

# ABB Solar inverters

## Quick Installation Guide

### UNO-2.0/2.5-I-OUTD

EN



In addition to what is explained below, the safety and installation information provided in the installation manual must be read and followed. The technical documentation and the interface and management software for the product are available at the website. The device must be used in the manner described in the manual. If this is not the case the safety devices guaranteed by the inverter might be ineffective.

Power and productivity for a better world™ **ABB**

#### Installation position

- Install on a wall or strong structure suitable for bearing the weight
- Install in safe, easy to reach places
- If possible, install at eye-level so that the display and status LEDs can be seen easily
- Install at a height that considers the heaviness of the equipment
- Install vertically with a maximum inclination of +/- 5°
- To carry out maintenance of the hardware and software of the equipment, remove the covers on the front. Check that there are the correct safety distances for the installation that will allow the normal control and maintenance operations to be carried out
- Comply with the indicated minimum distances
- For a multiple installation, position the inverters side by side
- If the space available does not allow this arrangement, position the inverters in a staggered arrangement as shown in the figure so that heat dissipation is not affected by other inverters

**Final installation of the inverter must not compromise access to any disconnection devices that may be located externally. Please refer to the warranty terms and conditions available on the website and evaluate any possible exclusion due to improper installation.**

#### LEDs and BUTTONS, in various combinations, can be used to view the status or carry out complex actions that are described more fully in the manual.

<b>POWER LED</b>	<b>GREEN</b> On if the inverter is working correctly. Flashes when checking the grid or if there is insufficient sunlight.	<b>ESC</b>	It is used to access the main menu, to go back to the previous menu or to go back to the previous digit to be edited.
<b>ALARM LED</b>	<b>YELLOW</b> The inverter has detected an anomaly. The anomaly is shown on the display.	<b>UP</b>	It is used to scroll up the menu options or to shift the numerical scale in ascending order.
<b>GFI LED</b>	<b>RED</b> Ground fault on the DC side of the PV generator. The error is shown on the display.	<b>DOWN</b>	It is used to scroll down the menu options or to shift the numerical scale in descending order.
		<b>ENTER</b>	It can be used to confirm an action, to access the submenu for the selected option (indicated by the > symbol) or to switch to the next digit to be edited.

The operating parameters of the equipment are displayed through the display (12): warnings, alarms, channels, voltages, etc. Description of symbols and display fields.

b1 RS485 data transmission	b13 Daily energy produced
b2 RS485 line present	b14 PV voltage > Vstart
b3 Radio line present	b15 DC voltage value
b4 Bluetooth line present (*)	b16 DC current value
b5 WiFi line present (*)	b17 DC/DC circuit part
b6 Warning	b18 DC/AC circuit part
b7 Temperature derating	b19 AC voltage value
b8 Instantaneous power	b20 AC current value
b9 MPP scan running	b21 Connection to the grid
b10 Graphic display	b22 Grid status
b11 Power graph	b23 Cyclic view on/off
b12 Total energy	(*) NOT available

#### Transport and handling

Transport of the equipment, especially by road, must be carried out with by suitable ways and means for protecting the components from violent shocks, humidity, vibration, etc.

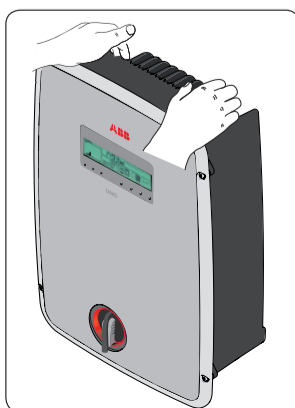
#### Lifting

The means used for lifting must be suitable to bear the weight of the equipment.

#### Unpacking and checking

The components of the packaging must be disposed on in accordance with the regulations in force in the country of installation. When you open the package, check that the equipment is undamaged and make sure all the components are present. If you find any defects or damage, stop unpacking and consult the carrier, and also promptly inform the Service ABB.

