuit.

Caution! Damages caused by polarity reversal and short circuits are excluded from liability.

8 Self error correction

Symptom	Possible cause	Solution
Inverter switched on. Status LED does not flash. No acoustic signal. No output voltage.	No input voltage.	1. Check battery voltage. 2. Check input fuse. 3. Check all connections to battery.
	Blown fuse due to polarity reversal. Caution: polarity reversal can damage the inverter despite a fuse.	Exchange blown fuses and connect cables correctly. If inverter does not work after exchange, it's broken. Please contact the support.
Acoustic signal sounds once.	1. Connection to consumers cut off. 2. Short circuit of consumers.	1. Check connection. 2. Check if short circuit.
Acoustic signal sounds 2x and red LED flashes.	Risk of undervoltage.	1. Check charging status of battery, charge if necessary. 2. Check compatibility of battery cable, use higher cross section if necessary. 3. Check if conductive parts (cables, pole terminals, lugs) are damaged.
Acoustic signal sounds 3x and red LED flashes.	Total undervoltage.	As above.
Acoustic signal sounds 4x and red LED flashes.	Input voltage too high.	1. Check input voltage. 2. Check charging voltage of battery charger. 3. Check if there are unwanted voltage sources.
Acoustic signal sounds 5x and red LED flashes.	Inverter overheated.	1. Check ventilation fan, if damaged, contact support. 2. Check if ventilation slits are free. 3. Check if ambient air is cool enough. 4. Reduce power.
Red LED flashes permanently.	Maximum short-term power reached.	1. Switch off inverter. 2. Reduce power. 3. Cool down inverter.
Charger does not work.	Parameters of input voltage are outside of tolerance.	Check voltage and frequency of input source.
Charger only supplies low current.	Low input voltage. One or several batteries are not connected / defect.	Use the right AC voltage. Check all connections.

Make sure that error sources are eliminated. Multiple restarts due to unsolved errors can destroy the inverter.

Especially prevent short circuits and polarity reversals because they can destroy the device despite protection.

9 Warranty terms and conditions

- Warranty is for a period of 24 months from the date of purchase of goods.
- Defects revealed during the warranty period shall be repaired within 21 working days, counting from the date of taking the equipment to the service.
- If it is necessary to import goods or parts from abroad, repair time is extended by the time necessary to import them.
- The customer delivers and collects the goods to the service at his own expense. Goods sent at the expense of the service will not be accepted.
- Service is not obligated to provide the purchaser with replacement goods for the duration of the repair.
- Repair under warranty will be made upon presentation of a clearly described defect, customer contact information and sales document.
- Warranty covers only defects caused by reasons inherent in the product sold. The warranty does not cover damages caused by external factors such as: mechanical damage, contamination, flooding, atmospheric phenomena, improper installation or operation, as well as operation inconsistent with the intended use and operating instructions. The warranty does not apply if the customer makes unauthorized repairs, changes to the firmware or formatting the device.
- Due to natural wear and tear of consumables, some of them are not covered by the warranty (e.g. cables, batteries, chargers, micro-contacts, buttons, etc.).
- In case of an unjustified claim for warranty repair, the costs of sending the equipment to and from the service shall be borne by the Customer.
- The service centre has the right to refuse warranty repair in case of: finding inconsistencies between the data in the documents and on the equipment, making repairs on their own, changes in equipment design.
- Refusal to perform warranty repair is equivalent to loss of warranty.