Model	Mass weight	Lifting points n°
UNO-2.0-I-OUTD	17 Kg	2
UNO-2.0-I-OUTD-S		



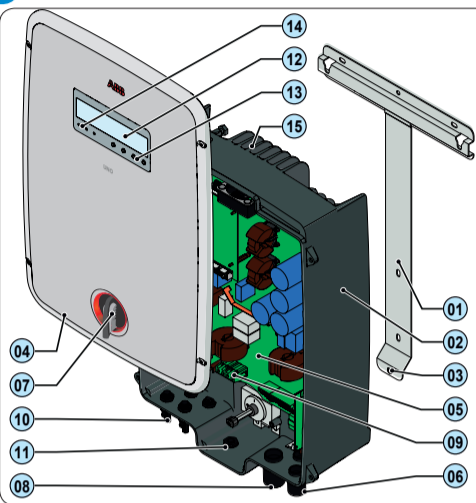
The labels on the inverter have the Agency marking, main technical data and identification of the equipment and manufacturer

UNO-2.5-I-OUTD-X	UNO-2.0-I-OUTD-S
www.abb.com/solar SOLAR INVERTER MODEL: UNO-2.5-I-OUTD-X V <sub>in</sub> max: 520 V V <sub>in</sub> range: 90 - 520 V V <sub>in</sub> full Power: 200 - 470 V I <sub>in</sub> max: 12.8 A I <sub>in</sub> range: 1.5 A V <sub>out</sub> : 230 V 1Ø f: 50 Hz P <sub>out</sub> (max): 2500 W @ 45°C amb. I <sub>out</sub> max: 12.5 A	www.abb.com/solar SOLAR INVERTER MODEL: UNO-2.0-I-OUTD-S V <sub>in</sub> max: 520 V V <sub>in</sub> range: 90 - 520 V V <sub>in</sub> full Power: 200 - 470 V I <sub>in</sub> max: 12.5 A I <sub>in</sub> range: 1.5 A V <sub>out</sub> : 230 V 1Ø f: 50 Hz P <sub>out</sub> (max): 2000 W @ 50°C amb. I <sub>out</sub> max: 10.5 A

The labels attached to the equipment must NOT be removed, damaged, dirtied, hidden, etc... If the service password is requested, the field to be used is the serial number -SN: YYYWSSSSSS-

In the manual and/or in some cases on the equipment, the danger or hazard zones are indicated with signs, labels, symbols or icons.


## Inverter Models and Components



The models of inverter to which this guide refers are available in 2 power ratings: 2.0 kW / 2.5 kW. For inverters of equal output power the variant between the various models is the presence or lack thereof, of the DC disconnect switch (07).

UNO-2.0-I-OUTD	UNO-2.0-I-OUTD-S
- Number of input channels: 1	- Number of input channels: 1
- DC disconnect switch (07): No	- DC disconnect switch (07): Yes
- Input connectors: quick fit connectors (2 pairs)	- Input connectors: quick fit connectors (2 pairs)

UNO-2.5-I-OUTD	UNO-2.5-I-OUTD-S
- Number of input channels: 1	- Number of input channels: 1
- DC disconnect switch (07): No	- DC disconnect switch (07): Yes
- Input connectors: quick fit connectors (2 pairs)	- Input connectors: quick fit connectors (2 pairs)

#### Main components

01 Bracket	09 AC output screw terminal block
02 Inverter	10 DC input connectors
03 Locking screw	11 Anticondensation valve
04 Front cover	12 Display
05 Main board	13 Keypad
06 Service cable glands	14 LED panel
07 DC disconnect switch	15 Heat sink
08 AC cable gland	

## Choice of installation location

#### Environmental checks

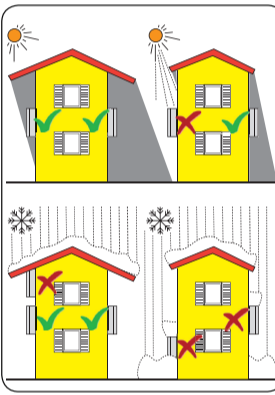
- Consult the technical data to check the environmental parameters to be observed
- Installation of the unit in a location exposed to direct sunlight must be avoided as it may cause:
  1. power limitation phenomena in the inverter (with a resulting decreased energy production by the system)
  2. premature wear of the electrical/electromechanical components
  3. premature wear of the mechanical components (gaskets) and of the user interface (display)
- Do not install in small closed rooms where air cannot circulate freely
- To avoid overheating, always make sure the flow of air around the inverter is not blocked
- Do not install in places where gases or flammable substances may be present
- Do not install in rooms where people live or where the prolonged presence of people or animals is expected, because of the noise (about 50dB(A) at 1 m) that the inverter makes during operation
- Avoid electromagnetic interference that can compromise the correct operation of electronic equipment, with consequent situations of danger.

#### Installations above 2000 metres

On account of the rarefaction of the air (at high altitudes), particular conditions may occur: Less efficient cooling and therefore a greater likelihood of the device going into derating because of high internal temperatures

- Reduction in the dielectric resistance of the air that, in the presence of high operating voltages (DC input), can create electric arcs (discharges) that can reach the point of damaging the inverter

All installations at altitudes of over 2000 metres must be assessed case by case with the ABB Service department.



## List of supplied components

Components available for all models	Quantity	Components available for all models	Quantity
	2		2 + 2
	2		1
	1		3 + 3
	2		1
	2		1
	1		

## Assembly instruction

#### Standard Version

#### -S Version

#### Wall/Pole mounting

During installation do not place the inverter (02) with the front cover (04) facing towards the ground.

- Position the bracket (01) perfectly level on the wall and use it as a drilling template.
- Drill the 3 holes required using a drill with 10mm bit. The holes must be about 70mm deep.
- On bracket (01) there are 5 fastening holes, but only 3 are used depending on the type of installation: on a pole holes A, on a wall holes B.
- Fix the bracket to the wall with the 3 wall anchors, 10mm in diameter, supplied.
- Hook the inverter to the bracket by inserting the head of the rear screws in the slots as shown in the figure.
- Proceed to anchor the inverter to the bracket by tightening the locking screw (03) located on the lower side.
- Unscrew the 4 screws and open the front cover (04) upwards in order to make all the necessary connections.
- The cover is equipped with fixed hinges and cannot be removed.
- Once the connections have been made proceed to closing the cover by tightening the 4 screws on the front to the torque indicated in the specifications.
- Remove the protective film located on the front.

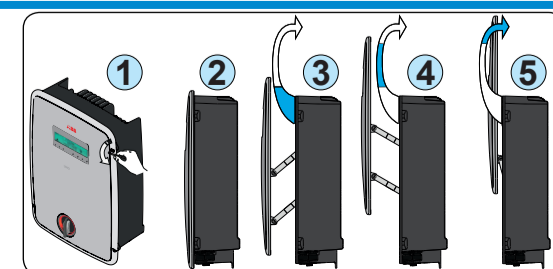
#### Main Components

01 Bracket	09 AC output screw terminal block
02 Inverter	10 DC input connectors
03 Locking screw	11 Anticondensation valve
04 Front cover	12 Display
05 Main board	13 Keypad
06 Service cable glands	14 LED panel
07 DC disconnect switch	15 Heat sink
08 AC cable gland	

## Opening the cover

Opening the front cover is assisted by 2 hinges on both the inner sides of the inverter, and it can be carried out with ease following the procedure described below:

- Slacken the 4 screws fastening the front cover (04) (step 1)
- Open the cover by pulling it toward you and then pushing it upwards on both sides (steps 2 and 3).
- Lock the cover in place by pushing it forwards (steps 4 and 5)



All versions of the inverter are fitted with a single input channel. It is possible to configure grounding of the input poles:
1. Negative pole to ground 2. Positive pole to ground 3. Neither pole connected to ground (floating)

Grounding configuration of the DC inputs

The grounding of the inputs is negative configuration by default. For the correct operation, some photovoltaic panels require the connection of the potential of the positive terminal to the earth terminal, or to have both of the input poles floating in regards to ground potential.

The configuration of the grounding of the inputs must be done before any connections or testing takes place. No pole of the array can have earthing connection points located outside the inverter.

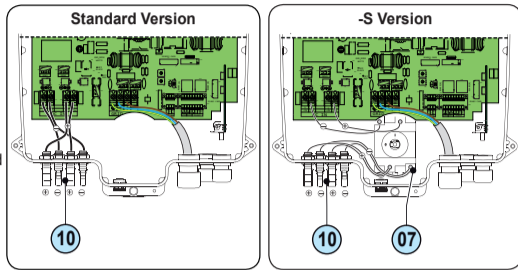
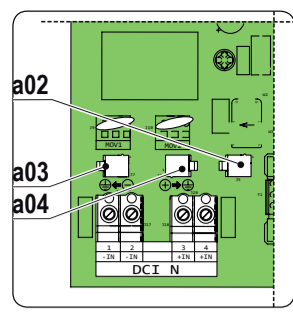
Check for correct polarity in the input strings and absence of any leakage to ground in the PV generator. When exposed to sunlight, the PV panels supply DC direct voltage to the inverter.

For the string connections it is necessary to use the quick fit connectors (multicon-tact or weidmüller) located on the bottom of the mechanic.

The maximum numbers of input strings which can be connected is 2.

Connect all the strings included in the design of the system and always check the tightness of the connectors. If some of the string inputs should not be used you must proceed to verify the presence of covers on DC input connectors.

The two pairs of DC input connectors are internally related to a single input channel, so there are no preferences on the connectors to be used in the case of installation of a single string.



Load protection breaker (AC disconnect switch) and line cable sizing

To protect the AC connection line of the inverter, we recommend installing a device for protection against over current and leakage with the following characteristics:

Table with 2 columns: UNO-2.0-I-OUTD and UNO-2.5-I-OUTD. Rows include Type, Voltage/Current rating, Magnetic protection characteristic, Number of poles, Type of differential protection, and Differential sensitivity.

ABB declares that the ABB high-frequency isolated inverters, in terms of their construction, do not inject continuous ground fault currents and therefore there is no requirement that the differential protection installed downstream of the inverter be type B in accordance with IEC 60755 / A.2.

Characteristics and sizing of the line cable

Three-pole cable required. The cross-section of the AC line conductor must be sized in order to prevent unwanted disconnections of the inverter from the grid due to high impedance of the line that connects the inverter to the power supply point

Table showing cross-section of the line conductor (mm²) and maximum length of the line conductor (m) for UNO-2.0-I-OUTD and UNO-2.5-I-OUTD models.

The values are calculated in nominal power conditions, taking into account: 1. a power loss of not more than 1% along the line. 2. copper cable, with HEPR insulation gum, laid in free air

For the connection to the inverter grid you need 3 connections: ground, neutral and phase.

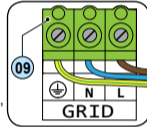
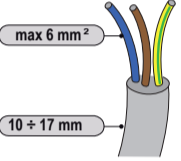
The ground connection to the inverter is obligatory. To prevent electrocution hazards, all the connection operations must be carried out with the disconnect switch downstream of the inverter (grid side) open and locked.

For all models you connect the AC output screw terminal block by passing the cables through the AC cable gland.

Unscrew the AC cable gland, remove the cover, insert the cable of suitable cross-section and connect the conductors (Ground, Neutral, and Phase) to the terminals on the AC output screw terminal block.

Pay special attention and ensure you do not reverse the phase with the neutral! Once the connection to the terminal board is complete, screw in the cable gland firmly (tightening torque 5.0Nm) and check the tightness.

Before connecting the inverter to the distribution grid it is necessary to set the country standard by manipulating the two rotary switches a09.



The inverter commissioning procedure is as follows:

- Turn the AC+DC disconnect switch to the ON position
- If there are two separate external disconnect switches (one for DC and the other for AC), first close the AC disconnect switch and then the DC disconnect switch.

- When the inverter has power, the first check performed is the one relating to the input voltage:
1. If the DC input voltage is lower than the Vstart voltage (voltage required to begin the inverter's grid connection) the b14 icon remains off and the "Waiting sun" message is displayed b10.

- The inverter performs a control of grid parameters. The b22 icon, which represents the grid distribution, can have different statuses:
3. not present, if the mains voltage results as absent.

If the input voltage and the grid voltage are within the inverter operating intervals, connection to the grid will commence. After the inverter is connected, the icons on the whole line b21 will come on steady.

Once the connection sequence has been completed, the inverter starts to operate and indicates its correct operation by making a sound and by the green LED coming on steady on the LED panel.

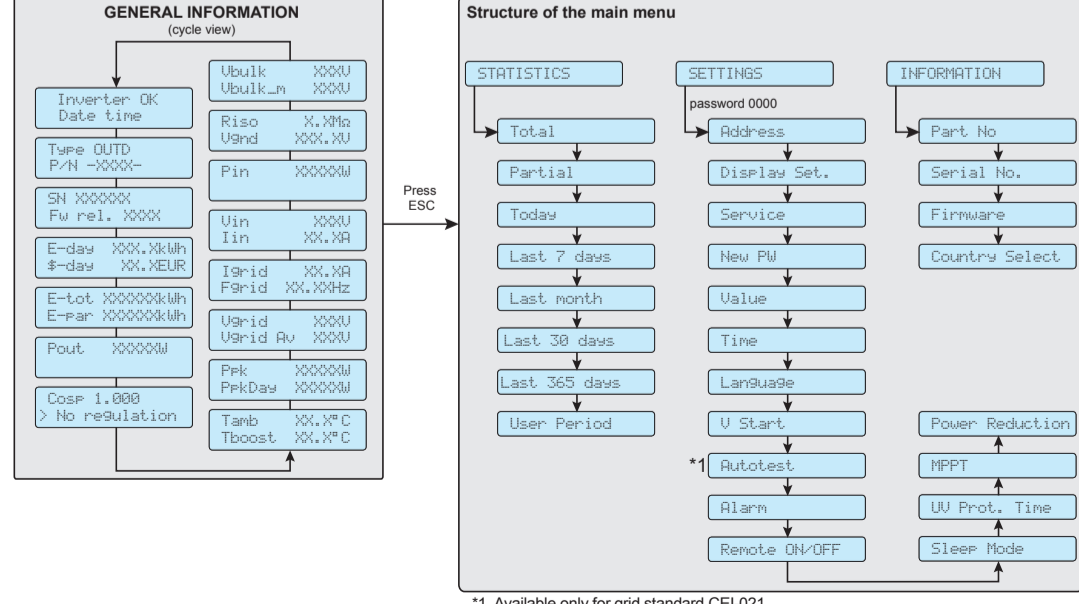
If the inverter signals any errors/warnings the messages and their codes will be indicated on the display. This state will also cause switching of the multi-function relay (set to alarm mode in the menu SETTINGS>Alarm) which activates any external signalling device that may be connected.

The display has a section b10 (graphic display) for moving through the menu using the buttons of the LED panel. Section b10 consists of 2 lines with 16 characters per line: Viewing of the GENERAL INFORMATION is cyclic. This information relates to the input and output parameters and the inverter identification parameters.

Press ESC to access the three main menus, which have the following functions:

- STATISTICS>Displays the statistics;
• SETTINGS>Modify the settings of the inverter
• INFO>View service messages for the operator

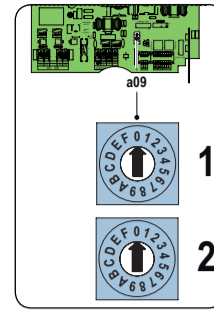
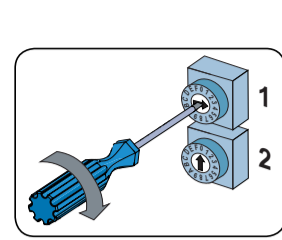
Refer to the manual for details regarding use and functions available in the menu



Before connecting the inverter to the distribution grid it is necessary to set the country standard by manipulating the two rotary switches a09: Table: country standard and language

Table with 4 columns: Switch 1, Switch 2, Country Grid Standard (name displayed), and Display language. Lists various country standards like CEI-021, GERMANY, UL1741, etc.

Table with 4 columns: Switch 1, Switch 2, Country Grid Standard (name displayed), and Display language. Lists standards like CEI-021 @ 230V EXTERNAL Protection, SOUTH AFRICA, etc.



The settings become fixed after 24 hours of operation of the inverter ((the PV generator simply has to be under power)). The standard for the Italian grid which must be set during installation is 1-9 (CEI-021 @ 400V INTERNAL Protection)

Connections of the signals to the main board

Each cable which must be connected to the connectors of the communication and control signals must pass through the two service cable glands (shown in the picture). The available cable glands are two M20s that can take a cable with a diameter of 7 mm to 13 mm.

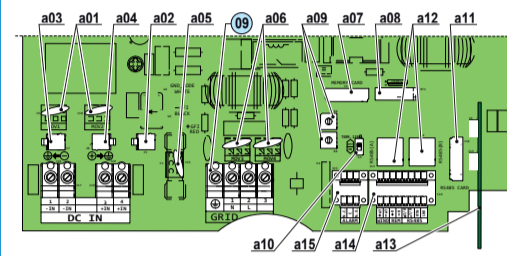
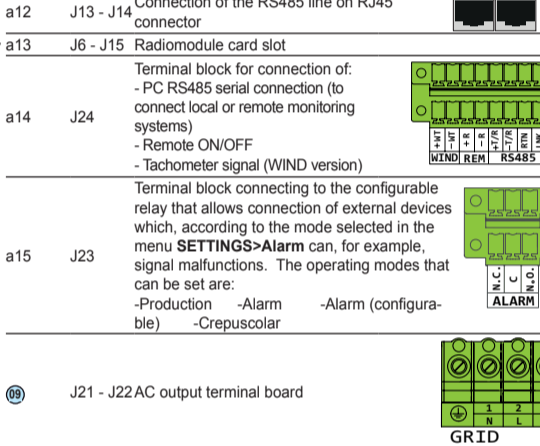
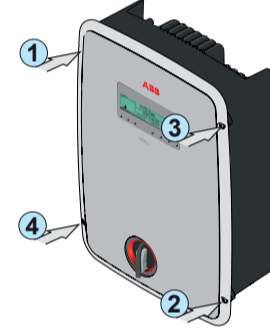


Table with 3 columns: Ref. manual, Ref. inverter, and Description. Lists components like Input variators, Connector for floating ground, Connector for negative grounding, etc.

Please refer to the manual for details of the connections and functions available on the main board

When you have finished connecting and configuring the inverter you must close the front cover (tightening torque 2.2Nm), inserting the screws in the order shown



Large table containing technical specifications for UNO-2.0-I-OUTD and UNO-2.5-I-OUTD models, including input/output voltages, power ratings, efficiency, and environmental conditions.

Contact us

www.abb.com/solarinverters

UNO-2.0\_2.5-TL-OUTD-Quick Installation Guide EN-RevC EFFECTIVE 2014-03-07 © Copyright 2014 ABB. All Rights Reserved. Specifications subject to change without notice.